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**rollNW**

**unknown**

**May 19, 2024**



# GETTING STARTED

<b>1</b>	<b>features</b>	<b>3</b>
<b>2</b>	<b>goals</b>	<b>5</b>
<b>3</b>	<b>quickstart - Open VS Code in your Browser</b>	<b>7</b>
<b>4</b>	<b>History</b>	<b>9</b>
<b>5</b>	<b>Moonshots</b>	<b>11</b>
<b>6</b>	<b>Credits</b>	<b>13</b>
	<b>Python Module Index</b>	<b>395</b>
	<b>Index</b>	<b>397</b>



rollNW is an homage to Neverwinter Nights in C++ and Python.

See the [docs](#) and [tests](#) for more info, or open an IDE in browser in the quickstart section below.

**This library is a work-in-progress. There will be serious refactoring and until there is a real release, it should be assumed the library is in flux.**

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## FEATURES

- The beginnings of a novel [Rules System](#) designed for easily adding, overriding, expanding, or removing any rule and reasonable performance
  - A [combat engine](#) that's very nearing being able to simulate melee battles.
  - Objects (i.e. Creatures, Waypoints, etc) are implemented at a toolset level. Or in other words their features cover blueprints, area instances, with support for effects and item properties. They are still missing some new EE things. Player Characters are read only, for now.
  - A recursive decent [NWScript Parser](#)
  - Implementations of pretty much every [NWN File Format](#)
  - An binary and ASCII [Model Parser](#). See also the [mudl](#) model viewer side project.
  - A Resource Manager that can load all NWN containers (e.g. erf, key, nwsync) and also Zip files.
  - An implementation of NWN's [Localization System](#) focused on utf8 everywhere.
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## GOALS

- aims to implement an RPG engine inspired by NWN, excluding graphics and networking.
  - focuses on usage, instead of doing things the Aurora Engine Way.
  - follows [utf8 everywhere](#).
  - hews as close to [C++ Core Guidelines](#) as possible.
  - aims to be as easily bindable as possible to other languages. I.e. only library specific or STL types at API boundaries.
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## QUICKSTART - OPEN VS CODE IN YOUR BROWSER

[Github Codespaces](#) is available to those in the beta.

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## HISTORY

A lot of what's here was written in the 2011-2015 range as part of personal minimalist toolset, modernized and with new EE stuff added. In some sense, it's a work of historical fiction - it's what I'd have suggested at the start of NWN:EE: get the game and the community on the same set of libraries. Similarly to an older project that asked "[what if Bioware had stuck with Lua?](#)". The answer to that was pretty positive: a decade ahead, at least, of nwscript.

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## **MOONSHOTS**

You make ask yourself, why? But, to paraphrase Tennyson, ours isn't to question why, it's but to do and die and learn and maybe make neat things. In that spirit, here is a list of crazy projects that this library hopes to facilitate and that all fly in the face of "WHY?".

- A nwscript [Language Server](#)
  - A modern, cross-platform nwexplorer.
  - And, of course, the ever elusive open source NWN Toolset, with plugins, scripting, and a built-in console.
-





## CREDITS

- [Bioware](#), [Beamdog](#) - The game itself
- [abseil](#) - Foundational
- [Catch2](#) - Testing
- [glm](#) - Mathematics
- [loguru](#), [fmt](#) - Logging
- [stbi\\_image](#), [NWNEexplorer](#), [SOIL2](#) - Image/Texture loading.
- [inih](#) - INI, SET parsing
- [nholmann\\_json](#) - JSON
- [toml++](#) - For settings.toml
- [libiconv](#), [boost::nowide](#) - i18n, string conversion
- [doxygen](#), [sphinx](#), [breathe](#) - documentation

## 6.1 building

rollnw uses cmake as its build system and more specifically [CMakePresets.json](#).

To build the library, all one needs to do is use the following cmake commands. This example also builds tests which are not enabled by default.

linux

macOS

windows

```
$ cd path/to/rollnw
$ cmake --preset linux -DROLLNW_BUILD_TESTS=ON
$ cmake --build --preset default
$ ctest --preset default
```

---

**Note:** The deployment target is currently set to 12.

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```
$ cd path/to/rollnw
$ cmake --preset macos -DROLLNW_BUILD_TESTS=ON
$ cmake --build --preset default
$ ctest --preset default
```

The main windows builds are for Visual Studio 2022 (Community Edition), but mingw-64, later versions of Visual Studio will added.

For now it's probably easiest to open the x64 Visual Studio Developer Command Prompt. If you have ninja installed, it's highly recommended to use the windows-ninja configuration preset.

```
$ cd path/to/rollnw
$ cmake --preset windows -DROLLNW_BUILD_TESTS=ON
$ cmake --build --preset default
$ ctest --preset default
```

**In order to run all of the tests, you can help the library locate Neverwinter Nights installation** paths by exporting the following ENV vars, if your install is in a non-standard location:

Linux / MacOS

Windows

```
$ export NWN_ROOT=path/to/game
$ export NWN_USER=path/to/nwn-user-dir
```

```
set NWN_ROOT=path\to\game
set NWN_USER=path\to\nwn-user-dir
```

## 6.2 using

While the library is far from done, basic usage would be as follows.

Python

C++

```
pip install rollnw
```

```
import rollnw

rollnw.kernel.start()
mod = rollnw.kernel.load_module("mymodule.mod")
for area in mod:
    # Do neat things
```

```
#include <nw/kernel/Kernel.hpp>
#include <nw/log.hpp>

int main(int argc, char* argv[])
{
    // Initialize logger
    nw::init_logger(argc, argv);
```

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```

    // Say this application is specific to 1.69.
    // This must be set before the initialize call below. The default is NWN:EE, so in
↳ that case,
    // ``set_version`` need not be called.. NOTE: THIS also controls which profile is
↳ loaded..
    nw::kernel::config().set_version(GameVersion::v1_69);

    // Sets config for the system, paths, version, etc.
    nw::kernel::config().initialize();

    // Initializes all systems
    nw::kernel::services().start();

    auto mod = nw::kernel::load_module("path/to/modules/your_module.mod");

    // Do neat stuff

    nw::kernel::unload_module();

    return 0;
}

```

## 6.3 differences

### 6.3.1 Changed

1. All resource names (i.e. resrefs, extensions) and resource paths are coerced to lower-case. On macOS, Windows, this generally makes no difference. On Linux, converting filenames, paths, etc, to lower-case has always been the best policy.

### 6.3.2 Unsupported

1. NWN(:EE or 2) configuration files for a couple reasons:
  - NWN:EE introduced a lot of needless complexity with `settings.tml` and it wasn't a particularly good choice to begin with.
  - If values are necessary they can be read first by some consumer of the library.
2. The concept of path aliases, i.e. "HAK:", "HD0:", etc.

## 6.4 formats

One thing that makes NWN(:EE) so great is that it's a local optima of power and simplicity. It's file formats are no different many of them - at the reader level - can be implemented as a thin wrapper over a handful of casts.

Where necessary the reading will be implemented separately from the writing and likewise from the 'rithmetic, unless it doesn't affect the usage or performance characteristics of one or the other. E.g. `tlk` can easily be made read/write/modifiable with the exact same performance characteristics, `Gff` cannot. It's better to separate them than convolute the implementations of all of them.

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### 6.4.1 2da

**Status:** read/write

The 2da parser is one of the more optimized parts of the library. It can parse ~300MBps and all default 2das in under half of a second.

**Example - Load a TwoDA:**

Python

C++

```
#!/usr/bin/env python

from rollnw import TwoDA
import os

for f in os.listdir():
    if os.path.isfile(f) and os.path.splitext(f)[1].lower() == '.2da':
        tda = TwoDA(f)
        if not tda.valid():
            print(f"failed parsing: {f}")
            continue
        print(tda[0][0])
```

```
nw::TwoDA feat("feat.2da");
if(feat.is_valid()) {
    std::cout << fmt::format("feat.2da has {} rows", feat.rows()) << "\n";
    std::cout << *feat.get<std::string_view>(4, 0) << "\n";
    std::cout << *feat.get<int32_t>(0, "FEAT") << "\n";
}
```

## 6.4.2 gff

See [serialization docs](#)

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## 6.4.3 images formats

**Status:**

- bmp: read/write
- dds (standard): read/write
- dds (bioware): read/write
- jpg: read/write
- gif: read/write
- plt: unsupported
- png: read/write
- tga: read/write

The library can do conversions between image formats and can do anything that stbi\_image can, however, this has no goal of being any kind of useful conversion library.

bmp, gif, jpg, png, tga are supported thanks to [stbi\\_image](#). dds (standard & bioware) is supported thanks to [SOIL2](#).

Python

C++

```
from rollnw import Image
img = Image("my_texture.dds") # Can be Bioware DDS or standard
img.write_to("my_texture.png")
```

```
// TODO
```

---

## 6.4.4 ini

**Status:** read

Supported thanks to [inih](#)

Python

C++

```
from rollnw import Ini
ini = Ini("userpatch.ini")
if ini.get_str("Patch/PatchFile000"):
    # User has patch files defined
    pass
```

```
// TODO
```

---

### 6.4.5 json

**Status:** read/write

Supported thanks to [nholmann\\_json](#)

---

### 6.4.6 mdl

See [model docs](#)

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### 6.4.7 mtr

**Status:** unsupported

Python

C++

```
# TODO
```

```
// TODO
```

---

### 6.4.8 set

**Status:** read

Supported thanks to [inih](#)

Python

C++

```
# TODO
```

```
// TODO
```

---

### 6.4.9 ssf

**Status:** unsupported

Python

C++

```
# TODO
```

```
// TODO
```

### 6.4.10 tml

**Status:** read/write (c++), unsupported (python)

Supported thanks to `toml++`.

### 6.4.11 txi

**Status:** unsupported

Python

C++

```
# TODO
```

```
// TODO
```

## 6.5 i18n

The **i18n** module provides support for internationalization, conversions between default NWN encodings and UTF-8 (see below).

### 6.5.1 Philosophy

The module follows the principles of **UTF-8 everywhere**. Or in other words, ordinary C++ string types, `std::string`, `std::string_view`, etc. *must* be in UTF-8. The only exception are:

- wide character types (`std::wstring`, `u16string`, `u32string`, etc) which are never used.
- `std::filesystem::path` which is, per the standard, stored in native encoding. E.g., on Linux, UTF-8; on windows, UCS-2; etc. Some platform specific conversions to UTF-8 are therefore necessary.

There is *no* caching or fixed caching policies at this layer of the library.

## 6.5.2 Neverwinter Nights Languages and Encodings

- English (CP1252)
- French (CP1252)
- German (CP1252)
- Italian (CP1252)
- Spanish (CP1252)
- Polish (CP1250)
- Korean (CP949) - Unsupported by NWN:EE
- Chinese Traditional (CP936) - Unsupported by NWN:EE
- Chinese Simplified (CP950) - Unsupported by NWN:EE
- Japanese (CP932) - Unsupported by NWN:EE

## 6.5.3 kernel service

The *Strings* kernel service provides access to dialog/custom TLKs and localized strings. It also provides a mechanism for interning commonly used strings.

### Example - Intern a String

```
auto str = nw::kernel::strings().intern("This is a Test");
if(str == "This is a Test") {
    // This will occur
}
```

## 6.6 kernel

The `kernel` module provides submodules for handling global resources and services. It's designed around some explicit goals:

- Every service should be easily overrideable to allow for [parallel implementation](#).
- Every service should be decoupled from the kernel itself.
- Any function or object that can modify global state must be contained in this module for easy search/grepability.

### 6.6.1 Services

#### Config

The `Config` service provides access to installation info.



## 6.7 model

As mentioned elsewhere, the goal of this library is not to render graphics, but maybe? Loading NWN models is for the purpose of conversion or in some other asset pipeline.

See the [mudl](#) model viewer side project for work on a NWN model viewer.

### 6.7.1 ASCII Models

Most default NWN models can be parsed without errors.

The parser can parse at about 100mb/s and can read pretty much [all ascii models](#) in ~20s on 2015 MacBook Pro.

### 6.7.2 Binary Models

The beginnings of binary model parsing is in the library. It's hard to tell what's right and what's wrong until there is more rendering experience.

### 6.7.3 Examples

Python

C++

```
#!/usr/bin/env python

from rollnw.model import Mdl
import os

mdl = Mdl.from_file("my_ascii_model.mdl")
if not mdl.valid():
    print(f"failed parsing: {f}")
print(mdl.supermodel_name)
```

```
// TODO
```

## 6.8 objects

rollNW is all about live objects and *not* serialized file formats.

## 6.8.1 definitions

### ObjectID

Unlike NWN an ObjectID does not provide a one-to-one mapping to an object. Rather, it's an index into a structure containing objects.

### ObjectHandle

An object handle maps to a specific object it consists of an ObjectID, the objects type, and an unsigned 16 bit integer indicating the object's version. To be valid, an object handle must match what is in the object array.

### ObjectBase

The base class of all objects

## 6.8.2 kernel service

Any object that is loaded via the Objects service, belongs to the service and must be deleted through it.

### Example - Loading and Deleting a Creature

Python

C++

```
import rollnw

rollnw.kernel.start()
obj = rollnw.kernel.objects().creature('nw_chicken.utc')
rollnw.kernel.objects().destroy(obj.handle())
# After this point accessing obj is undefined behavior and its handle if stored elsewhere
# will no longer be valid
```

```
auto obj = nw::kernel::objects().load<nw::Creature>(fs::path("a/path/to/nw_chicken.utc
↪"));
nw::kernel::objects().destroy(obj->handle());
// After this point accessing obj is undefined behavior and its handle if stored
↪elsewhere
// will no longer be valid
```

---

## 6.8.3 area

## 6.8.4 creature

Python

C++

```
from rollnw import Creature

# The file can also be rollnw JSON format, it doesn't matter.
cre = Creature.from_file("a/path/to/nw_chicken.utc")
if cre.scripts.on_attacked == "nw_c2_default5":
    cre.scripts.on_attacked = "nw_shakenbake"
```

```
// TODO
```

### 6.8.5 door

### 6.8.6 encounter

### 6.8.7 item

### 6.8.8 module

### 6.8.9 placeable

### 6.8.10 sound

### 6.8.11 store

### 6.8.12 trigger

### 6.8.13 waypoint

## 6.9 resources

### 6.9.1 kernel service

The resource services provides access the file system and resources stored in NWN container files. The main goals mostly satisfied: the ability to read all NWN(:EE) containers. The ability to add new container types is limited in utility due to [NWNX:EE](#)'s lack of a ResMan plugin, even so the ability to load files from a Zip file is included.

#### Example - Demanding a resource from resman

Python

C++

```
import rollnw
from rollnw.kernel import resman

rollnw.kernel.start()
assert resman().contains('nw_chicken.utc')
data = resman().demand('nw_chicken.utc')
data2 = resman().demand(rollnw.Resource('nw_chicken', rollnw.ResourceType.utc))
assert data == data2
```

```
nw::kernel::start();
// Assumes that NWN root directory was found.
if (nw::kernel::resman().contains({"nw_chicken"sv, nw::ResourceType::utc})) {
    auto utc = nw::kernel::resman().demand({"nw_chicken"sv, nw::ResourceType::utc});
    // Do something with this chicken.
}
```

## 6.9.2 containers

### Directory

Status: Read, Write (file format dependant)

#### Erf

Status: Read

#### Example - Load an Erf and Print Contents

Python

C++

```
import rollnw

erf = rollnw.Erf("tests/test_data/user/hak/hak_with_description.hak")
print(erf.name(), erf.size())
for rd in erf.all():
    print(rd.name.filename(), rd.size)
```

```
#include <nw/resources/Erf.hpp>
// ...
Erf e("MyModule.mod");
if (e.valid()) {
    std::cout << fmt::format("{} has {} resources", e.name(), e.size()) << "\n";
    for (const auto& rd : e.all()) {
        std::cout << fmt::format("File: {}, Size: {}", rd.name.filename(), rd.size) << "\n";
    }
}
```

#### Key/Bif

Status: Read

#### NWSync

Status: Read

#### Example - Loading and Reading From NWSync Manifest

Python

C++

```
import rollnw

nws = rollnw.NWSync("path/to/nwsync")
if nws.is_loaded():
    # One of the curated modules
```

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```

manifest = nws.get('9a84e512dd3971eb215d6f9b0816a2e3ae2fee54')
if manifest:
    tga = manifest.demand('002metal.tga')
    # Do something with this image..

#include <nw/resources/NWSync.hpp>
#include <nw/kernel/Kernel.hpp>

auto path = "path/to/nwsync"
auto n = nw::NWSync(path);
if(!n.is_loaded()) {
    throw std::runtime_error("a fit");
}

auto manifests = n.manifests();
if (manifests.size() > 0) {
    auto manifest = n.get(manifests[0]);
    auto resource = manifest->all();
    if(resource.size() > 0) {
        // Extract the first resource found
        manifest->extract(std::regex(resource[0].name.filename()), "tmp/");
    }
}

```

## Zip

Status: Read

## 6.10 rules

The Rules module presents some difficulties in the sense that if one was to sit down and design a system capable of expressing relatively arbitrary sets of rules and modifiers, it probably would not look much like NWN. Enhanced Edition's approach largely was to unhardcode *values*, but not systems<sup>1</sup>.

rollNW has the elements of NWN's rule system builtin, which is itself an approximation of the Dungeons and Dragons 3rd Edition ruleset.

### 6.10.1 The Goals

- Rules must be overridable, expandable, removable either through configuration (2da) or at the very least programmatically. Nothing should be hardcoded.
- The rules system must be queryable. Example: Given one creature attacking one chair with one handaxe in one bar of Chicago, what are all the modifiers that affect this particular situation?
- Ideally, constants would be disassociated from 2da rows. Say a UUID <-> integer map, but that's both a configuration and serialization problem.

<sup>1</sup> There are some exceptions, parts of the custom spellcaster system.

## 6.10.2 Definitions

### Profile

Profiles are a way of decoupling different rulesets from the rule system itself.

### Type

A rule type is an attribute of the rule system, say a skill or an ability or a damage. The rule system defines the type and its invalid case, but leaves valid cases up to the rule profile. An example, armor class:

```
// Definition of an attribute in nw/rules/attributes.hpp
DECLARE_RULE_TYPE(ArmorClass)

// Somewhere else in a rule profile that uses the concept of armor class
constexpr nw::ArmorClass ac_dodge = nw::ArmorClass::make(0);
constexpr nw::ArmorClass ac_natural = nw::ArmorClass::make(1);
constexpr nw::ArmorClass ac_armor = nw::ArmorClass::make(2);
constexpr nw::ArmorClass ac_shield = nw::ArmorClass::make(3);
constexpr nw::ArmorClass ac_deflection = nw::ArmorClass::make(4);

// Then it's possible to refer to them as some opaque value for type safety:
auto res = get_armor_class(object, ac_shield);

// Or as their underlying value:
switch(*ac_type) {
case *ac_dodge: // ..
case *ac_natural: // ..
case *ac_armor: // ..
case *ac_shield: // ..
case *ac_deflection: // ..
}

// Or if it makes logical sense to think of a particular type as an index:
obj->ac_bonuses[ac_dodge.idx()]
```

### Flag

`nw::RuleFlag` provides a mechanism for making flags out of rule types.

---

## 6.10.3 Modifiers

The foundation of the modifier system is just three types: `int32_t`, `float`, `strings`. It builds on the following abstractions to provide a dynamic, modifiable, queryable system. Modifiers are stored in a global table in `nw::kernel::Rules`. Note that Master Feat modifiers are special cased below.

The approach here is inspired by [Solstice](#) and Orth's NWNX:EE plugins [Race](#), [SkillRank](#), and [Feat](#).

Note that the examples below are designed for simplicity, not things that should necessarily be done.

## Definitions

### Modifier Type

A modifier type is a rule type that is used to determine how to process the outputs of a modifier.

### Modifier Source

A modifier source indicates the attribute of an object that modifier is associated with.

### Modifier Input

An input is an `int`, `float`, or a version of a `ModifierFunction`<sup>2</sup>.

### Modifier Output

In the basic cases, an output is the input passed directly without modification. When a function is the modifier input, it is called and its result is the output

The output is then passed to a callback provided to one of the `nw::kernel::resolve_modifier` function overloads.

The meaning of these outputs are determined by the modifier type. The number of output parameters is limited to one. They currently have to be integer, floating point types, or `nw::DamageRoll`.

In most cases using `nw::kernel::sum_modifier` or `nw::kernel::max_modifier` can avoid having to deal with passing callbacks.

### Example - Adding a Modifier:

```
// This is just an example, see "profiles/nwn1/modifiers.[ch]pp for real implementations.
↳ of rules.
auto mod2 = nwn1::mod::hitpoints(
    20, // Modifier value, if the below requirement is met
    "dnd-3.0-epic-toughness-01",
    nw::ModifierSource::feat
    { nwn1::qual::feat(nwn1::feat_epic_toughness_1) },
);

// Add it to the global modifier table
nw::kernel::rules().modifier.add(mod2);
```

### Example - Pale Master Armor Class Bonus:

```
auto mod = nw::load_module("test_data/user/modules/DockerDemo.mod");
auto ent = nw::objects().load<nw::Creature>(fs::path("some/palemaster.utc"));

int res = 0;
nw::resolve_modifier(ent, nwn1::mod_type_armor_class, nwn1::ac_natural,
    [&res](int value) { res += value; });
// res == 6

auto pm_ac_nerf = [](const nw::ObjectBase* obj) -> nw::ModifierResult {
    auto cre = obj->as_creature();
    if (!cre) { return 0; }
    auto pm_level = cre->levels.level_by_class(nwn1::class_type_pale_master);
    return ((pm_level / 4) + 1);
};
```

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<sup>2</sup> One could imagine in a different context, say NWNX:EE, you could add a callback to `nwnx_dotnet/lua/etc` or a string for use with `ExecuteScriptChunk`.

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```
// Get rid of any requirement
nw::rules().modifiers.replace("dnd-3.0-palemaster-ac", nw::Requirement{});
// Set nerf
nw::rules().modifiers.replace("dnd-3.0-palemaster-ac", pm_ac_nerf);
res = 0;
REQUIRE(nw::resolve_modifier(ent, nwn1::mod_type_armor_class, nwn1::ac_natural,
    [&res](int value) { res += value; }));
// res == 3

res = 0;
nw::resolve_modifier(ent, nwn1::mod_type_armor_class, nwn1::ac_natural,
    [&res](int value) { res += value; }));
// res == 0
```

### 6.10.4 Master Feats

Master feats and associated bonuses are set in the `nw::MasterFeatRegistry`. The master feat registry associates a particular rule element, say, a skill with a master feat and a feat corresponding to that skill.

#### Example - (Epic) Skill Focus: Discipline

```
auto& mfr = nw::kernel::rules().master_feats();
mfr->set_bonus(mfeat_skill_focus, 3);
mfr->set_bonus(mfeat_skill_focus_epic, 10);

mfr->add(skill_discipline, mfeat_skill_focus, feat_skill_focus_discipline);
mfr->add(skill_discipline, mfeat_skill_focus_epic, feat_epic_skill_focus_discipline)
```

Multiple feats are able to be associated with a rule element and masterfeat. Imagine in some universe, there is a class that has access to a generic Weapon Focus: Martial feat which provides Weapon Focus for all martial weapons.

#### Example - Multiple Associated Feats

```
auto& mfr = nw::kernel::rules().master_feats;
// Set up bonuses...
mfr->set_bonus(mfeat_weapon_focus, 1);
mfr->set_bonus(mfeat_weapon_focus_epic, 2);

// Register feats
mfr.add(baseitem_longsword, mfeat_weapon_focus, feat_weapon_focus_longsword);
mfr.add(baseitem_longsword, mfeat_weapon_focus, feat_weapon_focus_martial);
mfr.add(baseitem_longsword, mfeat_weapon_focus_epic, feat_epic_weapon_focus_longsword);
mfr.add(baseitem_longsword, mfeat_weapon_focus_epic, feat_epic_weapon_focus_martial);

// Process
auto callback = [](int value) { /* do something with value */ };
nw::kernel::resolve_master_feats<int>(cre, baseitem, callback,
    mfeat_weapon_focus, mfeat_weapon_focus_epic);

// Simple sums of master feat bonuses can be done as below.
```

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```

int value = nw::kernel::sum_master_feats<int>(cre, baseitem,
    mfeat_weapon_focus, mfeat_weapon_focus_epic);

// If you are only interested in resolving one master feat you can get that result
// directly:
int value2 = nw::kernel::resolve_master_feat<int>(cre, baseitem, mfeat_weapon_focus);

```

## 6.10.5 Requirements

### Selector

A selector gets some piece of information from an entity.

#### Example:

```

auto s = nwn1::sel::ability(ability_strength);
// ...
auto str = nw::kernel::rules().select<int>(s, entity);
// ...

```

### Qualifier

A qualifier is a selector with some constraints thereupon. In the example below any creature with an unmodified strength between [20, 40] inclusive would match.

```

auto q = nwn1::qual::ability(ability_strength, 20, 40);
// ...
if(nw::kernel::rules().match(q, creature)) {
    // ...
}

```

### Requirement

A requirement is just a set of one or more Qualifiers.

#### Example:

Some thing a has requirement of level 4, wisdom between [12, 20], and a minimum appraise skill of 6.

```

auto req = nw::Requirement{{
    nwn1::qual::level(4),
    nwn1::qual::ability(ability_wisdom, 12, 20), // Min, Max
    nwn1::qual::skill(skill_appraise, 6),
}};
// ...
if(nw::kernel::rules().meets_requirement(req, creature)) {
    // ...
}

```

By default a requirement uses logical conjunction, to use disjunction pass `false` at construction.

```

auto req = nw::Requirement{{
    // Qualifiers ...
}, false};

```

## 6.11 script

The script module provides a lexer, recursive decent parser, and type-checker for NWScript.

---

**Note:** In the case of the [Python API](#), the interface to the AST is read only.

---

### 6.11.1 examples

#### Basic Loading

Python

C++

```
import rollnw
from rollnw.script import Nss, Context

# Start kernel, if you want to load game assets
rollnw.kernel.start()

# Create a context and to add include path, pass them into the Context constructor
ctx = Context(["includes/"])

# Load the script from a file
nss = Nss("path/to/myscript.nss", ctx)

# Parse
nss.parse()

# Preprocessing
nss.process_includes()

# Now all dependencies are available
deps = nss.dependencies()

# Ast resolution and type-checking
nss.resolve()

# Load a script from string
nss2 = Nss.from_string("void test_function(string s, int b);", ctx)

# To get any old script in the the context's resman use ``get``. Note this
# parses and resolves the script, nothing further processing is needed.
raise_dead = ctx.get("nw_s0_raisedead")
```

```
#include <nw/kernel/Kernel.hpp>
#include <nw/script/Nss.hpp>

// Start the kernel, if you want to load game assets
nw::kernel::config().initialize();
nw::kernel::services().start();
```

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```

auto ctx = std::make_unique<nw::script::Context>();
nw::script::Nss nss{nw::kernel::resman().demand({"nwscript"sv, nw::ResourceType::nss),
↳ ctx.get(), true};

// Parse
nss.parse();

// Preprocessing
nss.process_includes()
// Now all dependencies are available
auto deps = nss.dependencies()

// Ast resolution and type-checking
nss.resolve()

```

### Iterating Top-Level Declarations

```

import rollnw
from rollnw.script import Nss, FunctionDecl, Context

# Start kernel, if you want to load game assets
rollnw.kernel.start()

# Create a context..
ctx = Context()

# The default command script is "nwscript"
nss = ctx.command_script()

# Iterate toplevel declarations and look for function declarations
# This is all functions WITHOUT bodies.
for decl in nss.ast():
    if isinstance(decl, FunctionDecl):
        # the identifier is token for now..
        print(f"function '{decl.identifier()}' has {len(decl)} parameter(s)")

# Or if you know what you're looking for.. the result is a rollnw.script.Symbol
int_to_string = nss.locate_export("IntToString", False)

```

### 6.11.2 performance

The parser currently parses at >100MBps on a 2015 MacBook Pro.

### 6.11.3 TODOs

- Decide how much to track NWN:EE NWScript changes, only raw strings isn't already done.
- Make the library more useful for NWScript successors (i.e Dragon Age or KoTOR)
- Whether to do optimizations or anything further than performance/usability improvements

### 6.11.4 credits

- [Crafting Interpreters](#)

## 6.12 serialization

### 6.12.1 Definitions

- **profile** - NWN has three different (de)serialization profiles:
  - **blueprint** - UTC, UTT, etc, etc. BIC is included here, though not a blueprint itself.
  - **instance** - Instances of blueprints stored in an area's GIT file.
  - **savegame** - All game and object state. This is outside of the scope of this library.. for now.
- **type** - C++ types corresponding to GFF serialization types.
  - `uint8_t` - Also convertible to `bool`
  - `int8_t`
  - `uint16_t`
  - `int16_t`
  - `uint32_t`
  - `int32_t`
  - `uint64_t`
  - `int64_t`
  - `float`
  - `double`
  - `std::string`
  - `Resref`
  - `LocString`
  - `ByteArray`
  - Scoped Enumerations are convertible when their underlying type matches the GFF type.

The library may support the lifting of numeric types, i.e. reading a `int16_t` into `int16_t` or `int32_t` or `int64_t`.

- **struct** is a collection of key-value pairs, where the key is a 16 character string and the value is one of the above types (almost).
- **list** is a list solely of structs, this follows the GFF pattern.
- **gffjson** refers to the nwn-lib/neverwinter.nim json format that mimics GFF. The extent to which this is supported by the library is an open issue.
- **json** refers specifically to rollnw json serialization. This very closely mimics the structure of a given object, such that if you load the JSON into another language, or a dynamic language that can construct arbitrary objects from JSON, the usage is identical or analogous to the C++ objects.

## 6.12.2 Examples

### Example - How to build your own GFF

```
nw::GffBuilder gff{"GFF"};

// Add a field. Note that the type of the field is determined by the value
// passed.
gff.top.add_field("DATA", 9);

// Add a list. Note that in the GFF format lists contain only structs
auto& xs = gff.top.add_list("LIST");
// So when you push_back, you're creating a struct with a specific struct ID
auto& st = xs.push_back(0xBEEF);
// Now you can add fields to the struct
st.add_field("A", 1)
  .add_field("B", 12);

// Add a struct. It's pretty rare that a gff field is a struct but if necessary
// you can add a struct with its struct ID, then add fields like above.
gff.top.add_struct("STRUCT", 42)
  .add_field("A", 1)
  .add_field("B", 12);

gff.build(); // This must be called after all fields have been added.
gff.write_to("mygff.gff");
```

## 6.12.3 Sample rollnw JSON serialization format

```
{
  "$type": "UTC",
  "$version": 1,
  "appearance": {
    "body_parts": {
      "belt": 0,
      "bicep_left": 1,
      "bicep_right": 1,
      "foot_left": 1,
      "foot_right": 1,
```

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```

        "forearm_left": 1,
        "forearm_right": 1,
        "hand_left": 1,
        "hand_right": 1,
        "head": 119,
        "neck": 1,
        "pelvis": 1,
        "shin_left": 1,
        "shin_right": 1,
        "shoulder_left": 0,
        "shoulder_right": 0,
        "thigh_left": 1,
        "thigh_right": 1,
        "torso": 1
    },
    "hair": 167,
    "id": 6,
    "phenotype": 0,
    "portrait_id": 65,
    "skin": 3,
    "tail": 0,
    "tattoo1": 1,
    "tattoo2": 1,
    "wings": 0
},
"bodybag": 0,
"chunk_death": 0,
"combat_info": {
    "ac_natural": 0,
    "special_abilities": [
        {
            "flags": 1,
            "level": 15,
            "spell": 120
        }
    ]
},
"common": {
    "comment": "",
    "locals": {
        "DIPType": {
            "integer": 3
        },
        "DeflectionAC": {
            "integer": 6
        },
        "DodgeAC": {
            "integer": 6
        },
        "OtherImmunes": {
            "integer": 1001945111
        }
    },

```

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```

    "Soak": {
      "string": "15+5"
    },
    "VFXDur1": {
      "integer": 11
    },
    "rlgs_ss_1": {
      "string": "lt_agent_1"
    }
  },
  "object_type": 5,
  "palette_id": 0,
  "resref": "pl_agent_001",
  "tag": "pl_agent_001"
},
"conversation": "",
"cr": 38.0,
"cr_adjust": -36,
"decay_time": 5000,
"deity": "",
"description": {
  "strings": [],
  "strref": 4294967295
},
"disarmable": 0,
"equipment": {
  "arms": "handwish",
  "chest": "dk_agent_thread2",
  "creature_left": "pl_slam_1d2"
},
"faction_id": 1,
"gender": 0,
"good_evil": 100,
"hp": 894,
"hp_current": 894,
"hp_max": 1014,
"immortal": 0,
"interruptable": 0,
"inventory": [],
"lawful_chaotic": 50,
"levels": [
  {
    "class": 4,
    "level": 10,
    "spellbook": {
      "known": [
        [],
        [],
        [],
        [],
        [],
        []
      ]
    }
  }
]

```

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```

        [],
        [],
        [],
        []
    ],
    "memorized": [
        [],
        [],
        [],
        [],
        [],
        [],
        [],
        [],
        [],
        [],
        []
    ]
}
},
{
    "class": 5,
    "level": 30,
    "spellbook": {
        "known": [
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            []
        ],
        "memorized": [
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            [],
            []
        ]
    }
}
],
"lootable": 0,
"name_first": {

```

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```

    "strings": [
      {
        "lang": 0,
        "string": "Agent"
      }
    ],
    "strref": 4294967295
  },
  "name_last": {
    "strings": [],
    "strref": 4294967295
  },
  "pc": 0,
  "perception_range": 11,
  "plot": false,
  "race": 6,
  "scripts": {
    "on_attacked": "mon_ai_5attacked",
    "on_blocked": "mon_ai_13blocked",
    "on_conversation": "mon_ai_4conv",
    "on_damaged": "mon_ai_6dmged",
    "on_death": "mon_ai_7death",
    "on_disturbed": "mon_ai_8disturb",
    "on_endround": "mon_ai_3ocre",
    "on_heartbeat": "mon_ai_1hb",
    "on_perceived": "mon_ai_2percep",
    "on_rested": "mon_ai_10rest",
    "on_spawn": "mon_ai_9spawn",
    "on_spell_cast_at": "mon_ai_11spcast",
    "on_user_defined": "mon_ai_12ud"
  },
  "soundset": 171,
  "starting_package": 4,
  "stats": {
    "abilities": [
      40,
      13,
      16,
      10,
      16,
      9
    ],
    "feats": [
      2,
      3,
      4,
      6,
      8,
      10,
      21,
      26,
      32,

```

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```

41,
45,
46,
49,
206,
207,
208,
209,
211,
212,
214,
215,
216,
258,
260,
289,
290,
291,
292,
297,
391,
392,
408,
755,
756,
757,
971,
1089
],
"save_bonus": {
    "fort": 9,
    "reflex": 15,
    "will": 13
},
"skills": [
    0,
    1,
    0,
    40,
    11,
    30,
    30,
    1,
    30,
    0,
    20,
    0,
    30,
    0,
    0,
    0,
    0,
    0
]

```

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```

        0,
        0,
        0,
        0,
        0,
        1,
        0,
        0,
        1,
        2,
        0
    ]
},
"subtrace": "",
"walkrate": 4
}

```

## 6.13 classes

### 6.13.1 nw::Ability

struct **Ability**

#### Public Functions

bool **operator==**(const *Ability* &rhs) const = default

Defaulted equality operator

auto **operator<=>**(const *Ability* &rhs) const = default

Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept

Returns rule type as value

inline constexpr size\_t **idx**() const noexcept

Returns rule type as index

#### Public Static Functions

static inline constexpr *Ability* **make**(int32\_t id)

Makes a rule type

static inline constexpr *Ability* **invalid**()

Returns an invalid rule type

### 6.13.2 nw::AbilityInfo

struct **AbilityInfo**

#### Public Functions

inline bool **valid**() const noexcept

#### Public Members

uint32\_t **name** = 0xFFFFFFFF

*InternedString* **constant**

### 6.13.3 nw::Appearance

struct **Appearance**

#### Public Functions

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

#### Public Members

int32\_t **phenotype** = 0

uint32\_t **tail** = 0

uint32\_t **wings** = 0

uint16\_t **id** = 0

uint16\_t **portrait\_id**

*BodyParts* **body\_parts**

uint8\_t **hair** = 0

uint8\_t **skin** = 0

```
uint8_t tattoo1 = 0
```

```
uint8_t tattoo2 = 0
```

### 6.13.4 nw::Area

```
struct Area : public nw::ObjectBase
```

#### Public Functions

**Area()**

```
inline virtual Common *as_common() override
```

```
inline virtual const Common *as_common() const override
```

```
inline virtual Area *as_area() override
```

```
inline virtual const Area *as_area() const override
```

```
virtual bool instantiate() override
```

```
inline ObjectHandle handle() const noexcept
```

```
inline void set_handle(ObjectHandle handle)
```

```
const EffectArray &effects() const
```

```
EffectArray &effects()
```

```
inline virtual Versus versus_me() const
```

```
virtual InternedString tag() const
```

```
inline virtual Creature *as_creature()
```

```
inline virtual const Creature *as_creature() const
```

```
inline virtual Door *as_door()
```

```
inline virtual const Door *as_door() const
```

```
inline virtual Encounter *as_encounter()
```

```
inline virtual const Encounter *as_encounter() const
```

```
inline virtual Item *as_item()
```

```
inline virtual const Item *as_item() const
```

```
inline virtual Module *as_module()
```

```
inline virtual const Module *as_module() const
```

```
inline virtual Placeable *as_placeable()
```

```
inline virtual const Placeable *as_placeable() const
inline virtual Player *as_player()
inline virtual const Player *as_player() const
inline virtual Sound *as_sound()
inline virtual const Sound *as_sound() const
inline virtual Store *as_store()
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const
inline virtual Waypoint *as_waypoint()
inline virtual const Waypoint *as_waypoint() const
```

## Public Members

*Common* **common**

*AreaScripts* **scripts**

*AreaWeather* **weather**

std::vector<*Creature*\*> **creatures**

std::vector<*Door*\*> **doors**

std::vector<*Encounter*\*> **encounters**

std::vector<*Item*\*> **items**

std::vector<*Placeable*\*> **placeables**

std::vector<*Sound*\*> **sounds**

std::vector<*Store*\*> **stores**

std::vector<*Trigger*\*> **triggers**

std::vector<*Waypoint*\*> **waypoints**

std::string **comments**

*LocString* **name**

*Resref* **tileset**

std::vector<*Tile*> **tiles**

int32\_t **creator\_id** = 0

*AreaFlags* **flags**

int32\_t **height** = 0

int32\_t **id** = 0

int32\_t **listen\_check\_mod** = 0

int32\_t **spot\_check\_mod** = 0

uint32\_t **version** = 0

int32\_t **width** = 0

uint16\_t **loadscreen** = 0

uint8\_t **no\_rest** = 0

uint8\_t **pvp** = 0

uint8\_t **shadow\_opacity** = 0

uint8\_t **skybox** = 0

### Public Static Functions

static bool **deserialize**(*Area* \*obj, const nlohmann::json &caf)

Deserialize from JSON

---

**Note:** Note only supports does ‘caf’ style input/output, i.e. ARE + GIT + GIC.

---

```
static bool deserialize(Area *obj, const nlohmann::json &are, const nlohmann::json &git, const  
                        nlohmann::json &gic)
```

```
static void serialize(const Area *obj, nlohmann::json &archive)  
    Serialize to JSON.
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::area
```

```
static constexpr ResourceType::type restype = ResourceType::caf
```

## 6.13.5 nw::AreaScripts

```
struct AreaScripts
```

### Public Functions

```
AreaScripts() = default
```

```
bool from_json(const nlohmann::json &archive)
```

```
nlohmann::json to_json() const
```

### Public Members

```
Resref on_enter
```

```
Resref on_exit
```

```
Resref on_heartbeat
```

```
Resref on_user_defined
```



### 6.13.6 nw::AreaWeather

struct **AreaWeather**

#### Public Functions

**AreaWeather**() = default

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

#### Public Members

int32\_t **chance\_lightning** = 0

int32\_t **chance\_rain** = 0

int32\_t **chance\_snow** = 0

uint32\_t **color\_moon\_ambient** = 0

uint32\_t **color\_moon\_diffuse** = 0

uint32\_t **color\_moon\_fog** = 0

uint32\_t **color\_sun\_ambient** = 0

uint32\_t **color\_sun\_diffuse** = 0

uint32\_t **color\_sun\_fog** = 0

float **fog\_clip\_distance** = 0.0f

int32\_t **wind\_power** = 0

uint8\_t **day\_night\_cycle** = 0

uint8\_t **is\_night** = 0

uint8\_t **lighting\_scheme** = 0

uint8\_t **fog\_moon\_amount** = 0

```
uint8_t moon_shadows = 0
```

```
uint8_t fog_sun_amount = 0
```

```
uint8_t sun_shadows = 0
```

### 6.13.7 nw::AttackData

struct **AttackData**

Structure for aggregating attack related data.

#### Public Types

```
using DamageArray = absl::InlinedVector<DamageResult, 8>
```

#### Public Functions

```
void add(nw::Damage type_, int amount, bool unblockable = false)
```

Adds damage to damage result.

```
DamageArray &damages()
```

Gets damage array.

```
const DamageArray &damages() const
```

Gets damage array.

#### Public Members

```
Creature *attacker = nullptr
```

```
ObjectBase *target = nullptr
```

```
Item *weapon = nullptr
```

```
AttackType type = AttackType::invalid()
```

```
AttackResult result = AttackResult::miss_by_roll
```

```
TargetState target_state = TargetState::none
```

```
bool target_is_creature = false
```

bool **is\_ranged\_attack** = false

bool **is\_killing\_blow** = false

Is the attack enough to kill target.

int **nth\_attack** = 0

The nth attack in the 'round'.

int **attack\_roll** = 0

int **attack\_bonus** = 0

int **damage\_total** = 0

int **armor\_class** = 0

int **iteration\_penalty** = 0

int **multiplier** = 0

int **threat\_range** = 0

int **concealment** = 0

*DamageResult* **damage\_base**

Base weapon damage.

absl::InlinedVector<nw::Effect\*, 8> **effects\_to\_apply**

Effects to apply to target.

absl::InlinedVector<nw::EffectHandle, 8> **effects\_to\_remove**

Effects to remove from target.

### 6.13.8 nw::BaseItem

struct **BaseItem**

### Public Functions

bool **operator==**(const *BaseItem* &rhs) const = default  
Defaulted equality operator

auto **operator<=>**(const *BaseItem* &rhs) const = default  
Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept  
Returns rule type as value

inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

### Public Static Functions

static inline constexpr *BaseItem* **make**(int32\_t id)  
Makes a rule type

static inline constexpr *BaseItem* **invalid**()  
Returns an invalid rule type

## 6.13.9 nw::BeamdogInstall

struct **BeamdogInstall**

### Public Members

const char \***appid**

const char \***path**

## 6.13.10 nw::Bif

struct **Bif**

*Bif* is used only by *nw::Key*, it has no independant use.

### Public Functions

**Bif**(*Key* \*key, std::filesystem::path path)

**Bif**(const *Bif* &) = delete

**Bif**(*Bif* &&other) = default

*Bif* &**operator**=(const *Bif* &) = delete

*Bif* &operator=(*Bif* &&other) = default

*ByteArray* demand(size\_t index) const

## Friends

friend struct Key

### 6.13.11 nw::BodyParts

struct **BodyParts**

#### Public Members

uint8\_t **belt** = 0

uint8\_t **bicep\_left** = 0

uint8\_t **bicep\_right** = 0

uint8\_t **foot\_left** = 0

uint8\_t **foot\_right** = 0

uint8\_t **forearm\_left** = 0

uint8\_t **forearm\_right** = 0

uint8\_t **hand\_left** = 0

uint8\_t **hand\_right** = 0

uint8\_t **head** = 0

uint8\_t **neck** = 0

uint8\_t **pelvis** = 0

uint8\_t **shin\_left** = 0

uint8\_t **shin\_right** = 0

```
uint8_t shoulder_left = 0
```

```
uint8_t shoulder_right = 0
```

```
uint8_t thigh_left = 0
```

```
uint8_t thigh_right = 0
```

```
uint8_t torso = 0
```

### 6.13.12 nw::ByteArray

```
struct ByteArray
```

#### Public Types

```
using Base = std::vector<uint8_t>
```

```
using iterator = Base::iterator
```

```
using const_iterator = Base::const_iterator
```

```
using size_type = Base::size_type
```

#### Public Functions

```
ByteArray() = default
```

```
ByteArray(const uint8_t *buffer, size_t len)
```

```
ByteArray(ByteArray&&) = default
```

```
ByteArray(const ByteArray&) = default
```

```
ByteArray &operator=(ByteArray&&) = default
```

```
ByteArray &operator=(const ByteArray&) = default
```

```
inline bool operator==(const ByteArray &other) const
```

```
inline uint8_t &operator[](size_type pos)
```

```
inline const uint8_t &operator[](size_type pos) const
```

```
void append(const void *buffer, size_t len)
```

Appends bytes to the array.

```

inline void clear()
    Clears the data in the array.

inline uint8_t *data() noexcept
    Returns pointer to the underlying array.

inline const uint8_t *data() const noexcept
    Returns pointer to the underlying array.

inline void push_back(uint8_t byte)
    Appends one element to the array.

bool read_at(size_t offset, void *buffer, size_t size) const
    Reads size bytes at offset into an arbitrary buffer

inline void reserve(size_type count)
    Increases the capacity of the array by count elements.

inline void resize(size_type count)
    Resizes array to contain count elements. If greater, than current size, null padded.

inline size_type size() const noexcept
    Returns the number of bytes.

inline std::span<uint8_t> span()
    Construct std::span.

inline std::span<const uint8_t> span() const
    Construct std::span.

std::string_view string_view() const
    Constructs string view of the array.

bool write_to(const std::filesystem::path &path) const
    Write contents to file.

```

### Public Static Functions

```

static ByteArray from_file(const std::filesystem::path &path)
    Load a file into memory.

```

### 6.13.13 nw::Class

```

struct Class

```

### Public Functions

bool **operator==**(const *Class* &rhs) const = default  
Defaulted equality operator

auto **operator<=>**(const *Class* &rhs) const = default  
Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept  
Returns rule type as value

inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

### Public Static Functions

static inline constexpr *Class* **make**(int32\_t id)  
Makes a rule type

static inline constexpr *Class* **invalid**()  
Returns an invalid rule type

## 6.13.14 nw::ClassArray

struct **ClassArray**  
*Class* Singleton component.

### Public Types

using **map\_type** = absl::flat\_hash\_map<*IntermedString*, *Class*, InternedStringHash, InternedStringEq>

### Public Functions

const *ClassInfo* \***get**(*Class* class\_) const noexcept

bool **is\_valid**(*Class* class\_) const noexcept

*Class* **from\_constant**(std::string\_view constant) const

int **get\_base\_attack\_bonus**(*Class* class\_, size\_t level) const  
Gets class base attack from attack tables.

*Saves* **get\_class\_save\_bonus**(*Class* class\_, size\_t level) const  
Gets class save bonuses from save tables.

bool **get\_is\_class\_skill**(*Class* class\_, *Skill* skill) const  
Determines if skill is a class skill.

int **get\_natural\_ac**(*Class* class\_, size\_t level) const  
Gets class Natural AC gain.



```
const ClassRequirement *get_requirement(Class class_) const
    Gets class requirements.

int get_stat_gain(Class class_, Ability ability, size_t level) const
    Gets class ability gain.
```

### Public Members

```
std::set<std::vector<int>> attack_tables
```

```
std::vector<int> stat_gain_tables
```

```
std::vector<ClassInfo> entries
```

```
map_type constant_to_index
```

#### 6.13.15 nw::ClassEntry

```
struct ClassEntry
```

### Public Members

```
Class id = nw::Class::invalid()
```

```
int16_t level = 0
```

```
SpellBook spells
```

#### 6.13.16 nw::ClassInfo

```
struct ClassInfo
```

### Public Functions

```
ClassInfo() = default
```

```
ClassInfo(const TwoDARowView &tda)
```

```
inline bool valid() const noexcept
```

## Public Members

ClassRequirement **requirements**

uint32\_t **name** = 0xFFFFFFFF

uint32\_t **plural** = 0xFFFFFFFF

uint32\_t **lower** = 0xFFFFFFFF

uint32\_t **description** = 0xFFFFFFFF

*Resource* **icon**

int **hitdie** = 0

const std::vector<int> **\*attack\_bonus\_table** = nullptr

*Resource* **feats\_table**

*Resource* **saving\_throw\_table**

std::vector<*Saves*> **class\_saves**

*Resource* **skill\_table**

std::vector<int> **class\_skills**

*Resource* **bonus\_feats\_table**

int **skill\_point\_base** = 0

*Resource* **spell\_gain\_table**

*Resource* **spell\_known\_table**

bool **player\_class** = false

bool **spellcaster** = false

int **primary\_ability**

```
uint32_t alignment_restriction = 0
```

```
uint32_t alignment_restriction_type = 0
```

```
bool invert_restriction = false
```

```
InternedString constant
```

```
Resource prereq_table
```

```
int max_level = 0
```

```
int xp_penalty = 0
```

```
int arcane_spellgain_mod = 0
```

```
int divine_spellgain_mod = 0
```

```
int epic_level_limit = -1
```

```
int package = 0
```

```
Resource stat_gain_table
```

```
std::vector<ClassStatGain> class_stat_gain
```

```
bool memorizes_spells = false
```

```
bool spellbook_restricted = false
```

```
bool pick_domains = false
```

```
bool pick_school = false
```

```
bool learn_scroll = false
```

```
bool arcane = false
```

```
bool arcane_spell_failure = false
```

```
nw::Ability caster_ability = nw::Ability::invalid()
```

```
std::string spell_table_column

float caster_level_multiplier = 1.0f

int level_min_caster = 0

int level_min_associate = 0

bool can_cast_spontaneously = false
```

### 6.13.17 nw::CombatInfo

struct **CombatInfo**

#### Public Functions

```
CombatInfo() = default
CombatInfo(CombatInfo&) = default
CombatInfo(CombatInfo&&) = default
CombatInfo &operator=(CombatInfo&) = delete
CombatInfo &operator=(CombatInfo&&) = default
bool from_json(const nlohmann::json &archive)
nlohmann::json to_json() const
```

#### Public Members

```
int ac_natural_bonus = 0

int attack_current = 0
    Current attack counter.
```

---

**Note:** Invariant: `attack_current <= attacks_onhand + attacks_offhand + attacks_extra`

---

```
int attacks_onhand = 0

int attacks_offhand = 0

int attacks_extra = 0
```

```

nw::ObjectBase *target = nullptr

float target_distance_sq = 0.0f
    Distance to target squared.

TargetState target_state = TargetState::none

int ac_armor_base = 0

int ac_shield_base = 0

CombatMode combat_mode = nw::CombatMode::invalid()

int32_t size_ab_modifier = 0

int32_t size_ac_modifier = 0

std::vector<SpecialAbility> special_abilities

```

### 6.13.18 nw::Common

struct **Common**

#### Public Functions

```

bool from_json(const nlohmann::json &archive, SerializationProfile profile, ObjectType object_type)
nlohmann::json to_json(SerializationProfile profile, ObjectType object_type) const
inline bool valid()

```

#### Public Members

```

uuids::uuid uuid

Resref resref

InternedString tag

LocString name

LocalData locals

```

*Location* **location**

std::string **comment**

uint8\_t **palette\_id** = std::numeric\_limits<uint8\_t>::max()

### 6.13.19 nw::CompressionHeader

struct **CompressionHeader**

#### Public Members

std::array<char, 4> **magic**

uint32\_t **version**

uint32\_t **algorithm**

uint32\_t **uncompressed\_size**

### 6.13.20 nw::ConfigOptions

struct **ConfigOptions**

Configuration options, maybe there will be an actual config file.. someday.

#### Public Members

bool **include\_install** = true

Load Game install files.

bool **include\_nwsync** = true

Load *NWSync* files.

bool **include\_user** = true

Load User files, note: if false, value overrides **include\_nwsync**

### 6.13.21 nw::Container

struct **Container**

Base class for all containers.

Subclassed by *nw::Directory*, *nw::Erf*, *nw::Key*, *nw::NWSyncManifest*, *nw::Zip*, *nw::kernel::Resources*

#### Public Functions

**Container()**

virtual **~Container()**

virtual std::vector<*ResourceDescriptor*> **all()** const = 0

Get all resources.

virtual bool **contains**(*Resource* res) const = 0

Get if container contains resource.

virtual ResourceData **demand**(*Resource* res) const = 0

Reads resource data, empty ResourceData if no match.

virtual int **extract\_by\_glob**(std::string\_view glob, const std::filesystem::path &output) const

Extract elements from a container by glob pattern.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const = 0

Extract elements from a container by regex.

virtual const std::string &**name**() const = 0

Equivalent to `basename` *path()*

virtual const std::string &**path**() const = 0

Path to container, for basic containers, should be canonical.

virtual size\_t **size**() const = 0

Determines the size, if applicable, of the container.

virtual *ResourceDescriptor* **stat**(const *Resource* &res) const = 0

Get some general data about a resource.

virtual bool **valid**() const noexcept = 0

Return true if loaded, false if not.

virtual void **visit**(std::function<void(const *Resource*&)> callback) const noexcept = 0

Visits all resources in a container.

const std::filesystem::path &**working\_directory**() const

Get container working directory.

### 6.13.22 nw::Creature

struct **Creature** : public nw::ObjectBase

Subclassed by *nw::Player*

#### Public Functions

**Creature**()

inline virtual *Common* \***as\_common**() override

inline virtual const *Common* \***as\_common**() const override

inline virtual *Creature* \***as\_creature**() override

inline virtual const *Creature* \***as\_creature**() const override

virtual bool **instantiate**() override

inline virtual *InternedString* **tag**() const override

virtual *Versus* **versus\_me**() const override

inline ObjectHandle **handle**() const noexcept

inline void **set\_handle**(ObjectHandle handle)

const *EffectArray* &**effects**() const

*EffectArray* &**effects**()

inline virtual *Area* \***as\_area**()

inline virtual const *Area* \***as\_area**() const

inline virtual *Door* \***as\_door**()

inline virtual const *Door* \***as\_door**() const

inline virtual *Encounter* \***as\_encounter**()

inline virtual const *Encounter* \***as\_encounter**() const

inline virtual *Item* \***as\_item**()

inline virtual const *Item* \***as\_item**() const

inline virtual *Module* \***as\_module**()

inline virtual const *Module* \***as\_module**() const

inline virtual *Placeable* \***as\_placeable**()

inline virtual const *Placeable* \***as\_placeable**() const

inline virtual *Player* \***as\_player**()

inline virtual const *Player* \***as\_player**() const



```

inline virtual Sound *as_sound()

inline virtual const Sound *as_sound() const

inline virtual Store *as_store()

inline virtual const Store *as_store() const

inline virtual Trigger *as_trigger()

inline virtual const Trigger *as_trigger() const

inline virtual Waypoint *as_waypoint()

inline virtual const Waypoint *as_waypoint() const

```

## Public Members

*Common* **common**

*Appearance* **appearance**

*CombatInfo* **combat\_info**

*Equips* **equipment**

*Inventory* **inventory**

*LevelStats* **levels**

*LevelHistory* **history**

*CreatureScripts* **scripts**

*CreatureStats* **stats**

*Resref* **conversation**

std::string **deity**

*LocString* **description**

*LocString* **name\_first**

*LocString* **name\_last**

```
std::string subrace

float cr = 0.0

int32_t cr_adjust = 0

uint32_t decay_time

Race race = Race::invalid()

int32_t walkrate = 0

uint16_t faction_id = 0

int16_t hp = 0

int16_t hp_current = 0

int16_t hp_max = 0

int16_t hp_temp = 0

uint16_t soundset

int32_t hasted = 0

int32_t size = 0

uint8_t bodybag = 0

uint8_t chunk_death = 0

uint8_t disarmable = 0

uint8_t gender = 0

uint8_t good_evil = 50

uint8_t interruptable = 0

uint8_t immortal = 0
```

```

uint8_t lawful_chaotic = 50

uint8_t lootable = 0

uint8_t pc = 0

uint8_t perception_range = 0

bool plot = false

uint8_t starting_package = 0

bool instantiated_ = false

```

### Public Static Functions

```

static bool deserialize(Creature *obj, const nlohmann::json &archive, SerializationProfile profile)

static bool serialize(const Creature *obj, nlohmann::json &archive, SerializationProfile profile)

```

### Public Static Attributes

```

static constexpr int json_archive_version = 1

static constexpr ObjectType object_type = ObjectType::creature

static constexpr ResourceType::type restype = ResourceType::utc

```

## 6.13.23 nw::CreatureScripts

```
struct CreatureScripts
```

### Public Functions

```

CreatureScripts() = default

bool deserialize(const GffStruct &archive)

bool from_json(const nlohmann::json &archive)

bool serialize(GffBuilderStruct &archive) const

nlohmann::json to_json() const

```

### Public Members

*Resref* **on\_attacked**

*Resref* **on\_blocked**

*Resref* **on\_conversation**

*Resref* **on\_damaged**

*Resref* **on\_death**

*Resref* **on\_disturbed**

*Resref* **on\_endround**

*Resref* **on\_heartbeat**

*Resref* **on\_perceived**

*Resref* **on\_rested**

*Resref* **on\_spawn**

*Resref* **on\_spell\_cast\_at**

*Resref* **on\_user\_defined**

### 6.13.24 nw::CreatureStats

struct **CreatureStats**

#### Public Functions

**CreatureStats**() = default

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

bool **add\_feat**(*Feat* id)

Attempts to add a feat to a creature, returning true if successful.

```
const std::vector<Feat> &feats() const noexcept
    Gets the feat array.

int get_ability_score(Ability id) const
    Gets an ability score.

int get_skill_rank(Skill id) const
    Gets a skill rank.

bool has_feat(Feat id) const noexcept
    Determines if creature has a feat.

bool set_ability_score(Ability id, int value)
    Sets an ability score, returning true if successful.

bool set_skill_rank(Skill id, int value)
    Sets a skill rank, returning true if successful.
```

### Public Members

*Saves* **save\_bonus**

### Friends

```
friend bool deserialize(CreatureStats &self, const GffStruct &archive)
friend bool serialize(const CreatureStats &self, GffBuilderStruct &archive)
```

## 6.13.25 nw::DamageResult

```
struct DamageResult
```

### Public Members

```
nw::Damage type = nw::Damage::invalid()

int amount = 0

int unblocked = 0

int immunity = 0

int reduction = 0

int reduction_remaining = 0
```

```
int resist = 0
```

```
int resist_remaining = 0
```

### 6.13.26 nw::DamageRoll

```
struct DamageRoll
```

#### Public Members

```
Damage type = Damage::invalid()
```

```
DiceRoll roll
```

```
DamageCategory flags = DamageCategory::none
```

### 6.13.27 nw::Dialog

```
struct Dialog
```

#### Public Functions

```
Dialog()
```

```
explicit Dialog(const GffStruct archive)
```

```
explicit Dialog(const nlohmann::json &archive)
```

```
Dialog(const Dialog&) = delete
```

```
Dialog &operator=(const Dialog&) = delete
```

```
DialogPtr *add()
```

Adds empty *Dialog* Pointer and Node.

```
void add_node_internal(DialogNode *node, DialogNodeType type)
```

Adds a node to the internal node lists

<b>Warning:</b> This should be considered for internal use and not client code
--

```
DialogPtr *add_ptr(DialogPtr *ptr, bool is_link = false)
```

Adds *Dialog* Pointer, if *is\_link* is false no new pointer or node is created. if *is\_link* is true a new pointer will be created with the node copied from input pointer.

*DialogPtr* \***add\_string**(std::string value, nw::LanguageID lang = nw::LanguageID::english, bool feminine = false)

Adds *Dialog* Pointer and Node with string value set.

*DialogNode* \***create\_node**(*DialogNodeType* type)

Creates a new *Dialog* Node.

*DialogPtr* \***create\_ptr**()

Creates a new *Dialog* Pointer.

void **delete\_node**(*DialogNode* \*node)

Deletes a dialog node

**Warning:** This should be considered for internal use and not client code

void **delete\_ptr**(*DialogPtr* \*ptr)

Deletes a dialog pointer

**Warning:** ptr should be removed from / not added to a dialog prior to deletion

size\_t **node\_index**(*DialogNode* \*node, *DialogNodeType* type) const

Get Node index.

void **remove\_node\_internal**(*DialogNode* \*node, *DialogNodeType* type)

Removes a node to the internal node lists

**Warning:** This should be considered for internal use and not client code

void **remove\_ptr**(*DialogPtr* \*ptr)

Removes *Dialog* Ptr from underlying node.

inline bool **valid**() const noexcept

Checks id dialog was successfully parsed.

## Public Members

std::vector<*DialogNode*\*> **entries**

std::vector<*DialogNode*\*> **replies**

*Resref* **script\_abort**

*Resref* **script\_end**

std::vector<*DialogPtr*\*> **starts**

```
uint32_t delay_entry = 0
```

```
uint32_t delay_reply = 0
```

```
uint32_t word_count = 0
```

```
bool prevent_zoom = false
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ResourceType::type restype = ResourceType::dlg
```

## 6.13.28 nw::DialogNode

```
struct DialogNode
```

### Public Functions

```
inline DialogNode()
```

```
DialogNode *copy() const
```

Copies a Node.

```
std::optional<std::string> get_action_param(const std::string &key)
```

Gets action parameter if it exists.

```
void remove_action_param(const std::string &key)
```

Removes action parameter by key.

```
void remove_action_param(size_t index)
```

Removes action parameter by index.

```
void set_action_param(const std::string &key, const std::string &value)
```

Sets action parameter, if key does not exist key and value are appended.

### Public Members

```
Dialog *parent = nullptr
```

```
DialogNodeType type
```

```
std::string comment
```



```

std::string quest

std::string speaker

uint32_t quest_entry = std::numeric_limits<uint32_t>::max()

Resref script_action

Resref sound

LocString text

DialogAnimation animation = DialogAnimation::default_

bool animation_loop = false

uint32_t delay = std::numeric_limits<uint32_t>::max()

std::vector<DialogPtr*> pointers

std::vector<std::pair<std::string, std::string>> action_params

```

### 6.13.29 nw::DialogPtr

struct **DialogPtr**

#### Public Functions

*DialogPtr* \***add\_ptr**(*DialogPtr* \*ptr, bool is\_link = false)

Adds *Dialog* Pointer, if *is\_link* is false no new pointer or node is created. if *is\_link* is true a new pointer will be created with the node copied from input pointer.

*DialogPtr* \***add\_string**(std::string value, nw::LanguageID lang = nw::LanguageID::english, bool feminine = false)

Adds *Dialog* Pointer and Node with string value set.

*DialogPtr* \***add**()

Adds empty *Dialog* Pointer and Node.

*DialogPtr* \***copy**() const

Copies dialog pointer and all sub-nodes.

void **get\_all\_subnodes**(std::vector<*DialogNode*\*> &subnodes)

Gets all sub-nodes that are not links. When a pointer is removed from the dialog tree all of its sub-nodes must be removed from the main node list, unless they are links.

`std::optional<std::string> get_condition_param(const std::string &key)`  
Gets a condition parameter if it exists.

`void remove_condition_param(const std::string &key)`  
Removes condition parameter by key.

`void remove_condition_param(size_t index)`  
Removes condition parameter by index.

`void remove_ptr(DialogPtr *ptr)`  
Removes *Dialog* Ptr from underlying node.

`void set_condition_param(const std::string &key, const std::string &value)`  
Sets condition parameter, if key does not exist key and value are appended.

### Public Members

*Dialog* \***parent** = nullptr

*DialogNodeType* **type** = *DialogNodeType::entry*

uint32\_t **index** = std::numeric\_limits<uint32\_t>::max()

*DialogNode* \***node** = nullptr

*Resref* **script\_appears**

std::vector<std::pair<std::string, std::string>> **condition\_params**

bool **is\_start** = false

bool **is\_link** = false

std::string **comment**

### 6.13.30 nw::DiceRoll

struct **DiceRoll**  
A dice roll.

### Public Functions

inline **operator bool**()

### Public Members

int **dice** = 0

Number of dice to roll.

int **sides** = 0

Number of sides on the dice.

int **bonus** = 0

Additional bonus.

## 6.13.31 nw::Directory

struct **Directory** : public nw::Container

### Public Functions

**Directory**() = default

explicit **Directory**(const std::filesystem::path &path)

virtual ~**Directory**() = default

virtual std::vector<ResourceDescriptor> **all**() const override

Get all resources.

virtual bool **contains**(Resource res) const override

Get if container contains resource.

virtual ResourceData **demand**(Resource res) const override

Reads resource data, empty ResourceData if no match.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const override

Extract elements from a container by regex.

inline virtual const std::string &**name**() const override

Equivalent to basename *path()*

inline virtual const std::string &**path**() const override

Path to container, for basic containers, should be canonical.

virtual size\_t **size**() const override

Determines the size, if applicable, of the container.

virtual ResourceDescriptor **stat**(const Resource &res) const override

Get some general data about a resource.

```
inline virtual bool valid() const noexcept override
    Return true if loaded, false if not.

virtual void visit(std::function<void(const Resource>> callback) const noexcept override
    Visits all resources in a container.

virtual int extract_by_glob(std::string_view glob, const std::filesystem::path &output) const
    Extract elements from a container by glob pattern.

const std::filesystem::path &working_directory() const
    Get container working directory.
```

### 6.13.32 nw::Disease

```
struct Disease
```

#### Public Functions

```
bool operator==(const Disease &rhs) const = default
    Defaulted equality operator

auto operator<=>(const Disease &rhs) const = default
    Defaulted spaceship operator

inline constexpr int32_t operator*() const noexcept
    Returns rule type as value

inline constexpr size_t idx() const noexcept
    Returns rule type as index
```

#### Public Static Functions

```
static inline constexpr Disease make(int32_t id)
    Makes a rule type

static inline constexpr Disease invalid()
    Returns an invalid rule type
```

### 6.13.33 nw::Door

```
struct Door : public nw::ObjectBase
```

## Public Functions

### Door()

```

inline virtual Common *as_common() override
inline virtual const Common *as_common() const override
inline virtual Door *as_door() override
inline virtual const Door *as_door() const override
inline virtual bool instantiate() override
inline virtual InternedString tag() const override
inline ObjectHandle handle() const noexcept
inline void set_handle(ObjectHandle handle)
const EffectArray &effects() const
EffectArray &effects()
inline virtual Versus versus_me() const
inline virtual Area *as_area()
inline virtual const Area *as_area() const
inline virtual Creature *as_creature()
inline virtual const Creature *as_creature() const
inline virtual Encounter *as_encounter()
inline virtual const Encounter *as_encounter() const
inline virtual Item *as_item()
inline virtual const Item *as_item() const
inline virtual Module *as_module()
inline virtual const Module *as_module() const
inline virtual Placeable *as_placeable()
inline virtual const Placeable *as_placeable() const
inline virtual Player *as_player()
inline virtual const Player *as_player() const
inline virtual Sound *as_sound()
inline virtual const Sound *as_sound() const
inline virtual Store *as_store()

```

```
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const
inline virtual Waypoint *as_waypoint()
inline virtual const Waypoint *as_waypoint() const
```

## Public Members

*Common* **common**

*DoorScripts* **scripts**

*Lock* **lock**

*Trap* **trap**

*Resref* **conversation**

*LocString* **description**

std::string **linked\_to**

*Saves* **saves**

uint32\_t **appearance**

uint32\_t **faction** = 0

uint32\_t **generic\_type** = 0

int16\_t **hp** = 0

int16\_t **hp\_current** = 0

uint16\_t **loadscreen** = 0

uint16\_t **portrait\_id**

*DoorAnimationState* **animation\_state** = *DoorAnimationState::closed*

```
uint8_t hardness
```

```
bool interruptable = 0
```

```
uint8_t linked_to_flags = 0
```

```
bool plot = false
```

```
bool instantiated_ = true
```

### Public Static Functions

```
static bool deserialize(Door *obj, const nlohmann::json &archive, SerializationProfile profile)
```

```
static bool serialize(const Door *obj, nlohmann::json &archive, SerializationProfile profile)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::door
```

```
static constexpr ResourceType::type restype = ResourceType::utd
```

## 6.13.34 nw::DoorScripts

```
struct DoorScripts
```

### Public Functions

```
bool from_json(const nlohmann::json &archive)
```

```
nlohmann::json to_json() const
```

### Public Members

```
Resref on_click
```

```
Resref on_closed
```

```
Resref on_damaged
```

*Resref* **on\_death**

*Resref* **on\_disarm**

*Resref* **on\_heartbeat**

*Resref* **on\_lock**

*Resref* **on\_melee\_attacked**

*Resref* **on\_open**

*Resref* **on\_open\_failure**

*Resref* **on\_spell\_cast\_at**

*Resref* **on\_trap\_triggered**

*Resref* **on\_unlock**

*Resref* **on\_user\_defined**

### 6.13.35 nw::Effect

struct **Effect**

#### Public Functions

**Effect**()

**Effect**(EffectType type\_)

void **clear**()

Clears the effect such that it's as if default constructed.

float **get\_float**(size\_t index) const noexcept

Gets a floating point value.

int **get\_int**(size\_t index) const noexcept

Gets an integer point value.

std::string\_view **get\_string**(size\_t index) const noexcept

Gets a string value.

*EffectHandle* **handle**() noexcept

Gets the effect's handle.



EffectID **id**() const noexcept  
 Gets the effect's ID.

void **set\_float**(size\_t index, float value)  
 Sets a floating point value.

void **set\_id**(EffectID id)  
 Sets effect's ID.

void **set\_int**(size\_t index, int value)  
 Sets an integer point value.

void **set\_string**(size\_t index, std::string value)  
 Sets a string value.

void **set\_versus**(*Versus* vs)  
 Sets the versus value.

const *Versus* &**versus**() const noexcept  
 Gets the versus value.

### Public Members

EffectType **type** = EffectType::invalid()

EffectCategory **category** = EffectCategory::magical

int **subtype** = -1

ObjectHandle **creator**

*Spell* **spell\_id** = *Spell*::invalid()

float **duration** = 0.0f

uint32\_t **expire\_day** = 0

uint32\_t **expire\_time** = 0

### 6.13.36 nw::EffectArray

struct **EffectArray**

## Public Types

using **storage** = std::vector<*EffectHandle*>

using **iterator** = *storage*::iterator

using **const\_iterator** = *storage*::const\_iterator

## Public Functions

bool **add**(*Effect* \*effect)

Adds an effect.

*iterator* **begin**()

*const\_iterator* **begin**() const

*iterator* **end**()

*const\_iterator* **end**() const

void **erase**(*iterator* first, *iterator* last)

Removes a range of effects.

bool **remove**(*Effect* \*effect)

Removes an effect.

size\_t **size**() const noexcept

Gets the number of applied effects.

### 6.13.37 nw::EffectHandle

struct **EffectHandle**

## Public Functions

bool **operator==**(const *EffectHandle*&) const = default

auto **operator<=>**(const *EffectHandle*&) const = default

## Public Members

EffectType **type** = EffectType::invalid()

int **subtype** = -1

ObjectHandle **creator**

```
Spell spell_id = Spell::invalid()
```

```
EffectCategory category = EffectCategory::magical
```

```
Effect *effect = nullptr
```

### 6.13.38 nw::Encounter

```
struct Encounter : public nw::ObjectBase
```

#### Public Functions

```
Encounter()
```

```
inline virtual Common *as_common() override
```

```
inline virtual const Common *as_common() const override
```

```
inline virtual Encounter *as_encounter() override
```

```
inline virtual const Encounter *as_encounter() const override
```

```
inline virtual bool instantiate() override
```

```
inline virtual InternedString tag() const override
```

```
inline ObjectHandle handle() const noexcept
```

```
inline void set_handle(ObjectHandle handle)
```

```
const EffectArray &effects() const
```

```
EffectArray &effects()
```

```
inline virtual Versus versus_me() const
```

```
inline virtual Area *as_area()
```

```
inline virtual const Area *as_area() const
```

```
inline virtual Creature *as_creature()
```

```
inline virtual const Creature *as_creature() const
```

```
inline virtual Door *as_door()
```

```
inline virtual const Door *as_door() const
```

```
inline virtual Item *as_item()
```

```
inline virtual const Item *as_item() const
```

```
inline virtual Module *as_module()
```

```
inline virtual const Module *as_module() const
inline virtual Placeable *as_placeable()
inline virtual const Placeable *as_placeable() const
inline virtual Player *as_player()
inline virtual const Player *as_player() const
inline virtual Sound *as_sound()
inline virtual const Sound *as_sound() const
inline virtual Store *as_store()
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const
inline virtual Waypoint *as_waypoint()
inline virtual const Waypoint *as_waypoint() const
```

## Public Members

*Common* **common**

*EncounterScripts* **scripts**

std::vector<*SpawnCreature*> **creatures**

std::vector<glm::vec3> **geometry**

std::vector<*SpawnPoint*> **spawn\_points**

int32\_t **creatures\_max** = -1

int32\_t **creatures\_recommended** = 0

int32\_t **difficulty** = 0

int32\_t **difficulty\_index** = 0

uint32\_t **faction** = 0

int32\_t **reset\_time** = 0

```
int32_t respawns = 0
```

```
int32_t spawn_option = 0
```

```
bool active = true
```

```
bool player_only = false
```

```
bool reset = true
```

```
bool instantiated_ = false
```

### Public Static Functions

```
static bool deserialize(Encounter *obj, const nlohmann::json &archive, SerializationProfile profile)
```

```
static bool serialize(const Encounter *obj, nlohmann::json &archive, SerializationProfile profile)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::encounter
```

```
static constexpr ResourceType::type restype = ResourceType::ute
```

## 6.13.39 nw::EncounterScripts

```
struct EncounterScripts
```

### Public Functions

```
bool from_json(const nlohmann::json &archive)
```

```
nlohmann::json to_json() const
```

### Public Members

*Resref* **on\_entered**

*Resref* **on\_exhausted**

*Resref* **on\_exit**

*Resref* **on\_heartbeat**

*Resref* **on\_user\_defined**

## 6.13.40 nw::Equips

struct **Equips**

### Public Functions

**Equips**(*Creature* \*owner)

**Equips**(const *Equips*&) = delete

**Equips**(*Equips*&&) = default

*Equips* &**operator**=(const *Equips*&) = delete

*Equips* &**operator**=(*Equips*&&) = default

**~Equips**() = default

bool **instantiate**()

bool **from\_json**(const nlohmann::json &archive, *SerializationProfile* profile)

nlohmann::json **to\_json**(*SerializationProfile* profile) const

### Public Members

nw::*Creature* \***owner\_** = nullptr

std::array<*EquipItem*, 18> **equips**

### 6.13.41 nw::Erf

struct **Erf** : public nw::Container

#### Public Functions

**Erf**() = default

explicit **Erf**(const std::filesystem::path &path)

**Erf**(const *Erf* &) = delete

**Erf**(*Erf* &&other) = default

virtual ~**Erf**() = default

bool **add**(Resource res, const ByteArray &bytes)

Adds resources from array of bytes.

bool **add**(const std::filesystem::path &path)

Adds resources from path.

size\_t **erase**(const Resource &res)

Removes resource.

bool **merge**(const Container \*container)

Merges the contents of another container.

bool **reload**()

Reloads *Erf*

---

**Note:** *Erf::working\_directory()* will not change

---

bool **save**() const

Saves *Erf* to *Erf::path()*

---

**Note:** It's probably best to call *Erf::reload* after save.

---

bool **save\_as**(const std::filesystem::path &path) const

Saves *Erf* to different path

---

**Note:** Current *Erf* unmodified, to load *Erf* at new path a new *Erf* must be constructed.

---

virtual std::vector<ResourceDescriptor> **all**() const override

Get all resources.

virtual bool **contains**(Resource res) const override

Get if container contains resource.

virtual ResourceData **demand**(Resource res) const override

Reads resource data, empty ResourceData if no match.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const override

Extract elements from a container by regex.

inline virtual const std::string &**name**() const override

Equivalent to `basename` [\*path\(\)\*](#)

inline virtual const std::string &**path**() const override

Path to container, for basic containers, should be canonical.

virtual size\_t **size**() const override

Determines the size, if applicable, of the container.

virtual [\*ResourceDescriptor\*](#) **stat**(const [\*Resource\*](#) &res) const override

Get some general data about a resource.

inline virtual bool **valid**() const noexcept override

Return true if loaded, false if not.

virtual void **visit**(std::function<void(const [\*Resource\*](#)&)> callback) const noexcept override

Visits all resources in a container.

[\*Erf\*](#) &**operator**=(const [\*Erf\*](#)&) = delete

[\*Erf\*](#) &**operator**=([\*Erf\*](#)&&) = default

virtual int **extract\_by\_glob**(std::string\_view glob, const std::filesystem::path &output) const

Extract elements from a container by glob pattern.

const std::filesystem::path &**working\_directory**() const

Get container working directory.

## Public Members

[\*ErfType\*](#) **type** = [\*ErfType\*](#)::*erf*

[\*Erf\*](#) type.

[\*ErfVersion\*](#) **version** = [\*ErfVersion\*](#)::*v1\_0*

Version.

[\*LocString\*](#) **description**

Description.

### 6.13.42 nw::Faction

struct **Faction**



### Public Functions

explicit **Faction**(const *Gff* &archive)

explicit **Faction**(const nlohmann::json &archive)

*GffBuilder* **serialize**() const

nlohmann::json **to\_json**() const

### Public Members

std::vector<*FactionInfo*> **factions**

std::vector<*Reputation*> **reputations**

### Public Static Attributes

static constexpr int **json\_archive\_version** = 1

static constexpr *ResourceType::type* **restype** = *ResourceType::fac*

## 6.13.43 nw::FactionInfo

struct **FactionInfo**

### Public Members

std::string **name**

uint32\_t **parent** = std::numeric\_limits<uint32\_t>::max()

uint16\_t **global** = 0

## 6.13.44 nw::Feat

struct **Feat**

### Public Functions

bool **operator==**(const *Feat* &rhs) const = default  
Defaulted equality operator

auto **operator<=>**(const *Feat* &rhs) const = default  
Defaulted spaceship operator

inline constexpr int32\_t **operator\***( ) const noexcept  
Returns rule type as value

inline constexpr size\_t **idx**( ) const noexcept  
Returns rule type as index

### Public Static Functions

static inline constexpr *Feat* **make**(int32\_t id)  
Makes a rule type

static inline constexpr *Feat* **invalid**( )  
Returns an invalid rule type

## 6.13.45 nw::FeatInfo

struct **FeatInfo**

*Feat* definition.

### Public Functions

**FeatInfo**( ) = default

**FeatInfo**(const TwoDARowView &tda)

inline bool **valid**( ) const noexcept

### Public Members

uint32\_t **name** = 0xFFFFFFFF

uint32\_t **description** = 0xFFFFFFFF

*Resource* **icon**

bool **all\_can\_use** = false

int **category** = -1

```
int max_cr = 0
```

```
int spell = -1
```

```
Feat successor = Feat::invalid()
```

```
float cr_value = 0.0f
```

```
int uses = 0
```

```
int master = 0
```

```
bool target_self = false
```

```
InternedString constant
```

```
int tools_categories = 0
```

```
bool hostile = false
```

```
bool epic = false
```

```
bool requires_action = false
```

```
Requirement requirements
```

#### 6.13.46 nw::GameProfile

struct **GameProfile**

Abstract base class for game profiles.

Subclassed by *nwn1::Profile*

##### Public Functions

virtual **~GameProfile()** = default

virtual bool **load\_rules()** const = 0

Loads game specific rules.

virtual bool **load\_resources()** = 0

### 6.13.47 nw::Gff

struct **Gff**

#### Public Functions

**Gff**() = default

explicit **Gff**(const std::filesystem::path &file, nw::LanguageID lang = nw::LanguageID::english)

explicit **Gff**(ResourceData data, nw::LanguageID lang = nw::LanguageID::english)

*GffStruct* **toplevel**() const

Get the toplevel struct.

inline std::string\_view **type**() const

Get *Gff* type.

bool **valid**() const

Get if *Gff* file successfully parsed.

inline std::string\_view **version**() const

Get the *Gff* Version.

#### Public Members

GffHeader \***head\_** = nullptr

*GffLabel* \***labels\_** = nullptr

GffStructEntry \***structs\_** = nullptr

GffFieldEntry \***fields\_** = nullptr

uint32\_t \***field\_indices\_** = nullptr

uint32\_t \***list\_indices\_** = nullptr

### 6.13.48 nw::GffBuilder

struct **GffBuilder**

### Public Functions

explicit **GffBuilder**(std::string\_view type, std::string\_view version = "V3.2")

size\_t **add\_label**(std::string\_view name)

void **build**()

*ByteArray* **to\_byte\_array**() const

bool **write\_to**(const std::filesystem::path &path) const

### Public Members

*GffBuilderStruct* **top**

GffHeader **header**

*ByteArray* **data**

std::vector<*GffLabel*> **labels**

std::vector<uint32\_t> **field\_indices**

std::vector<uint32\_t> **list\_indices**

std::vector<GffFieldEntry> **field\_entries**

std::vector<GffStructEntry> **struct\_entries**

## 6.13.49 nw::GffBuilderField

struct **GffBuilderField**

### Public Functions

explicit **GffBuilderField**(*GffBuilder* \*parent\_)

### Public Members

*GffBuilder* \***parent** = nullptr

*SerializationType::type* **type**

uint32\_t **index** = 0

uint32\_t **label\_index** = 0

uint32\_t **data\_or\_offset** = 0

std::variant<*GffBuilderStruct*, *GffBuilderList*> **structures**

## 6.13.50 nw::GffBuilderList

struct **GffBuilderList**

### Public Functions

**GffBuilderList**() = default

explicit **GffBuilderList**(*GffBuilder* \*parent\_)

*GffBuilderStruct* &**push\_back**(uint32\_t id)

inline size\_t **size**() const noexcept

### Public Members

*GffBuilder* \***parent** = nullptr

std::vector<*GffBuilderStruct*> **structs**

## 6.13.51 nw::GffBuilderStruct

struct **GffBuilderStruct**

## Public Functions

**GffBuilderStruct**() = default

explicit **GffBuilderStruct**(*GffBuilder* \*parent\_)

template<typename T>

*GffBuilderStruct* &**add\_field**(std::string\_view name, const T &value)

*GffBuilderList* &**add\_list**(std::string\_view name)

*GffBuilderStruct* &**add\_struct**(std::string\_view name, uint32\_t id\_)

## Public Members

*GffBuilder* \***parent** = nullptr

uint32\_t **index** = 0

uint32\_t **id** = 0

std::vector<*GffBuilderField*> **field\_entries**

### 6.13.52 nw::GffField

struct **GffField**

## Public Functions

template<typename T>

std::optional<T> **get**() const

Get the field's value.

template<typename T>

bool **get\_to**(T &value) const

Get the field's value.

std::string\_view **name**() const

Get label.

size\_t **size**() const

If field is a list, returns size of list, else 0.

*SerializationType::type* **type**() const

Get field type.

inline bool **valid**() const noexcept

Get if field is valid.

*GffStruct* **operator[]**(size\_t index) const

If field is a list, return struct at index, else invalid struct.

### 6.13.53 nw::GffLabel

struct **GffLabel**

#### Public Types

using **Storage** = std::array<char, *max\_size*>

using **value\_type** = typename *Storage*::value\_type

using **size\_type** = typename *Storage*::size\_type

#### Public Functions

**GffLabel**()

**GffLabel**(const *GffLabel*&) = default

**GffLabel**(*Storage* data) noexcept

**GffLabel**(const char \*string) noexcept

**GffLabel**(std::string\_view string) noexcept

*GffLabel* &**operator**=(const *GffLabel*&) = default

bool **empty**() const noexcept

Checks if the underlying array has no non-null characters.

*size\_type* **length**() const noexcept

Returns the number of char elements in the array, excluding nulls.

std::string **string**() const

Creates std::string of underlying array.

std::string\_view **view**() const noexcept

Creates std::string\_view of underlying array without null padding.

#### Public Static Attributes

static constexpr size\_t **max\_size** = 16



### 6.13.54 nw::GffStruct

struct **GffStruct**

#### Public Functions

bool **has\_field**(std::string\_view label) const

Check if a struct has a field.

inline uint32\_t **id**() const

Get struct id.

template<typename T>

std::optional<T> **get**(std::string\_view label, bool warn\_missing = true) const

Gets a value from a field in the struct.

template<typename T>

bool **get\_to**(std::string\_view label, T &out, bool warn\_missing = true) const

Gets a value from a field in the struct.

inline size\_t **size**() const

Number of fields in the struct.

inline bool **valid**() const

Check if *Gff* has been parsed without error.

*GffField* **operator**[](std::string\_view label) const

Get field by label.

*GffField* **operator**[](size\_t index) const

Get field by index.

### 6.13.55 nw::Image

struct **Image**

*Image Resource.*

Read/Write Support:

- jpg, png, dds, tga (thanks to stb\_image and SOIL)
- Bioware dds (thanks to NWNExplorer)

*Todo:*

plt

---

**Note:** Even though this supports writing images, this is **catagorically** not a tool for converting/compressing textures.

---

## Public Functions

explicit **Image**(const std::filesystem::path &filename)

explicit **Image**(ResourceData data)

**Image**(*Image* &&other)

**Image**(const *Image* &other) = delete

*Image* &operator=(*Image* &&other)

*Image* &operator=(const *Image* &other) = delete

~**Image**()

uint32\_t **channels**() const noexcept

Get BBP.

uint8\_t \***data**()

Get raw data.

uint32\_t **height**() const noexcept

Get height.

bool **is\_bio\_dds**() const noexcept

Returns true if image was loaded from a bioware dds file.

bool **valid**() const

Determine if successfully loaded.

uint32\_t **width**() const noexcept

Get width.

bool **write\_to**(const std::filesystem::path &filename) const

Write *Image* to file.

### 6.13.56 nw::Ini

struct **Ini**

*Ini* file format parser.

Lookup is by “<section>/<key>”

---

**Note:** This is read only currently.

---

## Public Functions

**Ini** () = default

explicit **Ini** (const std::filesystem::path &filename)

explicit **Ini** (*ByteArray* bytes)

template<typename T>  
std::optional<T> **get**(std::string key) const  
Gets a value.

### Template Parameters

**T** – int32\_t, float, or std::string

### Parameters

**key** –

### Returns

std::optional<T>

bool **get\_to**(std::string key, std::string &out) const  
Gets string value.

bool **get\_to**(std::string key, int &out) const  
Gets int value.

bool **get\_to**(std::string key, float &out) const  
Gets float value.

bool **valid**() const noexcept  
Determines if *Ini* file was successfully parsed.

## 6.13.57 nw::InstallInfo

struct **InstallInfo**

## Public Members

std::filesystem::path **install**

std::filesystem::path **user**

*GameVersion* **version** = *GameVersion::invalid*

### 6.13.58 nw::InternedString

struct **InternedString**

#### Public Functions

**InternedString**() = default

inline explicit **InternedString**(const std::string \*str)

bool **operator**==(const *InternedString* &rhs) const noexcept = default

auto **operator**<=>(const *InternedString* &rhs) const noexcept = default

inline std::string\_view **view**() const noexcept

inline **operator** bool() const noexcept

### 6.13.59 nw::Inventory

struct **Inventory**

#### Public Functions

**Inventory**() = default

inline explicit **Inventory**(ObjectBase \*owner\_)

**Inventory**(const *Inventory*&) = delete

**Inventory**(*Inventory*&&) = default

*Inventory* &**operator**=(const *Inventory*&) = delete

*Inventory* &**operator**=(*Inventory*&&) = default

**~Inventory**() = default

bool **instantiate**()

bool **from\_json**(const nlhmann::json &archive, *SerializationProfile* profile)

nlhmann::json **to\_json**(*SerializationProfile* profile) const

## Public Members

ObjectBase \***owner**

std::vector<*InventoryItem*> **items**

### 6.13.60 nw::InventoryItem

struct **InventoryItem**

## Public Members

bool **infinite** = false

uint16\_t **pos\_x**

uint16\_t **pos\_y**

std::variant<*Resref*, *Item*\*> **item**

### 6.13.61 nw::Item

struct **Item** : public nw::ObjectBase

## Public Functions

**Item**()

inline virtual *Common* \***as\_common**() override

inline virtual const *Common* \***as\_common**() const override

inline virtual *Item* \***as\_item**() override

inline virtual const *Item* \***as\_item**() const override

virtual bool **instantiate**() override

inline virtual *InternedString* **tag**() const override

inline ObjectHandle **handle**() const noexcept

inline void **set\_handle**(ObjectHandle handle)

const *EffectArray* &**effects**() const

*EffectArray* &effects()

inline virtual *Versus* **versus\_me**() const

inline virtual *Area* \***as\_area**()

inline virtual const *Area* \***as\_area**() const

inline virtual *Creature* \***as\_creature**()

inline virtual const *Creature* \***as\_creature**() const

inline virtual *Door* \***as\_door**()

inline virtual const *Door* \***as\_door**() const

inline virtual *Encounter* \***as\_encounter**()

inline virtual const *Encounter* \***as\_encounter**() const

inline virtual *Module* \***as\_module**()

inline virtual const *Module* \***as\_module**() const

inline virtual *Placeable* \***as\_placeable**()

inline virtual const *Placeable* \***as\_placeable**() const

inline virtual *Player* \***as\_player**()

inline virtual const *Player* \***as\_player**() const

inline virtual *Sound* \***as\_sound**()

inline virtual const *Sound* \***as\_sound**() const

inline virtual *Store* \***as\_store**()

inline virtual const *Store* \***as\_store**() const

inline virtual *Trigger* \***as\_trigger**()

inline virtual const *Trigger* \***as\_trigger**() const

inline virtual *Waypoint* \***as\_waypoint**()

inline virtual const *Waypoint* \***as\_waypoint**() const

## Public Members

*Common* **common**

*Inventory* **inventory**

*LocString* **description**

*LocString* **description\_id**

std::vector<*ItemProperty*> **properties**

int **armor\_id** = -1

uint32\_t **cost** = 0

uint32\_t **additional\_cost** = 0

nw::*BaseItem* **baseitem**

uint16\_t **stacksize** = 1

uint8\_t **charges** = 0

bool **cursed** = false

bool **identified** = false

bool **plot** = false

bool **stolen** = false

*ItemModelType* **model\_type** = *ItemModelType::simple*

std::array<uint8\_t, 6> **model\_colors**

std::array<uint8\_t, 19> **model\_parts**

bool **instantiated\_** = false

### Public Static Functions

static bool **deserialize**(*Item* \*obj, const nlohmann::json &archive, *SerializationProfile* profile)

static bool **serialize**(const *Item* \*obj, nlohmann::json &archive, *SerializationProfile* profile)

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::item
```

```
static constexpr ResourceType::type restype = ResourceType::uti
```

## 6.13.62 nw::ItemColors

```
struct ItemColors
```

### Public Types

```
enum type
```

*Values:*

```
enumerator cloth1
```

```
enumerator cloth2
```

```
enumerator leather1
```

```
enumerator leather2
```

```
enumerator metal1
```

```
enumerator metal2
```

## 6.13.63 nw::ItemModelParts

```
struct ItemModelParts
```

### Public Types

```
enum type
```

*Values:*

```
enumerator model1
```



enumerator **model2**

enumerator **model3**

enumerator **armor\_belt**

enumerator **armor\_lbicep**

enumerator **armor\_lfarm**

enumerator **armor\_lfoot**

enumerator **armor\_lhand**

enumerator **armor\_lshin**

enumerator **armor\_lshoul**

enumerator **armor\_lthigh**

enumerator **armor\_neck**

enumerator **armor\_pelvis**

enumerator **armor\_rbicep**

enumerator **armor\_rfarm**

enumerator **armor\_rfoot**

enumerator **armor\_rhand**

enumerator **armor\_robe**

enumerator **armor\_rshin**

enumerator **armor\_rshoul**

enumerator **armor\_rthigh**

enumerator **armor\_torso**

### 6.13.64 nw::ItemProperty

struct **ItemProperty**

#### Public Members

uint16\_t **type** = std::numeric\_limits<uint16\_t>::max()

uint16\_t **subtype** = std::numeric\_limits<uint16\_t>::max()

uint8\_t **cost\_table** = std::numeric\_limits<uint8\_t>::max()

uint16\_t **cost\_value** = std::numeric\_limits<uint16\_t>::max()

uint8\_t **param\_table** = std::numeric\_limits<uint8\_t>::max()

uint8\_t **param\_value** = std::numeric\_limits<uint8\_t>::max()

### 6.13.65 nw::Journal

struct **Journal**

#### Public Functions

explicit **Journal**(const *GffStruct* gff)

#### Public Members

std::vector<*JournalCategory*> **categories**

#### Public Static Attributes

static constexpr int **json\_archive\_version** = 1

static constexpr *ResourceType::type* **restype** = *ResourceType::jrl*

### 6.13.66 nw::JournalCategory

struct **JournalCategory**

#### **Public Members**

std::string **comment**

std::vector<*JournalEntry*> **entries**

*LocString* **name**

std::string **tag**

uint32\_t **priority**

uint32\_t **xp**

uint16\_t **picture**

### 6.13.67 nw::JournalEntry

struct **JournalEntry**

#### **Public Members**

*LocString* **text**

uint32\_t **id**

uint16\_t **end**

### 6.13.68 nw::Key

struct **Key** : public nw::Container

## Public Functions

explicit **Key**(std::filesystem::path path)

**Key**(const *Key*&) = delete

**Key**(*Key*&&) = default

virtual ~**Key**() = default

inline bool **is\_loaded**() const noexcept

Returns if *Key* file was successfully loaded.

virtual std::vector<*ResourceDescriptor*> **all**() const override

Get all resources.

virtual bool **contains**(*Resource* res) const override

Get if container contains resource.

virtual ResourceData **demand**(*Resource* res) const override

Reads resource data, empty ResourceData if no match.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const override

Extract elements from a container by regex.

inline virtual const std::string &**name**() const override

Equivalent to `basename` *path()*

inline virtual const std::string &**path**() const override

Path to container, for basic containers, should be canonical.

virtual size\_t **size**() const override

Determines the size, if applicable, of the container.

virtual *ResourceDescriptor* **stat**(const *Resource* &res) const override

Get some general data about a resource.

inline virtual bool **valid**() const noexcept override

Return true if loaded, false if not.

virtual void **visit**(std::function<void(const *Resource*&> callback) const noexcept override

Visits all resources in a container.

*Key* &**operator**=(const *Key*&) = delete

*Key* &**operator**=(*Key*&&) = default

virtual int **extract\_by\_glob**(std::string\_view glob, const std::filesystem::path &output) const

Extract elements from a container by glob pattern.

const std::filesystem::path &**working\_directory**() const

Get container working directory.

### 6.13.69 nw::Language

struct **Language**

Constants and related properties for supported languages.

---

**Note:** Might not be identical to what the game uses... yet. Short codes taken from [https://en.wikipedia.org/wiki/List\\_of\\_ISO\\_639-1\\_codes](https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes). Encodings are probably right.

---

#### Public Static Functions

static std::string\_view **encoding**(*LanguageID* lang)

Gets the encoding for a particular language.

static *LanguageID* **from\_string**(std::string\_view lang)

Converts string (short or long form) to ID.

static bool **has\_feminine**(*LanguageID* lang)

Determines if language has feminine translations.

static std::pair<*LanguageID*, bool> **to\_base\_id**(uint32\_t lang)

Convert runtime language identifier to base language and bool indicating masc/fem.

static uint32\_t **to\_runtime\_id**(*LanguageID* lang, bool feminine = false)

Convert language ID to runtime identifier.

static std::string\_view **to\_string**(*LanguageID* lang, bool long\_name = false)

Converts language to string form.

### 6.13.70 nw::Language::Properties

struct **Properties**

#### Public Members

*LanguageID* **id**

std::string\_view **lang\_short**

std::string\_view **lang\_long**

std::string\_view **encoding**

bool **has\_feminine**

### 6.13.71 nw::LevelHistory

struct **LevelHistory**

Encapsulates a players level up history.

#### Public Members

std::vector<LevelUp> **entries**

### 6.13.72 nw::LevelHistoryEntry

**Warning:** doxygenstruct: Cannot find class “nw::LevelHistoryEntry” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.73 nw::LevelStats

struct **LevelStats**

#### Public Functions

**LevelStats**() = default

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

int **level**() const noexcept

Determines total level.

int **level\_by\_class**(*Class* id) const noexcept

Determines level by class.

size\_t **position**(*Class* id) const noexcept

Returns the position of the class, or npos.

#### Public Members

std::array<*ClassEntry*, *max\_classes*> **entries**

## Public Static Attributes

```
static constexpr size_t max_classes = 8
```

```
static constexpr size_t npos = std::numeric_limits<size_t>::max()
```

### 6.13.74 nw::LocString

```
struct LocString
```

## Public Types

```
using LocStringPair = std::pair<uint32_t, std::string>
```

```
using Storage = std::vector<LocStringPair>
```

```
using size_type = Storage::size_type
```

```
using iterator = Storage::iterator
```

```
using const_iterator = Storage::const_iterator
```

## Public Functions

```
explicit LocString(uint32_t strref = std::numeric_limits<uint32_t>::max())
```

```
LocString(const LocString&) = default
```

```
LocString(LocString&&) = default
```

```
bool add(LanguageID language, std::string_view str, bool feminine = false)  
    Add a localized string.
```

```
std::string get(LanguageID language, bool feminine = false) const  
    Gets a localized string.
```

```
bool contains(LanguageID language, bool feminine = false) const  
    Determines if a localized string is set.
```

```
void remove(LanguageID language, bool feminine = false)  
    Removes a localized string.
```

```
size_type size() const  
    Gets number of localized strings.
```

```
uint32_t strref() const  
    Gets string reference.
```

*iterator* **begin**()  
Iterators.

*iterator* **end**()

*const\_iterator* **begin**() const

*const\_iterator* **end**() const

*LocString* &**operator**=(const *LocString*&) = default  
Operators.

*LocString* &**operator**=(*LocString*&&) = default

bool **operator**==(const *LocString* &other) const

### 6.13.75 nw::LocalData

struct **LocalData**

#### Public Functions

**LocalData**() = default

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**(*SerializationProfile* profile) const

void **delete\_float**(std::string\_view var)

void **delete\_int**(std::string\_view var)

void **delete\_object**(std::string\_view var)

void **delete\_string**(std::string\_view var)

void **delete\_location**(std::string\_view var)

float **get\_float**(std::string\_view var) const

int32\_t **get\_int**(std::string\_view var) const

*ObjectID* **get\_object**(std::string\_view var) const

std::string **get\_string**(std::string\_view var) const

*Location* **get\_location**(std::string\_view var) const

void **set\_float**(std::string\_view var, float value)

void **set\_int**(std::string\_view var, int32\_t value)

void **set\_object**(std::string\_view var, *ObjectID* value)

void **set\_string**(std::string\_view var, std::string\_view value)

void **set\_location**(std::string\_view var, *Location* value)

inline size\_t **size**() const noexcept



### Friends

friend bool **deserialize**(*LocalData* &self, const *GffStruct* &archive)

friend bool **serialize**(const *LocalData* &self, *GffBuilderStruct* &archive, *SerializationProfile* profile)

## 6.13.76 nw::LocalVar

struct **LocalVar**

### Public Members

float **float\_**

int32\_t **integer**

*ObjectID* **object**

std::string **string**

*Location* **loc**

std::bitset<8> **flags**

## 6.13.77 nw::LocalVarType

struct **LocalVarType**

### Public Static Attributes

static constexpr uint32\_t **integer** = 1

static constexpr uint32\_t **float\_** = 2

static constexpr uint32\_t **string** = 3

static constexpr uint32\_t **object** = 4

static constexpr uint32\_t **location** = 5

### 6.13.78 nw::Location

struct **Location**

#### Public Functions

**Location**()

inline **operator bool**()

**bool operator==**(const *Location*&) const = default

#### Public Members

*ObjectID* **area**

glm::vec3 **position**

glm::vec3 **orientation**

### 6.13.79 nw::Lock

struct **Lock**

Component for lockable objects.

#### Public Functions

**Lock**() = default

**bool from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

#### Public Members

std::string **key\_name**

**bool key\_required** = false

**bool lockable** = false

**bool locked** = false

```
uint8_t lock_dc = 0
```

```
uint8_t unlock_dc = 0
```

```
bool remove_key = false
```

### 6.13.80 nw::MasterFeat

```
struct MasterFeat
```

#### Public Functions

```
bool operator==(const MasterFeat &rhs) const = default  
    Defaulted equality operator
```

```
auto operator<=>(const MasterFeat &rhs) const = default  
    Defaulted spaceship operator
```

```
inline constexpr int32_t operator*() const noexcept  
    Returns rule type as value
```

```
inline constexpr size_t idx() const noexcept  
    Returns rule type as index
```

#### Public Static Functions

```
static inline constexpr MasterFeat make(int32_t id)  
    Makes a rule type
```

```
static inline constexpr MasterFeat invalid()  
    Returns an invalid rule type
```

### 6.13.81 nw::MasterFeatRegistry

```
struct MasterFeatRegistry
```

#### Public Functions

```
template<typename T>  
void add(T type, MasterFeat mfeat, Feat feat)
```

```
void clear() noexcept
```

```
inline const std::vector<MasterFeatEntry> &entries() const noexcept
```

```
const ModifierVariant &get_bonus(MasterFeat mfeat) const
```

```
template<typename T>
```

```
void remove(T type, MasterFeat mfeat)  
void set_bonus(MasterFeat mfeat, ModifierVariant bonus)
```

### 6.13.82 nw::Modifier

```
struct Modifier
```

#### Public Members

```
ModifierType type = ModifierType::invalid()  
  
ModifierVariant input  
  
InternedString tagged  
  
ModifierSource source = ModifierSource::unknown  
  
Requirement requirement = Requirement{ }  
  
Versus versus = { }  
  
int subtype = -1
```

### 6.13.83 nw::ModifierRegistry

```
struct ModifierRegistry
```

#### Public Types

```
using Storage = std::vector<Modifier>  
  
using iterator = Storage::iterator  
  
using const_iterator = Storage::const_iterator
```

## Public Functions

void **add**(*Modifier* mod)

Adds a modifier to the system.

*iterator* **begin**()

*const\_iterator* **begin**() const

*const\_iterator* **cbegin**() const

void **clear**()

Clears all modifiers.

*iterator* **end**()

*const\_iterator* **end**() const

*const\_iterator* **cend**() const

int **remove**(std::string\_view tag)

Removes modifiers by tag.

### Parameters

**tag** – if string\_view ends with '\*' then matches any tag that starts with tag

### Returns

int number of modifiers affected

int **replace**(std::string\_view tag, *ModifierVariant* value)

Replace modifier value.

### Parameters

- **tag** – if string\_view ends with '\*' then matches any tag that starts with tag
- **value** – new value

### Returns

int number of modifiers affected

int **replace**(std::string\_view tag, const *Requirement* &req)

Replace modifier requirement.

### Parameters

- **tag** – if string\_view ends with '\*' then matches any tag that starts with tag
- **req** – new requirement

### Returns

int number of modifiers affected

size\_t **size**() const

Gets the number of modifiers.

### 6.13.84 nw::ModifierType

struct **ModifierType**

#### Public Functions

bool **operator==**(const *ModifierType* &rhs) const = default  
Defaulted equality operator

auto **operator<=>**(const *ModifierType* &rhs) const = default  
Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept  
Returns rule type as value

inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

#### Public Static Functions

static inline constexpr *ModifierType* **make**(int32\_t id)  
Makes a rule type

static inline constexpr *ModifierType* **invalid**()  
Returns an invalid rule type

### 6.13.85 nw::Module

struct **Module** : public nw::ObjectBase

#### Public Types

using **AreaVariant** = std::variant<std::vector<*Resref*>, std::vector<*Area*\*>>

#### Public Functions

inline virtual *Module* \***as\_module**() override

inline virtual const *Module* \***as\_module**() const override

virtual bool **instantiate**() override

size\_t **area\_count**() const noexcept

const *Area* \***get\_area**(size\_t index) const

inline ObjectHandle **handle**() const noexcept

```

inline void set_handle(ObjectHandle handle)

const EffectArray &effects() const

EffectArray &effects()

inline virtual Versus versus_me() const

virtual InternedString tag() const

inline virtual Area *as_area()

inline virtual const Area *as_area() const

inline virtual Common *as_common()

inline virtual const Common *as_common() const

inline virtual Creature *as_creature()

inline virtual const Creature *as_creature() const

inline virtual Door *as_door()

inline virtual const Door *as_door() const

inline virtual Encounter *as_encounter()

inline virtual const Encounter *as_encounter() const

inline virtual Item *as_item()

inline virtual const Item *as_item() const

inline virtual Placeable *as_placeable()

inline virtual const Placeable *as_placeable() const

inline virtual Player *as_player()

inline virtual const Player *as_player() const

inline virtual Sound *as_sound()

inline virtual const Sound *as_sound() const

inline virtual Store *as_store()

inline virtual const Store *as_store() const

inline virtual Trigger *as_trigger()

inline virtual const Trigger *as_trigger() const

inline virtual Waypoint *as_waypoint()

inline virtual const Waypoint *as_waypoint() const

```

## Public Members

*LocalData* **locals**

*ModuleScripts* **scripts**

*AreaVariant* **areas**

*LocString* **description**

*Resref* **entry\_area**

glm::vec3 **entry\_orientation**

glm::vec3 **entry\_position**

std::vector<std::string> **haks**

*ByteArray* **id**

std::string **min\_game\_version**

*LocString* **name**

*Resref* **start\_movie**

std::string **tag**

std::string **tlk**

uuids::uuid **uuid**

int32\_t **creator** = 0

uint32\_t **start\_year**

uint32\_t **version** = 3

uint16\_t **expansion\_pack** = 0

uint8\_t **dawn\_hour** = 0



```
uint8_t dusk_hour = 0
```

```
bool is_save_game = false
```

```
uint8_t minutes_per_hour = 0
```

```
uint8_t start_day = 0
```

```
uint8_t start_hour = 0
```

```
uint8_t start_month = 0
```

```
uint8_t xpscale = 0
```

```
bool instantiated_ = false
```

### Public Static Functions

```
static bool deserialize(Module *ent, const nlohmann::json &archive)
```

```
static bool serialize(const Module *ent, nlohmann::json &archive)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::module
```

```
static constexpr ResourceType::type restype = ResourceType::ifo
```

## 6.13.86 nw::ModuleScripts

```
struct ModuleScripts
```

### Public Functions

```
ModuleScripts() = default
```

```
bool from_json(const nlohmann::json &archive)
```

```
nlohmann::json to_json() const
```

**Public Members**

*Resref* on\_client\_enter

*Resref* on\_client\_leave

*Resref* on\_cutsnabort

*Resref* on\_heartbeat

*Resref* on\_item\_acquire

*Resref* on\_item\_activate

*Resref* on\_item\_unaquire

*Resref* on\_load

*Resref* on\_player\_chat

*Resref* on\_player\_death

*Resref* on\_player\_dying

*Resref* on\_player\_equip

*Resref* on\_player\_level\_up

*Resref* on\_player\_rest

*Resref* on\_player\_uneqiup

*Resref* on\_spawnbtndn

*Resref* on\_start

*Resref* on\_user\_defined

### 6.13.87 nw::NWSync

struct **NWSync**

#### Public Functions

**NWSync**()

explicit **NWSync**(const std::filesystem::path &path)

**NWSync**(const *NWSync*&) = delete

**NWSync**(*NWSync*&&) = default

~**NWSync**() = default

*NWSyncManifest* \***get**(std::string\_view manifest)

Get a particular manifest as a container.

bool **is\_loaded**() const noexcept

Get if *NWSync* was successfully loaded.

std::vector<std::string> **manifests**()

Get list of all manifests.

size\_t **shard\_count**() const noexcept

Get the number of shards.

inline sqlite3 \***meta**()

Get a pointer to the nwsyncmeta database.

inline std::vector<*sqlite3\_ptr*> &**shards**()

List of all shards as active Sqlite3 connections.

*NWSync* &**operator**=(const *NWSync*&) = delete

*NWSync* &**operator**=(*NWSync*&&) = default

### 6.13.88 nw::NWSyncManifest

struct **NWSyncManifest** : public nw::Container

Abstracts over manifests, treating them as a *nw::Container*.

#### Public Functions

**NWSyncManifest**() = default

**NWSyncManifest**(std::string manifest, *NWSync* \*parent)

virtual std::vector<*ResourceDescriptor*> **all**() const override

Get all resources.

virtual bool **contains**(*Resource* res) const override  
Get if container contains resource.

virtual ResourceData **demand**(*Resource* res) const override  
Reads resource data, empty ResourceData if no match.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const override  
Extract elements from a container by regex.

inline virtual const std::string &**name**() const override  
Equivalent to `basename` *path()*

inline virtual const std::string &**path**() const override  
Path to container, for basic containers, should be canonical.

inline virtual size\_t **size**() const override  
Determines the size, if applicable, of the container.

virtual *ResourceDescriptor* **stat**(const *Resource* &res) const override  
Get some general data about a resource.

inline virtual bool **valid**() const noexcept override  
Return true if loaded, false if not.

virtual void **visit**(std::function<void(const *Resource*&)> callback) const noexcept override  
Visits all resources in a container.

virtual int **extract\_by\_glob**(std::string\_view glob, const std::filesystem::path &output) const  
Extract elements from a container by glob pattern.

const std::filesystem::path &**working\_directory**() const  
Get container working directory.

### 6.13.89 nw::Null

struct **Null**  
Empty helper struct for *Variant*.

### 6.13.90 nw::Palette

struct **Palette**

#### Public Functions

explicit **Palette**(const *Gff* &gff)  
**~Palette**() = default  
inline uint8\_t **max\_id**() const noexcept  
inline void **set\_max\_id**(uint8\_t id) noexcept

```
inline bool valid() const noexcept
nllohmann::json to_json(nw::ResourceType::type restype) const
```

## Public Members

*PaletteTreeNode* **root**

*ResourceType::type* **resource\_type**

*Resref* **tileset**

bool **is\_skeleton** = false

## Public Static Attributes

static constexpr int **json\_archive\_version** = 1

### 6.13.91 nw::PaletteTreeNode

struct **PaletteTreeNode**

## Public Functions

**PaletteTreeNode**() = default

## Public Members

*PaletteNodeType* **type**

uint8\_t **id** = std::numeric\_limits<uint8\_t>::max()

uint8\_t **display** = 0

std::string **name**

uint32\_t **strref** = std::numeric\_limits<uint32\_t>::max()

*Resref* **resref**

float **cr** = 0.0

std::string **faction**

std::vector<*PaletteTreeNode*> **children**

### 6.13.92 nw::Placeable

struct **Placeable** : public nw::ObjectBase

#### Public Functions

**Placeable()**

inline virtual *Common* \***as\_common**() override

inline virtual const *Common* \***as\_common**() const override

inline virtual *Placeable* \***as\_placeable**() override

inline virtual const *Placeable* \***as\_placeable**() const override

virtual bool **instantiate**() override

inline virtual *InternedString* **tag**() const override

inline ObjectHandle **handle**() const noexcept

inline void **set\_handle**(ObjectHandle handle)

const *EffectArray* &**effects**() const

*EffectArray* &**effects**()

inline virtual *Versus* **versus\_me**() const

inline virtual *Area* \***as\_area**()

inline virtual const *Area* \***as\_area**() const

inline virtual *Creature* \***as\_creature**()

inline virtual const *Creature* \***as\_creature**() const

inline virtual *Door* \***as\_door**()

inline virtual const *Door* \***as\_door**() const

inline virtual *Encounter* \***as\_encounter**()

inline virtual const *Encounter* \***as\_encounter**() const

inline virtual *Item* \***as\_item**()

inline virtual const *Item* \***as\_item**() const

inline virtual *Module* \***as\_module**()

```

inline virtual const Module *as_module() const
inline virtual Player *as_player()
inline virtual const Player *as_player() const
inline virtual Sound *as_sound()
inline virtual const Sound *as_sound() const
inline virtual Store *as_store()
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const
inline virtual Waypoint *as_waypoint()
inline virtual const Waypoint *as_waypoint() const

```

## Public Members

*Common* **common**

*PlaceableScripts* **scripts**

*Inventory* **inventory**

*Lock* **lock**

*Trap* **trap**

*Resref* **conversation**

*LocString* **description**

*Saves* **saves**

uint32\_t **appearance**

uint32\_t **faction** = 0

int16\_t **hp** = 0

int16\_t **hp\_current** = 0

```
uint16_t portrait_id
```

```
PlaceableAnimationState animation_state
```

```
uint8_t bodybag = 0
```

```
uint8_t hardness
```

```
bool has_inventory = false
```

```
bool interruptable = 0
```

```
bool plot = 0
```

```
bool static_ = false
```

```
bool useable = false
```

```
bool instantiated_ = false
```

### Public Static Functions

```
static bool deserialize(Placeable *obj, const nlohmann::json &archive, SerializationProfile profile)
```

```
static bool serialize(const Placeable *obj, nlohmann::json &archive, SerializationProfile profile)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::placeable
```

```
static constexpr ResourceType::type restype = ResourceType::utp
```

## 6.13.93 nw::PlaceableScripts

```
struct PlaceableScripts
```



## Public Functions

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

## Public Members

*Resref* **on\_click**

*Resref* **on\_closed**

*Resref* **on\_damaged**

*Resref* **on\_death**

*Resref* **on\_disarm**

*Resref* **on\_heartbeat**

*Resref* **on\_inventory\_disturbed**

*Resref* **on\_lock**

*Resref* **on\_melee\_attacked**

*Resref* **on\_open**

*Resref* **on\_spell\_cast\_at**

*Resref* **on\_trap\_triggered**

*Resref* **on\_unlock**

*Resref* **on\_used**

*Resref* **on\_user\_defined**

### 6.13.94 nw::Player

struct **Player** : public nw::Creature

#### Public Functions

```
inline virtual Player *as_player() override
inline virtual const Player *as_player() const override
inline virtual InternedString tag() const override
inline virtual Common *as_common() override
inline virtual const Common *as_common() const override
inline virtual Creature *as_creature() override
inline virtual const Creature *as_creature() const override
virtual bool instantiate() override
virtual Versus versus_me() const override
inline ObjectHandle handle() const noexcept
inline void set_handle(ObjectHandle handle)
const EffectArray &effects() const
EffectArray &effects()
inline virtual Area *as_area()
inline virtual const Area *as_area() const
inline virtual Door *as_door()
inline virtual const Door *as_door() const
inline virtual Encounter *as_encounter()
inline virtual const Encounter *as_encounter() const
inline virtual Item *as_item()
inline virtual const Item *as_item() const
inline virtual Module *as_module()
inline virtual const Module *as_module() const
inline virtual Placeable *as_placeable()
inline virtual const Placeable *as_placeable() const
inline virtual Sound *as_sound()
```

```
inline virtual const Sound *as_sound() const
inline virtual Store *as_store()
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const
inline virtual Waypoint *as_waypoint()
inline virtual const Waypoint *as_waypoint() const
```

## Public Members

*Common* **common**

*Appearance* **appearance**

*CombatInfo* **combat\_info**

*Equips* **equipment**

*Inventory* **inventory**

*LevelStats* **levels**

*LevelHistory* **history**

*CreatureScripts* **scripts**

*CreatureStats* **stats**

*Resref* **conversation**

std::string **deity**

*LocString* **description**

*LocString* **name\_first**

*LocString* **name\_last**

std::string **subrace**

```
float cr = 0.0

int32_t cr_adjust = 0

uint32_t decay_time

Race race = Race::invalid()

int32_t walkrate = 0

uint16_t faction_id = 0

int16_t hp = 0

int16_t hp_current = 0

int16_t hp_max = 0

int16_t hp_temp = 0

uint16_t soundset

int32_t hasted = 0

int32_t size = 0

uint8_t bodybag = 0

uint8_t chunk_death = 0

uint8_t disarmable = 0

uint8_t gender = 0

uint8_t good_evil = 50

uint8_t interruptable = 0

uint8_t immortal = 0

uint8_t lawful_chaotic = 50
```

```
uint8_t lootable = 0
```

```
uint8_t pc = 0
```

```
uint8_t perception_range = 0
```

```
bool plot = false
```

```
uint8_t starting_package = 0
```

```
bool instantiated_ = false
```

### Public Static Functions

```
static bool deserialize(Player *obj, const nlohmann::json &archive)
```

```
static bool deserialize(Creature *obj, const nlohmann::json &archive, SerializationProfile profile)
```

```
static bool serialize(const Creature *obj, nlohmann::json &archive, SerializationProfile profile)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::player
```

```
static constexpr ResourceType::type restype = ResourceType::bic
```

## 6.13.95 nw::Plt

```
struct Plt
```

Implementation of Bioware's PLT file format.

### Public Functions

```
Plt(std::filesystem::path file)
```

```
Plt(ResourceData data)
```

```
uint32_t height() const
```

Gets height.

```
const PltPixel *pixels() const
```

Gets pixel array.

bool **valid()** const  
Determines if PLT was successfully parsed.

uint32\_t **width()** const  
Gets width.

### 6.13.96 nw::PltColors

struct **PltColors**  
*Plt* Color Array

---

**Note:** This would be the colors that a player would select

---

#### Public Members

std::array<uint8\_t, plt\_layer\_size> **data** = {}

### 6.13.97 nw::PltPixel

struct **PltPixel**  
*Plt* Pixel.

#### Public Members

uint8\_t **color**

*PltLayer* **layer**

### 6.13.98 nw::Qualifier

struct **Qualifier**

#### Public Members

*Selector* **selector**

absl::InlinedVector<*RuleValue*, 4> **params**

### 6.13.99 nw::Race

struct **Race**

#### Public Functions

bool **operator==**(const *Race* &rhs) const = default  
Defaulted equality operator

auto **operator<=>**(const *Race* &rhs) const = default  
Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept  
Returns rule type as value

inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

#### Public Static Functions

static inline constexpr *Race* **make**(int32\_t id)  
Makes a rule type

static inline constexpr *Race* **invalid**()  
Returns an invalid rule type

### 6.13.100 nw::RaceInfo

struct **RaceInfo**

*Race* definition.

#### Public Functions

**RaceInfo**() = default

**RaceInfo**(const TwoDARowView &tda)

inline bool **valid**() const noexcept

#### Public Members

uint32\_t **name** = 0xFFFFFFFF

uint32\_t **name\_conversation** = 0xFFFFFFFF

uint32\_t **name\_conversation\_lower** = 0xFFFFFFFF

```
uint32_t name_plural = 0xFFFFFFFF
```

```
uint32_t description = 0xFFFFFFFF
```

*Resource* **icon**

```
int appearance = 0
```

```
std::array<int, 6> ability_modifiers
```

```
int favored_class = 0
```

*Resource* **feats\_table**

```
uint32_t biography = 0xFFFFFFFF
```

```
bool player_race = false
```

*InternedString* **constant**

```
int age = 1
```

```
int toolset_class = 0
```

```
float cr_modifier = 1.0f
```

```
int feats_extra_1st_level = 0
```

```
int skillpoints_extra_per_level = 0
```

```
int skillpoints_1st_level_multiplier = 0
```

```
int ability_point_buy_number = 0
```

```
int feats_normal_level = 0
```

```
int feats_normal_amount = 0
```

```
int skillpoints_ability = 0
```



### 6.13.101 nw::Reputation

struct **Reputation**

#### Public Members

uint32\_t **faction\_1**

uint32\_t **faction\_2**

uint32\_t **reputation**

### 6.13.102 nw::Requirement

struct **Requirement**

#### Public Functions

explicit **Requirement**(bool conjunction\_ = true)

explicit **Requirement**(std::initializer\_list<*Qualifier*> quals, bool conjunction\_ = true)

void **add**(*Qualifier* qualifier)

size\_t **size**() const noexcept

#### Public Members

absl::InlinedVector<*Qualifier*, 8> **qualifiers**

bool **conjunction** = true

### 6.13.103 nw::Resource

struct **Resource**

A *nw::Resource* consists of a *nw::Resref* and a *nw::ResourceType*. Since NWN1/EE doesn't have any notion of hierarchical organization (paths, etc), it represents a fully-qualified resource identifier.

### Public Functions

**Resource**() noexcept

**Resource**(const *Resref* &resref\_, *ResourceType::type* type\_) noexcept

**Resource**(std::string\_view resref\_, *ResourceType::type* type\_) noexcept

**Resource**(const *Resource*&) = default

**Resource**(*Resource*&&) = default

std::string **filename**() const

Gets a Resrefs file name with extension.

bool **valid**() const noexcept

A resource is valid if resref is not empty and resref type is not invalid.

*Resource* &**operator**=(const *Resource*&) = default

*Resource* &**operator**=(*Resource*&&) = default

### Public Members

*Resref* **resref**

*ResourceType::type* **type**

### Public Static Functions

static *Resource* **from\_filename**(std::string\_view)

static *Resource* **from\_path**(const std::filesystem::path &path)

## 6.13.104 nw::ResourceDescriptor

struct **ResourceDescriptor**

### Public Functions

inline **operator** bool()

## Public Members

*Resource* **name**

size\_t **size** = 0

int64\_t **mtime** = 0

const *Container* \***parent** = nullptr

### 6.13.105 nw::ResourceType

struct **ResourceType**

*Resource* type constants and helper functions.

## Public Types

enum **type**

Enumeration of *Resource* types.

*Values:*

enumerator **invalid**

enumerator **container**

enumerator **gff\_archive**

enumerator **movie**

enumerator **player**

enumerator **sound**

enumerator **texture**

enumerator **json**

enumerator **bmp**

enumerator **mve**

enumerator **tga**

enumerator **wav**

enumerator **plt**

enumerator **ini**

enumerator **bmu**

enumerator **mpg**

enumerator **txt**

enumerator **plh**

enumerator **tex**

enumerator **mdl**

enumerator **thg**

enumerator **fnt**

enumerator **lua**

enumerator **slt**

enumerator **nss**

enumerator **ncs**

enumerator **mod**

enumerator **are**

enumerator **set**

enumerator **ifo**

enumerator **bic**

enumerator **wok**

enumerator **twoda**

enumerator **tlk**

enumerator **txi**

enumerator **git**

enumerator **bti**

enumerator **uti**

enumerator **btc**

enumerator **utc**

enumerator **dlg**

enumerator **itp**

enumerator **btt**

enumerator **utt**

enumerator **dds**

enumerator **bts**

enumerator **uts**

enumerator **ltr**

enumerator **gff**

enumerator **fac**

enumerator **bte**

enumerator **ute**

enumerator **btd**

enumerator **utd**

enumerator **btp**

enumerator **utp**

enumerator **dft**

enumerator **gic**

enumerator **gui**

enumerator **css**

enumerator **ccs**

enumerator **btm**

enumerator **utm**

enumerator **dwk**

enumerator **pwk**

enumerator **btg**

enumerator **utg**

enumerator **jrl**

enumerator **sav**

enumerator **utw**

enumerator **fourpc**

enumerator **ssf**

enumerator **hak**

enumerator **nwm**

enumerator **bik**

enumerator **ndb**

enumerator **ptm**

enumerator **ptt**

enumerator **bak**

enumerator **dat**

enumerator **shd**

enumerator **xbc**

enumerator **wbm**

enumerator **mtr**

enumerator **ktx**

enumerator **ttf**

enumerator **sql**

enumerator **tml**

enumerator **sq3**

enumerator **lod**

enumerator **gif**

enumerator **png**

enumerator **jpg**

enumerator **caf**

enumerator **ids**

enumerator **erf**

enumerator **bif**

enumerator **key**

### Public Static Functions

static inline *type* **from\_extension**(std::string\_view ext)

Converts extension to *ResourceType::type*.

static inline std::string **to\_string**(*ResourceType::type* value)

Convert *ResourceType::type* to extension.

---

**Note:** The only compilers and standard libraries that are targeted have small string optimization, so there is no great overhead to just returning a `std::string`

---

#### Returns

extension or empty string on failure

static inline constexpr bool **check\_category**(*ResourceType::type* category, *ResourceType::type* type)

## 6.13.106 nw::Resref

struct **Resref**

*nw::Resref* names a resource.

In NWN1/EE they are 16 character arrays, in NWN2 32 character arrays. These character arrays are case-insensitive.

Later evolutions of resrefs, in Dragon Age, were 32 utf16 character arrays; then ultimately seem to have been replaced by a combination of FNV hashes.

Currently only the NWN1/EE variety is supported.

### Public Types

using **Storage** = std::array<char, *max\_size*>

using **value\_type** = typename *Storage*::value\_type

using **size\_type** = typename *Storage*::size\_type



## Public Functions

**Resref()**

**Resref**(const *Resref*&) = default

template<size\_t **N**>

**Resref**(std::array<char, *N*> &string) noexcept

**Resref**(const char \*string) noexcept

**Resref**(std::string\_view string) noexcept

*Resref* &**operator**=(const *Resref*&) = default

const *Storage* &**data**() const noexcept

Get underlying storage.

bool **empty**() const noexcept

Checks if the underlying array has no non-null characters.

size\_type **length**() const noexcept

Returns the number of char elements in the array, excluding nulls.

std::string **string**() const

Creates std::string of underlying array.

std::string\_view **view**() const noexcept

Creates std::string\_view of underlying array without null padding.

## Public Static Attributes

static constexpr size\_t **max\_size** = 32

### 6.13.107 nw::RuleFlag

template<typename **T**, size\_t **N** = 64>

struct **RuleFlag** : private std::bitset<64>

## Public Types

using **Base** = std::bitset<*N*>

### Public Functions

```
constexpr RuleFlag() = default  
  
inline constexpr RuleFlag(unsigned long long val) noexcept  
  
inline RuleFlag(T val) noexcept  
  
inline explicit RuleFlag(std::string_view str)  
  
inline bool operator[](T pos) const  
  
inline RuleFlag &flip(T pos)  
  
inline RuleFlag &reset(T pos)  
  
inline RuleFlag &set(T pos, bool value = true)  
  
inline bool test(T pos) const
```

### 6.13.108 nw::RuleTypeArray

```
template<typename RuleType, typename RuleTypeInfo>  
struct RuleTypeArray
```

Base template for rule type arrays.

#### Template Parameters

- **RuleType** –
- **RuleTypeInfo** –

### Public Types

```
using map_type = absl::flat_hash_map<InternedString, RuleType, InternedStringHash, InternedStringEq>
```

### Public Functions

```
inline const RuleTypeInfo *get(RuleType type) const noexcept  
  
inline bool is_valid(RuleType type) const noexcept  
  
inline RuleType from_constant(std::string_view constant) const
```

### Public Members

`std::vector<RuleTypeInfo> entries`

*map\_type* **constant\_to\_index**

## 6.13.109 nw::Save

struct **Save**

### Public Functions

bool **operator==**(const *Save* &rhs) const = default

Defaulted equality operator

auto **operator<=>**(const *Save* &rhs) const = default

Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept

Returns rule type as value

inline constexpr size\_t **idx**() const noexcept

Returns rule type as index

### Public Members

int32\_t **val** = -1

### Public Static Functions

static inline constexpr *Save* **make**(int32\_t id)

Makes a rule type

static inline constexpr *Save* **invalid**()

Returns an invalid rule type

## 6.13.110 nw::Saves

struct **Saves**

**Public Members**

`int16_t` **fort** = 0

`int16_t` **reflex** = 0

`int16_t` **will** = 0

**6.13.111 nw::Selector**

struct **Selector**

**Public Members**

*SelectorType* **type**

*RuleValue* **subtype** = { }

**6.13.112 nw::SerializationType**

struct **SerializationType**

*Gff* types, renamed for clarity.

**Public Types**

enum **type**

*Values:*

enumerator **invalid**

enumerator **uint8**

enumerator **int8**

enumerator **uint16**

enumerator **int16**

enumerator **uint32**

enumerator **int32**

enumerator **uint64**

enumerator **int64**

enumerator **float\_**

enumerator **double\_**

enumerator **string**

enumerator **resref**

enumerator **locstring**

enumerator **void\_**

enumerator **struct\_**

enumerator **list**

### Public Static Functions

template<typename T>

static constexpr *SerializationType::type* **id**()

Convert type to *SerializationType*.

static constexpr std::string\_view **to\_string**(*SerializationType::type* type)

## 6.13.113 nw::Situation

struct **Situation**

### Public Functions

bool **operator==**(const *Situation* &rhs) const = default

Defaulted equality operator

auto **operator<=>**(const *Situation* &rhs) const = default

Defaulted spaceship operator

inline constexpr int32\_t **operator\***() const noexcept

Returns rule type as value

inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

### Public Members

int32\_t **val** = -1

### Public Static Functions

static inline constexpr *Situation* **make**(int32\_t id)  
Makes a rule type  
static inline constexpr *Situation* **invalid**()  
Returns an invalid rule type

## 6.13.114 nw::Skill

struct **Skill**

### Public Functions

bool **operator**==(const *Skill* &rhs) const = default  
Defaulted equality operator  
auto **operator**<=>(const *Skill* &rhs) const = default  
Defaulted spaceship operator  
inline constexpr int32\_t **operator**\*() const noexcept  
Returns rule type as value  
inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

### Public Static Functions

static inline constexpr *Skill* **make**(int32\_t id)  
Makes a rule type  
static inline constexpr *Skill* **invalid**()  
Returns an invalid rule type

### 6.13.115 nw::SkillInfo

struct **SkillInfo**

*Skill* definition.

#### Public Functions

**SkillInfo**() = default

**SkillInfo**(const TwoDARowView &tda)

inline bool **valid**() const noexcept

#### Public Members

uint32\_t **name** = 0xFFFFFFFF

uint32\_t **description** = 0xFFFFFFFF

*Resource* **icon**

bool **untrained** = false

*Ability* **ability** = { }

bool **armor\_check\_penalty** = false

bool **all\_can\_use** = false

*InternedString* **constant**

bool **hostile** = false

### 6.13.116 nw::Sound

struct **Sound** : public nw::ObjectBase

## Public Functions

### Sound()

```
inline virtual Common *as_common() override
inline virtual const Common *as_common() const override
inline virtual Sound *as_sound() override
inline virtual const Sound *as_sound() const override
inline virtual bool instantiate() override
inline virtual InternedString tag() const override
inline ObjectHandle handle() const noexcept
inline void set_handle(ObjectHandle handle)
const EffectArray &effects() const
EffectArray &effects()
inline virtual Versus versus_me() const
inline virtual Area *as_area()
inline virtual const Area *as_area() const
inline virtual Creature *as_creature()
inline virtual const Creature *as_creature() const
inline virtual Door *as_door()
inline virtual const Door *as_door() const
inline virtual Encounter *as_encounter()
inline virtual const Encounter *as_encounter() const
inline virtual Item *as_item()
inline virtual const Item *as_item() const
inline virtual Module *as_module()
inline virtual const Module *as_module() const
inline virtual Placeable *as_placeable()
inline virtual const Placeable *as_placeable() const
inline virtual Player *as_player()
inline virtual const Player *as_player() const
inline virtual Store *as_store()
```



```
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const
inline virtual Waypoint *as_waypoint()
inline virtual const Waypoint *as_waypoint() const
```

## Public Members

*Common* **common**

std::vector<*Resref*> **sounds**

float **distance\_min** = 0.0f

float **distance\_max** = 0.0f

float **elevation** = 0.0f

uint32\_t **generated\_type** = 0

uint32\_t **hours** = 0

uint32\_t **interval** = 0

uint32\_t **interval\_variation** = 0

float **pitch\_variation** = 0.0f

float **random\_x** = 0.0f

float **random\_y** = 0.0f

bool **active** = 0

bool **continuous** = 0

bool **looping** = 0

bool **positional** = 0

```
uint8_t priority = 0
```

```
bool random = 0
```

```
bool random_position = 0
```

```
uint8_t times = 3
```

```
uint8_t volume = 100
```

```
uint8_t volume_variation = 0
```

```
bool instantiated_ = false
```

### Public Static Functions

```
static bool deserialize(Sound *obj, const nlohmann::json &archive, SerializationProfile profile)
```

```
static void serialize(const Sound *obj, nlohmann::json &archive, SerializationProfile profile)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::sound
```

```
static constexpr ResourceType::type restype = ResourceType::uts
```

## 6.13.117 nw::SpawnCreature

```
struct SpawnCreature
```

### Public Functions

```
bool from_json(const nlohmann::json &archive)
```

```
nlohmann::json to_json() const
```

### Public Members

int32\_t **appearance**

float **cr**

*Resref* **resref**

bool **single\_spawn**

## 6.13.118 nw::SpawnPoint

struct **SpawnPoint**

### Public Functions

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

### Public Members

float **orientation**

glm::vec3 **position**

## 6.13.119 nw::SpecialAbility

struct **SpecialAbility**

### Public Members

uint16\_t **spell**

uint8\_t **level**

*SpellFlags* **flags** = *SpellFlags::none*

### 6.13.120 nw::Spell

struct **Spell**

#### Public Functions

bool **operator**==(const *Spell* &rhs) const = default  
Defaulted equality operator

auto **operator**<=>(const *Spell* &rhs) const = default  
Defaulted spaceship operator

inline constexpr int32\_t **operator**\*() const noexcept  
Returns rule type as value

inline constexpr size\_t **idx**() const noexcept  
Returns rule type as index

#### Public Static Functions

static inline constexpr *Spell* **make**(int32\_t id)  
Makes a rule type

static inline constexpr *Spell* **invalid**()  
Returns an invalid rule type

### 6.13.121 nw::SpellBook

struct **SpellBook**

#### Public Functions

**SpellBook**()

bool **from\_json**(const nlohmann::json &archive)  
nlohmann::json **to\_json**() const

bool **add\_known\_spell**(size\_t level, *SpellEntry* entry)  
Adds a known spell at level.

bool **add\_memorized\_spell**(size\_t level, *SpellEntry* entry)  
Adds a memorized spell at level.

size\_t **get\_known\_spell\_count**(size\_t level) const  
Gets the number of known at a given level.

size\_t **get\_memorized\_spell\_count**(size\_t level) const  
Gets the number of memorized at a given level.

*SpellEntry* **get\_known\_spell**(size\_t level, size\_t index) const

Gets a known spell entry.

*SpellEntry* **get\_memorized\_spell**(size\_t level, size\_t index) const

Gets a memorized spell entry.

void **remove\_known\_spell**(size\_t level, *SpellEntry* entry)

Removes a known spell entry.

void **remove\_memorized\_spell**(size\_t level, *SpellEntry* entry)

Removes a memorized spell entry.

### Public Members

std::vector<std::vector<*SpellEntry*>> **known\_**

std::vector<std::vector<*SpellEntry*>> **memorized\_**

## 6.13.122 nw::SpellEntry

struct **SpellEntry**

### Public Functions

bool **operator==**(const *SpellEntry*&) const = default

auto **operator<=>**(const *SpellEntry*&) const = default

### Public Members

*Spell* **spell** = *Spell::invalid*()

*SpellMetaMagic* **meta** = *SpellMetaMagic::none*

*SpellFlags* **flags** = *SpellFlags::none*

## 6.13.123 nw::SpellInfo

struct **SpellInfo**

### Public Functions

**SpellInfo**() = default

**SpellInfo**(const TwoDARowView &tda)

inline bool **valid**() const noexcept

### Public Members

uint32\_t **name** = 0xFFFFFFFF

*Resource* **icon**

nw::SpellSchool **school** = nw::SpellSchool::invalid()

*SpellMetaMagic* **metamagic** = *SpellMetaMagic::none*

int **innate\_level** = 0

## 6.13.124 nw::Store

struct **Store** : public nw::ObjectBase

### Public Functions

**Store**()

inline virtual *Common* \***as\_common**() override

inline virtual const *Common* \***as\_common**() const override

inline virtual *Store* \***as\_store**() override

inline virtual const *Store* \***as\_store**() const override

virtual bool **instantiate**() override

inline ObjectHandle **handle**() const noexcept

inline void **set\_handle**(ObjectHandle handle)

const *EffectArray* &**effects**() const

*EffectArray* &**effects**()

inline virtual *Versus* **versus\_me**() const

virtual *InternedString* **tag**() const

```

inline virtual Area *as_area()

inline virtual const Area *as_area() const

inline virtual Creature *as_creature()

inline virtual const Creature *as_creature() const

inline virtual Door *as_door()

inline virtual const Door *as_door() const

inline virtual Encounter *as_encounter()

inline virtual const Encounter *as_encounter() const

inline virtual Item *as_item()

inline virtual const Item *as_item() const

inline virtual Module *as_module()

inline virtual const Module *as_module() const

inline virtual Placeable *as_placeable()

inline virtual const Placeable *as_placeable() const

inline virtual Player *as_player()

inline virtual const Player *as_player() const

inline virtual Sound *as_sound()

inline virtual const Sound *as_sound() const

inline virtual Trigger *as_trigger()

inline virtual const Trigger *as_trigger() const

inline virtual Waypoint *as_waypoint()

inline virtual const Waypoint *as_waypoint() const

```

## Public Members

*Common* **common**

*StoreScripts* **scripts**

*StoreInventory* **inventory**

int32\_t **blackmarket\_markdown** = 0

int32\_t **identify\_price** = 100

```
int32_t markdown = 0
```

```
int32_t markup = 0
```

```
int32_t max_price = -1
```

```
int32_t gold = -1
```

```
bool blackmarket
```

```
bool instantiated_ = false
```

### Public Static Functions

```
static bool deserialize(Store *obj, const nlohmann::json &archive, SerializationProfile profile)
```

```
static bool serialize(const Store *obj, nlohmann::json &archive, SerializationProfile profile)
```

### Public Static Attributes

```
static constexpr int json_archive_version = 1
```

```
static constexpr ObjectType object_type = ObjectType::store
```

```
static constexpr ResourceType::type restype = ResourceType::utm
```

## 6.13.125 nw::StoreInventory

```
struct StoreInventory
```

*Store Inventory* component.

### Public Functions

```
StoreInventory() = default
```

```
StoreInventory(ObjectBase *owner)
```

```
void set_owner(ObjectBase *owner)
```

Sets inventory owner.



### Public Members

*Inventory* **armor**

*Inventory* **miscellaneous**

*Inventory* **potions**

*Inventory* **rings**

*Inventory* **weapons**

std::vector<int32\_t> **will\_not\_buy**

std::vector<int32\_t> **will\_only\_buy**

## 6.13.126 nw::StoreScripts

struct **StoreScripts**

### Public Members

*Resref* **on\_closed**

*Resref* **on\_opened**

## 6.13.127 nw::Tile

struct **Tile**

### Public Functions

**Tile()** = default

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

### Public Members

int32\_t **id** = 0

int32\_t **height** = 0

int32\_t **orientation** = 0

uint8\_t **animloop1** = 0

uint8\_t **animloop2** = 0

uint8\_t **animloop3** = 0

uint8\_t **mainlight1** = 0

uint8\_t **mainlight2** = 0

uint8\_t **srcelight1** = 0

uint8\_t **srcelight2** = 0

### 6.13.128 nw::Tlk

struct **Tlk**

#### Public Functions

explicit **Tlk**(*LanguageID* language = *LanguageID::english*)

explicit **Tlk**(std::filesystem::path filename)

**Tlk**(const *Tlk*&) = delete

**Tlk**(*Tlk*&&) = default

std::string **get**(uint32\_t strref) const

Get a localized string.

*LanguageID* **language\_id**() const noexcept

Get language ID.

bool **modified**() const noexcept

Is *Tlk* modified.

void **save**()

Write TLK to file.

void **save\_as**(const std::filesystem::path &path)

Write TLK to file.

void **set**(uint32\_t strref, std::string\_view string)

Set a localized string.

size\_t **size**() const noexcept

Get the number of tlk entries.

---

**Note:** This is equivalent to the highest string reference, not the number of actual strings

---

bool **valid**() const noexcept

Get if successfully parsed.

inline std::string **operator[]**(uint32\_t strref) const

Get a localized string.

*Tlk* &**operator**=(const *Tlk*&) = delete

*Tlk* &**operator**=(*Tlk*&&) = default

### Public Static Attributes

static constexpr uint32\_t **custom\_flag** = 0x01000000

## 6.13.129 nw::TlkElement

struct **TlkElement**

### Public Functions

inline **TlkElement**()

### Public Members

uint32\_t **flags**

std::array<char, 16> **sound**

uint32\_t **unused**[2]

uint32\_t **offset**

uint32\_t **size**

float **snd\_duration**

### 6.13.130 nw::TlkFlags

struct **TlkFlags**

*Tlk* Flags.

#### Public Static Attributes

static constexpr uint32\_t **empty** = 0x0

static constexpr uint32\_t **text** = 0x1

static constexpr uint32\_t **sound** = 0x2

static constexpr uint32\_t **sound\_length** = 0x4

### 6.13.131 nw::TlkHeader

struct **TlkHeader**

#### Public Members

std::array<char, 4> **type** = {'T', 'L', 'K', ' '}

std::array<char, 4> **version** = {'V', '3', '.', '0'}

uint32\_t **language\_id** = 0

uint32\_t **str\_count** = 0

uint32\_t **str\_offset** = 0

### 6.13.132 nw::Tokenizer

struct **Tokenizer**

### Public Functions

**Tokenizer()**

**Tokenizer**(std::string\_view buffer, std::string\_view comment, bool skip\_newline = true)

std::string\_view **current**() const

bool **is\_newline**(std::string\_view tk) const

size\_t **line**() const

std::string\_view **next**()

void **put\_back**(std::string\_view token)

void **set\_buffer**(std::string\_view buffer)

### 6.13.133 nw::Trap

struct **Trap**

### Public Functions

**Trap**() = default

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

### Public Members

bool **is\_trapped** = false

uint8\_t **type** = 0

bool **detectable** = false

uint8\_t **detect\_dc** = 0

bool **disarmable** = false

uint8\_t **disarm\_dc** = 0

bool **one\_shot** = false

### 6.13.134 nw::Trigger

struct **Trigger** : public nw::ObjectBase

#### Public Functions

##### Trigger()

```
inline virtual Common *as_common() override
inline virtual const Common *as_common() const override
inline virtual Trigger *as_trigger() override
inline virtual const Trigger *as_trigger() const override
inline virtual bool instantiate() override
inline virtual InternedString tag() const override
virtual Versus versus_me() const override
inline ObjectHandle handle() const noexcept
inline void set_handle(ObjectHandle handle)
const EffectArray &effects() const
EffectArray &effects()
inline virtual Area *as_area()
inline virtual const Area *as_area() const
inline virtual Creature *as_creature()
inline virtual const Creature *as_creature() const
inline virtual Door *as_door()
inline virtual const Door *as_door() const
inline virtual Encounter *as_encounter()
inline virtual const Encounter *as_encounter() const
inline virtual Item *as_item()
inline virtual const Item *as_item() const
inline virtual Module *as_module()
inline virtual const Module *as_module() const
inline virtual Placeable *as_placeable()
inline virtual const Placeable *as_placeable() const
```

```

inline virtual Player *as_player()

inline virtual const Player *as_player() const

inline virtual Sound *as_sound()

inline virtual const Sound *as_sound() const

inline virtual Store *as_store()

inline virtual const Store *as_store() const

inline virtual Waypoint *as_waypoint()

inline virtual const Waypoint *as_waypoint() const

```

## Public Members

*Common* **common**

*Trap* **trap**

*TriggerScripts* **scripts**

std::vector<glm::vec3> **geometry**

std::string **linked\_to**

uint32\_t **faction** = 0

float **highlight\_height** = 0.0f

int32\_t **type** = 0

uint16\_t **loadscreen** = 0

uint16\_t **portrait** = 0

uint8\_t **cursor** = 0

uint8\_t **linked\_to\_flags** = 0

bool **instantiated\_** = false

### Public Static Functions

static bool **deserialize**(*Trigger* \*obj, const nlohmann::json &archive, *SerializationProfile* profile)

static bool **serialize**(const *Trigger* \*obj, nlohmann::json &archive, *SerializationProfile* profile)

### Public Static Attributes

static constexpr int **json\_archive\_version** = 1

static constexpr *ObjectType* **object\_type** = *ObjectType::trigger*

static constexpr *ResourceType::type* **restype** = *ResourceType::utt*

## 6.13.135 nw::TriggerScripts

struct **TriggerScripts**

### Public Functions

bool **from\_json**(const nlohmann::json &archive)

nlohmann::json **to\_json**() const

### Public Members

*Resref* **on\_click**

*Resref* **on\_disarm**

*Resref* **on\_enter**

*Resref* **on\_exit**

*Resref* **on\_heartbeat**

*Resref* **on\_trap\_triggered**

*Resref* **on\_user\_defined**



### 6.13.136 nw::TwoDA

struct **TwoDA**

#### Public Functions

**TwoDA**() = default

**TwoDA**(const *TwoDA*&) = delete

**TwoDA**(*TwoDA*&&) = default

*TwoDA* &**operator**=(const *TwoDA*&) = delete

*TwoDA* &**operator**=(*TwoDA*&&) = default

explicit **TwoDA**(const std::filesystem::path &filename)

Constructs *TwoDA* object from a file.

explicit **TwoDA**(ResourceData data)

Constructs *TwoDA* object from an array of bytes.

size\_t **column\_index**(std::string\_view column) const

Finds the index of a column, or -1.

size\_t **columns**() const noexcept

Get the number of columns.

template<typename T>

std::optional<T> **get**(size\_t row, size\_t col) const

Gets an element.

template<typename T>

std::optional<T> **get**(size\_t row, std::string\_view col) const

Gets an element.

template<typename T>

bool **get\_to**(size\_t row, size\_t col, T &out) const

Gets an element.

template<typename T>

bool **get\_to**(size\_t row, std::string\_view col, T &out) const

Gets an element.

void **pad**(size\_t count)

Pads the 2da with count rows.

TwoDARowView **row**(size\_t row) const noexcept

Gets entire row as.

size\_t **rows**() const noexcept

Number of rows.

template<typename T>

void **set**(size\_t row, size\_t col, const *T* &value)

Sets an element.

template<typename **T**>

void **set**(size\_t row, std::string\_view col, const *T* &value)

Sets an element.

bool **is\_valid**() const noexcept

Is the 2da parsed without error.

### Public Static Attributes

static constexpr size\_t **npos** = std::numeric\_limits<size\_t>::max()

#### 6.13.137 nw::TwoDACache

**Warning:** doxygenstruct: Cannot find class “nw::TwoDACache” in doxygen xml output for project “rollNW” from directory: build/xml/

#### 6.13.138 nw::Variant

template<typename ...**Ts**>

struct **Variant**

Wrapper around std::variant.

### Public Functions

**Variant**() = default

**Variant**(const *Variant*&) = default

**Variant**(*Variant*&&) = default

*Variant* &**operator**=(const *Variant*&) = default

*Variant* &**operator**=(*Variant*&&) = default

template<typename **T**>

inline **Variant**(*T* value)

template<typename **T**>

inline bool **is**() const noexcept

Checks variant value is T

template<typename **T**>

inline *T* &**as**()

Gets variant value as T

template<typename **T**>

```
inline const T &as() const
```

Gets variant value as T

```
template<typename T>
```

```
inline std::optional<T> get() const
```

Checks variant value is `std::optional<T>`

---

**Note:** This does entail a copy

---

```
inline bool operator<(const Variant &rhs) const noexcept
```

```
inline bool operator==(const Variant &rhs) const noexcept
```

```
inline bool empty() const noexcept
```

### 6.13.139 nw::Versus

```
struct Versus
```

#### Public Functions

```
bool operator==(const Versus &rhs) const = default
```

```
auto operator<=>(const Versus &rhs) const = default
```

```
inline operator bool() const noexcept
```

```
inline bool match(const Versus &rhs) const noexcept
```

#### Public Members

```
Race race = Race::invalid()
```

```
AlignmentFlags align_flags = AlignmentFlags::none
```

```
bool trap = false
```

### 6.13.140 nw::Waypoint

```
struct Waypoint : public nw::ObjectBase
```

## Public Functions

### Waypoint()

```
inline virtual Common *as_common() override
inline virtual const Common *as_common() const override
inline virtual Waypoint *as_waypoint() override
inline virtual const Waypoint *as_waypoint() const override
inline virtual bool instantiate() override
inline virtual InternedString tag() const override
inline ObjectHandle handle() const noexcept
inline void set_handle(ObjectHandle handle)
const EffectArray &effects() const
EffectArray &effects()
inline virtual Versus versus_me() const
inline virtual Area *as_area()
inline virtual const Area *as_area() const
inline virtual Creature *as_creature()
inline virtual const Creature *as_creature() const
inline virtual Door *as_door()
inline virtual const Door *as_door() const
inline virtual Encounter *as_encounter()
inline virtual const Encounter *as_encounter() const
inline virtual Item *as_item()
inline virtual const Item *as_item() const
inline virtual Module *as_module()
inline virtual const Module *as_module() const
inline virtual Placeable *as_placeable()
inline virtual const Placeable *as_placeable() const
inline virtual Player *as_player()
inline virtual const Player *as_player() const
inline virtual Sound *as_sound()
```

```

inline virtual const Sound *as_sound() const
inline virtual Store *as_store()
inline virtual const Store *as_store() const
inline virtual Trigger *as_trigger()
inline virtual const Trigger *as_trigger() const

```

## Public Members

*Common* **common**

*LocString* **description**

Description of waypoint.

std::string **linked\_to**

Tag of entity waypoint is linked to.

*LocString* **map\_note**

Map not for player minimap.

uint8\_t **appearance**

*Appearance*.

bool **has\_map\_note** = false

If true waypoint has map note.

bool **map\_note\_enabled** = false

If true show map note.

bool **instantiated\_** = false

## Public Static Functions

static bool **deserialize**(*Waypoint* \*obj, const nlohmann::json &archive, *SerializationProfile* profile)

Deserializes entity from JSON.

static void **serialize**(const *Waypoint* \*obj, nlohmann::json &archive, *SerializationProfile* profile)

Deserializes entity to JSON.

### Public Static Attributes

static constexpr int **json\_archive\_version** = 1

static constexpr *ObjectType* **object\_type** = *ObjectType::waypoint*

static constexpr *ResourceType::type* **restype** = *ResourceType::utw*

## 6.13.141 nw::Zip

struct **Zip** : public nw::Container

### Public Functions

**Zip**(const std::filesystem::path &path)

~**Zip**()

virtual std::vector<*ResourceDescriptor*> **all**() const override

Get all resources.

virtual bool **contains**(*Resource* res) const override

Get if container contains resource.

virtual ResourceData **demand**(*Resource* res) const override

Reads resource data, empty ResourceData if no match.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const override

Extract elements from a container by regex.

inline virtual const std::string &**name**() const override

Equivalent to `basename` *path()*

inline virtual const std::string &**path**() const override

Path to container, for basic containers, should be canonical.

virtual size\_t **size**() const override

Determines the size, if applicable, of the container.

virtual *ResourceDescriptor* **stat**(const *Resource* &res) const override

Get some general data about a resource.

inline virtual bool **valid**() const noexcept override

Return true if loaded, false if not.

virtual void **visit**(std::function<void(const *Resource*&>> callback) const noexcept override

Visits all resources in a container.

virtual int **extract\_by\_glob**(std::string\_view glob, const std::filesystem::path &output) const

Extract elements from a container by glob pattern.

const std::filesystem::path &**working\_directory**() const

Get container working directory.

### 6.13.142 nw::ZipElement

struct **ZipElement**

#### **Public Members**

*Resource* **resref**

size\_t **size**

### 6.13.143 nw::ZlibHeader

struct **ZlibHeader**

#### **Public Members**

uint32\_t **version**

### 6.13.144 nw::ZstdHeader

struct **ZstdHeader**

#### **Public Members**

uint32\_t **version**

uint32\_t **dictionary**

### 6.13.145 nw::kernel::Config

struct **Config**

### Public Functions

explicit **Config**() = default

void **initialize**(*ConfigOptions* options = {})

Initializes configuration system.

const std::filesystem::path &**install\_path**() const noexcept

Game installation path.

const *ConfigOptions* &**options**() const noexcept

Gets installation info.

void **set\_paths**(const std::filesystem::path install, const std::filesystem::path user)

Sets game paths.

---

**Note:** If paths are unset, the kernel will attempt to find them.

---

void **set\_version**(*GameVersion* version)

Sets game version.

const std::filesystem::path &**user\_path**() const noexcept

Path to user directory.

*GameVersion* **version**() const noexcept

Gets games version.

## 6.13.146 nw::kernel::EffectSystem

struct **EffectSystem** : public nw::kernel::Service

### Public Functions

virtual ~**EffectSystem**() = default

bool **add**(EffectType type, EffectFunc apply, EffectFunc remove)

Adds an effect type to the registry.

bool **add**(ItemPropertyType type, ItemPropFunc generator)

Adds an item property type to the registry.

bool **apply**(ObjectBase \*obj, *Effect* \*effect)

Applies an effect to an object.

virtual void **clear**() override

Clears effect registry and all effects.

*Effect* \***create**(EffectType type)

Creates an effect.

void **destroy**(*Effect* \*effect)

Destroys an effect.



```

std::pair<int, int> effect_limits_ability() const noexcept
    Gets ability effect minimum and maximum.

std::pair<int, int> effect_limits_armor_class() const noexcept
    Gets armor class effect minimum and maximum.

std::pair<int, int> effect_limits_attack() const noexcept
    Gets attack effect minimum and maximum.

std::pair<int, int> effect_limits_skill() const noexcept
    Gets skill effect minimum and maximum.

Effect *generate(const ItemProperty &property, EquipIndex index, BaseItem baseitem) const
    Generates an effect from an item property.

virtual void initialize() override
    Initialize effect system.

const TwoDA *ip_cost_table(size_t table) const
    Gets an item property cost table.

const ItemPropertyDefinition *ip_definition(ItemPropertyType type) const
    Gets an item property definition.

const TwoDA *ip_param_table(size_t table) const
    Gets an item property param table.

bool remove(ObjectBase *obj, Effect *effect)
    Removes an effect to an object.

void set_effect_limits_ability(int min, int max) noexcept
    Sets ability effect minimum and maximum.

void set_effect_limits_armor_class(int min, int max) noexcept
    Sets armor class effect minimum and maximum.

void set_effect_limits_attack(int min, int max) noexcept
    Sets attack effect minimum and maximum.

void set_effect_limits_skill(int min, int max) noexcept
    Sets skill effect minimum and maximum.

EffectSystemStats stats() const noexcept
    Gets stats regarding the effect system.

```

### 6.13.147 nw::kernel::EventSystem

```

struct EventSystem : public nw::kernel::Service

```

### Public Types

```
template<typename T>
using storage = std::priority_queue<T, std::vector<T>, std::greater<T>>>
```

### Public Functions

```
void add(EventType type, ObjectBase *object, void *data = nullptr)
```

```
int process()
```

```
inline virtual void initialize()
```

Initializes a service.

```
inline virtual void clear()
```

Clears a service.

### Public Members

```
storage<EventHandle> queue_
```

## 6.13.148 nw::kernel::ObjectSystem

```
struct ObjectSystem : public nw::kernel::Service
```

The object system creates, serializes, and deserializes entities.

### Public Functions

```
ObjectSystem() = default
```

```
ObjectSystem(const ObjectSystem&) = delete
```

```
ObjectSystem(ObjectSystem&&) = default
```

```
ObjectSystem &operator=(ObjectSystem&) = delete
```

```
ObjectSystem &operator=(ObjectSystem&&) = default
```

```
inline virtual ~ObjectSystem()
```

```
virtual void clear() override
```

Destroys all objects.

```
inline virtual void initialize() override
```

Initializes a service.

```
void destroy(ObjectHandle obj)
```

Destroys a single object.

```
template<typename T>
```

*T* \***get**(ObjectHandle obj)

Gets an object.

ObjectBase \***get\_object\_base**(ObjectHandle obj) const

Gets an object.

ObjectBase \***get\_by\_tag**(std::string\_view tag, int nth = 0) const

Gets object by tag.

ObjectBase \***alloc**(*ObjectType* object\_type)

template<typename T>

*T* \***load**(const std::filesystem::path &archive, *SerializationProfile* profile = *SerializationProfile::blueprint*)

Loads an object from file system.

template<typename T>

*T* \***load**(std::string\_view resref)

Loads an object from resource system.

template<typename T>

*T* \***load**(const *GffStruct* &archive)

Loads an object from gff instance.

template<typename T>

*T* \***load**(const nlohmann::json &archive)

Loads an object from json instance.

*Player* \***load\_player**(std::string\_view cdkey, std::string\_view resref)

Loads an object from resource system.

template<typename T>

*T* \***make**()

Creates a new object.

*Area* \***make\_area**(*Resref* area)

Creates an area object.

*Module* \***make\_module**()

Creates a module object

**Warning:** : nw::kernel::resman().load\_module(...) **must** be called before this.

bool **valid**(ObjectHandle obj) const

Determines if object handle is valid.

### 6.13.149 nw::kernel::Resources

struct **Resources** : public nw::Container, public nw::kernel::Service

## Public Types

using **SearchVector** = std::vector<LocatorPayload>

## Public Functions

**Resources**(const *Resources* \*parent = nullptr)

virtual **~Resources**() = default

virtual void **initialize**() override  
Initializes resources management system.

inline virtual void **clear**() override  
Clears a service.

bool **add\_base\_container**(const std::filesystem::path &path, const std::string &name, *ResourceType::type* restype = *ResourceType::invalid*)  
Add a base container

---

**Note:** This anything that is BELOW the module in priority

---

bool **add\_custom\_container**(*Container* \*container, bool take\_ownership = true, *ResourceType::type* restype = *ResourceType::invalid*)  
Add already created container

---

**Note:** These containers are above all others in priority

---

bool **add\_override\_container**(const std::filesystem::path &path, const std::string &name, *ResourceType::type* restype = *ResourceType::invalid*)  
Add already created container.  
Add override container

---

**Note:** This anything that is ABOVE the module in priority

---

void **clear\_containers**()  
Clears any custom loaded containers.

bool **load\_module**(std::filesystem::path path, std::string\_view manifest = {})  
Loads container resources for a module.

void **load\_module\_haks**(const std::vector<std::string> &haks)  
Loads module haks.

void **unload\_module**()  
Unloads module.

ResourceData **demand\_server\_vault**(std::string\_view cdkey, std::string\_view resref)  
Demands a player character file.

ResourceData **demand\_any**(*Resref* resref, std::initializer\_list<*ResourceType::type*> restypes) const  
 Attempts to locate first matching resource type by container priority.

ResourceData **demand\_in\_order**(*Resref* resref, std::initializer\_list<*ResourceType::type*> restypes) const  
 Attempts to locate first matching resource by resource type priority.

void **load\_palette\_textures**()

*Image* \***palette\_texture**(*PltLayer* layer)

inline virtual std::vector<*ResourceDescriptor*> **all**() const override  
 Get all resources.

virtual bool **contains**(*Resource* res) const override  
 Get if container contains resource.

virtual ResourceData **demand**(*Resource* res) const override  
 Reads resource data, empty ResourceData if no match.

virtual int **extract**(const std::regex &pattern, const std::filesystem::path &output) const override  
 Extract elements from a container by regex.

inline virtual const std::string &**name**() const override  
 Equivalent to basename *path()*

inline virtual const std::string &**path**() const override  
 Path to container, for basic containers, should be canonical.

virtual size\_t **size**() const override  
 Determines the size, if applicable, of the container.

virtual *ResourceDescriptor* **stat**(const *Resource* &res) const override  
 Get some general data about a resource.

inline virtual bool **valid**() const noexcept override  
 Return true if loaded, false if not.

virtual void **visit**(std::function<void(const *Resource*&)> callback) const noexcept override  
 Visits all resources in a container.

virtual int **extract\_by\_glob**(std::string\_view glob, const std::filesystem::path &output) const  
 Extract elements from a container by glob pattern.

const std::filesystem::path &**working\_directory**() const  
 Get container working directory.

### 6.13.150 nw::kernel::Rules

struct **Rules** : public nw::kernel::Service

## Public Types

using **qualifier\_type** = std::function<bool(const *Qualifier*&, const ObjectBase\*)>

using **selector\_type** = std::function<*RuleValue*(const *Selector*&, const ObjectBase\*)>

## Public Functions

virtual **~Rules**()

virtual void **initialize**() override

Initializes rules system.

virtual void **clear**() override

Clears rules system of all rules and cached 2da files.

bool **match**(const *Qualifier* &qual, const ObjectBase \*obj) const

Match.

bool **meets\_requirement**(const *Requirement* &req, const ObjectBase \*obj) const

Meets requirements.

*RuleValue* **select**(const *Selector*&, const ObjectBase\*) const

Select.

void **set\_qualifier**(*qualifier\_type* match)

Set rules qualifier.

void **set\_selector**(*selector\_type* selector)

Set rules selector.

## Public Members

*BaseItemArray* **baseitems**

*ClassArray* **classes**

*FeatArray* **feats**

*RaceArray* **races**

*SpellArray* **spells**

SpellSchoolArray **spellschools**

*SkillArray* **skills**

*MasterFeatRegistry* **master\_feats**

*ModifierRegistry* **modifiers**

### 6.13.151 nw::kernel::ScriptSystem

**Warning:** doxygenstruct: Cannot find class “nw::kernel::ScriptSystem” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.152 nw::kernel::Service

struct **Service**

Subclassed by *nw::kernel::EffectSystem*, *nw::kernel::EventSystem*, *nw::kernel::ObjectSystem*, *nw::kernel::Resources*, *nw::kernel::Rules*, *nw::kernel::Strings*, *nw::kernel::TwoDACCACHE*

### 6.13.153 nw::kernel::Services

struct **Services**

#### Public Functions

**Services()**

void **start()**

Initializes kernel services.

void **shutdown()**

Shutsdown kernel services.

*GameProfile* \***profile()** const

Gets current game profile.

template<typename T>

*T* \***add()**

Adds a service.

template<typename T>

const *T* \***get()** const

Gets a service.

template<typename T>

*T* \***get\_mut()**

Gets a service as non-const.

## Public Members

std::unique\_ptr<*Strings*> **strings**

std::unique\_ptr<*Resources*> **resources**

std::unique\_ptr<TwoDACache> **twoda\_cache**

std::unique\_ptr<*Rules*> **rules**

std::unique\_ptr<*EffectSystem*> **effects**

std::unique\_ptr<*ObjectSystem*> **objects**

std::unique\_ptr<*EventSystem*> **events**

### 6.13.154 nw::kernel::Strings

struct **Strings** : public nw::kernel::Service

## Public Functions

**Strings**() = default

virtual ~**Strings**() = default

virtual void **initialize**() override

Initializes strings system.

inline virtual void **clear**() override

Initializes strings system.

std::string **get**(const *LocString* &locstring, bool feminine = false) const

Gets string by *LocString*

---

**Note:** if *Tlk* strref, use that; if not look in localized strings

---

std::string **get**(uint32\_t strref, bool feminine = false) const

Gets string by *Tlk* strref.

*InternedString* **get\_interned**(std::string\_view str) const

Gets interned string

---

**Note:** Return will not be valid if there is no interned string

---



---

*InternedString* **intern**(std::string\_view str)

Interns a string

---

**Note:** Multiple calls to **intern** with the same string will and must return the same exact underlying string, such that equality can be determined by a comparison of pointers.

---

*InternedString* **intern**(uint32\_t strref)

Interns a string by strref

---

**Note:** Multiple calls to **intern** with the same string will and must return the same exact underlying string, such that equality can be determined by a comparison of pointers.

---

void **load\_custom\_tlk**(const std::filesystem::path &path)

Loads a modules custom *Tlk* and feminine version if available.

void **load\_dialog\_tlk**(const std::filesystem::path &path)

Loads a dialog *Tlk* and feminine version if available.

*LanguageID* **global\_language**() const noexcept

Gets the language ID that is considered ‘default’

---

**Note:** This determines the character encoding of strings as they are stored in game resources, TLK, GFF, etc. In EE the only encoding that isn’t CP1252 is Polish, so generally safe to not worry too much.

---

void **set\_global\_language**(*LanguageID* language) noexcept

Sets the language ID that is considered ‘default’.

void **unload\_custom\_tlk**()

Unloads a modules custom *Tlk* and feminine version if available.

### 6.13.155 nw::model::AABEntry

struct **AABEntry**

#### Public Members

glm::vec3 **bmin**

glm::vec3 **bmax**

int32\_t **leaf\_face**

uint32\_t **plane**

### 6.13.156 nw::model::AABBNode

struct **AABBNode** : public nw::model::TrimeshNode

#### Public Functions

**AABBNode**(std::string name\_)

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

#### Public Members

std::vector<AABBEEntry> **entries**

glm::vec3 **ambient**

bool **beaming**

glm::vec3 **bmin**

glm::vec3 **bmax**

std::string **bitmap**

glm::vec3 **center**

glm::vec3 **diffuse**

std::string **materialname**

bool **render** = {true}

std::string **renderhint**

bool **rotatetexture** = {false}

bool **shadow** = {false}

```
float shininess

glm::vec3 specular

std::array<std::string, 3> textures

uint32_t tilefade = {0}

int transparencyhint = {0}

bool showdispl = {false}

uint32_t displtype = {1}

uint32_t lightmapped = {0}

std::vector<std::string> multimaterial

std::vector<glm::vec3> colors

std::vector<Vertex> vertices

std::vector<uint16_t> indices

std::string name

const uint32_t type

bool inheritcolor = false

Node *parent = nullptr

std::vector<Node*> children

std::vector<ControllerKey> controller_keys

std::vector<float> controller_data
```

### 6.13.157 nw::model::Animation

```
struct Animation : public nw::model::Geometry
```

#### Public Functions

```
Animation(std::string name_)
```

```
virtual ~Animation() = default
```

```
Node *find(const std::regex &re)
```

```
const Node *find(const std::regex &re) const
```

#### Public Members

```
float length = { 1.0f }
```

```
float transition_time = { 0.25f }
```

```
std::string anim_root
```

```
std::vector<AnimationEvent> events
```

```
std::string name
```

```
GeometryType type
```

```
std::vector<std::unique_ptr<Node>> nodes
```

### 6.13.158 nw::model::AnimationEvent

```
struct AnimationEvent
```

#### Public Members

```
float time = { 0.0f }
```

```
std::string name
```

### 6.13.159 nw::model::AnimeshNode

struct **AnimeshNode** : public nw::model::TrimeshNode

#### Public Functions

**AnimeshNode**(std::string name\_)

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

#### Public Members

std::vector<glm::vec3> **animtverts**

std::vector<glm::vec3> **animverts**

float **sampleperiod**

float **cliph** = {0.0f}

float **clipw** = {0.0f}

float **clipv** = {0.0f}

float **clipu** = {0.0f}

glm::vec3 **ambient**

bool **beaming**

glm::vec3 **bmin**

glm::vec3 **bmax**

std::string **bitmap**

glm::vec3 **center**

```
glm::vec3 diffuse

std::string materialname

bool render = {true}

std::string renderhint

bool rotatetexture = {false}

bool shadow = {false}

float shininess

glm::vec3 specular

std::array<std::string, 3> textures

uint32_t tilefade = {0}

int transparencyhint = {0}

bool showdispl = {false}

uint32_t displtype = {1}

uint32_t lightmapped = {0}

std::vector<std::string> multimaterial

std::vector<glm::vec3> colors

std::vector<Vertex> vertices

std::vector<uint16_t> indices

std::string name

const uint32_t type

bool inheritcolor = false
```

```

Node *parent = nullptr

std::vector<Node*> children

std::vector<ControllerKey> controller_keys

std::vector<float> controller_data

```

### 6.13.160 nw::model::CameraNode

```
struct CameraNode : public nw::model::Node
```

#### Public Functions

```

CameraNode(std::string name_)

void add_controller_data(std::string_view name_, uint32_t type_, std::vector<float> times_,
                        std::vector<float> data_, int rows_, int columns_ = 1)

    Adds a controller to a model node.

ControllerValue get_controller(uint32_t type_, bool key = false) const

    Gets a controller to a model node.

```

#### Public Members

```

std::string name

const uint32_t type

bool inheritcolor = false

Node *parent = nullptr

std::vector<Node*> children

std::vector<ControllerKey> controller_keys

std::vector<float> controller_data

```

### 6.13.161 nw::model::ControllerKey

struct **ControllerKey**

#### Public Functions

inline **ControllerKey**(*IntermedString* name\_, uint32\_t type\_, int rows\_, int key\_offset\_, int time\_offset\_, int data\_offset\_, int columns\_, bool is\_key\_)

#### Public Members

*IntermedString* **name**

uint32\_t **type**

int **rows** = {0}

int **key\_offset** = {0}

int **time\_offset** = {0}

int **data\_offset** = {0}

int **columns** = {0}

bool **is\_key** = {false}

### 6.13.162 nw::model::ControllerType

struct **ControllerType**

#### Public Static Functions

static std::pair<uint32\_t, uint32\_t> **lookup**(std::string\_view cont)



### Public Static Attributes

static constexpr uint32\_t **Position** = 8

static constexpr uint32\_t **Orientation** = 20

static constexpr uint32\_t **Scale** = 36

static constexpr uint32\_t **Wirecolor** = 20004

static constexpr uint32\_t **Color** = 76

static constexpr uint32\_t **Radius** = 88

static constexpr uint32\_t **ShadowRadius** = 96

static constexpr uint32\_t **VerticalDisplacement** = 100

static constexpr uint32\_t **Multiplier** = 140

static constexpr uint32\_t **AlphaEnd** = 80

static constexpr uint32\_t **AlphaStart** = 84

static constexpr uint32\_t **BirthRate** = 88

static constexpr uint32\_t **Bounce\_Co** = 92

static constexpr uint32\_t **ColorEnd** = 96

static constexpr uint32\_t **ColorStart** = 108

static constexpr uint32\_t **CombineTime** = 120

static constexpr uint32\_t **Drag** = 124

static constexpr uint32\_t **FPS** = 128

static constexpr uint32\_t **FrameEnd** = 132

static constexpr uint32\_t **FrameStart** = 136

```
static constexpr uint32_t Grav = 140

static constexpr uint32_t LifeExp = 144

static constexpr uint32_t Mass = 148

static constexpr uint32_t P2P_Bezier2 = 152

static constexpr uint32_t P2P_Bezier3 = 156

static constexpr uint32_t ParticleRot = 160

static constexpr uint32_t RandVel = 164

static constexpr uint32_t SizeStart = 168

static constexpr uint32_t SizeEnd = 172

static constexpr uint32_t SizeStart_Y = 176

static constexpr uint32_t SizeEnd_Y = 180

static constexpr uint32_t Spread = 184

static constexpr uint32_t Threshold = 188

static constexpr uint32_t Velocity = 192

static constexpr uint32_t XSize = 196

static constexpr uint32_t YSize = 200

static constexpr uint32_t BlurLength = 204

static constexpr uint32_t LightningDelay = 208

static constexpr uint32_t LightningRadius = 212

static constexpr uint32_t LightningScale = 216

static constexpr uint32_t LightningSubDiv = 220
```

```

static constexpr uint32_t Detonate = 228

static constexpr uint32_t AlphaMid = 464

static constexpr uint32_t ColorMid = 468

static constexpr uint32_t PercentStart = 480

static constexpr uint32_t PercentMid = 481

static constexpr uint32_t PercentEnd = 482

static constexpr uint32_t SizeMid = 484

static constexpr uint32_t SizeMid_Y = 488

static constexpr uint32_t lock_axes = 500

static constexpr uint32_t spawn_type = 501

static constexpr uint32_t random = 502

static constexpr uint32_t inherit = 503

static constexpr uint32_t inherit_local = 503

static constexpr uint32_t SelfIllumColor = 100

static constexpr uint32_t Alpha = 128

static const std::unordered_map<std::string_view, std::pair<uint32_t, uint32_t>> map

```

### 6.13.163 nw::model::DanglymeshNode

```
struct DanglymeshNode : public nw::model::TrimeshNode
```

## Public Functions

**DanglymeshNode**(std::string name\_)

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

## Public Members

std::vector<float> **constraints**

float **displacement**

float **period**

float **tightness**

glm::vec3 **ambient**

bool **beaming**

glm::vec3 **bmin**

glm::vec3 **bmax**

std::string **bitmap**

glm::vec3 **center**

glm::vec3 **diffuse**

std::string **materialname**

bool **render** = {true}

std::string **renderhint**

bool **rotatetexture** = {false}

bool **shadow** = {false}

```
float shininess

glm::vec3 specular

std::array<std::string, 3> textures

uint32_t tilefade = {0}

int transparencyhint = {0}

bool showdispl = {false}

uint32_t displtype = {1}

uint32_t lightmapped = {0}

std::vector<std::string> multimaterial

std::vector<glm::vec3> colors

std::vector<Vertex> vertices

std::vector<uint16_t> indices

std::string name

const uint32_t type

bool inheritcolor = false

Node *parent = nullptr

std::vector<Node*> children

std::vector<ControllerKey> controller_keys

std::vector<float> controller_data
```

### 6.13.164 nw::model::DummyNode

```
struct DummyNode : public nw::model::Node
```

#### Public Functions

```
DummyNode(std::string name_)
```

```
void add_controller_data(std::string_view name_, uint32_t type_, std::vector<float> times_,  
                        std::vector<float> data_, int rows_, int columns_ = 1)
```

Adds a controller to a model node.

```
ControllerValue get_controller(uint32_t type_, bool key = false) const
```

Gets a controller to a model node.

#### Public Members

```
std::string name
```

```
const uint32_t type
```

```
bool inheritcolor = false
```

```
Node *parent = nullptr
```

```
std::vector<Node*> children
```

```
std::vector<ControllerKey> controller_keys
```

```
std::vector<float> controller_data
```

### 6.13.165 nw::model::EmitterFlag

```
struct EmitterFlag
```

#### Public Static Attributes

```
static constexpr uint32_t P2P = 0x0001
```

```
static constexpr uint32_t P2PSel = 0x0002
```

```
static constexpr uint32_t AffectedByWind = 0x0004
```

```

static constexpr uint32_t IsTinted = 0x0008

static constexpr uint32_t Bounce = 0x0010

static constexpr uint32_t Random = 0x0020

static constexpr uint32_t Inherit = 0x0040

static constexpr uint32_t InheritVel = 0x0080

static constexpr uint32_t InheritLocal = 0x0100

static constexpr uint32_t Splat = 0x0200

static constexpr uint32_t InheritPart = 0x0400

```

### 6.13.166 nw::model::EmitterNode

```
struct EmitterNode : public nw::model::Node
```

#### Public Functions

```
EmitterNode(std::string name_)
```

```
void add_controller_data(std::string_view name_, uint32_t type_, std::vector<float> times_,
                        std::vector<float> data_, int rows_, int columns_ = 1)
```

Adds a controller to a model node.

```
ControllerValue get_controller(uint32_t type_, bool key = false) const
```

Gets a controller to a model node.

#### Public Members

```
float blastlength = {0.0f}
```

```
float blastradius = {0.0f}
```

```
std::string blend
```

```
std::string chunkname
```

```
float deadspace = {0.0f}
```

```
uint32_t loop = {0}

std::string render

uint32_t renderorder = {0}

int32_t spawntype = {0}

std::string texture

uint32_t twosidedtex = {0}

std::string update

uint32_t xgrid = {0}

uint32_t ygrid = {0}

uint32_t flags = {0}

uint32_t render_sel = {0}

uint32_t blend_sel = {0}

uint32_t update_sel = {0}

uint32_t spawntype_sel = {0}

float opacity = {0.0f}

std::string p2p_type

uint32_t tilefade = {0}

std::string name

const uint32_t type

bool inheritcolor = false

Node *parent = nullptr
```



```
std::vector<Node*> children
```

```
std::vector<ControllerKey> controller_keys
```

```
std::vector<float> controller_data
```

### 6.13.167 nw::model::Face

```
struct Face
```

#### Public Members

```
std::array<uint32_t, 3> vert_idx
```

```
int32_t shader_group_idx
```

```
std::array<uint32_t, 3> tvert_idx
```

```
uint32_t material_idx
```

### 6.13.168 nw::model::Geometry

```
struct Geometry
```

Subclassed by *nw::model::Animation*, *nw::model::Model*

#### Public Functions

```
Geometry(GeometryType type_ = GeometryType::geometry)
```

```
Geometry(Geometry&) = delete
```

```
virtual ~Geometry() = default
```

```
Geometry &operator=(Geometry&) = delete
```

```
Node *find(const std::regex &re)
```

```
const Node *find(const std::regex &re) const
```

## Public Members

std::string **name**

GeometryType **type**

std::vector<std::unique\_ptr<*Node*>> **nodes**

### 6.13.169 nw::model::GeometryFlag

**Warning:** doxygenstruct: Cannot find class “nw::model::GeometryFlag” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.170 nw::model::GeometryType

**Warning:** doxygenstruct: Cannot find class “nw::model::GeometryType” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.171 nw::model::LightNode

struct **LightNode** : public nw::model::Node

## Public Functions

**LightNode**(std::string name\_)

virtual ~**LightNode**() = default

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

## Public Members

int32\_t **lensflares** = {0}

float **flareradius** = {0.0f}

float **multiplier** = {0.0f}

```
glm::vec3 color

std::vector<float> flaresizes

std::vector<float> flarepositions

std::vector<glm::vec3> flarecolorshifts

std::vector<std::string> textures

uint32_t lightpriority = {5}

int32_t ambientonly = {0}

bool dynamic = {true}

uint32_t affectdynamic = {1}

uint32_t shadow = {1}

uint32_t generateflare = {0}

uint32_t fadinglight = {1}

std::string name

const uint32_t type

bool inheritcolor = false

Node *parent = nullptr

std::vector<Node*> children

std::vector<ControllerKey> controller_keys

std::vector<float> controller_data
```

### 6.13.172 nw::model::Mdl

class **Mdl**

Implements Bioware MDL file format

**Warning:** This is still incomplete

#### Public Functions

**Mdl**(const std::filesystem::path &filename)

**Mdl**(ResourceData data)

std::unique\_ptr<*Node*> **make\_node**(uint32\_t type, std::string\_view name)

bool **valid**() const

#### Public Members

*Model* **model**

### 6.13.173 nw::model::TextParser

class **TextParser**

#### Public Functions

**TextParser**(std::string\_view buffer, *Mdl* \*mdl)

bool **parse**()

### 6.13.174 nw::model::Model

struct **Model** : public nw::model::*Geometry*

#### Public Functions

**Model**()

**Model**(*Model*&) = delete

virtual **~Model**() = default

*Model* &**operator=**(*Model*&) = delete

```

Animation *find_animation(std::string_view name)

const Animation *find_animation(std::string_view name) const

Node *find(const std::regex &re)

const Node *find(const std::regex &re) const

```

## Public Members

```

ModelClass classification

bool ignorefog

std::vector<std::unique_ptr<Animation>> animations

std::unique_ptr<Mdl> supermodel

glm::vec3 bmin

glm::vec3 bmax

float radius

float animationscale

std::string supermodel_name

std::string file_dependency

std::string name

GeometryType type

std::vector<std::unique_ptr<Node>> nodes

```

### 6.13.175 nw::model::ModelClass

**Warning:** doxygenstruct: Cannot find class “nw::model::ModelClass” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.176 nw::model::Node

struct **Node**

Subclassed by *nw::model::CameraNode*, *nw::model::DummyNode*, *nw::model::EmitterNode*,  
*nw::model::LightNode*, *nw::model::PatchNode*, *nw::model::ReferenceNode*, *nw::model::TrimeshNode*

### Public Functions

**Node**(std::string name\_, uint32\_t type\_)

virtual **~Node**() = default

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

### Public Members

std::string **name**

const uint32\_t **type**

bool **inheritcolor** = false

*Node* \***parent** = nullptr

std::vector<*Node*\*> **children**

std::vector<*ControllerKey*> **controller\_keys**

std::vector<float> **controller\_data**

## 6.13.177 nw::model::NodeFlags

struct **NodeFlags**

### Public Static Attributes

```
static constexpr uint32_t header = 0x00000001
```

```
static constexpr uint32_t light = 0x00000002
```

```
static constexpr uint32_t emitter = 0x00000004
```

```
static constexpr uint32_t camera = 0x00000008
```

```
static constexpr uint32_t reference = 0x00000010
```

```
static constexpr uint32_t mesh = 0x00000020
```

```
static constexpr uint32_t skin = 0x00000040
```

```
static constexpr uint32_t anim = 0x00000080
```

```
static constexpr uint32_t dangly = 0x00000100
```

```
static constexpr uint32_t aabb = 0x00000200
```

```
static constexpr uint32_t patch = 0x00000400
```

## 6.13.178 nw::model::NodeType

```
struct NodeType
```

### Public Static Functions

```
static inline uint32_t from_string(std::string_view str)
```

```
static inline constexpr std::string_view to_string(uint32_t value)
```

### Public Static Attributes

```
static constexpr uint32_t camera = (NodeFlags::header | NodeFlags::camera)
```

```
static constexpr uint32_t dummy = NodeFlags::header
```

```
static constexpr uint32_t emitter = NodeFlags::header | NodeFlags::emitter
```

```
static constexpr uint32_t light = NodeFlags::header | NodeFlags::light

static constexpr uint32_t reference = NodeFlags::header | NodeFlags::reference

static constexpr uint32_t patch = NodeFlags::header | NodeFlags::patch

static constexpr uint32_t trimesh = NodeFlags::header | NodeFlags::mesh

static constexpr uint32_t danglymesh = trimesh | NodeFlags::dangly

static constexpr uint32_t skin = trimesh | NodeFlags::skin

static constexpr uint32_t animmesh = trimesh | NodeFlags::anim

static constexpr uint32_t aabb = trimesh | NodeFlags::aabb
```

### 6.13.179 nw::model::PatchNode

```
struct PatchNode : public nw::model::Node
```

#### Public Functions

```
PatchNode(std::string name_)
```

```
void add_controller_data(std::string_view name_, uint32_t type_, std::vector<float> times_,  
                        std::vector<float> data_, int rows_, int columns_ = 1)
```

Adds a controller to a model node.

```
ControllerValue get_controller(uint32_t type_, bool key = false) const
```

Gets a controller to a model node.

#### Public Members

```
std::string name
```

```
const uint32_t type
```

```
bool inheritcolor = false
```

```
Node *parent = nullptr
```

```
std::vector<Node*> children
```



```
std::vector<ControllerKey> controller_keys
```

```
std::vector<float> controller_data
```

### 6.13.180 nw::model::ReferenceNode

```
struct ReferenceNode : public nw::model::Node
```

#### Public Functions

```
ReferenceNode(std::string name_)
```

```
void add_controller_data(std::string_view name_, uint32_t type_, std::vector<float> times_,  
                        std::vector<float> data_, int rows_, int columns_ = 1)
```

Adds a controller to a model node.

```
ControllerValue get_controller(uint32_t type_, bool key = false) const
```

Gets a controller to a model node.

#### Public Members

```
std::string refmodel
```

```
bool reattachable
```

```
std::string name
```

```
const uint32_t type
```

```
bool inheritcolor = false
```

```
Node *parent = nullptr
```

```
std::vector<Node*> children
```

```
std::vector<ControllerKey> controller_keys
```

```
std::vector<float> controller_data
```

### 6.13.181 nw::model::SkinNode

struct **SkinNode** : public nw::model::TrimeshNode

#### Public Functions

**SkinNode**(std::string name\_)

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

#### Public Members

std::vector<SkinVertex> **vertices**

std::array<int16\_t, 64> **bone\_nodes**

glm::vec3 **ambient**

bool **beaming**

glm::vec3 **bmin**

glm::vec3 **bmax**

std::string **bitmap**

glm::vec3 **center**

glm::vec3 **diffuse**

std::string **materialname**

bool **render** = {true}

std::string **renderhint**

bool **rotatetexture** = {false}

```
bool shadow = {false}

float shininess

glm::vec3 specular

std::array<std::string, 3> textures

uint32_t tilefade = {0}

int transparencyhint = {0}

bool showdispl = {false}

uint32_t displtype = {1}

uint32_t lightmapped = {0}

std::vector<std::string> multimaterial

std::vector<glm::vec3> colors

std::vector<uint16_t> indices

std::string name

const uint32_t type

bool inheritcolor = false

Node *parent = nullptr

std::vector<Node*> children

std::vector<ControllerKey> controller_keys

std::vector<float> controller_data
```

### 6.13.182 nw::model::SkinWeight

**Warning:** doxygenstruct: Cannot find class “nw::model::SkinWeight” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.183 nw::model::TriangleMode

**Warning:** doxygenstruct: Cannot find class “nw::model::TriangleMode” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.13.184 nw::model::TrimeshNode

struct **TrimeshNode** : public nw::model::Node

Subclassed by *nw::model::AABBNode*, *nw::model::AnimeshNode*, *nw::model::DanglymeshNode*,  
*nw::model::SkinNode*

#### Public Functions

**TrimeshNode**(std::string name\_, uint32\_t type\_ = *NodeType::trimesh*)

virtual **~TrimeshNode**() = default

void **add\_controller\_data**(std::string\_view name\_, uint32\_t type\_, std::vector<float> times\_,  
std::vector<float> data\_, int rows\_, int columns\_ = 1)

Adds a controller to a model node.

ControllerValue **get\_controller**(uint32\_t type\_, bool key = false) const

Gets a controller to a model node.

#### Public Members

glm::vec3 **ambient**

bool **beaming**

glm::vec3 **bmin**

glm::vec3 **bmax**

std::string **bitmap**

glm::vec3 **center**

```
glm::vec3 diffuse

std::string materialname

bool render = {true}

std::string renderhint

bool rotatetexture = {false}

bool shadow = {false}

float shininess

glm::vec3 specular

std::array<std::string, 3> textures

uint32_t tilefade = {0}

int transparencyhint = {0}

bool showdispl = {false}

uint32_t displtype = {1}

uint32_t lightmapped = {0}

std::vector<std::string> multimaterial

std::vector<glm::vec3> colors

std::vector<Vertex> vertices

std::vector<uint16_t> indices

std::string name

const uint32_t type

bool inheritcolor = false
```

*Node* \*parent = nullptr

std::vector<*Node*\*> children

std::vector<*ControllerKey*> controller\_keys

std::vector<float> controller\_data

### 6.13.185 nw::script::AssignExpression

struct **AssignExpression** : public nw::script::Expression

#### Public Functions

inline **AssignExpression**(*Expression* \*lhs\_, *NssToken* token, *Expression* \*rhs\_)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*Expression* \*lhs = nullptr

*NssToken* op

*Expression* \*rhs = nullptr

size\_t type\_id\_ = invalid\_type\_id

bool is\_const\_ = false

immer::map<std::string, Export> env\_

*SourceRange* range\_

### 6.13.186 nw::script::Ast

struct **Ast**

#### Public Functions

**Ast**() = default

**Ast**(const *Ast*&) = delete

**Ast**(*Ast*&&) = default

*Ast* &**operator**=(const *Ast*&) = delete

*Ast* &**operator**=(*Ast*&&) = default

template<typename **T**, typename ...**Args**>

inline *T* \***create\_node**(*Args*&&... args)

inline void **accept**(*BaseVisitor* \*visitor)

std::string\_view **find\_comment**(size\_t line) const noexcept

Finds first comment that the source range of which ends on line or line - 1.

#### Public Members

std::vector<*Statement*\*> **decls**

std::vector<*Include*> **includes**

std::unordered\_map<std::string, std::string> **defines**

std::vector<*Comment*> **comments**

std::vector<size\_t> **line\_map**

std::vector<std::unique\_ptr<*AstNode*>> **nodes\_**

### 6.13.187 nw::script::AstLocator

struct **AstLocator** : public nw::script::*BaseVisitor*

## Public Functions

```
inline AstLocator(Nss *parent, std::string symbol, size_t line, size_t character)

inline Symbol locate_in_dependencies(const std::string &needle, bool is_type = false)

inline virtual void visit(Ast *script)

inline virtual void visit(FunctionDecl *decl)

inline virtual void visit(FunctionDefinition *decl)

inline virtual void visit(StructDecl *decl)

inline virtual void visit(VarDecl *decl)

inline virtual void visit(AssignExpression *expr)

inline virtual void visit(BinaryExpression *expr)

inline virtual void visit(CallExpression *expr)

inline virtual void visit(ComparisonExpression *expr)

inline virtual void visit(ConditionalExpression *expr)

inline virtual void visit(DotExpression *expr)

inline virtual void visit(EmptyExpression *expr)

inline virtual void visit(GroupingExpression *expr)

inline virtual void visit(LiteralExpression *expr)

inline virtual void visit(LiteralVectorExpression *expr)

inline virtual void visit(LogicalExpression *expr)

inline virtual void visit(PostfixExpression *expr)

inline virtual void visit(UnaryExpression *expr)

inline virtual void visit(VariableExpression *expr)

inline virtual void visit(BlockStatement *stmt)

inline virtual void visit(DeclList *stmt)

inline virtual void visit(DoStatement *stmt)

inline virtual void visit(EmptyStatement *stmt)

inline virtual void visit(ExprStatement *stmt)

inline virtual void visit(IfStatement *stmt)

inline virtual void visit(ForStatement *stmt)

inline virtual void visit(JumpStatement *stmt)
```



```

inline virtual void visit(LabelStatement *stmt)
inline virtual void visit(SwitchStatement *stmt)
inline virtual void visit(WhileStatement *stmt)

```

### Public Members

```

const Nss *parent_ = nullptr

std::string symbol_

SourcePosition pos_

bool in_func_decl_ = false

bool in_struct_decl_ = false

bool found_ = false

Symbol result_

const Declaration *last_seen_decl = nullptr

const DotExpression *dot = nullptr

const CallExpression *call = nullptr

size_t active_param = 0

```

## 6.13.188 nw::script::AstNode

struct **AstNode**

Subclassed by *nw::script::Expression*, *nw::script::Statement*

### Public Functions

```

virtual ~AstNode() = default

virtual void accept(BaseVisitor *visitor) = 0

```

```
virtual void complete(const std::string &needle, std::vector<const Declaration*> &out, bool no_filter = false) const
```

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

```
size_t type_id_ = invalid_type_id
```

```
bool is_const_ = false
```

```
immer::map<std::string, Export> env_
```

```
SourceRange range_
```

### 6.13.189 nw::script::AstPrinter

```
struct AstPrinter : public nw::script::BaseVisitor
```

## Public Functions

```
~AstPrinter() = default
```

```
inline virtual void visit(Ast *script) override
```

```
inline virtual void visit(FunctionDecl *decl) override
```

```
inline virtual void visit(FunctionDefinition *decl) override
```

```
inline virtual void visit(StructDecl *decl) override
```

```
inline virtual void visit(VarDecl *decl) override
```

```
inline virtual void visit(AssignExpression *expr) override
```

```
inline virtual void visit(BinaryExpression *expr) override
```

```
inline virtual void visit(CallExpression *expr) override
```

```
inline virtual void visit(ComparisonExpression *expr) override
```

```
inline virtual void visit(ConditionalExpression *expr) override
```

```
inline virtual void visit(DotExpression *expr) override
```

```
inline virtual void visit(EmptyExpression *expr) override
```

```
inline virtual void visit(GroupingExpression *expr) override
```

```

inline virtual void visit(LiteralExpression *expr) override
inline virtual void visit(LiteralVectorExpression *expr) override
inline virtual void visit(LogicalExpression *expr) override
inline virtual void visit(PostfixExpression *expr) override
inline virtual void visit(UnaryExpression *expr) override
inline virtual void visit(VariableExpression *expr) override
inline virtual void visit(BlockStatement *stmt) override
inline virtual void visit(DeclList *stmt) override
inline virtual void visit(DoStatement *stmt) override
inline virtual void visit(EmptyStatement*) override
inline virtual void visit(ExprStatement *stmt) override
inline virtual void visit(IfStatement *stmt) override
inline virtual void visit(ForStatement *stmt) override
inline virtual void visit(JumpStatement *stmt) override
inline virtual void visit(LabelStatement *stmt) override
inline virtual void visit(SwitchStatement *stmt) override
inline virtual void visit(WhileStatement *stmt) override

```

## Public Members

```
std::stringstream ss
```

```
int depth = 0
```

### 6.13.190 nw::script::AstResolver

```
struct AstResolver : public nw::script::BaseVisitor
```

## Public Types

```
using ScopeMap = std::unordered_map<std::string, ScopeDecl>
```

```
using ScopeStack = std::vector<ScopeMap>
```

```
using EnvStack = std::vector<immer::map<std::string, Export>>
```

## Public Functions

```
inline AstResolver(Nss *parent, Context *ctx, bool command_script = false)

virtual ~AstResolver() = default

inline void begin_scope(bool global = false)

inline void declare(NssToken token, Declaration *decl, bool is_type = false)

inline void define(NssToken token, bool is_type = false)

inline void end_scope(bool global = false)

inline immer::map<std::string, Export> symbol_table() const

inline const Declaration *resolve(std::string_view token, SourceRange range, bool is_type)

inline virtual void visit(Ast *script) override

inline void match_function_decls(const FunctionDecl *decl, const FunctionDecl *def)

inline bool all_control_flow_paths_return(const AstNode *node)

inline virtual void visit(FunctionDecl *decl) override

inline virtual void visit(FunctionDefinition *decl) override

inline virtual void visit(StructDecl *decl) override

inline virtual void visit(VarDecl *decl) override

inline virtual void visit(AssignExpression *expr) override

inline virtual void visit(BinaryExpression *expr) override

inline virtual void visit(CallExpression *expr) override

inline virtual void visit(ComparisonExpression *expr) override

inline virtual void visit(ConditionalExpression *expr) override

inline virtual void visit(DotExpression *expr) override

inline virtual void visit(EmptyExpression *expr) override

inline virtual void visit(GroupingExpression *expr) override

inline virtual void visit(LiteralExpression *expr) override

inline virtual void visit(LiteralVectorExpression *expr) override

inline virtual void visit(LogicalExpression *expr) override

inline virtual void visit(PostfixExpression *expr) override

inline virtual void visit(UnaryExpression *expr) override

inline virtual void visit(VariableExpression *expr) override
```

```

inline virtual void visit(BlockStatement *stmt) override
inline virtual void visit(DeclList *stmt) override
inline virtual void visit(DoStatement *stmt) override
inline virtual void visit(EmptyStatement *stmt) override
inline virtual void visit(ExprStatement *stmt) override
inline virtual void visit(IfStatement *stmt) override
inline virtual void visit(ForStatement *stmt) override
inline virtual void visit(JumpStatement *stmt) override
inline virtual void visit(LabelStatement *stmt) override
inline virtual void visit(SwitchStatement *stmt) override
inline virtual void visit(WhileStatement *stmt) override

```

### Public Members

```
Nss *parent_ = nullptr
```

```
Context *ctx_ = nullptr
```

```
ScopeStack scope_stack_
```

```
EnvStack env_stack_
```

```
int loop_stack_ = 0
```

```
int switch_stack_ = 0
```

```
FunctionDefinition *func_def_stack_ = nullptr
```

```
bool is_command_script_ = false
```

#### 6.13.191 nw::script::BaseVisitor

```
struct BaseVisitor
```

```

Subclassed by nw::script::AstConstEvaluator, nw::script::AstHint, nw::script::AstLocator,
nw::script::AstPrinter, nw::script::AstResolver

```

## Public Functions

```
virtual ~BaseVisitor() = default
virtual void visit(Ast *script) = 0
virtual void visit(FunctionDecl *decl) = 0
virtual void visit(FunctionDefinition *decl) = 0
virtual void visit(StructDecl *decl) = 0
virtual void visit(VarDecl *decl) = 0
virtual void visit(AssignExpression *expr) = 0
virtual void visit(BinaryExpression *expr) = 0
virtual void visit(CallExpression *expr) = 0
virtual void visit(ComparisonExpression *expr) = 0
virtual void visit(ConditionalExpression *expr) = 0
virtual void visit(DotExpression *expr) = 0
virtual void visit(EmptyExpression *expr) = 0
virtual void visit(GroupingExpression *expr) = 0
virtual void visit(LiteralExpression *expr) = 0
virtual void visit(LiteralVectorExpression *expr) = 0
virtual void visit(LogicalExpression *expr) = 0
virtual void visit(PostfixExpression *expr) = 0
virtual void visit(UnaryExpression *expr) = 0
virtual void visit(VariableExpression *expr) = 0
virtual void visit(BlockStatement *stmt) = 0
virtual void visit(DeclList *stmt) = 0
virtual void visit(DoStatement *stmt) = 0
virtual void visit(EmptyStatement *stmt) = 0
virtual void visit(ExprStatement *stmt) = 0
virtual void visit(IfStatement *stmt) = 0
virtual void visit(ForStatement *stmt) = 0
virtual void visit(JumpStatement *stmt) = 0
virtual void visit(LabelStatement *stmt) = 0
virtual void visit(SwitchStatement *stmt) = 0
virtual void visit(WhileStatement *stmt) = 0
```

### 6.13.192 nw::script::BinaryExpression

struct **BinaryExpression** : public nw::script::Expression

#### Public Functions

inline **BinaryExpression**(Expression \*lhs\_, NssToken token, Expression \*rhs\_)

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

Expression \*lhs = nullptr

NssToken op

Expression \*rhs = nullptr

size\_t type\_id\_ = invalid\_type\_id

bool is\_const\_ = false

immer::map<std::string, Export> env\_

SourceRange range\_

### 6.13.193 nw::script::BlockStatement

struct **BlockStatement** : public nw::script::Statement

### Public Functions

**BlockStatement**() = default

**BlockStatement**(*BlockStatement*&) = delete

*BlockStatement* &**operator**=(const *BlockStatement*&) = delete

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

### Public Members

std::vector<*Statement*\*> **nodes**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

## 6.13.194 nw::script::CallExpression

struct **CallExpression** : public nw::script::*Expression*

### Public Functions

inline explicit **CallExpression**(*Expression* \*expr\_)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---



## Public Members

*Expression* \***expr** = nullptr

std::vector<*Expression*\*> **args**

*SourceRange* **arg\_range**

std::vector<*SourceRange*> **comma\_ranges**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.195 nw::script::Comment

struct **Comment**

Abstracts a comment.

## Public Functions

inline void **append**(std::string\_view comment, *SourceLocation* range)

## Public Members

*SourceLocation* **range\_**

std::string **comment\_**

### 6.13.196 nw::script::ConditionalExpression

struct **ConditionalExpression** : public nw::script::*Expression*

### Public Functions

inline **ConditionalExpression**(*Expression* \*expr\_, *Expression* \*true\_branch\_, *Expression* \*false\_branch\_)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

### Public Members

*Expression* \***test** = nullptr

*Expression* \***true\_branch** = nullptr

*Expression* \***false\_branch** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

## 6.13.197 nw::script::Context

struct **Context**

### Public Functions

**Context**(std::vector<std::string> include\_paths = { }, std::string command\_script = "nwscript")

virtual ~**Context**() = default

void **add\_include\_path**(const std::filesystem::path &path)

Adds include path to internal resman.

*Nss* \***get**(*Resref* resref, bool command\_script = false)

Gets a script from internal resman.

inline const *Nss* \***command\_script**() const noexcept

Gets command script.

```

virtual void register_default_types()
virtual void register_engine_types()
size_t type_id(std::string_view type_name, bool define = false)
size_t type_id(Type type_name, bool define = false)
std::string_view type_name(size_t type_id)
virtual size_t type_check_binary_op(NssToken op, size_t lhs, size_t rhs)
virtual bool is_type_convertible(size_t lhs, size_t rhs)
virtual void lexical_diagnostic(Nss *script, std::string_view msg, bool is_warning, SourceRange range)
virtual void parse_diagnostic(Nss *script, std::string_view msg, bool is_warning, SourceRange range)
virtual void semantic_diagnostic(Nss *script, std::string_view msg, bool is_warning, SourceRange range)

```

## Public Members

```

std::vector<std::string> include_paths_

absl::flat_hash_map<Resource, std::unique_ptr<Nss>> dependencies_

std::vector<IncludeStackEntry> include_stack_

std::vector<IncludeStackEntry> preprocessed_

kernel::Resources resman_

std::string command_script_name_

Nss *command_script_ = nullptr

absl::flat_hash_map<std::string, size_t> type_map_

std::vector<std::string> type_array_

std::vector<StructDecl*> struct_stack_

```

### 6.13.198 nw::script::Declaration

struct **Declaration** : public nw::script::Statement

Subclassed by nw::script::DeclList, nw::script::FunctionDecl, nw::script::FunctionDefinition, nw::script::StructDecl, nw::script::VarDecl

#### Public Functions

virtual std::string **identifier**() const = 0

virtual *SourceRange* **range**() const noexcept

virtual *SourceRange* **selection\_range**() const noexcept

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*Type* **type**

*SourceRange* **range\_selection\_**

std::string\_view **view**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.199 nw::script::Diagnostic

struct **Diagnostic**

#### Public Members

*DiagnosticType* **type**

DiagnosticSeverity **severity**

std::string **script**

std::string **message**

*SourceRange* **location**

### 6.13.200 nw::script::DoStatement

struct **DoStatement** : public nw::script::Statement

#### Public Functions

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*Statement* \***block** = nullptr

*Expression* \***expr** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.201 nw::script::DotExpression

struct **DotExpression** : public nw::script::Expression

#### Public Functions

inline **DotExpression**(Expression \*lhs\_, NssToken token, Expression \*rhs\_)

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

Expression \***lhs** = nullptr

NssToken **dot**

Expression \***rhs** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.202 nw::script::ExprStatement

struct **ExprStatement** : public nw::script::Statement

## Public Functions

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

*Expression* \***expr** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.203 nw::script::Expression

struct **Expression** : public nw::script::AstNode

Subclassed by *nw::script::AssignExpression*, *nw::script::BinaryExpression*, *nw::script::CallExpression*,  
*nw::script::ComparisonExpression*, *nw::script::ConditionalExpression*, *nw::script::DotExpression*,  
*nw::script::EmptyExpression*, *nw::script::GroupingExpression*, *nw::script::LiteralExpression*,  
*nw::script::LiteralVectorExpression*, *nw::script::LogicalExpression*, *nw::script::PostfixExpression*,  
*nw::script::UnaryExpression*, *nw::script::VariableExpression*

## Public Functions

virtual ~**Expression**() = default

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

### Public Members

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

## 6.13.204 nw::script::ForStatement

struct **ForStatement** : public nw::script::Statement

### Public Functions

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

### Public Members

*AstNode* \***init** = nullptr

*Expression* \***check** = nullptr

*Expression* \***inc** = nullptr

*Statement* \***block** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**



### 6.13.205 nw::script::FunctionDecl

struct **FunctionDecl** : public nw::script::Declaration

#### Public Functions

**FunctionDecl**() = default

**FunctionDecl**(*FunctionDecl*&) = delete

*FunctionDecl* &**operator**=(const *FunctionDecl*&) = delete

inline virtual std::string **identifier**() const override

virtual *SourceRange* **range**() const noexcept

virtual *SourceRange* **selection\_range**() const noexcept

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*NssToken* **identifier\_**

std::vector<*VarDecl*\*> **params**

*Type* **type**

*SourceRange* **range\_selection\_**

std::string\_view **view**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.206 nw::script::FunctionDefinition

struct **FunctionDefinition** : public nw::script::Declaration

#### Public Functions

inline virtual std::string **identifier**() const override

virtual *SourceRange* **range**() const noexcept

virtual *SourceRange* **selection\_range**() const noexcept

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*FunctionDecl* \***decl\_inline** = nullptr

*BlockStatement* \***block** = nullptr

const *FunctionDecl* \***decl\_external** = nullptr

*Type* **type**

*SourceRange* **range\_selection\_**

std::string\_view **view**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.207 nw::script::GroupingExpression

struct **GroupingExpression** : public nw::script::Expression

#### Public Functions

inline explicit **GroupingExpression**(Expression \*expr\_)

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this Ast Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

Expression \***expr** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

SourceRange **range\_**

### 6.13.208 nw::script::IfStatement

struct **IfStatement** : public nw::script::Statement

#### Public Functions

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this Ast Node

---

**Note:** This function does not traverse dependencies

---

### Public Members

*Expression* \***expr** = nullptr

*Statement* \***if\_branch** = nullptr

*Statement* \***else\_branch** = nullptr

size\_t **type\_id** = invalid\_type\_id

bool **is\_const** = false

immer::map<std::string, Export> **env**\_

*SourceRange* **range**\_

## 6.13.209 nw::script::Include

struct **Include**

Abstracts an script include.

### Public Members

std::string **resref**

*Resref* of included script.

*SourceRange* **location**

Source location in script.

*Nss* \***script** = nullptr

Loaded script.

int **used** = 0

Number of times include is used in script file.

### 6.13.210 nw::script::InlayHint

struct **InlayHint**

#### Public Members

std::string **message**

*SourcePosition* **position**

### 6.13.211 nw::script::JumpStatement

struct **JumpStatement** : public nw::script::Statement

#### Public Functions

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*NssToken* **op**

*Expression* \***expr** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.212 nw::script::LabelStatement

struct **LabelStatement** : public nw::script::Statement

#### Public Functions

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this Ast Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

NssToken type

Expression \*expr = nullptr

size\_t type\_id\_ = invalid\_type\_id

bool is\_const\_ = false

immer::map<std::string, Export> env\_

SourceRange range\_

### 6.13.213 nw::script::LiteralExpression

struct **LiteralExpression** : public nw::script::Expression

#### Public Functions

inline explicit **LiteralExpression**(NssToken token)

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this Ast Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

*NssToken* **literal**

*Variant*<int32\_t, float, std::string, *Location*, *ObjectID*> **data**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.214 nw::script::LiteralVectorExpression

struct **LiteralVectorExpression** : public nw::script::Expression

## Public Functions

inline explicit **LiteralVectorExpression**(*NssToken* x\_, *NssToken* y\_, *NssToken* z\_)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

*NssToken* **x**

*NssToken* **y**

*NssToken* **z**

glm::vec3 **data**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.215 nw::script::LogicalExpression

struct **LogicalExpression** : public nw::script::Expression

#### Public Functions

inline **LogicalExpression**(Expression \*lhs\_, NssToken token, Expression \*rhs\_)

virtual void **accept**(BaseVisitor \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const Declaration\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

Expression \***lhs** = nullptr

NssToken **op**

Expression \***rhs** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**



### 6.13.216 nw::script::Nss

struct **Nss**

#### Public Functions

explicit **Nss**(const std::filesystem::path &filename, *Context* \*ctx, bool command\_script = false)

explicit **Nss**(std::string\_view script, *Context* \*ctx, bool command\_script = false)

explicit **Nss**(ResourceData data, *Context* \*ctx, bool command\_script = false)

void **add\_diagnostic**(*Diagnostic* diagnostic)

Add diagnostic to script.

*Ast* &**ast**()

Gets parsed AST.

const *Ast* &**ast**() const

Gets parsed ast.

void **complete**(const std::string &needle, CompletionContext &out, bool no\_filter = false) const

Generates a list of potential completions (excluding dependencies)

void **complete\_at**(const std::string &needle, size\_t line, size\_t character, CompletionContext &out, bool no\_filter = false)

Get all completions (including dependencies)

void **complete\_dot**(const std::string &needle, size\_t line, size\_t character, std::vector<*Symbol*> &out, bool no\_filter = false)

Get all completions (including dependencies)

*Context* \***ctx**() const

Script context.

*Symbol* **declaration\_to\_symbol**(const *Declaration* \*decl) const

Converts declaration to symbol

---

**Note:** *Declaration* must be in script

---

std::vector<std::string> **dependencies**() const

Returns all transitive dependencies in ‘preprocessed’ order, i.e. *dependencies*()[n] was include before *dependencies*()[n+1]

const std::vector<*Diagnostic*> &**diagnostics**() const noexcept

Gets script diagnostics.

inline size\_t **errors**() const noexcept

Returns how many errors were found during parsing.

inline immer::map<std::string, Export> **exports**() const noexcept

Table of symbols exported from script.

inline size\_t **export\_count**() const noexcept  
Count of symbols exported from script.

inline void **increment\_errors**() noexcept  
Increments error count.

inline void **increment\_warnings**() noexcept  
Increments warning count.

std::vector<*InlayHint*> **inlay\_hints**(*SourceRange* range)

inline bool **is\_command\_script**() const noexcept  
Is script a command script.

*Symbol* **locate\_export**(const std::string &symbol, bool is\_type, bool search\_dependencies = false) const  
Locate export, i.e. a top level symbols.

*Symbol* **locate\_symbol**(const std::string &symbol, size\_t line, size\_t character)  
Locate symbol in source file.

std::string\_view **name**() const noexcept  
Script name.

void **parse**()  
Parses script file.

void **process\_includes**(*Nss* \*parent = nullptr)  
Process includes recursively.

void **resolve**()  
Resolves and type checks the *Ast*.

void **set\_name**(const std::string &new\_name)  
Sets a scripts name.

SignatureHelp **signature\_help**(size\_t line, size\_t character)

std::string\_view **text**() const noexcept  
Gets text of script.

std::string\_view **view\_from\_range**(*SourceRange* range) const noexcept  
Gets a view of source file in specified range.

inline size\_t **warnings**() const noexcept  
Returns how many warnings were found during parsing.

### 6.13.217 nw::script::NssLexer

struct **NssLexer**

## Public Functions

explicit **NssLexer**(std::string\_view buffer, *Context* \*ctx, *Nss* \*parent = nullptr)

*NssToken* **next**()

const *NssToken* &**current**() const

const char \***data**() const

## Public Members

std::vector<size\_t> **line\_map**

### 6.13.218 nw::script::NssParser

struct **NssParser**

## Public Functions

explicit **NssParser**(std::string\_view view, *Context* \*ctx, *Nss* \*parent = nullptr)

*NssToken* **advance**()

Advances the token stream.

bool **check**(std::initializer\_list<*NssTokenType*> types) const

Checks if next token matches a particular type.

---

**Note:** Does not advance the token stream

---

### Parameters

**types** – An initializer list of token types

### Returns

True if there is a match

bool **check\_is\_type**() const

Checks if next token matches a particular type.

---

**Note:** Does not advance the token stream

---

### Returns

True if there is a match

*NssToken* **consume**(*NssTokenType* type, std::string\_view error)

Consumes a token.

**Parameters**

- **type** – *Type* of token to consume
- **error** – Error message if token type is not matched

**Returns**

Matched token

void **diagnostic**(std::string\_view msg, *NssToken* token, bool is\_warning = false)

Report diagnostic

**Parameters**

**msg** – Message to report

bool **is\_end**() const

Checks if at end of token stream.

bool **match**(std::initializer\_list<*NssTokenType*> types)

Checks if next token matches a particular type.

---

**Note:** Advances the token stream

---

**Parameters**

**types** – An initializer list of token types

**Returns**

True if there is a match

void **lex**()

Lexes the file.

*NssToken* **lookahead**(size\_t index) const

Looks ahead in the token stream

**Parameters**

**index** – Index to look ahead to, from current token

*NssToken* **peek**() const

Next token in the token stream.

*NssToken* **previous**()

Previous token in the token stream.

void **synchronize**(bool allow\_rbrace = false)

Advances token stream after an error.

*Expression* \***parse\_expr**()

*Expression* \***parse\_expr\_assign**()

*Expression* \***parse\_expr\_conditional**()

*Expression* \***parse\_expr\_or**()

---

*Expression* \***parse\_expr\_and()**  
*Expression* \***parse\_expr\_bitwise()**  
*Expression* \***parse\_expr\_equality()**  
*Expression* \***parse\_expr\_relational()**  
*Expression* \***parse\_expr\_shift()**  
*Expression* \***parse\_expr\_additive()**  
*Expression* \***parse\_expr\_multiplicative()**  
*Expression* \***parse\_expr\_unary()**  
*Expression* \***parse\_expr\_postfix()**  
*Expression* \***parse\_expr\_primary()**  
*Expression* \***parse\_expr\_group()**  
*Statement* \***parse\_stmt()**  
*BlockStatement* \***parse\_stmt\_block()**  
*DoStatement* \***parse\_stmt\_do()**  
*ExprStatement* \***parse\_stmt\_expr()**  
*IfStatement* \***parse\_stmt\_if()**  
*ForStatement* \***parse\_stmt\_for()**  
*LabelStatement* \***parse\_stmt\_label()**  
*JumpStatement* \***parse\_stmt\_jump()**  
*SwitchStatement* \***parse\_stmt\_switch()**  
*WhileStatement* \***parse\_stmt\_while()**  
*Type* **parse\_type()**  
*Statement* \***parse\_decl()**  
*StructDecl* \***parse\_decl\_struct()**  
*Declaration* \***parse\_decl\_function\_def()**  
*FunctionDecl* \***parse\_decl\_function()**  
*VarDecl* \***parse\_decl\_param()**  
*Ast* **parse\_program()**  
Parses script.

### Public Members

*Context* \***ctx\_** = nullptr

*Nss* \***parent\_** = nullptr

std::string\_view **view\_**

*Ast* **ast\_**

std::vector<*NssToken*> **tokens**

size\_t **current\_** = 0

### 6.13.219 nw::script::NssToken

struct **NssToken**

#### Public Functions

**NssToken**() = default

inline **NssToken**(*NssTokenType* type\_, std::string\_view id\_)

inline **NssToken**(*NssTokenType* type\_, std::string\_view id\_, *SourcePosition* start, *SourcePosition* end)

#### Public Members

*NssTokenType* **type** = *NssTokenType::INVALID*

*SourceLocation* **loc**

### 6.13.220 nw::script::PostfixExpression

struct **PostfixExpression** : public nw::script::*Expression*

### Public Functions

inline **PostfixExpression**(*Expression* \*lhs\_, *NssToken* token)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

### Public Members

*Expression* \*lhs = nullptr

*NssToken* op

size\_t type\_id\_ = invalid\_type\_id

bool is\_const\_ = false

immer::map<std::string, Export> env\_

*SourceRange* range\_

## 6.13.221 nw::script::SourceLocation

struct **SourceLocation**

### Public Functions

inline size\_t **length**() const noexcept

Gets the length of source code covered.

inline std::string\_view **view**() const noexcept

Gets a view of the source code covered.

### Public Members

const char \***start** = nullptr

Pointer to start of source code.

const char \***end** = nullptr

Pointer to end of source code.

*SourceRange* **range**

Source range.

## 6.13.222 nw::script::SourcePosition

struct **SourcePosition**

Position in source code.

### Public Functions

bool **operator**==(const *SourcePosition* &rhs) const = default

auto **operator**<=>(const *SourcePosition* &rhs) const = default

### Public Members

size\_t **line** = 0

Starting line.

size\_t **column** = 0

Starting column.

## 6.13.223 nw::script::SourceRange

struct **SourceRange**

Range of source code.

### Public Members

*SourcePosition* **start**

Start of range.

*SourcePosition* **end**

End of Range.



### 6.13.224 nw::script::Statement

struct **Statement** : public nw::script::AstNode

Subclassed by *nw::script::BlockStatement*, *nw::script::Declaration*, *nw::script::DoStatement*,  
*nw::script::EmptyStatement*, *nw::script::ExprStatement*, *nw::script::ForStatement*, *nw::script::IfStatement*,  
*nw::script::JumpStatement*, *nw::script::LabelStatement*, *nw::script::SwitchStatement*,  
*nw::script::WhileStatement*

#### Public Functions

virtual ~**Statement**() = default

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.225 nw::script::StructDecl

struct **StructDecl** : public nw::script::Declaration

#### Public Functions

inline virtual std::string **identifier**() const override

const *VarDecl* \***locate\_member\_decl**(std::string\_view name) const

virtual *SourceRange* **range**() const noexcept

virtual *SourceRange* **selection\_range**() const noexcept

virtual void **accept**(*BaseVisitor* \*visitor) = 0

```
virtual void complete(const std::string &needle, std::vector<const Declaration*> &out, bool no_filter = false) const
```

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

std::vector<*Declaration*\*> **decls**

*Type* **type**

*SourceRange* **range\_selection\_**

std::string\_view **view**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.226 nw::script::SwitchStatement

```
struct SwitchStatement : public nw::script::Statement
```

## Public Functions

```
virtual void accept(BaseVisitor *visitor) = 0
```

```
virtual void complete(const std::string &needle, std::vector<const Declaration*> &out, bool no_filter = false) const
```

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

*Expression* \***target**

*Statement* \***block** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.227 nw::script::Symbol

struct **Symbol**

Info regarding a particular symbol somewhere in a source file.

## Public Members

*AstNode* \***node** = nullptr

*AstNode* if symbol is used in a variable expression.

const *Declaration* \***decl** = nullptr

Original declaration.

std::string **comment**

*Comment* on original declaration, in case of functions decl is preferred over definition.

std::string **type**

*Type* of the symbol.

*SymbolKind* **kind**

The kind of symbol.

const *Nss* \***provider** = nullptr

What script this symbol is from, i.e. “nwscript”.

std::string\_view **view**

View of declaration.

### 6.13.228 nw::script::Type

struct **Type**

Contains type tokens.

#### Public Functions

inline *SourcePosition* **range\_start**() const noexcept

#### Public Members

*NssToken* **type\_qualifier**

const

*NssToken* **type\_specifier**

int, float, string, etc

*NssToken* **struct\_id**

### 6.13.229 nw::script::UnaryExpression

struct **UnaryExpression** : public nw::script::Expression

#### Public Functions

inline **UnaryExpression**(*NssToken* token, *Expression* \*rhs\_)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*NssToken* **op**

*Expression* \***rhs** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.230 nw::script::VarDecl

struct **VarDecl** : public nw::script::Declaration

#### Public Functions

inline virtual std::string **identifier**() const override

virtual *SourceRange* **range**() const noexcept

virtual *SourceRange* **selection\_range**() const noexcept

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*NssToken* **identifier\_**

*Expression* \***init** = nullptr

*Type* **type**

*SourceRange* **range\_selection\_**

std::string\_view **view**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.231 nw::script::VariableExpression

struct **VariableExpression** : public nw::script::Expression

#### Public Functions

inline explicit **VariableExpression**(*NssToken* token)

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

#### Public Members

*NssToken* **var**

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.232 nw::script::WhileStatement

struct **WhileStatement** : public nw::script::Statement

## Public Functions

virtual void **accept**(*BaseVisitor* \*visitor) = 0

virtual void **complete**(const std::string &needle, std::vector<const *Declaration*\*> &out, bool no\_filter = false) const

Find completions for this *Ast* Node

---

**Note:** This function does not traverse dependencies

---

## Public Members

*Expression* \***check** = nullptr

*Statement* \***block** = nullptr

size\_t **type\_id\_** = invalid\_type\_id

bool **is\_const\_** = false

immer::map<std::string, Export> **env\_**

*SourceRange* **range\_**

### 6.13.233 nwn1::Profile

struct **Profile** : public nw::GameProfile  
NWN1 Game *Profile*.

## Public Functions

virtual ~**Profile**() = default

virtual bool **load\_rules**() const override  
Loads rules.

- Load Selector and Matcher
- Load Components
- Load 2DAs
- Load Constants
- Post Process 2DAs

virtual bool **load\_resources**() override  
Loads containers into resman.

## 6.14 defines

### 6.14.1 DEFINE\_ENUM\_FLAGS

**DEFINE\_ENUM\_FLAGS**(T)

Defines bitwise functions for an enum type.

### 6.14.2 ROLLNW\_STRINGIFY

**ROLLNW\_STRINGIFY**(a)

### 6.14.3 ROLLNW\_UNUSED

**ROLLNW\_UNUSED**(thing)

Silences unused variable warnings.

### 6.14.4 SCOPE\_EXIT

**SCOPE\_EXIT**(f)

Creates scope exit.

## 6.15 enums

### 6.15.1 nw::AlignmentAxis

enum class nw::AlignmentAxis

*Values:*

enumerator **neither**

enumerator **law\_chaos**

enumerator **good\_evil**

enumerator **both**



### 6.15.2 nw::AlignmentFlags

enum class nw::AlignmentFlags

*Values:*

enumerator **none**

enumerator **neutral**

enumerator **lawful**

enumerator **chaotic**

enumerator **good**

enumerator **evil**

### 6.15.3 nw::AlignmentType

enum class nw::AlignmentType

*Values:*

enumerator **all**

enumerator **neutral**

enumerator **lawful**

enumerator **chaotic**

enumerator **good**

enumerator **evil**

### 6.15.4 nw::AreaFlags

enum class nw::AreaFlags : uint32\_t

*Values:*

enumerator **none**

Unspecified.

enumerator **interior**

Exterior if unset.

enumerator **underground**

Above ground if unset.

enumerator **natural**

Urban if unset.

### 6.15.5 nw::AttackResult

enum class nw::AttackResult

*Values:*

enumerator **hit\_by\_auto\_success**

enumerator **hit\_by\_critical**

enumerator **hit\_by\_roll**

enumerator **miss\_by\_auto\_fail**

enumerator **miss\_by\_concealment**

enumerator **miss\_by\_miss\_chance**

enumerator **miss\_by\_roll**

### 6.15.6 nw::DialogNodeType

enum class nw::DialogNodeType

*Values:*

enumerator **entry**

enumerator **reply**

### 6.15.7 nw::DoorAnimationState

enum class nw::DoorAnimationState : uint8\_t

*Values:*

enumerator **closed**

enumerator **opened1**

enumerator **opened2**

### 6.15.8 nw::EquipIndex

enum class nw::EquipIndex : uint32\_t

*Values:*

enumerator **head**

enumerator **chest**

enumerator **boots**

enumerator **arms**

enumerator **righthand**

enumerator **lefthand**

enumerator **cloak**

enumerator **leftring**

enumerator **rightring**

enumerator **neck**

enumerator **belt**

enumerator **arrows**

enumerator **bullets**

enumerator **bolts**

enumerator **creature\_left**

enumerator **creature\_right**

enumerator **creature\_bite**

enumerator **creature\_skin**

enumerator **invalid**

### 6.15.9 nw::EquipSlot

enum class nw::EquipSlot

*Values:*

enumerator **head**

enumerator **chest**

enumerator **boots**

enumerator **arms**

enumerator **righthand**

enumerator **lefthand**

enumerator **cloak**

enumerator **leftring**

enumerator **rightring**

enumerator **neck**

enumerator **belt**

enumerator **arrows**

enumerator **bullets**

enumerator **bolts**

enumerator **creature\_left**

enumerator **creature\_right**

enumerator **creature\_bite**

enumerator **creature\_skin**

### 6.15.10 nw::ErfType

enum class nw::ErfType

*Values:*

enumerator **erf**

enumerator **hak**

enumerator **mod**

enumerator **sav**

### 6.15.11 nw::ErfVersion

enum class nw::ErfVersion

*Values:*

enumerator **v1\_0**

enumerator **v1\_1**

### 6.15.12 nw::GameVersion

enum class nw::GameVersion

*Values:*

enumerator invalid

enumerator v1\_69

enumerator vEE

enumerator nwn2

### 6.15.13 nw::ItemModelType

enum class nw::ItemModelType : uint8\_t

*Values:*

enumerator simple

enumerator layered

enumerator composite

enumerator armor

### 6.15.14 nw::LanguageID

enum class nw::LanguageID : uint32\_t

*Language IDs.*

*Values:*

enumerator invalid

enumerator english

enumerator french

enumerator german

enumerator italian

enumerator **spanish**

enumerator **polish**

enumerator **korean**

Unsupported in EE?

enumerator **chinese\_traditional**

Unsupported in EE?

enumerator **chinese\_simplified**

Unsupported in EE?

enumerator **japanese**

Unsupported in EE?

#### 6.15.15 nw::ObjectID

enum class nw::ObjectID : uint32\_t

Opaque type.. for now.

*Values:*

#### 6.15.16 nw::ObjectType

enum class nw::ObjectType : uint16\_t

Object types.

*Values:*

enumerator **invalid**

enumerator **gui**

enumerator **tile**

enumerator **module**

enumerator **area**

enumerator **creature**

enumerator **item**

enumerator **trigger**

enumerator **projectile**

enumerator **placeable**

enumerator **door**

enumerator **areaofeffect**

enumerator **waypoint**

enumerator **encounter**

enumerator **store**

enumerator **portal**

enumerator **sound**

enumerator **player**

### 6.15.17 nw::PaletteNodeType

enum class nw::PaletteNodeType

*Values:*

enumerator **branch**

enumerator **category**

enumerator **blueprint**

### 6.15.18 nw::PlaceableAnimationState

enum class nw::PlaceableAnimationState : uint8\_t

*Values:*

enumerator **none**

enumerator **open**



enumerator **closed**

enumerator **destroyed**

enumerator **activated**

enumerator **deactivated**

### 6.15.19 nw::PltLayer

enum nw::PltLayer

*Plt* formats respective layers.

*Values:*

enumerator **plt\_layer\_skin**

enumerator **plt\_layer\_hair**

enumerator **plt\_layer\_metal1**

enumerator **plt\_layer\_metal2**

enumerator **plt\_layer\_cloth1**

enumerator **plt\_layer\_cloth2**

enumerator **plt\_layer\_leather1**

enumerator **plt\_layer\_leather2**

enumerator **plt\_layer\_tattoo1**

enumerator **plt\_layer\_tattoo2**

enumerator **plt\_layer\_size**

### 6.15.20 nw::SelectorType

enum class nw::SelectorType : uint32\_t

*Selector* types.

*Values:*

enumerator **ability**

Subtype: ability\_\* constant.

enumerator **ac**

Subtype: ac\_\* constant.

enumerator **alignment**

Subtype: AlignmentAxis.

enumerator **arcane\_level**

Subtype: none.

enumerator **bab**

Subtype: none.

enumerator **caster\_level**

Subtype:

enumerator **class\_level**

Subtype: class\_\* constant.

enumerator **feat**

Subtype: feat\_\* constant.

enumerator **hitpoints\_max**

Subtype: none.

enumerator **level**

Subtype: none.

enumerator **local\_var\_int**

Subtype: local var name, eg. "X1\_AllowArcher".

enumerator **local\_var\_str**

Subtype: local var name, eg. "some\_var".

enumerator **race**

Subtype: none.

enumerator **skill**

Subtype: skill\_\* constant.

enumerator **spell\_level**

Subtype:

### 6.15.21 nw::SerializationProfile

enum class nw::**SerializationProfile**

Game serialization profiles.

*Values:*

enumerator **any**

enumerator **blueprint**

enumerator **instance**

enumerator **savegame**

### 6.15.22 nw::SpellFlags

enum class nw::**SpellFlags** : uint8\_t

*Values:*

enumerator **none**

enumerator **readied**

enumerator **spontaneous**

enumerator **unlimited**

### 6.15.23 nw::SpellMetaMagic

enum class nw::**SpellMetaMagic** : uint8\_t

*Values:*

enumerator **none**

enumerator **empower**

enumerator **extend**

enumerator **maximize**

enumerator **quicken**

enumerator **silent**

enumerator **still**

### **6.15.24 nw::TargetState**

enum class **nw::TargetState**

*Values:*

enumerator **none**

enumerator **blind**

enumerator **attacker\_invis**

enumerator **unseen**

enumerator **moving**

enumerator **prone**

enumerator **stunned**

enumerator **flanked**

enumerator **flatfooted**

enumerator **asleep**

enumerator **attacker\_unseen**

enumerator **invis**

### 6.15.25 nw::script::DiagnosticLevel

**Warning:** doxygenenum: Cannot find enum “nw::script::DiagnosticLevel” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.15.26 nw::script::DiagnosticType

enum class nw::script::DiagnosticType

*Values:*

enumerator **lexical**

enumerator **parse**

enumerator **semantic**

### 6.15.27 nw::script::NssTokenType

enum class nw::script::NssTokenType

*Values:*

enumerator **INVALID**

enumerator **END**

enumerator **IDENTIFIER**

enumerator **COMMENT**

enumerator **LPAREN**

enumerator **RPAREN**

enumerator **LBRACE**

enumerator **RBRACE**

enumerator **LBRACKET**

enumerator **RBRACKET**

enumerator **COMMA**

enumerator **COLON**

enumerator **QUESTION**

enumerator **SEMICOLON**

enumerator **POUND**

enumerator **DOT**

enumerator **AND**

enumerator **ANDAND**

enumerator **ANDEQ**

enumerator **DIV**

enumerator **DIVEQ**

enumerator **EQ**

enumerator **EQEQ**

enumerator **GT**

enumerator **GTEQ**

enumerator **LT**

enumerator **LTEQ**

enumerator **MINUS**

enumerator **MINUSEQ**

enumerator **MINUSMINUS**

enumerator **MOD**

enumerator **MODEQ**

enumerator **TIMES**

enumerator **TIMESEQ**

enumerator **NOT**

enumerator **NOTEQ**

enumerator **OR**

enumerator **OREQ**

enumerator **OROR**

enumerator **PLUS**

enumerator **PLUSEQ**

enumerator **PLUSPLUS**

enumerator **SL**

enumerator **SLEQ**

enumerator **SR**

enumerator **SREQ**

enumerator **TILDE**

enumerator **USR**

enumerator **USREQ**

enumerator **XOR**

enumerator **XOREQ**

enumerator **FLOAT\_CONST**

enumerator **INTEGER\_CONST**

enumerator **OBJECT\_INVALID\_CONST**

enumerator **OBJECT\_SELF\_CONST**

enumerator **STRING\_CONST**

enumerator **STRING\_RAW\_CONST**

enumerator **LOCATION\_INVALID**

enumerator **JSON\_CONST**

enumerator **ACTION**

enumerator **BREAK**

enumerator **CASE**

enumerator **CASSOWARY**

enumerator **CONST\_**

enumerator **CONTINUE**

enumerator **DEFAULT**

enumerator **DO**

enumerator **EFFECT**

enumerator **ELSE**

enumerator **EVENT**

enumerator **FLOAT**

enumerator **FOR**

enumerator **IF**



enumerator **INT**

enumerator **ITEMPROPERTY**

enumerator **JSON**

enumerator **LOCATION**

enumerator **OBJECT**

enumerator **RETURN**

enumerator **STRING**

enumerator **STRUCT**

enumerator **SQLQUERY**

enumerator **SWITCH**

enumerator **TALENT**

enumerator **VECTOR**

enumerator **VOID\_**

enumerator **WHILE**

### 6.15.28 **nw::script::SymbolKind**

enum class **nw::script::SymbolKind**

*Values:*

enumerator **variable**

enumerator **function**

enumerator **type**

enumerator **param**

enumerator **field**

## 6.16 functions

### 6.16.1 nw::alignment\_axis\_from\_flags

*AlignmentAxis* nw::alignment\_axis\_from\_flags(*AlignmentFlags* flags)

Gets alignment axis from alignment flags.

### 6.16.2 nw::always\_false

template<typename T>

constexpr bool nw::always\_false()

Always returns false for use with static\_assert

#### Template Parameters

T – type is disregarded

### 6.16.3 nw::count\_feats\_in\_range

int nw::count\_feats\_in\_range(const nw::Creature \*obj, nw::Feat start, nw::Feat end)

Counts the number of known feats in the range [start, end].

### 6.16.4 nw::create\_unique\_tmp\_path

fs::path nw::create\_unique\_tmp\_path()

Creates randomly named folder in tmp. Analguous to POSIX mkdtemp.

### 6.16.5 nw::decode\_plt\_color

std::array<uint8\_t, 4> nw::decode\_plt\_color(const *Plt* &plt, const *PltColors* &colors, uint32\_t x, uint32\_t y)

Decodes PLT and user selected colors to RGBA.

### 6.16.6 nw::decompress

*ByteArray* nw::decompress(std::span<const uint8\_t> span, const char \*magic)

Decompress a NWN:EE compressed buffer.

---

**Note:** Doesn't support Zstd dictionaries, but the game doesn't either.. yet. Supporting that will likely lead to API change.

---

#### Parameters

- **span** – Compressed data
- **magic** – Magic 4 byte sequence, i.e. “NSYC”

#### Returns

*ByteArray* Uncompressed data, empty on error.

### 6.16.7 nw::documents\_path

`fs::path nw::documents_path()`

Gets user's documents path.

### 6.16.8 nw::equip\_index\_to\_string

`constexpr std::string_view nw::equip_index_to_string(EquipIndex idx)`

### 6.16.9 nw::equip\_slot\_to\_index

`constexpr EquipIndex nw::equip_slot_to_index(EquipSlot slot)`

### 6.16.10 nw::expand\_path

`std::filesystem::path nw::expand_path(const std::filesystem::path &path)`

Expands path with ~ and environment variables.

### 6.16.11 nw::find\_first\_effect\_of

`template<typename It>`

`It nw::find_first_effect_of(It begin, It end, nw::EffectType type, int subtype = -1)`

Finds first effect of a given type.

#### Template Parameters

***It*** – A forward iterator

#### Parameters

- **begin** – Beginning of an range of effects
- **end** – Beginning of an range of effects
- **type** – An `effect_type_*` constant
- **subtype** – An effect subtype

#### Returns

*It* iterator to the first effect, or `end`

### 6.16.12 nw::from\_base64

`ByteArray nw::from_base64(const std::string &string)`

Converts base64 string to an array of bytes.

### 6.16.13 nw::from\_json

void nw::from\_json(const nlohmann::json &json, *ByteArray* &ba)

**Warning:** doxygenfunction: Unable to resolve function “from\_json” with arguments (const nlohmann::json&, Dialog&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
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- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile,
↳ObjectType object_type)
- void from_json(const nlohmann::json &j, Ability &type)
- void from_json(const nlohmann::json &j, ArmorClass &type)
- void from_json(const nlohmann::json &j, AttackType &type)
- void from_json(const nlohmann::json &j, BaseItem &type)
- void from_json(const nlohmann::json &j, Class &type)
- void from_json(const nlohmann::json &j, CombatMode &type)
- void from_json(const nlohmann::json &j, Damage &type)
- void from_json(const nlohmann::json &j, DamageModType &type)
- void from_json(const nlohmann::json &j, Disease &type)
- void from_json(const nlohmann::json &j, EffectType &type)
- void from_json(const nlohmann::json &j, Feat &type)
- void from_json(const nlohmann::json &j, ItemPropertyType &type)
- void from_json(const nlohmann::json &j, LocString &loc)
- void from_json(const nlohmann::json &j, MasterFeat &type)
- void from_json(const nlohmann::json &j, MissChanceType &type)
- void from_json(const nlohmann::json &j, ModifierType &type)
- void from_json(const nlohmann::json &j, ObjectID &id)
- void from_json(const nlohmann::json &j, ObjectType &type)
- void from_json(const nlohmann::json &j, Poison &type)
- void from_json(const nlohmann::json &j, Race &type)
- void from_json(const nlohmann::json &j, Resource &r)
- void from_json(const nlohmann::json &j, Resref &r)
- void from_json(const nlohmann::json &j, Save &type)
```

```

- void from_json(const nlohmann::json &j, SaveVersus &type)
- void from_json(const nlohmann::json &j, Situation &type)
- void from_json(const nlohmann::json &j, Skill &type)
- void from_json(const nlohmann::json &j, SpecialAttack &type)
- void from_json(const nlohmann::json &j, Spell &type)
- void from_json(const nlohmann::json &j, SpellEntry &spell)
- void from_json(const nlohmann::json &j, SpellSchool &type)
- void from_json(const nlohmann::json &j, ByteArray &ba)
- void from_json(const nlohmann::json &j, LevelUp &entry)
- void from_json(const nlohmann::json &j, Location &loc)
- void from_json(const nlohmann::json &j, Saves &saves)

```

**Warning:** doxygenfunction: Unable to resolve function “from\_json” with arguments (const nlohmann::json&, DialogNode&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```

- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
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- bool from_json(const nlohmann::json &archive)
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- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile,
↳ObjectType object_type)
- void from_json(const nlohmann::json &j, Ability &type)
- void from_json(const nlohmann::json &j, ArmorClass &type)
- void from_json(const nlohmann::json &j, AttackType &type)
- void from_json(const nlohmann::json &j, BaseItem &type)
- void from_json(const nlohmann::json &j, Class &type)
- void from_json(const nlohmann::json &j, CombatMode &type)
- void from_json(const nlohmann::json &j, Damage &type)
- void from_json(const nlohmann::json &j, DamageModType &type)
- void from_json(const nlohmann::json &j, Disease &type)
- void from_json(const nlohmann::json &j, EffectType &type)
- void from_json(const nlohmann::json &j, Feat &type)
- void from_json(const nlohmann::json &j, ItemPropertyType &type)
- void from_json(const nlohmann::json &j, LocString &loc)

```

```

- void from_json(const nlohmann::json &j, MasterFeat &type)
- void from_json(const nlohmann::json &j, MissChanceType &type)
- void from_json(const nlohmann::json &j, ModifierType &type)
- void from_json(const nlohmann::json &j, ObjectID &id)
- void from_json(const nlohmann::json &j, ObjectType &type)
- void from_json(const nlohmann::json &j, Poison &type)
- void from_json(const nlohmann::json &j, Race &type)
- void from_json(const nlohmann::json &j, Resource &r)
- void from_json(const nlohmann::json &j, Resref &r)
- void from_json(const nlohmann::json &j, Save &type)
- void from_json(const nlohmann::json &j, SaveVersus &type)
- void from_json(const nlohmann::json &j, Situation &type)
- void from_json(const nlohmann::json &j, Skill &type)
- void from_json(const nlohmann::json &j, SpecialAttack &type)
- void from_json(const nlohmann::json &j, Spell &type)
- void from_json(const nlohmann::json &j, SpellEntry &spell)
- void from_json(const nlohmann::json &j, SpellSchool &type)
- void from_json(const nlohmann::json &j, ByteArray &ba)
- void from_json(const nlohmann::json &j, LevelUp &entry)
- void from_json(const nlohmann::json &j, Location &loc)
- void from_json(const nlohmann::json &j, Saves &saves)

```

**Warning:** doxygenfunction: Unable to resolve function “from\_json” with arguments (const nlohmann::json&, DialogPtr&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```

- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
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- bool from_json(const nlohmann::json &archive)
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- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile)
- bool from_json(const nlohmann::json &archive, SerializationProfile profile,
->ObjectType object_type)
- void from_json(const nlohmann::json &j, Ability &type)
- void from_json(const nlohmann::json &j, ArmorClass &type)
- void from_json(const nlohmann::json &j, AttackType &type)

```

```

- void from_json(const nlohmann::json &j, BaseItem &type)
- void from_json(const nlohmann::json &j, Class &type)
- void from_json(const nlohmann::json &j, CombatMode &type)
- void from_json(const nlohmann::json &j, Damage &type)
- void from_json(const nlohmann::json &j, DamageModType &type)
- void from_json(const nlohmann::json &j, Disease &type)
- void from_json(const nlohmann::json &j, EffectType &type)
- void from_json(const nlohmann::json &j, Feat &type)
- void from_json(const nlohmann::json &j, ItemPropertyType &type)
- void from_json(const nlohmann::json &j, LocString &loc)
- void from_json(const nlohmann::json &j, MasterFeat &type)
- void from_json(const nlohmann::json &j, MissChanceType &type)
- void from_json(const nlohmann::json &j, ModifierType &type)
- void from_json(const nlohmann::json &j, ObjectID &id)
- void from_json(const nlohmann::json &j, ObjectType &type)
- void from_json(const nlohmann::json &j, Poison &type)
- void from_json(const nlohmann::json &j, Race &type)
- void from_json(const nlohmann::json &j, Resource &r)
- void from_json(const nlohmann::json &j, Resref &r)
- void from_json(const nlohmann::json &j, Save &type)
- void from_json(const nlohmann::json &j, SaveVersus &type)
- void from_json(const nlohmann::json &j, Situation &type)
- void from_json(const nlohmann::json &j, Skill &type)
- void from_json(const nlohmann::json &j, SpecialAttack &type)
- void from_json(const nlohmann::json &j, Spell &type)
- void from_json(const nlohmann::json &j, SpellEntry &spell)
- void from_json(const nlohmann::json &j, SpellSchool &type)
- void from_json(const nlohmann::json &j, ByteArray &ba)
- void from_json(const nlohmann::json &j, LevelUp &entry)
- void from_json(const nlohmann::json &j, Location &loc)
- void from_json(const nlohmann::json &j, Saves &saves)

```

```
void nw::from_json(const nlohmann::json &j, Location &loc)
```

```
void nw::from_json(const nlohmann::json &j, LocString &loc)
```

```
void nw::from_json(const nlohmann::json &j, ObjectID &id)
```

```
    nlohmann::json specialization
```

```
void nw::from_json(const nlohmann::json &j, ObjectType &type)
```

```
    nlohmann::json specialization
```

```
void nw::from_json(const nlohmann::json &j, Resource &r)
```

```
    nlohmann::json specialization
```

```
void nw::from_json(const nlohmann::json &j, Resref &r)
```

```
    nlohmann::json specialization
```

```
void nw::from_json(const nlohmann::json &j, Saves &saves)
```

```
void nw::from_json(const nlohmann::json &j, SpellEntry &spell)
```

### 6.16.14 nw::from\_utf8

std::string nw::from\_utf8(std::string\_view str, std::string\_view encoding, bool ignore\_errors = false)  
Convert from utf8.

### 6.16.15 nw::from\_utf8\_by\_global\_lang

std::string nw::from\_utf8\_by\_global\_lang(std::string\_view str, bool ignore\_errors)

### 6.16.16 nw::from\_utf8\_by\_langid

std::string nw::from\_utf8\_by\_langid(std::string\_view str, *LanguageID* id, bool ignore\_errors)

### 6.16.17 nw::get\_all\_available\_feats

std::vector<nw::Feat> nw::get\_all\_available\_feats(const nw::Creature \*obj)  
Gets all feats for which requirements are met

---

**Note:** This is not yet very useful until a level up parameter is added.

---

### 6.16.18 nw::gff\_to\_gffjson

nlohmann::json nw::gff\_to\_gffjson(const *Gff* &gff)  
Convert a *Gff* to JSON (nwn-lib/neverwinter.nim format, I think.)

### 6.16.19 nw::has\_effect\_applied

bool nw::has\_effect\_applied(nw::ObjectBase \*obj, nw::EffectType type, int subtype = -1)  
Determines if an effect type is applied to an object.

### 6.16.20 nw::has\_feat\_successor

std::pair<nw::Feat, int> nw::has\_feat\_successor(const nw::Creature \*obj, nw::Feat feat)  
Gets the highest known successor feat.



### 6.16.21 nw::highest\_feat\_in\_range

`nw::Feat nw::highest_feat_in_range(const nw::Creature *obj, nw::Feat start, nw::Feat end)`

Gets the highest known feat in range [start, end].

### 6.16.22 nw::home\_path

`fs::path nw::home_path()`

Gets user's home path.

### 6.16.23 nw::init\_logger

`void nw::init_logger(int argc, char *argv[])`

Initialize logger.

### 6.16.24 nw::is\_attack\_type\_hit

`constexpr bool nw::is_attack_type_hit(AttackResult value)`

### 6.16.25 nw::is\_attack\_type\_miss

`constexpr bool nw::is_attack_type_miss(AttackResult value)`

### 6.16.26 nw::istream\_read

`template<typename T, typename U>`

`std::istream &nw::istream_read(std::istream &stream, T *data, U size)`

Reads from a stream into an arbitrary pointer of type T

### 6.16.27 nw::itemprop\_to\_string

`std::string nw::itemprop_to_string(const nw::ItemProperty &ip)`

Converts item property to in-game style string.

### 6.16.28 nw::kernel::config

`Config &nw::kernel::config()`

Gets configuration options.

### 6.16.29 nw::kernel::load\_module

*Module* \*nw::kernel::load\_module(const std::filesystem::path &path, std::string\_view manifest = {})

Loads a module.

### 6.16.30 nw::kernel::max\_modifier

template<typename T>

T nw::kernel::max\_modifier(const ObjectBase \*obj, const *ModifierType* type)

Maxes all modifiers of type

**Template Parameters**

T –

---

template<typename T>

T nw::kernel::max\_modifier(const ObjectBase \*obj, const *ModifierType* type, const ObjectBase \*versus)

Maxes all modifiers of type versus an object.

**Template Parameters**

T –

---

template<typename T, typename SubType>

T nw::kernel::max\_modifier(const ObjectBase \*obj, const *ModifierType* type, *SubType* subtype)

Maxes all modifiers of a type and subtype

**Template Parameters**

- T –
  - U – is some rule subtype
- 

template<typename T, typename SubType>

T nw::kernel::max\_modifier(const ObjectBase \*obj, const *ModifierType* type, *SubType* subtype, const ObjectBase \*versus)

Maxes all modifiers of a type and subtype versus another object.

**Template Parameters**

- T –
- U – is some rule subtype

### 6.16.31 nw::kernel::objects

inline *ObjectSystem* &nw::kernel::objects()

### 6.16.32 nw::kernel::resman

inline *Resources* &nw::kernel::resman()

### 6.16.33 nw::kernel::resolve\_master\_feat

template<typename T, typename U>

T nw::kernel::resolve\_master\_feat(const *Creature* \*obj, U type, *MasterFeat* mfeat)

Resolves a master feat bonus.

#### Template Parameters

- **T** – Return type
- **U** – Rule type

#### Parameters

- **obj** – *Creature* object
- **type** – Rule value
- **mfeat** – Master feat

### 6.16.34 nw::kernel::resolve\_master\_feats

template<typename T, typename U, typename **Callback**, typename ...**Args**>

void nw::kernel::resolve\_master\_feats(const *Creature* \*obj, U type, *Callback* cb, *Args*... mfeats)

Resolves an arbitrary number of master feats.

#### Template Parameters

- **T** – Return type
- **U** – Rule type
- **Callback** – Callback type should be void(T)
- **Args** – *MasterFeat*...

#### Parameters

- **obj** – *Creature* object
- **type** – Rule value
- **cb** – This parameter will be called with any valid master feat bonus as a parameter.
- **mfeats** – As many master feats as needed

### 6.16.35 nw::kernel::resolve\_modifier

```
template<typename Callback>
bool nw::kernel::resolve_modifier(const ObjectBase *obj, const Modifier &mod, Callback cb, const
                                ObjectBase *versus = nullptr, int32_t subtype = -1)
```

Calculates a modifier.

**Template Parameters**

**Callback** – *Modifier* callback function

---

```
template<typename Callback>
bool nw::kernel::resolve_modifier(const ObjectBase *obj, const ModifierType type, Callback cb)
```

Calculates all modifiers of type

**Template Parameters**

**Callback** – *Modifier* callback function

---

```
template<typename Callback>
bool nw::kernel::resolve_modifier(const ObjectBase *obj, const ModifierType type, const ObjectBase
                                *versus, Callback cb)
```

Calculates all modifiers of type versus an object.

**Template Parameters**

**Callback** – *Modifier* callback function

---

```
template<typename SubType, typename Callback>
bool nw::kernel::resolve_modifier(const ObjectBase *obj, const ModifierType type, SubType subtype,
                                Callback cb)
```

Calculates all modifiers of a type and subtype

**Template Parameters**

- **U** – is some rule subtype
  - **Callback** – *Modifier* callback function
- 

```
template<typename SubType, typename Callback>
bool nw::kernel::resolve_modifier(const ObjectBase *obj, const ModifierType type, SubType subtype, const
                                ObjectBase *versus, Callback cb)
```

Calculates all modifiers of a type and subtype versus another object.

**Template Parameters**

- **U** – is some rule subtype
- **Callback** – *Modifier* callback function

### 6.16.36 nw::kernel::rules

inline *Rules* &nw::kernel::rules()

### 6.16.37 nw::kernel::serial\_id\_to\_obj\_type

inline *ObjectType* nw::kernel::serial\_id\_to\_obj\_type(std::string\_view id)

### 6.16.38 nw::kernel::services

*Services* &nw::kernel::services()

Gets services.

### 6.16.39 nw::kernel::strings

inline *Strings* &nw::kernel::strings()

### 6.16.40 nw::kernel::sum\_master\_feats

template<typename T, typename U, typename ...**MasterFeats**>

T nw::kernel::sum\_master\_feats(const *Creature* \*obj, U type, *MasterFeats*... mfeats)

Sum master feat bonus.

#### Template Parameters

- **T** – Return type
- **U** – Rule type
- **Args** – *MasterFeat*...

#### Parameters

- **obj** – *Creature* object
- **type** – Rule value
- **mfeats** – *MasterFeats*

### 6.16.41 nw::kernel::sum\_modifier

template<typename T>

T nw::kernel::sum\_modifier(const ObjectBase \*obj, const *ModifierType* type)

Sums all modifiers of type

#### Template Parameters

- **T** –

**Warning:** doxygenfunction: Unable to resolve function “sum\_modifier” with arguments (const ObjectBase\*, const ModifierType, const ObjectBase\*) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```
- template<typename T, typename SubType> T sum_modifier(const ObjectBase *obj, const ↵
↵ ModifierType type, SubType subtype)
- template<typename T, typename SubType> T sum_modifier(const ObjectBase *obj, const ↵
↵ ObjectBase *versus, const ModifierType type, SubType subtype)
- template<typename T> T sum_modifier(const ObjectBase *obj, const ModifierType type)
- template<typename T> T sum_modifier(const ObjectBase *obj, const ObjectBase *versus,
↵ const ModifierType type)
```

---

template<typename T, typename **SubType**>

*T* nw::kernel::sum\_modifier(const ObjectBase \*obj, const *ModifierType* type, *SubType* subtype)

Sums all modifiers of a type and subtype

#### Template Parameters

- **T** –
- **U** – is some rule subtype

---

**Warning:** doxygenfunction: Unable to resolve function “sum\_modifier” with arguments (const ObjectBase\*, const ModifierType, SubType, const ObjectBase\*) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```
- template<typename T, typename SubType> T sum_modifier(const ObjectBase *obj, const ↵
↵ ModifierType type, SubType subtype)
- template<typename T, typename SubType> T sum_modifier(const ObjectBase *obj, const ↵
↵ ObjectBase *versus, const ModifierType type, SubType subtype)
- template<typename T> T sum_modifier(const ObjectBase *obj, const ModifierType type)
- template<typename T> T sum_modifier(const ObjectBase *obj, const ObjectBase *versus,
↵ const ModifierType type)
```

### 6.16.42 nw::kernel::unload\_module

void nw::kernel::unload\_module()

Unloads currently active module.

### 6.16.43 nw::knows\_feat

bool nw::knows\_feat(const nw::Creature \*obj, nw::Feat feat)

Checks if an entity knows a given feat.

### 6.16.44 nw::max\_effects\_of

```
template<typename T, typename It, typename Extractor = decltype(&effect_extract_int0)>
std::pair<T, It> nw::max_effects_of(It begin, It end, nw::EffectType type, int subtype, Versus vs = {}, Extractor
                                   extractor = &effect_extract_int0) noexcept
```

Finds all applicable effects of a given type / subtype.

Applicable effects are passed to a user supplied callback.

#### Template Parameters

- **T** – An arbitrary type that can be held in an effect, e.g. a simple integer, a damage roll, etc.
- **It** – An iterator type
- **Extractor** – A function that extracts a value of type T from an *EffectHandle*

#### Parameters

- **begin** – Start of a range of effect handles of a type/subtype
- **end** – End range of effect handles
- **type** – An effect\_type\_\* constant
- **subtype** – A effect subtype, if no subtype -1 should be passed
- **vs** – *Versus* struct
- **extractor** – A function that extracts the value from a particular effect.

#### Returns

(result, iterator)

### 6.16.45 nw::move\_file\_safely

```
bool nw::move_file_safely(const std::filesystem::path &from, const std::filesystem::path &to)
```

Copies and deletes a file to a new location, overwrites existing.

### 6.16.46 nw::needs\_quote

```
inline bool nw::needs_quote(std::string_view str)
```

### 6.16.47 nw::operator==

```
bool nw::operator==(const DiceRoll &lhs, const DiceRoll &rhs)
```

```
inline bool nw::operator==(const Null&, const Null&)
```

```
inline bool nw::operator==(const Resource &lhs, const Resource &rhs)
```

```
inline bool nw::operator==(const Resref &lhs, const Resref &rhs)
```

**Warning:** doxygenfunction: Unable to resolve function “operator==” with arguments (const Selector&, const Selector&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```
- bool operator==(const Ability &rhs) const = default
- bool operator==(const ArmorClass &rhs) const = default
- bool operator==(const AttackType &rhs) const = default
- bool operator==(const BaseItem &rhs) const = default
- bool operator==(const ByteArray &other) const
- bool operator==(const Class &rhs) const = default
- bool operator==(const CombatMode &rhs) const = default
- bool operator==(const Damage &rhs) const = default
- bool operator==(const DamageModType &rhs) const = default
- bool operator==(const DiceRoll &lhs, const DiceRoll &rhs)
- bool operator==(const Disease &rhs) const = default
- bool operator==(const EffectHandle&) const = default
- bool operator==(const EffectType &rhs) const = default
- bool operator==(const EventHandle &rhs) const
- bool operator==(const Feat &rhs) const = default
- bool operator==(const InternedString &rhs) const noexcept = default
- bool operator==(const ItemPropertyType &rhs) const = default
- bool operator==(const LocString &other) const
- bool operator==(const Location&) const = default
- bool operator==(const MasterFeat &rhs) const = default
- bool operator==(const MasterFeatEntry &lhs, const MasterFeatEntry &rhs)
- bool operator==(const MissChanceType &rhs) const = default
- bool operator==(const ModifierType &rhs) const = default
- bool operator==(const Null&, const Null&)
- bool operator==(const Poison &rhs) const = default
- bool operator==(const Race &rhs) const = default
- bool operator==(const Resource &lhs, const Resource &rhs)
- bool operator==(const ResourceData &other) const = default
- bool operator==(const Resref &lhs, const Resref &rhs)
- bool operator==(const Save &rhs) const = default
- bool operator==(const SaveVersus &rhs) const = default
- bool operator==(const Situation &rhs) const = default
- bool operator==(const Skill &rhs) const = default
- bool operator==(const SourcePosition &rhs) const = default
- bool operator==(const SpecialAttack &rhs) const = default
- bool operator==(const Spell &rhs) const = default
- bool operator==(const SpellEntry&) const = default
- bool operator==(const SpellSchool &rhs) const = default
- bool operator==(const Variant &rhs) const noexcept
- bool operator==(const Versus &rhs) const = default
- bool operator==(const WeaponModifier &lhs, const WeaponModifier &rhs)
```



### 6.16.48 nw::operator<<

std::ostream &nw::operator<<(std::ostream &out, const *Resource* &res)

std::ostream &nw::operator<<(std::ostream &out, const *Resref* &resref)

**Warning:** doxygenfunction: Unable to resolve function “operator<<” with arguments (std::ostream&, const TwoDA&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

- std::ostream &operator<<(std::ostream &out, const Resource &res)
- std::ostream &operator<<(std::ostream &out, const Resref &resref)
- std::ostream &operator<<(std::ostream &out, const TwoDA &tda)
- std::ostream &operator<<(std::ostream &out, const TwoDA &tda)
- std::ostream &operator<<(std::ostream &out, const nw::script::NssToken &token)

inline std::ostream &operator<<(std::ostream &out, const nw::script::NssToken &token)

### 6.16.49 nw::operator<

bool nw::operator<(const *DiceRoll* &lhs, const *DiceRoll* &rhs)

inline bool nw::operator<(const *Null*&, const *Null*&)

inline bool nw::operator<(const *Resource* &lhs, const *Resource* &rhs)

inline bool nw::operator<(const *Resref* &lhs, const *Resref* &rhs)

**Warning:** doxygenfunction: Unable to resolve function “operator<” with arguments (const Selector&, const Selector&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

- bool operator<(const DiceRoll &lhs, const DiceRoll &rhs)
- bool operator<(const EventHandle &rhs) const
- bool operator<(const MasterFeatEntry &lhs, const MasterFeatEntry &rhs)
- bool operator<(const Modifier &lhs, const Modifier &rhs)
- bool operator<(const Null&, const Null&)
- bool operator<(const Resource &lhs, const Resource &rhs)
- bool operator<(const Resref &lhs, const Resref &rhs)
- bool operator<(const Variant &rhs) const noexcept
- bool operator<(const WeaponModifier &lhs, const WeaponModifier &rhs)

### 6.16.50 nw::ostream\_write

template<typename T, typename U>

std::ostream &nw::ostream\_write(std::ostream &stream, const T \*data, U size)

Writes to a stream from nto an arbitrary pointer of type T

### 6.16.51 nw::probe\_nwn\_install

*InstallInfo* nw::probe\_nwn\_install(*GameVersion* version)

Probes for an NWN install

#### Parameters

**only** – probe for specific version

### 6.16.52 nw::resolve\_effects\_of

```
template<typename T, typename It, typename Callback, typename Extractor, typename Comp = std::greater<T>>
It nw::resolve_effects_of(It begin, It end, nw::EffectType type, int subtype, Versus vs, Callback cb, Extractor
                        extractor, Comp comparator = std::greater<T>{ }) noexcept
```

Finds all applicable effects of a given type / subtype.

Applicable effects are passed to a user supplied callback.

#### Template Parameters

- **T** – An arbitrary type that can be held in an effect, e.g. a simple integer, a damage roll, etc.
- **It** – An iterator type
- **Callback** – A function with the signature void(T) supplied by the user
- **Extractor** – A function that extracts a value of type T from an *EffectHandle*
- **Comp** – A comparator taking two T values and returns **true** if the first is greater (Default std::greater<T>)

#### Parameters

- **begin** – Start of a range of effect handles of a type/subtype
- **end** – End range of effect handles
- **type** – An effect\_type\_\* constant
- **subtype** – A effect subtype, if no subtype -1 should be passed
- **vs** – *Versus* struct
- **cb** – A user defined callback that will be passed an applicable effect's value.
- **extractor** – A function that extracts the value from a particular effect.
- **comparator** – A function taking two T values and returns **true** if the first is greater (Default std::greater<T>)

#### Returns

iterator to passed last processed effect

### 6.16.53 nw::reverse

```
template<typename T>
reversion_wrapper<T> nw::reverse(T &&iterable)
```

Creates a reverse iterator for range-for loops.

### 6.16.54 nw::roll\_dice

```
int nw::roll_dice(DiceRoll roll, int multiplier)
```

Rolls a set of dice

#### Parameters

- **roll** – Dice to roll
- **multiplier** – Roll dice n times

### 6.16.55 nw::roll\_dice\_explode

```
int nw::roll_dice_explode(DiceRoll dice, int on, int limit)
```

Rolls a set exploding of dice

#### Parameters

- **dice** – Dice to roll
- **on** – Value to explode on, default is the sides of the dice
- **limit** – Limit of the number of explosions, default limit is 20

### 6.16.56 nw::string::desanitize\_colors

```
std::string nw::string::desanitize_colors(std::string str)
```

Converts color hex to bytes <cXXXXXX> -> <c\x\x\x>. Note: MOVE in the string.

### 6.16.57 nw::string::endswith

```
bool nw::string::endswith(std::string_view str, std::string_view suffix)
```

Determines if a string ends with a given suffix.

### 6.16.58 nw::string::from

```
template<typename T>
std::optional<T> nw::string::from(std::string_view str) = delete
```

String conversions to integral and floating pointing types.

---

**Note:** Even those tho this function is deleted, see Template Parameters for specilized versions.

---

#### Template Parameters

T – bool, int32\_t, uint32\_t, int64\_t, uint64\_t, float, double

**Parameters**

**str** – Input string

**Returns**

std::optional<T>

### 6.16.59 nw::string::glob\_to\_regex

std::regex nw::string::glob\_to\_regex(std::string\_view pattern, bool icase = false)

Converts a glob pattern to a regex.

---

**Note:** This only supports ?, \*, and [seq]

---

**Parameters**

- **pattern** – E.g, “file?\_nam\*.ext”
- **icase** – If true returns a case insensitive regex

**Returns**

std::regex

### 6.16.60 nw::string::icmp

bool nw::string::icmp(std::string\_view first, std::string\_view second)

Case insensitive comparison.

### 6.16.61 nw::string::join

std::string nw::string::join(const std::vector<std::string> &strings, const char \*delim = " ")

Joins a vector of strings.

**Parameters**

- **strings** – Vector of strings.
- **delim** – Separator. Default “ ”

**Returns**

std::string

### 6.16.62 nw::string::ltrim\_in\_place

std::string \*nw::string::ltrim\_in\_place(std::string \*str)

Trims left in place.

### 6.16.63 `nw::string::rtrim_in_place`

`std::string *nw::string::rtrim_in_place(std::string *str)`

Trims right in place.

### 6.16.64 `nw::string::sanitize_colors`

`std::string nw::string::sanitize_colors(std::string str)`

Converts color bytes to hex `<c\x\x> -> <cXXXXXX>`. Note: MOVE in the string.

### 6.16.65 `nw::string::split`

`std::vector<std::string> nw::string::split(const std::string &str, char delim, bool skipEmpty = true, bool trimmed = true)`

Splits a string into an vector of strings.

#### Parameters

- **str** – String to split
- **delim** – Delimiter
- **skipEmpty** – Ignore empty strings
- **trimmed** – Trim strings after split

#### Returns

`std::vector<std::string>`

### 6.16.66 `nw::string::startswith`

`bool nw::string::startswith(std::string_view str, std::string_view prefix)`

Determines if a string starts with a given prefix.

### 6.16.67 `nw::string::tolower`

`void nw::string::tolower(std::string *str)`

Converts string to lowercase, in place.

### 6.16.68 `nw::string::trim_in_place`

`std::string *nw::string::trim_in_place(std::string *str)`

Trims string in place.

### 6.16.69 nw::sum\_effects\_of

```
template<typename T, typename It, typename Extractor = decltype(&effect_extract_int0), typename Comp =
std::greater<T>>
```

```
std::pair<T, It> nw::sum_effects_of(It begin, It end, nw::EffectType type, int subtype, Versus vs = {}, Extractor
    extractor = &effect_extract_int0, Comp comparator = std::greater<T>{})
    noexcept
```

Finds all applicable effects of a given type / subtype.

Applicable effects are passed to a user supplied callback.

#### Template Parameters

- **T** – An arbitrary type that can be held in an effect, e.g. a simple integer, a damage roll, etc.
- **It** – An iterator type
- **Extractor** – A function that extracts a value of type T from an *EffectHandle*
- **Comp** – A comparator taking two T values and returns `true` if the first is greater (Default `std::greater<T>`)

#### Parameters

- **begin** – Start of a range of effect handles of a type/subtype
- **end** – End range of effect handles
- **type** – An `effect_type_*` constant
- **subtype** – A effect subtype, if no subtype -1 should be passed
- **vs** – *Versus* struct
- **extractor** – A function that extracts the value from a particular effect.
- **comparator** – A function taking two T values and returns `true` if the first is greater (Default `std::greater<T>`)

#### Returns

(result, iterator)

### 6.16.70 nw::to\_base64

```
std::string nw::to_base64(std::span<const uint8_t> bytes)
```

Converts span of bytes to a base64 string.

### 6.16.71 nw::to\_bool

```
template<typename T>
```

```
constexpr bool to_bool(const T thing)
```

Converts enum flag to boolean.



```
- void to_json(nlohmann::json &j, const Save &type)
- void to_json(nlohmann::json &j, const SaveVersus &type)
- void to_json(nlohmann::json &j, const Situation &type)
- void to_json(nlohmann::json &j, const Skill &type)
- void to_json(nlohmann::json &j, const SpecialAttack &type)
- void to_json(nlohmann::json &j, const Spell &type)
- void to_json(nlohmann::json &j, const SpellEntry &spell)
- void to_json(nlohmann::json &j, const SpellSchool &type)
- void to_json(nlohmann::json &j, const ByteArray &ba)
- void to_json(nlohmann::json &j, const LevelUp &entry)
- void to_json(nlohmann::json &j, const Location &loc)
- void to_json(nlohmann::json &j, const Saves &saves)
```

**Warning:** doxygenfunction: Unable to resolve function “to\_json” with arguments (nlohmann::json&, const DialogNode&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
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- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json(SerializationProfile profile) const
- nlohmann::json to_json(SerializationProfile profile) const
- nlohmann::json to_json(SerializationProfile profile) const
- nlohmann::json to_json(SerializationProfile profile, ObjectType object_type) const
- nlohmann::json to_json(nw::ResourceType::type restype) const
- void to_json(nlohmann::json &j, ObjectID id)
- void to_json(nlohmann::json &j, ObjectType type)
- void to_json(nlohmann::json &j, const Ability &type)
- void to_json(nlohmann::json &j, const ArmorClass &type)
- void to_json(nlohmann::json &j, const AttackType &type)
- void to_json(nlohmann::json &j, const BaseItem &type)
- void to_json(nlohmann::json &j, const Class &type)
- void to_json(nlohmann::json &j, const CombatMode &type)
- void to_json(nlohmann::json &j, const Damage &type)
- void to_json(nlohmann::json &j, const DamageModType &type)
- void to_json(nlohmann::json &j, const Disease &type)
```



```

- void to_json(nlohmann::json &j, const EffectType &type)
- void to_json(nlohmann::json &j, const Feat &type)
- void to_json(nlohmann::json &j, const ItemPropertyType &type)
- void to_json(nlohmann::json &j, const LocString &loc)
- void to_json(nlohmann::json &j, const MasterFeat &type)
- void to_json(nlohmann::json &j, const MissChanceType &type)
- void to_json(nlohmann::json &j, const ModifierType &type)
- void to_json(nlohmann::json &j, const Poison &type)
- void to_json(nlohmann::json &j, const Race &type)
- void to_json(nlohmann::json &j, const Resource &r)
- void to_json(nlohmann::json &j, const Resref &r)
- void to_json(nlohmann::json &j, const Save &type)
- void to_json(nlohmann::json &j, const SaveVersus &type)
- void to_json(nlohmann::json &j, const Situation &type)
- void to_json(nlohmann::json &j, const Skill &type)
- void to_json(nlohmann::json &j, const SpecialAttack &type)
- void to_json(nlohmann::json &j, const Spell &type)
- void to_json(nlohmann::json &j, const SpellEntry &spell)
- void to_json(nlohmann::json &j, const SpellSchool &type)
- void to_json(nlohmann::json &j, const ByteArray &ba)
- void to_json(nlohmann::json &j, const LevelUp &entry)
- void to_json(nlohmann::json &j, const Location &loc)
- void to_json(nlohmann::json &j, const Saves &saves)

```

**Warning:** doxygenfunction: Unable to resolve function “to\_json” with arguments (nlohmann::json&, const DialogPtr&) in doxygen xml output for project “rollNW” from directory: build/xml/. Potential matches:

```

- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
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- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json() const
- nlohmann::json to_json(SerializationProfile profile) const
- nlohmann::json to_json(SerializationProfile profile) const
- nlohmann::json to_json(SerializationProfile profile) const
- nlohmann::json to_json(SerializationProfile profile, ObjectType object_type) const
- nlohmann::json to_json(nw::ResourceType::type restype) const

```

```
- void to_json(nlohmann::json &j, ObjectID id)
- void to_json(nlohmann::json &j, ObjectType type)
- void to_json(nlohmann::json &j, const Ability &type)
- void to_json(nlohmann::json &j, const ArmorClass &type)
- void to_json(nlohmann::json &j, const AttackType &type)
- void to_json(nlohmann::json &j, const BaseItem &type)
- void to_json(nlohmann::json &j, const Class &type)
- void to_json(nlohmann::json &j, const CombatMode &type)
- void to_json(nlohmann::json &j, const Damage &type)
- void to_json(nlohmann::json &j, const DamageModType &type)
- void to_json(nlohmann::json &j, const Disease &type)
- void to_json(nlohmann::json &j, const EffectType &type)
- void to_json(nlohmann::json &j, const Feat &type)
- void to_json(nlohmann::json &j, const ItemPropertyType &type)
- void to_json(nlohmann::json &j, const LocString &loc)
- void to_json(nlohmann::json &j, const MasterFeat &type)
- void to_json(nlohmann::json &j, const MissChanceType &type)
- void to_json(nlohmann::json &j, const ModifierType &type)
- void to_json(nlohmann::json &j, const Poison &type)
- void to_json(nlohmann::json &j, const Race &type)
- void to_json(nlohmann::json &j, const Resource &r)
- void to_json(nlohmann::json &j, const Resref &r)
- void to_json(nlohmann::json &j, const Save &type)
- void to_json(nlohmann::json &j, const SaveVersus &type)
- void to_json(nlohmann::json &j, const Situation &type)
- void to_json(nlohmann::json &j, const Skill &type)
- void to_json(nlohmann::json &j, const SpecialAttack &type)
- void to_json(nlohmann::json &j, const Spell &type)
- void to_json(nlohmann::json &j, const SpellEntry &spell)
- void to_json(nlohmann::json &j, const SpellSchool &type)
- void to_json(nlohmann::json &j, const ByteArray &ba)
- void to_json(nlohmann::json &j, const LevelUp &entry)
- void to_json(nlohmann::json &j, const Location &loc)
- void to_json(nlohmann::json &j, const Saves &saves)
```

```
void nw::to_json(nlohmann::json &j, const Location &loc)
```

```
void nw::to_json(nlohmann::json &j, const LocString &loc)
```

```
void nw::to_json(nlohmann::json &j, const Resource &r)
```

```
    nlohmann::json specialization
```

```
void nw::to_json(nlohmann::json &j, const Resref &r)
```

```
    nlohmann::json specialization
```

```
void nw::to_json(nlohmann::json &j, const Saves &saves)
```

```
void nw::to_json(nlohmann::json &j, const SpellEntry &spell)
```

```
void nw::to_json(nlohmann::json &j, ObjectID id)
```

```
    nlohmann::json specialization
```

```
void nw::to_json(nlohmann::json &j, ObjectType type)
```

```
    nlohmann::json specialization
```

### 6.16.73 nw::to\_underlying

```
template<class Enum>
constexpr std::underlying_type_t<Enum> nw::to_underlying(Enum e) noexcept
    Gets the underlying value of an enum.
```

---

**Note:** Replace when C++23 comes around

---

#### Template Parameters

**Enum** – Any enum type.

### 6.16.74 nw::to\_utf8

```
std::string nw::to_utf8(std::string_view str, std::string_view encoding, bool ignore_errors = false)
    Convert to utf8.
```

### 6.16.75 nw::to\_utf8\_by\_global\_lang

```
std::string nw::to_utf8_by_global_lang(std::string_view str, bool ignore_errors)
```

### 6.16.76 nw::to\_utf8\_by\_langid

```
std::string nw::to_utf8_by_langid(std::string_view str, LanguageID id, bool ignore_errors)
```

### 6.16.77 nwn1::base\_attack\_bonus

```
int nwn1::base_attack_bonus(const nw::Creature *obj)
    Calculates base attack bonus.
```

### 6.16.78 nwn1::effect\_ability\_modifier

```
nw::Effect *nwn1::effect_ability_modifier(nw::Ability ability, int modifier)
    Creates an ability modifier effect.
```

### 6.16.79 nwn1::effect\_armor\_class\_modifier

```
nw::Effect *nwn1::effect_armor_class_modifier(nw::ArmorClass type, int modifier)
    Creates an armor class modifier effect.
```

### 6.16.80 nwn1::effect\_attack\_modifier

`nw::Effect *nwn1::effect_attack_modifier(nw::AttackType attack, int modifier)`

Creates an attack modifier effect.

### 6.16.81 nwn1::effect\_concealment

`nw::Effect *nwn1::effect_concealment(int value, nw::MissChanceType type = miss_chance_type_normal)`

Creates concealment effect.

### 6.16.82 nwn1::effect\_haste

`nw::Effect *nwn1::effect_haste()`

Creates a haste effect.

### 6.16.83 nwn1::effect\_miss\_chance

`nw::Effect *nwn1::effect_miss_chance(int value, nw::MissChanceType type = miss_chance_type_normal)`

Creates miss chance effect.

### 6.16.84 nwn1::effect\_skill\_modifier

`nw::Effect *nwn1::effect_skill_modifier(nw::Skill skill, int modifier)`

Creates an skill modifier effect.

### 6.16.85 nwn1::get\_ability\_modifier

`int nwn1::get_ability_modifier(const nw::Creature *obj, nw::Ability ability, bool base = false)`

Gets creatures ability modifier.

### 6.16.86 nwn1::get\_ability\_score

`int nwn1::get_ability_score(const nw::Creature *obj, nw::Ability ability, bool base = false)`

Gets creatures ability score.

### 6.16.87 nwn1::get\_caster\_level

`int nwn1::get_caster_level(nw::Creature *obj, nw::Class class_)`

Gets creature's caster level for specified class.

### 6.16.88 nwn1::get\_dex\_modifier

int nwn1::get\_dex\_modifier(const nw::Creature \*obj)  
 Gets creatures dexterity modifier as modified by armor, etc.

### 6.16.89 nwn1::get\_max\_hitpoints

int nwn1::get\_max\_hitpoints(const nw::ObjectBase \*obj)  
 Gets objects maximum hit points.

### 6.16.90 nwn1::get\_skill\_rank

int nwn1::get\_skill\_rank(const nw::Creature \*obj, nw::Skill skill, nw::ObjectBase \*versus = nullptr, bool base = false)  
 Determines creatures skill rank.

### 6.16.91 nwn1::get\_spell\_dc

int nwn1::get\_spell\_dc(nw::Creature \*obj, nw::Class class\_, nw::Spell spell)  
 Gets spell DC.

### 6.16.92 nwn1::get\_weapon\_by\_attack\_type

nw::Item \*nwn1::get\_weapon\_by\_attack\_type(const nw::Creature \*obj, nw::AttackType type)  
 Gets an equipped weapon by attack type.

### 6.16.93 nwn1::has\_effect\_type\_applied

bool nwn1::has\_effect\_type\_applied(nw::ObjectBase \*obj, nw::EffectType type)  
 Determines if object has effect type applied.

### 6.16.94 nwn1::is\_creature\_weapon

bool nwn1::is\_creature\_weapon(const nw::Item \*item)  
 Determines if item is creature weapon.

### 6.16.95 nwn1::is\_ranged\_weapon

bool nwn1::is\_ranged\_weapon(const nw::Item \*item)  
 Determines if item is ranged weapon.

### 6.16.96 nwn1::is\_shield

bool nwn1::is\_shield(nw::BaseItem baseitem)

Determines if item is a shield.

### 6.16.97 nwn1::is\_unarmed\_weapon

bool nwn1::is\_unarmed\_weapon(const nw::Item \*item)

Determines if item is unarmed weapon.

### 6.16.98 nwn1::meets\_requirements

**Warning:** doxygenfunction: Cannot find function “nwn1::meets\_requirements” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.16.99 nwn1::qual::ability

nw::Qualifier nwn1::qual::ability(nw::Ability id, int min, int max)

### 6.16.100 nwn1::qual::alignment

nw::Qualifier nwn1::qual::alignment(nw::AlignmentAxis axis, nw::AlignmentFlags flags)

### 6.16.101 nwn1::qual::class\_level

nw::Qualifier nwn1::qual::class\_level(nw::Class id, int min, int max)

### 6.16.102 nwn1::qual::feat

nw::Qualifier nwn1::qual::feat(nw::Feat id)

### 6.16.103 nwn1::qual::level

nw::Qualifier nwn1::qual::level(int min, int max)

### 6.16.104 nwn1::qual::race

nw::Qualifier nwn1::qual::race(nw::Race id)

### 6.16.105 nwn1::qual::skill

nw::Qualifier nwn1::qual::skill(nw::Skill id, int min, int max)

### 6.16.106 nwn1::resolve\_attack

std::unique\_ptr<nw::AttackData> nwn1::resolve\_attack(nw::Creature \*attacker, nw::ObjectBase \*target)

Resolves an attack

---

**Note:** All transient book keeping is done at the toplevel of this function, any other that attacker and/or target are passed to, are passed as const.

---

### 6.16.107 nwn1::resolve\_attack\_bonus

int nwn1::resolve\_attack\_bonus(const nw::Creature \*obj, nw::AttackType type, const nw::ObjectBase \*versus = nullptr)

Resolves attack bonus.

### 6.16.108 nwn1::resolve\_attack\_damage

std::unique\_ptr<nw::AttackData> nwn1::resolve\_attack(nw::Creature \*attacker, nw::ObjectBase \*target)

Resolves an attack

---

**Note:** All transient book keeping is done at the toplevel of this function, any other that attacker and/or target are passed to, are passed as const.

---

### 6.16.109 nwn1::resolve\_attack\_roll

nw::AttackResult nwn1::resolve\_attack\_roll(const nw::Creature \*obj, nw::AttackType type, const nw::ObjectBase \*vs, nw::AttackData \*data = nullptr)

Resolves an attack roll.

### 6.16.110 nwn1::resolve\_attack\_type

`nw::AttackType nwn1::resolve_attack_type(const nw::Creature *obj)`

Resolves attack type.

### 6.16.111 nwn1::resolve\_concealment

`std::pair<int, bool> nwn1::resolve_concealment(const nw::ObjectBase *obj, const nw::ObjectBase *target, bool vs_ranged)`

Resolves an concealment - i.e. the highest of concealment and miss chance

#### Returns

Concealment amount, bool that if `true` is from attacking creature i.e miss chance, if `false` from target object i.e. concealment

### 6.16.112 nwn1::resolve\_creature\_damage

`nw::DiceRoll nwn1::resolve_creature_damage(const nw::Creature *attacker, nw::Item *weapon)`

Resolves creature weapon damage.

### 6.16.113 nwn1::resolve\_critical\_multiplier

`int nwn1::resolve_critical_multiplier(const nw::Creature *obj, nw::AttackType type, const nw::ObjectBase *vs = nullptr)`

Resolves critical multiplier.

### 6.16.114 nwn1::resolve\_critical\_threat

`int nwn1::resolve_critical_threat(const nw::Creature *obj, nw::AttackType type)`

Resolves critical threat range.

### 6.16.115 nwn1::resolve\_damage\_modifiers

`void nwn1::resolve_damage_modifiers(const nw::Creature *obj, const nw::ObjectBase *versus, nw::AttackData *data)`

Resolves damage modifiers - soak, resist, immunity.

### 6.16.116 nwn1::resolve\_dual\_wield\_penalty

`std::pair<int, int> nwn1::resolve_dual_wield_penalty(const nw::Creature *obj)`

Resolves dual-wield penalty.



### 6.16.117 nwn1::resolve\_iteration\_penalty

int nwn1::resolve\_iteration\_penalty(const nw::Creature \*attacker, nw::AttackType type)

Resolves iteration penalty.

### 6.16.118 nwn1::resolve\_number\_of\_attacks

std::pair<int, int> nwn1::resolve\_number\_of\_attacks(const nw::Creature \*obj)

Resolves number of attacks.

### 6.16.119 nwn1::resolve\_saving\_throw

bool nwn1::resolve\_saving\_throw(const nw::ObjectBase \*obj, nw::Save type, int dc, nw::SaveVersus type\_vs, const nw::ObjectBase \*versus)

### 6.16.120 nwn1::resolve\_skill\_check

bool nwn1::resolve\_skill\_check(const nw::Creature \*obj, nw::Skill skill, int dc, nw::ObjectBase \*versus)

### 6.16.121 nwn1::resolve\_unarmed\_damage

nw::DiceRoll nwn1::resolve\_unarmed\_damage(const nw::Creature \*attacker)

Resolve unarmed base damage.

### 6.16.122 nwn1::resolve\_weapon\_damage

nw::DiceRoll nwn1::resolve\_weapon\_damage(const nw::Creature \*attacker, nw::BaseItem item)

Resolve weapon base damage

---

**Note:** Includes specialization and arcane archer bonuses

---

### 6.16.123 nwn1::resolve\_weapon\_damage\_flags

nw::DamageFlag nwn1::resolve\_weapon\_damage\_flags(const nw::Item \*weapon)

Resolve weapon base damage flags.

### 6.16.124 nwn1::saving\_throw

int nwn1::saving\_throw(const nw::ObjectBase \*obj, nw::Save type, nw::SaveVersus type\_vs, const nw::ObjectBase \*versus)

### 6.16.125 nwn1::sel::ability

nw::Selector nwn1::sel::ability(nw::Ability id)

### 6.16.126 nwn1::sel::alignment

nw::Selector nwn1::sel::alignment(nw::AlignmentAxis id)

### 6.16.127 nwn1::sel::class\_level

nw::Selector nwn1::sel::class\_level(nw::Class id)

### 6.16.128 nwn1::sel::feat

nw::Selector nwn1::sel::feat(nw::Feat id)

### 6.16.129 nwn1::sel::level

nw::Selector nwn1::sel::level()

### 6.16.130 nwn1::sel::race

nw::Selector nwn1::sel::race()

### 6.16.131 nwn1::sel::skill

nw::Selector nwn1::sel::skill(nw::Skill id)

### 6.16.132 nwn1::selector

nw::RuleValue nwn1::selector(const nw::Selector &selector, const nw::ObjectBase \*obj)

### 6.16.133 nwn1::weapon\_is\_finessable

bool nwn1::weapon\_is\_finessable(const nw::Creature \*obj, nw::Item \*weapon)

Determines if a weapon is finessable.

### 6.16.134 nwn1::weapon\_iteration

int nwn1::weapon\_iteration(const nw::Creature \*obj, const nw::Item \*weapon)

Calculates weapon iteration, e.g. 5 or 3 for monk weapons.

## 6.17 typedefs

### 6.17.1 nw::AbilityArray

using nw::AbilityArray = RuleTypeArray<Ability, AbilityInfo>

*Ability* singleton component.

### 6.17.2 nw::BaseItemArray

using nw::BaseItemArray = RuleTypeArray<BaseItem, BaseItemInfo>

*BaseItem* singleton component.

### 6.17.3 nw::DamageFlag

using nw::DamageFlag = RuleFlag<Damage, 32>

### 6.17.4 nw::EquipItem

using nw::EquipItem = std::variant<Resref, Item\*>

### 6.17.5 nw::FeatArray

using nw::FeatArray = RuleTypeArray<Feat, FeatInfo>

*Feat* Singleton Component.

### 6.17.6 nw::LocalVarTable

```
using nw::LocalVarTable = absl::flat_hash_map<std::string, LocalVar>
```

### 6.17.7 nw::ModifierFunction

```
using nw::ModifierFunction = std::function<ModifierResult(const ObjectBase*)>
```

### 6.17.8 nw::ModifierInputs

**Warning:** doxygentypedef: Cannot find typedef “nw::ModifierInputs” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.17.9 nw::ModifierOutputs

**Warning:** doxygentypedef: Cannot find typedef “nw::ModifierOutputs” in doxygen xml output for project “rollNW” from directory: build/xml/

### 6.17.10 nw::ModifierResult

```
using nw::ModifierResult = Variant<int, float, DamageRoll>
```

### 6.17.11 nw::ModifierVariant

```
using nw::ModifierVariant = Variant<int, float, DamageRoll, ModifierFunction, ModifierSubFunction, ModifierVsFunction, ModifierSubVsFunction>
```

### 6.17.12 nw::RaceArray

```
using nw::RaceArray = RuleTypeArray<Race, RaceInfo>  
    Race singleton component.
```

### 6.17.13 nw::RuleValue

using nw::RuleValue = *Variant*<int32\_t, float, std::string>

### 6.17.14 nw::SkillArray

using nw::SkillArray = *RuleTypeArray*<*Skill*, *SkillInfo*>  
Singleton Component for Skills.

### 6.17.15 nw::SpellArray

using nw::SpellArray = *RuleTypeArray*<*Spell*, *SpellInfo*>  
*Spell* singleton component.

### 6.17.16 nw::sqlite3\_ptr

using nw::sqlite3\_ptr = std::unique\_ptr<sqlite3, void (\*)(sqlite3\*)>  
sqlite3 database pointer wrapper

### 6.17.17 nw::unique\_container

using nw::unique\_container = std::unique\_ptr<*Container*>

## 6.18 rollnw

class rollnw.Appearance

Class containing creature's appearance

body\_parts: *BodyParts*

body\_parts

hair: int

hair

id: int

Index into appearance.2da

phenotype: int

phenotype

portrait\_id: int

Index into portraits.2da

skin: int

skin

```
tail: int
    tail
tattoo1: int
    tattoo1
tattoo2: int
    tattoo2
wings: int
    wings
class rollnw.Area
    Area object
    comments: str
    creator_id: int
    creatures: List[Creature]
    doors: List[Door]
    encounters: List[Encounter]
    flags: AreaFlags
    height: int
    id: int
    items: List[Item]
    json_archive_version: ClassVar[int]
    listen_check_mod: int
    loadscreen: int
    name: LocString
    no_rest: int
    object_type: ClassVar[int]
    placeables: List[Placeable]
    pvp: int
    scripts: AreaScripts
    shadow_opacity: int
    skybox: int
    sounds: List[Sound]
    spot_check_mod: int
    stores: List[Store]
```

```
    tiles: List[Tile]
    tileset: str
    triggers: List[Trigger]
    version: int
    waypoints: List[Waypoint]
    weather: AreaWeather
    width: int

flag rollnw.AreaFlags(value)
    Valid values are as follows:
    interior = <AreaFlags.interior: 1>
    underground = <AreaFlags.underground: 2>
    natural = <AreaFlags.natural: 4>

class rollnw.AreaScripts
    Area's scripts
    on_enter: str
    on_exit: str
    on_heartbeat: str
    on_user_defined: str

class rollnw.AreaWeather
    Area's weather
    chance_lightning: int
    chance_rain: int
    chance_snow: int
    color_moon_ambient: int
    color_moon_diffuse: int
    color_moon_fog: int
    color_sun_ambient: int
    color_sun_diffuse: int
    color_sun_fog: int
    day_night_cycle: int
    fog_clip_distance: int
    fog_moon_amount: int
```

```
fog_sun_amount: int
is_night: int
lighting_scheme: int
moon_shadows: int
sun_shadows: int
wind_power: int

class rollnw.AttackData
    Class aggregating attack data
    Attributes:
        armor_class: int
        attack_bonus: int
        attack_roll: int
        attacker: Creature
        concealment: int
        is_ranged_attack: bool
        iteration_penalty: int
        multiplier: int
        nth_attack: int
        result: AttackResult
        target: ObjectBase
        target_is_creature: bool
        target_state: int
        threat_range: int
        type: int

enum rollnw.AttackResult(value)
    Attack Result Type
        Member Type
            int
    Valid values are as follows:
        hit_by_auto_success = <AttackResult.hit_by_auto_success: 1>
        hit_by_critical = <AttackResult.hit_by_critical: 2>
        hit_by_roll = <AttackResult.hit_by_roll: 3>
```



```
miss_by_auto_fail = <AttackResult.miss_by_auto_fail: 4>
miss_by_concealment = <AttackResult.miss_by_concealment: 5>
miss_by_miss_chance = <AttackResult.miss_by_miss_chance: 6>
miss_by_roll = <AttackResult.miss_by_roll: 7>
```

**class rollnw.BodyParts**

Class containing references to creature's body parts

```
belt: int
bicep_left: int
bicep_right: int
foot_left: int
foot_right: int
forearm_left: int
forearm_right: int
hand_left: int
hand_right: int
head: int
neck: int
pelvis: int
shin_left: int
shin_right: int
shoulder_left: int
shoulder_right: int
thigh_left: int
thigh_right: int
```

**class rollnw.ClassEntry**

Class level data

```
id: int
level: int
spells: SpellBook
```

**class rollnw.CombatInfo**

Class containing combat related data

```
ac_armor_base: int
```

```
ac_natural_bonus: int
ac_shield_base: int
combat_mode: int
size_ab_modifier: int
size_ac_modifier: int
target_state: int
```

```
class rollnw.Common
```

Class containing attributes common to all objects

```
comment: str
locals: LocalData
location: Location
name: LocString
palette_id: int
resref: str
tag: str
```

```
class rollnw.Container
```

Base container interface

```
all()
    Get all resources

contains(res: Resource | str) → bool
    Get if container contains resource

demand(res: Resource | str) → bytes
    Reads resource data, empty ByteArray if no match.

extract(pattern, output) → int
    Extract elements from a container by regex

extract_by_glob(glob: str, output: str) → int
    Extract elements from a container by glob pattern

name() → str
    Equivalent to basename path()

path() → str
    Path to container, for basic containers, should be canonical

size() → int
    Gets the number of resources, if applicable, of the container

stat(res) → ResourceDescriptor
    Get some general data about a resource
```

**valid()** → bool

Return true if loaded, false if not.

**working\_directory()** → str

Get container working directory

**class rollnw.Creature**

Class that represents a Creature object

**appearance:** *Appearance*

**bodybag:** int

**chunk\_death:** int

**common:** *Common*

**conversation:** str

Dialog resref

**cr:** float

**cr\_adjust:** int

**decay\_time:** int

**deity:** str

**description:** *LocString*

**disarmable:** int

**property equipment:** *Equips*

Gets creatures equipped items

**faction\_id:** int

**static from\_dict**(value: dict)

Constructs object from python dict.

**static from\_file**(path: str)

Constructs object from file. The file can be JSON or Gff.

**gender:** int

**good\_evil:** int

**property history:** *LevelHistory*

Gets creatures level history

**hp:** int

**hp\_current:** int

**hp\_max:** int

**immortal:** int

**interruptable:** int

```
property inventory: Inventory
    Gets creatures inventory
json_archive_version: ClassVar[int]
lawful_chaotic: int
levels: LevelStats
lootable: int
name_first: LocString
name_last: LocString
object_type: ClassVar[int]
pc: int
perception_range: float
plot: int
race: int
scripts: CreatureScripts
soundset: str
starting_package: int
stats: CreatureStats
    Offensive and defensive stats.
subrace: str
walkrate: int
```

```
class rollnw.CreatureScripts
    A class containing a creature's script set.
    on_attacked: str
    on_blocked: str
    on_conversation: str
    on_damaged: str
    on_death: str
    on_disturbed: str
    on_endround: str
    on_heartbeat: str
    on_perceived: str
    on_rested: str
```

```
    on_spawn: str
    on_spell_cast_at: str
    on_user_defined: str

class rollnw.CreatureStats
    Implementation of a creature's general attributes and stats
    add_feat(feat) → bool
        Attempts to add a feat to a creature, returning true if successful
    get_ability_score(id: int)
        Gets an ability score
    get_skill_rank(id: int)
        Gets a skill rank
    has_feat(feat) → bool
        Determines if creature has feat
    set_ability_score(id: int, value: int) → bool
        Sets an ability score, returning true if successful
    set_skill_rank(id: int, value: int) → bool
        Sets a skill rank, returning true if successful

class rollnw.Dialog
    add() → DialogPtr
        Adds empty Dialog Pointer and Node
    add_ptr(ptr: DialogPtr, is_link: bool = False) → DialogPtr
        Adds Dialog Pointer, if is_link is false no new pointer or node is created. if is_link is true a new pointer
        will created with the node copied from input pointer.
    add_string(value: str, lang: LanguageID = LanguageID.english, feminine: bool = False) → DialogPtr
        Adds Dialog Pointer and Node with string value set
    delay_entry: int = 0
    delay_reply: int = 0
    delete_ptr(ptr: DialogPtr)
        Deletes a dialog pointer @warning ptr should be removed from / not added to a dialog prior to deletion
    static from_file(path: str) → Dialog
        Creates a dialog from a GFF or rollnw JSON file
    json_archive_version: ClassVar[int]
    prevent_zoom: bool = False
    remove_ptr(ptr: DialogPtr)
        Removes Dialog Ptr from underlying node
    restype: ClassVar[ObjectType]
```

**save**(*path: str*)

Saves a dialog to file, valid extentions are “.dlg” and “.dlg.json”

**script\_abort:** **str**

**script\_end:** **str**

**valid()** → **bool**

Checks id dialog was successfully parsed

**word\_count:** **int** = 0

**enum** rollnw.DialogAnimation(*value*)

**Member Type**

**int**

Valid values are as follows:

**default** = <DialogAnimation.default: 0>

**taunt** = <DialogAnimation.taunt: 28>

**greeting** = <DialogAnimation.greeting: 29>

**listen** = <DialogAnimation.listen: 30>

**worship** = <DialogAnimation.worship: 33>

**salute** = <DialogAnimation.salute: 34>

**bow** = <DialogAnimation.bow: 35>

**steal** = <DialogAnimation.steal: 37>

**talk\_normal** = <DialogAnimation.talk\_normal: 38>

**talk\_pleading** = <DialogAnimation.talk\_pleading: 39>

**talk\_forceful** = <DialogAnimation.talk\_forceful: 40>

**talk\_laugh** = <DialogAnimation.talk\_laugh: 41>

**victory\_1** = <DialogAnimation.victory\_1: 44>

**victory\_2** = <DialogAnimation.victory\_2: 45>

**victory\_3** = <DialogAnimation.victory\_3: 46>

**look\_far** = <DialogAnimation.look\_far: 48>

**drink** = <DialogAnimation.drink: 70>

**read** = <DialogAnimation.read: 71>

**none** = <DialogAnimation.none: 88>

**class** rollnw.DialogNode

**animation:** *DialogAnimation* = 0

```

comment:  str

copy() → DialogNode
    Copies a Node

delay:  int = -1

get_action_param(key: str) → str | None
    Gets action parameter if it exists

parent:  Dialog

pointers:  List[DialogPtr]

quest:  str

quest_entry:  int = -1

remove_action_param(key: str)
    Removes action parameter by key

script_action:  str

set_action_param(key: str, value: str)
    Sets action parameter, if key does not exist key and value are appended

sound:  str

speaker:  str

text:  LocString

type:  DialogNodeType

enum rollnw.DialogNodeType(value)

    Member Type
    int

    Valid values are as follows:

    entry = <DialogNodeType.entry: 0>

    reply = <DialogNodeType.reply: 1>

class rollnw.DialogPtr

    add() → DialogPtr
        Adds empty Dialog Pointer and Node

    add_ptr(ptr: DialogPtr, is_link: bool = False) → DialogPtr
        Adds Dialog Pointer, if is_link is false no new pointer or node is created. if is_link is true a new pointer
        will created with the node copied from input pointer.

    add_string(value: str, lang: LanguageID = LanguageID.english, feminine: bool = False) → DialogPtr
        Adds Dialog Pointer and Node with string value set

    comment:  str

```

**copy()** → *DialogPtr*

Copies dialog pointer and all sub-nodes

**get\_condition\_param**(key: *str*) → *str* | *None*

Gets condition parameter by key

**is\_link:** *bool*

**is\_start:** *bool*

**node:** *DialogNode*

**parent:** *Dialog*

**remove\_condition\_param**(key: *str*)

Removes condition parameter by key

**remove\_ptr**(ptr: *DialogPtr*)

Removes Dialog Ptr from underlying node

**script\_appears:** *str*

**set\_condition\_param**(key: *str*, value: *str*)

Sets condition parameter, if key does not exist key and value are appended

**type:** *DialogNodeType*

**class** rollnw.DiceRoll

Dice roll

**bonus:** *int*

**dice:** *int*

**sides:** *int*

**class** rollnw.Directory(*path: str*)

Implementation of a directory as a rollnw.Container

**Parameters**

**path** (*str*) – Directory to load

**class** rollnw.Door

Class that represents a Door object

**animation\_state:** *DoorAnimationState*

**appearance:** *int*

**conversation:** *str*

Door's conversation resref

**description:** *LocString*

**faction:** *int*

**static from\_dict**(value: *dict*)

Constructs object from python dict.



```
static from_file(path: str)
    Constructs object from file. The file can be JSON or Gff.

generic_type: int
hardness: int
hp: int
hp_current: int
interruptable: int
json_archive_version: ClassVar[int]
linked_to: str
linked_to_flags: int
loadscreen: int
lock: Lock
object_type: ClassVar[int]
plot: int
portrait_id: int
saves: Saves
scripts: DoorScripts
trap: Trap

enum rollnw.DoorAnimationState(value)
    Door animation states
    Valid values are as follows:
    closed = <DoorAnimationState.closed: 1>
    opened1 = <DoorAnimationState.opened1: 2>
    opened2 = <DoorAnimationState.opened2: 3>

class rollnw.DoorScripts
    Door's scripts
    on_click: str
    on_closed: str
    on_damaged: str
    on_death: str
    on_disarm: str
    on_heartbeat: str
```

```
on_lock: str
on_melee_attacked: str
on_open: str
on_open_failure: str
on_spell_cast_at: str
on_trap_triggered: str
on_unlock: str
on_user_defined: str

class rollnw.Effect
    clear()
        Clears the effect such that it's as if default constructed
    get_float(index)
        Gets a floating point value
    get_int(index)
        Gets an integer point value
    get_string(index)
        Gets a string value
    handle()
        Gets the effect's handle
    id()
        Gets the effect's ID
    set_float(index: int, value: float)
        Sets a floating point value
    set_int(index: int, value: int)
        Sets an integer point value
    set_string(index: int, value: str)
        Sets a string value
    set_versus(vs)
        Sets the versus value
    versus()
        Gets the versus value
enum rollnw.EffectCategory(value)
    Effect category
        Member Type
        int
    Valid values are as follows:
    magical = <EffectCategory.magical: 1>
```

```
    extraordinary = <EffectCategory.extraordinary: 2>
    supernatural = <EffectCategory.supernatural: 3>
    item = <EffectCategory.item: 4>
    innate = <EffectCategory.innate: 5>

class rollnw.EffectHandle
    Effect Handle
    category: EffectCategory
    creator: ObjectHandle
    effect: Effect
    spell_id: int
    subtype: int
    type: int

class rollnw.EffectID
    Effect ID
    index: int
    version: int

class rollnw.Encounter
    Class that represents an Encounter object
    active: bool
    creatures: List[SpawnCreature]
    creatures_max: int
    creatures_recommended: int
    difficulty: int
    difficulty_index: int
    faction: int
    static from_dict(value: dict)
        Constructs object from python dict.
    static from_file(path: str)
        Constructs object from file. The file can be JSON or Gff.
    geometry: List[Vector3]
    player_only: bool
    reset: bool
    reset_time: int
```

```
    respawns: int
    scripts: EncounterScripts
    spawn_option: int
    spawn_points: List[SpawnPoint]

class rollnw.EncounterScripts
    Encounter's scripts
    on_entered: str
    on_exhausted: str
    on_exit: str
    on_heartbeat: str
    on_user_defined: str

enum rollnw.EquipIndex(value)
    Member Type
    int

    Valid values are as follows:
    head = <EquipIndex.head: 0>
    chest = <EquipIndex.chest: 1>
    boots = <EquipIndex.boots: 2>
    arms = <EquipIndex.arms: 3>
    righthand = <EquipIndex.righthand: 4>
    lefthand = <EquipIndex.lefthand: 5>
    cloak = <EquipIndex.cloak: 6>
    leftring = <EquipIndex.leftring: 7>
    rightring = <EquipIndex.rightring: 8>
    neck = <EquipIndex.neck: 9>
    belt = <EquipIndex.belt: 10>
    arrows = <EquipIndex.arrows: 11>
    bullets = <EquipIndex.bullets: 12>
    bolts = <EquipIndex.bolts: 13>
    creature_left = <EquipIndex.creature_left: 14>
    creature_right = <EquipIndex.creature_right: 15>
    creature_bite = <EquipIndex.creature_bite: 16>
```

```

    creature_skin = <EquipIndex.creature_skin: 17>
    invalid = <EquipIndex.invalid: 4294967295>
flag rollnw.EquipSlot(value)
    Equipment slot flags
    Valid values are as follows:
    head = <EquipSlot.head: 1>
    chest = <EquipSlot.chest: 2>
    boots = <EquipSlot.boots: 4>
    arms = <EquipSlot.arms: 8>
    righthand = <EquipSlot.righthand: 16>
    lefthand = <EquipSlot.lefthand: 32>
    cloak = <EquipSlot.cloak: 64>
    leftring = <EquipSlot.leftring: 128>
    rightring = <EquipSlot.rightring: 256>
    neck = <EquipSlot.neck: 512>
    belt = <EquipSlot.belt: 1024>
    arrows = <EquipSlot.arrows: 2048>
    bullets = <EquipSlot.bullets: 4096>
    bolts = <EquipSlot.bolts: 8192>
    creature_left = <EquipSlot.creature_left: 16384>
    creature_right = <EquipSlot.creature_right: 32768>
    creature_bite = <EquipSlot.creature_bite: 65536>
    creature_skin = <EquipSlot.creature_skin: 131072>
class rollnw.Equips
    Creature's equipment
    equips: List[str | Item]
        len(equips) == 18
        Type
        Note
    instantiate()
        Instantiates equipment by loading contained items from the resource manager
class rollnw.Erf(path: str)
    Implementation of Erf file format
    Parameters
        path (str) – Erf file to load

```

**add**(*path*)

Adds resources from path

**erase**(*resource*)

Removes resource

**merge**(*container*)

Merges the contents of another rollnw.Container

**reload**()

Reloads Erf

### Notes

Erf:: working\_directory() will not change

**save**()

Saves Erf to Erf:: path()

### Notes

It's probably best to call Erf:: reload after save.

**save\_as**(*path*)

Saves Erf to different path

### Notes

Current Erf unmodified, to load Erf at new path a new Erf must be constructed.

**enum** rollnw.**GameVersion**(*value*)

Game versions

Valid values are as follows:

**v1\_69** = <GameVersion.v1\_69: 1>

**vEE** = <GameVersion.vEE: 2>

**nwn2** = <GameVersion.nwn2: 3>

**class** rollnw.**IVector4**

**w**: int

**x**: int

**y**: int

**z**: int

**class** rollnw.**Image**(*filename: str*)

Loads an image

### Parameters

**filename** (*str*) – image file to load

```
channels()
    Gets BPP

data()
    Get raw data

height()
    Get height

valid()
    Determine if successfully loaded.

width()
    Get width

write_to()
    Write Image to file

class rollnw.Ini(filename: str)
    Loads an ini

    Parameters
        filename (str) – ini file to load

get_float(key: str) → float | None
    Gets an INI value

get_int(key: str) → int | None
    Gets an INI value

get_str(key: str) → str | None
    Gets an INI value

valid()
    Deterimes if Ini file was successfully parsed

class rollnw.Inventory
    An Object's inventory

instantiate()
    Instantiates inventory by loading contained items from the resource manager

items: List[InventoryItem]

owner: ObjectBase

class rollnw.InventoryItem
    An inventory item

infinite: bool
    Only applicable to stores

item: str | Item

x: int

y: int
```

```
class rollnw.Item
    Class that represents an Item object
    additional_cost: int
    baseitem: int
    charges: int
    cost: int
    cursed: bool
    description: LocString
        Description
    description_id: LocString
        Description after being identified.
    static from_dict(value: dict)
        Constructs object from python dict.
    static from_file(path: str)
        Constructs object from file. The file can be JSON or Gff.
    identified: bool
    inventory: Inventory
    model_colors: List[int]
    model_parts: List[int]
    model_type: ItemModelType
    plot: bool
        Is a plot item.
    properties: List[ItemProperty]
    stacksize: int
    stolen: bool

enum rollnw.ItemColors(value)
    Valid values are as follows:
    cloth1 = <ItemColors.cloth1: 1>
    cloth2 = <ItemColors.cloth2: 2>
    leather1 = <ItemColors.leather1: 3>
    leather2 = <ItemColors.leather2: 4>
    metal1 = <ItemColors.metal1: 5>
    metal2 = <ItemColors.metal2: 6>
```



**enum** rollnw.ItemModelParts(*value*)

Valid values are as follows:

```
model1 = <ItemModelParts.model1: 1>
model2 = <ItemModelParts.model2: 2>
model3 = <ItemModelParts.model3: 3>
armor_belt = <ItemModelParts.armor_belt: 4>
armor_lbicep = <ItemModelParts.armor_lbicep: 5>
armor_lfarm = <ItemModelParts.armor_lfarm: 6>
armor_lfoot = <ItemModelParts.armor_lfoot: 7>
armor_lhand = <ItemModelParts.armor_lhand: 8>
armor_lshin = <ItemModelParts.armor_lshin: 9>
armor_lshoul = <ItemModelParts.armor_lshoul: 10>
armor_lthigh = <ItemModelParts.armor_lthigh: 11>
armor_neck = <ItemModelParts.armor_neck: 12>
armor_pelvis = <ItemModelParts.armor_pelvis: 13>
armor_rbicep = <ItemModelParts.armor_rbicep: 14>
armor_rfarm = <ItemModelParts.armor_rfarm: 15>
armor_rfoot = <ItemModelParts.armor_rfoot: 16>
armor_rhand = <ItemModelParts.armor_rhand: 17>
armor_robe = <ItemModelParts.armor_robe: 18>
armor_rshin = <ItemModelParts.armor_rshin: 19>
armor_rshoul = <ItemModelParts.armor_rshoul: 20>
armor_rthigh = <ItemModelParts.armor_rthigh: 21>
armor_torso = <ItemModelParts.armor_torso: 22>
```

**enum** rollnw.ItemModelType(*value*)

Valid values are as follows:

```
simple = <ItemModelType.simple: 1>
layered = <ItemModelType.layered: 2>
composite = <ItemModelType.composite: 3>
armor = <ItemModelType.armor: 4>
```

**class** rollnw.ItemProperty

An item property

```
cost_table: int
cost_value: int
param_table: int
param_value: int
subtype: int
type: int
```

```
class rollnw.Key(path: str)
```

Implementation Key/Bif file format as a rollnw.Container

**Parameters**

**path** (*str*) – Path to key file

```
class rollnw.Language
```

```
static encoding(language: LanguageID) → str
```

Gets the encoding for a particular language

```
static from_string(string: str) → LanguageID
```

Converts string (short or long form) to ID

```
static has_feminine(language: LanguageID) → bool
```

Determines if language has feminine translations

```
static to_base_id(id: int) → Tuple[LanguageID, bool]
```

Convert runtime language identifier to base language and bool indicating masc/fem.

```
static to_runtime_id(language: LanguageID, feminine: bool = False) → int
```

Convert language ID to runtime identifier.

```
static to_string(language: LanguageID, long_name: bool = False) → str
```

Converts language to string form

```
enum rollnw.LanguageID(value)
```

**Member Type**

int

Valid values are as follows:

```
invalid = <LanguageID.invalid: -1>
```

```
english = <LanguageID.english: 0>
```

```
french = <LanguageID.french: 1>
```

```
german = <LanguageID.german: 2>
```

```
italian = <LanguageID.italian: 3>
```

```
spanish = <LanguageID.spanish: 4>
```

```
polish = <LanguageID.polish: 5>
```

```
korean = <LanguageID.korean: 128>
```

```

    chinese_traditional = <LanguageID.chinese_traditional: 129>

    chinese_simplified = <LanguageID.chinese_simplified: 130>

    japanese = <LanguageID.japanese: 131>

class rollnw.LevelHistory
    Implements a creatures levelup history

    entries: List[LevelUp]
        Entries for levels

class rollnw.LevelStats
    Implements a creatures level related stats

    entries: List[ClassEntry]
        Entries for levels

    level() → int
        Gets total level

    level_by_class(class_: int) → int
        Gets level by class

class rollnw.LevelUp
    Level up data

    ability: int
        Ability score that was raised, if any. -1 if none

    class_: int
        Class the level was taken as

    epic: bool
        True if level is an epic level

    feats: List[int]
        Added feats

    hitpoints: int
        Hitpoints gained.

    known_spells: List[Tuple[int, int]]
        Level, Spell pair for gained spells

    skillpoints: int
        Roll over skill points

    skills: List[Tuple[int, int]]
        Skill and the amount increased

class rollnw.LocString(strref: int = -1)
    Implements a localized string

    Parameters
        strref (int) – String reference. (default -1)

    add(language: LanguageID, string: str, feminine: bool = False)
        Adds a localized string

```

**contains**(*language: LanguageID, feminine: bool = False*)

Checks if a localized string is contained

**static from\_dict**(*data: dict*)

Converts python dict to LocString

**get**(*language: LanguageID, feminine: bool = False*)

Gets a localized string

**remove**(*language: LanguageID, feminine: bool = False*)

Removes a localized string

**size**()

Gets number of localized strings

**strref**()

Gets string reference

**to\_dict**() → DefaultDict

Converts LocString to python dict

**class rollnw.LocalData**

**delete\_float**(*varname: str*)

Deletes float variable

**delete\_int**(*varname: str*)

Deletes int variable

**delete\_location**(*varname: str*)

Deletes location variable

**delete\_object**(*varname: str*)

Deletes object variable

**delete\_string**(*varname: str*)

Deletes string variable

**get\_float**(*varname: str*)

Gets float variable

**get\_int**(*varname: str*) → int

Gets int variable

**get\_location**(*varname: str*)

Gets location variable

**get\_object**(*varname: str*)

Gets object variable

**get\_string**(*varname: str*) → str

Gets string variable

**set\_float**(*varname: str, value: float*)

Sets float variable

**set\_int**(*varname: str, value: int*)

Sets int variable

```
set_location(varname: str, value: Location)
    Sets location variable

set_object(varname: str, value: ObjectHandle)
    Sets object variable

set_string(varname: str, value: str)
    Sets string variable

size()
    Gets number of variables

class rollnw.Location
    Class representing an objects location

    area: int

    orientation: Vector3

    position: Vector3

class rollnw.Lock
    Class representing a lock on an object

    key_name: str

    key_required: bool

    lock_dc: int

    lockable: bool

    locked: bool

    remove_key: bool

    unlock_dc: int

class rollnw.Module
    Class that represents a Module object

    area_count() → int
        Gets number of areas in module

    creator: int

    dawn_hour: int

    description: LocString

    dusk_hour: int

    entry_area: str

    entry_orientation: Vector3

    entry_position: Vector3

    expansion_pack: int
```

```
get_area(index: int) → Area | None
    Gets number of areas in module

haks: List[str]

id: ByteString

is_save_game: bool

locals: LocalData

min_game_version: int

minutes_per_hour: int

name: LocString

scripts: ModuleScripts

start_day: int

start_hour: int

start_month: int

start_movie: str

start_year: int

tag: str

tlk: str

property uuid: str
    Gets modules UUID

version: int

xpscale: int

class rollnw.ModuleScripts
    Module Scripts

    on_client_enter: str

    on_client_leave: str

    on_cutscene_abort: str

    on_heartbeat: str

    on_item_acquire: str

    on_item_activate: str

    on_item_unacquire: str

    on_load: str

    on_player_chat: str
```

```
on_player_death: str
on_player_dying: str
on_player_equip: str
on_player_level_up: str
on_player_rest: str
on_player_unequip: str
on_spawnbtndn: str
on_start: str
on_user_defined: str
```

```
class rollnw.NWSync(path: str)
```

Implementation of NWSync file format

**Parameters**

**path** (str) – Path to NWSync repository

```
get(manifest)
```

Gets a particular manifest as a container

```
is_loaded()
```

Gets if NWSync was successfully loaded

```
manifests()
```

Get list of all manifests

```
shard_count()
```

Get the number of shards

```
class rollnw.NWSyncManifest
```

Implementation of NWSync Manifest as a rollnw.Container

```
class rollnw.ObjectBase
```

```
handle()
```

Gets object handle

```
class rollnw.ObjectHandle
```

Object handle

```
id: int
```

index into object array

```
type: ObjectType
```

object type

```
valid()
```

Determines if handle is valid

```
version: int
```

object index version

```
enum rollnw.ObjectType(value)
```

Object types

Valid values are as follows:

```
invalid = <ObjectType.invalid: 1>
gui = <ObjectType.gui: 2>
tile = <ObjectType.tile: 3>
module = <ObjectType.module: 4>
area = <ObjectType.area: 5>
creature = <ObjectType.creature: 6>
item = <ObjectType.item: 7>
trigger = <ObjectType.trigger: 8>
projectile = <ObjectType.projectile: 9>
placeable = <ObjectType.placeable: 10>
door = <ObjectType.door: 11>
areaofeffect = <ObjectType.areaofeffect: 12>
waypoint = <ObjectType.waypoint: 13>
encounter = <ObjectType.encounter: 14>
store = <ObjectType.store: 15>
portal = <ObjectType.portal: 16>
sound = <ObjectType.sound: 17>
```

```
class rollnw.Placeable
```

Class that represents a Placeable object

```
animation_state: PlaceableAnimationState
```

```
appearance: int
```

```
bodybag: int
```

```
common: Common
```

```
conversation: str
```

```
description: LocString
```

```
faction: int
```

```
static from_dict(value: dict)
```

Constructs object from python dict.

```
static from_file(path: str)
```

Constructs object from file. The file can be JSON or Gff.



```

hardness: int
has_inventory: bool
hp: int
hp_current: int
interruptable: bool
inventory: Inventory
json_archive_version: ClassVar[int]
lock: Lock
object_type: ClassVar[int]
plot: bool
portrait_id: int
saves: Saves
scripts: PlaceableScripts
static: bool
trap: Trap
useable: bool

enum rollnw.PlaceableAnimationState(value)
    Valid values are as follows:
    none = <PlaceableAnimationState.none: 1>
    open = <PlaceableAnimationState.open: 2>
    closed = <PlaceableAnimationState.closed: 3>
    destroyed = <PlaceableAnimationState.destroyed: 4>
    activated = <PlaceableAnimationState.activated: 5>
    deactivated = <PlaceableAnimationState.deactivated: 6>

class rollnw.PlaceableScripts
    Placeable's scripts
    on_click: str
    on_closed: str
    on_damaged: str
    on_death: str
    on_disarm: str
    on_heartbeat: str

```

```
on_inventory_disturbed: str
on_lock: str
on_melee_attacked: str
on_open: str
on_spell_cast_at: str
on_trap_triggered: str
on_unlock: str
on_used: str
on_user_defined: str
```

```
class rollnw.Player
```

Player character

**Warning:** This is very incomplete

```
class rollnw.Plt
```

Implementation of PLT file format

```
height()
```

```
pixels()
```

```
valid()
```

```
width()
```

```
class rollnw.PltColors
```

Plt Color Array

### Notes

This would be the colors that a player would select

```
colors: List[int]
```

```
enum rollnw.PltLayer(value)
```

Plt layers

**Member Type**

int

Valid values are as follows:

```
plt_layer_skin = <PltLayer.plt_layer_skin: 0>
```

```
plt_layer_hair = <PltLayer.plt_layer_hair: 1>
```

```
plt_layer_metal1 = <PltLayer.plt_layer_metal1: 2>
```

```

plt_layer_metal2 = <PltLayer.plt_layer_metal2: 3>
plt_layer_cloth1 = <PltLayer.plt_layer_cloth1: 4>
plt_layer_cloth2 = <PltLayer.plt_layer_cloth2: 5>
plt_layer_leather1 = <PltLayer.plt_layer_leather1: 6>
plt_layer_leather2 = <PltLayer.plt_layer_leather2: 7>
plt_layer_tattoo1 = <PltLayer.plt_layer_tattoo1: 8>
plt_layer_tattoo2 = <PltLayer.plt_layer_tattoo2: 9>

```

```
class rollnw.PltPixel
```

Plt pixel

**color**

**layer**

```
class rollnw.Resource
```

Resource name

**Parameters**

- **name** (*str*) – resref or filename
- **type** (*ResourceType* / *None*) – (Default None)

## Notes

If a resource type is not passed name is assumed to be a file name, e.g. 'nw\_chicken.utc'

**resref**

**Type**

*str*

**type**

**Type**

*ResourceType*

**filename()** → *str*

Returns resource as 'resref.ext'

**static from\_filename**(*filename: str*) → *Resource*

Creates resource from file name

**valid()** → *bool*

Determines if is valid resource name

```
class rollnw.ResourceDescriptor
```

Resource descriptor

**name**

**size**

**mtime**

**parent**

**enum** rollnw.ResourceType(*value*)

Valid values are as follows:

**invalid** = <ResourceType.invalid: 1>

**container** = <ResourceType.container: 2>

**gff\_archive** = <ResourceType.gff\_archive: 3>

**movie** = <ResourceType.movie: 4>

**player** = <ResourceType.player: 5>

**sound** = <ResourceType.sound: 6>

**texture** = <ResourceType.texture: 7>

**json** = <ResourceType.json: 8>

**bmp** = <ResourceType.bmp: 9>

**mve** = <ResourceType.mve: 10>

**tga** = <ResourceType.tga: 11>

**wav** = <ResourceType.wav: 12>

**plt** = <ResourceType.plt: 13>

**ini** = <ResourceType.ini: 14>

**bmu** = <ResourceType.bmu: 15>

**mpg** = <ResourceType.mpg: 16>

**txt** = <ResourceType.txt: 17>

**plh** = <ResourceType.plh: 18>

**tex** = <ResourceType.tex: 19>

**mdl** = <ResourceType.mdl: 20>

**thg** = <ResourceType.thg: 21>

**fnt** = <ResourceType.fnt: 22>

**lua** = <ResourceType.lua: 23>

**slt** = <ResourceType.slt: 24>

**nss** = <ResourceType.nss: 25>

**ncs** = <ResourceType.ncs: 26>

**mod** = <ResourceType.mod: 27>

are = <ResourceType.are: 28>  
set = <ResourceType.set: 29>  
ifo = <ResourceType.ifo: 30>  
bic = <ResourceType.bic: 31>  
wok = <ResourceType.wok: 32>  
twoda = <ResourceType.twoda: 33>  
tlk = <ResourceType.tlk: 34>  
txi = <ResourceType.txi: 35>  
git = <ResourceType.git: 36>  
bti = <ResourceType.bti: 37>  
uti = <ResourceType.uti: 38>  
btc = <ResourceType.btc: 39>  
utc = <ResourceType.utc: 40>  
dlg = <ResourceType.dlg: 41>  
itp = <ResourceType.itp: 42>  
btt = <ResourceType.btt: 43>  
utt = <ResourceType.utt: 44>  
dds = <ResourceType.dds: 45>  
bts = <ResourceType.bts: 46>  
uts = <ResourceType.uts: 47>  
ltr = <ResourceType.ltr: 48>  
gff = <ResourceType.gff: 49>  
fac = <ResourceType.fac: 50>  
bte = <ResourceType.bte: 51>  
ute = <ResourceType.ute: 52>  
btd = <ResourceType.btd: 53>  
utd = <ResourceType.utd: 54>  
btp = <ResourceType.btp: 55>  
utp = <ResourceType.utp: 56>  
dft = <ResourceType.dft: 57>  
gic = <ResourceType.gic: 58>

```
gui = <ResourceType.gui: 59>
css = <ResourceType.css: 60>
ccs = <ResourceType.ccs: 61>
btm = <ResourceType.btm: 62>
utm = <ResourceType.utm: 63>
dwk = <ResourceType.dwk: 64>
pwk = <ResourceType.pwk: 65>
btg = <ResourceType.btg: 66>
utg = <ResourceType.utg: 67>
jrl = <ResourceType.jrl: 68>
sav = <ResourceType.sav: 69>
utw = <ResourceType.utw: 70>
fourpc = <ResourceType.fourpc: 71>
ssf = <ResourceType.ssf: 72>
hak = <ResourceType.hak: 73>
nwm = <ResourceType.nwm: 74>
bik = <ResourceType.bik: 75>
ndb = <ResourceType.ndb: 76>
ptm = <ResourceType.ptm: 77>
ptt = <ResourceType.ptt: 78>
bak = <ResourceType.bak: 79>
dat = <ResourceType.dat: 80>
shd = <ResourceType.shd: 81>
xbc = <ResourceType.xbc: 82>
wbm = <ResourceType.wbm: 83>
mtr = <ResourceType.mtr: 84>
ktx = <ResourceType.ktx: 85>
ttf = <ResourceType.ttf: 86>
sql = <ResourceType.sql: 87>
tml = <ResourceType.tml: 88>
sq3 = <ResourceType.sq3: 89>
```

```
lod = <ResourceType.lod: 90>
gif = <ResourceType.gif: 91>
png = <ResourceType.png: 92>
jpg = <ResourceType.jpg: 93>
caf = <ResourceType.caf: 94>
ids = <ResourceType.ids: 95>
erf = <ResourceType.erf: 96>
bif = <ResourceType.bif: 97>
key = <ResourceType.key: 98>

class rollnw.Saves
    An objects saves
    fort: int
    reflex: int
    will: int

class rollnw.Sound
    Class that represents a Sound object
    active: bool
    common: Common
    continuous: bool
    distance_max: float
    distance_min: float
    elevation: float
    static from_dict(value: dict)
        Constructs object from python dict.
    static from_file(path: str)
        Constructs object from file. The file can be JSON or Gff.
    generated_type: int
    hours: int
    interval: int
    interval_variation: int
    json_archive_version: ClassVar[int]
    looping: bool
```

```
    object_type: ClassVar[int]
    pitch_variation: float
    positional: bool
    priority: int
    random: bool
    random_position: bool
    random_x: float
    random_y: float
    sounds: List[str]
    times: int
    volume: int
    volume_variation: int

class rollnw.SpawnCreature
    Encounter creature spawn
    appearance: int
    cr: int
    resref: str
    single_spawn: bool

class rollnw.SpawnPoint
    A spawn point
    orientation: Vector3
    position: Vector3

class rollnw.SpecialAbility
    Special Ability
    flags: SpellFlags
    level: int
    spell: int

class rollnw.SpellBook
    Implements a spell casters spellbook
    add_known_spell(level: int, entry: SpellEntry)
        Adds a known spell at level
    add_memorized_spell(level: int, entry: SpellEntry)
        Adds a memorized spell at level
```



```
get_known_spell(level: int, index: int)
    Gets a known spell entry

get_known_spell_count(level: int)
    Gets the number of known at a given level

get_memorized_spell(level: int, index: int)
    Gets a memorized spell entry

get_memorized_spell_count(level: int)
    Gets the number of memorized at a given level

remove_known_spell(level: int, entry: SpellEntry)
    Removes a known spell entry

remove_memorized_spell(level: int, entry: SpellEntry)
    Removes a memorized spell entry

class rollnw.SpellEntry
    An entry in a spellbook

    flags: SpellFlags

    meta: SpellMetaMagic

    spell: int

flag rollnw.SpellFlags(value)
    Valid values are as follows:

    readied = <SpellFlags.readied: 1>

    spontaneous = <SpellFlags.spontaneous: 2>

    unlimited = <SpellFlags.unlimited: 4>

flag rollnw.SpellMetaMagic(value)
    Valid values are as follows:

    empower = <SpellMetaMagic.empower: 1>

    extend = <SpellMetaMagic.extend: 2>

    maximize = <SpellMetaMagic.maximize: 4>

    quicken = <SpellMetaMagic.quicken: 8>

    silent = <SpellMetaMagic.silent: 16>

    still = <SpellMetaMagic.still: 32>

class rollnw.Store
    Class that represents a Store object

    armor: Inventory

    blackmarket: bool

    blackmarket_markdown: int
```

**static from\_dict**(*value: dict*) → *Store*

Constructs object from python dict.

**static from\_file**(*path: str*) → *Store*

Constructs object from file. The file can be JSON or Gff.

**gold:** int

**identify\_price:** int

**json\_archive\_version:** ClassVar[int]

**markdown:** int

**markup:** int

**max\_price:** int

**miscellaneous:** *Inventory*

**object\_type:** ClassVar[int]

**potions:** *Inventory*

**rings:** *Inventory*

**scripts:** *StoreScripts*

**weapons:** *Inventory*

**class** rollnw.StoreScripts

A Store's scripts

**on\_closed:** str

**on\_opened:** str

**class** rollnw.Tile

Area tile

**animloop1:** int

**animloop2:** int

**animloop3:** int

**height:** int

**id:** int

**mainlight1:** int

**mainlight2:** int

**orientation:** int

**srclight1:** int

**srclight2:** int

**class** rollnw.Tlk(*init: str* | *LanguageID*)

Implementation of the TLK file format

**Parameters**

**init** (*str* / *LanguageID*) – if passed a string, **init** will be treated as a path to a TLK file, if passed a *LanguageID*, default constructs with the TLKs language set to **init**.

**get**(*strref: int*) → *str*

Gets a tlk entry.

**language\_id**()

Gets the language ID

**modified**()

Is Tlk modified

**save**()

Writes TLK to file

**save\_as**(*path: str*)

Writes TLK to file

**set**(*strref: int, string: str*)

Sets a localized string

**size**()

Gets the highest set strref

**valid**()

Gets if successfully parsed

**class** rollnw.Trap

Class representing a trap on an object

**detect\_dc: int**

**detectable: bool**

**disarm\_dc: int**

**disarmable: bool**

**is\_trapped: bool**

**one\_shot: bool**

**type: int**

**class** rollnw.Trigger

Class that represents a Trigger object

**cursor: int**

**faction: int**

**static from\_dict**(*value: dict*) → *Trigger*

Constructs object from python dict.

**static** **from\_file**(*path: str*) → *Trigger*

Constructs object from file. The file can be JSON or Gff.

**geometry:** **List**[*Vector3*]

**highlight\_height:** **float**

**linked\_to:** **str**

**linked\_to\_flags:** **int**

**loadscreen:** **int**

**portrait:** **int**

**scripts:** *TriggerScripts*

**trap:** *Trap*

**type:** **int**

**class** rollnw.**TriggerScripts**

A trigger's scripts

**on\_click:** **str**

**on\_disarm:** **str**

**on\_enter:** **str**

**on\_exit:** **str**

**on\_heartbeat:** **str**

**on\_trap\_triggered:** **str**

**on\_user\_defined:** **str**

**class** rollnw.**TwoDA**(*filename: str*)

Implementation of 2da file format

**Parameters**

**filename** (*str*) – 2da file to load

**get**(*row: int, column: int | str*)

Gets a TwoDA value

**Parameters**

- **row** (*int*) – Row number
- **column** (*int | str*) – Column number or label

**Returns**

An *int | float | string* depending on the underlying value

**set**(*row: int, column: int | str, value: int | float | str*)

Sets a TwoDA value

**Parameters**

- **row** (*int*) – Row number

- **column**(*int* / *str*) – Column number or label
- **value**(*int* / *float* / *str*) – New value

**class** rollnw.Vector2

**x:** float

**y:** float

**class** rollnw.Vector3

**x:** float

**y:** float

**z:** float

**class** rollnw.Vector4

**w:** float

**x:** float

**y:** float

**z:** float

**class** rollnw.Waypoint

Class that represents a Waypoint object

**appearance:** int

**description:** *LocString*

**static from\_dict**(*value: dict*)

Constructs object from python dict.

**static from\_file**(*path: str*)

Constructs object from file. The file can be JSON or Gff.

**has\_map\_note:** bool

Has a map note

**linked\_to:** str

Tag of linked object

**map\_note:** *LocString*

**map\_note\_enabled:** bool

**class** rollnw.Zip(*path: str*)

Implementation of Zip file format as a container

**Parameters**

**path** (*str*) – Path to zip file

**rollnw.decode\_plt\_color**(*plt: Plt, colors: PltColors, x: int, y: int*) → List[int]

Decodes PLT and user selected colors to RGBA

`rollnw.resmatch(res: Resource, pattern: str) → bool`

Analog of `fnmatch` but for resource names

**Parameters**

- **res** (`Resource`) – Resource name
- **pattern** (`str`) – glob pattern

## 6.19 rollnw.kernel

**class** `rollnw.kernel.Config`

Configuration service

**initialize**(*options*: `ConfigOptions`)

Initialize config system

**install\_path**() → `str`

Gets game install path

**options**() → `ConfigOptions`

Gets config options

**set\_paths**(*install*: `str`, *user*: `str`)

Sets game paths

Note: Must be called before `initialize`

**set\_version**(*version*: `GameVersion`)

Sets game paths

Note: Must be called before `initialize`

**user\_path**() → `str`

Gets game install path

**class** `rollnw.kernel.ConfigOptions`

Configuration options

**include\_install**: `bool` = `True`

If true, load base game data.

**include\_nwsync**: `bool` = `True`

If true, load NWSync data.

**include\_user**: `bool` = `True`

If true, load user data.

**class** `rollnw.kernel.EffectSystem`

**add\_effect**(*type*, *apply*, *remove*)

Adds an effect type to the registry

**add\_itemprop**(*type*, *generator*)

Adds an item property type to the registry

---

```

apply(obj: ObjectBase, effect: Effect) → bool
    Applies an effect to an object

create(type) → Effect
    Creates an effect

destroy(effect: Effect) → None
    Destroys an effect

effect_limits_ability() → Tuple[int, int]
    Gets ability effect minimum and maximum

effect_limits_armor_class() → Tuple[int, int]
    Gets armor class effect minimum and maximum

effect_limits_attack() → Tuple[int, int]
    Gets attack effect minimum and maximum

effect_limits_skill() → Tuple[int, int]
    Gets skill effect minimum and maximum

ip_cost_table(table: int) → TwoDA | None
    Gets an item property cost table

ip_definition(type)
    Gets an item property definition

ip_param_table(table: int) → TwoDA | None
    Gets an item property param table

remove(obj: ObjectBase, effect: Effect) → bool
    Removes an effect to an object

set_effect_limits_ability(min: int, max: int) → None
    Sets ability effect minimum and maximum

set_effect_limits_armor_class(min: int, max: int) → None
    Sets armor class effect minimum and maximum

set_effect_limits_attack(min: int, max: int) → None
    Sets attack effect minimum and maximum

set_effect_limits_skill(min: int, max: int) → None
    Sets skill effect minimum and maximum

stats() → EffectSystemStats
    Gets stats regarding the effect system

class rollnw.kernel.EffectSystemStats
    Effect system stat data

    free_list_size: int

    pool_size: int

class rollnw.kernel.Objects
    The object system creates, serializes, and deserializes entities

```

**area**(*resref: str*) → *Area*

**creature**(*resref: str*) → *Creature*

**destroy**(*obj: ObjectHandle*) → None

Destroys an object and removes it from object system

**door**(*resref: str*) → *Door*

**encounter**(*resref: str*) → *Encounter*

**get**(*handle: ObjectHandle*)

Gets an object by its handle

**get\_by\_tag**(*tag: str, nth: int = 0*) → *ObjectBase* | None

Gets an object with specific tag

**placeable**(*resref: str*) → *Placeable*

**store**(*resref: str*) → *Store*

**trigger**(*resref: str*) → *Trigger*

**valid**(*handle: ObjectHandle*) → bool

Checks if an object handle is still valid

**waypoint**(*resref: str*) → *Waypoint*

**class** rollnw.kernel.**Resources**(*parent: Resources* | None)

Resources service

**class** rollnw.kernel.**Rules**

Rules service

**class** rollnw.kernel.**Strings**

Strings service

**class** rollnw.kernel.**TwoDACache**

2da cache

**get**(*name: str* | *Resource*) → *TwoDA* | None

Gets a cached twoda

rollnw.kernel.**config**()

Gets config service

rollnw.kernel.**effects**()

Gets effects service

rollnw.kernel.**load\_module**(*path: str, manifest: str*) → *Module*

Loads a module

#### Parameters

- **path** (*str*) – path to module, can be a directory (with module.ifo), a mod file, or a zip file
- **manifest** (*str*) – NWSynch manifest hash

rollnw.kernel.**objects**()

Gets objects service



`rollnw.kernel.resman()` → *Resources*

Gets resman service

`rollnw.kernel.rules()`

Gets rules service

`rollnw.kernel.start(options: ConfigOptions | None)`

Starts kernel services

**Parameters**

**config** (*rollnw.ConfigOptions* | *None*) – Optionally pass in configuration. Default behavior is to search for whatever NWN(:EE) install that it can find

`rollnw.kernel.strings()`

Gets strings service

`rollnw.kernel.unload_module()` → *None*

Unloads the currently loaded module

## 6.20 rollnw.model

**class** `rollnw.model.Mdl`

Implementation of ASCII Mdl file format

**static** `from_file(path)`

Loads mdl file from file path

**model:** *MdlModel*

The parsed model

**valid()**

Determines if file was successfully parsed

**class** `rollnw.model.MdlAABBEntry`

AABB Entry

**bmax:** *Vector3*

**bmin:** *Vector3*

**leaf\_face:** *int*

**plane:** *int*

**class** `rollnw.model.MdlAABBNode`

AABB model node

**entries:** *List[MdlAABBEntry]*

**class** `rollnw.model.MdlAnimation`

Class containing model animation

**anim\_root:** *str*

**events:** *List[MdlAnimationEvent]*

```
    length: float
    transition_time: float
class rollnw.model.MdlAnimationEvent
    Animation Event
    name: str
    time: float
class rollnw.model.MdlAnimeshNode
    Animated mesh node
    animtverts: List[Vector3]
    animverts: List[Vector3]
    sampleperiod: float
class rollnw.model.MdlCameraNode
    Camera node
enum rollnw.model.MdlClassification(value)
    Model classes
        Member Type
        int
    Valid values are as follows:
    invalid = <MdlClassification.invalid: 1>
    effect = <MdlClassification.effect: 2>
    tile = <MdlClassification.tile: 3>
    character = <MdlClassification.character: 4>
    door = <MdlClassification.door: 5>
    item = <MdlClassification.item: 6>
    gui = <MdlClassification.gui: 7>
class rollnw.model.MdlControllerKey
    Model controller
    columns: int
    data_offset: int
    is_key: bool
    key_offset: int
    name: str
    rows: int
    time_offset: int
```

```
    type: int
class rollnw.model.MdlControllerType
    Controller types
    alpha: ClassVar[int]
    alpha_end: ClassVar[int]
    alpha_mid: ClassVar[int]
    alpha_start: ClassVar[int]
    birthrate: ClassVar[int]
    blur_length: ClassVar[int]
    bounce_co: ClassVar[int]
    color: ClassVar[int]
    color_end: ClassVar[int]
    color_mid: ClassVar[int]
    color_start: ClassVar[int]
    combine_time: ClassVar[int]
    detonate: ClassVar[int]
    drag: ClassVar[int]
    fps: ClassVar[int]
    frame_end: ClassVar[int]
    frame_start: ClassVar[int]
    grav: ClassVar[int]
    life_exp: ClassVar[int]
    lightning_delay: ClassVar[int]
    lightning_radius: ClassVar[int]
    lightning_scale: ClassVar[int]
    lightning_subdiv: ClassVar[int]
    mass: ClassVar[int]
    multiplier: ClassVar[int]
    orientation: ClassVar[int]
    p2p_bezier2: ClassVar[int]
    p2p_bezier3: ClassVar[int]
```

```
particle_rot: ClassVar[int]
percent_end: ClassVar[int]
percent_mid: ClassVar[int]
percent_start: ClassVar[int]
position: ClassVar[int]
radius: ClassVar[int]
rand_vel: ClassVar[int]
scale: ClassVar[int]
self_illum_color: ClassVar[int]
shadow_radius: ClassVar[int]
size_end: ClassVar[int]
size_end_y: ClassVar[int]
size_mid: ClassVar[int]
size_mid_y: ClassVar[int]
size_start: ClassVar[int]
size_start_y: ClassVar[int]
spread: ClassVar[int]
threshold: ClassVar[int]
velocity: ClassVar[int]
vertical_displacement: ClassVar[int]
wirecolor: ClassVar[int]
xsize: ClassVar[int]
ysize: ClassVar[int]

class rollnw.model.MdlDanglymeshNode
    constraints: List[float]
    displacement: float
    period: float
    tightness: float

class rollnw.model.MdlDummyNode
    Dummy node

class rollnw.model.MdlEmitterNode
    Emitter node
```

```
blastlength: float
blastradius: float
blend: str
blend_sel: int
chunkname: str
deadspace: float
flags: int
loop: int
opacity: float
p2p_type: str
render: str
render_sel: int
renderorder: int
spawntype: int
spawntype_sel: int
texture: str
twosidedtex: int
update: str
update_sel: int
xgrid: int
ygrid: int

class rollnw.model.MdlFace
    Model face
    material_idx: int
    shader_group_idx: int
    tvert_idx: List[int]
    vert_idx: List[int]

class rollnw.model.MdlGeometry
    Class containing model geometry
    name: str
    type: int
```

**enum** rollnw.model.MdlGeometryFlag(*value*)

Geometry flags

**Member Type**

int

Valid values are as follows:

**geometry** = <MdlGeometryFlag.geometry: 1>

**model** = <MdlGeometryFlag.model: 2>

**animation** = <MdlGeometryFlag.animation: 3>

**binary** = <MdlGeometryFlag.binary: 4>

**enum** rollnw.model.MdlGeometryType(*value*)

Geometry types

**Member Type**

int

Valid values are as follows:

**geometry** = <MdlGeometryType.geometry: 1>

**model** = <MdlGeometryType.model: 2>

**animation** = <MdlGeometryType.animation: 3>

**class** rollnw.model.MdlLightNode

Light node

**affectdynamic:** int

**ambientonly:** int

**color:** *Vector3*

**dynamic:** bool

**fadinglight:** int

**flarecolorshifts:** List[*Vector3*]

**flarepositions:** List[float]

**flareradius:** float

**flaresizes:** List[float]

**generateflare:** int

**lensflares:** float

**lightpriority:** int

**multiplier:** float

**shadow:** int

```
    textures: List[str]

class rollnw.model.MdlModel
    A parsed model
    animation_count()
        Gets the number of animations
    animations()
        Gets an iterator of animations
    animationscale: float
    bmax: Vector3
    bmin: Vector3
    classification: int
    file_dependency: str
    get_animation(index: int)
        Gets an animation
    ignorefog: bool
    radius: float
    supermodel: Mdl | None
    supermodel_name: str

class rollnw.model.MdlNode
    Base Model Node
    children: List[MdlNode]

    get_controller(type: int, is_key: bool) → Tuple[MdlControllerKey, List[float], List[float]]
        Gets a controller key and times and key data



---


    Note: If not an animation, time will be empty


---



    inheritcolor: bool
    name: str
    parent: MdlNode
    type: int

class rollnw.model.MdlNodeFlags
    Model node flags
    aabb: ClassVar[int]
    anim: ClassVar[int]
    camera: ClassVar[int]
```

```
dangly: ClassVar[int]
emitter: ClassVar[int]
header: ClassVar[int]
light: ClassVar[int]
mesh: ClassVar[int]
patch: ClassVar[int]
reference: ClassVar[int]
skin: ClassVar[int]
class rollnw.model.MdlNodeType
    Model node types
    aabb: ClassVar[int]
    animmesh: ClassVar[int]
    camera: ClassVar[int]
    danglymesh: ClassVar[int]
    dummy: ClassVar[int]
    emitter: ClassVar[int]
    light: ClassVar[int]
    patch: ClassVar[int]
    reference: ClassVar[int]
    skin: ClassVar[int]
    trimesh: ClassVar[int]
class rollnw.model.MdlPatchNode
    Patch node
class rollnw.model.MdlReferenceNode
    Reference node
    reattachable: bool
    refmodel: str
class rollnw.model.MdlSkinNode
    Skin mesh node
    vertices: List[SkinVertex]
        List of vertex positions, texcoords, normals, tangents
```



```
enum rollnw.model.MdlTriangleMode(value)
```

Triangle mode

**Member Type**

int

Valid values are as follows:

```
triangle = <MdlTriangleMode.triangle: 1>
```

```
triangle_strip = <MdlTriangleMode.triangle_strip: 2>
```

```
class rollnw.model.MdlTrimeshNode
```

Trimesh Node

```
ambient: Vector3
```

```
beaming: bool
```

```
bitmap: str
```

```
bmax: Vector3
```

```
bmin: Vector3
```

```
center: Vector3
```

```
diffuse: Vector3
```

```
displtype: int
```

```
indices: List[int]
```

List of vertex indices

```
lightmapped: int
```

```
materialname: str
```

```
multimaterial: List[str]
```

```
render: bool
```

```
renderhint: str
```

```
rotatetexture: bool
```

```
shadow: bool
```

```
shininess: float
```

```
showdispl: bool
```

```
specular: Vector3
```

```
textures: List[str]
```

```
tilefade: int
```

```
transparencyhint: int
```

**vertices:** List[*Vertex*]

List of vertex positions, texcoords, normals, tangents

**class** rollnw.model.ModelEmitterFlag

Emitter flags

**affected\_by\_wind:** ClassVar[int]

**bounce:** ClassVar[int]

**inherit:** ClassVar[int]

**inherit\_local:** ClassVar[int]

**inherit\_part:** ClassVar[int]

**inherit\_vel:** ClassVar[int]

**is\_tinted:** ClassVar[int]

**p2p:** ClassVar[int]

**p2p\_sel:** ClassVar[int]

**random:** ClassVar[int]

**splat:** ClassVar[int]

**class** rollnw.model.SkinVertex

Skin Vertex data

**bones:** *IVector4*

**normal:** *Vector3*

**position:** *Vector3*

**tangent:** *Vector4*

**tex\_coords:** *Vector2*

**weights:** *Vector4*

**class** rollnw.model.Vertex

Vertex data

**normal:** *Vector3*

**position:** *Vector3*

**tangent:** *Vector3*

**tex\_coords:** *Vector2*

## 6.21 rollnw.nwn1

`rollnw.nwn1.attacks_per_second(obj: Creature, type, versus: ObjectBase) → float`

Number of attacks per second

`rollnw.nwn1.base_attack_bonus(obj: Creature) → int`

Calculates base attack bonus

`rollnw.nwn1.calculate_ac_versus(obj: ObjectBase, versus: ObjectBase | None = None, is_touch_attack: bool = False) → int`

Calculate Armor Class versus another object

`rollnw.nwn1.calculate_item_ac(obj: Item) → int`

Calculates the armor class of a piece of armor

`rollnw.nwn1.can_equip_item(obj: Creature, item: Item, slot: int)`

Determines if an item can be equipped

`rollnw.nwn1.can_use_monk_abilities(obj: Creature) → Tuple[bool, int]`

Determines if monk class abilities are usable and monk class level

`rollnw.nwn1.effect_ability_modifier(ability, modifier) → Effect`

Creates an ability modifier effect

`rollnw.nwn1.effect_armor_class_modifier(type, modifier) → Effect`

Creates an armor class modifier effect

`rollnw.nwn1.effect_attack_modifier(attack, modifier) → Effect`

Creates an attack modifier effect

`rollnw.nwn1.effect_haste() → Effect`

Creates a haste effect

`rollnw.nwn1.effect_skill_modifier(skill, modifier) → Effect`

Creates an skill modifier effect

`rollnw.nwn1.equip_index_to_attack_type(equip)`

Converts an equip index to an attack type

`rollnw.nwn1.equip_item(obj: Creature, item: Item, slot: int)`

Equip an item

`rollnw.nwn1.get_ability_modifier(obj: Creature, ability, base: bool = False) → int`

Gets creatures ability modifier

`rollnw.nwn1.get_ability_score(obj: Creature, ability, base: bool = False) → int`

Gets creatures ability score

`rollnw.nwn1.get_caster_level(obj: Creature, class_: int) → int`

Gets creatures caster level

`rollnw.nwn1.get_dex_modifier(obj: Creature) → int`

Gets creatures dexterity modifier as modified by armor, etc.

`rollnw.nwn1.get_equipped_item(obj: Creature, slot)`

Gets an equipped item

`rollnw.nwn1.get_skill_rank(obj: Creature, skill, versus=None, base=False)`

Determines creatures skill rank

`rollnw.nwn1.get_spell_dc(obj: Creature, class_: int, spell: int) → int`

Gets spell DC

`rollnw.nwn1.get_weapon_by_attack_type(obj: Creature, type) → Item`

Gets an equipped weapon by attack type

`rollnw.nwn1.is_flanked(target: Creature, attacker: Creature) → bool`

`rollnw.nwn1.is_ranged_weapon(item: Item) → bool`

Determines if weapon is ranged

`rollnw.nwn1.is_shield(baseitem) → bool`

Determines if item is a shield

`rollnw.nwn1.itemprop_ability_modifier(ability, modifier) → ItemProperty`

Creates ability modifier item property

`rollnw.nwn1.itemprop_armor_class_modifier(value) → ItemProperty`

Creates armor modifier item property

`rollnw.nwn1.itemprop_attack_modifier(value) → ItemProperty`

Creates attack modifier item property

`rollnw.nwn1.itemprop_enhancement_modifier(value) → ItemProperty`

Creates enhancement modifier item property

`rollnw.nwn1.itemprop_haste() → ItemProperty`

Creates haste item property

`rollnw.nwn1.itemprop_skill_modifier(skill, modifier) → ItemProperty`

Creates skill modifier item property

`rollnw.nwn1.queue_remove_effect_by(obj: ObjectBase, creator: ObjectHandle)`

Queues remove effect events by effect creator

`rollnw.nwn1.resolve_attack(obj: Creature, type, versus: ObjectBase)`

Resolves an attack

`rollnw.nwn1.resolve_attack_bonus(obj: Creature, type, versus: ObjectBase | None = None) → int`

Calculates attack bonus

`rollnw.nwn1.resolve_attack_damage(obj: Creature, versus: ObjectBase, data: AttackData) → int`

Resolves damage from an attack

`rollnw.nwn1.resolve_concealment(obj: ObjectBase, type, target: ObjectBase, vs_ranged: bool) → Tuple[int, bool]`

Resolves an concealment - i.e. the highest of concealment and miss chance

`rollnw.nwn1.resolve_critical_multiplier(obj: Creature, type, versus: ObjectBase | None = None) → int`

Resolves critical multiplier

`rollnw.nwn1.resolve_critical_threat(obj: Creature, type) → int`

Resolves critical multiplier

---

```
rollnw.nwn1.resolve_damage_immunity(obj: ObjectBase, dmg_type, versus: ObjectBase | None = None) →
    int
    Resolves damage immunity

rollnw.nwn1.resolve_damage_modifiers(obj: Creature, versus: ObjectBase, data: AttackData) → None
    Resolves resistance, immunity, and reduction

rollnw.nwn1.resolve_damage_reduction(obj: ObjectBase, power: int, versus: ObjectBase | None = None) →
    Tuple[int, Effect]
    Resolves damage reduction

rollnw.nwn1.resolve_damage_resistance(obj: ObjectBase, dmg_type, versus: ObjectBase | None = None) →
    Tuple[int, Effect]
    Resolves damage resistance

rollnw.nwn1.resolve_dual_wield_penalty(obj: Creature) → Tuple[int, int]
    Resolves dual wield attack bonus penalty

rollnw.nwn1.resolve_iteration_penalty(obj: Creature, attack_type)
    Resolves iteration attack bonus penalty

rollnw.nwn1.resolve_number_of_attacks(obj: Creature, offhand: bool = False) → Tuple[int, int]
    Calculates number of attacks

rollnw.nwn1.resolve_target_state(obj: Creature, versus: ObjectBase)
    Resolves damage from an attack

rollnw.nwn1.resolve_unarmed_damage(obj: Creature) → DiceRoll
    Resolves unarmed damage

rollnw.nwn1.resolve_weapon_damage(obj: Creature, weapon: Item) → DiceRoll
    Resolves weapon damage

rollnw.nwn1.resolve_weapon_power(obj: Creature, weapon: Item) → int
    Resolves weapon power

rollnw.nwn1.unequip_item(obj: Creature, slot: int)
    Unequips an item

rollnw.nwn1.weapon_is_finessable(obj: Creature, weapon: Item) → bool
    Determines if a weapon is finessable

rollnw.nwn1.weapon_iteration(obj: Creature, weapon: Item) → int
    Calculates weapon iteration, e.g. 5 or 3 for monk weapons
```

## 6.22 rollnw.script

```
class rollnw.script.AssignExpression
```

Assignment operation expression

```
lhs: VariableExpression | DotExpression
```

Expression being assigned to. Note that in a simple language like NWScript this can only be a variable expression or a dot expression (i.e. assigning a struct member)

**operator:** *NssToken*

The assignment operator, '=', '+=', etc, etc.

**rhs:** *Expression*

The expression being assigned

**class** rollnw.script.**Ast**

Class containing a parsed ast

**\_\_getitem\_\_**(*index: int*) → *Declaration*

Gets a toplevel declaration

**\_\_iter\_\_**() → Iterator[*Declaration*]

Gets an iterator of toplevel declarations

**\_\_len\_\_**() → int

Gets number of toplevel declarations

**comments**() → List[*Comment*]

Gets all comments in Ast

**defines:** dict[str, str]

Defines from #define directive. Only used in command script, i.e. nwscript.nss

**find\_comment**(*line*) → str

Finds first comment that the source range of which ends on line or line - 1

**includes:** List[*Include*]

Scripts that are included in the current script

**class** rollnw.script.**AstNode**

Base Ast Node class

**complete**(*needle: str*) → List[*Symbol*]

Find completions for any Ast Node

@note This function does not traverse dependencies

**class** rollnw.script.**BinaryExpression**

Binary operation expression

**lhs:** *Expression*

Lefthand side of the binary expression

**operator:** *NssToken*

The binary operator, '+', '-', etc, etc.

**rhs:** *Expression*

Righthand side of the binary expression

**class** rollnw.script.**BlockStatement**

Block statement

**range**

Range in source code

**Type**

*SourceRange*

```
__getitem__(idx: int) → Statement
    Gets a statement in the block

__iter__() → Iterator[Statement]
    Gets iterator of statements

__len__() → int
    Gets the number of statements

class rollnw.script.CallExpression
    Call operation expression

    __getitem__(idx: int) → Expression
        Gets an argument

    __iter__() → Iterator[Expression]
        Gets iterator of arguments

    __len__() → int
        Gets the number of arguments

    expr: Expression
        The expression prior to (...)

class rollnw.script.Comment
    Abstracts Comment

    __str__() → str
        Return str(self).

class rollnw.script.ComparisonExpression
    Comparison operation expression

    lhs: Expression
        Lefthand side of the Comparison expression

    operator: NssToken
        The Comparison operator, '==', '<', etc, etc.

    rhs: Expression
        Righthand side of the Comparison expression

class rollnw.script.ConditionalExpression
    Conditional operation expression

    false_branch: Statement
        The branch where test is False

    test: Expression
        The expression that is tested

    true_branch: Statement
        The branch where test is True

class rollnw.script.Context(include_paths: List[str] = [], command_script: str = 'nwscript')
    Provides a context for parsing a NWScript file

    Every context contains its own resource manager that has as a parent the global resource manager. Ultimately,
    this will be changed to each context having its own unique resource manager.
```

**Parameters**

- **include\_paths** (*[str]*, *optional*) – A list of include paths to load into internal resource manager. Default: [].
- **command\_script** (*str*, *optional*) – Command script to load. Default: “nwscript”.

**\_\_init\_\_** (*include\_paths: List[str] = [], command\_script: str = 'nwscript'*)

**add\_include\_path** (*path: str*)

Adds path to internal resman

**command\_script** () → *Nss* | None

Gets the command script for the current context

**get** (*resref: str, is\_command\_script: bool = False*) → *Nss* | None

Gets a script from the context’s internal resman

**class** rollnw.script.DeclList

**\_\_getitem\_\_** (*idx: int*) → *Declaration*

Gets a declaration

**\_\_iter\_\_** () → Iterator [*Declaration*]

Gets iterator of statements

**\_\_len\_\_** () → int

Gets the number of declarations

**class** rollnw.script.Declaration

Base Declaration class type

**identifier** () → str

Get declaration identifier

**class** rollnw.script.Diagnostic

Information for a script diagnostic

**location:** *SourceRange*

Source range in script

**message:** str

A helpful message

**script:** str

Name of script

**severity:** *DiagnosticSeverity*

The severity of the diagnostic

**type:** *DiagnosticType*

The type of the diagnostic

**enum** rollnw.script.DiagnosticSeverity (*value*)

**Member Type**

int

Valid values are as follows:



```

    error = <DiagnosticSeverity.error: 1>
    hint = <DiagnosticSeverity.hint: 2>
    information = <DiagnosticSeverity.information: 3>
    warning = <DiagnosticSeverity.warning: 4>
enum rollnw.script.DiagnosticType(value)
    Member Type
    int
Valid values are as follows:
    lexical = <DiagnosticType.lexical: 1>
    parse = <DiagnosticType.parse: 2>
    semantic = <DiagnosticType.semantic: 3>
class rollnw.script.DoStatement
    Do statement
    block: BlockStatement
        The do block statement
    test: Expression
        The test at the end of the block
class rollnw.script.DotExpression
    Dot operation expression
    lhs: VariableExpression | CallExpression
        In NWScript the only two possible expressions on the left hand of the dot are var_expr.var_expr or
        call_expr.var_expr
    rhs: VariableExpression
        The right hand side of a dot operator
class rollnw.script.EmptyExpression
    Empty expression only used in case of expression parsing erros
class rollnw.script.EmptyStatement
    Empty statement
class rollnw.script.ExprStatement
    Expression statement
    expr: Expression
        An expression
class rollnw.script.Expression
    Base Expression AST node
class rollnw.script.ForStatement
    For statement
    block: Statement
        While this is called block, any (single) statement can follow a for loop.

```

**increment:** *Expression* | None

An optional increment expression

**init:** *ASTNode* | None

An optional initialization. Normally this is a Declaration or just an expression

**test:** *Expression* | None

An optional expression that determines if the loop is to continue

**class** rollnw.script.FunctionDecl

Function declaration

**\_\_getitem\_\_**(idx: int) → *Declaration*

Gets a parameter

**\_\_iter\_\_**() → Iterator[*Declaration*]

Gets iterator of parameters

**\_\_len\_\_**() → int

Gets the number of parameters

**class** rollnw.script.FunctionDefinition

Function definition

**block:** *BlockStatement*

Block of the function

**decl:** *FunctionDecl*

Declaration of the function definition

**class** rollnw.script.GroupingExpression

Grouping operation expression

**expr:** *Expression*

Expression contained in the grouping parenthesis.

**class** rollnw.script.IfStatement

If statement

**false\_branch:** *Statement*

The optional branch where test is False

**test:** *Expression*

The expression that is tested

**true\_branch:** *Statement*

The branch where test is True

**class** rollnw.script.Include

Abstracts a script include

**location:** *SourceRange*

Source range in script

**resref:** str

Resref of included script

**script:** *Nss*  
Loaded script

**used:** *int*  
Number of times include is used in script file

**class** rollnw.script.**InlayHint**  
An inlay source code hint for an LSP

**message:** *str*  
Helpful message to display inline or a type, etc.

**position:** *SourcePosition*  
The position where the hint should be displayed

**class** rollnw.script.**JumpStatement**  
Jump statement

**expr:** *Expression* | *None*  
Optional expression when returning a value

**operator:** *NssToken*  
Token representing the jump statement (i.e. return, break, continue)

**class** rollnw.script.**LabelStatement**  
Label statement

**expr:** *Expression* | *None*  
Expression when label is a case.

**label:** *NssToken*  
Token representing the label statement (i.e. case, default)

**class** rollnw.script.**LiteralExpression**  
Literal expression

**data:** *int* | *str* | *float* | *Location*  
Data of the literal value

**literal:** *NssToken*  
Token of the literal value

**class** rollnw.script.**LiteralVectorExpression**  
Literal vector expression

**x:** *NssToken*  
Token representation for x value

**y:** *NssToken*  
Token representation for y value

**z:** *NssToken*  
Token representation for z value

**class** rollnw.script.**LogicalExpression**  
Logical operation expression

**lhs:** *Expression*

Lefthand side of the logical expression

**operator:** *NssToken*

The logical operator, '||', '&&', etc, etc.

**rhs:** *Expression*

Righthand side of the logical expression

**class** rollnw.script.Nss(path: str, ctx: *Context*, is\_command\_script: bool = False)

Implementation of nwscript

**\_\_init\_\_**(path: str, ctx: *Context*, is\_command\_script: bool = False)

Constructs Nss object

**ast**() → *Ast*

Gets the parsed script

**complete**(needle: str) → List[*Symbol*]

Generates a list of potential completions (excluding dependencies)

**complete\_at**(needle: str, line: int, character: int) → List[*Symbol*]

Get all completions (including dependencies)

**complete\_dot**(needle: str, line: int, character: int) → List[*Symbol*]

Get all completions for struct fields

**diagnostics**() → List[*Diagnostic*]

**errors**() → int

Gets number of errors encountered while parsing

**exports**() → List[*Symbol*]

Gets all of the scripts exports, i.e. top level declarations

**static from\_string**(string: str, ctx: *Context*, is\_command\_script: bool = False) → *Nss*

Loads Nss from string

**locate\_export**(is\_type: bool, search\_dependencies: bool = False) → *Symbol*

Locate export, i.e. a top level symbols

**locate\_symbol**(symbol: str, line: int, character: int) → *Symbol*

Locate symbol in source file

**name**() → str

Gets script's name

**parse**()

Parses the script

**process\_includes**()

Process includes and dependencies

**resolve**()

Resolves and type-checks Ast

**signature\_help**(line: int, character: int) → *SignatureHelp*

Gets signature help for a call expression that contains the provided position

---

```

view_from_range(range: SourceRange) → str
    Gets string view of the source at range

warnings() → int
    Gets number of errors encountered while parsing

class rollnw.script.NssLexer(script: str)
    A nwscript lexer

    __init__(script: str)
        Constructs lexer from a string

    current()
        Gets next token

    next()
        Gets next token

class rollnw.script.NssToken
    Nss token

    loc: SourceLocation
        The location of the token in a source file

    type: NssTokenType
        The type of the token

enum rollnw.script.NssTokenType(value)

    Member Type
        int

    Valid values are as follows:

    INVALID = <NssTokenType.INVALID: 1>

    END = <NssTokenType.END: 2>

    IDENTIFIER = <NssTokenType.IDENTIFIER: 3>

    LPAREN = <NssTokenType.LPAREN: 4>

    RPAREN = <NssTokenType.RPAREN: 5>

    LBRACE = <NssTokenType.LBRACE: 6>

    RBRACE = <NssTokenType.RBRACE: 7>

    LBRACKET = <NssTokenType.LBRACKET: 8>

    RBRACKET = <NssTokenType.RBRACKET: 9>

    COMMA = <NssTokenType.COMMA: 10>

    COLON = <NssTokenType.COLON: 11>

    QUESTION = <NssTokenType.QUESTION: 12>

    SEMICOLON = <NssTokenType.SEMICOLON: 13>

```

POUND = <NssTokenType.POUND: 14>  
DOT = <NssTokenType.DOT: 15>  
AND = <NssTokenType.AND: 16>  
ANDAND = <NssTokenType.ANDAND: 17>  
ANDEQ = <NssTokenType.ANDEQ: 18>  
DIV = <NssTokenType.DIV: 19>  
DIVEQ = <NssTokenType.DIVEQ: 20>  
EQ = <NssTokenType.EQ: 21>  
EQEQ = <NssTokenType.EQEQ: 22>  
GT = <NssTokenType.GT: 23>  
GTEQ = <NssTokenType.GTEQ: 24>  
LT = <NssTokenType.LT: 25>  
LTEQ = <NssTokenType.LTEQ: 26>  
MINUS = <NssTokenType.MINUS: 27>  
MINUSEQ = <NssTokenType.MINUSEQ: 28>  
MINUSMINUS = <NssTokenType.MINUSMINUS: 29>  
MOD = <NssTokenType.MOD: 30>  
MODEQ = <NssTokenType.MODEQ: 31>  
TIMES = <NssTokenType.TIMES: 32>  
TIMESEQ = <NssTokenType.TIMESEQ: 33>  
NOT = <NssTokenType.NOT: 34>  
NOTEQ = <NssTokenType.NOTEQ: 35>  
OR = <NssTokenType.OR: 36>  
OREQ = <NssTokenType.OREQ: 37>  
OROR = <NssTokenType.OROR: 38>  
PLUS = <NssTokenType.PLUS: 39>  
PLUSEQ = <NssTokenType.PLUSEQ: 40>  
PLUSPLUS = <NssTokenType.PLUSPLUS: 41>  
SL = <NssTokenType.SL: 42>  
SLEQ = <NssTokenType.SLEQ: 43>  
SR = <NssTokenType.SR: 44>

SREQ = <NssTokenType.SREQ: 45>  
TILDE = <NssTokenType.TILDE: 46>  
USR = <NssTokenType.USR: 47>  
USREQ = <NssTokenType.USREQ: 48>  
XOR = <NssTokenType.XOR: 49>  
XOREQ = <NssTokenType.XOREQ: 50>  
FLOAT\_CONST = <NssTokenType.FLOAT\_CONST: 51>  
INTEGER\_CONST = <NssTokenType.INTEGER\_CONST: 52>  
OBJECT\_INVALID\_CONST = <NssTokenType.OBJECT\_INVALID\_CONST: 53>  
OBJECT\_SELF\_CONST = <NssTokenType.OBJECT\_SELF\_CONST: 54>  
STRING\_CONST = <NssTokenType.STRING\_CONST: 55>  
STRING\_RAW\_CONST = <NssTokenType.STRING\_RAW\_CONST: 56>  
ACTION = <NssTokenType.ACTION: 57>  
BREAK = <NssTokenType.BREAK: 58>  
CASE = <NssTokenType.CASE: 59>  
CASSOWARY = <NssTokenType.CASSOWARY: 60>  
CONST = <NssTokenType.CONST: 61>  
CONTINUE = <NssTokenType.CONTINUE: 62>  
DEFAULT = <NssTokenType.DEFAULT: 63>  
DO = <NssTokenType.DO: 64>  
EFFECT = <NssTokenType.EFFECT: 65>  
ELSE = <NssTokenType.ELSE: 66>  
EVENT = <NssTokenType.EVENT: 67>  
FLOAT = <NssTokenType.FLOAT: 68>  
FOR = <NssTokenType.FOR: 69>  
IF = <NssTokenType.IF: 70>  
INT = <NssTokenType.INT: 71>  
ITEMPROPERTY = <NssTokenType.ITEMPROPERTY: 72>  
JSON = <NssTokenType.JSON: 73>  
LOCATION = <NssTokenType.LOCATION: 74>  
OBJECT = <NssTokenType.OBJECT: 75>

```
RETURN = <NssTokenType.RETURN: 76>
STRING = <NssTokenType.STRING: 77>
STRUCT = <NssTokenType.STRUCT: 78>
SQLQUERY = <NssTokenType.SQLQUERY: 79>
SWITCH = <NssTokenType.SWITCH: 80>
TALENT = <NssTokenType.TALENT: 81>
VECTOR = <NssTokenType.VECTOR: 82>
VOID = <NssTokenType.VOID: 83>
WHILE = <NssTokenType.WHILE: 84>
JSON_CONST = <NssTokenType.JSON_CONST: 85>
LOCATION_INVALID = <NssTokenType.LOCATION_INVALID: 86>
```

```
class rollnw.script.PostfixExpression
```

Postfix operation expression

**lhs:** *Expression*

Lefthand side of the postfix expression

**operator:** *NssToken*

The postix operator, ‘++’, ‘-’, etc.

```
class rollnw.script.SignatureHelp
```

Data required for providing Signature Help in an LSP

**active\_param:** *int*

The currently active parameter, i.e. where the cursor is in the parameter

**decl:** *Declaration*

The declaration for expr

**expr:** *CallExpression*

The current call expression

```
class rollnw.script.SourceLocation
```

Nss source location

**length()** → *int*

Length of the source location

**range:** *SourceRange*

Range in source code

**view()** → *str*

String view of the location

```
class rollnw.script.SourcePosition
```

Position in source code



```
column: int
    Starting column
line: int
    Starting line
class rollnw.script.SourceRange
    Range into the source code
end: SourcePosition
    End
start: SourcePosition
    Start
class rollnw.script.Statement
    Base statement class
class rollnw.script.StructDecl
    Struct declaration
    __getitem__(idx: int) → Declaration
        Gets a struct member declaration
    __iter__() → Iterator[Declaration]
        Gets iterator of statements
    __len__() → int
        Gets the number of struct members
class rollnw.script.SwitchStatement
    Switch statement
    block: BlockStatement
        The block of labels and stuff
    target: Expression
        The target expression for the switch
class rollnw.script.Symbol
    Info regarding a particular symbol somewhere in a source file
    comment: str
        Comment associated with the line the symbol is on or the line prior
    decl: Declaration
        The declaration of the symbol
    kind: SymbolKind
        The symbols kind, for use with an LSP
    node: AstNode | None
        The ast node where the symbol was found, if available
    provider: Nss
        The script in which the symbol was found
```

**type:** *str*

The symbols type as a string

**view:** *str*

A string view of the symbol in source

**enum** rollnw.script.**SymbolKind**(*value*)

Enum of different symbol kinds

**Member Type**

*int*

Valid values are as follows:

**variable** = <SymbolKind.variable: 1>

**function** = <SymbolKind.function: 2>

**type** = <SymbolKind.type: 3>

**param** = <SymbolKind.param: 4>

**field** = <SymbolKind.field: 5>

**class** rollnw.script.**UnaryExpression**

Unary operation expression

**operator:** *NssToken*

The postfix operator, '++', '--', etc.

**rhs:** *Expression*

Righthand side of the postfix expression

**class** rollnw.script.**VarDecl**

Variable declaration

**init:** *Expression* | *None*

An optional expression to initialize declaration

**class** rollnw.script.**VariableExpression**

Variable expression

**var:** *NssToken*

Token containing variable identifier

**class** rollnw.script.**WhileStatement**

While statement

**block:** *Statement*

While this is called block, any (single) statement can follow a for loop.

**test:** *Expression*

The expression that determines if the loop is to continue

## 6.23 are

```

all:
  ChanceLightning: int
  ChanceRain: int
  ChanceSnow: int
  Comments: string
  Creator_ID: int
  DayNightCycle: byte
  Expansion_List: # Obsolete
    - {}
  Flags: dword
  FogClipDist: float
  Height: int
  ID: int
  IsNight: byte
  LightingScheme: byte
  LoadScreenID: word
  ModListenCheck: int
  ModSpotCheck: int
  MoonAmbientColor: dword
  MoonDiffuseColor: dword
  MoonFogAmount: byte
  MoonFogColor: dword
  MoonShadows: byte
  Name: locstring
  NoRest: byte
  OnEnter: resref
  OnExit: resref
  OnHeartbeat: resref
  OnUserDefined: resref
  PlayerVsPlayer: byte
  ResRef: resref
  ShadowOpacity: byte
  SkyBox: byte
  SunAmbientColor: dword
  SunDiffuseColor: dword
  SunFogAmount: byte
  SunFogColor: dword
  SunShadows: byte
  Tag: string
  Tile_List:
    - $struct_id: 1
      Tile_AnimLoop1: byte
      Tile_AnimLoop2: byte
      Tile_AnimLoop3: byte
      Tile_Height: int
      Tile_ID: int
      Tile_MainLight1: byte
      Tile_MainLight2: byte
      Tile_Orientation: int
      Tile_SrcLight1: byte

```

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```

    Tile_SrcLight2: byte
    Tileset: resref
    Version: dword
    Width: int
    WindPower: int

```

## 6.24 bic

```

# [TODO] - A lot

instances:
    $inherit: utc.yaml
    Age: int
    LvlStatList:
        - $struct_id: 0
          EpicLevel: byte
          FeatList:
              - $struct_id: 0
                Feat: word
          KnownList{0-9}?:
              - $struct_id: 0
                Spell: word
          LvlStatAbility: byte?
          LvlStatClass: byte
          LvlStatHitDie: byte
          SkillList:
              - $struct_id: 0
                Rank: byte
          SkillPoints: word
    # Spells

```

## 6.25 dlg

```

all:
    DelayEntry: dword
    DelayReply: dword
    EndConverAbort: resref
    EndConversation: resref
    EntryList:
        - AnimLoop: byte
          Animation: dword
          Comment: cexostr
          Delay: dword
          Quest: cexostr
          RepliesList:
              - $struct_id: index
                Active: resref

```

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```

    Index: dword
    IsChild: byte
    LinkComment: cexostr
    Script: resref
    Sound: resref
    Speaker: cexostr
    Text: cexolocstr
NumWords: dword
PreventZoomIn: byte
ReplyList:
- $struct_id: index
  AnimLoop: byte
  Animation: dword
  Comment: cexostr
  Delay: dword
  EntriesList:
  - $struct_id: index
    Active: resref
    Index: dword
    IsChild: byte
    LinkComment: cexostr
  Quest: cexostr
  QuestEntry: dword
  Script: resref
  Sound: resref
  Text: cexolocstr
StartingList:
- $struct_id: index
  Active: resref
  Index: dword

```

## 6.26 fac

```

FactionList:
- $struct_id: index
  FactionGlobal: word
  FactionName: string
  FactionParentID: dword
ReplList:
- $struct_id: index
  FactionID1: dword
  FactionID2: dword
  FactionRep: dword

```

## 6.27 gic

```
Creature List:
- $struct_id: 4
  Comment: string
Door List:
- $struct_id: 8
  Comment: string
Encounter List:
- $struct_id: 7
  Comment: string
List:
- $struct_id: 0
  Comment: string
Placeable List:
- $struct_id: 9
  Comment: string
SoundList:
- $struct_id: 6
  Comment: string
  PlayInToolset: byte
StoreList:
- $struct_id: 11
  Comment: string
TriggerList:
- $struct_id: 1
  Comment: string
WaypointList:
- $struct_id: 5
  Comment: string
```

## 6.28 git

```
AreaProperties:
  $struct_id: 100
  AmbientSndDay: int
  AmbientSndDayVol: int
  AmbientSndNight: int
  AmbientSndNitVol: int
  EnvAudio: int
  MusicBattle: int
  MusicDay: int
  MusicDelay: int
  MusicNight: int
Creature List:
- $struct_id: 4
  utc.yml: instance
Door List:
- $struct_id: 8
  utd.yml: instance
```

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```

Encounter List:
- $struct_id: 7
  ute.yml: instance
List:
- $struct_id: 0
  uti.yml: instance
Placeable List:
- $struct_id: 9
  utp.yml: instance
SoundList:
- $struct_id: 6
  uts.yml: instance
StoreList:
- $struct_id: 11
  utm.yml: instance
TriggerList:
- $struct_id: 1
  utt.yml: instance
VarTable: variable.yml
WaypointList:
- $struct_id: 5
  utw.yml: instance

```

## 6.29 ifo

```

all:
  Expansion_Pack: word
  Mod_Area_list:
    - $struct_id: 6
      Area_Name: resref
  Mod_CacheNSSLList: # Obsolete
    - {}
  Mod_Creator_ID: int # Obsolete, always 2
  Mod_CustomTlk: string
  Mod_CutSceneList: # Obsolete
    - {}
  Mod_DawnHour: byte
  Mod_Description: locstring
  Mod_DuskHour: byte
  Mod_Entry_Area: resref
  Mod_Entry_Dir_X: float
  Mod_Entry_Dir_Y: float
  Mod_Entry_X: float
  Mod_Entry_Y: float
  Mod_Entry_Z: float
  Mod_Expan_List: # Obsolete
    - {}
  Mod_GVar_List: # Obsolete
    - {}
  Mod_HakList:

```

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```

- $struct_id: 8
  Mod_Hak: string
Mod_ID: void
Mod_IsSaveGame: byte
Mod_MinGameVer: string
Mod_MinPerHour: byte
Mod_Name: locstring
Mod_OnAcquirItem: resref
Mod_OnActvtItem: resref
Mod_OnClientEntr: resref
Mod_OnClientLeav: resref
Mod_OnCutsnAbort: resref
Mod_OnHeartbeat: resref
Mod_OnModLoad: resref
Mod_OnModStart: resref
Mod_OnPlrChat: resref
Mod_OnPlrDeath: resref
Mod_OnPlrDying: resref
Mod_OnPlrEqItm: resref
Mod_OnPlrLvlUp: resref
Mod_OnPlrRest: resref
Mod_OnPlrUnEqItm: resref
Mod_OnSpawnBtnDn: resref
Mod_OnUnAqreItem: resref
Mod_OnUsrDefined: resref
Mod_StartDay: byte
Mod_StartHour: byte
Mod_StartMonth: byte
Mod_StartMovie: resref
Mod_StartYear: dword
Mod_Tag: string
Mod_UUID: string
Mod_Version: dword
Mod_XPScale: byte
VarTable: vartable.yml

```

## 6.30 itp

```
# Note, this is not good
```

**MAIN:**

```

- $struct_id: 1
  ID: byte
  LIST:
    - $struct_id: 1
      CR: float
      FACTION: string
      ID: byte
      LIST:
        - $struct_id: 1

```

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```

    NAME: string
    RESREF: resref
    STRREF: dword
NAME: string
RESREF: resref
STRREF: dword
STRREF: dword

```

## 6.31 jrl

### Categories:

```

- $struct_id: index
  Comment: cexostr
  EntryList:
    - $struct_id: index
      End: word
      ID: dword
      Text: cexolocstr
  Name: cexolocstr
  Picture: word
  Priority: dword
  Tag: cexostr
  XP: dword

```

## 6.32 utc

### all:

```

Appearance_Head: byte
Appearance_Type: word
ArmorPart_RFoot: byte
BodyBag: byte
BodyPart_Belt: byte
BodyPart_LBicep: byte
BodyPart_LFArm: byte
BodyPart_LFoot: byte
BodyPart_LHand: byte
BodyPart_LShin: byte
BodyPart_LShoul: byte
BodyPart_LThigh: byte
BodyPart_Neck: byte
BodyPart_Pelvis: byte
BodyPart_RBicep: byte
BodyPart_RFArm: byte
BodyPart_RHand: byte
BodyPart_RShin: byte
BodyPart_RShoul: byte
BodyPart_RThigh: byte

```

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```
BodyPart_Torso: byte
CRAdjust: int
Cha: byte
ChallengeRating: float
ClassList:
- Class: int
  ClassLevel: short
  KnownList0:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList1:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList2:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList3:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList4:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList5:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList6:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList7:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList8:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  KnownList9:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  MemorizedList0:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
  MemorizedList1:
```

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```

    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList2:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList3:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList4:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList5:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList6:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList7:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList8:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
MemorizedList9:
    - Spell: word
      SpellFlags: byte
      SpellMetaMagic: byte
Color_Hair: byte
Color_Skin: byte
Color_Tattoo1: byte
Color_Tattoo2: byte
Con: byte
Conversation: resref
CurrentHitPoints: short
DecayTime: dword
Deity: cexostr
Description: cexolocstr
Dex: byte
Disarmable: byte
FactionID: word
FeatList:
    - Feat: word
FirstName: cexolocstr
Gender: byte

```

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```
GoodEvil: byte
HitPoints: short
Int: byte
Interruptable: byte
IsImmortal: byte
IsPC: byte
LastName: cexolocstr
LawfulChaotic: byte
Lootable: byte
MaxHitPoints: short
NaturalAC: byte
NoPermDeath: byte
PerceptionRange: byte
Phenotype: int
Plot: byte
PortraitId: word
Race: byte
ScriptAttacked: resref
ScriptDamaged: resref
ScriptDeath: resref
ScriptDialogue: resref
ScriptDisturbed: resref
ScriptEndRound: resref
ScriptHeartbeat: resref
ScriptOnBlocked: resref
ScriptOnNotice: resref
ScriptRested: resref
ScriptSpawn: resref
ScriptSpellAt: resref
ScriptUserDefine: resref
SkillList:
  - Rank: byte
SoundSetFile: word
SpecAbilityList:
  - Spell: word
    SpellCasterLevel: byte
    SpellFlags: byte
StartingPackage: byte
Str: byte
Subrace: cexostr
Tag: cexostr
Tail_New: dword # 1.69
TemplateList:
  - TemplateID: word
TemplateResRef: resref
VarTable: vartable.yml
WalkRate: int
Wings_New: dword # 1.69
Wis: byte
fortbonus: short
refbonus: short
willbonus: short
```

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```

blueprint:
  Comment: cexostr
  Equip_ItemList:
    - Dropable: byte
      EquippedRes: resref
  ItemList:
    - Dropable: byte
      InventoryRes: resref
      Pickpocketable: byte
      Repos_PosX: word
      Repos_Posy: word
  PaletteID: byte

instance:
  Equip_ItemList:
    - uti.yml: instance
      Dropable: byte
  ItemList:
    - uti.yml: instance
      Dropable: byte
      Pickpocketable: byte
      Repos_PosX: word
      Repos_Posy: word

```

## 6.33 utd

```

all:
  AnimationState: byte
  Appearance: dword
  AutoRemoveKey: byte
  CloseLockDC: byte
  Conversation: resref
  CurrentHP: short
  Description: cexolocstr
  DisarmDC: byte
  Faction: dword
  Fort: byte
  GenericType_New: dword # 1.69
  GenericType: byte # until 1.69
  HP: short
  Hardness: byte
  Interruptable: byte
  KeyName: string
  KeyRequired: byte
  LinkedTo: string
  LinkedToFlags: byte
  LoadScreenID: word
  LocName: cexolocstr
  Lockable: byte

```

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```

Locked: byte
OnClick: resref
OnClosed: resref
OnDamaged: resref
OnDeath: resref
OnDisarm: resref
OnFailToOpen: resref
OnHeartbeat: resref
OnLock: resref
OnMeleeAttacked: resref
OnOpen: resref
OnSpellCastAt: resref
OnTrapTriggered: resref
OnUnlock: resref
OnUserDefined: resref
OpenLockDC: byte
Plot: byte
PortraitId: word
Ref: byte
Tag: string
TemplateResRef: resref
TrapDetectDC: byte
TrapDetectable: byte
TrapDisarmable: byte
TrapFlag: byte
TrapOneShot: byte
TrapType: byte
VarTable: vartable.yml
Will: byte

blueprint:
  Comment: string
  PaletteID: byte

instance:
  Bearing: float
  X: float
  "Y": float
  Z: float

```

## 6.34 ute

```

all:
  Active: byte
  CreatureList:
    - $struct_id: 0
      Appearance: int
      CR: float
      ResRef: resref
      SingleSpawn: byte

```

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```

Difficulty: int
DifficultyIndex: int
Faction: dword
LocalizedName: cexolocstr
MaxCreatures: int
OnEntered: resref
OnExhausted: resref
OnExit: resref
OnHeartbeat: resref
OnUserDefined: resref
PlayerOnly: byte
RecCreatures: int
Reset: byte
ResetTime: int
Respawns: int
SpawnOption: int
Tag: cexostr
TemplateResRef: resref

blueprint:
  Comment: cexostr
  PaletteID: byte

instance:
  Geometry:
    - $struct_id: 1
      X: float
      "Y": float
      Z: float
  SpawnPointList:
    - $struct_id: 0
      Orientation: float
      X: float
      "Y": float
      Z: float
  XPosition: float
  YPosition: float
  ZPosition: float

```

## 6.35 uti

```

all:
  AddCost: dword
  ArmorPart_Belt: byte
  ArmorPart_LBicep: byte
  ArmorPart_LFArm: byte
  ArmorPart_LFoot: byte
  ArmorPart_LHand: byte
  ArmorPart_LShin: byte
  ArmorPart_LShoul: byte

```

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```

ArmorPart_LThigh: byte
ArmorPart_Neck: byte
ArmorPart_Pelvis: byte
ArmorPart_RBicep: byte
ArmorPart_RFarm: byte
ArmorPart_RFoot: byte
ArmorPart_RHand: byte
ArmorPart_RShin: byte
ArmorPart_RShoul: byte
ArmorPart_RThigh: byte
ArmorPart_Robe: byte
ArmorPart_Torso: byte
BaseItem: int
Charges: byte
Cloth1Color: byte
Cloth2Color: byte
Cost: dword
Cursed: byte
DescIdentified: locstring
Description: locstring
Identified: byte
Leather1Color: byte
Leather2Color: byte
LocalizedName: locstring
Metal1Color: byte
Metal2Color: byte
ModelPart1: byte
ModelPart2: byte
ModelPart3: byte
Plot: byte
PropertiesList:
- ChanceAppear: byte
  CostTable: byte
  CostValue: word
  Param1: byte
  Param1Value: byte
  PropertyName: word
  Subtype: word
StackSize: word
Stolen: byte
Tag: cexostr
TemplateResRef: resref
VarTable: vartable.yml

blueprint:
  Comment: cexostr
  PaletteID: byte

instance:
  XOrientation: float
  XPosition: float
  YOrientation: float

```

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```
YPosition: float
ZPosition: float
```

## 6.36 utm

```
all:
  BM_MarkDown: int
  BlackMarket: byte
  ID: byte
  IdentifyPrice: int
  LocName: locstring
  MarkDown: int
  MarkUp: int
  MaxBuyPrice: int
  OnOpenStore: resref
  OnStoreClosed: resref
  ResRef: resref
  StoreGold: int
  Tag: string
  VarTable: variable.yml
  WillNotBuy:
    - BaseItem: int
  WillOnlyBuy:
    - BaseItem: int

blueprint:
  Comment: string
  StoreList:
    - ItemList:
        - Infinite: byte
        InventoryRes: resref
        Repos_PosX: word
        Repos_Posy: word

instance:
  StoreList:
    - Comment: string
    ItemList:
      - uti.yml: instance
      Infinite: byte
      Repos_PosX: word
      Repos_Posy: word
  XOrientation: float
  XPosition: float
  YOrientation: float
  YPosition: float
  ZPosition: float
```

## 6.37 utp

```
all:
  AnimationState: byte
  Appearance: dword
  AutoRemoveKey: byte
  BodyBag: byte
  CloseLockDC: byte
  Conversation: resref
  CurrentHP: short
  Description: locstring
  DisarmDC: byte
  Faction: dword
  Fort: byte
  HP: short
  Hardness: byte
  HasInventory: byte
  Interruptable: byte
  KeyName: string
  KeyRequired: byte
  LocName: locstring
  Lockable: byte
  Locked: byte
  OnClick: resref
  OnClosed: resref
  OnDamaged: resref
  OnDeath: resref
  OnDisarm: resref
  OnHeartbeat: resref
  OnInvDisturbed: resref
  OnLock: resref
  OnMeleeAttacked: resref
  OnOpen: resref
  OnSpellCastAt: resref
  OnTrapTriggered: resref
  OnUnlock: resref
  OnUsed: resref
  OnUserDefined: resref
  OpenLockDC: byte
  Plot: byte
  PortraitId: word
  Ref: byte
  Static: byte
  Tag: string
  TemplateResRef: resref
  TrapDetectDC: byte
  TrapDetectable: byte
  TrapDisarmable: byte
  TrapFlag: byte
  TrapOneShot: byte
  TrapType: byte
  Type: byte
```

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```

Useable: byte
VarTable: vartable.yml
Will: byte

blueprint:
  Comment: string
  ItemList:
    - $struct_id: index
      InventoryRes: resref
      Repos_PosX: word
      Repos_Posy: word
  PaletteID: byte

instance:
  Bearing: float
  ItemList:
    - $struct_id: index
      uti.yml: instance
      Repos_PosX: word
      Repos_Posy: word
  X: float
  "Y": float
  Z: float

```

## 6.38 uts

```

all:
  Active: byte
  Continuous: byte
  Elevation: float
  Hours: dword
  Interval: dword
  IntervalVrtn: dword
  LocName: locstring
  Looping: byte
  MaxDistance: float
  MinDistance: float
  PitchVariation: float
  Positional: byte
  Priority: byte
  Random: byte
  RandomPosition: byte
  RandomRangeX: float
  RandomRangeY: float
  Sounds:
    - $struct_id: 0
      Sound: resref
  Tag: string
  TemplateResRef: resref
  Times: byte

```

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```

Volume: byte
VolumeVrtn: byte

blueprint:
  Comment: string
  PaletteID: byte

instance:
  GeneratedType: dword # Docs say byte, but GFFs say dword
  XPosition: float
  YPosition: float
  ZPosition: float

```

## 6.39 utt

```

all:
  AutoRemoveKey: byte # Obsolete
  Cursor: byte
  DisarmDC: byte
  Faction: dword
  HighlightHeight: float
  KeyName: string # Obsolete
  LinkedTo: string
  LinkedToFlags: byte
  LoadScreenID: word
  LocalizedName: locstring
  OnClick: resref
  OnDisarm: resref
  OnTrapTriggered: resref
  PortraitId: word
  ScriptHeartbeat: resref
  ScriptOnEnter: resref
  ScriptOnExit: resref
  ScriptUserDefine: resref
  Tag: string
  TemplateResRef: resref
  TrapDetectDC: byte
  TrapDetectable: byte
  TrapDisarmable: byte
  TrapFlag: byte
  TrapOneShot: byte
  TrapType: byte
  Type: int
  VarTable: vartable.yml

blueprint:
  Comment: string
  PaletteID: byte

instance:

```

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```

Geometry:
- $struct_id: 3
  PointX: float
  PointY: float
  PointZ: float
XOrientation: float
XPosition: float
YOrientation: float
YPosition: float
ZOrientation: float
ZPosition: float

```

## 6.40 utw

```

all:
  Appearance: byte
  Description: locstring
  HasMapNote: byte
  LinkedTo: string
  LocalizedName: locstring
  MapNote: locstring
  MapNoteEnabled: byte
  Tag: string
  TemplateResRef: resref
  VarTable: variable.yml

blueprint:
  Comment: string
  PaletteID: byte

instance:
  XOrientation: float
  XPosition: float
  YOrientation: float
  YPosition: float
  ZPosition: float

```

## 6.41 variable

```

VarTable:
- Name: string
  Type: dword
  Value: string|int|float|location|object # Not sure if any of the others are ever
↪ saved.

```



## PYTHON MODULE INDEX

### r

- `rollnw`, 305
- `rollnw.kernel`, 346
- `rollnw.model`, 349
- `rollnw.nwn1`, 359
- `rollnw.script`, 361





## Symbols

\_\_getitem\_\_() (rollnw.script.Ast method), 362  
 \_\_getitem\_\_() (rollnw.script.BlockStatement method), 362  
 \_\_getitem\_\_() (rollnw.script.CallExpression method), 363  
 \_\_getitem\_\_() (rollnw.script.DeclList method), 364  
 \_\_getitem\_\_() (rollnw.script.FunctionDecl method), 366  
 \_\_getitem\_\_() (rollnw.script.StructDecl method), 373  
 \_\_init\_\_() (rollnw.script.Context method), 364  
 \_\_init\_\_() (rollnw.script.Nss method), 368  
 \_\_init\_\_() (rollnw.script.NssLexer method), 369  
 \_\_iter\_\_() (rollnw.script.Ast method), 362  
 \_\_iter\_\_() (rollnw.script.BlockStatement method), 363  
 \_\_iter\_\_() (rollnw.script.CallExpression method), 363  
 \_\_iter\_\_() (rollnw.script.DeclList method), 364  
 \_\_iter\_\_() (rollnw.script.FunctionDecl method), 366  
 \_\_iter\_\_() (rollnw.script.StructDecl method), 373  
 \_\_len\_\_() (rollnw.script.Ast method), 362  
 \_\_len\_\_() (rollnw.script.BlockStatement method), 363  
 \_\_len\_\_() (rollnw.script.CallExpression method), 363  
 \_\_len\_\_() (rollnw.script.DeclList method), 364  
 \_\_len\_\_() (rollnw.script.FunctionDecl method), 366  
 \_\_len\_\_() (rollnw.script.StructDecl method), 373  
 \_\_str\_\_() (rollnw.script.Comment method), 363

## A

aabb (rollnw.model.MdlNodeFlags attribute), 355  
 aabb (rollnw.model.MdlNodeType attribute), 356  
 ability (rollnw.LevelUp attribute), 327  
 ac\_armor\_base (rollnw.CombatInfo attribute), 309  
 ac\_natural\_bonus (rollnw.CombatInfo attribute), 309  
 ac\_shield\_base (rollnw.CombatInfo attribute), 310  
 ACTION (rollnw.script.NssTokenType attribute), 371  
 activated (rollnw.PlaceableAnimationState attribute), 333  
 active (rollnw.Encounter attribute), 319  
 active (rollnw.Sound attribute), 339  
 active\_param (rollnw.script.SignatureHelp attribute), 372  
 add() (rollnw.Dialog method), 313

add() (rollnw.DialogPtr method), 315  
 add() (rollnw.Erf method), 321  
 add() (rollnw.LocString method), 327  
 add\_effect() (rollnw.kernel.EffectSystem method), 346  
 add\_feat() (rollnw.CreatureStats method), 313  
 add\_include\_path() (rollnw.script.Context method), 364  
 add\_itemprop() (rollnw.kernel.EffectSystem method), 346  
 add\_known\_spell() (rollnw.SpellBook method), 340  
 add\_memorized\_spell() (rollnw.SpellBook method), 340  
 add\_ptr() (rollnw.Dialog method), 313  
 add\_ptr() (rollnw.DialogPtr method), 315  
 add\_string() (rollnw.Dialog method), 313  
 add\_string() (rollnw.DialogPtr method), 315  
 additional\_cost (rollnw.Item attribute), 324  
 affectdynamic (rollnw.model.MdlLightNode attribute), 354  
 affected\_by\_wind (rollnw.model.ModelEmitterFlag attribute), 358  
 all() (rollnw.Container method), 310  
 alpha (rollnw.model.MdlControllerType attribute), 351  
 alpha\_end (rollnw.model.MdlControllerType attribute), 351  
 alpha\_mid (rollnw.model.MdlControllerType attribute), 351  
 alpha\_start (rollnw.model.MdlControllerType attribute), 351  
 ambient (rollnw.model.MdlTrimeshNode attribute), 357  
 ambientonly (rollnw.model.MdlLightNode attribute), 354  
 AND (rollnw.script.NssTokenType attribute), 370  
 ANDAND (rollnw.script.NssTokenType attribute), 370  
 ANDEQ (rollnw.script.NssTokenType attribute), 370  
 anim (rollnw.model.MdlNodeFlags attribute), 355  
 anim\_root (rollnw.model.MdlAnimation attribute), 349  
 animation (rollnw.DialogNode attribute), 314  
 animation (rollnw.model.MdlGeometryFlag attribute), 354  
 animation (rollnw.model.MdlGeometryType attribute), 354

- animation\_count() (rollnw.model.MdlModel method), 355  
 animation\_state (rollnw.Door attribute), 316  
 animation\_state (rollnw.Placeable attribute), 332  
 animations() (rollnw.model.MdlModel method), 355  
 animationscale (rollnw.model.MdlModel attribute), 355  
 animloop1 (rollnw.Tile attribute), 342  
 animloop2 (rollnw.Tile attribute), 342  
 animloop3 (rollnw.Tile attribute), 342  
 animmesh (rollnw.model.MdlNodeType attribute), 356  
 animtverts (rollnw.model.MdlAnimeshNode attribute), 350  
 animverts (rollnw.model.MdlAnimeshNode attribute), 350  
 Appearance (class in rollnw), 305  
 appearance (rollnw.Creature attribute), 311  
 appearance (rollnw.Door attribute), 316  
 appearance (rollnw.Placeable attribute), 332  
 appearance (rollnw.SpawnCreature attribute), 340  
 appearance (rollnw.Waypoint attribute), 345  
 apply() (rollnw.kernel.EffectSystem method), 346  
 are (rollnw.ResourceType attribute), 336  
 Area (class in rollnw), 306  
 area (rollnw.Location attribute), 329  
 area (rollnw.ObjectType attribute), 332  
 area() (rollnw.kernel.Objects method), 347  
 area\_count() (rollnw.Module method), 329  
 areaofeffect (rollnw.ObjectType attribute), 332  
 AreaScripts (class in rollnw), 307  
 AreaWeather (class in rollnw), 307  
 armor (rollnw.ItemModelType attribute), 325  
 armor (rollnw.Store attribute), 341  
 armor\_belt (rollnw.ItemModelParts attribute), 325  
 armor\_class (rollnw.AttackData attribute), 308  
 armor\_lbicep (rollnw.ItemModelParts attribute), 325  
 armor\_lfarm (rollnw.ItemModelParts attribute), 325  
 armor\_lfoot (rollnw.ItemModelParts attribute), 325  
 armor\_lhand (rollnw.ItemModelParts attribute), 325  
 armor\_lshin (rollnw.ItemModelParts attribute), 325  
 armor\_lshoul (rollnw.ItemModelParts attribute), 325  
 armor\_lthigh (rollnw.ItemModelParts attribute), 325  
 armor\_neck (rollnw.ItemModelParts attribute), 325  
 armor\_pelvis (rollnw.ItemModelParts attribute), 325  
 armor\_rbicep (rollnw.ItemModelParts attribute), 325  
 armor\_rfarm (rollnw.ItemModelParts attribute), 325  
 armor\_rfoot (rollnw.ItemModelParts attribute), 325  
 armor\_rhand (rollnw.ItemModelParts attribute), 325  
 armor\_robe (rollnw.ItemModelParts attribute), 325  
 armor\_rshin (rollnw.ItemModelParts attribute), 325  
 armor\_rshoul (rollnw.ItemModelParts attribute), 325  
 armor\_rthigh (rollnw.ItemModelParts attribute), 325  
 armor\_torso (rollnw.ItemModelParts attribute), 325  
 arms (rollnw.EquipIndex attribute), 320  
 arms (rollnw.EquipSlot attribute), 321  
 arrows (rollnw.EquipIndex attribute), 320  
 arrows (rollnw.EquipSlot attribute), 321  
 AssignExpression (class in rollnw.script), 361  
 Ast (class in rollnw.script), 362  
 ast() (rollnw.script.Nss method), 368  
 AstNode (class in rollnw.script), 362  
 attack\_bonus (rollnw.AttackData attribute), 308  
 attack\_roll (rollnw.AttackData attribute), 308  
 AttackData (class in rollnw), 308  
 attacker (rollnw.AttackData attribute), 308  
 attacks\_per\_second() (in module rollnw.nwn1), 359
- ## B
- bak (rollnw.ResourceType attribute), 338  
 base\_attack\_bonus() (in module rollnw.nwn1), 359  
 baseitem (rollnw.Item attribute), 324  
 beaming (rollnw.model.MdlTrimeshNode attribute), 357  
 belt (rollnw.BodyParts attribute), 309  
 belt (rollnw.EquipIndex attribute), 320  
 belt (rollnw.EquipSlot attribute), 321  
 bic (rollnw.ResourceType attribute), 337  
 bicep\_left (rollnw.BodyParts attribute), 309  
 bicep\_right (rollnw.BodyParts attribute), 309  
 bif (rollnw.ResourceType attribute), 339  
 bik (rollnw.ResourceType attribute), 338  
 binary (rollnw.model.MdlGeometryFlag attribute), 354  
 BinaryExpression (class in rollnw.script), 362  
 birthrate (rollnw.model.MdlControllerType attribute), 351  
 bitmap (rollnw.model.MdlTrimeshNode attribute), 357  
 blackmarket (rollnw.Store attribute), 341  
 blackmarket\_markdown (rollnw.Store attribute), 341  
 blastlength (rollnw.model.MdlEmitterNode attribute), 352  
 blastradius (rollnw.model.MdlEmitterNode attribute), 353  
 blend (rollnw.model.MdlEmitterNode attribute), 353  
 blend\_sel (rollnw.model.MdlEmitterNode attribute), 353  
 block (rollnw.script.DoStatement attribute), 365  
 block (rollnw.script.ForStatement attribute), 365  
 block (rollnw.script.FunctionDefinition attribute), 366  
 block (rollnw.script.SwitchStatement attribute), 373  
 block (rollnw.script.WhileStatement attribute), 374  
 BlockStatement (class in rollnw.script), 362  
 blur\_length (rollnw.model.MdlControllerType attribute), 351  
 bmax (rollnw.model.MdlAABBEntry attribute), 349  
 bmax (rollnw.model.MdlModel attribute), 355  
 bmax (rollnw.model.MdlTrimeshNode attribute), 357  
 bmin (rollnw.model.MdlAABBEntry attribute), 349  
 bmin (rollnw.model.MdlModel attribute), 355  
 bmin (rollnw.model.MdlTrimeshNode attribute), 357

bmp (*rollnw.ResourceType* attribute), 336  
 bmu (*rollnw.ResourceType* attribute), 336  
 body\_parts (*rollnw.Appearance* attribute), 305  
 bodybag (*rollnw.Creature* attribute), 311  
 bodybag (*rollnw.Placeable* attribute), 332  
 BodyParts (class in *rollnw*), 309  
 bolts (*rollnw.EquipIndex* attribute), 320  
 bolts (*rollnw.EquipSlot* attribute), 321  
 bones (*rollnw.model.SkinVertex* attribute), 358  
 bonus (*rollnw.DiceRoll* attribute), 316  
 boots (*rollnw.EquipIndex* attribute), 320  
 boots (*rollnw.EquipSlot* attribute), 321  
 bounce (*rollnw.model.ModelEmitterFlag* attribute), 358  
 bounce\_co (*rollnw.model.MdlControllerType* attribute), 351  
 bow (*rollnw.DialogAnimation* attribute), 314  
 BREAK (*rollnw.script.NssTokenType* attribute), 371  
 btc (*rollnw.ResourceType* attribute), 337  
 btd (*rollnw.ResourceType* attribute), 337  
 bte (*rollnw.ResourceType* attribute), 337  
 btg (*rollnw.ResourceType* attribute), 338  
 bti (*rollnw.ResourceType* attribute), 337  
 btm (*rollnw.ResourceType* attribute), 338  
 btp (*rollnw.ResourceType* attribute), 337  
 bts (*rollnw.ResourceType* attribute), 337  
 btt (*rollnw.ResourceType* attribute), 337  
 bullets (*rollnw.EquipIndex* attribute), 320  
 bullets (*rollnw.EquipSlot* attribute), 321

## C

caf (*rollnw.ResourceType* attribute), 339  
 calculate\_ac\_versus() (in module *rollnw.nwnI*), 359  
 calculate\_item\_ac() (in module *rollnw.nwnI*), 359  
 CallExpression (class in *rollnw.script*), 363  
 camera (*rollnw.model.MdlNodeFlags* attribute), 355  
 camera (*rollnw.model.MdlNodeType* attribute), 356  
 can\_equip\_item() (in module *rollnw.nwnI*), 359  
 can\_use\_monk\_abilities() (in module *rollnw.nwnI*), 359  
 CASE (*rollnw.script.NssTokenType* attribute), 371  
 CASSOWARY (*rollnw.script.NssTokenType* attribute), 371  
 category (*rollnw.EffectHandle* attribute), 319  
 ccs (*rollnw.ResourceType* attribute), 338  
 center (*rollnw.model.MdlTrimeshNode* attribute), 357  
 chance\_lightning (*rollnw.AreaWeather* attribute), 307  
 chance\_rain (*rollnw.AreaWeather* attribute), 307  
 chance\_snow (*rollnw.AreaWeather* attribute), 307  
 channels() (*rollnw.Image* method), 322  
 character (*rollnw.model.MdlClassification* attribute), 350  
 charges (*rollnw.Item* attribute), 324  
 chest (*rollnw.EquipIndex* attribute), 320  
 chest (*rollnw.EquipSlot* attribute), 321  
 children (*rollnw.model.MdlNode* attribute), 355  
 chinese\_simplified (*rollnw.LanguageID* attribute), 327  
 chinese\_traditional (*rollnw.LanguageID* attribute), 326  
 chunk\_death (*rollnw.Creature* attribute), 311  
 chunkname (*rollnw.model.MdlEmitterNode* attribute), 353  
 class\_ (*rollnw.LevelUp* attribute), 327  
 ClassEntry (class in *rollnw*), 309  
 classification (*rollnw.model.MdlModel* attribute), 355  
 clear() (*rollnw.Effect* method), 318  
 cloak (*rollnw.EquipIndex* attribute), 320  
 cloak (*rollnw.EquipSlot* attribute), 321  
 closed (*rollnw.DoorAnimationState* attribute), 317  
 closed (*rollnw.PlaceableAnimationState* attribute), 333  
 cloth1 (*rollnw.ItemColors* attribute), 324  
 cloth2 (*rollnw.ItemColors* attribute), 324  
 COLON (*rollnw.script.NssTokenType* attribute), 369  
 color (*rollnw.model.MdlControllerType* attribute), 351  
 color (*rollnw.model.MdlLightNode* attribute), 354  
 color (*rollnw.PlrPixel* attribute), 335  
 color\_end (*rollnw.model.MdlControllerType* attribute), 351  
 color\_mid (*rollnw.model.MdlControllerType* attribute), 351  
 color\_moon\_ambient (*rollnw.AreaWeather* attribute), 307  
 color\_moon\_diffuse (*rollnw.AreaWeather* attribute), 307  
 color\_moon\_fog (*rollnw.AreaWeather* attribute), 307  
 color\_start (*rollnw.model.MdlControllerType* attribute), 351  
 color\_sun\_ambient (*rollnw.AreaWeather* attribute), 307  
 color\_sun\_diffuse (*rollnw.AreaWeather* attribute), 307  
 color\_sun\_fog (*rollnw.AreaWeather* attribute), 307  
 colors (*rollnw.PlrColors* attribute), 334  
 column (*rollnw.script.SourcePosition* attribute), 372  
 columns (*rollnw.model.MdlControllerKey* attribute), 350  
 combat\_mode (*rollnw.CombatInfo* attribute), 310  
 CombatInfo (class in *rollnw*), 309  
 combine\_time (*rollnw.model.MdlControllerType* attribute), 351  
 COMMA (*rollnw.script.NssTokenType* attribute), 369  
 command\_script() (*rollnw.script.Context* method), 364  
 Comment (class in *rollnw.script*), 363  
 comment (*rollnw.Common* attribute), 310  
 comment (*rollnw.DialogNode* attribute), 314  
 comment (*rollnw.DialogPtr* attribute), 315  
 comment (*rollnw.script.Symbol* attribute), 373  
 comments (*rollnw.Area* attribute), 306  
 comments() (*rollnw.script.Ast* method), 362



Common (class in rollnw), 310  
 common (rollnw.Creature attribute), 311  
 common (rollnw.Placeable attribute), 332  
 common (rollnw.Sound attribute), 339  
 ComparisonExpression (class in rollnw.script), 363  
 complete() (rollnw.script.AstNode method), 362  
 complete() (rollnw.script.Nss method), 368  
 complete\_at() (rollnw.script.Nss method), 368  
 complete\_dot() (rollnw.script.Nss method), 368  
 composite (rollnw.ItemModelType attribute), 325  
 concealment (rollnw.AttackData attribute), 308  
 ConditionalExpression (class in rollnw.script), 363  
 Config (class in rollnw.kernel), 346  
 config() (in module rollnw.kernel), 348  
 ConfigOptions (class in rollnw.kernel), 346  
 CONST (rollnw.script.NssTokenType attribute), 371  
 constraints (rollnw.model.MdlDanglymeshNode attribute), 352  
 Container (class in rollnw), 310  
 container (rollnw.ResourceType attribute), 336  
 contains() (rollnw.Container method), 310  
 contains() (rollnw.LocString method), 327  
 Context (class in rollnw.script), 363  
 CONTINUE (rollnw.script.NssTokenType attribute), 371  
 continuous (rollnw.Sound attribute), 339  
 conversation (rollnw.Creature attribute), 311  
 conversation (rollnw.Door attribute), 316  
 conversation (rollnw.Placeable attribute), 332  
 copy() (rollnw.DialogNode method), 315  
 copy() (rollnw.DialogPtr method), 315  
 cost (rollnw.Item attribute), 324  
 cost\_table (rollnw.ItemProperty attribute), 325  
 cost\_value (rollnw.ItemProperty attribute), 326  
 cr (rollnw.Creature attribute), 311  
 cr (rollnw.SpawnCreature attribute), 340  
 cr\_adjust (rollnw.Creature attribute), 311  
 create() (rollnw.kernel.EffectSystem method), 347  
 creator (rollnw.EffectHandle attribute), 319  
 creator (rollnw.Module attribute), 329  
 creator\_id (rollnw.Area attribute), 306  
 Creature (class in rollnw), 311  
 creature (rollnw.ObjectType attribute), 332  
 creature() (rollnw.kernel.Objects method), 348  
 creature\_bite (rollnw.EquipIndex attribute), 320  
 creature\_bite (rollnw.EquipSlot attribute), 321  
 creature\_left (rollnw.EquipIndex attribute), 320  
 creature\_left (rollnw.EquipSlot attribute), 321  
 creature\_right (rollnw.EquipIndex attribute), 320  
 creature\_right (rollnw.EquipSlot attribute), 321  
 creature\_skin (rollnw.EquipIndex attribute), 320  
 creature\_skin (rollnw.EquipSlot attribute), 321  
 creatures (rollnw.Area attribute), 306  
 creatures (rollnw.Encounter attribute), 319  
 creatures\_max (rollnw.Encounter attribute), 319

creatures\_recommended (rollnw.Encounter attribute), 319  
 CreatureScripts (class in rollnw), 312  
 CreatureStats (class in rollnw), 313  
 css (rollnw.ResourceType attribute), 338  
 current() (rollnw.script.NssLexer method), 369  
 cursed (rollnw.Item attribute), 324  
 cursor (rollnw.Trigger attribute), 343

## D

dangly (rollnw.model.MdlNodeFlags attribute), 355  
 danglymesh (rollnw.model.MdlNodeType attribute), 356  
 dat (rollnw.ResourceType attribute), 338  
 data (rollnw.script.LiteralExpression attribute), 367  
 data() (rollnw.Image method), 323  
 data\_offset (rollnw.model.MdlControllerKey attribute), 350  
 dawn\_hour (rollnw.Module attribute), 329  
 day\_night\_cycle (rollnw.AreaWeather attribute), 307  
 dds (rollnw.ResourceType attribute), 337  
 deactivated (rollnw.PlaceableAnimationState attribute), 333  
 deadspace (rollnw.model.MdlEmitterNode attribute), 353  
 decay\_time (rollnw.Creature attribute), 311  
 decl (rollnw.script.FunctionDefinition attribute), 366  
 decl (rollnw.script.SignatureHelp attribute), 372  
 decl (rollnw.script.Symbol attribute), 373  
 Declaration (class in rollnw.script), 364  
 DeclList (class in rollnw.script), 364  
 decode\_plt\_color() (in module rollnw), 345  
 default (rollnw.DialogAnimation attribute), 314  
 DEFAULT (rollnw.script.NssTokenType attribute), 371  
 DEFINE\_ENUM\_FLAGS (C macro), 252  
 defines (rollnw.script.Ast attribute), 362  
 deity (rollnw.Creature attribute), 311  
 delay (rollnw.DialogNode attribute), 315  
 delay\_entry (rollnw.Dialog attribute), 313  
 delay\_reply (rollnw.Dialog attribute), 313  
 delete\_float() (rollnw.LocalData method), 328  
 delete\_int() (rollnw.LocalData method), 328  
 delete\_location() (rollnw.LocalData method), 328  
 delete\_object() (rollnw.LocalData method), 328  
 delete\_ptr() (rollnw.Dialog method), 313  
 delete\_string() (rollnw.LocalData method), 328  
 demand() (rollnw.Container method), 310  
 description (rollnw.Creature attribute), 311  
 description (rollnw.Door attribute), 316  
 description (rollnw.Item attribute), 324  
 description (rollnw.Module attribute), 329  
 description (rollnw.Placeable attribute), 332  
 description (rollnw.Waypoint attribute), 345  
 description\_id (rollnw.Item attribute), 324  
 destroy() (rollnw.kernel.EffectSystem method), 347

- destroy() (*rollnw.kernel.Objects method*), 348  
 destroyed (*rollnw.PlaceableAnimationState attribute*), 333  
 detect\_dc (*rollnw.Trap attribute*), 343  
 detectable (*rollnw.Trap attribute*), 343  
 detonate (*rollnw.model.MdlControllerType attribute*), 351  
 dft (*rollnw.ResourceType attribute*), 337  
 Diagnostic (*class in rollnw.script*), 364  
 diagnostics() (*rollnw.script.Nss method*), 368  
 Dialog (*class in rollnw*), 313  
 DialogNode (*class in rollnw*), 314  
 DialogPtr (*class in rollnw*), 315  
 dice (*rollnw.DiceRoll attribute*), 316  
 DiceRoll (*class in rollnw*), 316  
 difficulty (*rollnw.Encounter attribute*), 319  
 difficulty\_index (*rollnw.Encounter attribute*), 319  
 diffuse (*rollnw.model.MdlTrimeshNode attribute*), 357  
 Directory (*class in rollnw*), 316  
 disarm\_dc (*rollnw.Trap attribute*), 343  
 disarmable (*rollnw.Creature attribute*), 311  
 disarmable (*rollnw.Trap attribute*), 343  
 displacement (*rollnw.model.MdlDanglymeshNode attribute*), 352  
 displtype (*rollnw.model.MdlTrimeshNode attribute*), 357  
 distance\_max (*rollnw.Sound attribute*), 339  
 distance\_min (*rollnw.Sound attribute*), 339  
 DIV (*rollnw.script.NssTokenType attribute*), 370  
 DIVEQ (*rollnw.script.NssTokenType attribute*), 370  
 dlg (*rollnw.ResourceType attribute*), 337  
 DO (*rollnw.script.NssTokenType attribute*), 371  
 Door (*class in rollnw*), 316  
 door (*rollnw.model.MdlClassification attribute*), 350  
 door (*rollnw.ObjectType attribute*), 332  
 door() (*rollnw.kernel.Objects method*), 348  
 doors (*rollnw.Area attribute*), 306  
 DoorScripts (*class in rollnw*), 317  
 DoStatement (*class in rollnw.script*), 365  
 DOT (*rollnw.script.NssTokenType attribute*), 370  
 DotExpression (*class in rollnw.script*), 365  
 drag (*rollnw.model.MdlControllerType attribute*), 351  
 drink (*rollnw.DialogAnimation attribute*), 314  
 dummy (*rollnw.model.MdlNodeType attribute*), 356  
 dusk\_hour (*rollnw.Module attribute*), 329  
 dwk (*rollnw.ResourceType attribute*), 338  
 dynamic (*rollnw.model.MdlLightNode attribute*), 354
- ## E
- Effect (*class in rollnw*), 318  
 effect (*rollnw.EffectHandle attribute*), 319  
 effect (*rollnw.model.MdlClassification attribute*), 350  
 EFFECT (*rollnw.script.NssTokenType attribute*), 371  
 effect\_ability\_modifier() (*in module rollnw.nwn1*), 359  
 effect\_armor\_class\_modifier() (*in module rollnw.nwn1*), 359  
 effect\_attack\_modifier() (*in module rollnw.nwn1*), 359  
 effect\_haste() (*in module rollnw.nwn1*), 359  
 effect\_limits\_ability() (*rollnw.kernel.EffectSystem method*), 347  
 effect\_limits\_armor\_class() (*rollnw.kernel.EffectSystem method*), 347  
 effect\_limits\_attack() (*rollnw.kernel.EffectSystem method*), 347  
 effect\_limits\_skill() (*rollnw.kernel.EffectSystem method*), 347  
 effect\_skill\_modifier() (*in module rollnw.nwn1*), 359  
 EffectHandle (*class in rollnw*), 319  
 EffectID (*class in rollnw*), 319  
 effects() (*in module rollnw.kernel*), 348  
 EffectSystem (*class in rollnw.kernel*), 346  
 EffectSystemStats (*class in rollnw.kernel*), 347  
 elevation (*rollnw.Sound attribute*), 339  
 ELSE (*rollnw.script.NssTokenType attribute*), 371  
 emitter (*rollnw.model.MdlNodeFlags attribute*), 356  
 emitter (*rollnw.model.MdlNodeType attribute*), 356  
 empower (*rollnw.SpellMetaMagic attribute*), 341  
 EmptyExpression (*class in rollnw.script*), 365  
 EmptyStatement (*class in rollnw.script*), 365  
 encoding() (*rollnw.Language static method*), 326  
 Encounter (*class in rollnw*), 319  
 encounter (*rollnw.ObjectType attribute*), 332  
 encounter() (*rollnw.kernel.Objects method*), 348  
 encounters (*rollnw.Area attribute*), 306  
 EncounterScripts (*class in rollnw*), 320  
 END (*rollnw.script.NssTokenType attribute*), 369  
 end (*rollnw.script.SourceRange attribute*), 373  
 english (*rollnw.LanguageID attribute*), 326  
 entries (*rollnw.LevelHistory attribute*), 327  
 entries (*rollnw.LevelStats attribute*), 327  
 entries (*rollnw.model.MdlAABBNode attribute*), 349  
 entry (*rollnw.DialogNodeType attribute*), 315  
 entry\_area (*rollnw.Module attribute*), 329  
 entry\_orientation (*rollnw.Module attribute*), 329  
 entry\_position (*rollnw.Module attribute*), 329  
 epic (*rollnw.LevelUp attribute*), 327  
 EQ (*rollnw.script.NssTokenType attribute*), 370  
 EQEQ (*rollnw.script.NssTokenType attribute*), 370  
 equip\_index\_to\_attack\_type() (*in module rollnw.nwn1*), 359  
 equip\_item() (*in module rollnw.nwn1*), 359  
 equipment (*rollnw.Creature property*), 311  
 Equips (*class in rollnw*), 321  
 equips (*rollnw.Equips attribute*), 321

erase() (*rollnw.Erf* method), 322  
 Erf (class in *rollnw*), 321  
 erf (*rollnw.ResourceType* attribute), 339  
 error (*rollnw.script.DiagnosticSeverity* attribute), 364  
 errors() (*rollnw.script.Nss* method), 368  
 EVENT (*rollnw.script.NssTokenType* attribute), 371  
 events (*rollnw.model.MdlAnimation* attribute), 349  
 expansion\_pack (*rollnw.Module* attribute), 329  
 exports() (*rollnw.script.Nss* method), 368  
 expr (*rollnw.script.CallExpression* attribute), 363  
 expr (*rollnw.script.ExprStatement* attribute), 365  
 expr (*rollnw.script.GroupingExpression* attribute), 366  
 expr (*rollnw.script.JumpStatement* attribute), 367  
 expr (*rollnw.script.LabelStatement* attribute), 367  
 expr (*rollnw.script.SignatureHelp* attribute), 372  
 Expression (class in *rollnw.script*), 365  
 ExprStatement (class in *rollnw.script*), 365  
 extend (*rollnw.SpellMetaMagic* attribute), 341  
 extract() (*rollnw.Container* method), 310  
 extract\_by\_glob() (*rollnw.Container* method), 310  
 extraordinary (*rollnw.EffectCategory* attribute), 318

## F

fac (*rollnw.ResourceType* attribute), 337  
 faction (*rollnw.Door* attribute), 316  
 faction (*rollnw.Encounter* attribute), 319  
 faction (*rollnw.Placeable* attribute), 332  
 faction (*rollnw.Trigger* attribute), 343  
 faction\_id (*rollnw.Creature* attribute), 311  
 fadinglight (*rollnw.model.MdlLightNode* attribute), 354  
 false\_branch (*rollnw.script.ConditionalExpression* attribute), 363  
 false\_branch (*rollnw.script.IfStatement* attribute), 366  
 feats (*rollnw.LevelUp* attribute), 327  
 field (*rollnw.script.SymbolKind* attribute), 374  
 file\_dependency (*rollnw.model.MdlModel* attribute), 355  
 filename() (*rollnw.Resource* method), 335  
 find\_comment() (*rollnw.script.Ast* method), 362  
 flags (*rollnw.Area* attribute), 306  
 flags (*rollnw.model.MdlEmitterNode* attribute), 353  
 flags (*rollnw.SpecialAbility* attribute), 340  
 flags (*rollnw.SpellEntry* attribute), 341  
 flarecolorshifts (*rollnw.model.MdlLightNode* attribute), 354  
 flarepositions (*rollnw.model.MdlLightNode* attribute), 354  
 flareradius (*rollnw.model.MdlLightNode* attribute), 354  
 flaresizes (*rollnw.model.MdlLightNode* attribute), 354  
 FLOAT (*rollnw.script.NssTokenType* attribute), 371  
 FLOAT\_CONST (*rollnw.script.NssTokenType* attribute), 371

fnt (*rollnw.ResourceType* attribute), 336  
 fog\_clip\_distance (*rollnw.AreaWeather* attribute), 307  
 fog\_moon\_amount (*rollnw.AreaWeather* attribute), 307  
 fog\_sun\_amount (*rollnw.AreaWeather* attribute), 307  
 foot\_left (*rollnw.BodyParts* attribute), 309  
 foot\_right (*rollnw.BodyParts* attribute), 309  
 FOR (*rollnw.script.NssTokenType* attribute), 371  
 forearm\_left (*rollnw.BodyParts* attribute), 309  
 forearm\_right (*rollnw.BodyParts* attribute), 309  
 ForStatement (class in *rollnw.script*), 365  
 fort (*rollnw.Saves* attribute), 339  
 fourpc (*rollnw.ResourceType* attribute), 338  
 fps (*rollnw.model.MdlControllerType* attribute), 351  
 frame\_end (*rollnw.model.MdlControllerType* attribute), 351  
 frame\_start (*rollnw.model.MdlControllerType* attribute), 351  
 free\_list\_size (*rollnw.kernel.EffectSystemStats* attribute), 347  
 french (*rollnw.LanguageID* attribute), 326  
 from\_dict() (*rollnw.Creature* static method), 311  
 from\_dict() (*rollnw.Door* static method), 316  
 from\_dict() (*rollnw.Encounter* static method), 319  
 from\_dict() (*rollnw.Item* static method), 324  
 from\_dict() (*rollnw.LocString* static method), 328  
 from\_dict() (*rollnw.Placeable* static method), 332  
 from\_dict() (*rollnw.Sound* static method), 339  
 from\_dict() (*rollnw.Store* static method), 341  
 from\_dict() (*rollnw.Trigger* static method), 343  
 from\_dict() (*rollnw.Waypoint* static method), 345  
 from\_file() (*rollnw.Creature* static method), 311  
 from\_file() (*rollnw.Dialog* static method), 313  
 from\_file() (*rollnw.Door* static method), 316  
 from\_file() (*rollnw.Encounter* static method), 319  
 from\_file() (*rollnw.Item* static method), 324  
 from\_file() (*rollnw.model.Mdl* static method), 349  
 from\_file() (*rollnw.Placeable* static method), 332  
 from\_file() (*rollnw.Sound* static method), 339  
 from\_file() (*rollnw.Store* static method), 342  
 from\_file() (*rollnw.Trigger* static method), 343  
 from\_file() (*rollnw.Waypoint* static method), 345  
 from\_filename() (*rollnw.Resource* static method), 335  
 from\_string() (*rollnw.Language* static method), 326  
 from\_string() (*rollnw.script.Nss* static method), 368  
 function (*rollnw.script.SymbolKind* attribute), 374  
 FunctionDecl (class in *rollnw.script*), 366  
 FunctionDefinition (class in *rollnw.script*), 366

## G

gender (*rollnw.Creature* attribute), 311  
 generated\_type (*rollnw.Sound* attribute), 339  
 generateflare (*rollnw.model.MdlLightNode* attribute), 354



- generic\_type (rollnw.Door attribute), 317  
 geometry (rollnw.Encounter attribute), 319  
 geometry (rollnw.model.MdlGeometryFlag attribute), 354  
 geometry (rollnw.model.MdlGeometryType attribute), 354  
 geometry (rollnw.Trigger attribute), 344  
 german (rollnw.LanguageID attribute), 326  
 get() (rollnw.kernel.Objects method), 348  
 get() (rollnw.kernel.TwoDACCACHE method), 348  
 get() (rollnw.LocString method), 328  
 get() (rollnw.NWSync method), 331  
 get() (rollnw.script.Context method), 364  
 get() (rollnw.Tlk method), 343  
 get() (rollnw.TwoDA method), 344  
 get\_ability\_modifier() (in module rollnw.nwn1), 359  
 get\_ability\_score() (in module rollnw.nwn1), 359  
 get\_ability\_score() (rollnw.CreatureStats method), 313  
 get\_action\_param() (rollnw.DialogNode method), 315  
 get\_animation() (rollnw.model.MdlModel method), 355  
 get\_area() (rollnw.Module method), 329  
 get\_by\_tag() (rollnw.kernel.Objects method), 348  
 get\_caster\_level() (in module rollnw.nwn1), 359  
 get\_condition\_param() (rollnw.DialogPtr method), 316  
 get\_controller() (rollnw.model.MdlNode method), 355  
 get\_dex\_modifier() (in module rollnw.nwn1), 359  
 get\_equipped\_item() (in module rollnw.nwn1), 359  
 get\_float() (rollnw.Effect method), 318  
 get\_float() (rollnw.Ini method), 323  
 get\_float() (rollnw.LocalData method), 328  
 get\_int() (rollnw.Effect method), 318  
 get\_int() (rollnw.Ini method), 323  
 get\_int() (rollnw.LocalData method), 328  
 get\_known\_spell() (rollnw.SpellBook method), 340  
 get\_known\_spell\_count() (rollnw.SpellBook method), 341  
 get\_location() (rollnw.LocalData method), 328  
 get\_memorized\_spell() (rollnw.SpellBook method), 341  
 get\_memorized\_spell\_count() (rollnw.SpellBook method), 341  
 get\_object() (rollnw.LocalData method), 328  
 get\_skill\_rank() (in module rollnw.nwn1), 359  
 get\_skill\_rank() (rollnw.CreatureStats method), 313  
 get\_spell\_dc() (in module rollnw.nwn1), 360  
 get\_str() (rollnw.Ini method), 323  
 get\_string() (rollnw.Effect method), 318  
 get\_string() (rollnw.LocalData method), 328  
 get\_weapon\_by\_attack\_type() (in module rollnw.nwn1), 360  
 gff (rollnw.ResourceType attribute), 337  
 gff\_archive (rollnw.ResourceType attribute), 336  
 gic (rollnw.ResourceType attribute), 337  
 gif (rollnw.ResourceType attribute), 339  
 git (rollnw.ResourceType attribute), 337  
 gold (rollnw.Store attribute), 342  
 good\_evil (rollnw.Creature attribute), 311  
 grav (rollnw.model.MdlControllerType attribute), 351  
 greeting (rollnw.DialogAnimation attribute), 314  
 GroupingExpression (class in rollnw.script), 366  
 GT (rollnw.script.NssTokenType attribute), 370  
 GTEQ (rollnw.script.NssTokenType attribute), 370  
 gui (rollnw.model.MdlClassification attribute), 350  
 gui (rollnw.ObjectType attribute), 332  
 gui (rollnw.ResourceType attribute), 337
- ## H
- hair (rollnw.Appearance attribute), 305  
 hak (rollnw.ResourceType attribute), 338  
 haks (rollnw.Module attribute), 330  
 hand\_left (rollnw.BodyParts attribute), 309  
 hand\_right (rollnw.BodyParts attribute), 309  
 handle() (rollnw.Effect method), 318  
 handle() (rollnw.ObjectBase method), 331  
 hardness (rollnw.Door attribute), 317  
 hardness (rollnw.Placeable attribute), 332  
 has\_feat() (rollnw.CreatureStats method), 313  
 has\_feminine() (rollnw.Language static method), 326  
 has\_inventory (rollnw.Placeable attribute), 333  
 has\_map\_note (rollnw.Waypoint attribute), 345  
 head (rollnw.BodyParts attribute), 309  
 head (rollnw.EquipIndex attribute), 320  
 head (rollnw.EquipSlot attribute), 321  
 header (rollnw.model.MdlNodeFlags attribute), 356  
 height (rollnw.Area attribute), 306  
 height (rollnw.Tile attribute), 342  
 height() (rollnw.Image method), 323  
 height() (rollnw.Placement method), 334  
 highlight\_height (rollnw.Trigger attribute), 344  
 hint (rollnw.script.DiagnosticSeverity attribute), 365  
 history (rollnw.Creature property), 311  
 hit\_by\_auto\_success (rollnw.AttackResult attribute), 308  
 hit\_by\_critical (rollnw.AttackResult attribute), 308  
 hit\_by\_roll (rollnw.AttackResult attribute), 308  
 hitpoints (rollnw.LevelUp attribute), 327  
 hours (rollnw.Sound attribute), 339  
 hp (rollnw.Creature attribute), 311  
 hp (rollnw.Door attribute), 317  
 hp (rollnw.Placeable attribute), 333  
 hp\_current (rollnw.Creature attribute), 311  
 hp\_current (rollnw.Door attribute), 317

hp\_current (*rollnw.Placeable* attribute), 333

hp\_max (*rollnw.Creature* attribute), 311

I

id (*rollnw.Appearance* attribute), 305

id (*rollnw.Area* attribute), 306

id (*rollnw.ClassEntry* attribute), 309

id (*rollnw.Module* attribute), 330

id (*rollnw.ObjectHandle* attribute), 331

id (*rollnw.Tile* attribute), 342

id() (*rollnw.Effect* method), 318

identified (*rollnw.Item* attribute), 324

IDENTIFIER (*rollnw.script.NssTokenType* attribute), 369

identifier() (*rollnw.script.Declaration* method), 364

identify\_price (*rollnw.Store* attribute), 342

ids (*rollnw.ResourceType* attribute), 339

IF (*rollnw.script.NssTokenType* attribute), 371

ifo (*rollnw.ResourceType* attribute), 337

IfStatement (class in *rollnw.script*), 366

ignorefog (*rollnw.model.MdlModel* attribute), 355

Image (class in *rollnw*), 322

immortal (*rollnw.Creature* attribute), 311

Include (class in *rollnw.script*), 366

include\_install (*rollnw.kernel.ConfigOptions* attribute), 346

include\_nwsync (*rollnw.kernel.ConfigOptions* attribute), 346

include\_user (*rollnw.kernel.ConfigOptions* attribute), 346

includes (*rollnw.script.Ast* attribute), 362

increment (*rollnw.script.ForStatement* attribute), 365

index (*rollnw.EffectID* attribute), 319

indices (*rollnw.model.MdlTrimeshNode* attribute), 357

infinite (*rollnw.InventoryItem* attribute), 323

information (*rollnw.script.DiagnosticSeverity* attribute), 365

inherit (*rollnw.model.ModelEmitterFlag* attribute), 358

inherit\_local (*rollnw.model.ModelEmitterFlag* attribute), 358

inherit\_part (*rollnw.model.ModelEmitterFlag* attribute), 358

inherit\_vel (*rollnw.model.ModelEmitterFlag* attribute), 358

inheritcolor (*rollnw.model.MdlNode* attribute), 355

Ini (class in *rollnw*), 323

ini (*rollnw.ResourceType* attribute), 336

init (*rollnw.script.ForStatement* attribute), 366

init (*rollnw.script.VarDecl* attribute), 374

initialize() (*rollnw.kernel.Config* method), 346

InlayHint (class in *rollnw.script*), 367

innate (*rollnw.EffectCategory* attribute), 319

install\_path() (*rollnw.kernel.Config* method), 346

instantiate() (*rollnw.Equips* method), 321

instantiate() (*rollnw.Inventory* method), 323

INT (*rollnw.script.NssTokenType* attribute), 371

INTEGER\_CONST (*rollnw.script.NssTokenType* attribute), 371

interior (*rollnw.AreaFlags* attribute), 307

interruptable (*rollnw.Creature* attribute), 311

interruptable (*rollnw.Door* attribute), 317

interruptable (*rollnw.Placeable* attribute), 333

interval (*rollnw.Sound* attribute), 339

interval\_variation (*rollnw.Sound* attribute), 339

invalid (*rollnw.EquipIndex* attribute), 321

invalid (*rollnw.LanguageID* attribute), 326

invalid (*rollnw.model.MdlClassification* attribute), 350

invalid (*rollnw.ObjectType* attribute), 332

invalid (*rollnw.ResourceType* attribute), 336

INVALID (*rollnw.script.NssTokenType* attribute), 369

Inventory (class in *rollnw*), 323

inventory (*rollnw.Creature* property), 311

inventory (*rollnw.Item* attribute), 324

inventory (*rollnw.Placeable* attribute), 333

InventoryItem (class in *rollnw*), 323

ip\_cost\_table() (*rollnw.kernel.EffectSystem* method), 347

ip\_definition() (*rollnw.kernel.EffectSystem* method), 347

ip\_param\_table() (*rollnw.kernel.EffectSystem* method), 347

is\_flanked() (in module *rollnw.nwnI*), 360

is\_key (*rollnw.model.MdlControllerKey* attribute), 350

is\_link (*rollnw.DialogPtr* attribute), 316

is\_loaded() (*rollnw.NWSync* method), 331

is\_night (*rollnw.AreaWeather* attribute), 308

is\_ranged\_attack (*rollnw.AttackData* attribute), 308

is\_ranged\_weapon() (in module *rollnw.nwnI*), 360

is\_save\_game (*rollnw.Module* attribute), 330

is\_shield() (in module *rollnw.nwnI*), 360

is\_start (*rollnw.DialogPtr* attribute), 316

is\_tinted (*rollnw.model.ModelEmitterFlag* attribute), 358

is\_trapped (*rollnw.Trap* attribute), 343

italian (*rollnw.LanguageID* attribute), 326

Item (class in *rollnw*), 323

item (*rollnw.EffectCategory* attribute), 319

item (*rollnw.InventoryItem* attribute), 323

item (*rollnw.model.MdlClassification* attribute), 350

item (*rollnw.ObjectType* attribute), 332

itemprop\_ability\_modifier() (in module *rollnw.nwnI*), 360

itemprop\_armor\_class\_modifier() (in module *rollnw.nwnI*), 360

itemprop\_attack\_modifier() (in module *rollnw.nwnI*), 360

itemprop\_enhancement\_modifier() (in module *rollnw.nwnI*), 360

itemprop\_haste() (in module *rollnw.nwnI*), 360



- itemprop\_skill\_modifier() (in module *rollnw.nwn1*), 360  
 ItemProperty (class in *rollnw*), 325  
 ITEMPROPERTY (*rollnw.script.NssTokenType* attribute), 371  
 items (*rollnw.Area* attribute), 306  
 items (*rollnw.Inventory* attribute), 323  
 iteration\_penalty (*rollnw.AttackData* attribute), 308  
 itp (*rollnw.ResourceType* attribute), 337  
 IVector4 (class in *rollnw*), 322
- ## J
- japanese (*rollnw.LanguageID* attribute), 327  
 jpg (*rollnw.ResourceType* attribute), 339  
 jrl (*rollnw.ResourceType* attribute), 338  
 json (*rollnw.ResourceType* attribute), 336  
 JSON (*rollnw.script.NssTokenType* attribute), 371  
 json\_archive\_version (*rollnw.Area* attribute), 306  
 json\_archive\_version (*rollnw.Creature* attribute), 312  
 json\_archive\_version (*rollnw.Dialog* attribute), 313  
 json\_archive\_version (*rollnw.Door* attribute), 317  
 json\_archive\_version (*rollnw.Placeable* attribute), 333  
 json\_archive\_version (*rollnw.Sound* attribute), 339  
 json\_archive\_version (*rollnw.Store* attribute), 342  
 JSON\_CONST (*rollnw.script.NssTokenType* attribute), 372  
 JumpStatement (class in *rollnw.script*), 367
- ## K
- Key (class in *rollnw*), 326  
 key (*rollnw.ResourceType* attribute), 339  
 key\_name (*rollnw.Lock* attribute), 329  
 key\_offset (*rollnw.model.MdlControllerKey* attribute), 350  
 key\_required (*rollnw.Lock* attribute), 329  
 kind (*rollnw.script.Symbol* attribute), 373  
 known\_spells (*rollnw.LevelUp* attribute), 327  
 korean (*rollnw.LanguageID* attribute), 326  
 ktx (*rollnw.ResourceType* attribute), 338
- ## L
- label (*rollnw.script.LabelStatement* attribute), 367  
 LabelStatement (class in *rollnw.script*), 367  
 Language (class in *rollnw*), 326  
 language\_id() (*rollnw.Tlk* method), 343  
 lawful\_chaotic (*rollnw.Creature* attribute), 312  
 layer (*rollnw.PltPixel* attribute), 335  
 layered (*rollnw.ItemModelType* attribute), 325  
 LBRACE (*rollnw.script.NssTokenType* attribute), 369  
 LBRACKET (*rollnw.script.NssTokenType* attribute), 369  
 leaf\_face (*rollnw.model.MdlAABEntry* attribute), 349  
 leather1 (*rollnw.ItemColors* attribute), 324  
 leather2 (*rollnw.ItemColors* attribute), 324  
 lefthand (*rollnw.EquipIndex* attribute), 320  
 lefthand (*rollnw.EquipSlot* attribute), 321  
 leftring (*rollnw.EquipIndex* attribute), 320  
 leftring (*rollnw.EquipSlot* attribute), 321  
 length (*rollnw.model.MdlAnimation* attribute), 349  
 length() (*rollnw.script.SourceLocation* method), 372  
 lensflares (*rollnw.model.MdlLightNode* attribute), 354  
 level (*rollnw.ClassEntry* attribute), 309  
 level (*rollnw.SpecialAbility* attribute), 340  
 level() (*rollnw.LevelStats* method), 327  
 level\_by\_class() (*rollnw.LevelStats* method), 327  
 LevelHistory (class in *rollnw*), 327  
 levels (*rollnw.Creature* attribute), 312  
 LevelStats (class in *rollnw*), 327  
 LevelUp (class in *rollnw*), 327  
 lexical (*rollnw.script.DiagnosticType* attribute), 365  
 lhs (*rollnw.script.AssignExpression* attribute), 361  
 lhs (*rollnw.script.BinaryExpression* attribute), 362  
 lhs (*rollnw.script.ComparisonExpression* attribute), 363  
 lhs (*rollnw.script.DotExpression* attribute), 365  
 lhs (*rollnw.script.LogicalExpression* attribute), 367  
 lhs (*rollnw.script.PostfixExpression* attribute), 372  
 life\_exp (*rollnw.model.MdlControllerType* attribute), 351  
 light (*rollnw.model.MdlNodeFlags* attribute), 356  
 light (*rollnw.model.MdlNodeType* attribute), 356  
 lighting\_scheme (*rollnw.AreaWeather* attribute), 308  
 lightmapped (*rollnw.model.MdlTrimeshNode* attribute), 357  
 lightning\_delay (*rollnw.model.MdlControllerType* attribute), 351  
 lightning\_radius (*rollnw.model.MdlControllerType* attribute), 351  
 lightning\_scale (*rollnw.model.MdlControllerType* attribute), 351  
 lightning\_subdiv (*rollnw.model.MdlControllerType* attribute), 351  
 lightpriority (*rollnw.model.MdlLightNode* attribute), 354  
 line (*rollnw.script.SourcePosition* attribute), 373  
 linked\_to (*rollnw.Door* attribute), 317  
 linked\_to (*rollnw.Trigger* attribute), 344  
 linked\_to (*rollnw.Waypoint* attribute), 345  
 linked\_to\_flags (*rollnw.Door* attribute), 317  
 linked\_to\_flags (*rollnw.Trigger* attribute), 344  
 listen (*rollnw.DialogAnimation* attribute), 314  
 listen\_check\_mod (*rollnw.Area* attribute), 306  
 literal (*rollnw.script.LiteralExpression* attribute), 367  
 LiteralExpression (class in *rollnw.script*), 367  
 LiteralVectorExpression (class in *rollnw.script*), 367  
 load\_module() (in module *rollnw.kernel*), 348  
 loadscreen (*rollnw.Area* attribute), 306  
 loadscreen (*rollnw.Door* attribute), 317

loadscreen (*rollnw.Trigger attribute*), 344  
 loc (*rollnw.script.NssToken attribute*), 369  
 LocalData (*class in rollnw*), 328  
 locals (*rollnw.Common attribute*), 310  
 locals (*rollnw.Module attribute*), 330  
 locate\_export() (*rollnw.script.Nss method*), 368  
 locate\_symbol() (*rollnw.script.Nss method*), 368  
 Location (*class in rollnw*), 329  
 location (*rollnw.Common attribute*), 310  
 location (*rollnw.script.Diagnostic attribute*), 364  
 location (*rollnw.script.Include attribute*), 366  
 LOCATION (*rollnw.script.NssTokenType attribute*), 371  
 LOCATION\_INVALID (*rollnw.script.NssTokenType attribute*), 372  
 Lock (*class in rollnw*), 329  
 lock (*rollnw.Door attribute*), 317  
 lock (*rollnw.Placeable attribute*), 333  
 lock\_dc (*rollnw.Lock attribute*), 329  
 lockable (*rollnw.Lock attribute*), 329  
 locked (*rollnw.Lock attribute*), 329  
 LocString (*class in rollnw*), 327  
 lod (*rollnw.ResourceType attribute*), 338  
 LogicalExpression (*class in rollnw.script*), 367  
 look\_far (*rollnw.DialogAnimation attribute*), 314  
 loop (*rollnw.model.MdlEmitterNode attribute*), 353  
 looping (*rollnw.Sound attribute*), 339  
 lootable (*rollnw.Creature attribute*), 312  
 LPAREN (*rollnw.script.NssTokenType attribute*), 369  
 LT (*rollnw.script.NssTokenType attribute*), 370  
 LTEQ (*rollnw.script.NssTokenType attribute*), 370  
 ltr (*rollnw.ResourceType attribute*), 337  
 lua (*rollnw.ResourceType attribute*), 336

## M

magical (*rollnw.EffectCategory attribute*), 318  
 mainlight1 (*rollnw.Tile attribute*), 342  
 mainlight2 (*rollnw.Tile attribute*), 342  
 manifests() (*rollnw.NWSync method*), 331  
 map\_note (*rollnw.Waypoint attribute*), 345  
 map\_note\_enabled (*rollnw.Waypoint attribute*), 345  
 markdown (*rollnw.Store attribute*), 342  
 markup (*rollnw.Store attribute*), 342  
 mass (*rollnw.model.MdlControllerType attribute*), 351  
 material\_idx (*rollnw.model.MdlFace attribute*), 353  
 materialname (*rollnw.model.MdlTrimeshNode attribute*), 357  
 max\_price (*rollnw.Store attribute*), 342  
 maximize (*rollnw.SpellMetaMagic attribute*), 341  
 Mdl (*class in rollnw.model*), 349  
 mdl (*rollnw.ResourceType attribute*), 336  
 MdlAABBBEntry (*class in rollnw.model*), 349  
 MdlAABBNode (*class in rollnw.model*), 349  
 MdlAnimation (*class in rollnw.model*), 349  
 MdlAnimationEvent (*class in rollnw.model*), 350

MdlAnimeshNode (*class in rollnw.model*), 350  
 MdlCameraNode (*class in rollnw.model*), 350  
 MdlControllerKey (*class in rollnw.model*), 350  
 MdlControllerType (*class in rollnw.model*), 351  
 MdlDanglymeshNode (*class in rollnw.model*), 352  
 MdlDummyNode (*class in rollnw.model*), 352  
 MdlEmitterNode (*class in rollnw.model*), 352  
 MdlFace (*class in rollnw.model*), 353  
 MdlGeometry (*class in rollnw.model*), 353  
 MdlLightNode (*class in rollnw.model*), 354  
 MdlModel (*class in rollnw.model*), 355  
 MdlNode (*class in rollnw.model*), 355  
 MdlNodeFlags (*class in rollnw.model*), 355  
 MdlNodeType (*class in rollnw.model*), 356  
 MdlPatchNode (*class in rollnw.model*), 356  
 MdlReferenceNode (*class in rollnw.model*), 356  
 MdlSkinNode (*class in rollnw.model*), 356  
 MdlTrimeshNode (*class in rollnw.model*), 357  
 merge() (*rollnw.Erf method*), 322  
 mesh (*rollnw.model.MdlNodeFlags attribute*), 356  
 message (*rollnw.script.Diagnostic attribute*), 364  
 message (*rollnw.script.InlayHint attribute*), 367  
 meta (*rollnw.SpellEntry attribute*), 341  
 metal1 (*rollnw.ItemColors attribute*), 324  
 metal2 (*rollnw.ItemColors attribute*), 324  
 min\_game\_version (*rollnw.Module attribute*), 330  
 MINUS (*rollnw.script.NssTokenType attribute*), 370  
 MINUSEQ (*rollnw.script.NssTokenType attribute*), 370  
 MINUSMINUS (*rollnw.script.NssTokenType attribute*), 370  
 minutes\_per\_hour (*rollnw.Module attribute*), 330  
 miscellaneous (*rollnw.Store attribute*), 342  
 miss\_by\_auto\_fail (*rollnw.AttackResult attribute*), 308  
 miss\_by\_concealment (*rollnw.AttackResult attribute*), 309  
 miss\_by\_miss\_chance (*rollnw.AttackResult attribute*), 309  
 miss\_by\_roll (*rollnw.AttackResult attribute*), 309  
 mod (*rollnw.ResourceType attribute*), 336  
 MOD (*rollnw.script.NssTokenType attribute*), 370  
 model (*rollnw.model.Mdl attribute*), 349  
 model (*rollnw.model.MdlGeometryFlag attribute*), 354  
 model (*rollnw.model.MdlGeometryType attribute*), 354  
 model1 (*rollnw.ItemModelParts attribute*), 325  
 model2 (*rollnw.ItemModelParts attribute*), 325  
 model3 (*rollnw.ItemModelParts attribute*), 325  
 model\_colors (*rollnw.Item attribute*), 324  
 model\_parts (*rollnw.Item attribute*), 324  
 model\_type (*rollnw.Item attribute*), 324  
 ModelEmitterFlag (*class in rollnw.model*), 358  
 MODEQ (*rollnw.script.NssTokenType attribute*), 370  
 modified() (*rollnw.Tlk method*), 343  
 module  
     rollnw, 305

- rollnw.kernel, 346
- rollnw.model, 349
- rollnw.nwn1, 359
- rollnw.script, 361
- Module (class in rollnw), 329
- module (rollnw.ObjectType attribute), 332
- ModuleScripts (class in rollnw), 330
- moon\_shadows (rollnw.AreaWeather attribute), 308
- movie (rollnw.ResourceType attribute), 336
- mpg (rollnw.ResourceType attribute), 336
- mtime (rollnw.ResourceDescriptor attribute), 335
- mtr (rollnw.ResourceType attribute), 338
- multimaterial (rollnw.model.MdlTrimeshNode attribute), 357
- multiplier (rollnw.AttackData attribute), 308
- multiplier (rollnw.model.MdlControllerType attribute), 351
- multiplier (rollnw.model.MdlLightNode attribute), 354
- mve (rollnw.ResourceType attribute), 336
- N**
- name (rollnw.Area attribute), 306
- name (rollnw.Common attribute), 310
- name (rollnw.model.MdlAnimationEvent attribute), 350
- name (rollnw.model.MdlControllerKey attribute), 350
- name (rollnw.model.MdlGeometry attribute), 353
- name (rollnw.model.MdlNode attribute), 355
- name (rollnw.Module attribute), 330
- name (rollnw.ResourceDescriptor attribute), 335
- name() (rollnw.Container method), 310
- name() (rollnw.script.Nss method), 368
- name\_first (rollnw.Creature attribute), 312
- name\_last (rollnw.Creature attribute), 312
- natural (rollnw.AreaFlags attribute), 307
- ncs (rollnw.ResourceType attribute), 336
- ndb (rollnw.ResourceType attribute), 338
- neck (rollnw.BodyParts attribute), 309
- neck (rollnw.EquipIndex attribute), 320
- neck (rollnw.EquipSlot attribute), 321
- next() (rollnw.script.NssLexer method), 369
- no\_rest (rollnw.Area attribute), 306
- node (rollnw.DialogPtr attribute), 316
- node (rollnw.script.Symbol attribute), 373
- none (rollnw.DialogAnimation attribute), 314
- none (rollnw.PlaceableAnimationState attribute), 333
- normal (rollnw.model.SkinVertex attribute), 358
- normal (rollnw.model.Vertex attribute), 358
- NOT (rollnw.script.NssTokenType attribute), 370
- NOTEQ (rollnw.script.NssTokenType attribute), 370
- Nss (class in rollnw.script), 368
- nss (rollnw.ResourceType attribute), 336
- NssLexer (class in rollnw.script), 369
- NssToken (class in rollnw.script), 369
- nth\_attack (rollnw.AttackData attribute), 308
- nw::Ability (C++ struct), 39
- nw::Ability::idx (C++ function), 39
- nw::Ability::invalid (C++ function), 39
- nw::Ability::make (C++ function), 39
- nw::Ability::operator\* (C++ function), 39
- nw::Ability::operator== (C++ function), 39
- nw::Ability::operator<=> (C++ function), 39
- nw::AbilityArray (C++ type), 303
- nw::AbilityInfo (C++ struct), 40
- nw::AbilityInfo::constant (C++ member), 40
- nw::AbilityInfo::name (C++ member), 40
- nw::AbilityInfo::valid (C++ function), 40
- nw::alignment\_axis\_from\_flags (C++ function), 270
- nw::AxisAlignment (C++ enum), 252
- nw::AxisAlignment::both (C++ enumerator), 252
- nw::AxisAlignment::good\_evil (C++ enumerator), 252
- nw::AxisAlignment::law\_chaos (C++ enumerator), 252
- nw::AxisAlignment::neither (C++ enumerator), 252
- nw::AlignmentFlags (C++ enum), 253
- nw::AlignmentFlags::chaotic (C++ enumerator), 253
- nw::AlignmentFlags::evil (C++ enumerator), 253
- nw::AlignmentFlags::good (C++ enumerator), 253
- nw::AlignmentFlags::lawful (C++ enumerator), 253
- nw::AlignmentFlags::neutral (C++ enumerator), 253
- nw::AlignmentFlags::none (C++ enumerator), 253
- nw::AlignmentType (C++ enum), 253
- nw::AlignmentType::all (C++ enumerator), 253
- nw::AlignmentType::chaotic (C++ enumerator), 253
- nw::AlignmentType::evil (C++ enumerator), 253
- nw::AlignmentType::good (C++ enumerator), 253
- nw::AlignmentType::lawful (C++ enumerator), 253
- nw::AlignmentType::neutral (C++ enumerator), 253
- nw::always\_false (C++ function), 270
- nw::Appearance (C++ struct), 40
- nw::Appearance::body\_parts (C++ member), 40
- nw::Appearance::from\_json (C++ function), 40
- nw::Appearance::hair (C++ member), 40
- nw::Appearance::id (C++ member), 40
- nw::Appearance::phenotype (C++ member), 40
- nw::Appearance::portrait\_id (C++ member), 40
- nw::Appearance::skin (C++ member), 40
- nw::Appearance::tail (C++ member), 40
- nw::Appearance::tattoo1 (C++ member), 40
- nw::Appearance::tattoo2 (C++ member), 41
- nw::Appearance::to\_json (C++ function), 40

nw::Appearance::wings (C++ member), 40  
 nw::Area (C++ struct), 41  
 nw::Area::Area (C++ function), 41  
 nw::Area::as\_area (C++ function), 41  
 nw::Area::as\_common (C++ function), 41  
 nw::Area::as\_creature (C++ function), 41  
 nw::Area::as\_door (C++ function), 41  
 nw::Area::as\_encounter (C++ function), 41  
 nw::Area::as\_item (C++ function), 41  
 nw::Area::as\_module (C++ function), 41  
 nw::Area::as\_placeable (C++ function), 41  
 nw::Area::as\_player (C++ function), 42  
 nw::Area::as\_sound (C++ function), 42  
 nw::Area::as\_store (C++ function), 42  
 nw::Area::as\_trigger (C++ function), 42  
 nw::Area::as\_waypoint (C++ function), 42  
 nw::Area::comments (C++ member), 42  
 nw::Area::common (C++ member), 42  
 nw::Area::creator\_id (C++ member), 43  
 nw::Area::creatures (C++ member), 42  
 nw::Area::deserialize (C++ function), 43  
 nw::Area::doors (C++ member), 42  
 nw::Area::effects (C++ function), 41  
 nw::Area::encounters (C++ member), 42  
 nw::Area::flags (C++ member), 43  
 nw::Area::handle (C++ function), 41  
 nw::Area::height (C++ member), 43  
 nw::Area::id (C++ member), 43  
 nw::Area::instantiate (C++ function), 41  
 nw::Area::items (C++ member), 42  
 nw::Area::json\_archive\_version (C++ member), 44  
 nw::Area::listen\_check\_mod (C++ member), 43  
 nw::Area::loadscreen (C++ member), 43  
 nw::Area::name (C++ member), 43  
 nw::Area::no\_rest (C++ member), 43  
 nw::Area::object\_type (C++ member), 44  
 nw::Area::placeables (C++ member), 42  
 nw::Area::pvp (C++ member), 43  
 nw::Area::restype (C++ member), 44  
 nw::Area::scripts (C++ member), 42  
 nw::Area::serialize (C++ function), 44  
 nw::Area::set\_handle (C++ function), 41  
 nw::Area::shadow\_opacity (C++ member), 43  
 nw::Area::skybox (C++ member), 43  
 nw::Area::sounds (C++ member), 42  
 nw::Area::spot\_check\_mod (C++ member), 43  
 nw::Area::stores (C++ member), 42  
 nw::Area::tag (C++ function), 41  
 nw::Area::tiles (C++ member), 43  
 nw::Area::tileset (C++ member), 43  
 nw::Area::triggers (C++ member), 42  
 nw::Area::version (C++ member), 43  
 nw::Area::versus\_me (C++ function), 41  
 nw::Area::waypoints (C++ member), 42  
 nw::Area::weather (C++ member), 42  
 nw::Area::width (C++ member), 43  
 nw::AreaFlags (C++ enum), 253  
 nw::AreaFlags::interior (C++ enumerator), 253  
 nw::AreaFlags::natural (C++ enumerator), 254  
 nw::AreaFlags::none (C++ enumerator), 253  
 nw::AreaFlags::underground (C++ enumerator), 254  
 nw::AreaScripts (C++ struct), 44  
 nw::AreaScripts::AreaScripts (C++ function), 44  
 nw::AreaScripts::from\_json (C++ function), 44  
 nw::AreaScripts::on\_enter (C++ member), 44  
 nw::AreaScripts::on\_exit (C++ member), 44  
 nw::AreaScripts::on\_heartbeat (C++ member), 44  
 nw::AreaScripts::on\_user\_defined (C++ member), 44  
 nw::AreaScripts::to\_json (C++ function), 44  
 nw::AreaWeather (C++ struct), 45  
 nw::AreaWeather::AreaWeather (C++ function), 45  
 nw::AreaWeather::chance\_lightning (C++ member), 45  
 nw::AreaWeather::chance\_rain (C++ member), 45  
 nw::AreaWeather::chance\_snow (C++ member), 45  
 nw::AreaWeather::color\_moon\_ambient (C++ member), 45  
 nw::AreaWeather::color\_moon\_diffuse (C++ member), 45  
 nw::AreaWeather::color\_moon\_fog (C++ member), 45  
 nw::AreaWeather::color\_sun\_ambient (C++ member), 45  
 nw::AreaWeather::color\_sun\_diffuse (C++ member), 45  
 nw::AreaWeather::color\_sun\_fog (C++ member), 45  
 nw::AreaWeather::day\_night\_cycle (C++ member), 45  
 nw::AreaWeather::fog\_clip\_distance (C++ member), 45  
 nw::AreaWeather::fog\_moon\_amount (C++ member), 45  
 nw::AreaWeather::fog\_sun\_amount (C++ member), 46  
 nw::AreaWeather::from\_json (C++ function), 45  
 nw::AreaWeather::is\_night (C++ member), 45  
 nw::AreaWeather::lighting\_scheme (C++ member), 45  
 nw::AreaWeather::moon\_shadows (C++ member), 45  
 nw::AreaWeather::sun\_shadows (C++ member), 46  
 nw::AreaWeather::to\_json (C++ function), 45  
 nw::AreaWeather::wind\_power (C++ member), 45  
 nw::AttackData (C++ struct), 46  
 nw::AttackData::add (C++ function), 46



nw::AttackData::armor\_class (C++ member), 47  
 nw::AttackData::attack\_bonus (C++ member), 47  
 nw::AttackData::attack\_roll (C++ member), 47  
 nw::AttackData::attacker (C++ member), 46  
 nw::AttackData::concealment (C++ member), 47  
 nw::AttackData::damage\_base (C++ member), 47  
 nw::AttackData::damage\_total (C++ member), 47  
 nw::AttackData::DamageArray (C++ type), 46  
 nw::AttackData::damages (C++ function), 46  
 nw::AttackData::effects\_to\_apply (C++ member), 47  
 nw::AttackData::effects\_to\_remove (C++ member), 47  
 nw::AttackData::is\_killing\_blow (C++ member), 47  
 nw::AttackData::is\_ranged\_attack (C++ member), 46  
 nw::AttackData::iteration\_penalty (C++ member), 47  
 nw::AttackData::multiplier (C++ member), 47  
 nw::AttackData::nth\_attack (C++ member), 47  
 nw::AttackData::result (C++ member), 46  
 nw::AttackData::target (C++ member), 46  
 nw::AttackData::target\_is\_creature (C++ member), 46  
 nw::AttackData::target\_state (C++ member), 46  
 nw::AttackData::threat\_range (C++ member), 47  
 nw::AttackData::type (C++ member), 46  
 nw::AttackData::weapon (C++ member), 46  
 nw::AttackResult (C++ enum), 254  
 nw::AttackResult::hit\_by\_auto\_success (C++ enumerator), 254  
 nw::AttackResult::hit\_by\_critical (C++ enumerator), 254  
 nw::AttackResult::hit\_by\_roll (C++ enumerator), 254  
 nw::AttackResult::miss\_by\_auto\_fail (C++ enumerator), 254  
 nw::AttackResult::miss\_by\_concealment (C++ enumerator), 254  
 nw::AttackResult::miss\_by\_miss\_chance (C++ enumerator), 254  
 nw::AttackResult::miss\_by\_roll (C++ enumerator), 254  
 nw::BaseItem (C++ struct), 47  
 nw::BaseItem::idx (C++ function), 48  
 nw::BaseItem::invalid (C++ function), 48  
 nw::BaseItem::make (C++ function), 48  
 nw::BaseItem::operator\* (C++ function), 48  
 nw::BaseItem::operator== (C++ function), 48  
 nw::BaseItem::operator<=> (C++ function), 48  
 nw::BaseItemArray (C++ type), 303  
 nw::BeamdogInstall (C++ struct), 48  
 nw::BeamdogInstall::appid (C++ member), 48  
 nw::BeamdogInstall::path (C++ member), 48  
 nw::Bif (C++ struct), 48  
 nw::Bif::Bif (C++ function), 48  
 nw::Bif::demand (C++ function), 49  
 nw::Bif::operator= (C++ function), 48  
 nw::BodyParts (C++ struct), 49  
 nw::BodyParts::belt (C++ member), 49  
 nw::BodyParts::bicep\_left (C++ member), 49  
 nw::BodyParts::bicep\_right (C++ member), 49  
 nw::BodyParts::foot\_left (C++ member), 49  
 nw::BodyParts::foot\_right (C++ member), 49  
 nw::BodyParts::forearm\_left (C++ member), 49  
 nw::BodyParts::forearm\_right (C++ member), 49  
 nw::BodyParts::hand\_left (C++ member), 49  
 nw::BodyParts::hand\_right (C++ member), 49  
 nw::BodyParts::head (C++ member), 49  
 nw::BodyParts::neck (C++ member), 49  
 nw::BodyParts::pelvis (C++ member), 49  
 nw::BodyParts::shin\_left (C++ member), 49  
 nw::BodyParts::shin\_right (C++ member), 49  
 nw::BodyParts::shoulder\_left (C++ member), 49  
 nw::BodyParts::shoulder\_right (C++ member), 50  
 nw::BodyParts::thigh\_left (C++ member), 50  
 nw::BodyParts::thigh\_right (C++ member), 50  
 nw::BodyParts::torso (C++ member), 50  
 nw::ByteArray (C++ struct), 50  
 nw::ByteArray::append (C++ function), 50  
 nw::ByteArray::Base (C++ type), 50  
 nw::ByteArray::ByteArray (C++ function), 50  
 nw::ByteArray::clear (C++ function), 50  
 nw::ByteArray::const\_iterator (C++ type), 50  
 nw::ByteArray::data (C++ function), 51  
 nw::ByteArray::from\_file (C++ function), 51  
 nw::ByteArray::iterator (C++ type), 50  
 nw::ByteArray::operator= (C++ function), 50  
 nw::ByteArray::operator== (C++ function), 50  
 nw::ByteArray::operator[] (C++ function), 50  
 nw::ByteArray::push\_back (C++ function), 51  
 nw::ByteArray::read\_at (C++ function), 51  
 nw::ByteArray::reserve (C++ function), 51  
 nw::ByteArray::resize (C++ function), 51  
 nw::ByteArray::size (C++ function), 51  
 nw::ByteArray::size\_type (C++ type), 50  
 nw::ByteArray::span (C++ function), 51  
 nw::ByteArray::string\_view (C++ function), 51  
 nw::ByteArray::write\_to (C++ function), 51  
 nw::Class (C++ struct), 51  
 nw::Class::idx (C++ function), 52  
 nw::Class::invalid (C++ function), 52  
 nw::Class::make (C++ function), 52  
 nw::Class::operator\* (C++ function), 52  
 nw::Class::operator== (C++ function), 52  
 nw::Class::operator<=> (C++ function), 52  
 nw::ClassArray (C++ struct), 52

nw::ClassArray::attack\_tables (C++ member), 53  
 nw::ClassArray::constant\_to\_index (C++ member), 53  
 nw::ClassArray::entries (C++ member), 53  
 nw::ClassArray::from\_constant (C++ function), 52  
 nw::ClassArray::get (C++ function), 52  
 nw::ClassArray::get\_base\_attack\_bonus (C++ function), 52  
 nw::ClassArray::get\_class\_save\_bonus (C++ function), 52  
 nw::ClassArray::get\_is\_class\_skill (C++ function), 52  
 nw::ClassArray::get\_natural\_ac (C++ function), 52  
 nw::ClassArray::get\_requirement (C++ function), 52  
 nw::ClassArray::get\_stat\_gain (C++ function), 53  
 nw::ClassArray::is\_valid (C++ function), 52  
 nw::ClassArray::map\_type (C++ type), 52  
 nw::ClassArray::stat\_gain\_tables (C++ member), 53  
 nw::ClassEntry (C++ struct), 53  
 nw::ClassEntry::id (C++ member), 53  
 nw::ClassEntry::level (C++ member), 53  
 nw::ClassEntry::spells (C++ member), 53  
 nw::ClassInfo (C++ struct), 53  
 nw::ClassInfo::alignment\_restriction (C++ member), 54  
 nw::ClassInfo::alignment\_restriction\_type (C++ member), 55  
 nw::ClassInfo::arcane (C++ member), 55  
 nw::ClassInfo::arcane\_spell\_failure (C++ member), 55  
 nw::ClassInfo::arcane\_spellgain\_mod (C++ member), 55  
 nw::ClassInfo::attack\_bonus\_table (C++ member), 54  
 nw::ClassInfo::bonus\_feats\_table (C++ member), 54  
 nw::ClassInfo::can\_cast\_spontaneously (C++ member), 56  
 nw::ClassInfo::caster\_ability (C++ member), 55  
 nw::ClassInfo::caster\_level\_multiplier (C++ member), 56  
 nw::ClassInfo::class\_saves (C++ member), 54  
 nw::ClassInfo::class\_skills (C++ member), 54  
 nw::ClassInfo::class\_stat\_gain (C++ member), 55  
 nw::ClassInfo::ClassInfo (C++ function), 53  
 nw::ClassInfo::constant (C++ member), 55  
 nw::ClassInfo::description (C++ member), 54  
 nw::ClassInfo::divine\_spellgain\_mod (C++ member), 55  
 nw::ClassInfo::epic\_level\_limit (C++ member), 55  
 nw::ClassInfo::feats\_table (C++ member), 54  
 nw::ClassInfo::hitdie (C++ member), 54  
 nw::ClassInfo::icon (C++ member), 54  
 nw::ClassInfo::invert\_restriction (C++ member), 55  
 nw::ClassInfo::learn\_scroll (C++ member), 55  
 nw::ClassInfo::level\_min\_associate (C++ member), 56  
 nw::ClassInfo::level\_min\_caster (C++ member), 56  
 nw::ClassInfo::lower (C++ member), 54  
 nw::ClassInfo::max\_level (C++ member), 55  
 nw::ClassInfo::memorizes\_spells (C++ member), 55  
 nw::ClassInfo::name (C++ member), 54  
 nw::ClassInfo::package (C++ member), 55  
 nw::ClassInfo::pick\_domains (C++ member), 55  
 nw::ClassInfo::pick\_school (C++ member), 55  
 nw::ClassInfo::player\_class (C++ member), 54  
 nw::ClassInfo::plural (C++ member), 54  
 nw::ClassInfo::prereq\_table (C++ member), 55  
 nw::ClassInfo::primary\_ability (C++ member), 54  
 nw::ClassInfo::requirements (C++ member), 54  
 nw::ClassInfo::saving\_throw\_table (C++ member), 54  
 nw::ClassInfo::skill\_point\_base (C++ member), 54  
 nw::ClassInfo::skill\_table (C++ member), 54  
 nw::ClassInfo::spell\_gain\_table (C++ member), 54  
 nw::ClassInfo::spell\_known\_table (C++ member), 54  
 nw::ClassInfo::spell\_table\_column (C++ member), 55  
 nw::ClassInfo::spellbook\_restricted (C++ member), 55  
 nw::ClassInfo::spellcaster (C++ member), 54  
 nw::ClassInfo::stat\_gain\_table (C++ member), 55  
 nw::ClassInfo::valid (C++ function), 53  
 nw::ClassInfo::xp\_penalty (C++ member), 55  
 nw::CombatInfo (C++ struct), 56  
 nw::CombatInfo::ac\_armor\_base (C++ member), 57  
 nw::CombatInfo::ac\_natural\_bonus (C++ member), 56  
 nw::CombatInfo::ac\_shield\_base (C++ member), 57  
 nw::CombatInfo::attack\_current (C++ member), 56  
 nw::CombatInfo::attacks\_extra (C++ member), 56  
 nw::CombatInfo::attacks\_offhand (C++ member), 56

nw::CombatInfo::attacks\_onhand (C++ member), 56  
 nw::CombatInfo::combat\_mode (C++ member), 57  
 nw::CombatInfo::CombatInfo (C++ function), 56  
 nw::CombatInfo::from\_json (C++ function), 56  
 nw::CombatInfo::operator= (C++ function), 56  
 nw::CombatInfo::size\_ab\_modifier (C++ member), 57  
 nw::CombatInfo::size\_ac\_modifier (C++ member), 57  
 nw::CombatInfo::special\_abilities (C++ member), 57  
 nw::CombatInfo::target (C++ member), 56  
 nw::CombatInfo::target\_distance\_sq (C++ member), 57  
 nw::CombatInfo::target\_state (C++ member), 57  
 nw::CombatInfo::to\_json (C++ function), 56  
 nw::Common (C++ struct), 57  
 nw::Common::comment (C++ member), 58  
 nw::Common::from\_json (C++ function), 57  
 nw::Common::locals (C++ member), 57  
 nw::Common::location (C++ member), 57  
 nw::Common::name (C++ member), 57  
 nw::Common::palette\_id (C++ member), 58  
 nw::Common::resref (C++ member), 57  
 nw::Common::tag (C++ member), 57  
 nw::Common::to\_json (C++ function), 57  
 nw::Common::uuid (C++ member), 57  
 nw::Common::valid (C++ function), 57  
 nw::CompressionHeader (C++ struct), 58  
 nw::CompressionHeader::algorithm (C++ member), 58  
 nw::CompressionHeader::magic (C++ member), 58  
 nw::CompressionHeader::uncompressed\_size (C++ member), 58  
 nw::CompressionHeader::version (C++ member), 58  
 nw::ConfigOptions (C++ struct), 58  
 nw::ConfigOptions::include\_install (C++ member), 58  
 nw::ConfigOptions::include\_nwsync (C++ member), 58  
 nw::ConfigOptions::include\_user (C++ member), 58  
 nw::Container (C++ struct), 59  
 nw::Container::~~Container (C++ function), 59  
 nw::Container::all (C++ function), 59  
 nw::Container::Container (C++ function), 59  
 nw::Container::contains (C++ function), 59  
 nw::Container::demand (C++ function), 59  
 nw::Container::extract (C++ function), 59  
 nw::Container::extract\_by\_glob (C++ function), 59  
 nw::Container::name (C++ function), 59  
 nw::Container::path (C++ function), 59  
 nw::Container::size (C++ function), 59  
 nw::Container::stat (C++ function), 59  
 nw::Container::valid (C++ function), 59  
 nw::Container::visit (C++ function), 59  
 nw::Container::working\_directory (C++ function), 59  
 nw::count\_feats\_in\_range (C++ function), 270  
 nw::create\_unique\_tmp\_path (C++ function), 270  
 nw::Creature (C++ struct), 60  
 nw::Creature::appearance (C++ member), 61  
 nw::Creature::as\_area (C++ function), 60  
 nw::Creature::as\_common (C++ function), 60  
 nw::Creature::as\_creature (C++ function), 60  
 nw::Creature::as\_door (C++ function), 60  
 nw::Creature::as\_encounter (C++ function), 60  
 nw::Creature::as\_item (C++ function), 60  
 nw::Creature::as\_module (C++ function), 60  
 nw::Creature::as\_placeable (C++ function), 60  
 nw::Creature::as\_player (C++ function), 60  
 nw::Creature::as\_sound (C++ function), 60, 61  
 nw::Creature::as\_store (C++ function), 61  
 nw::Creature::as\_trigger (C++ function), 61  
 nw::Creature::as\_waypoint (C++ function), 61  
 nw::Creature::bodybag (C++ member), 62  
 nw::Creature::chunk\_death (C++ member), 62  
 nw::Creature::combat\_info (C++ member), 61  
 nw::Creature::common (C++ member), 61  
 nw::Creature::conversation (C++ member), 61  
 nw::Creature::cr (C++ member), 62  
 nw::Creature::cr\_adjust (C++ member), 62  
 nw::Creature::Creature (C++ function), 60  
 nw::Creature::decay\_time (C++ member), 62  
 nw::Creature::deity (C++ member), 61  
 nw::Creature::description (C++ member), 61  
 nw::Creature::deserialize (C++ function), 63  
 nw::Creature::disarmable (C++ member), 62  
 nw::Creature::effects (C++ function), 60  
 nw::Creature::equipment (C++ member), 61  
 nw::Creature::faction\_id (C++ member), 62  
 nw::Creature::gender (C++ member), 62  
 nw::Creature::good\_evil (C++ member), 62  
 nw::Creature::handle (C++ function), 60  
 nw::Creature::hasted (C++ member), 62  
 nw::Creature::history (C++ member), 61  
 nw::Creature::hp (C++ member), 62  
 nw::Creature::hp\_current (C++ member), 62  
 nw::Creature::hp\_max (C++ member), 62  
 nw::Creature::hp\_temp (C++ member), 62  
 nw::Creature::immortal (C++ member), 62  
 nw::Creature::instantiate (C++ function), 60  
 nw::Creature::instantiated\_ (C++ member), 63  
 nw::Creature::interruptable (C++ member), 62  
 nw::Creature::inventory (C++ member), 61

```

nw::Creature::json_archive_version (C++ member), 63
nw::Creature::lawful_chaotic (C++ member), 62
nw::Creature::levels (C++ member), 61
nw::Creature::lootable (C++ member), 63
nw::Creature::name_first (C++ member), 61
nw::Creature::name_last (C++ member), 61
nw::Creature::object_type (C++ member), 63
nw::Creature::pc (C++ member), 63
nw::Creature::perception_range (C++ member), 63
nw::Creature::plot (C++ member), 63
nw::Creature::race (C++ member), 62
nw::Creature::restype (C++ member), 63
nw::Creature::scripts (C++ member), 61
nw::Creature::serialize (C++ function), 63
nw::Creature::set_handle (C++ function), 60
nw::Creature::size (C++ member), 62
nw::Creature::soundset (C++ member), 62
nw::Creature::starting_package (C++ member), 63
nw::Creature::stats (C++ member), 61
nw::Creature::subrace (C++ member), 61
nw::Creature::tag (C++ function), 60
nw::Creature::versus_me (C++ function), 60
nw::Creature::walkrate (C++ member), 62
nw::CreatureScripts (C++ struct), 63
nw::CreatureScripts::CreatureScripts (C++ function), 63
nw::CreatureScripts::deserialize (C++ function), 63
nw::CreatureScripts::from_json (C++ function), 63
nw::CreatureScripts::on_attacked (C++ member), 64
nw::CreatureScripts::on_blocked (C++ member), 64
nw::CreatureScripts::on_conversation (C++ member), 64
nw::CreatureScripts::on_damaged (C++ member), 64
nw::CreatureScripts::on_death (C++ member), 64
nw::CreatureScripts::on_disturbed (C++ member), 64
nw::CreatureScripts::on_endround (C++ member), 64
nw::CreatureScripts::on_heartbeat (C++ member), 64
nw::CreatureScripts::on_perceived (C++ member), 64
nw::CreatureScripts::on_rested (C++ member), 64
nw::CreatureScripts::on_spawn (C++ member), 64
nw::CreatureScripts::on_spell_cast_at (C++ member), 64
nw::CreatureScripts::on_user_defined (C++ member), 64
nw::CreatureScripts::serialize (C++ function), 63
nw::CreatureScripts::to_json (C++ function), 63
nw::CreatureStats (C++ struct), 64
nw::CreatureStats::add_feat (C++ function), 64
nw::CreatureStats::CreatureStats (C++ function), 64
nw::CreatureStats::deserialize (C++ function), 65
nw::CreatureStats::feats (C++ function), 64
nw::CreatureStats::from_json (C++ function), 64
nw::CreatureStats::get_ability_score (C++ function), 65
nw::CreatureStats::get_skill_rank (C++ function), 65
nw::CreatureStats::has_feat (C++ function), 65
nw::CreatureStats::save_bonus (C++ member), 65
nw::CreatureStats::serialize (C++ function), 65
nw::CreatureStats::set_ability_score (C++ function), 65
nw::CreatureStats::set_skill_rank (C++ function), 65
nw::CreatureStats::to_json (C++ function), 64
nw::DamageFlag (C++ type), 303
nw::DamageResult (C++ struct), 65
nw::DamageResult::amount (C++ member), 65
nw::DamageResult::immunity (C++ member), 65
nw::DamageResult::reduction (C++ member), 65
nw::DamageResult::reduction_remaining (C++ member), 65
nw::DamageResult::resist (C++ member), 65
nw::DamageResult::resist_remaining (C++ member), 66
nw::DamageResult::type (C++ member), 65
nw::DamageResult::unblocked (C++ member), 65
nw::DamageRoll (C++ struct), 66
nw::DamageRoll::flags (C++ member), 66
nw::DamageRoll::roll (C++ member), 66
nw::DamageRoll::type (C++ member), 66
nw::decode_plt_color (C++ function), 270
nw::decompress (C++ function), 270
nw::Dialog (C++ struct), 66
nw::Dialog::add (C++ function), 66
nw::Dialog::add_node_internal (C++ function), 66
nw::Dialog::add_ptr (C++ function), 66
nw::Dialog::add_string (C++ function), 66
nw::Dialog::create_node (C++ function), 67
nw::Dialog::create_ptr (C++ function), 67
nw::Dialog::delay_entry (C++ member), 67
nw::Dialog::delay_reply (C++ member), 68
nw::Dialog::delete_node (C++ function), 67

```



nw::Dialog::delete\_ptr (C++ function), 67  
nw::Dialog::Dialog (C++ function), 66  
nw::Dialog::entries (C++ member), 67  
nw::Dialog::json\_archive\_version (C++ member), 68  
nw::Dialog::node\_index (C++ function), 67  
nw::Dialog::operator= (C++ function), 66  
nw::Dialog::prevent\_zoom (C++ member), 68  
nw::Dialog::remove\_node\_internal (C++ function), 67  
nw::Dialog::remove\_ptr (C++ function), 67  
nw::Dialog::replies (C++ member), 67  
nw::Dialog::restype (C++ member), 68  
nw::Dialog::script\_abort (C++ member), 67  
nw::Dialog::script\_end (C++ member), 67  
nw::Dialog::starts (C++ member), 67  
nw::Dialog::valid (C++ function), 67  
nw::Dialog::word\_count (C++ member), 68  
nw::DialogNode (C++ struct), 68  
nw::DialogNode::action\_params (C++ member), 69  
nw::DialogNode::animation (C++ member), 69  
nw::DialogNode::animation\_loop (C++ member), 69  
nw::DialogNode::comment (C++ member), 68  
nw::DialogNode::copy (C++ function), 68  
nw::DialogNode::delay (C++ member), 69  
nw::DialogNode::DialogNode (C++ function), 68  
nw::DialogNode::get\_action\_param (C++ function), 68  
nw::DialogNode::parent (C++ member), 68  
nw::DialogNode::pointers (C++ member), 69  
nw::DialogNode::quest (C++ member), 68  
nw::DialogNode::quest\_entry (C++ member), 69  
nw::DialogNode::remove\_action\_param (C++ function), 68  
nw::DialogNode::script\_action (C++ member), 69  
nw::DialogNode::set\_action\_param (C++ function), 68  
nw::DialogNode::sound (C++ member), 69  
nw::DialogNode::speaker (C++ member), 69  
nw::DialogNode::text (C++ member), 69  
nw::DialogNode::type (C++ member), 68  
nw::DialogNodeType (C++ enum), 254  
nw::DialogNodeType::entry (C++ enumerator), 254  
nw::DialogNodeType::reply (C++ enumerator), 254  
nw::DialogPtr (C++ struct), 69  
nw::DialogPtr::add (C++ function), 69  
nw::DialogPtr::add\_ptr (C++ function), 69  
nw::DialogPtr::add\_string (C++ function), 69  
nw::DialogPtr::comment (C++ member), 70  
nw::DialogPtr::condition\_params (C++ member), 70  
nw::DialogPtr::copy (C++ function), 69  
nw::DialogPtr::get\_all\_subnodes (C++ function), 69  
nw::DialogPtr::get\_condition\_param (C++ function), 69  
nw::DialogPtr::index (C++ member), 70  
nw::DialogPtr::is\_link (C++ member), 70  
nw::DialogPtr::is\_start (C++ member), 70  
nw::DialogPtr::node (C++ member), 70  
nw::DialogPtr::parent (C++ member), 70  
nw::DialogPtr::remove\_condition\_param (C++ function), 70  
nw::DialogPtr::remove\_ptr (C++ function), 70  
nw::DialogPtr::script\_appears (C++ member), 70  
nw::DialogPtr::set\_condition\_param (C++ function), 70  
nw::DialogPtr::type (C++ member), 70  
nw::DiceRoll (C++ struct), 70  
nw::DiceRoll::bonus (C++ member), 71  
nw::DiceRoll::dice (C++ member), 71  
nw::DiceRoll::operator bool (C++ function), 71  
nw::DiceRoll::sides (C++ member), 71  
nw::Directory (C++ struct), 71  
nw::Directory::~Directory (C++ function), 71  
nw::Directory::all (C++ function), 71  
nw::Directory::contains (C++ function), 71  
nw::Directory::demand (C++ function), 71  
nw::Directory::Directory (C++ function), 71  
nw::Directory::extract (C++ function), 71  
nw::Directory::extract\_by\_glob (C++ function), 72  
nw::Directory::name (C++ function), 71  
nw::Directory::path (C++ function), 71  
nw::Directory::size (C++ function), 71  
nw::Directory::stat (C++ function), 71  
nw::Directory::valid (C++ function), 71  
nw::Directory::visit (C++ function), 72  
nw::Directory::working\_directory (C++ function), 72  
nw::Disease (C++ struct), 72  
nw::Disease::idx (C++ function), 72  
nw::Disease::invalid (C++ function), 72  
nw::Disease::make (C++ function), 72  
nw::Disease::operator\* (C++ function), 72  
nw::Disease::operator== (C++ function), 72  
nw::Disease::operator<=> (C++ function), 72  
nw::documents\_path (C++ function), 271  
nw::Door (C++ struct), 72  
nw::Door::animation\_state (C++ member), 74  
nw::Door::appearance (C++ member), 74  
nw::Door::as\_area (C++ function), 73  
nw::Door::as\_common (C++ function), 73  
nw::Door::as\_creature (C++ function), 73  
nw::Door::as\_door (C++ function), 73  
nw::Door::as\_encounter (C++ function), 73

nw::Door::as\_item (C++ function), 73  
 nw::Door::as\_module (C++ function), 73  
 nw::Door::as\_placeable (C++ function), 73  
 nw::Door::as\_player (C++ function), 73  
 nw::Door::as\_sound (C++ function), 73  
 nw::Door::as\_store (C++ function), 73  
 nw::Door::as\_trigger (C++ function), 74  
 nw::Door::as\_waypoint (C++ function), 74  
 nw::Door::common (C++ member), 74  
 nw::Door::conversation (C++ member), 74  
 nw::Door::description (C++ member), 74  
 nw::Door::deserialize (C++ function), 75  
 nw::Door::Door (C++ function), 73  
 nw::Door::effects (C++ function), 73  
 nw::Door::faction (C++ member), 74  
 nw::Door::generic\_type (C++ member), 74  
 nw::Door::handle (C++ function), 73  
 nw::Door::hardness (C++ member), 74  
 nw::Door::hp (C++ member), 74  
 nw::Door::hp\_current (C++ member), 74  
 nw::Door::instantiate (C++ function), 73  
 nw::Door::instantiated\_ (C++ member), 75  
 nw::Door::interruptable (C++ member), 75  
 nw::Door::json\_archive\_version (C++ member), 75  
 nw::Door::linked\_to (C++ member), 74  
 nw::Door::linked\_to\_flags (C++ member), 75  
 nw::Door::loadscreen (C++ member), 74  
 nw::Door::lock (C++ member), 74  
 nw::Door::object\_type (C++ member), 75  
 nw::Door::plot (C++ member), 75  
 nw::Door::portrait\_id (C++ member), 74  
 nw::Door::restype (C++ member), 75  
 nw::Door::saves (C++ member), 74  
 nw::Door::scripts (C++ member), 74  
 nw::Door::serialize (C++ function), 75  
 nw::Door::set\_handle (C++ function), 73  
 nw::Door::tag (C++ function), 73  
 nw::Door::trap (C++ member), 74  
 nw::Door::versus\_me (C++ function), 73  
 nw::DoorAnimationState (C++ enum), 255  
 nw::DoorAnimationState::closed (C++ enumerator), 255  
 nw::DoorAnimationState::opened1 (C++ enumerator), 255  
 nw::DoorAnimationState::opened2 (C++ enumerator), 255  
 nw::DoorScripts (C++ struct), 75  
 nw::DoorScripts::from\_json (C++ function), 75  
 nw::DoorScripts::on\_click (C++ member), 75  
 nw::DoorScripts::on\_closed (C++ member), 75  
 nw::DoorScripts::on\_damaged (C++ member), 75  
 nw::DoorScripts::on\_death (C++ member), 75  
 nw::DoorScripts::on\_disarm (C++ member), 76  
 nw::DoorScripts::on\_heartbeat (C++ member), 76  
 nw::DoorScripts::on\_lock (C++ member), 76  
 nw::DoorScripts::on\_melee\_attacked (C++ member), 76  
 nw::DoorScripts::on\_open (C++ member), 76  
 nw::DoorScripts::on\_open\_failure (C++ member), 76  
 nw::DoorScripts::on\_spell\_cast\_at (C++ member), 76  
 nw::DoorScripts::on\_trap\_triggered (C++ member), 76  
 nw::DoorScripts::on\_unlock (C++ member), 76  
 nw::DoorScripts::on\_user\_defined (C++ member), 76  
 nw::DoorScripts::to\_json (C++ function), 75  
 nw::Effect (C++ struct), 76  
 nw::Effect::category (C++ member), 77  
 nw::Effect::clear (C++ function), 76  
 nw::Effect::creator (C++ member), 77  
 nw::Effect::duration (C++ member), 77  
 nw::Effect::Effect (C++ function), 76  
 nw::Effect::expire\_day (C++ member), 77  
 nw::Effect::expire\_time (C++ member), 77  
 nw::Effect::get\_float (C++ function), 76  
 nw::Effect::get\_int (C++ function), 76  
 nw::Effect::get\_string (C++ function), 76  
 nw::Effect::handle (C++ function), 76  
 nw::Effect::id (C++ function), 76  
 nw::Effect::set\_float (C++ function), 77  
 nw::Effect::set\_id (C++ function), 77  
 nw::Effect::set\_int (C++ function), 77  
 nw::Effect::set\_string (C++ function), 77  
 nw::Effect::set\_versus (C++ function), 77  
 nw::Effect::spell\_id (C++ member), 77  
 nw::Effect::subtype (C++ member), 77  
 nw::Effect::type (C++ member), 77  
 nw::Effect::versus (C++ function), 77  
 nw::EffectArray (C++ struct), 77  
 nw::EffectArray::add (C++ function), 78  
 nw::EffectArray::begin (C++ function), 78  
 nw::EffectArray::const\_iterator (C++ type), 78  
 nw::EffectArray::end (C++ function), 78  
 nw::EffectArray::erase (C++ function), 78  
 nw::EffectArray::iterator (C++ type), 78  
 nw::EffectArray::remove (C++ function), 78  
 nw::EffectArray::size (C++ function), 78  
 nw::EffectArray::storage (C++ type), 78  
 nw::EffectHandle (C++ struct), 78  
 nw::EffectHandle::category (C++ member), 79  
 nw::EffectHandle::creator (C++ member), 78  
 nw::EffectHandle::effect (C++ member), 79  
 nw::EffectHandle::operator== (C++ function), 78  
 nw::EffectHandle::operator<=> (C++ function), 78  
 nw::EffectHandle::spell\_id (C++ member), 78

nw::EffectHandle::subtype (C++ member), 78  
 nw::EffectHandle::type (C++ member), 78  
 nw::Encounter (C++ struct), 79  
 nw::Encounter::active (C++ member), 81  
 nw::Encounter::as\_area (C++ function), 79  
 nw::Encounter::as\_common (C++ function), 79  
 nw::Encounter::as\_creature (C++ function), 79  
 nw::Encounter::as\_door (C++ function), 79  
 nw::Encounter::as\_encounter (C++ function), 79  
 nw::Encounter::as\_item (C++ function), 79  
 nw::Encounter::as\_module (C++ function), 79  
 nw::Encounter::as\_placeable (C++ function), 80  
 nw::Encounter::as\_player (C++ function), 80  
 nw::Encounter::as\_sound (C++ function), 80  
 nw::Encounter::as\_store (C++ function), 80  
 nw::Encounter::as\_trigger (C++ function), 80  
 nw::Encounter::as\_waypoint (C++ function), 80  
 nw::Encounter::common (C++ member), 80  
 nw::Encounter::creatures (C++ member), 80  
 nw::Encounter::creatures\_max (C++ member), 80  
 nw::Encounter::creatures\_recommended (C++ member), 80  
 nw::Encounter::deserialize (C++ function), 81  
 nw::Encounter::difficulty (C++ member), 80  
 nw::Encounter::difficulty\_index (C++ member), 80  
 nw::Encounter::effects (C++ function), 79  
 nw::Encounter::Encounter (C++ function), 79  
 nw::Encounter::faction (C++ member), 80  
 nw::Encounter::geometry (C++ member), 80  
 nw::Encounter::handle (C++ function), 79  
 nw::Encounter::instantiate (C++ function), 79  
 nw::Encounter::instantiated\_ (C++ member), 81  
 nw::Encounter::json\_archive\_version (C++ member), 81  
 nw::Encounter::object\_type (C++ member), 81  
 nw::Encounter::player\_only (C++ member), 81  
 nw::Encounter::reset (C++ member), 81  
 nw::Encounter::reset\_time (C++ member), 80  
 nw::Encounter::respawns (C++ member), 80  
 nw::Encounter::retype (C++ member), 81  
 nw::Encounter::scripts (C++ member), 80  
 nw::Encounter::serialize (C++ function), 81  
 nw::Encounter::set\_handle (C++ function), 79  
 nw::Encounter::spawn\_option (C++ member), 81  
 nw::Encounter::spawn\_points (C++ member), 80  
 nw::Encounter::tag (C++ function), 79  
 nw::Encounter::versus\_me (C++ function), 79  
 nw::EncounterScripts (C++ struct), 81  
 nw::EncounterScripts::from\_json (C++ function), 81  
 nw::EncounterScripts::on\_entered (C++ member), 82  
 nw::EncounterScripts::on\_exhausted (C++ member), 82  
 nw::EncounterScripts::on\_exit (C++ member), 82  
 nw::EncounterScripts::on\_heartbeat (C++ member), 82  
 nw::EncounterScripts::on\_user\_defined (C++ member), 82  
 nw::EncounterScripts::to\_json (C++ function), 81  
 nw::equip\_index\_to\_string (C++ function), 271  
 nw::equip\_slot\_to\_index (C++ function), 271  
 nw::EquipIndex (C++ enum), 255  
 nw::EquipIndex::arms (C++ enumerator), 255  
 nw::EquipIndex::arrows (C++ enumerator), 255  
 nw::EquipIndex::belt (C++ enumerator), 255  
 nw::EquipIndex::bolts (C++ enumerator), 255  
 nw::EquipIndex::boots (C++ enumerator), 255  
 nw::EquipIndex::bullets (C++ enumerator), 255  
 nw::EquipIndex::chest (C++ enumerator), 255  
 nw::EquipIndex::cloak (C++ enumerator), 255  
 nw::EquipIndex::creature\_bite (C++ enumerator), 256  
 nw::EquipIndex::creature\_left (C++ enumerator), 256  
 nw::EquipIndex::creature\_right (C++ enumerator), 256  
 nw::EquipIndex::creature\_skin (C++ enumerator), 256  
 nw::EquipIndex::head (C++ enumerator), 255  
 nw::EquipIndex::invalid (C++ enumerator), 256  
 nw::EquipIndex::lefthand (C++ enumerator), 255  
 nw::EquipIndex::leftring (C++ enumerator), 255  
 nw::EquipIndex::neck (C++ enumerator), 255  
 nw::EquipIndex::righthand (C++ enumerator), 255  
 nw::EquipIndex::rightring (C++ enumerator), 255  
 nw::EquipItem (C++ type), 303  
 nw::Equips (C++ struct), 82  
 nw::Equips::~~Equips (C++ function), 82  
 nw::Equips::Equips (C++ function), 82  
 nw::Equips::equips (C++ member), 82  
 nw::Equips::from\_json (C++ function), 82  
 nw::Equips::instantiate (C++ function), 82  
 nw::Equips::operator= (C++ function), 82  
 nw::Equips::owner\_ (C++ member), 82  
 nw::Equips::to\_json (C++ function), 82  
 nw::EquipSlot (C++ enum), 256  
 nw::EquipSlot::arms (C++ enumerator), 256  
 nw::EquipSlot::arrows (C++ enumerator), 256  
 nw::EquipSlot::belt (C++ enumerator), 256  
 nw::EquipSlot::bolts (C++ enumerator), 257  
 nw::EquipSlot::boots (C++ enumerator), 256  
 nw::EquipSlot::bullets (C++ enumerator), 256  
 nw::EquipSlot::chest (C++ enumerator), 256  
 nw::EquipSlot::cloak (C++ enumerator), 256

---

```

nw::EquipSlot::creature_bite (C++ enumerator), 257
nw::EquipSlot::creature_left (C++ enumerator), 257
nw::EquipSlot::creature_right (C++ enumerator), 257
nw::EquipSlot::creature_skin (C++ enumerator), 257
nw::EquipSlot::head (C++ enumerator), 256
nw::EquipSlot::lefthand (C++ enumerator), 256
nw::EquipSlot::leftring (C++ enumerator), 256
nw::EquipSlot::neck (C++ enumerator), 256
nw::EquipSlot::righthand (C++ enumerator), 256
nw::EquipSlot::rightring (C++ enumerator), 256
nw::Erf (C++ struct), 83
nw::Erf::~~Erf (C++ function), 83
nw::Erf::add (C++ function), 83
nw::Erf::all (C++ function), 83
nw::Erf::contains (C++ function), 83
nw::Erf::demand (C++ function), 83
nw::Erf::description (C++ member), 84
nw::Erf::erase (C++ function), 83
nw::Erf::Erf (C++ function), 83
nw::Erf::extract (C++ function), 83
nw::Erf::extract_by_glob (C++ function), 84
nw::Erf::merge (C++ function), 83
nw::Erf::name (C++ function), 84
nw::Erf::operator= (C++ function), 84
nw::Erf::path (C++ function), 84
nw::Erf::reload (C++ function), 83
nw::Erf::save (C++ function), 83
nw::Erf::save_as (C++ function), 83
nw::Erf::size (C++ function), 84
nw::Erf::stat (C++ function), 84
nw::Erf::type (C++ member), 84
nw::Erf::valid (C++ function), 84
nw::Erf::version (C++ member), 84
nw::Erf::visit (C++ function), 84
nw::Erf::working_directory (C++ function), 84
nw::ErfType (C++ enum), 257
nw::ErfType::erf (C++ enumerator), 257
nw::ErfType::hak (C++ enumerator), 257
nw::ErfType::mod (C++ enumerator), 257
nw::ErfType::sav (C++ enumerator), 257
nw::ErfVersion (C++ enum), 257
nw::ErfVersion::v1_0 (C++ enumerator), 257
nw::ErfVersion::v1_1 (C++ enumerator), 257
nw::expand_path (C++ function), 271
nw::Faction (C++ struct), 84
nw::Faction::Faction (C++ function), 85
nw::Faction::factions (C++ member), 85
nw::Faction::json_archive_version (C++ member), 85
nw::Faction::reputations (C++ member), 85
nw::Faction::restype (C++ member), 85
nw::Faction::serialize (C++ function), 85
nw::Faction::to_json (C++ function), 85
nw::FactionInfo (C++ struct), 85
nw::FactionInfo::global (C++ member), 85
nw::FactionInfo::name (C++ member), 85
nw::FactionInfo::parent (C++ member), 85
nw::Feat (C++ struct), 85
nw::Feat::idx (C++ function), 86
nw::Feat::invalid (C++ function), 86
nw::Feat::make (C++ function), 86
nw::Feat::operator* (C++ function), 86
nw::Feat::operator== (C++ function), 86
nw::Feat::operator<=> (C++ function), 86
nw::FeatArray (C++ type), 303
nw::FeatInfo (C++ struct), 86
nw::FeatInfo::all_can_use (C++ member), 86
nw::FeatInfo::category (C++ member), 86
nw::FeatInfo::constant (C++ member), 87
nw::FeatInfo::cr_value (C++ member), 87
nw::FeatInfo::description (C++ member), 86
nw::FeatInfo::epic (C++ member), 87
nw::FeatInfo::FeatInfo (C++ function), 86
nw::FeatInfo::hostile (C++ member), 87
nw::FeatInfo::icon (C++ member), 86
nw::FeatInfo::master (C++ member), 87
nw::FeatInfo::max_cr (C++ member), 86
nw::FeatInfo::name (C++ member), 86
nw::FeatInfo::requirements (C++ member), 87
nw::FeatInfo::requires_action (C++ member), 87
nw::FeatInfo::spell (C++ member), 87
nw::FeatInfo::successor (C++ member), 87
nw::FeatInfo::target_self (C++ member), 87
nw::FeatInfo::tools_categories (C++ member), 87
nw::FeatInfo::uses (C++ member), 87
nw::FeatInfo::valid (C++ function), 86
nw::find_first_effect_of (C++ function), 271
nw::from_base64 (C++ function), 271
nw::from_json (C++ function), 272, 275
nw::from_utf8 (C++ function), 276
nw::from_utf8_by_global_lang (C++ function), 276
nw::from_utf8_by_langid (C++ function), 276
nw::GameProfile (C++ struct), 87
nw::GameProfile::~~GameProfile (C++ function), 87
nw::GameProfile::load_resources (C++ function), 87
nw::GameProfile::load_rules (C++ function), 87
nw::GameVersion (C++ enum), 258
nw::GameVersion::invalid (C++ enumerator), 258
nw::GameVersion::nwn2 (C++ enumerator), 258
nw::GameVersion::v1_69 (C++ enumerator), 258
nw::GameVersion::vEE (C++ enumerator), 258
nw::get_all_available_feats (C++ function), 276

```



nw::Gff (C++ struct), 88  
 nw::Gff::field\_indices\_ (C++ member), 88  
 nw::Gff::fields\_ (C++ member), 88  
 nw::Gff::Gff (C++ function), 88  
 nw::Gff::head\_ (C++ member), 88  
 nw::Gff::labels\_ (C++ member), 88  
 nw::Gff::list\_indices\_ (C++ member), 88  
 nw::Gff::structs\_ (C++ member), 88  
 nw::Gff::toplevel (C++ function), 88  
 nw::Gff::type (C++ function), 88  
 nw::Gff::valid (C++ function), 88  
 nw::Gff::version (C++ function), 88  
 nw::gff\_to\_gffjson (C++ function), 276  
 nw::GffBuilder (C++ struct), 88  
 nw::GffBuilder::add\_label (C++ function), 89  
 nw::GffBuilder::build (C++ function), 89  
 nw::GffBuilder::data (C++ member), 89  
 nw::GffBuilder::field\_entries (C++ member), 89  
 nw::GffBuilder::field\_indices (C++ member), 89  
 nw::GffBuilder::GffBuilder (C++ function), 89  
 nw::GffBuilder::header (C++ member), 89  
 nw::GffBuilder::labels (C++ member), 89  
 nw::GffBuilder::list\_indices (C++ member), 89  
 nw::GffBuilder::struct\_entries (C++ member), 89  
 nw::GffBuilder::to\_byte\_array (C++ function), 89  
 nw::GffBuilder::top (C++ member), 89  
 nw::GffBuilder::write\_to (C++ function), 89  
 nw::GffBuilderField (C++ struct), 89  
 nw::GffBuilderField::data\_or\_offset (C++ member), 90  
 nw::GffBuilderField::GffBuilderField (C++ function), 89  
 nw::GffBuilderField::index (C++ member), 90  
 nw::GffBuilderField::label\_index (C++ member), 90  
 nw::GffBuilderField::parent (C++ member), 90  
 nw::GffBuilderField::structures (C++ member), 90  
 nw::GffBuilderField::type (C++ member), 90  
 nw::GffBuilderList (C++ struct), 90  
 nw::GffBuilderList::GffBuilderList (C++ function), 90  
 nw::GffBuilderList::parent (C++ member), 90  
 nw::GffBuilderList::push\_back (C++ function), 90  
 nw::GffBuilderList::size (C++ function), 90  
 nw::GffBuilderList::structs (C++ member), 90  
 nw::GffBuilderStruct (C++ struct), 90  
 nw::GffBuilderStruct::add\_field (C++ function), 91  
 nw::GffBuilderStruct::add\_list (C++ function), 91  
 nw::GffBuilderStruct::add\_struct (C++ function), 91  
 nw::GffBuilderStruct::field\_entries (C++ member), 91  
 nw::GffBuilderStruct::GffBuilderStruct (C++ function), 91  
 nw::GffBuilderStruct::id (C++ member), 91  
 nw::GffBuilderStruct::index (C++ member), 91  
 nw::GffBuilderStruct::parent (C++ member), 91  
 nw::GffField (C++ struct), 91  
 nw::GffField::get (C++ function), 91  
 nw::GffField::get\_to (C++ function), 91  
 nw::GffField::name (C++ function), 91  
 nw::GffField::operator[] (C++ function), 91  
 nw::GffField::size (C++ function), 91  
 nw::GffField::type (C++ function), 91  
 nw::GffField::valid (C++ function), 91  
 nw::GffLabel (C++ struct), 92  
 nw::GffLabel::empty (C++ function), 92  
 nw::GffLabel::GffLabel (C++ function), 92  
 nw::GffLabel::length (C++ function), 92  
 nw::GffLabel::max\_size (C++ member), 92  
 nw::GffLabel::operator= (C++ function), 92  
 nw::GffLabel::size\_type (C++ type), 92  
 nw::GffLabel::Storage (C++ type), 92  
 nw::GffLabel::string (C++ function), 92  
 nw::GffLabel::value\_type (C++ type), 92  
 nw::GffLabel::view (C++ function), 92  
 nw::GffStruct (C++ struct), 93  
 nw::GffStruct::get (C++ function), 93  
 nw::GffStruct::get\_to (C++ function), 93  
 nw::GffStruct::has\_field (C++ function), 93  
 nw::GffStruct::id (C++ function), 93  
 nw::GffStruct::operator[] (C++ function), 93  
 nw::GffStruct::size (C++ function), 93  
 nw::GffStruct::valid (C++ function), 93  
 nw::has\_effect\_applied (C++ function), 276  
 nw::has\_feat\_successor (C++ function), 276  
 nw::highest\_feat\_in\_range (C++ function), 277  
 nw::home\_path (C++ function), 277  
 nw::Image (C++ struct), 93  
 nw::Image::~Image (C++ function), 94  
 nw::Image::channels (C++ function), 94  
 nw::Image::data (C++ function), 94  
 nw::Image::height (C++ function), 94  
 nw::Image::Image (C++ function), 94  
 nw::Image::is\_bio\_dds (C++ function), 94  
 nw::Image::operator= (C++ function), 94  
 nw::Image::valid (C++ function), 94  
 nw::Image::width (C++ function), 94  
 nw::Image::write\_to (C++ function), 94  
 nw::Ini (C++ struct), 94  
 nw::Ini::get (C++ function), 95  
 nw::Ini::get\_to (C++ function), 95  
 nw::Ini::Ini (C++ function), 95  
 nw::Ini::valid (C++ function), 95

```

nw::init_logger (C++ function), 277
nw::InstallInfo (C++ struct), 95
nw::InstallInfo::install (C++ member), 95
nw::InstallInfo::user (C++ member), 95
nw::InstallInfo::version (C++ member), 95
nw::InternedString (C++ struct), 96
nw::InternedString::InternedString (C++ function), 96
nw::InternedString::operator bool (C++ function), 96
nw::InternedString::operator== (C++ function), 96
nw::InternedString::operator<=> (C++ function), 96
nw::InternedString::view (C++ function), 96
nw::Inventory (C++ struct), 96
nw::Inventory::~~Inventory (C++ function), 96
nw::Inventory::from_json (C++ function), 96
nw::Inventory::instantiate (C++ function), 96
nw::Inventory::Inventory (C++ function), 96
nw::Inventory::items (C++ member), 97
nw::Inventory::operator= (C++ function), 96
nw::Inventory::owner (C++ member), 97
nw::Inventory::to_json (C++ function), 96
nw::InventoryItem (C++ struct), 97
nw::InventoryItem::infinite (C++ member), 97
nw::InventoryItem::item (C++ member), 97
nw::InventoryItem::pos_x (C++ member), 97
nw::InventoryItem::pos_y (C++ member), 97
nw::is_attack_type_hit (C++ function), 277
nw::is_attack_type_miss (C++ function), 277
nw::istream_read (C++ function), 277
nw::Item (C++ struct), 97
nw::Item::additional_cost (C++ member), 99
nw::Item::armor_id (C++ member), 99
nw::Item::as_area (C++ function), 98
nw::Item::as_common (C++ function), 97
nw::Item::as_creature (C++ function), 98
nw::Item::as_door (C++ function), 98
nw::Item::as_encounter (C++ function), 98
nw::Item::as_item (C++ function), 97
nw::Item::as_module (C++ function), 98
nw::Item::as_placeable (C++ function), 98
nw::Item::as_player (C++ function), 98
nw::Item::as_sound (C++ function), 98
nw::Item::as_store (C++ function), 98
nw::Item::as_trigger (C++ function), 98
nw::Item::as_waypoint (C++ function), 98
nw::Item::baseitem (C++ member), 99
nw::Item::charges (C++ member), 99
nw::Item::common (C++ member), 98
nw::Item::cost (C++ member), 99
nw::Item::cursed (C++ member), 99
nw::Item::description (C++ member), 98
nw::Item::description_id (C++ member), 98
nw::Item::deserialize (C++ function), 99
nw::Item::effects (C++ function), 97
nw::Item::handle (C++ function), 97
nw::Item::identified (C++ member), 99
nw::Item::instantiate (C++ function), 97
nw::Item::instantiated_ (C++ member), 99
nw::Item::inventory (C++ member), 98
nw::Item::Item (C++ function), 97
nw::Item::json_archive_version (C++ member), 100
nw::Item::model_colors (C++ member), 99
nw::Item::model_parts (C++ member), 99
nw::Item::model_type (C++ member), 99
nw::Item::object_type (C++ member), 100
nw::Item::plot (C++ member), 99
nw::Item::properties (C++ member), 99
nw::Item::restype (C++ member), 100
nw::Item::serialize (C++ function), 99
nw::Item::set_handle (C++ function), 97
nw::Item::stacksize (C++ member), 99
nw::Item::stolen (C++ member), 99
nw::Item::tag (C++ function), 97
nw::Item::versus_me (C++ function), 98
nw::ItemColors (C++ struct), 100
nw::ItemColors::type (C++ enum), 100
nw::ItemColors::type::cloth1 (C++ enumerator), 100
nw::ItemColors::type::cloth2 (C++ enumerator), 100
nw::ItemColors::type::leather1 (C++ enumerator), 100
nw::ItemColors::type::leather2 (C++ enumerator), 100
nw::ItemColors::type::metal1 (C++ enumerator), 100
nw::ItemColors::type::metal2 (C++ enumerator), 100
nw::ItemModelParts (C++ struct), 100
nw::ItemModelParts::type (C++ enum), 100
nw::ItemModelParts::type::armor_belt (C++ enumerator), 101
nw::ItemModelParts::type::armor_lbicep (C++ enumerator), 101
nw::ItemModelParts::type::armor_lfarm (C++ enumerator), 101
nw::ItemModelParts::type::armor_lfoot (C++ enumerator), 101
nw::ItemModelParts::type::armor_lhand (C++ enumerator), 101
nw::ItemModelParts::type::armor_lshin (C++ enumerator), 101
nw::ItemModelParts::type::armor_lshoul (C++ enumerator), 101

```

nw::ItemModelParts::type::armor\_lthigh (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_neck (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_pelvis (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rbicep (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rfarm (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rfoot (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rhand (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_robe (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rshin (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rshoul (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_rthigh (C++ enumerator), 101  
 nw::ItemModelParts::type::armor\_torso (C++ enumerator), 101  
 nw::ItemModelParts::type::model1 (C++ enumerator), 100  
 nw::ItemModelParts::type::model2 (C++ enumerator), 100  
 nw::ItemModelParts::type::model3 (C++ enumerator), 101  
 nw::ItemModelType (C++ enum), 258  
 nw::ItemModelType::armor (C++ enumerator), 258  
 nw::ItemModelType::composite (C++ enumerator), 258  
 nw::ItemModelType::layered (C++ enumerator), 258  
 nw::ItemModelType::simple (C++ enumerator), 258  
 nw::itemprop\_to\_string (C++ function), 277  
 nw::ItemProperty (C++ struct), 102  
 nw::ItemProperty::cost\_table (C++ member), 102  
 nw::ItemProperty::cost\_value (C++ member), 102  
 nw::ItemProperty::param\_table (C++ member), 102  
 nw::ItemProperty::param\_value (C++ member), 102  
 nw::ItemProperty::subtype (C++ member), 102  
 nw::ItemProperty::type (C++ member), 102  
 nw::Journal (C++ struct), 102  
 nw::Journal::categories (C++ member), 102  
 nw::Journal::Journal (C++ function), 102  
 nw::Journal::json\_archive\_version (C++ member), 102  
 nw::Journal::restype (C++ member), 102  
 nw::JournalCategory (C++ struct), 103  
 nw::JournalCategory::comment (C++ member), 103  
 nw::JournalCategory::entries (C++ member), 103  
 nw::JournalCategory::name (C++ member), 103  
 nw::JournalCategory::picture (C++ member), 103  
 nw::JournalCategory::priority (C++ member), 103  
 nw::JournalCategory::tag (C++ member), 103  
 nw::JournalCategory::xp (C++ member), 103  
 nw::JournalEntry (C++ struct), 103  
 nw::JournalEntry::end (C++ member), 103  
 nw::JournalEntry::id (C++ member), 103  
 nw::JournalEntry::text (C++ member), 103  
 nw::kernel::config (C++ function), 277  
 nw::kernel::Config (C++ struct), 171  
 nw::kernel::Config::Config (C++ function), 172  
 nw::kernel::Config::initialize (C++ function), 172  
 nw::kernel::Config::install\_path (C++ function), 172  
 nw::kernel::Config::options (C++ function), 172  
 nw::kernel::Config::set\_paths (C++ function), 172  
 nw::kernel::Config::set\_version (C++ function), 172  
 nw::kernel::Config::user\_path (C++ function), 172  
 nw::kernel::Config::version (C++ function), 172  
 nw::kernel::EffectSystem (C++ struct), 172  
 nw::kernel::EffectSystem::~~EffectSystem (C++ function), 172  
 nw::kernel::EffectSystem::add (C++ function), 172  
 nw::kernel::EffectSystem::apply (C++ function), 172  
 nw::kernel::EffectSystem::clear (C++ function), 172  
 nw::kernel::EffectSystem::create (C++ function), 172  
 nw::kernel::EffectSystem::destroy (C++ function), 172  
 nw::kernel::EffectSystem::effect\_limits\_ability (C++ function), 172  
 nw::kernel::EffectSystem::effect\_limits\_armor\_class (C++ function), 173  
 nw::kernel::EffectSystem::effect\_limits\_attack (C++ function), 173  
 nw::kernel::EffectSystem::effect\_limits\_skill (C++ function), 173  
 nw::kernel::EffectSystem::generate (C++ function), 173  
 nw::kernel::EffectSystem::initialize (C++ function), 173  
 nw::kernel::EffectSystem::ip\_cost\_table (C++ function), 173

---

```

nw::kernel::EffectSystem::ip_definition      (C++ function), 173
nw::kernel::EffectSystem::ip_param_table     (C++ function), 173
nw::kernel::EffectSystem::remove (C++ function), 173
nw::kernel::EffectSystem::set_effect_limits_ability (C++ function), 173
nw::kernel::EffectSystem::set_effect_limits_armor (C++ function), 173
nw::kernel::EffectSystem::set_effect_limits_attack (C++ function), 173
nw::kernel::EffectSystem::set_effect_limits_skill (C++ function), 173
nw::kernel::EffectSystem::stats (C++ function), 173
nw::kernel::EventSystem (C++ struct), 173
nw::kernel::EventSystem::add (C++ function), 174
nw::kernel::EventSystem::clear (C++ function), 174
nw::kernel::EventSystem::initialize (C++ function), 174
nw::kernel::EventSystem::process (C++ function), 174
nw::kernel::EventSystem::queue_ (C++ member), 174
nw::kernel::EventSystem::storage (C++ type), 174
nw::kernel::load_module (C++ function), 278
nw::kernel::max_modifier (C++ function), 278
nw::kernel::objects (C++ function), 278
nw::kernel::ObjectSystem (C++ struct), 174
nw::kernel::ObjectSystem::~~ObjectSystem (C++ function), 174
nw::kernel::ObjectSystem::alloc (C++ function), 175
nw::kernel::ObjectSystem::clear (C++ function), 174
nw::kernel::ObjectSystem::destroy (C++ function), 174
nw::kernel::ObjectSystem::get (C++ function), 174
nw::kernel::ObjectSystem::get_by_tag (C++ function), 175
nw::kernel::ObjectSystem::get_object_base (C++ function), 175
nw::kernel::ObjectSystem::initialize (C++ function), 174
nw::kernel::ObjectSystem::load (C++ function), 175
nw::kernel::ObjectSystem::load_player (C++ function), 175
nw::kernel::ObjectSystem::make (C++ function), 175
nw::kernel::ObjectSystem::make_area (C++ function), 175
nw::kernel::ObjectSystem::make_module (C++ function), 175
nw::kernel::ObjectSystem::ObjectSystem (C++ function), 174
nw::kernel::ObjectSystem::operator= (C++ function), 174
nw::kernel::ObjectSystem::valid (C++ function), 175
nw::kernel::resman (C++ function), 279
nw::kernel::resolve_master_feat (C++ function), 279
nw::kernel::resolve_master_feats (C++ function), 279
nw::kernel::resolve_modifier (C++ function), 280
nw::kernel::Resources (C++ struct), 175
nw::kernel::Resources::~~Resources (C++ function), 176
nw::kernel::Resources::add_base_container (C++ function), 176
nw::kernel::Resources::add_custom_container (C++ function), 176
nw::kernel::Resources::add_override_container (C++ function), 176
nw::kernel::Resources::all (C++ function), 177
nw::kernel::Resources::clear (C++ function), 176
nw::kernel::Resources::clear_containers (C++ function), 176
nw::kernel::Resources::contains (C++ function), 177
nw::kernel::Resources::demand (C++ function), 177
nw::kernel::Resources::demand_any (C++ function), 176
nw::kernel::Resources::demand_in_order (C++ function), 177
nw::kernel::Resources::demand_server_vault (C++ function), 176
nw::kernel::Resources::extract (C++ function), 177
nw::kernel::Resources::extract_by_glob (C++ function), 177
nw::kernel::Resources::initialize (C++ function), 176
nw::kernel::Resources::load_module (C++ function), 176
nw::kernel::Resources::load_module_haks (C++ function), 176
nw::kernel::Resources::load_palette_textures (C++ function), 177
nw::kernel::Resources::name (C++ function), 177
nw::kernel::Resources::palette_texture (C++ function), 177

```



nw::kernel::Resources::path (C++ *function*), 177  
 nw::kernel::Resources::Resources (C++ *function*), 176  
 nw::kernel::Resources::SearchVector (C++ *type*), 176  
 nw::kernel::Resources::size (C++ *function*), 177  
 nw::kernel::Resources::stat (C++ *function*), 177  
 nw::kernel::Resources::unload\_module (C++ *function*), 176  
 nw::kernel::Resources::valid (C++ *function*), 177  
 nw::kernel::Resources::visit (C++ *function*), 177  
 nw::kernel::Resources::working\_directory (C++ *function*), 177  
 nw::kernel::rules (C++ *function*), 281  
 nw::kernel::Rules (C++ *struct*), 177  
 nw::kernel::Rules::~~Rules (C++ *function*), 178  
 nw::kernel::Rules::baseitems (C++ *member*), 178  
 nw::kernel::Rules::classes (C++ *member*), 178  
 nw::kernel::Rules::clear (C++ *function*), 178  
 nw::kernel::Rules::feats (C++ *member*), 178  
 nw::kernel::Rules::initialize (C++ *function*), 178  
 nw::kernel::Rules::master\_feats (C++ *member*), 178  
 nw::kernel::Rules::match (C++ *function*), 178  
 nw::kernel::Rules::meets\_requirement (C++ *function*), 178  
 nw::kernel::Rules::modifiers (C++ *member*), 179  
 nw::kernel::Rules::qualifier\_type (C++ *type*), 178  
 nw::kernel::Rules::races (C++ *member*), 178  
 nw::kernel::Rules::select (C++ *function*), 178  
 nw::kernel::Rules::selector\_type (C++ *type*), 178  
 nw::kernel::Rules::set\_qualifier (C++ *function*), 178  
 nw::kernel::Rules::set\_selector (C++ *function*), 178  
 nw::kernel::Rules::skills (C++ *member*), 178  
 nw::kernel::Rules::spells (C++ *member*), 178  
 nw::kernel::Rules::spellschools (C++ *member*), 178  
 nw::kernel::serial\_id\_to\_obj\_type (C++ *function*), 281  
 nw::kernel::Service (C++ *struct*), 179  
 nw::kernel::services (C++ *function*), 281  
 nw::kernel::Services (C++ *struct*), 179  
 nw::kernel::Services::add (C++ *function*), 179  
 nw::kernel::Services::effects (C++ *member*), 180  
 nw::kernel::Services::events (C++ *member*), 180  
 nw::kernel::Services::get (C++ *function*), 179  
 nw::kernel::Services::get\_mut (C++ *function*), 179  
 nw::kernel::Services::objects (C++ *member*), 180  
 nw::kernel::Services::profile (C++ *function*), 179  
 nw::kernel::Services::resources (C++ *member*), 180  
 nw::kernel::Services::rules (C++ *member*), 180  
 nw::kernel::Services::Services (C++ *function*), 179  
 nw::kernel::Services::shutdown (C++ *function*), 179  
 nw::kernel::Services::start (C++ *function*), 179  
 nw::kernel::Services::strings (C++ *member*), 180  
 nw::kernel::Services::twoda\_cache (C++ *member*), 180  
 nw::kernel::strings (C++ *function*), 281  
 nw::kernel::Strings (C++ *struct*), 180  
 nw::kernel::Strings::~~Strings (C++ *function*), 180  
 nw::kernel::Strings::clear (C++ *function*), 180  
 nw::kernel::Strings::get (C++ *function*), 180  
 nw::kernel::Strings::get\_interned (C++ *function*), 180  
 nw::kernel::Strings::global\_language (C++ *function*), 181  
 nw::kernel::Strings::initialize (C++ *function*), 180  
 nw::kernel::Strings::intern (C++ *function*), 180  
 nw::kernel::Strings::load\_custom\_tlk (C++ *function*), 181  
 nw::kernel::Strings::load\_dialog\_tlk (C++ *function*), 181  
 nw::kernel::Strings::set\_global\_language (C++ *function*), 181  
 nw::kernel::Strings::Strings (C++ *function*), 180  
 nw::kernel::Strings::unload\_custom\_tlk (C++ *function*), 181  
 nw::kernel::sum\_master\_feats (C++ *function*), 281  
 nw::kernel::sum\_modifier (C++ *function*), 281, 282  
 nw::kernel::unload\_module (C++ *function*), 282  
 nw::Key (C++ *struct*), 103  
 nw::Key::~~Key (C++ *function*), 104  
 nw::Key::all (C++ *function*), 104  
 nw::Key::contains (C++ *function*), 104  
 nw::Key::demand (C++ *function*), 104  
 nw::Key::extract (C++ *function*), 104  
 nw::Key::extract\_by\_glob (C++ *function*), 104  
 nw::Key::is\_loaded (C++ *function*), 104  
 nw::Key::Key (C++ *function*), 104  
 nw::Key::name (C++ *function*), 104  
 nw::Key::operator= (C++ *function*), 104  
 nw::Key::path (C++ *function*), 104

nw::Key::size (C++ function), 104  
 nw::Key::stat (C++ function), 104  
 nw::Key::valid (C++ function), 104  
 nw::Key::visit (C++ function), 104  
 nw::Key::working\_directory (C++ function), 104  
 nw::knows\_feat (C++ function), 282  
 nw::Language (C++ struct), 105  
 nw::Language::encoding (C++ function), 105  
 nw::Language::from\_string (C++ function), 105  
 nw::Language::has\_feminine (C++ function), 105  
 nw::Language::Properties (C++ struct), 105  
 nw::Language::Properties::encoding (C++ member), 105  
 nw::Language::Properties::has\_feminine (C++ member), 105  
 nw::Language::Properties::id (C++ member), 105  
 nw::Language::Properties::lang\_long (C++ member), 105  
 nw::Language::Properties::lang\_short (C++ member), 105  
 nw::Language::to\_base\_id (C++ function), 105  
 nw::Language::to\_runtime\_id (C++ function), 105  
 nw::Language::to\_string (C++ function), 105  
 nw::LanguageID (C++ enum), 258  
 nw::LanguageID::chinese\_simplified (C++ enumerator), 259  
 nw::LanguageID::chinese\_traditional (C++ enumerator), 259  
 nw::LanguageID::english (C++ enumerator), 258  
 nw::LanguageID::french (C++ enumerator), 258  
 nw::LanguageID::german (C++ enumerator), 258  
 nw::LanguageID::invalid (C++ enumerator), 258  
 nw::LanguageID::italian (C++ enumerator), 258  
 nw::LanguageID::japanese (C++ enumerator), 259  
 nw::LanguageID::korean (C++ enumerator), 259  
 nw::LanguageID::polish (C++ enumerator), 259  
 nw::LanguageID::spanish (C++ enumerator), 258  
 nw::LevelHistory (C++ struct), 106  
 nw::LevelHistory::entries (C++ member), 106  
 nw::LevelStats (C++ struct), 106  
 nw::LevelStats::entries (C++ member), 106  
 nw::LevelStats::from\_json (C++ function), 106  
 nw::LevelStats::level (C++ function), 106  
 nw::LevelStats::level\_by\_class (C++ function), 106  
 nw::LevelStats::LevelStats (C++ function), 106  
 nw::LevelStats::max\_classes (C++ member), 107  
 nw::LevelStats::npos (C++ member), 107  
 nw::LevelStats::position (C++ function), 106  
 nw::LevelStats::to\_json (C++ function), 106  
 nw::LocalData (C++ struct), 108  
 nw::LocalData::delete\_float (C++ function), 108  
 nw::LocalData::delete\_int (C++ function), 108  
 nw::LocalData::delete\_location (C++ function), 108  
 nw::LocalData::delete\_object (C++ function), 108  
 nw::LocalData::delete\_string (C++ function), 108  
 nw::LocalData::deserialize (C++ function), 109  
 nw::LocalData::from\_json (C++ function), 108  
 nw::LocalData::get\_float (C++ function), 108  
 nw::LocalData::get\_int (C++ function), 108  
 nw::LocalData::get\_location (C++ function), 108  
 nw::LocalData::get\_object (C++ function), 108  
 nw::LocalData::get\_string (C++ function), 108  
 nw::LocalData::LocalData (C++ function), 108  
 nw::LocalData::serialize (C++ function), 109  
 nw::LocalData::set\_float (C++ function), 108  
 nw::LocalData::set\_int (C++ function), 108  
 nw::LocalData::set\_location (C++ function), 108  
 nw::LocalData::set\_object (C++ function), 108  
 nw::LocalData::set\_string (C++ function), 108  
 nw::LocalData::size (C++ function), 108  
 nw::LocalData::to\_json (C++ function), 108  
 nw::LocalVar (C++ struct), 109  
 nw::LocalVar::flags (C++ member), 109  
 nw::LocalVar::float\_ (C++ member), 109  
 nw::LocalVar::integer (C++ member), 109  
 nw::LocalVar::loc (C++ member), 109  
 nw::LocalVar::object (C++ member), 109  
 nw::LocalVar::string (C++ member), 109  
 nw::LocalVarTable (C++ type), 304  
 nw::LocalVarType (C++ struct), 109  
 nw::LocalVarType::float\_ (C++ member), 109  
 nw::LocalVarType::integer (C++ member), 109  
 nw::LocalVarType::location (C++ member), 109  
 nw::LocalVarType::object (C++ member), 109  
 nw::LocalVarType::string (C++ member), 109  
 nw::Location (C++ struct), 110  
 nw::Location::area (C++ member), 110  
 nw::Location::Location (C++ function), 110  
 nw::Location::operator bool (C++ function), 110  
 nw::Location::operator== (C++ function), 110  
 nw::Location::orientation (C++ member), 110  
 nw::Location::position (C++ member), 110  
 nw::Lock (C++ struct), 110  
 nw::Lock::from\_json (C++ function), 110  
 nw::Lock::key\_name (C++ member), 110  
 nw::Lock::key\_required (C++ member), 110  
 nw::Lock::Lock (C++ function), 110  
 nw::Lock::lock\_dc (C++ member), 110  
 nw::Lock::lockable (C++ member), 110  
 nw::Lock::locked (C++ member), 110  
 nw::Lock::remove\_key (C++ member), 111  
 nw::Lock::to\_json (C++ function), 110  
 nw::Lock::unlock\_dc (C++ member), 111  
 nw::LocString (C++ struct), 107  
 nw::LocString::add (C++ function), 107

nw::LocString::begin (C++ function), 107, 108  
 nw::LocString::const\_iterator (C++ type), 107  
 nw::LocString::contains (C++ function), 107  
 nw::LocString::end (C++ function), 108  
 nw::LocString::get (C++ function), 107  
 nw::LocString::iterator (C++ type), 107  
 nw::LocString::LocString (C++ function), 107  
 nw::LocString::LocStringPair (C++ type), 107  
 nw::LocString::operator= (C++ function), 108  
 nw::LocString::operator== (C++ function), 108  
 nw::LocString::remove (C++ function), 107  
 nw::LocString::size (C++ function), 107  
 nw::LocString::size\_type (C++ type), 107  
 nw::LocString::Storage (C++ type), 107  
 nw::LocString::strref (C++ function), 107  
 nw::MasterFeat (C++ struct), 111  
 nw::MasterFeat::idx (C++ function), 111  
 nw::MasterFeat::invalid (C++ function), 111  
 nw::MasterFeat::make (C++ function), 111  
 nw::MasterFeat::operator\* (C++ function), 111  
 nw::MasterFeat::operator== (C++ function), 111  
 nw::MasterFeat::operator<=> (C++ function), 111  
 nw::MasterFeatRegistry (C++ struct), 111  
 nw::MasterFeatRegistry::add (C++ function), 111  
 nw::MasterFeatRegistry::clear (C++ function), 111  
 nw::MasterFeatRegistry::entries (C++ function), 111  
 nw::MasterFeatRegistry::get\_bonus (C++ function), 111  
 nw::MasterFeatRegistry::remove (C++ function), 111  
 nw::MasterFeatRegistry::set\_bonus (C++ function), 112  
 nw::max\_effects\_of (C++ function), 283  
 nw::model::AABBEntry (C++ struct), 181  
 nw::model::AABBEntry::bmax (C++ member), 181  
 nw::model::AABBEntry::bmin (C++ member), 181  
 nw::model::AABBEntry::leaf\_face (C++ member), 181  
 nw::model::AABBEntry::plane (C++ member), 181  
 nw::model::AABBNode (C++ struct), 182  
 nw::model::AABBNode::AABBNode (C++ function), 182  
 nw::model::AABBNode::add\_controller\_data (C++ function), 182  
 nw::model::AABBNode::ambient (C++ member), 182  
 nw::model::AABBNode::beaming (C++ member), 182  
 nw::model::AABBNode::bitmap (C++ member), 182  
 nw::model::AABBNode::bmax (C++ member), 182  
 nw::model::AABBNode::bmin (C++ member), 182  
 nw::model::AABBNode::center (C++ member), 182  
 nw::model::AABBNode::children (C++ member), 183  
 nw::model::AABBNode::colors (C++ member), 183  
 nw::model::AABBNode::controller\_data (C++ member), 183  
 nw::model::AABBNode::controller\_keys (C++ member), 183  
 nw::model::AABBNode::diffuse (C++ member), 182  
 nw::model::AABBNode::displtype (C++ member), 183  
 nw::model::AABBNode::entries (C++ member), 182  
 nw::model::AABBNode::get\_controller (C++ function), 182  
 nw::model::AABBNode::indices (C++ member), 183  
 nw::model::AABBNode::inheritcolor (C++ member), 183  
 nw::model::AABBNode::lightmapped (C++ member), 183  
 nw::model::AABBNode::materialname (C++ member), 182  
 nw::model::AABBNode::multimaterial (C++ member), 183  
 nw::model::AABBNode::name (C++ member), 183  
 nw::model::AABBNode::parent (C++ member), 183  
 nw::model::AABBNode::render (C++ member), 182  
 nw::model::AABBNode::renderhint (C++ member), 182  
 nw::model::AABBNode::rotatetexture (C++ member), 182  
 nw::model::AABBNode::shadow (C++ member), 182  
 nw::model::AABBNode::shininess (C++ member), 182  
 nw::model::AABBNode::showdispl (C++ member), 183  
 nw::model::AABBNode::specular (C++ member), 183  
 nw::model::AABBNode::textures (C++ member), 183  
 nw::model::AABBNode::tilefade (C++ member), 183  
 nw::model::AABBNode::transparencyhint (C++ member), 183  
 nw::model::AABBNode::type (C++ member), 183  
 nw::model::AABBNode::vertices (C++ member), 183  
 nw::model::Animation (C++ struct), 184  
 nw::model::Animation::~Animation (C++ function), 184  
 nw::model::Animation::anim\_root (C++ member), 184  
 nw::model::Animation::Animation (C++ function), 184  
 nw::model::Animation::events (C++ member), 184  
 nw::model::Animation::find (C++ function), 184  
 nw::model::Animation::length (C++ member), 184  
 nw::model::Animation::name (C++ member), 184

```

nw::model::Animation::nodes (C++ member), 184
nw::model::Animation::transition_time (C++ member), 184
nw::model::Animation::type (C++ member), 184
nw::model::AnimationEvent (C++ struct), 184
nw::model::AnimationEvent::name (C++ member), 184
nw::model::AnimationEvent::time (C++ member), 184
nw::model::AnimeshNode (C++ struct), 185
nw::model::AnimeshNode::add_controller_data (C++ function), 185
nw::model::AnimeshNode::ambient (C++ member), 185
nw::model::AnimeshNode::AnimeshNode (C++ function), 185
nw::model::AnimeshNode::animtverts (C++ member), 185
nw::model::AnimeshNode::animverts (C++ member), 185
nw::model::AnimeshNode::beaming (C++ member), 185
nw::model::AnimeshNode::bitmap (C++ member), 185
nw::model::AnimeshNode::bmax (C++ member), 185
nw::model::AnimeshNode::bmin (C++ member), 185
nw::model::AnimeshNode::center (C++ member), 185
nw::model::AnimeshNode::children (C++ member), 187
nw::model::AnimeshNode::cliph (C++ member), 185
nw::model::AnimeshNode::clipu (C++ member), 185
nw::model::AnimeshNode::clipv (C++ member), 185
nw::model::AnimeshNode::clipw (C++ member), 185
nw::model::AnimeshNode::colors (C++ member), 186
nw::model::AnimeshNode::controller_data (C++ member), 187
nw::model::AnimeshNode::controller_keys (C++ member), 187
nw::model::AnimeshNode::diffuse (C++ member), 185
nw::model::AnimeshNode::displtype (C++ member), 186
nw::model::AnimeshNode::get_controller (C++ function), 185
nw::model::AnimeshNode::indices (C++ member), 186
nw::model::AnimeshNode::inheritcolor (C++ member), 186
nw::model::AnimeshNode::lightmapped (C++ member), 186
nw::model::AnimeshNode::materialname (C++ member), 186
nw::model::AnimeshNode::multimaterial (C++ member), 186
nw::model::AnimeshNode::name (C++ member), 186
nw::model::AnimeshNode::parent (C++ member), 186
nw::model::AnimeshNode::render (C++ member), 186
nw::model::AnimeshNode::renderhint (C++ member), 186
nw::model::AnimeshNode::rotatetexture (C++ member), 186
nw::model::AnimeshNode::sampleperiod (C++ member), 185
nw::model::AnimeshNode::shadow (C++ member), 186
nw::model::AnimeshNode::shininess (C++ member), 186
nw::model::AnimeshNode::showdispl (C++ member), 186
nw::model::AnimeshNode::specular (C++ member), 186
nw::model::AnimeshNode::textures (C++ member), 186
nw::model::AnimeshNode::tilefade (C++ member), 186
nw::model::AnimeshNode::transparencyhint (C++ member), 186
nw::model::AnimeshNode::type (C++ member), 186
nw::model::AnimeshNode::vertices (C++ member), 186
nw::model::CameraNode (C++ struct), 187
nw::model::CameraNode::add_controller_data (C++ function), 187
nw::model::CameraNode::CameraNode (C++ function), 187
nw::model::CameraNode::children (C++ member), 187
nw::model::CameraNode::controller_data (C++ member), 187
nw::model::CameraNode::controller_keys (C++ member), 187
nw::model::CameraNode::get_controller (C++ function), 187
nw::model::CameraNode::inheritcolor (C++ member), 187
nw::model::CameraNode::name (C++ member), 187
nw::model::CameraNode::parent (C++ member), 187
nw::model::CameraNode::type (C++ member), 187
nw::model::ControllerKey (C++ struct), 188

```

---

nw::model::ControllerKey::columns (C++ member), 188	189	nw::model::ControllerType::inherit (C++ member), 191
nw::model::ControllerKey::ControllerKey (C++ function), 188		nw::model::ControllerType::inherit_local (C++ member), 191
nw::model::ControllerKey::data_offset (C++ member), 188		nw::model::ControllerType::LifeExp (C++ member), 190
nw::model::ControllerKey::is_key (C++ member), 188		nw::model::ControllerType::LightningDelay (C++ member), 190
nw::model::ControllerKey::key_offset (C++ member), 188		nw::model::ControllerType::LightningRadius (C++ member), 190
nw::model::ControllerKey::name (C++ member), 188		nw::model::ControllerType::LightningScale (C++ member), 190
nw::model::ControllerKey::rows (C++ member), 188		nw::model::ControllerType::LightningSubDiv (C++ member), 190
nw::model::ControllerKey::time_offset (C++ member), 188		nw::model::ControllerType::lock_axes (C++ member), 191
nw::model::ControllerKey::type (C++ member), 188		nw::model::ControllerType::lookup (C++ function), 188
nw::model::ControllerType (C++ struct), 188		nw::model::ControllerType::map (C++ member), 191
nw::model::ControllerType::Alpha (C++ member), 191		nw::model::ControllerType::Mass (C++ member), 190
nw::model::ControllerType::AlphaEnd (C++ member), 189		nw::model::ControllerType::Multiplier (C++ member), 189
nw::model::ControllerType::AlphaMid (C++ member), 191		nw::model::ControllerType::Orientation (C++ member), 189
nw::model::ControllerType::AlphaStart (C++ member), 189		nw::model::ControllerType::P2P_Bezier2 (C++ member), 190
nw::model::ControllerType::BirthRate (C++ member), 189		nw::model::ControllerType::P2P_Bezier3 (C++ member), 190
nw::model::ControllerType::BlurLength (C++ member), 190		nw::model::ControllerType::ParticleRot (C++ member), 190
nw::model::ControllerType::Bounce_Co (C++ member), 189		nw::model::ControllerType::PercentEnd (C++ member), 191
nw::model::ControllerType::Color (C++ member), 189		nw::model::ControllerType::PercentMid (C++ member), 191
nw::model::ControllerType::ColorEnd (C++ member), 189		nw::model::ControllerType::PercentStart (C++ member), 191
nw::model::ControllerType::ColorMid (C++ member), 191		nw::model::ControllerType::Position (C++ member), 189
nw::model::ControllerType::ColorStart (C++ member), 189		nw::model::ControllerType::Radius (C++ member), 189
nw::model::ControllerType::CombineTime (C++ member), 189		nw::model::ControllerType::random (C++ member), 191
nw::model::ControllerType::Detonate (C++ member), 190		nw::model::ControllerType::RandVel (C++ member), 190
nw::model::ControllerType::Drag (C++ member), 189		nw::model::ControllerType::Scale (C++ member), 189
nw::model::ControllerType::FPS (C++ member), 189		nw::model::ControllerType::SelfIllumColor (C++ member), 191
nw::model::ControllerType::FrameEnd (C++ member), 189		nw::model::ControllerType::ShadowRadius (C++ member), 189
nw::model::ControllerType::FrameStart (C++ member), 189		nw::model::ControllerType::SizeEnd (C++ member), 189
nw::model::ControllerType::Grav (C++ member), 189		



```

        ber), 190
nw::model::ControllerType::SizeEnd_Y    (C++
        member), 190
nw::model::ControllerType::SizeMid (C++ mem-
        ber), 191
nw::model::ControllerType::SizeMid_Y    (C++
        member), 191
nw::model::ControllerType::SizeStart    (C++
        member), 190
nw::model::ControllerType::SizeStart_Y (C++
        member), 190
nw::model::ControllerType::spawn_type  (C++
        member), 191
nw::model::ControllerType::Spread (C++ mem-
        ber), 190
nw::model::ControllerType::Threshold    (C++
        member), 190
nw::model::ControllerType::Velocity    (C++
        member), 190
nw::model::ControllerType::VerticalDisplacement
        (C++ member), 189
nw::model::ControllerType::Wirecolor    (C++
        member), 189
nw::model::ControllerType::XSize (C++ mem-
        ber), 190
nw::model::ControllerType::YSize (C++ mem-
        ber), 190
nw::model::DanglymeshNode (C++ struct), 191
nw::model::DanglymeshNode::add_controller_data
        (C++ function), 192
nw::model::DanglymeshNode::ambient (C++ mem-
        ber), 192
nw::model::DanglymeshNode::beaming (C++ mem-
        ber), 192
nw::model::DanglymeshNode::bitmap (C++ mem-
        ber), 192
nw::model::DanglymeshNode::bmax (C++ member),
        192
nw::model::DanglymeshNode::bmin (C++ member),
        192
nw::model::DanglymeshNode::center (C++ mem-
        ber), 192
nw::model::DanglymeshNode::children    (C++
        member), 193
nw::model::DanglymeshNode::colors (C++ mem-
        ber), 193
nw::model::DanglymeshNode::constraints (C++
        member), 192
nw::model::DanglymeshNode::controller_data
        (C++ member), 193
nw::model::DanglymeshNode::controller_keys
        (C++ member), 193
nw::model::DanglymeshNode::DanglymeshNode
        (C++ function), 192
nw::model::DanglymeshNode::diffuse (C++ mem-
        ber), 192
nw::model::DanglymeshNode::displacement
        (C++ member), 192
nw::model::DanglymeshNode::displtype  (C++
        member), 193
nw::model::DanglymeshNode::get_controller
        (C++ function), 192
nw::model::DanglymeshNode::indices (C++ mem-
        ber), 193
nw::model::DanglymeshNode::inheritcolor
        (C++ member), 193
nw::model::DanglymeshNode::lightmapped (C++
        member), 193
nw::model::DanglymeshNode::materialname
        (C++ member), 192
nw::model::DanglymeshNode::multimaterial
        (C++ member), 193
nw::model::DanglymeshNode::name (C++ member),
        193
nw::model::DanglymeshNode::parent (C++ mem-
        ber), 193
nw::model::DanglymeshNode::period (C++ mem-
        ber), 192
nw::model::DanglymeshNode::render (C++ mem-
        ber), 192
nw::model::DanglymeshNode::renderhint (C++
        member), 192
nw::model::DanglymeshNode::rotatetexture
        (C++ member), 192
nw::model::DanglymeshNode::shadow (C++ mem-
        ber), 192
nw::model::DanglymeshNode::shininess  (C++
        member), 192
nw::model::DanglymeshNode::showdispl  (C++
        member), 193
nw::model::DanglymeshNode::specular    (C++
        member), 193
nw::model::DanglymeshNode::textures    (C++
        member), 193
nw::model::DanglymeshNode::tightness   (C++
        member), 192
nw::model::DanglymeshNode::tilefade    (C++
        member), 193
nw::model::DanglymeshNode::transparencyhint
        (C++ member), 193
nw::model::DanglymeshNode::type (C++ member),
        193
nw::model::DanglymeshNode::vertices    (C++
        member), 193
nw::model::DummyNode (C++ struct), 194
nw::model::DummyNode::add_controller_data
        (C++ function), 194
nw::model::DummyNode::children (C++ member),

```

194

`nw::model::DummyNode::controller_data` (C++ member), 194

`nw::model::DummyNode::controller_keys` (C++ member), 194

`nw::model::DummyNode::DummyNode` (C++ function), 194

`nw::model::DummyNode::get_controller` (C++ function), 194

`nw::model::DummyNode::inheritcolor` (C++ member), 194

`nw::model::DummyNode::name` (C++ member), 194

`nw::model::DummyNode::parent` (C++ member), 194

`nw::model::DummyNode::type` (C++ member), 194

`nw::model::EmitterFlag` (C++ struct), 194

`nw::model::EmitterFlag::AffectedByWind` (C++ member), 194

`nw::model::EmitterFlag::Bounce` (C++ member), 195

`nw::model::EmitterFlag::Inherit` (C++ member), 195

`nw::model::EmitterFlag::InheritLocal` (C++ member), 195

`nw::model::EmitterFlag::InheritPart` (C++ member), 195

`nw::model::EmitterFlag::InheritVel` (C++ member), 195

`nw::model::EmitterFlag::IsTinted` (C++ member), 194

`nw::model::EmitterFlag::P2P` (C++ member), 194

`nw::model::EmitterFlag::P2PSel` (C++ member), 194

`nw::model::EmitterFlag::Random` (C++ member), 195

`nw::model::EmitterFlag::Splat` (C++ member), 195

`nw::model::EmitterNode` (C++ struct), 195

`nw::model::EmitterNode::add_controller_data` (C++ function), 195

`nw::model::EmitterNode::blastlength` (C++ member), 195

`nw::model::EmitterNode::blastradius` (C++ member), 195

`nw::model::EmitterNode::blend` (C++ member), 195

`nw::model::EmitterNode::blend_sel` (C++ member), 196

`nw::model::EmitterNode::children` (C++ member), 196

`nw::model::EmitterNode::chunkname` (C++ member), 195

`nw::model::EmitterNode::controller_data` (C++ member), 197

`nw::model::EmitterNode::controller_keys` (C++ member), 197

`nw::model::EmitterNode::deadspace` (C++ member), 195

`nw::model::EmitterNode::EmitterNode` (C++ function), 195

`nw::model::EmitterNode::flags` (C++ member), 196

`nw::model::EmitterNode::get_controller` (C++ function), 195

`nw::model::EmitterNode::inheritcolor` (C++ member), 196

`nw::model::EmitterNode::loop` (C++ member), 195

`nw::model::EmitterNode::name` (C++ member), 196

`nw::model::EmitterNode::opacity` (C++ member), 196

`nw::model::EmitterNode::p2p_type` (C++ member), 196

`nw::model::EmitterNode::parent` (C++ member), 196

`nw::model::EmitterNode::render` (C++ member), 196

`nw::model::EmitterNode::render_sel` (C++ member), 196

`nw::model::EmitterNode::renderorder` (C++ member), 196

`nw::model::EmitterNode::spawntype` (C++ member), 196

`nw::model::EmitterNode::spawntype_sel` (C++ member), 196

`nw::model::EmitterNode::texture` (C++ member), 196

`nw::model::EmitterNode::tilefade` (C++ member), 196

`nw::model::EmitterNode::twosidedtex` (C++ member), 196

`nw::model::EmitterNode::type` (C++ member), 196

`nw::model::EmitterNode::update` (C++ member), 196

`nw::model::EmitterNode::update_sel` (C++ member), 196

`nw::model::EmitterNode::xgrid` (C++ member), 196

`nw::model::EmitterNode::ygrid` (C++ member), 196

`nw::model::Face` (C++ struct), 197

`nw::model::Face::material_idx` (C++ member), 197

`nw::model::Face::shader_group_idx` (C++ member), 197

`nw::model::Face::tvert_idx` (C++ member), 197

`nw::model::Face::vert_idx` (C++ member), 197

`nw::model::Geometry` (C++ struct), 197

`nw::model::Geometry::~~Geometry` (C++ function), 197

nw::model::Geometry::find (C++ function), 197  
 nw::model::Geometry::Geometry (C++ function), 197  
 nw::model::Geometry::name (C++ member), 198  
 nw::model::Geometry::nodes (C++ member), 198  
 nw::model::Geometry::operator= (C++ function), 197  
 nw::model::Geometry::type (C++ member), 198  
 nw::model::LightNode (C++ struct), 198  
 nw::model::LightNode::~~LightNode (C++ function), 198  
 nw::model::LightNode::add\_controller\_data (C++ function), 198  
 nw::model::LightNode::affectdynamic (C++ member), 199  
 nw::model::LightNode::ambientonly (C++ member), 199  
 nw::model::LightNode::children (C++ member), 199  
 nw::model::LightNode::color (C++ member), 198  
 nw::model::LightNode::controller\_data (C++ member), 199  
 nw::model::LightNode::controller\_keys (C++ member), 199  
 nw::model::LightNode::dynamic (C++ member), 199  
 nw::model::LightNode::fadinglight (C++ member), 199  
 nw::model::LightNode::flarecolorshifts (C++ member), 199  
 nw::model::LightNode::flarepositions (C++ member), 199  
 nw::model::LightNode::flareradius (C++ member), 198  
 nw::model::LightNode::flaresizes (C++ member), 199  
 nw::model::LightNode::generateflare (C++ member), 199  
 nw::model::LightNode::get\_controller (C++ function), 198  
 nw::model::LightNode::inheritcolor (C++ member), 199  
 nw::model::LightNode::lensflares (C++ member), 198  
 nw::model::LightNode::LightNode (C++ function), 198  
 nw::model::LightNode::lightpriority (C++ member), 199  
 nw::model::LightNode::multiplier (C++ member), 198  
 nw::model::LightNode::name (C++ member), 199  
 nw::model::LightNode::parent (C++ member), 199  
 nw::model::LightNode::shadow (C++ member), 199  
 nw::model::LightNode::textures (C++ member), 199  
 nw::model::LightNode::type (C++ member), 199  
 nw::model::Mdl (C++ class), 200  
 nw::model::Mdl::make\_node (C++ function), 200  
 nw::model::Mdl::Mdl (C++ function), 200  
 nw::model::Mdl::model (C++ member), 200  
 nw::model::Mdl::valid (C++ function), 200  
 nw::model::Model (C++ struct), 200  
 nw::model::Model::~~Model (C++ function), 200  
 nw::model::Model::animations (C++ member), 201  
 nw::model::Model::animationscale (C++ member), 201  
 nw::model::Model::bmax (C++ member), 201  
 nw::model::Model::bmin (C++ member), 201  
 nw::model::Model::classification (C++ member), 201  
 nw::model::Model::file\_dependency (C++ member), 201  
 nw::model::Model::find (C++ function), 201  
 nw::model::Model::find\_animation (C++ function), 200, 201  
 nw::model::Model::ignorefog (C++ member), 201  
 nw::model::Model::Model (C++ function), 200  
 nw::model::Model::name (C++ member), 201  
 nw::model::Model::nodes (C++ member), 201  
 nw::model::Model::operator= (C++ function), 200  
 nw::model::Model::radius (C++ member), 201  
 nw::model::Model::supermodel (C++ member), 201  
 nw::model::Model::supermodel\_name (C++ member), 201  
 nw::model::Model::type (C++ member), 201  
 nw::model::Node (C++ struct), 201  
 nw::model::Node::~~Node (C++ function), 202  
 nw::model::Node::add\_controller\_data (C++ function), 202  
 nw::model::Node::children (C++ member), 202  
 nw::model::Node::controller\_data (C++ member), 202  
 nw::model::Node::controller\_keys (C++ member), 202  
 nw::model::Node::get\_controller (C++ function), 202  
 nw::model::Node::inheritcolor (C++ member), 202  
 nw::model::Node::name (C++ member), 202  
 nw::model::Node::Node (C++ function), 202  
 nw::model::Node::parent (C++ member), 202  
 nw::model::Node::type (C++ member), 202  
 nw::model::NodeFlags (C++ struct), 202  
 nw::model::NodeFlags::aabb (C++ member), 203  
 nw::model::NodeFlags::anim (C++ member), 203  
 nw::model::NodeFlags::camera (C++ member), 203  
 nw::model::NodeFlags::dangly (C++ member), 203



---

```

nw::model::NodeFlags::emitter (C++ member),
    203
nw::model::NodeFlags::header (C++ member), 203
nw::model::NodeFlags::light (C++ member), 203
nw::model::NodeFlags::mesh (C++ member), 203
nw::model::NodeFlags::patch (C++ member), 203
nw::model::NodeFlags::reference (C++ member),
    203
nw::model::NodeFlags::skin (C++ member), 203
nw::model::NodeType (C++ struct), 203
nw::model::NodeType::aabb (C++ member), 204
nw::model::NodeType::animmesh (C++ member),
    204
nw::model::NodeType::camera (C++ member), 203
nw::model::NodeType::danglymesh (C++ member),
    204
nw::model::NodeType::dummy (C++ member), 203
nw::model::NodeType::emitter (C++ member), 203
nw::model::NodeType::from_string (C++ function), 203
nw::model::NodeType::light (C++ member), 203
nw::model::NodeType::patch (C++ member), 204
nw::model::NodeType::reference (C++ member),
    204
nw::model::NodeType::skin (C++ member), 204
nw::model::NodeType::to_string (C++ function),
    203
nw::model::NodeType::trimesh (C++ member), 204
nw::model::PatchNode (C++ struct), 204
nw::model::PatchNode::add_controller_data
    (C++ function), 204
nw::model::PatchNode::children (C++ member),
    204
nw::model::PatchNode::controller_data (C++
    member), 205
nw::model::PatchNode::controller_keys (C++
    member), 204
nw::model::PatchNode::get_controller (C++
    function), 204
nw::model::PatchNode::inheritcolor (C++ mem-
    ber), 204
nw::model::PatchNode::name (C++ member), 204
nw::model::PatchNode::parent (C++ member), 204
nw::model::PatchNode::PatchNode (C++ function),
    204
nw::model::PatchNode::type (C++ member), 204
nw::model::ReferenceNode (C++ struct), 205
nw::model::ReferenceNode::add_controller_data
    (C++ function), 205
nw::model::ReferenceNode::children (C++ mem-
    ber), 205
nw::model::ReferenceNode::controller_data
    (C++ member), 205
nw::model::ReferenceNode::controller_keys
    (C++ member), 205
nw::model::ReferenceNode::emitter (C++ member), 205
nw::model::ReferenceNode::get_controller
    (C++ function), 205
nw::model::ReferenceNode::inheritcolor (C++
    member), 205
nw::model::ReferenceNode::name (C++ member),
    205
nw::model::ReferenceNode::parent (C++ mem-
    ber), 205
nw::model::ReferenceNode::reattachable (C++
    member), 205
nw::model::ReferenceNode::ReferenceNode
    (C++ function), 205
nw::model::ReferenceNode::refmodel (C++ mem-
    ber), 205
nw::model::ReferenceNode::type (C++ member),
    205
nw::model::SkinNode (C++ struct), 206
nw::model::SkinNode::add_controller_data
    (C++ function), 206
nw::model::SkinNode::ambient (C++ member), 206
nw::model::SkinNode::beaming (C++ member), 206
nw::model::SkinNode::bitmap (C++ member), 206
nw::model::SkinNode::bmax (C++ member), 206
nw::model::SkinNode::bmin (C++ member), 206
nw::model::SkinNode::bone_nodes (C++ member),
    206
nw::model::SkinNode::center (C++ member), 206
nw::model::SkinNode::children (C++ member),
    207
nw::model::SkinNode::colors (C++ member), 207
nw::model::SkinNode::controller_data (C++
    member), 207
nw::model::SkinNode::controller_keys (C++
    member), 207
nw::model::SkinNode::diffuse (C++ member), 206
nw::model::SkinNode::displtype (C++ member),
    207
nw::model::SkinNode::get_controller (C++
    function), 206
nw::model::SkinNode::indices (C++ member), 207
nw::model::SkinNode::inheritcolor (C++ mem-
    ber), 207
nw::model::SkinNode::lightmapped (C++ mem-
    ber), 207
nw::model::SkinNode::materialname (C++ mem-
    ber), 206
nw::model::SkinNode::multimaterial (C++ mem-
    ber), 207
nw::model::SkinNode::name (C++ member), 207
nw::model::SkinNode::parent (C++ member), 207
nw::model::SkinNode::render (C++ member), 206
nw::model::SkinNode::renderhint (C++ member),
    206

```

---

nw::model::SkinNode::rotatetexture (C++ member), 206  
 nw::model::SkinNode::shadow (C++ member), 206  
 nw::model::SkinNode::shininess (C++ member), 207  
 nw::model::SkinNode::showdispl (C++ member), 207  
 nw::model::SkinNode::SkinNode (C++ function), 206  
 nw::model::SkinNode::specular (C++ member), 207  
 nw::model::SkinNode::textures (C++ member), 207  
 nw::model::SkinNode::tilefade (C++ member), 207  
 nw::model::SkinNode::transparencyhint (C++ member), 207  
 nw::model::SkinNode::type (C++ member), 207  
 nw::model::SkinNode::vertices (C++ member), 206  
 nw::model::TextParser (C++ class), 200  
 nw::model::TextParser::parse (C++ function), 200  
 nw::model::TextParser::TextParser (C++ function), 200  
 nw::model::TrimeshNode (C++ struct), 208  
 nw::model::TrimeshNode::~~TrimeshNode (C++ function), 208  
 nw::model::TrimeshNode::add\_controller\_data (C++ function), 208  
 nw::model::TrimeshNode::ambient (C++ member), 208  
 nw::model::TrimeshNode::beaming (C++ member), 208  
 nw::model::TrimeshNode::bitmap (C++ member), 208  
 nw::model::TrimeshNode::bmax (C++ member), 208  
 nw::model::TrimeshNode::bmin (C++ member), 208  
 nw::model::TrimeshNode::center (C++ member), 208  
 nw::model::TrimeshNode::children (C++ member), 210  
 nw::model::TrimeshNode::colors (C++ member), 209  
 nw::model::TrimeshNode::controller\_data (C++ member), 210  
 nw::model::TrimeshNode::controller\_keys (C++ member), 210  
 nw::model::TrimeshNode::diffuse (C++ member), 208  
 nw::model::TrimeshNode::displtype (C++ member), 209  
 nw::model::TrimeshNode::get\_controller (C++ function), 208  
 nw::model::TrimeshNode::indices (C++ member), 209  
 nw::model::TrimeshNode::inheritcolor (C++ member), 209  
 nw::model::TrimeshNode::lightmapped (C++ member), 209  
 nw::model::TrimeshNode::materialname (C++ member), 209  
 nw::model::TrimeshNode::multimaterial (C++ member), 209  
 nw::model::TrimeshNode::name (C++ member), 209  
 nw::model::TrimeshNode::parent (C++ member), 209  
 nw::model::TrimeshNode::render (C++ member), 209  
 nw::model::TrimeshNode::renderhint (C++ member), 209  
 nw::model::TrimeshNode::rotatetexture (C++ member), 209  
 nw::model::TrimeshNode::shadow (C++ member), 209  
 nw::model::TrimeshNode::shininess (C++ member), 209  
 nw::model::TrimeshNode::showdispl (C++ member), 209  
 nw::model::TrimeshNode::specular (C++ member), 209  
 nw::model::TrimeshNode::textures (C++ member), 209  
 nw::model::TrimeshNode::tilefade (C++ member), 209  
 nw::model::TrimeshNode::transparencyhint (C++ member), 209  
 nw::model::TrimeshNode::TrimeshNode (C++ function), 208  
 nw::model::TrimeshNode::type (C++ member), 209  
 nw::model::TrimeshNode::vertices (C++ member), 209  
 nw::Modifier (C++ struct), 112  
 nw::Modifier::input (C++ member), 112  
 nw::Modifier::requirement (C++ member), 112  
 nw::Modifier::source (C++ member), 112  
 nw::Modifier::subtype (C++ member), 112  
 nw::Modifier::tagged (C++ member), 112  
 nw::Modifier::type (C++ member), 112  
 nw::Modifier::versus (C++ member), 112  
 nw::ModifierFunction (C++ type), 304  
 nw::ModifierRegistry (C++ struct), 112  
 nw::ModifierRegistry::add (C++ function), 113  
 nw::ModifierRegistry::begin (C++ function), 113  
 nw::ModifierRegistry::cbegin (C++ function), 113  
 nw::ModifierRegistry::cend (C++ function), 113  
 nw::ModifierRegistry::clear (C++ function), 113  
 nw::ModifierRegistry::const\_iterator (C++ type), 112

nw::ModifierRegistry::end (C++ function), 113  
 nw::ModifierRegistry::iterator (C++ type), 112  
 nw::ModifierRegistry::remove (C++ function), 113  
 nw::ModifierRegistry::replace (C++ function), 113  
 nw::ModifierRegistry::size (C++ function), 113  
 nw::ModifierRegistry::Storage (C++ type), 112  
 nw::ModifierResult (C++ type), 304  
 nw::ModifierType (C++ struct), 114  
 nw::ModifierType::idx (C++ function), 114  
 nw::ModifierType::invalid (C++ function), 114  
 nw::ModifierType::make (C++ function), 114  
 nw::ModifierType::operator\* (C++ function), 114  
 nw::ModifierType::operator== (C++ function), 114  
 nw::ModifierType::operator<=> (C++ function), 114  
 nw::ModifierVariant (C++ type), 304  
 nw::Module (C++ struct), 114  
 nw::Module::area\_count (C++ function), 114  
 nw::Module::areas (C++ member), 116  
 nw::Module::AreaVariant (C++ type), 114  
 nw::Module::as\_area (C++ function), 115  
 nw::Module::as\_common (C++ function), 115  
 nw::Module::as\_creature (C++ function), 115  
 nw::Module::as\_door (C++ function), 115  
 nw::Module::as\_encounter (C++ function), 115  
 nw::Module::as\_item (C++ function), 115  
 nw::Module::as\_module (C++ function), 114  
 nw::Module::as\_placeable (C++ function), 115  
 nw::Module::as\_player (C++ function), 115  
 nw::Module::as\_sound (C++ function), 115  
 nw::Module::as\_store (C++ function), 115  
 nw::Module::as\_trigger (C++ function), 115  
 nw::Module::as\_waypoint (C++ function), 115  
 nw::Module::creator (C++ member), 116  
 nw::Module::dawn\_hour (C++ member), 116  
 nw::Module::description (C++ member), 116  
 nw::Module::deserialize (C++ function), 117  
 nw::Module::dusk\_hour (C++ member), 116  
 nw::Module::effects (C++ function), 115  
 nw::Module::entry\_area (C++ member), 116  
 nw::Module::entry\_orientation (C++ member), 116  
 nw::Module::entry\_position (C++ member), 116  
 nw::Module::expansion\_pack (C++ member), 116  
 nw::Module::get\_area (C++ function), 114  
 nw::Module::haks (C++ member), 116  
 nw::Module::handle (C++ function), 114  
 nw::Module::id (C++ member), 116  
 nw::Module::instantiate (C++ function), 114  
 nw::Module::instantiated\_ (C++ member), 117  
 nw::Module::is\_save\_game (C++ member), 117  
 nw::Module::json\_archive\_version (C++ member), 117  
 nw::Module::locals (C++ member), 116  
 nw::Module::min\_game\_version (C++ member), 116  
 nw::Module::minutes\_per\_hour (C++ member), 117  
 nw::Module::name (C++ member), 116  
 nw::Module::object\_type (C++ member), 117  
 nw::Module::restype (C++ member), 117  
 nw::Module::scripts (C++ member), 116  
 nw::Module::serialize (C++ function), 117  
 nw::Module::set\_handle (C++ function), 114  
 nw::Module::start\_day (C++ member), 117  
 nw::Module::start\_hour (C++ member), 117  
 nw::Module::start\_month (C++ member), 117  
 nw::Module::start\_movie (C++ member), 116  
 nw::Module::start\_year (C++ member), 116  
 nw::Module::tag (C++ function), 115  
 nw::Module::tag (C++ member), 116  
 nw::Module::tlk (C++ member), 116  
 nw::Module::uuid (C++ member), 116  
 nw::Module::version (C++ member), 116  
 nw::Module::versus\_me (C++ function), 115  
 nw::Module::xpscale (C++ member), 117  
 nw::ModuleScripts (C++ struct), 117  
 nw::ModuleScripts::from\_json (C++ function), 117  
 nw::ModuleScripts::ModuleScripts (C++ function), 117  
 nw::ModuleScripts::on\_client\_enter (C++ member), 118  
 nw::ModuleScripts::on\_client\_leave (C++ member), 118  
 nw::ModuleScripts::on\_cutsnabort (C++ member), 118  
 nw::ModuleScripts::on\_heartbeat (C++ member), 118  
 nw::ModuleScripts::on\_item\_acquire (C++ member), 118  
 nw::ModuleScripts::on\_item\_activate (C++ member), 118  
 nw::ModuleScripts::on\_item\_unaquire (C++ member), 118  
 nw::ModuleScripts::on\_load (C++ member), 118  
 nw::ModuleScripts::on\_player\_chat (C++ member), 118  
 nw::ModuleScripts::on\_player\_death (C++ member), 118  
 nw::ModuleScripts::on\_player\_dying (C++ member), 118  
 nw::ModuleScripts::on\_player\_equip (C++ member), 118  
 nw::ModuleScripts::on\_player\_level\_up (C++ member), 118  
 nw::ModuleScripts::on\_player\_rest (C++ member), 118  
 nw::ModuleScripts::on\_player\_unequip (C++ member), 118

nw::ModuleScripts::on\_spawnbtndn (C++ member), 118  
 nw::ModuleScripts::on\_start (C++ member), 118  
 nw::ModuleScripts::on\_user\_defined (C++ member), 118  
 nw::ModuleScripts::to\_json (C++ function), 117  
 nw::move\_file\_safely (C++ function), 283  
 nw::needs\_quote (C++ function), 283  
 nw::Null (C++ struct), 120  
 nw::NWSync (C++ struct), 119  
 nw::NWSync::~~NWSync (C++ function), 119  
 nw::NWSync::get (C++ function), 119  
 nw::NWSync::is\_loaded (C++ function), 119  
 nw::NWSync::manifests (C++ function), 119  
 nw::NWSync::meta (C++ function), 119  
 nw::NWSync::NWSync (C++ function), 119  
 nw::NWSync::operator= (C++ function), 119  
 nw::NWSync::shard\_count (C++ function), 119  
 nw::NWSync::shards (C++ function), 119  
 nw::NWSyncManifest (C++ struct), 119  
 nw::NWSyncManifest::all (C++ function), 119  
 nw::NWSyncManifest::contains (C++ function), 119  
 nw::NWSyncManifest::demand (C++ function), 120  
 nw::NWSyncManifest::extract (C++ function), 120  
 nw::NWSyncManifest::extract\_by\_glob (C++ function), 120  
 nw::NWSyncManifest::name (C++ function), 120  
 nw::NWSyncManifest::NWSyncManifest (C++ function), 119  
 nw::NWSyncManifest::path (C++ function), 120  
 nw::NWSyncManifest::size (C++ function), 120  
 nw::NWSyncManifest::stat (C++ function), 120  
 nw::NWSyncManifest::valid (C++ function), 120  
 nw::NWSyncManifest::visit (C++ function), 120  
 nw::NWSyncManifest::working\_directory (C++ function), 120  
 nw::ObjectID (C++ enum), 259  
 nw::ObjectType (C++ enum), 259  
 nw::ObjectType::area (C++ enumerator), 259  
 nw::ObjectType::areaofeffect (C++ enumerator), 260  
 nw::ObjectType::creature (C++ enumerator), 259  
 nw::ObjectType::door (C++ enumerator), 260  
 nw::ObjectType::encounter (C++ enumerator), 260  
 nw::ObjectType::gui (C++ enumerator), 259  
 nw::ObjectType::invalid (C++ enumerator), 259  
 nw::ObjectType::item (C++ enumerator), 259  
 nw::ObjectType::module (C++ enumerator), 259  
 nw::ObjectType::placeable (C++ enumerator), 260  
 nw::ObjectType::player (C++ enumerator), 260  
 nw::ObjectType::portal (C++ enumerator), 260  
 nw::ObjectType::projectile (C++ enumerator), 260  
 nw::ObjectType::sound (C++ enumerator), 260  
 nw::ObjectType::store (C++ enumerator), 260  
 nw::ObjectType::tile (C++ enumerator), 259  
 nw::ObjectType::trigger (C++ enumerator), 259  
 nw::ObjectType::waypoint (C++ enumerator), 260  
 nw::operator== (C++ function), 283  
 nw::operator< (C++ function), 285  
 nw::operator<< (C++ function), 285  
 nw::ostream\_write (C++ function), 285  
 nw::Palette (C++ struct), 120  
 nw::Palette::~~Palette (C++ function), 120  
 nw::Palette::is\_skeleton (C++ member), 121  
 nw::Palette::json\_archive\_version (C++ member), 121  
 nw::Palette::max\_id (C++ function), 120  
 nw::Palette::Palette (C++ function), 120  
 nw::Palette::resource\_type (C++ member), 121  
 nw::Palette::root (C++ member), 121  
 nw::Palette::set\_max\_id (C++ function), 120  
 nw::Palette::tileset (C++ member), 121  
 nw::Palette::to\_json (C++ function), 121  
 nw::Palette::valid (C++ function), 120  
 nw::PaletteNodeType (C++ enum), 260  
 nw::PaletteNodeType::blueprint (C++ enumerator), 260  
 nw::PaletteNodeType::branch (C++ enumerator), 260  
 nw::PaletteNodeType::category (C++ enumerator), 260  
 nw::PaletteTreeNode (C++ struct), 121  
 nw::PaletteTreeNode::children (C++ member), 122  
 nw::PaletteTreeNode::cr (C++ member), 121  
 nw::PaletteTreeNode::display (C++ member), 121  
 nw::PaletteTreeNode::faction (C++ member), 121  
 nw::PaletteTreeNode::id (C++ member), 121  
 nw::PaletteTreeNode::name (C++ member), 121  
 nw::PaletteTreeNode::PaletteTreeNode (C++ function), 121  
 nw::PaletteTreeNode::resref (C++ member), 121  
 nw::PaletteTreeNode::strref (C++ member), 121  
 nw::PaletteTreeNode::type (C++ member), 121  
 nw::Placeable (C++ struct), 122  
 nw::Placeable::animation\_state (C++ member), 124  
 nw::Placeable::appearance (C++ member), 123  
 nw::Placeable::as\_area (C++ function), 122  
 nw::Placeable::as\_common (C++ function), 122  
 nw::Placeable::as\_creature (C++ function), 122  
 nw::Placeable::as\_door (C++ function), 122  
 nw::Placeable::as\_encounter (C++ function), 122  
 nw::Placeable::as\_item (C++ function), 122  
 nw::Placeable::as\_module (C++ function), 122  
 nw::Placeable::as\_placeable (C++ function), 122  
 nw::Placeable::as\_player (C++ function), 123



nw::Placeable::as\_sound (C++ function), 123  
 nw::Placeable::as\_store (C++ function), 123  
 nw::Placeable::as\_trigger (C++ function), 123  
 nw::Placeable::as\_waypoint (C++ function), 123  
 nw::Placeable::bodybag (C++ member), 124  
 nw::Placeable::common (C++ member), 123  
 nw::Placeable::conversation (C++ member), 123  
 nw::Placeable::description (C++ member), 123  
 nw::Placeable::deserialize (C++ function), 124  
 nw::Placeable::effects (C++ function), 122  
 nw::Placeable::faction (C++ member), 123  
 nw::Placeable::handle (C++ function), 122  
 nw::Placeable::hardness (C++ member), 124  
 nw::Placeable::has\_inventory (C++ member), 124  
 nw::Placeable::hp (C++ member), 123  
 nw::Placeable::hp\_current (C++ member), 123  
 nw::Placeable::instantiate (C++ function), 122  
 nw::Placeable::instantiated\_ (C++ member), 124  
 nw::Placeable::interruptable (C++ member), 124  
 nw::Placeable::inventory (C++ member), 123  
 nw::Placeable::json\_archive\_version (C++ member), 124  
 nw::Placeable::lock (C++ member), 123  
 nw::Placeable::object\_type (C++ member), 124  
 nw::Placeable::Placeable (C++ function), 122  
 nw::Placeable::plot (C++ member), 124  
 nw::Placeable::portrait\_id (C++ member), 123  
 nw::Placeable::restype (C++ member), 124  
 nw::Placeable::saves (C++ member), 123  
 nw::Placeable::scripts (C++ member), 123  
 nw::Placeable::serialize (C++ function), 124  
 nw::Placeable::set\_handle (C++ function), 122  
 nw::Placeable::static\_ (C++ member), 124  
 nw::Placeable::tag (C++ function), 122  
 nw::Placeable::trap (C++ member), 123  
 nw::Placeable::useable (C++ member), 124  
 nw::Placeable::versus\_me (C++ function), 122  
 nw::PlaceableAnimationState (C++ enum), 260  
 nw::PlaceableAnimationState::activated (C++ enumerator), 261  
 nw::PlaceableAnimationState::closed (C++ enumerator), 260  
 nw::PlaceableAnimationState::deactivated (C++ enumerator), 261  
 nw::PlaceableAnimationState::destroyed (C++ enumerator), 261  
 nw::PlaceableAnimationState::none (C++ enumerator), 260  
 nw::PlaceableAnimationState::open (C++ enumerator), 260  
 nw::PlaceableScripts (C++ struct), 124  
 nw::PlaceableScripts::from\_json (C++ function), 125  
 nw::PlaceableScripts::on\_click (C++ member), 125  
 nw::PlaceableScripts::on\_closed (C++ member), 125  
 nw::PlaceableScripts::on\_damaged (C++ member), 125  
 nw::PlaceableScripts::on\_death (C++ member), 125  
 nw::PlaceableScripts::on\_disarm (C++ member), 125  
 nw::PlaceableScripts::on\_heartbeat (C++ member), 125  
 nw::PlaceableScripts::on\_inventory\_disturbed (C++ member), 125  
 nw::PlaceableScripts::on\_lock (C++ member), 125  
 nw::PlaceableScripts::on\_melee\_attacked (C++ member), 125  
 nw::PlaceableScripts::on\_open (C++ member), 125  
 nw::PlaceableScripts::on\_spell\_cast\_at (C++ member), 125  
 nw::PlaceableScripts::on\_trap\_triggered (C++ member), 125  
 nw::PlaceableScripts::on\_unlock (C++ member), 125  
 nw::PlaceableScripts::on\_used (C++ member), 125  
 nw::PlaceableScripts::on\_user\_defined (C++ member), 125  
 nw::PlaceableScripts::to\_json (C++ function), 125  
 nw::Player (C++ struct), 126  
 nw::Player::appearance (C++ member), 127  
 nw::Player::as\_area (C++ function), 126  
 nw::Player::as\_common (C++ function), 126  
 nw::Player::as\_creature (C++ function), 126  
 nw::Player::as\_door (C++ function), 126  
 nw::Player::as\_encounter (C++ function), 126  
 nw::Player::as\_item (C++ function), 126  
 nw::Player::as\_module (C++ function), 126  
 nw::Player::as\_placeable (C++ function), 126  
 nw::Player::as\_player (C++ function), 126  
 nw::Player::as\_sound (C++ function), 126  
 nw::Player::as\_store (C++ function), 127  
 nw::Player::as\_trigger (C++ function), 127  
 nw::Player::as\_waypoint (C++ function), 127  
 nw::Player::bodybag (C++ member), 128  
 nw::Player::chunk\_death (C++ member), 128  
 nw::Player::combat\_info (C++ member), 127  
 nw::Player::common (C++ member), 127  
 nw::Player::conversation (C++ member), 127  
 nw::Player::cr (C++ member), 127  
 nw::Player::cr\_adjust (C++ member), 128

nw::Player::decay\_time (C++ member), 128  
 nw::Player::deity (C++ member), 127  
 nw::Player::description (C++ member), 127  
 nw::Player::deserialize (C++ function), 129  
 nw::Player::disarmable (C++ member), 128  
 nw::Player::effects (C++ function), 126  
 nw::Player::equipment (C++ member), 127  
 nw::Player::faction\_id (C++ member), 128  
 nw::Player::gender (C++ member), 128  
 nw::Player::good\_evil (C++ member), 128  
 nw::Player::handle (C++ function), 126  
 nw::Player::hasted (C++ member), 128  
 nw::Player::history (C++ member), 127  
 nw::Player::hp (C++ member), 128  
 nw::Player::hp\_current (C++ member), 128  
 nw::Player::hp\_max (C++ member), 128  
 nw::Player::hp\_temp (C++ member), 128  
 nw::Player::immortal (C++ member), 128  
 nw::Player::instantiate (C++ function), 126  
 nw::Player::instantiated\_ (C++ member), 129  
 nw::Player::interruptable (C++ member), 128  
 nw::Player::inventory (C++ member), 127  
 nw::Player::json\_archive\_version (C++ member), 129  
 nw::Player::lawful\_chaotic (C++ member), 128  
 nw::Player::levels (C++ member), 127  
 nw::Player::lootable (C++ member), 128  
 nw::Player::name\_first (C++ member), 127  
 nw::Player::name\_last (C++ member), 127  
 nw::Player::object\_type (C++ member), 129  
 nw::Player::pc (C++ member), 129  
 nw::Player::perception\_range (C++ member), 129  
 nw::Player::plot (C++ member), 129  
 nw::Player::race (C++ member), 128  
 nw::Player::retype (C++ member), 129  
 nw::Player::scripts (C++ member), 127  
 nw::Player::serialize (C++ function), 129  
 nw::Player::set\_handle (C++ function), 126  
 nw::Player::size (C++ member), 128  
 nw::Player::soundset (C++ member), 128  
 nw::Player::starting\_package (C++ member), 129  
 nw::Player::stats (C++ member), 127  
 nw::Player::subrace (C++ member), 127  
 nw::Player::tag (C++ function), 126  
 nw::Player::versus\_me (C++ function), 126  
 nw::Player::walkrate (C++ member), 128  
 nw::Plt (C++ struct), 129  
 nw::Plt::height (C++ function), 129  
 nw::Plt::pixels (C++ function), 129  
 nw::Plt::Plt (C++ function), 129  
 nw::Plt::valid (C++ function), 129  
 nw::Plt::width (C++ function), 130  
 nw::PltColors (C++ struct), 130  
 nw::PltColors::data (C++ member), 130  
 nw::PltLayer (C++ enum), 261  
 nw::PltLayer::plt\_layer\_cloth1 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_cloth2 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_hair (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_leather1 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_leather2 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_metal1 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_metal2 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_size (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_skin (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_tattoo1 (C++ enumerator), 261  
 nw::PltLayer::plt\_layer\_tattoo2 (C++ enumerator), 261  
 nw::PltPixel (C++ struct), 130  
 nw::PltPixel::color (C++ member), 130  
 nw::PltPixel::layer (C++ member), 130  
 nw::probe\_nwn\_install (C++ function), 286  
 nw::Qualifier (C++ struct), 130  
 nw::Qualifier::params (C++ member), 130  
 nw::Qualifier::selector (C++ member), 130  
 nw::Race (C++ struct), 131  
 nw::Race::idx (C++ function), 131  
 nw::Race::invalid (C++ function), 131  
 nw::Race::make (C++ function), 131  
 nw::Race::operator\* (C++ function), 131  
 nw::Race::operator== (C++ function), 131  
 nw::Race::operator<=> (C++ function), 131  
 nw::RaceArray (C++ type), 304  
 nw::RaceInfo (C++ struct), 131  
 nw::RaceInfo::ability\_modifiers (C++ member), 132  
 nw::RaceInfo::ability\_point\_buy\_number (C++ member), 132  
 nw::RaceInfo::age (C++ member), 132  
 nw::RaceInfo::appearance (C++ member), 132  
 nw::RaceInfo::biography (C++ member), 132  
 nw::RaceInfo::constant (C++ member), 132  
 nw::RaceInfo::cr\_modifier (C++ member), 132  
 nw::RaceInfo::description (C++ member), 132  
 nw::RaceInfo::favored\_class (C++ member), 132  
 nw::RaceInfo::feats\_extra\_1st\_level (C++ member), 132  
 nw::RaceInfo::feats\_normal\_amount (C++ member), 132

---

nw::RaceInfo::feats\_normal\_level (C++ member), 132  
 nw::RaceInfo::feats\_table (C++ member), 132  
 nw::RaceInfo::icon (C++ member), 132  
 nw::RaceInfo::name (C++ member), 131  
 nw::RaceInfo::name\_conversation (C++ member), 131  
 nw::RaceInfo::name\_conversation\_lower (C++ member), 131  
 nw::RaceInfo::name\_plural (C++ member), 131  
 nw::RaceInfo::player\_race (C++ member), 132  
 nw::RaceInfo::RaceInfo (C++ function), 131  
 nw::RaceInfo::skillpoints\_1st\_level\_multiplier (C++ member), 132  
 nw::RaceInfo::skillpoints\_ability (C++ member), 132  
 nw::RaceInfo::skillpoints\_extra\_per\_level (C++ member), 132  
 nw::RaceInfo::toolset\_class (C++ member), 132  
 nw::RaceInfo::valid (C++ function), 131  
 nw::Reputation (C++ struct), 133  
 nw::Reputation::faction\_1 (C++ member), 133  
 nw::Reputation::faction\_2 (C++ member), 133  
 nw::Reputation::reputation (C++ member), 133  
 nw::Requirement (C++ struct), 133  
 nw::Requirement::add (C++ function), 133  
 nw::Requirement::conjunction (C++ member), 133  
 nw::Requirement::qualifiers (C++ member), 133  
 nw::Requirement::Requirement (C++ function), 133  
 nw::Requirement::size (C++ function), 133  
 nw::resolve\_effects\_of (C++ function), 286  
 nw::Resource (C++ struct), 133  
 nw::Resource::filename (C++ function), 134  
 nw::Resource::from\_filename (C++ function), 134  
 nw::Resource::from\_path (C++ function), 134  
 nw::Resource::operator= (C++ function), 134  
 nw::Resource::Resource (C++ function), 134  
 nw::Resource::resref (C++ member), 134  
 nw::Resource::type (C++ member), 134  
 nw::Resource::valid (C++ function), 134  
 nw::ResourceDescriptor (C++ struct), 134  
 nw::ResourceDescriptor::mtime (C++ member), 135  
 nw::ResourceDescriptor::name (C++ member), 135  
 nw::ResourceDescriptor::operator bool (C++ function), 134  
 nw::ResourceDescriptor::parent (C++ member), 135  
 nw::ResourceDescriptor::size (C++ member), 135  
 nw::ResourceType (C++ struct), 135  
 nw::ResourceType::check\_category (C++ function), 140  
 nw::ResourceType::from\_extension (C++ function), 140  
 nw::ResourceType::to\_string (C++ function), 140  
 nw::ResourceType::type (C++ enum), 135  
 nw::ResourceType::type::are (C++ enumerator), 136  
 nw::ResourceType::type::bak (C++ enumerator), 139  
 nw::ResourceType::type::bic (C++ enumerator), 136  
 nw::ResourceType::type::bif (C++ enumerator), 140  
 nw::ResourceType::type::bik (C++ enumerator), 139  
 nw::ResourceType::type::bmp (C++ enumerator), 135  
 nw::ResourceType::type::bmu (C++ enumerator), 136  
 nw::ResourceType::type::btc (C++ enumerator), 137  
 nw::ResourceType::type::btd (C++ enumerator), 137  
 nw::ResourceType::type::bte (C++ enumerator), 137  
 nw::ResourceType::type::btg (C++ enumerator), 138  
 nw::ResourceType::type::bti (C++ enumerator), 137  
 nw::ResourceType::type::btm (C++ enumerator), 138  
 nw::ResourceType::type::btp (C++ enumerator), 138  
 nw::ResourceType::type::bts (C++ enumerator), 137  
 nw::ResourceType::type::btt (C++ enumerator), 137  
 nw::ResourceType::type::caf (C++ enumerator), 139  
 nw::ResourceType::type::ccs (C++ enumerator), 138  
 nw::ResourceType::type::container (C++ enumerator), 135  
 nw::ResourceType::type::css (C++ enumerator), 138  
 nw::ResourceType::type::dat (C++ enumerator), 139  
 nw::ResourceType::type::dds (C++ enumerator), 137  
 nw::ResourceType::type::dft (C++ enumerator), 138  
 nw::ResourceType::type::dlg (C++ enumerator), 137  
 nw::ResourceType::type::dwk (C++ enumerator), 138  
 nw::ResourceType::type::erf (C++ enumerator), 140

nw::ResourceType::type::fac (C++ <i>enumerator</i> ), 137	nw::ResourceType::type::mtr (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::fnt (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::mve (C++ <i>enumerator</i> ), 135
nw::ResourceType::type::fourpc (C++ <i>enumerator</i> ), 138	nw::ResourceType::type::ncs (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::gff (C++ <i>enumerator</i> ), 137	nw::ResourceType::type::ndb (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::gff_archive (C++ <i>enumerator</i> ), 135	nw::ResourceType::type::nss (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::gic (C++ <i>enumerator</i> ), 138	nw::ResourceType::type::nwm (C++ <i>enumerator</i> ), 138
nw::ResourceType::type::gif (C++ <i>enumerator</i> ), 139	nw::ResourceType::type::player (C++ <i>enumerator</i> ), 135
nw::ResourceType::type::git (C++ <i>enumerator</i> ), 137	nw::ResourceType::type::plh (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::gui (C++ <i>enumerator</i> ), 138	nw::ResourceType::type::plt (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::hak (C++ <i>enumerator</i> ), 138	nw::ResourceType::type::png (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::ids (C++ <i>enumerator</i> ), 139	nw::ResourceType::type::ptm (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::ifo (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::ptt (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::ini (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::pwk (C++ <i>enumerator</i> ), 138
nw::ResourceType::type::invalid (C++ <i>enumerator</i> ), 135	nw::ResourceType::type::sav (C++ <i>enumerator</i> ), 138
nw::ResourceType::type::itp (C++ <i>enumerator</i> ), 137	nw::ResourceType::type::set (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::jpg (C++ <i>enumerator</i> ), 139	nw::ResourceType::type::shd (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::jrl (C++ <i>enumerator</i> ), 138	nw::ResourceType::type::slt (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::json (C++ <i>enumerator</i> ), 135	nw::ResourceType::type::sound (C++ <i>enumerator</i> ), 135
nw::ResourceType::type::key (C++ <i>enumerator</i> ), 140	nw::ResourceType::type::sq3 (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::ktx (C++ <i>enumerator</i> ), 139	nw::ResourceType::type::sql (C++ <i>enumerator</i> ), 139
nw::ResourceType::type::lod (C++ <i>enumerator</i> ), 139	nw::ResourceType::type::ssf (C++ <i>enumerator</i> ), 138
nw::ResourceType::type::ltr (C++ <i>enumerator</i> ), 137	nw::ResourceType::type::tex (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::lua (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::texture (C++ <i>enumerator</i> ), 135
nw::ResourceType::type::mdl (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::tga (C++ <i>enumerator</i> ), 135
nw::ResourceType::type::mod (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::thg (C++ <i>enumerator</i> ), 136
nw::ResourceType::type::movie (C++ <i>enumerator</i> ), 135	nw::ResourceType::type::tlk (C++ <i>enumerator</i> ), 137
nw::ResourceType::type::mpg (C++ <i>enumerator</i> ), 136	nw::ResourceType::type::tml (C++ <i>enumerator</i> ), 139



nw::ResourceType::type::ttf (C++ *enumerator*), 139  
 nw::ResourceType::type::twoda (C++ *enumerator*), 137  
 nw::ResourceType::type::txi (C++ *enumerator*), 137  
 nw::ResourceType::type::txt (C++ *enumerator*), 136  
 nw::ResourceType::type::utc (C++ *enumerator*), 137  
 nw::ResourceType::type::utd (C++ *enumerator*), 138  
 nw::ResourceType::type::ute (C++ *enumerator*), 137  
 nw::ResourceType::type::utg (C++ *enumerator*), 138  
 nw::ResourceType::type::uti (C++ *enumerator*), 137  
 nw::ResourceType::type::utm (C++ *enumerator*), 138  
 nw::ResourceType::type::utp (C++ *enumerator*), 138  
 nw::ResourceType::type::uts (C++ *enumerator*), 137  
 nw::ResourceType::type::utt (C++ *enumerator*), 137  
 nw::ResourceType::type::utw (C++ *enumerator*), 138  
 nw::ResourceType::type::wav (C++ *enumerator*), 136  
 nw::ResourceType::type::wbm (C++ *enumerator*), 139  
 nw::ResourceType::type::wok (C++ *enumerator*), 136  
 nw::ResourceType::type::xbc (C++ *enumerator*), 139  
 nw::Resref (C++ *struct*), 140  
 nw::Resref::data (C++ *function*), 141  
 nw::Resref::empty (C++ *function*), 141  
 nw::Resref::length (C++ *function*), 141  
 nw::Resref::max\_size (C++ *member*), 141  
 nw::Resref::operator= (C++ *function*), 141  
 nw::Resref::Resref (C++ *function*), 141  
 nw::Resref::size\_type (C++ *type*), 140  
 nw::Resref::Storage (C++ *type*), 140  
 nw::Resref::string (C++ *function*), 141  
 nw::Resref::value\_type (C++ *type*), 140  
 nw::Resref::view (C++ *function*), 141  
 nw::reverse (C++ *function*), 287  
 nw::roll\_dice (C++ *function*), 287  
 nw::roll\_dice\_explode (C++ *function*), 287  
 nw::RuleFlag (C++ *struct*), 141  
 nw::RuleFlag::Base (C++ *type*), 141  
 nw::RuleFlag::flip (C++ *function*), 142  
 nw::RuleFlag::operator[] (C++ *function*), 142  
 nw::RuleFlag::reset (C++ *function*), 142  
 nw::RuleFlag::RuleFlag (C++ *function*), 142  
 nw::RuleFlag::set (C++ *function*), 142  
 nw::RuleFlag::test (C++ *function*), 142  
 nw::RuleTypeArray (C++ *struct*), 142  
 nw::RuleTypeArray::constant\_to\_index (C++ *member*), 143  
 nw::RuleTypeArray::entries (C++ *member*), 143  
 nw::RuleTypeArray::from\_constant (C++ *function*), 142  
 nw::RuleTypeArray::get (C++ *function*), 142  
 nw::RuleTypeArray::is\_valid (C++ *function*), 142  
 nw::RuleTypeArray::map\_type (C++ *type*), 142  
 nw::RuleValue (C++ *type*), 305  
 nw::Save (C++ *struct*), 143  
 nw::Save::idx (C++ *function*), 143  
 nw::Save::invalid (C++ *function*), 143  
 nw::Save::make (C++ *function*), 143  
 nw::Save::operator\* (C++ *function*), 143  
 nw::Save::operator== (C++ *function*), 143  
 nw::Save::operator<=> (C++ *function*), 143  
 nw::Save::val (C++ *member*), 143  
 nw::Saves (C++ *struct*), 143  
 nw::Saves::fort (C++ *member*), 144  
 nw::Saves::reflex (C++ *member*), 144  
 nw::Saves::will (C++ *member*), 144  
 nw::script::AssignExpression (C++ *struct*), 210  
 nw::script::AssignExpression::accept (C++ *function*), 210  
 nw::script::AssignExpression::AssignExpression (C++ *function*), 210  
 nw::script::AssignExpression::complete (C++ *function*), 210  
 nw::script::AssignExpression::env\_ (C++ *member*), 210  
 nw::script::AssignExpression::is\_const\_ (C++ *member*), 210  
 nw::script::AssignExpression::lhs (C++ *member*), 210  
 nw::script::AssignExpression::op (C++ *member*), 210  
 nw::script::AssignExpression::range\_ (C++ *member*), 210  
 nw::script::AssignExpression::rhs (C++ *member*), 210  
 nw::script::AssignExpression::type\_id\_ (C++ *member*), 210  
 nw::script::Ast (C++ *struct*), 211  
 nw::script::Ast::accept (C++ *function*), 211  
 nw::script::Ast::Ast (C++ *function*), 211  
 nw::script::Ast::comments (C++ *member*), 211  
 nw::script::Ast::create\_node (C++ *function*), 211  
 nw::script::Ast::decls (C++ *member*), 211

nw::script::Ast::defines (C++ member), 211  
 nw::script::Ast::find\_comment (C++ function), 211  
 nw::script::Ast::includes (C++ member), 211  
 nw::script::Ast::line\_map (C++ member), 211  
 nw::script::Ast::nodes\_ (C++ member), 211  
 nw::script::Ast::operator= (C++ function), 211  
 nw::script::AstLocator (C++ struct), 211  
 nw::script::AstLocator::active\_param (C++ member), 213  
 nw::script::AstLocator::AstLocator (C++ function), 212  
 nw::script::AstLocator::call (C++ member), 213  
 nw::script::AstLocator::dot (C++ member), 213  
 nw::script::AstLocator::found\_ (C++ member), 213  
 nw::script::AstLocator::in\_func\_decl\_ (C++ member), 213  
 nw::script::AstLocator::in\_struct\_decl\_ (C++ member), 213  
 nw::script::AstLocator::last\_seen\_decl (C++ member), 213  
 nw::script::AstLocator::locate\_in\_dependencies (C++ function), 212  
 nw::script::AstLocator::parent\_ (C++ member), 213  
 nw::script::AstLocator::pos\_ (C++ member), 213  
 nw::script::AstLocator::result\_ (C++ member), 213  
 nw::script::AstLocator::symbol\_ (C++ member), 213  
 nw::script::AstLocator::visit (C++ function), 212, 213  
 nw::script::AstNode (C++ struct), 213  
 nw::script::AstNode::~~AstNode (C++ function), 213  
 nw::script::AstNode::accept (C++ function), 213  
 nw::script::AstNode::complete (C++ function), 213  
 nw::script::AstNode::env\_ (C++ member), 214  
 nw::script::AstNode::is\_const\_ (C++ member), 214  
 nw::script::AstNode::range\_ (C++ member), 214  
 nw::script::AstNode::type\_id\_ (C++ member), 214  
 nw::script::AstPrinter (C++ struct), 214  
 nw::script::AstPrinter::~~AstPrinter (C++ function), 214  
 nw::script::AstPrinter::depth (C++ member), 215  
 nw::script::AstPrinter::ss (C++ member), 215  
 nw::script::AstPrinter::visit (C++ function), 214, 215  
 nw::script::AstResolver (C++ struct), 215  
 nw::script::AstResolver::~~AstResolver (C++ function), 216  
 nw::script::AstResolver::all\_control\_flow\_paths\_return (C++ function), 216  
 nw::script::AstResolver::AstResolver (C++ function), 216  
 nw::script::AstResolver::begin\_scope (C++ function), 216  
 nw::script::AstResolver::ctx\_ (C++ member), 217  
 nw::script::AstResolver::declare (C++ function), 216  
 nw::script::AstResolver::define (C++ function), 216  
 nw::script::AstResolver::end\_scope (C++ function), 216  
 nw::script::AstResolver::env\_stack\_ (C++ member), 217  
 nw::script::AstResolver::EnvStack (C++ type), 215  
 nw::script::AstResolver::func\_def\_stack\_ (C++ member), 217  
 nw::script::AstResolver::is\_command\_script\_ (C++ member), 217  
 nw::script::AstResolver::loop\_stack\_ (C++ member), 217  
 nw::script::AstResolver::match\_function\_decls (C++ function), 216  
 nw::script::AstResolver::parent\_ (C++ member), 217  
 nw::script::AstResolver::resolve (C++ function), 216  
 nw::script::AstResolver::scope\_stack\_ (C++ member), 217  
 nw::script::AstResolver::ScopeMap (C++ type), 215  
 nw::script::AstResolver::ScopeStack (C++ type), 215  
 nw::script::AstResolver::switch\_stack\_ (C++ member), 217  
 nw::script::AstResolver::symbol\_table (C++ function), 216  
 nw::script::AstResolver::visit (C++ function), 216, 217  
 nw::script::BaseVisitor (C++ struct), 217  
 nw::script::BaseVisitor::~~BaseVisitor (C++ function), 218  
 nw::script::BaseVisitor::visit (C++ function), 218  
 nw::script::BinaryExpression (C++ struct), 219  
 nw::script::BinaryExpression::accept (C++ function), 219  
 nw::script::BinaryExpression::BinaryExpression (C++ function), 219

---

```

nw::script::BinaryExpression::complete (C++ function), 219
nw::script::BinaryExpression::env_ (C++ member), 219
nw::script::BinaryExpression::is_const_ (C++ member), 219
nw::script::BinaryExpression::lhs (C++ member), 219
nw::script::BinaryExpression::op (C++ member), 219
nw::script::BinaryExpression::range_ (C++ member), 219
nw::script::BinaryExpression::rhs (C++ member), 219
nw::script::BinaryExpression::type_id_ (C++ member), 219
nw::script::BlockStatement (C++ struct), 219
nw::script::BlockStatement::accept (C++ function), 220
nw::script::BlockStatement::BlockStatement (C++ function), 220
nw::script::BlockStatement::complete (C++ function), 220
nw::script::BlockStatement::env_ (C++ member), 220
nw::script::BlockStatement::is_const_ (C++ member), 220
nw::script::BlockStatement::nodes (C++ member), 220
nw::script::BlockStatement::operator= (C++ function), 220
nw::script::BlockStatement::range_ (C++ member), 220
nw::script::BlockStatement::type_id_ (C++ member), 220
nw::script::CallExpression (C++ struct), 220
nw::script::CallExpression::accept (C++ function), 220
nw::script::CallExpression::arg_range (C++ member), 221
nw::script::CallExpression::args (C++ member), 221
nw::script::CallExpression::CallExpression (C++ function), 220
nw::script::CallExpression::comma_ranges (C++ member), 221
nw::script::CallExpression::complete (C++ function), 220
nw::script::CallExpression::env_ (C++ member), 221
nw::script::CallExpression::expr (C++ member), 221
nw::script::CallExpression::is_const_ (C++ member), 221
nw::script::CallExpression::range_ (C++ member), 221
nw::script::CallExpression::type_id_ (C++ member), 221
nw::script::Comment (C++ struct), 221
nw::script::Comment::append (C++ function), 221
nw::script::Comment::comment_ (C++ member), 221
nw::script::Comment::range_ (C++ member), 221
nw::script::ConditionalExpression (C++ struct), 221
nw::script::ConditionalExpression::accept (C++ function), 222
nw::script::ConditionalExpression::complete (C++ function), 222
nw::script::ConditionalExpression::ConditionalExpression (C++ function), 222
nw::script::ConditionalExpression::env_ (C++ member), 222
nw::script::ConditionalExpression::false_branch (C++ member), 222
nw::script::ConditionalExpression::is_const_ (C++ member), 222
nw::script::ConditionalExpression::range_ (C++ member), 222
nw::script::ConditionalExpression::test (C++ member), 222
nw::script::ConditionalExpression::true_branch (C++ member), 222
nw::script::ConditionalExpression::type_id_ (C++ member), 222
nw::script::Context (C++ struct), 222
nw::script::Context::~~Context (C++ function), 222
nw::script::Context::add_include_path (C++ function), 222
nw::script::Context::command_script (C++ function), 222
nw::script::Context::command_script_ (C++ member), 223
nw::script::Context::command_script_name_ (C++ member), 223
nw::script::Context::Context (C++ function), 222
nw::script::Context::dependencies_ (C++ member), 223
nw::script::Context::get (C++ function), 222
nw::script::Context::include_paths_ (C++ member), 223
nw::script::Context::include_stack_ (C++ member), 223
nw::script::Context::is_type_convertible (C++ function), 223
nw::script::Context::lexical_diagnostic (C++ function), 223

```

nw::script::Context::parse\_diagnostic (C++ function), 223  
 nw::script::Context::preprocessed\_ (C++ member), 223  
 nw::script::Context::register\_default\_types (C++ function), 222  
 nw::script::Context::register\_engine\_types (C++ function), 223  
 nw::script::Context::resman\_ (C++ member), 223  
 nw::script::Context::semantic\_diagnostic (C++ function), 223  
 nw::script::Context::struct\_stack\_ (C++ member), 223  
 nw::script::Context::type\_array\_ (C++ member), 223  
 nw::script::Context::type\_check\_binary\_op (C++ function), 223  
 nw::script::Context::type\_id (C++ function), 223  
 nw::script::Context::type\_map\_ (C++ member), 223  
 nw::script::Context::type\_name (C++ function), 223  
 nw::script::Declaration (C++ struct), 224  
 nw::script::Declaration::accept (C++ function), 224  
 nw::script::Declaration::complete (C++ function), 224  
 nw::script::Declaration::env\_ (C++ member), 224  
 nw::script::Declaration::identifier (C++ function), 224  
 nw::script::Declaration::is\_const\_ (C++ member), 224  
 nw::script::Declaration::range (C++ function), 224  
 nw::script::Declaration::range\_ (C++ member), 224  
 nw::script::Declaration::range\_selection\_ (C++ member), 224  
 nw::script::Declaration::selection\_range (C++ function), 224  
 nw::script::Declaration::type (C++ member), 224  
 nw::script::Declaration::type\_id\_ (C++ member), 224  
 nw::script::Declaration::view (C++ member), 224  
 nw::script::Diagnostic (C++ struct), 225  
 nw::script::Diagnostic::location (C++ member), 225  
 nw::script::Diagnostic::message (C++ member), 225  
 nw::script::Diagnostic::script (C++ member), 225  
 nw::script::Diagnostic::severity (C++ member), 225  
 nw::script::Diagnostic::type (C++ member), 225  
 nw::script::DiagnosticType (C++ enum), 265  
 nw::script::DiagnosticType::lexical (C++ enumerator), 265  
 nw::script::DiagnosticType::parse (C++ enumerator), 265  
 nw::script::DiagnosticType::semantic (C++ enumerator), 265  
 nw::script::DoStatement (C++ struct), 225  
 nw::script::DoStatement::accept (C++ function), 225  
 nw::script::DoStatement::block (C++ member), 225  
 nw::script::DoStatement::complete (C++ function), 225  
 nw::script::DoStatement::env\_ (C++ member), 225  
 nw::script::DoStatement::expr (C++ member), 225  
 nw::script::DoStatement::is\_const\_ (C++ member), 225  
 nw::script::DoStatement::range\_ (C++ member), 225  
 nw::script::DoStatement::type\_id\_ (C++ member), 225  
 nw::script::DotExpression (C++ struct), 226  
 nw::script::DotExpression::accept (C++ function), 226  
 nw::script::DotExpression::complete (C++ function), 226  
 nw::script::DotExpression::dot (C++ member), 226  
 nw::script::DotExpression::DotExpression (C++ function), 226  
 nw::script::DotExpression::env\_ (C++ member), 226  
 nw::script::DotExpression::is\_const\_ (C++ member), 226  
 nw::script::DotExpression::lhs (C++ member), 226  
 nw::script::DotExpression::range\_ (C++ member), 226  
 nw::script::DotExpression::rhs (C++ member), 226  
 nw::script::DotExpression::type\_id\_ (C++ member), 226  
 nw::script::Expression (C++ struct), 227  
 nw::script::Expression::~Expression (C++ function), 227  
 nw::script::Expression::accept (C++ function), 227  
 nw::script::Expression::complete (C++ func-

tion), 227  
 nw::script::Expression::env\_ (C++ member), 228  
 nw::script::Expression::is\_const\_ (C++ member), 228  
 nw::script::Expression::range\_ (C++ member), 228  
 nw::script::Expression::type\_id\_ (C++ member), 228  
 nw::script::ExprStatement (C++ struct), 226  
 nw::script::ExprStatement::accept (C++ function), 227  
 nw::script::ExprStatement::complete (C++ function), 227  
 nw::script::ExprStatement::env\_ (C++ member), 227  
 nw::script::ExprStatement::expr (C++ member), 227  
 nw::script::ExprStatement::is\_const\_ (C++ member), 227  
 nw::script::ExprStatement::range\_ (C++ member), 227  
 nw::script::ExprStatement::type\_id\_ (C++ member), 227  
 nw::script::ForStatement (C++ struct), 228  
 nw::script::ForStatement::accept (C++ function), 228  
 nw::script::ForStatement::block (C++ member), 228  
 nw::script::ForStatement::check (C++ member), 228  
 nw::script::ForStatement::complete (C++ function), 228  
 nw::script::ForStatement::env\_ (C++ member), 228  
 nw::script::ForStatement::inc (C++ member), 228  
 nw::script::ForStatement::init (C++ member), 228  
 nw::script::ForStatement::is\_const\_ (C++ member), 228  
 nw::script::ForStatement::range\_ (C++ member), 228  
 nw::script::ForStatement::type\_id\_ (C++ member), 228  
 nw::script::FunctionDecl (C++ struct), 229  
 nw::script::FunctionDecl::accept (C++ function), 229  
 nw::script::FunctionDecl::complete (C++ function), 229  
 nw::script::FunctionDecl::env\_ (C++ member), 229  
 nw::script::FunctionDecl::FunctionDecl (C++ function), 229  
 nw::script::FunctionDecl::identifier (C++ function), 229  
 nw::script::FunctionDecl::identifier\_ (C++ member), 229  
 nw::script::FunctionDecl::is\_const\_ (C++ member), 229  
 nw::script::FunctionDecl::operator= (C++ function), 229  
 nw::script::FunctionDecl::params (C++ member), 229  
 nw::script::FunctionDecl::range (C++ function), 229  
 nw::script::FunctionDecl::range\_ (C++ member), 229  
 nw::script::FunctionDecl::range\_selection\_ (C++ member), 229  
 nw::script::FunctionDecl::selection\_range (C++ function), 229  
 nw::script::FunctionDecl::type (C++ member), 229  
 nw::script::FunctionDecl::type\_id\_ (C++ member), 229  
 nw::script::FunctionDecl::view (C++ member), 229  
 nw::script::FunctionDefinition (C++ struct), 230  
 nw::script::FunctionDefinition::accept (C++ function), 230  
 nw::script::FunctionDefinition::block (C++ member), 230  
 nw::script::FunctionDefinition::complete (C++ function), 230  
 nw::script::FunctionDefinition::decl\_external (C++ member), 230  
 nw::script::FunctionDefinition::decl\_inline (C++ member), 230  
 nw::script::FunctionDefinition::env\_ (C++ member), 230  
 nw::script::FunctionDefinition::identifier (C++ function), 230  
 nw::script::FunctionDefinition::is\_const\_ (C++ member), 230  
 nw::script::FunctionDefinition::range (C++ function), 230  
 nw::script::FunctionDefinition::range\_ (C++ member), 230  
 nw::script::FunctionDefinition::range\_selection\_ (C++ member), 230  
 nw::script::FunctionDefinition::selection\_range (C++ function), 230  
 nw::script::FunctionDefinition::type (C++ member), 230  
 nw::script::FunctionDefinition::type\_id\_ (C++ member), 230  
 nw::script::FunctionDefinition::view (C++



```

        member), 230
nw::script::GroupingExpression (C++ struct),
    231
nw::script::GroupingExpression::accept (C++
    function), 231
nw::script::GroupingExpression::complete
    (C++ function), 231
nw::script::GroupingExpression::env_ (C++
    member), 231
nw::script::GroupingExpression::expr (C++
    member), 231
nw::script::GroupingExpression::GroupingExpression
    member), 233
    (C++ function), 231
nw::script::GroupingExpression::is_const_
    (C++ member), 231
nw::script::GroupingExpression::range_ (C++
    member), 231
nw::script::GroupingExpression::type_id_
    (C++ member), 231
nw::script::IfStatement (C++ struct), 231
nw::script::IfStatement::accept (C++ function),
    231
nw::script::IfStatement::complete (C++ func-
    tion), 231
nw::script::IfStatement::else_branch (C++
    member), 232
nw::script::IfStatement::env_ (C++ member),
    232
nw::script::IfStatement::expr (C++ member),
    232
nw::script::IfStatement::if_branch (C++ mem-
    ber), 232
nw::script::IfStatement::is_const_ (C++ mem-
    ber), 232
nw::script::IfStatement::range_ (C++ member),
    232
nw::script::IfStatement::type_id_ (C++ mem-
    ber), 232
nw::script::Include (C++ struct), 232
nw::script::Include::location (C++ member),
    232
nw::script::Include::resref (C++ member), 232
nw::script::Include::script (C++ member), 232
nw::script::Include::used (C++ member), 232
nw::script::InlayHint (C++ struct), 233
nw::script::InlayHint::message (C++ member),
    233
nw::script::InlayHint::position (C++ member),
    233
nw::script::JumpStatement (C++ struct), 233
nw::script::JumpStatement::accept (C++ func-
    tion), 233
nw::script::JumpStatement::complete (C++
    function), 233
nw::script::JumpStatement::env_ (C++ member),
    233
nw::script::JumpStatement::expr (C++ member),
    233
nw::script::JumpStatement::is_const_ (C++
    member), 233
nw::script::JumpStatement::op (C++ member),
    233
nw::script::JumpStatement::range_ (C++ mem-
    ber), 233
nw::script::JumpStatement::type_id_ (C++
    member), 233
nw::script::LabelStatement (C++ struct), 234
nw::script::LabelStatement::accept (C++ func-
    tion), 234
nw::script::LabelStatement::complete (C++
    function), 234
nw::script::LabelStatement::env_ (C++ mem-
    ber), 234
nw::script::LabelStatement::expr (C++ mem-
    ber), 234
nw::script::LabelStatement::is_const_ (C++
    member), 234
nw::script::LabelStatement::range_ (C++ mem-
    ber), 234
nw::script::LabelStatement::type (C++ mem-
    ber), 234
nw::script::LabelStatement::type_id_ (C++
    member), 234
nw::script::LiteralExpression (C++ struct), 234
nw::script::LiteralExpression::accept (C++
    function), 234
nw::script::LiteralExpression::complete
    (C++ function), 234
nw::script::LiteralExpression::data (C++
    member), 235
nw::script::LiteralExpression::env_ (C++
    member), 235
nw::script::LiteralExpression::is_const_
    (C++ member), 235
nw::script::LiteralExpression::literal (C++
    member), 235
nw::script::LiteralExpression::LiteralExpression
    (C++ function), 234
nw::script::LiteralExpression::range_ (C++
    member), 235
nw::script::LiteralExpression::type_id_
    (C++ member), 235
nw::script::LiteralVectorExpression (C++
    struct), 235
nw::script::LiteralVectorExpression::accept
    (C++ function), 235
nw::script::LiteralVectorExpression::complete
    (C++ function), 235

```

---

<code>nw::script::LiteralVectorExpression::data</code> (C++ member), 235	<code>nw::script::Nss::export_count</code> (C++ function), 237
<code>nw::script::LiteralVectorExpression::env_</code> (C++ member), 236	<code>nw::script::Nss::exports</code> (C++ function), 237
<code>nw::script::LiteralVectorExpression::is_const_</code> (C++ member), 235	<code>nw::script::Nss::increment_errors</code> (C++ func- tion), 238
<code>nw::script::LiteralVectorExpression::LiteralVectorExpression</code> , 238	<code>nw::script::Nss::increment_warnings</code> (C++ function), 238
<code>nw::script::LiteralVectorExpression::range_</code> (C++ member), 236	<code>nw::script::Nss::inlay_hints</code> (C++ function), 238
<code>nw::script::LiteralVectorExpression::type_id_</code> (C++ member), 235	<code>nw::script::Nss::is_command_script</code> (C++ func- tion), 238
<code>nw::script::LiteralVectorExpression::x</code> (C++ member), 235	<code>nw::script::Nss::locate_export</code> (C++ function), 238
<code>nw::script::LiteralVectorExpression::y</code> (C++ member), 235	<code>nw::script::Nss::locate_symbol</code> (C++ function), 238
<code>nw::script::LiteralVectorExpression::z</code> (C++ member), 235	<code>nw::script::Nss::name</code> (C++ function), 238
<code>nw::script::LogicalExpression</code> (C++ struct), 236	<code>nw::script::Nss::Nss</code> (C++ function), 237
<code>nw::script::LogicalExpression::accept</code> (C++ function), 236	<code>nw::script::Nss::parse</code> (C++ function), 238
<code>nw::script::LogicalExpression::complete</code> (C++ function), 236	<code>nw::script::Nss::process_includes</code> (C++ func- tion), 238
<code>nw::script::LogicalExpression::env_</code> (C++ member), 236	<code>nw::script::Nss::resolve</code> (C++ function), 238
<code>nw::script::LogicalExpression::is_const_</code> (C++ member), 236	<code>nw::script::Nss::set_name</code> (C++ function), 238
<code>nw::script::LogicalExpression::lhs</code> (C++ mem- ber), 236	<code>nw::script::Nss::signature_help</code> (C++ function), 238
<code>nw::script::LogicalExpression::LogicalExpression</code> (C++ function), 236	<code>nw::script::Nss::text</code> (C++ function), 238
<code>nw::script::LogicalExpression::op</code> (C++ mem- ber), 236	<code>nw::script::Nss::view_from_range</code> (C++ func- tion), 238
<code>nw::script::LogicalExpression::range_</code> (C++ member), 236	<code>nw::script::Nss::warnings</code> (C++ function), 238
<code>nw::script::LogicalExpression::rhs</code> (C++ mem- ber), 236	<code>nw::script::NssLexer</code> (C++ struct), 238
<code>nw::script::LogicalExpression::type_id_</code> (C++ member), 236	<code>nw::script::NssLexer::current</code> (C++ function), 239
<code>nw::script::Nss</code> (C++ struct), 237	<code>nw::script::NssLexer::data</code> (C++ function), 239
<code>nw::script::Nss::add_diagnostic</code> (C++ function), 237	<code>nw::script::NssLexer::line_map</code> (C++ member), 239
<code>nw::script::Nss::ast</code> (C++ function), 237	<code>nw::script::NssLexer::next</code> (C++ function), 239
<code>nw::script::Nss::complete</code> (C++ function), 237	<code>nw::script::NssLexer::NssLexer</code> (C++ function), 239
<code>nw::script::Nss::complete_at</code> (C++ function), 237	<code>nw::script::NssParser</code> (C++ struct), 239
<code>nw::script::Nss::complete_dot</code> (C++ function), 237	<code>nw::script::NssParser::advance</code> (C++ function), 239
<code>nw::script::Nss::ctx</code> (C++ function), 237	<code>nw::script::NssParser::ast_</code> (C++ member), 242
<code>nw::script::Nss::declaration_to_symbol</code> (C++ function), 237	<code>nw::script::NssParser::check</code> (C++ function), 239
<code>nw::script::Nss::dependencies</code> (C++ function), 237	<code>nw::script::NssParser::check_is_type</code> (C++ function), 239
<code>nw::script::Nss::diagnostics</code> (C++ function), 237	<code>nw::script::NssParser::consume</code> (C++ function), 239
<code>nw::script::Nss::errors</code> (C++ function), 237	<code>nw::script::NssParser::ctx_</code> (C++ member), 242
	<code>nw::script::NssParser::current_</code> (C++ member), 242
	<code>nw::script::NssParser::diagnostic</code> (C++ func- tion), 240
	<code>nw::script::NssParser::is_end</code> (C++ function), 240
	<code>nw::script::NssParser::lex</code> (C++ function), 240
	<code>nw::script::NssParser::lookahead</code> (C++ func-

tion), 240  
 nw::script::NssParser::match (C++ function), 240  
 nw::script::NssParser::NssParser (C++ function), 239  
 nw::script::NssParser::parent\_ (C++ member), 242  
 nw::script::NssParser::parse\_decl (C++ function), 241  
 nw::script::NssParser::parse\_decl\_function (C++ function), 241  
 nw::script::NssParser::parse\_decl\_function\_defnw::script::NssParser::parse\_stmt\_switch (C++ function), 241  
 nw::script::NssParser::parse\_decl\_param (C++ function), 241  
 nw::script::NssParser::parse\_decl\_struct (C++ function), 241  
 nw::script::NssParser::parse\_expr (C++ function), 240  
 nw::script::NssParser::parse\_expr\_additive (C++ function), 241  
 nw::script::NssParser::parse\_expr\_and (C++ function), 240  
 nw::script::NssParser::parse\_expr\_assign (C++ function), 240  
 nw::script::NssParser::parse\_expr\_bitwise (C++ function), 241  
 nw::script::NssParser::parse\_expr\_conditional (C++ function), 240  
 nw::script::NssParser::parse\_expr\_equality (C++ function), 241  
 nw::script::NssParser::parse\_expr\_group (C++ function), 241  
 nw::script::NssParser::parse\_expr\_multiplicative (C++ function), 241  
 nw::script::NssParser::parse\_expr\_or (C++ function), 240  
 nw::script::NssParser::parse\_expr\_postfix (C++ function), 241  
 nw::script::NssParser::parse\_expr\_primary (C++ function), 241  
 nw::script::NssParser::parse\_expr\_relational (C++ function), 241  
 nw::script::NssParser::parse\_expr\_shift (C++ function), 241  
 nw::script::NssParser::parse\_expr\_unary (C++ function), 241  
 nw::script::NssParser::parse\_program (C++ function), 241  
 nw::script::NssParser::parse\_stmt (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_block (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_do (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_expr (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_for (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_if (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_jump (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_label (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_switch (C++ function), 241  
 nw::script::NssParser::parse\_stmt\_while (C++ function), 241  
 nw::script::NssParser::parse\_type (C++ function), 241  
 nw::script::NssParser::peek (C++ function), 240  
 nw::script::NssParser::previous (C++ function), 240  
 nw::script::NssParser::synchronize (C++ function), 240  
 nw::script::NssParser::tokens (C++ member), 242  
 nw::script::NssParser::view\_ (C++ member), 242  
 nw::script::NssToken (C++ struct), 242  
 nw::script::NssToken::loc (C++ member), 242  
 nw::script::NssToken::NssToken (C++ function), 242  
 nw::script::NssToken::type (C++ member), 242  
 nw::script::NssTokenType (C++ enum), 265  
 nw::script::NssTokenType::ACTION (C++ enumerator), 268  
 nw::script::NssTokenType::AND (C++ enumerator), 266  
 nw::script::NssTokenType::ANDAND (C++ enumerator), 266  
 nw::script::NssTokenType::ANDEQ (C++ enumerator), 266  
 nw::script::NssTokenType::BREAK (C++ enumerator), 268  
 nw::script::NssTokenType::CASE (C++ enumerator), 268  
 nw::script::NssTokenType::CASSOWARY (C++ enumerator), 268  
 nw::script::NssTokenType::COLON (C++ enumerator), 266  
 nw::script::NssTokenType::COMMA (C++ enumerator), 265  
 nw::script::NssTokenType::COMMENT (C++ enumerator), 265  
 nw::script::NssTokenType::CONST\_ (C++ enumerator), 268  
 nw::script::NssTokenType::CONTINUE (C++ enumerator), 268



nw::script::NssTokenType::DEFAULT (C++ enumerator), 268  
 nw::script::NssTokenType::DIV (C++ enumerator), 266  
 nw::script::NssTokenType::DIVEQ (C++ enumerator), 266  
 nw::script::NssTokenType::DO (C++ enumerator), 268  
 nw::script::NssTokenType::DOT (C++ enumerator), 266  
 nw::script::NssTokenType::EFFECT (C++ enumerator), 268  
 nw::script::NssTokenType::ELSE (C++ enumerator), 268  
 nw::script::NssTokenType::END (C++ enumerator), 265  
 nw::script::NssTokenType::EQ (C++ enumerator), 266  
 nw::script::NssTokenType::EQEQ (C++ enumerator), 266  
 nw::script::NssTokenType::EVENT (C++ enumerator), 268  
 nw::script::NssTokenType::FLOAT (C++ enumerator), 268  
 nw::script::NssTokenType::FLOAT\_CONST (C++ enumerator), 267  
 nw::script::NssTokenType::FOR (C++ enumerator), 268  
 nw::script::NssTokenType::GT (C++ enumerator), 266  
 nw::script::NssTokenType::GTEQ (C++ enumerator), 266  
 nw::script::NssTokenType::IDENTIFIER (C++ enumerator), 265  
 nw::script::NssTokenType::IF (C++ enumerator), 268  
 nw::script::NssTokenType::INT (C++ enumerator), 268  
 nw::script::NssTokenType::INTEGER\_CONST (C++ enumerator), 267  
 nw::script::NssTokenType::INVALID (C++ enumerator), 265  
 nw::script::NssTokenType::ITEMPROPERTY (C++ enumerator), 269  
 nw::script::NssTokenType::JSON (C++ enumerator), 269  
 nw::script::NssTokenType::JSON\_CONST (C++ enumerator), 268  
 nw::script::NssTokenType::LBRACE (C++ enumerator), 265  
 nw::script::NssTokenType::LBRACKET (C++ enumerator), 265  
 nw::script::NssTokenType::LOCATION (C++ enumerator), 269  
 nw::script::NssTokenType::LOCATION\_INVALID (C++ enumerator), 268  
 nw::script::NssTokenType::LPAREN (C++ enumerator), 265  
 nw::script::NssTokenType::LT (C++ enumerator), 266  
 nw::script::NssTokenType::LTEQ (C++ enumerator), 266  
 nw::script::NssTokenType::MINUS (C++ enumerator), 266  
 nw::script::NssTokenType::MINUSEQ (C++ enumerator), 266  
 nw::script::NssTokenType::MINUSMINUS (C++ enumerator), 266  
 nw::script::NssTokenType::MOD (C++ enumerator), 266  
 nw::script::NssTokenType::MODEQ (C++ enumerator), 266  
 nw::script::NssTokenType::NOT (C++ enumerator), 267  
 nw::script::NssTokenType::NOTEQ (C++ enumerator), 267  
 nw::script::NssTokenType::OBJECT (C++ enumerator), 269  
 nw::script::NssTokenType::OBJECT\_INVALID\_CONST (C++ enumerator), 268  
 nw::script::NssTokenType::OBJECT\_SELF\_CONST (C++ enumerator), 268  
 nw::script::NssTokenType::OR (C++ enumerator), 267  
 nw::script::NssTokenType::OREQ (C++ enumerator), 267  
 nw::script::NssTokenType::OROR (C++ enumerator), 267  
 nw::script::NssTokenType::PLUS (C++ enumerator), 267  
 nw::script::NssTokenType::PLUSEQ (C++ enumerator), 267  
 nw::script::NssTokenType::PLUSPLUS (C++ enumerator), 267  
 nw::script::NssTokenType::POUND (C++ enumerator), 266  
 nw::script::NssTokenType::QUESTION (C++ enumerator), 266  
 nw::script::NssTokenType::RBRACE (C++ enumerator), 265  
 nw::script::NssTokenType::RBRACKET (C++ enumerator), 265  
 nw::script::NssTokenType::RETURN (C++ enumerator), 269  
 nw::script::NssTokenType::RPAREN (C++ enumerator), 265  
 nw::script::NssTokenType::SEMICOLON (C++ enumerator), 266

nw::script::NssTokenType::SL (C++ *enumerator*),  
     267  
 nw::script::NssTokenType::SLEQ (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::SQLQUERY (C++ *enu-*  
     *merator*), 269  
 nw::script::NssTokenType::SR (C++ *enumerator*),  
     267  
 nw::script::NssTokenType::SREQ (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::STRING (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::STRING\_CONST (C++  
     *enumerator*), 268  
 nw::script::NssTokenType::STRING\_RAW\_CONST  
     (C++ *enumerator*), 268  
 nw::script::NssTokenType::STRUCT (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::SWITCH (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::TALENT (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::TILDE (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::TIMES (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::TIMESEQ (C++ *enu-*  
     *merator*), 267  
 nw::script::NssTokenType::USR (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::USREQ (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::VECTOR (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::VOID\_ (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::WHILE (C++ *enumera-*  
     *tor*), 269  
 nw::script::NssTokenType::XOR (C++ *enumera-*  
     *tor*), 267  
 nw::script::NssTokenType::XOREQ (C++ *enumera-*  
     *tor*), 267  
 nw::script::PostfixExpression (C++ *struct*), 242  
 nw::script::PostfixExpression::accept (C++  
     *function*), 243  
 nw::script::PostfixExpression::complete  
     (C++ *function*), 243  
 nw::script::PostfixExpression::env\_ (C++  
     *member*), 243  
 nw::script::PostfixExpression::is\_const\_  
     (C++ *member*), 243  
 nw::script::PostfixExpression::lhs (C++ *mem-*  
     *ber*), 243  
 nw::script::PostfixExpression::op (C++ *mem-*  
     *ber*), 243  
 nw::script::PostfixExpression::PostfixExpression  
     (C++ *function*), 243  
 nw::script::PostfixExpression::range\_ (C++  
     *member*), 243  
 nw::script::PostfixExpression::type\_id\_  
     (C++ *member*), 243  
 nw::script::SourceLocation (C++ *struct*), 243  
 nw::script::SourceLocation::end (C++ *member*),  
     244  
 nw::script::SourceLocation::length (C++ *func-*  
     *tion*), 243  
 nw::script::SourceLocation::range (C++ *mem-*  
     *ber*), 244  
 nw::script::SourceLocation::start (C++ *mem-*  
     *ber*), 244  
 nw::script::SourceLocation::view (C++ *func-*  
     *tion*), 243  
 nw::script::SourcePosition (C++ *struct*), 244  
 nw::script::SourcePosition::column (C++ *mem-*  
     *ber*), 244  
 nw::script::SourcePosition::line (C++ *mem-*  
     *ber*), 244  
 nw::script::SourcePosition::operator== (C++  
     *function*), 244  
 nw::script::SourcePosition::operator<=>  
     (C++ *function*), 244  
 nw::script::SourceRange (C++ *struct*), 244  
 nw::script::SourceRange::end (C++ *member*), 244  
 nw::script::SourceRange::start (C++ *member*),  
     244  
 nw::script::Statement (C++ *struct*), 245  
 nw::script::Statement::~~Statement (C++ *func-*  
     *tion*), 245  
 nw::script::Statement::accept (C++ *function*),  
     245  
 nw::script::Statement::complete (C++ *function*),  
     245  
 nw::script::Statement::env\_ (C++ *member*), 245  
 nw::script::Statement::is\_const\_ (C++ *mem-*  
     *ber*), 245  
 nw::script::Statement::range\_ (C++ *member*),  
     245  
 nw::script::Statement::type\_id\_ (C++ *member*),  
     245  
 nw::script::StructDecl (C++ *struct*), 245  
 nw::script::StructDecl::accept (C++ *function*),  
     245  
 nw::script::StructDecl::complete (C++ *func-*  
     *tion*), 245  
 nw::script::StructDecl::decls (C++ *member*),  
     246  
 nw::script::StructDecl::env\_ (C++ *member*), 246  
 nw::script::StructDecl::identifier (C++ *func-*

tion), 245  
 nw::script::StructDecl::is\_const\_ (C++ member), 246  
 nw::script::StructDecl::locate\_member\_decl (C++ function), 245  
 nw::script::StructDecl::range (C++ function), 245  
 nw::script::StructDecl::range\_ (C++ member), 246  
 nw::script::StructDecl::range\_selection\_ (C++ member), 246  
 nw::script::StructDecl::selection\_range (C++ function), 245  
 nw::script::StructDecl::type (C++ member), 246  
 nw::script::StructDecl::type\_id\_ (C++ member), 246  
 nw::script::StructDecl::view (C++ member), 246  
 nw::script::SwitchStatement (C++ struct), 246  
 nw::script::SwitchStatement::accept (C++ function), 246  
 nw::script::SwitchStatement::block (C++ member), 247  
 nw::script::SwitchStatement::complete (C++ function), 246  
 nw::script::SwitchStatement::env\_ (C++ member), 247  
 nw::script::SwitchStatement::is\_const\_ (C++ member), 247  
 nw::script::SwitchStatement::range\_ (C++ member), 247  
 nw::script::SwitchStatement::target (C++ member), 247  
 nw::script::SwitchStatement::type\_id\_ (C++ member), 247  
 nw::script::Symbol (C++ struct), 247  
 nw::script::Symbol::comment (C++ member), 247  
 nw::script::Symbol::decl (C++ member), 247  
 nw::script::Symbol::kind (C++ member), 247  
 nw::script::Symbol::node (C++ member), 247  
 nw::script::Symbol::provider (C++ member), 247  
 nw::script::Symbol::type (C++ member), 247  
 nw::script::Symbol::view (C++ member), 247  
 nw::script::SymbolKind (C++ enum), 269  
 nw::script::SymbolKind::field (C++ enumerator), 269  
 nw::script::SymbolKind::function (C++ enumerator), 269  
 nw::script::SymbolKind::param (C++ enumerator), 269  
 nw::script::SymbolKind::type (C++ enumerator), 269  
 nw::script::SymbolKind::variable (C++ enumerator), 269  
 nw::script::Type (C++ struct), 248  
 nw::script::Type::range\_start (C++ function), 248  
 nw::script::Type::struct\_id (C++ member), 248  
 nw::script::Type::type\_qualifier (C++ member), 248  
 nw::script::Type::type\_specifier (C++ member), 248  
 nw::script::UnaryExpression (C++ struct), 248  
 nw::script::UnaryExpression::accept (C++ function), 248  
 nw::script::UnaryExpression::complete (C++ function), 248  
 nw::script::UnaryExpression::env\_ (C++ member), 249  
 nw::script::UnaryExpression::is\_const\_ (C++ member), 248  
 nw::script::UnaryExpression::op (C++ member), 248  
 nw::script::UnaryExpression::range\_ (C++ member), 249  
 nw::script::UnaryExpression::rhs (C++ member), 248  
 nw::script::UnaryExpression::type\_id\_ (C++ member), 248  
 nw::script::UnaryExpression::UnaryExpression (C++ function), 248  
 nw::script::VarDecl (C++ struct), 249  
 nw::script::VarDecl::accept (C++ function), 249  
 nw::script::VarDecl::complete (C++ function), 249  
 nw::script::VarDecl::env\_ (C++ member), 249  
 nw::script::VarDecl::identifier (C++ function), 249  
 nw::script::VarDecl::identifier\_ (C++ member), 249  
 nw::script::VarDecl::init (C++ member), 249  
 nw::script::VarDecl::is\_const\_ (C++ member), 249  
 nw::script::VarDecl::range (C++ function), 249  
 nw::script::VarDecl::range\_ (C++ member), 249  
 nw::script::VarDecl::range\_selection\_ (C++ member), 249  
 nw::script::VarDecl::selection\_range (C++ function), 249  
 nw::script::VarDecl::type (C++ member), 249  
 nw::script::VarDecl::type\_id\_ (C++ member), 249  
 nw::script::VarDecl::view (C++ member), 249  
 nw::script::VariableExpression (C++ struct), 250  
 nw::script::VariableExpression::accept (C++ function), 250  
 nw::script::VariableExpression::complete (C++ function), 250

nw::script::VariableExpression::env\_ (C++ member), 250  
 nw::script::VariableExpression::is\_const\_ (C++ member), 250  
 nw::script::VariableExpression::range\_ (C++ member), 250  
 nw::script::VariableExpression::type\_id\_ (C++ member), 250  
 nw::script::VariableExpression::var (C++ member), 250  
 nw::script::VariableExpression::VariableExpression (C++ function), 250  
 nw::script::WhileStatement (C++ struct), 250  
 nw::script::WhileStatement::accept (C++ function), 251  
 nw::script::WhileStatement::block (C++ member), 251  
 nw::script::WhileStatement::check (C++ member), 251  
 nw::script::WhileStatement::complete (C++ function), 251  
 nw::script::WhileStatement::env\_ (C++ member), 251  
 nw::script::WhileStatement::is\_const\_ (C++ member), 251  
 nw::script::WhileStatement::range\_ (C++ member), 251  
 nw::script::WhileStatement::type\_id\_ (C++ member), 251  
 nw::Selector (C++ struct), 144  
 nw::Selector::subtype (C++ member), 144  
 nw::Selector::type (C++ member), 144  
 nw::SelectorType (C++ enum), 262  
 nw::SelectorType::ability (C++ enumerator), 262  
 nw::SelectorType::ac (C++ enumerator), 262  
 nw::SelectorType::alignment (C++ enumerator), 262  
 nw::SelectorType::arcane\_level (C++ enumerator), 262  
 nw::SelectorType::bab (C++ enumerator), 262  
 nw::SelectorType::caster\_level (C++ enumerator), 262  
 nw::SelectorType::class\_level (C++ enumerator), 262  
 nw::SelectorType::feat (C++ enumerator), 262  
 nw::SelectorType::hitpoints\_max (C++ enumerator), 262  
 nw::SelectorType::level (C++ enumerator), 262  
 nw::SelectorType::local\_var\_int (C++ enumerator), 262  
 nw::SelectorType::local\_var\_str (C++ enumerator), 262  
 nw::SelectorType::race (C++ enumerator), 262  
 nw::SelectorType::skill (C++ enumerator), 262  
 nw::SelectorType::spell\_level (C++ enumerator), 263  
 nw::SerializationProfile (C++ enum), 263  
 nw::SerializationProfile::any (C++ enumerator), 263  
 nw::SerializationProfile::blueprint (C++ enumerator), 263  
 nw::SerializationProfile::instance (C++ enumerator), 263  
 nw::SerializationProfile::savegame (C++ enumerator), 263  
 nw::SerializationType (C++ struct), 144  
 nw::SerializationType::id (C++ function), 145  
 nw::SerializationType::to\_string (C++ function), 145  
 nw::SerializationType::type (C++ enum), 144  
 nw::SerializationType::type::double\_ (C++ enumerator), 145  
 nw::SerializationType::type::float\_ (C++ enumerator), 145  
 nw::SerializationType::type::int16 (C++ enumerator), 144  
 nw::SerializationType::type::int32 (C++ enumerator), 144  
 nw::SerializationType::type::int64 (C++ enumerator), 145  
 nw::SerializationType::type::int8 (C++ enumerator), 144  
 nw::SerializationType::type::invalid (C++ enumerator), 144  
 nw::SerializationType::type::list (C++ enumerator), 145  
 nw::SerializationType::type::locstring (C++ enumerator), 145  
 nw::SerializationType::type::resref (C++ enumerator), 145  
 nw::SerializationType::type::string (C++ enumerator), 145  
 nw::SerializationType::type::struct\_ (C++ enumerator), 145  
 nw::SerializationType::type::uint16 (C++ enumerator), 144  
 nw::SerializationType::type::uint32 (C++ enumerator), 144  
 nw::SerializationType::type::uint64 (C++ enumerator), 145  
 nw::SerializationType::type::uint8 (C++ enumerator), 144  
 nw::SerializationType::type::void\_ (C++ enumerator), 145  
 nw::Situation (C++ struct), 145  
 nw::Situation::idx (C++ function), 145  
 nw::Situation::invalid (C++ function), 146  
 nw::Situation::make (C++ function), 146

nw::Situation::operator\* (C++ function), 145  
 nw::Situation::operator== (C++ function), 145  
 nw::Situation::operator<=> (C++ function), 145  
 nw::Situation::val (C++ member), 146  
 nw::Skill (C++ struct), 146  
 nw::Skill::idx (C++ function), 146  
 nw::Skill::invalid (C++ function), 146  
 nw::Skill::make (C++ function), 146  
 nw::Skill::operator\* (C++ function), 146  
 nw::Skill::operator== (C++ function), 146  
 nw::Skill::operator<=> (C++ function), 146  
 nw::SkillArray (C++ type), 305  
 nw::SkillInfo (C++ struct), 147  
 nw::SkillInfo::ability (C++ member), 147  
 nw::SkillInfo::all\_can\_use (C++ member), 147  
 nw::SkillInfo::armor\_check\_penalty (C++ member), 147  
 nw::SkillInfo::constant (C++ member), 147  
 nw::SkillInfo::description (C++ member), 147  
 nw::SkillInfo::hostile (C++ member), 147  
 nw::SkillInfo::icon (C++ member), 147  
 nw::SkillInfo::name (C++ member), 147  
 nw::SkillInfo::SkillInfo (C++ function), 147  
 nw::SkillInfo::untrained (C++ member), 147  
 nw::SkillInfo::valid (C++ function), 147  
 nw::Sound (C++ struct), 147  
 nw::Sound::active (C++ member), 149  
 nw::Sound::as\_area (C++ function), 148  
 nw::Sound::as\_common (C++ function), 148  
 nw::Sound::as\_creature (C++ function), 148  
 nw::Sound::as\_door (C++ function), 148  
 nw::Sound::as\_encounter (C++ function), 148  
 nw::Sound::as\_item (C++ function), 148  
 nw::Sound::as\_module (C++ function), 148  
 nw::Sound::as\_placeable (C++ function), 148  
 nw::Sound::as\_player (C++ function), 148  
 nw::Sound::as\_sound (C++ function), 148  
 nw::Sound::as\_store (C++ function), 148  
 nw::Sound::as\_trigger (C++ function), 149  
 nw::Sound::as\_waypoint (C++ function), 149  
 nw::Sound::common (C++ member), 149  
 nw::Sound::continuous (C++ member), 149  
 nw::Sound::deserialize (C++ function), 150  
 nw::Sound::distance\_max (C++ member), 149  
 nw::Sound::distance\_min (C++ member), 149  
 nw::Sound::effects (C++ function), 148  
 nw::Sound::elevation (C++ member), 149  
 nw::Sound::generated\_type (C++ member), 149  
 nw::Sound::handle (C++ function), 148  
 nw::Sound::hours (C++ member), 149  
 nw::Sound::instantiate (C++ function), 148  
 nw::Sound::instantiated\_ (C++ member), 150  
 nw::Sound::interval (C++ member), 149  
 nw::Sound::interval\_variation (C++ member), 149  
 nw::Sound::json\_archive\_version (C++ member), 150  
 nw::Sound::looping (C++ member), 149  
 nw::Sound::object\_type (C++ member), 150  
 nw::Sound::pitch\_variation (C++ member), 149  
 nw::Sound::positional (C++ member), 149  
 nw::Sound::priority (C++ member), 149  
 nw::Sound::random (C++ member), 150  
 nw::Sound::random\_position (C++ member), 150  
 nw::Sound::random\_x (C++ member), 149  
 nw::Sound::random\_y (C++ member), 149  
 nw::Sound::restype (C++ member), 150  
 nw::Sound::serialize (C++ function), 150  
 nw::Sound::set\_handle (C++ function), 148  
 nw::Sound::Sound (C++ function), 148  
 nw::Sound::sounds (C++ member), 149  
 nw::Sound::tag (C++ function), 148  
 nw::Sound::times (C++ member), 150  
 nw::Sound::versus\_me (C++ function), 148  
 nw::Sound::volume (C++ member), 150  
 nw::Sound::volume\_variation (C++ member), 150  
 nw::SpawnCreature (C++ struct), 150  
 nw::SpawnCreature::appearance (C++ member), 151  
 nw::SpawnCreature::cr (C++ member), 151  
 nw::SpawnCreature::from\_json (C++ function), 150  
 nw::SpawnCreature::resref (C++ member), 151  
 nw::SpawnCreature::single\_spawn (C++ member), 151  
 nw::SpawnCreature::to\_json (C++ function), 150  
 nw::SpawnPoint (C++ struct), 151  
 nw::SpawnPoint::from\_json (C++ function), 151  
 nw::SpawnPoint::orientation (C++ member), 151  
 nw::SpawnPoint::position (C++ member), 151  
 nw::SpawnPoint::to\_json (C++ function), 151  
 nw::SpecialAbility (C++ struct), 151  
 nw::SpecialAbility::flags (C++ member), 151  
 nw::SpecialAbility::level (C++ member), 151  
 nw::SpecialAbility::spell (C++ member), 151  
 nw::Spell (C++ struct), 152  
 nw::Spell::idx (C++ function), 152  
 nw::Spell::invalid (C++ function), 152  
 nw::Spell::make (C++ function), 152  
 nw::Spell::operator\* (C++ function), 152  
 nw::Spell::operator== (C++ function), 152  
 nw::Spell::operator<=> (C++ function), 152  
 nw::SpellArray (C++ type), 305  
 nw::SpellBook (C++ struct), 152  
 nw::SpellBook::add\_known\_spell (C++ function), 152  
 nw::SpellBook::add\_memorized\_spell (C++ function), 152



`nw::SpellBook::from_json (C++ function)`, 152  
`nw::SpellBook::get_known_spell (C++ function)`, 152  
`nw::SpellBook::get_known_spell_count (C++ function)`, 152  
`nw::SpellBook::get_memorized_spell (C++ function)`, 153  
`nw::SpellBook::get_memorized_spell_count (C++ function)`, 152  
`nw::SpellBook::known_ (C++ member)`, 153  
`nw::SpellBook::memorized_ (C++ member)`, 153  
`nw::SpellBook::remove_known_spell (C++ function)`, 153  
`nw::SpellBook::remove_memorized_spell (C++ function)`, 153  
`nw::SpellBook::SpellBook (C++ function)`, 152  
`nw::SpellBook::to_json (C++ function)`, 152  
`nw::SpellEntry (C++ struct)`, 153  
`nw::SpellEntry::flags (C++ member)`, 153  
`nw::SpellEntry::meta (C++ member)`, 153  
`nw::SpellEntry::operator== (C++ function)`, 153  
`nw::SpellEntry::operator<=> (C++ function)`, 153  
`nw::SpellEntry::spell (C++ member)`, 153  
`nw::SpellFlags (C++ enum)`, 263  
`nw::SpellFlags::none (C++ enumerator)`, 263  
`nw::SpellFlags::readied (C++ enumerator)`, 263  
`nw::SpellFlags::spontaneous (C++ enumerator)`, 263  
`nw::SpellFlags::unlimited (C++ enumerator)`, 263  
`nw::SpellInfo (C++ struct)`, 153  
`nw::SpellInfo::icon (C++ member)`, 154  
`nw::SpellInfo::innate_level (C++ member)`, 154  
`nw::SpellInfo::metamagic (C++ member)`, 154  
`nw::SpellInfo::name (C++ member)`, 154  
`nw::SpellInfo::school (C++ member)`, 154  
`nw::SpellInfo::SpellInfo (C++ function)`, 154  
`nw::SpellInfo::valid (C++ function)`, 154  
`nw::SpellMetaMagic (C++ enum)`, 263  
`nw::SpellMetaMagic::empower (C++ enumerator)`, 263  
`nw::SpellMetaMagic::extend (C++ enumerator)`, 263  
`nw::SpellMetaMagic::maximize (C++ enumerator)`, 264  
`nw::SpellMetaMagic::none (C++ enumerator)`, 263  
`nw::SpellMetaMagic::quicken (C++ enumerator)`, 264  
`nw::SpellMetaMagic::silent (C++ enumerator)`, 264  
`nw::SpellMetaMagic::still (C++ enumerator)`, 264  
`nw::sqlite3_ptr (C++ type)`, 305  
`nw::Store (C++ struct)`, 154  
`nw::Store::as_area (C++ function)`, 154, 155  
`nw::Store::as_common (C++ function)`, 154  
`nw::Store::as_creature (C++ function)`, 155  
`nw::Store::as_door (C++ function)`, 155  
`nw::Store::as_encounter (C++ function)`, 155  
`nw::Store::as_item (C++ function)`, 155  
`nw::Store::as_module (C++ function)`, 155  
`nw::Store::as_placeable (C++ function)`, 155  
`nw::Store::as_player (C++ function)`, 155  
`nw::Store::as_sound (C++ function)`, 155  
`nw::Store::as_store (C++ function)`, 154  
`nw::Store::as_trigger (C++ function)`, 155  
`nw::Store::as_waypoint (C++ function)`, 155  
`nw::Store::blackmarket (C++ member)`, 156  
`nw::Store::blackmarket_markdown (C++ member)`, 155  
`nw::Store::common (C++ member)`, 155  
`nw::Store::deserialize (C++ function)`, 156  
`nw::Store::effects (C++ function)`, 154  
`nw::Store::gold (C++ member)`, 156  
`nw::Store::handle (C++ function)`, 154  
`nw::Store::identify_price (C++ member)`, 155  
`nw::Store::instantiate (C++ function)`, 154  
`nw::Store::instantiated_ (C++ member)`, 156  
`nw::Store::inventory (C++ member)`, 155  
`nw::Store::json_archive_version (C++ member)`, 156  
`nw::Store::markdown (C++ member)`, 155  
`nw::Store::markup (C++ member)`, 156  
`nw::Store::max_price (C++ member)`, 156  
`nw::Store::object_type (C++ member)`, 156  
`nw::Store::restype (C++ member)`, 156  
`nw::Store::scripts (C++ member)`, 155  
`nw::Store::serialize (C++ function)`, 156  
`nw::Store::set_handle (C++ function)`, 154  
`nw::Store::Store (C++ function)`, 154  
`nw::Store::tag (C++ function)`, 154  
`nw::Store::versus_me (C++ function)`, 154  
`nw::StoreInventory (C++ struct)`, 156  
`nw::StoreInventory::armor (C++ member)`, 157  
`nw::StoreInventory::miscellaneous (C++ member)`, 157  
`nw::StoreInventory::potions (C++ member)`, 157  
`nw::StoreInventory::rings (C++ member)`, 157  
`nw::StoreInventory::set_owner (C++ function)`, 156  
`nw::StoreInventory::StoreInventory (C++ function)`, 156  
`nw::StoreInventory::weapons (C++ member)`, 157  
`nw::StoreInventory::will_not_buy (C++ member)`, 157  
`nw::StoreInventory::will_only_buy (C++ member)`, 157  
`nw::StoreScripts (C++ struct)`, 157  
`nw::StoreScripts::on_closed (C++ member)`, 157  
`nw::StoreScripts::on_opened (C++ member)`, 157

nw::string::desanitize\_colors (C++ function), 287  
 nw::string::endswith (C++ function), 287  
 nw::string::from (C++ function), 287  
 nw::string::glob\_to\_regex (C++ function), 288  
 nw::string::icmp (C++ function), 288  
 nw::string::join (C++ function), 288  
 nw::string::ltrim\_in\_place (C++ function), 288  
 nw::string::rtrim\_in\_place (C++ function), 289  
 nw::string::sanitize\_colors (C++ function), 289  
 nw::string::split (C++ function), 289  
 nw::string::startswith (C++ function), 289  
 nw::string::tolower (C++ function), 289  
 nw::string::trim\_in\_place (C++ function), 289  
 nw::sum\_effects\_of (C++ function), 290  
 nw::TargetState (C++ enum), 264  
 nw::TargetState::asleep (C++ enumerator), 264  
 nw::TargetState::attacker\_invis (C++ enumerator), 264  
 nw::TargetState::attacker\_unseen (C++ enumerator), 264  
 nw::TargetState::blind (C++ enumerator), 264  
 nw::TargetState::flanked (C++ enumerator), 264  
 nw::TargetState::flatfooted (C++ enumerator), 264  
 nw::TargetState::invis (C++ enumerator), 264  
 nw::TargetState::moving (C++ enumerator), 264  
 nw::TargetState::none (C++ enumerator), 264  
 nw::TargetState::prone (C++ enumerator), 264  
 nw::TargetState::stunned (C++ enumerator), 264  
 nw::TargetState::unseen (C++ enumerator), 264  
 nw::Tile (C++ struct), 157  
 nw::Tile::animloop1 (C++ member), 158  
 nw::Tile::animloop2 (C++ member), 158  
 nw::Tile::animloop3 (C++ member), 158  
 nw::Tile::from\_json (C++ function), 157  
 nw::Tile::height (C++ member), 158  
 nw::Tile::id (C++ member), 158  
 nw::Tile::mainlight1 (C++ member), 158  
 nw::Tile::mainlight2 (C++ member), 158  
 nw::Tile::orientation (C++ member), 158  
 nw::Tile::srclight1 (C++ member), 158  
 nw::Tile::srclight2 (C++ member), 158  
 nw::Tile::Tile (C++ function), 157  
 nw::Tile::to\_json (C++ function), 157  
 nw::Tlk (C++ struct), 158  
 nw::Tlk::custom\_flag (C++ member), 159  
 nw::Tlk::get (C++ function), 158  
 nw::Tlk::language\_id (C++ function), 158  
 nw::Tlk::modified (C++ function), 158  
 nw::Tlk::operator= (C++ function), 159  
 nw::Tlk::operator[] (C++ function), 159  
 nw::Tlk::save (C++ function), 158  
 nw::Tlk::save\_as (C++ function), 158  
 nw::Tlk::set (C++ function), 159  
 nw::Tlk::size (C++ function), 159  
 nw::Tlk::Tlk (C++ function), 158  
 nw::Tlk::valid (C++ function), 159  
 nw::TlkElement (C++ struct), 159  
 nw::TlkElement::flags (C++ member), 159  
 nw::TlkElement::offset (C++ member), 159  
 nw::TlkElement::size (C++ member), 159  
 nw::TlkElement::snd\_duration (C++ member), 159  
 nw::TlkElement::sound (C++ member), 159  
 nw::TlkElement::TlkElement (C++ function), 159  
 nw::TlkElement::unused (C++ member), 159  
 nw::TlkFlags (C++ struct), 160  
 nw::TlkFlags::empty (C++ member), 160  
 nw::TlkFlags::sound (C++ member), 160  
 nw::TlkFlags::sound\_length (C++ member), 160  
 nw::TlkFlags::text (C++ member), 160  
 nw::TlkHeader (C++ struct), 160  
 nw::TlkHeader::language\_id (C++ member), 160  
 nw::TlkHeader::str\_count (C++ member), 160  
 nw::TlkHeader::str\_offset (C++ member), 160  
 nw::TlkHeader::type (C++ member), 160  
 nw::TlkHeader::version (C++ member), 160  
 nw::to\_base64 (C++ function), 290  
 nw::to\_json (C++ function), 291, 294  
 nw::to\_underlying (C++ function), 295  
 nw::to\_utf8 (C++ function), 295  
 nw::to\_utf8\_by\_global\_lang (C++ function), 295  
 nw::to\_utf8\_by\_langid (C++ function), 295  
 nw::Tokenizer (C++ struct), 160  
 nw::Tokenizer::current (C++ function), 161  
 nw::Tokenizer::is\_newline (C++ function), 161  
 nw::Tokenizer::line (C++ function), 161  
 nw::Tokenizer::next (C++ function), 161  
 nw::Tokenizer::put\_back (C++ function), 161  
 nw::Tokenizer::set\_buffer (C++ function), 161  
 nw::Tokenizer::Tokenizer (C++ function), 161  
 nw::Trap (C++ struct), 161  
 nw::Trap::detect\_dc (C++ member), 161  
 nw::Trap::detectable (C++ member), 161  
 nw::Trap::disarm\_dc (C++ member), 161  
 nw::Trap::disarmable (C++ member), 161  
 nw::Trap::from\_json (C++ function), 161  
 nw::Trap::is\_trapped (C++ member), 161  
 nw::Trap::one\_shot (C++ member), 161  
 nw::Trap::to\_json (C++ function), 161  
 nw::Trap::Trap (C++ function), 161  
 nw::Trap::type (C++ member), 161  
 nw::Trigger (C++ struct), 162  
 nw::Trigger::as\_area (C++ function), 162  
 nw::Trigger::as\_common (C++ function), 162  
 nw::Trigger::as\_creature (C++ function), 162  
 nw::Trigger::as\_door (C++ function), 162  
 nw::Trigger::as\_encounter (C++ function), 162

`nw::Trigger::as_item (C++ function), 162`  
`nw::Trigger::as_module (C++ function), 162`  
`nw::Trigger::as_placeable (C++ function), 162`  
`nw::Trigger::as_player (C++ function), 162, 163`  
`nw::Trigger::as_sound (C++ function), 163`  
`nw::Trigger::as_store (C++ function), 163`  
`nw::Trigger::as_trigger (C++ function), 162`  
`nw::Trigger::as_waypoint (C++ function), 163`  
`nw::Trigger::common (C++ member), 163`  
`nw::Trigger::cursor (C++ member), 163`  
`nw::Trigger::deserialize (C++ function), 164`  
`nw::Trigger::effects (C++ function), 162`  
`nw::Trigger::faction (C++ member), 163`  
`nw::Trigger::geometry (C++ member), 163`  
`nw::Trigger::handle (C++ function), 162`  
`nw::Trigger::highlight_height (C++ member), 163`  
`nw::Trigger::instantiate (C++ function), 162`  
`nw::Trigger::instantiated_ (C++ member), 163`  
`nw::Trigger::json_archive_version (C++ member), 164`  
`nw::Trigger::linked_to (C++ member), 163`  
`nw::Trigger::linked_to_flags (C++ member), 163`  
`nw::Trigger::loadscreen (C++ member), 163`  
`nw::Trigger::object_type (C++ member), 164`  
`nw::Trigger::portrait (C++ member), 163`  
`nw::Trigger::restype (C++ member), 164`  
`nw::Trigger::scripts (C++ member), 163`  
`nw::Trigger::serialize (C++ function), 164`  
`nw::Trigger::set_handle (C++ function), 162`  
`nw::Trigger::tag (C++ function), 162`  
`nw::Trigger::trap (C++ member), 163`  
`nw::Trigger::Trigger (C++ function), 162`  
`nw::Trigger::type (C++ member), 163`  
`nw::Trigger::versus_me (C++ function), 162`  
`nw::TriggerScripts (C++ struct), 164`  
`nw::TriggerScripts::from_json (C++ function), 164`  
`nw::TriggerScripts::on_click (C++ member), 164`  
`nw::TriggerScripts::on_disarm (C++ member), 164`  
`nw::TriggerScripts::on_enter (C++ member), 164`  
`nw::TriggerScripts::on_exit (C++ member), 164`  
`nw::TriggerScripts::on_heartbeat (C++ member), 164`  
`nw::TriggerScripts::on_trap_triggered (C++ member), 164`  
`nw::TriggerScripts::on_user_defined (C++ member), 164`  
`nw::TriggerScripts::to_json (C++ function), 164`  
`nw::TwoDA (C++ struct), 165`  
`nw::TwoDA::column_index (C++ function), 165`  
`nw::TwoDA::columns (C++ function), 165`  
`nw::TwoDA::get (C++ function), 165`  
`nw::TwoDA::get_to (C++ function), 165`  
`nw::TwoDA::is_valid (C++ function), 166`  
`nw::TwoDA::npos (C++ member), 166`  
`nw::TwoDA::operator= (C++ function), 165`  
`nw::TwoDA::pad (C++ function), 165`  
`nw::TwoDA::row (C++ function), 165`  
`nw::TwoDA::rows (C++ function), 165`  
`nw::TwoDA::set (C++ function), 165, 166`  
`nw::TwoDA::TwoDA (C++ function), 165`  
`nw::unique_container (C++ type), 305`  
`nw::Variant (C++ struct), 166`  
`nw::Variant::as (C++ function), 166`  
`nw::Variant::empty (C++ function), 167`  
`nw::Variant::get (C++ function), 167`  
`nw::Variant::is (C++ function), 166`  
`nw::Variant::operator= (C++ function), 166`  
`nw::Variant::operator== (C++ function), 167`  
`nw::Variant::operator< (C++ function), 167`  
`nw::Variant::Variant (C++ function), 166`  
`nw::Versus (C++ struct), 167`  
`nw::Versus::align_flags (C++ member), 167`  
`nw::Versus::match (C++ function), 167`  
`nw::Versus::operator bool (C++ function), 167`  
`nw::Versus::operator== (C++ function), 167`  
`nw::Versus::operator<=> (C++ function), 167`  
`nw::Versus::race (C++ member), 167`  
`nw::Versus::trap (C++ member), 167`  
`nw::Waypoint (C++ struct), 167`  
`nw::Waypoint::appearance (C++ member), 169`  
`nw::Waypoint::as_area (C++ function), 168`  
`nw::Waypoint::as_common (C++ function), 168`  
`nw::Waypoint::as_creature (C++ function), 168`  
`nw::Waypoint::as_door (C++ function), 168`  
`nw::Waypoint::as_encounter (C++ function), 168`  
`nw::Waypoint::as_item (C++ function), 168`  
`nw::Waypoint::as_module (C++ function), 168`  
`nw::Waypoint::as_placeable (C++ function), 168`  
`nw::Waypoint::as_player (C++ function), 168`  
`nw::Waypoint::as_sound (C++ function), 168`  
`nw::Waypoint::as_store (C++ function), 169`  
`nw::Waypoint::as_trigger (C++ function), 169`  
`nw::Waypoint::as_waypoint (C++ function), 168`  
`nw::Waypoint::common (C++ member), 169`  
`nw::Waypoint::description (C++ member), 169`  
`nw::Waypoint::deserialize (C++ function), 169`  
`nw::Waypoint::effects (C++ function), 168`  
`nw::Waypoint::handle (C++ function), 168`  
`nw::Waypoint::has_map_note (C++ member), 169`  
`nw::Waypoint::instantiate (C++ function), 168`  
`nw::Waypoint::instantiated_ (C++ member), 169`  
`nw::Waypoint::json_archive_version (C++ member), 170`  
`nw::Waypoint::linked_to (C++ member), 169`  
`nw::Waypoint::map_note (C++ member), 169`



nw::Waypoint::map\_note\_enabled (C++ member), 169  
 nw::Waypoint::object\_type (C++ member), 170  
 nw::Waypoint::restype (C++ member), 170  
 nw::Waypoint::serialize (C++ function), 169  
 nw::Waypoint::set\_handle (C++ function), 168  
 nw::Waypoint::tag (C++ function), 168  
 nw::Waypoint::versus\_me (C++ function), 168  
 nw::Waypoint::Waypoint (C++ function), 168  
 nw::Zip (C++ struct), 170  
 nw::Zip::~~Zip (C++ function), 170  
 nw::Zip::all (C++ function), 170  
 nw::Zip::contains (C++ function), 170  
 nw::Zip::demand (C++ function), 170  
 nw::Zip::extract (C++ function), 170  
 nw::Zip::extract\_by\_glob (C++ function), 170  
 nw::Zip::name (C++ function), 170  
 nw::Zip::path (C++ function), 170  
 nw::Zip::size (C++ function), 170  
 nw::Zip::stat (C++ function), 170  
 nw::Zip::valid (C++ function), 170  
 nw::Zip::visit (C++ function), 170  
 nw::Zip::working\_directory (C++ function), 170  
 nw::Zip::Zip (C++ function), 170  
 nw::ZipElement (C++ struct), 171  
 nw::ZipElement::resref (C++ member), 171  
 nw::ZipElement::size (C++ member), 171  
 nw::ZlibHeader (C++ struct), 171  
 nw::ZlibHeader::version (C++ member), 171  
 nw::ZstdHeader (C++ struct), 171  
 nw::ZstdHeader::dictionary (C++ member), 171  
 nw::ZstdHeader::version (C++ member), 171  
 nwm (rollnw.ResourceType attribute), 338  
 nwn1::base\_attack\_bonus (C++ function), 295  
 nwn1::effect\_ability\_modifier (C++ function), 295  
 nwn1::effect\_armor\_class\_modifier (C++ function), 295  
 nwn1::effect\_attack\_modifier (C++ function), 296  
 nwn1::effect\_concealment (C++ function), 296  
 nwn1::effect\_haste (C++ function), 296  
 nwn1::effect\_miss\_chance (C++ function), 296  
 nwn1::effect\_skill\_modifier (C++ function), 296  
 nwn1::get\_ability\_modifier (C++ function), 296  
 nwn1::get\_ability\_score (C++ function), 296  
 nwn1::get\_caster\_level (C++ function), 296  
 nwn1::get\_dex\_modifier (C++ function), 297  
 nwn1::get\_max\_hitpoints (C++ function), 297  
 nwn1::get\_skill\_rank (C++ function), 297  
 nwn1::get\_spell\_dc (C++ function), 297  
 nwn1::get\_weapon\_by\_attack\_type (C++ function), 297  
 nwn1::has\_effect\_type\_applied (C++ function), 297  
 nwn1::is\_creature\_weapon (C++ function), 297  
 nwn1::is\_ranged\_weapon (C++ function), 297  
 nwn1::is\_shield (C++ function), 298  
 nwn1::is\_unarmed\_weapon (C++ function), 298  
 nwn1::Profile (C++ struct), 251  
 nwn1::Profile::~~Profile (C++ function), 251  
 nwn1::Profile::load\_resources (C++ function), 251  
 nwn1::Profile::load\_rules (C++ function), 251  
 nwn1::qual::ability (C++ function), 298  
 nwn1::qual::alignment (C++ function), 298  
 nwn1::qual::class\_level (C++ function), 298  
 nwn1::qual::feat (C++ function), 298  
 nwn1::qual::level (C++ function), 298  
 nwn1::qual::race (C++ function), 299  
 nwn1::qual::skill (C++ function), 299  
 nwn1::resolve\_attack (C++ function), 299  
 nwn1::resolve\_attack\_bonus (C++ function), 299  
 nwn1::resolve\_attack\_roll (C++ function), 299  
 nwn1::resolve\_attack\_type (C++ function), 300  
 nwn1::resolve\_concealment (C++ function), 300  
 nwn1::resolve\_creature\_damage (C++ function), 300  
 nwn1::resolve\_critical\_multiplier (C++ function), 300  
 nwn1::resolve\_critical\_threat (C++ function), 300  
 nwn1::resolve\_damage\_modifiers (C++ function), 300  
 nwn1::resolve\_dual\_wield\_penalty (C++ function), 300  
 nwn1::resolve\_iteration\_penalty (C++ function), 301  
 nwn1::resolve\_number\_of\_attacks (C++ function), 301  
 nwn1::resolve\_saving\_throw (C++ function), 301  
 nwn1::resolve\_skill\_check (C++ function), 301  
 nwn1::resolve\_unarmed\_damage (C++ function), 301  
 nwn1::resolve\_weapon\_damage (C++ function), 301  
 nwn1::resolve\_weapon\_damage\_flags (C++ function), 301  
 nwn1::saving\_throw (C++ function), 302  
 nwn1::sel::ability (C++ function), 302  
 nwn1::sel::alignment (C++ function), 302  
 nwn1::sel::class\_level (C++ function), 302  
 nwn1::sel::feat (C++ function), 302  
 nwn1::sel::level (C++ function), 302  
 nwn1::sel::race (C++ function), 302  
 nwn1::sel::skill (C++ function), 302  
 nwn1::selector (C++ function), 302  
 nwn1::weapon\_is\_finessable (C++ function), 303  
 nwn1::weapon\_iteration (C++ function), 303  
 nwn2 (rollnw.GameVersion attribute), 322  
 NWSync (class in rollnw), 331

NWSyncManifest (class in rollnw), 331

## O

OBJECT (rollnw.script.NssTokenType attribute), 371

OBJECT\_INVALID\_CONST (rollnw.script.NssTokenType attribute), 371

OBJECT\_SELF\_CONST (rollnw.script.NssTokenType attribute), 371

object\_type (rollnw.Area attribute), 306

object\_type (rollnw.Creature attribute), 312

object\_type (rollnw.Door attribute), 317

object\_type (rollnw.Placeable attribute), 333

object\_type (rollnw.Sound attribute), 339

object\_type (rollnw.Store attribute), 342

ObjectBase (class in rollnw), 331

ObjectHandle (class in rollnw), 331

Objects (class in rollnw.kernel), 347

objects() (in module rollnw.kernel), 348

on\_attacked (rollnw.CreatureScripts attribute), 312

on\_blocked (rollnw.CreatureScripts attribute), 312

on\_click (rollnw.DoorScripts attribute), 317

on\_click (rollnw.PlaceableScripts attribute), 333

on\_click (rollnw.TriggerScripts attribute), 344

on\_client\_enter (rollnw.ModuleScripts attribute), 330

on\_client\_leave (rollnw.ModuleScripts attribute), 330

on\_closed (rollnw.DoorScripts attribute), 317

on\_closed (rollnw.PlaceableScripts attribute), 333

on\_closed (rollnw.StoreScripts attribute), 342

on\_conversation (rollnw.CreatureScripts attribute), 312

on\_cutsnabort (rollnw.ModuleScripts attribute), 330

on\_damaged (rollnw.CreatureScripts attribute), 312

on\_damaged (rollnw.DoorScripts attribute), 317

on\_damaged (rollnw.PlaceableScripts attribute), 333

on\_death (rollnw.CreatureScripts attribute), 312

on\_death (rollnw.DoorScripts attribute), 317

on\_death (rollnw.PlaceableScripts attribute), 333

on\_disarm (rollnw.DoorScripts attribute), 317

on\_disarm (rollnw.PlaceableScripts attribute), 333

on\_disarm (rollnw.TriggerScripts attribute), 344

on\_disturbed (rollnw.CreatureScripts attribute), 312

on\_endround (rollnw.CreatureScripts attribute), 312

on\_enter (rollnw.AreaScripts attribute), 307

on\_enter (rollnw.TriggerScripts attribute), 344

on\_entered (rollnw.EncounterScripts attribute), 320

on\_exhausted (rollnw.EncounterScripts attribute), 320

on\_exit (rollnw.AreaScripts attribute), 307

on\_exit (rollnw.EncounterScripts attribute), 320

on\_exit (rollnw.TriggerScripts attribute), 344

on\_heartbeat (rollnw.AreaScripts attribute), 307

on\_heartbeat (rollnw.CreatureScripts attribute), 312

on\_heartbeat (rollnw.DoorScripts attribute), 317

on\_heartbeat (rollnw.EncounterScripts attribute), 320

on\_heartbeat (rollnw.ModuleScripts attribute), 330

on\_heartbeat (rollnw.PlaceableScripts attribute), 333

on\_heartbeat (rollnw.TriggerScripts attribute), 344

on\_inventory\_disturbed (rollnw.PlaceableScripts attribute), 333

on\_item\_acquire (rollnw.ModuleScripts attribute), 330

on\_item\_activate (rollnw.ModuleScripts attribute), 330

on\_item\_unaquire (rollnw.ModuleScripts attribute), 330

on\_load (rollnw.ModuleScripts attribute), 330

on\_lock (rollnw.DoorScripts attribute), 317

on\_lock (rollnw.PlaceableScripts attribute), 334

on\_melee\_attacked (rollnw.DoorScripts attribute), 318

on\_melee\_attacked (rollnw.PlaceableScripts attribute), 334

on\_open (rollnw.DoorScripts attribute), 318

on\_open (rollnw.PlaceableScripts attribute), 334

on\_open\_failure (rollnw.DoorScripts attribute), 318

on\_opened (rollnw.StoreScripts attribute), 342

on\_perceived (rollnw.CreatureScripts attribute), 312

on\_player\_chat (rollnw.ModuleScripts attribute), 330

on\_player\_death (rollnw.ModuleScripts attribute), 330

on\_player\_dying (rollnw.ModuleScripts attribute), 331

on\_player\_equip (rollnw.ModuleScripts attribute), 331

on\_player\_level\_up (rollnw.ModuleScripts attribute), 331

on\_player\_rest (rollnw.ModuleScripts attribute), 331

on\_player\_unequip (rollnw.ModuleScripts attribute), 331

on\_rested (rollnw.CreatureScripts attribute), 312

on\_spawn (rollnw.CreatureScripts attribute), 312

on\_spawnbtndn (rollnw.ModuleScripts attribute), 331

on\_spell\_cast\_at (rollnw.CreatureScripts attribute), 313

on\_spell\_cast\_at (rollnw.DoorScripts attribute), 318

on\_spell\_cast\_at (rollnw.PlaceableScripts attribute), 334

on\_start (rollnw.ModuleScripts attribute), 331

on\_trap\_triggered (rollnw.DoorScripts attribute), 318

on\_trap\_triggered (rollnw.PlaceableScripts attribute), 334

on\_trap\_triggered (rollnw.TriggerScripts attribute), 344

on\_unlock (rollnw.DoorScripts attribute), 318

on\_unlock (rollnw.PlaceableScripts attribute), 334

on\_used (rollnw.PlaceableScripts attribute), 334

on\_user\_defined (rollnw.AreaScripts attribute), 307

on\_user\_defined (rollnw.CreatureScripts attribute), 313

on\_user\_defined (rollnw.DoorScripts attribute), 318

on\_user\_defined (rollnw.EncounterScripts attribute), 320

on\_user\_defined (rollnw.ModuleScripts attribute), 331

- on\_user\_defined (rollnw.PlaceableScripts attribute), 334
- on\_user\_defined (rollnw.TriggerScripts attribute), 344
- one\_shot (rollnw.Trap attribute), 343
- opacity (rollnw.model.MdlEmitterNode attribute), 353
- open (rollnw.PlaceableAnimationState attribute), 333
- opened1 (rollnw.DoorAnimationState attribute), 317
- opened2 (rollnw.DoorAnimationState attribute), 317
- operator (rollnw.script.AssignExpression attribute), 361
- operator (rollnw.script.BinaryExpression attribute), 362
- operator (rollnw.script.ComparisonExpression attribute), 363
- operator (rollnw.script.JumpStatement attribute), 367
- operator (rollnw.script.LogicalExpression attribute), 368
- operator (rollnw.script.PostfixExpression attribute), 372
- operator (rollnw.script.UnaryExpression attribute), 374
- operator<< (C++ function), 285
- options() (rollnw.kernel.Config method), 346
- OR (rollnw.script.NssTokenType attribute), 370
- OREQ (rollnw.script.NssTokenType attribute), 370
- orientation (rollnw.Location attribute), 329
- orientation (rollnw.model.MdlControllerType attribute), 351
- orientation (rollnw.SpawnPoint attribute), 340
- orientation (rollnw.Tile attribute), 342
- OROR (rollnw.script.NssTokenType attribute), 370
- owner (rollnw.Inventory attribute), 323
- ## P
- p2p (rollnw.model.ModelEmitterFlag attribute), 358
- p2p\_bezier2 (rollnw.model.MdlControllerType attribute), 351
- p2p\_bezier3 (rollnw.model.MdlControllerType attribute), 351
- p2p\_sel (rollnw.model.ModelEmitterFlag attribute), 358
- p2p\_type (rollnw.model.MdlEmitterNode attribute), 353
- palette\_id (rollnw.Common attribute), 310
- param (rollnw.script.SymbolKind attribute), 374
- param\_table (rollnw.ItemProperty attribute), 326
- param\_value (rollnw.ItemProperty attribute), 326
- parent (rollnw.DialogNode attribute), 315
- parent (rollnw.DialogPtr attribute), 316
- parent (rollnw.model.MdlNode attribute), 355
- parent (rollnw.ResourceDescriptor attribute), 336
- parse (rollnw.script.DiagnosticType attribute), 365
- parse() (rollnw.script.Nss method), 368
- particle\_rot (rollnw.model.MdlControllerType attribute), 351
- patch (rollnw.model.MdlNodeFlags attribute), 356
- patch (rollnw.model.MdlNodeType attribute), 356
- path() (rollnw.Container method), 310
- pc (rollnw.Creature attribute), 312
- pelvis (rollnw.BodyParts attribute), 309
- percent\_end (rollnw.model.MdlControllerType attribute), 352
- percent\_mid (rollnw.model.MdlControllerType attribute), 352
- percent\_start (rollnw.model.MdlControllerType attribute), 352
- perception\_range (rollnw.Creature attribute), 312
- period (rollnw.model.MdlDanglymeshNode attribute), 352
- phenotype (rollnw.Appearance attribute), 305
- pitch\_variation (rollnw.Sound attribute), 340
- pixels() (rollnw.Plr method), 334
- Placeable (class in rollnw), 332
- placeable (rollnw.ObjectType attribute), 332
- placeable() (rollnw.kernel.Objects method), 348
- placeables (rollnw.Area attribute), 306
- PlaceableScripts (class in rollnw), 333
- plane (rollnw.model.MdlAABBEEntry attribute), 349
- Player (class in rollnw), 334
- player (rollnw.ResourceType attribute), 336
- player\_only (rollnw.Encounter attribute), 319
- plh (rollnw.ResourceType attribute), 336
- plot (rollnw.Creature attribute), 312
- plot (rollnw.Door attribute), 317
- plot (rollnw.Item attribute), 324
- plot (rollnw.Placeable attribute), 333
- Plt (class in rollnw), 334
- plt (rollnw.ResourceType attribute), 336
- plt\_layer\_cloth1 (rollnw.PlrLayer attribute), 335
- plt\_layer\_cloth2 (rollnw.PlrLayer attribute), 335
- plt\_layer\_hair (rollnw.PlrLayer attribute), 334
- plt\_layer\_leather1 (rollnw.PlrLayer attribute), 335
- plt\_layer\_leather2 (rollnw.PlrLayer attribute), 335
- plt\_layer\_metal1 (rollnw.PlrLayer attribute), 334
- plt\_layer\_metal2 (rollnw.PlrLayer attribute), 334
- plt\_layer\_skin (rollnw.PlrLayer attribute), 334
- plt\_layer\_tattoo1 (rollnw.PlrLayer attribute), 335
- plt\_layer\_tattoo2 (rollnw.PlrLayer attribute), 335
- PltColors (class in rollnw), 334
- PltPixel (class in rollnw), 335
- PLUS (rollnw.script.NssTokenType attribute), 370
- PLUSEQ (rollnw.script.NssTokenType attribute), 370
- PLUSPLUS (rollnw.script.NssTokenType attribute), 370
- png (rollnw.ResourceType attribute), 339
- pointers (rollnw.DialogNode attribute), 315
- polish (rollnw.LanguageID attribute), 326
- pool\_size (rollnw.kernel.EffectSystemStats attribute), 347
- portal (rollnw.ObjectType attribute), 332
- portrait (rollnw.Trigger attribute), 344
- portrait\_id (rollnw.Appearance attribute), 305
- portrait\_id (rollnw.Door attribute), 317
- portrait\_id (rollnw.Placeable attribute), 333



position (*rollnw.Location* attribute), 329  
 position (*rollnw.model.MdlControllerType* attribute), 352  
 position (*rollnw.model.SkinVertex* attribute), 358  
 position (*rollnw.model.Vertex* attribute), 358  
 position (*rollnw.script.InlayHint* attribute), 367  
 position (*rollnw.SpawnPoint* attribute), 340  
 positional (*rollnw.Sound* attribute), 340  
 PostfixExpression (class in *rollnw.script*), 372  
 potions (*rollnw.Store* attribute), 342  
 POUND (*rollnw.script.NssTokenType* attribute), 369  
 prevent\_zoom (*rollnw.Dialog* attribute), 313  
 priority (*rollnw.Sound* attribute), 340  
 process\_includes() (*rollnw.script.Nss* method), 368  
 projectile (*rollnw.ObjectType* attribute), 332  
 properties (*rollnw.Item* attribute), 324  
 provider (*rollnw.script.Symbol* attribute), 373  
 ptm (*rollnw.ResourceType* attribute), 338  
 ptt (*rollnw.ResourceType* attribute), 338  
 pvp (*rollnw.Area* attribute), 306  
 pwk (*rollnw.ResourceType* attribute), 338

## Q

quest (*rollnw.DialogNode* attribute), 315  
 quest\_entry (*rollnw.DialogNode* attribute), 315  
 QUESTION (*rollnw.script.NssTokenType* attribute), 369  
 queue\_remove\_effect\_by() (in module *rollnw.nwn1*), 360  
 quicken (*rollnw.SpellMetaMagic* attribute), 341

## R

race (*rollnw.Creature* attribute), 312  
 radius (*rollnw.model.MdlControllerType* attribute), 352  
 radius (*rollnw.model.MdlModel* attribute), 355  
 rand\_vel (*rollnw.model.MdlControllerType* attribute), 352  
 random (*rollnw.model.ModelEmitterFlag* attribute), 358  
 random (*rollnw.Sound* attribute), 340  
 random\_position (*rollnw.Sound* attribute), 340  
 random\_x (*rollnw.Sound* attribute), 340  
 random\_y (*rollnw.Sound* attribute), 340  
 range (*rollnw.script.BlockStatement* attribute), 362  
 range (*rollnw.script.SourceLocation* attribute), 372  
 RBRACE (*rollnw.script.NssTokenType* attribute), 369  
 RBRACKET (*rollnw.script.NssTokenType* attribute), 369  
 read (*rollnw.DialogAnimation* attribute), 314  
 readied (*rollnw.SpellFlags* attribute), 341  
 reattachable (*rollnw.model.MdlReferenceNode* attribute), 356  
 reference (*rollnw.model.MdlNodeFlags* attribute), 356  
 reference (*rollnw.model.MdlNodeType* attribute), 356  
 reflex (*rollnw.Saves* attribute), 339  
 refmodel (*rollnw.model.MdlReferenceNode* attribute), 356

reload() (*rollnw.Erf* method), 322  
 remove() (*rollnw.kernel.EffectSystem* method), 347  
 remove() (*rollnw.LocString* method), 328  
 remove\_action\_param() (*rollnw.DialogNode* method), 315  
 remove\_condition\_param() (*rollnw.DialogPtr* method), 316  
 remove\_key (*rollnw.Lock* attribute), 329  
 remove\_known\_spell() (*rollnw.SpellBook* method), 341  
 remove\_memorized\_spell() (*rollnw.SpellBook* method), 341  
 remove\_ptr() (*rollnw.Dialog* method), 313  
 remove\_ptr() (*rollnw.DialogPtr* method), 316  
 render (*rollnw.model.MdlEmitterNode* attribute), 353  
 render (*rollnw.model.MdlTrimeshNode* attribute), 357  
 render\_sel (*rollnw.model.MdlEmitterNode* attribute), 353  
 renderhint (*rollnw.model.MdlTrimeshNode* attribute), 357  
 renderorder (*rollnw.model.MdlEmitterNode* attribute), 353  
 reply (*rollnw.DialogNodeType* attribute), 315  
 reset (*rollnw.Encounter* attribute), 319  
 reset\_time (*rollnw.Encounter* attribute), 319  
 resman() (in module *rollnw.kernel*), 348  
 resmatch() (in module *rollnw*), 345  
 resolve() (*rollnw.script.Nss* method), 368  
 resolve\_attack() (in module *rollnw.nwn1*), 360  
 resolve\_attack\_bonus() (in module *rollnw.nwn1*), 360  
 resolve\_attack\_damage() (in module *rollnw.nwn1*), 360  
 resolve\_concealment() (in module *rollnw.nwn1*), 360  
 resolve\_critical\_multiplier() (in module *rollnw.nwn1*), 360  
 resolve\_critical\_threat() (in module *rollnw.nwn1*), 360  
 resolve\_damage\_immunity() (in module *rollnw.nwn1*), 360  
 resolve\_damage\_modifiers() (in module *rollnw.nwn1*), 361  
 resolve\_damage\_reduction() (in module *rollnw.nwn1*), 361  
 resolve\_damage\_resistance() (in module *rollnw.nwn1*), 361  
 resolve\_dual\_wield\_penalty() (in module *rollnw.nwn1*), 361  
 resolve\_iteration\_penalty() (in module *rollnw.nwn1*), 361  
 resolve\_number\_of\_attacks() (in module *rollnw.nwn1*), 361  
 resolve\_target\_state() (in module *rollnw.nwn1*), 361

- resolve\_unarmed\_damage() (in module rollnw.nwn1), 361  
 resolve\_weapon\_damage() (in module rollnw.nwn1), 361  
 resolve\_weapon\_power() (in module rollnw.nwn1), 361  
 Resource (class in rollnw), 335  
 ResourceDescriptor (class in rollnw), 335  
 Resources (class in rollnw.kernel), 348  
 respawns (rollnw.Encounter attribute), 319  
 resref (rollnw.Common attribute), 310  
 resref (rollnw.Resource attribute), 335  
 resref (rollnw.script.Include attribute), 366  
 resref (rollnw.SpawnCreature attribute), 340  
 restype (rollnw.Dialog attribute), 313  
 result (rollnw.AttackData attribute), 308  
 RETURN (rollnw.script.NssTokenType attribute), 371  
 rhs (rollnw.script.AssignExpression attribute), 362  
 rhs (rollnw.script.BinaryExpression attribute), 362  
 rhs (rollnw.script.ComparisonExpression attribute), 363  
 rhs (rollnw.script.DotExpression attribute), 365  
 rhs (rollnw.script.LogicalExpression attribute), 368  
 rhs (rollnw.script.UnaryExpression attribute), 374  
 righthand (rollnw.EquipIndex attribute), 320  
 righthand (rollnw.EquipSlot attribute), 321  
 rightring (rollnw.EquipIndex attribute), 320  
 rightring (rollnw.EquipSlot attribute), 321  
 rings (rollnw.Store attribute), 342  
 rollnw  
   module, 305  
 rollnw.kernel  
   module, 346  
 rollnw.model  
   module, 349  
 rollnw.nwn1  
   module, 359  
 rollnw.script  
   module, 361  
 ROLLNW\_STRINGIFY (C macro), 252  
 ROLLNW\_UNUSED (C macro), 252  
 rotatetexture (rollnw.model.MdlTrimeshNode attribute), 357  
 rows (rollnw.model.MdlControllerKey attribute), 350  
 RPAREN (rollnw.script.NssTokenType attribute), 369  
 Rules (class in rollnw.kernel), 348  
 rules() (in module rollnw.kernel), 349  
**S**  
 salute (rollnw.DialogAnimation attribute), 314  
 sampleperiod (rollnw.model.MdlAnimeshNode attribute), 350  
 sav (rollnw.ResourceType attribute), 338  
 save() (rollnw.Dialog method), 313  
 save() (rollnw.Erf method), 322  
 save() (rollnw.Tlk method), 343  
 save\_as() (rollnw.Erf method), 322  
 save\_as() (rollnw.Tlk method), 343  
 Saves (class in rollnw), 339  
 saves (rollnw.Door attribute), 317  
 saves (rollnw.Placeable attribute), 333  
 scale (rollnw.model.MdlControllerType attribute), 352  
 SCOPE\_EXIT (C macro), 252  
 script (rollnw.script.Diagnostic attribute), 364  
 script (rollnw.script.Include attribute), 366  
 script\_abort (rollnw.Dialog attribute), 314  
 script\_action (rollnw.DialogNode attribute), 315  
 script\_appears (rollnw.DialogPtr attribute), 316  
 script\_end (rollnw.Dialog attribute), 314  
 scripts (rollnw.Area attribute), 306  
 scripts (rollnw.Creature attribute), 312  
 scripts (rollnw.Door attribute), 317  
 scripts (rollnw.Encounter attribute), 320  
 scripts (rollnw.Module attribute), 330  
 scripts (rollnw.Placeable attribute), 333  
 scripts (rollnw.Store attribute), 342  
 scripts (rollnw.Trigger attribute), 344  
 self\_illum\_color (rollnw.model.MdlControllerType attribute), 352  
 semantic (rollnw.script.DiagnosticType attribute), 365  
 SEMICOLON (rollnw.script.NssTokenType attribute), 369  
 set (rollnw.ResourceType attribute), 337  
 set() (rollnw.Tlk method), 343  
 set() (rollnw.TwoDA method), 344  
 set\_ability\_score() (rollnw.CreatureStats method), 313  
 set\_action\_param() (rollnw.DialogNode method), 315  
 set\_condition\_param() (rollnw.DialogPtr method), 316  
 set\_effect\_limits\_ability() (rollnw.kernel.EffectSystem method), 347  
 set\_effect\_limits\_armor\_class() (rollnw.kernel.EffectSystem method), 347  
 set\_effect\_limits\_attack() (rollnw.kernel.EffectSystem method), 347  
 set\_effect\_limits\_skill() (rollnw.kernel.EffectSystem method), 347  
 set\_float() (rollnw.Effect method), 318  
 set\_float() (rollnw.LocalData method), 328  
 set\_int() (rollnw.Effect method), 318  
 set\_int() (rollnw.LocalData method), 328  
 set\_location() (rollnw.LocalData method), 328  
 set\_object() (rollnw.LocalData method), 329  
 set\_paths() (rollnw.kernel.Config method), 346  
 set\_skill\_rank() (rollnw.CreatureStats method), 313  
 set\_string() (rollnw.Effect method), 318  
 set\_string() (rollnw.LocalData method), 329  
 set\_version() (rollnw.kernel.Config method), 346

- set\_versus() (rollnw.Effect method), 318  
 severity (rollnw.script.Diagnostic attribute), 364  
 shader\_group\_idx (rollnw.model.MdlFace attribute), 353  
 shadow (rollnw.model.MdlLightNode attribute), 354  
 shadow (rollnw.model.MdlTrimeshNode attribute), 357  
 shadow\_opacity (rollnw.Area attribute), 306  
 shadow\_radius (rollnw.model.MdlControllerType attribute), 352  
 shard\_count() (rollnw.NWSync method), 331  
 shd (rollnw.ResourceType attribute), 338  
 shin\_left (rollnw.BodyParts attribute), 309  
 shin\_right (rollnw.BodyParts attribute), 309  
 shininess (rollnw.model.MdlTrimeshNode attribute), 357  
 shoulder\_left (rollnw.BodyParts attribute), 309  
 shoulder\_right (rollnw.BodyParts attribute), 309  
 showdispl (rollnw.model.MdlTrimeshNode attribute), 357  
 sides (rollnw.DiceRoll attribute), 316  
 signature\_help() (rollnw.script.Nss method), 368  
 SignatureHelp (class in rollnw.script), 372  
 silent (rollnw.SpellMetaMagic attribute), 341  
 simple (rollnw.ItemModelType attribute), 325  
 single\_spawn (rollnw.SpawnCreature attribute), 340  
 size (rollnw.ResourceDescriptor attribute), 335  
 size() (rollnw.Container method), 310  
 size() (rollnw.LocalData method), 329  
 size() (rollnw.LocString method), 328  
 size() (rollnw.Tlk method), 343  
 size\_ab\_modifier (rollnw.CombatInfo attribute), 310  
 size\_ac\_modifier (rollnw.CombatInfo attribute), 310  
 size\_end (rollnw.model.MdlControllerType attribute), 352  
 size\_end\_y (rollnw.model.MdlControllerType attribute), 352  
 size\_mid (rollnw.model.MdlControllerType attribute), 352  
 size\_mid\_y (rollnw.model.MdlControllerType attribute), 352  
 size\_start (rollnw.model.MdlControllerType attribute), 352  
 size\_start\_y (rollnw.model.MdlControllerType attribute), 352  
 skillpoints (rollnw.LevelUp attribute), 327  
 skills (rollnw.LevelUp attribute), 327  
 skin (rollnw.Appearance attribute), 305  
 skin (rollnw.model.MdlNodeFlags attribute), 356  
 skin (rollnw.model.MdlNodeType attribute), 356  
 SkinVertex (class in rollnw.model), 358  
 skybox (rollnw.Area attribute), 306  
 SL (rollnw.script.NssTokenType attribute), 370  
 SLEQ (rollnw.script.NssTokenType attribute), 370  
 slt (rollnw.ResourceType attribute), 336  
 Sound (class in rollnw), 339  
 sound (rollnw.DialogNode attribute), 315  
 sound (rollnw.ObjectType attribute), 332  
 sound (rollnw.ResourceType attribute), 336  
 sounds (rollnw.Area attribute), 306  
 sounds (rollnw.Sound attribute), 340  
 soundset (rollnw.Creature attribute), 312  
 SourceLocation (class in rollnw.script), 372  
 SourcePosition (class in rollnw.script), 372  
 SourceRange (class in rollnw.script), 373  
 spanish (rollnw.LanguageID attribute), 326  
 spawn\_option (rollnw.Encounter attribute), 320  
 spawn\_points (rollnw.Encounter attribute), 320  
 SpawnCreature (class in rollnw), 340  
 SpawnPoint (class in rollnw), 340  
 spawntype (rollnw.model.MdlEmitterNode attribute), 353  
 spawntype\_sel (rollnw.model.MdlEmitterNode attribute), 353  
 speaker (rollnw.DialogNode attribute), 315  
 SpecialAbility (class in rollnw), 340  
 specular (rollnw.model.MdlTrimeshNode attribute), 357  
 spell (rollnw.SpecialAbility attribute), 340  
 spell (rollnw.SpellEntry attribute), 341  
 spell\_id (rollnw.EffectHandle attribute), 319  
 SpellBook (class in rollnw), 340  
 SpellEntry (class in rollnw), 341  
 spells (rollnw.ClassEntry attribute), 309  
 splat (rollnw.model.ModelEmitterFlag attribute), 358  
 spontaneous (rollnw.SpellFlags attribute), 341  
 spot\_check\_mod (rollnw.Area attribute), 306  
 spread (rollnw.model.MdlControllerType attribute), 352  
 sq3 (rollnw.ResourceType attribute), 338  
 sql (rollnw.ResourceType attribute), 338  
 SQLQUERY (rollnw.script.NssTokenType attribute), 372  
 SR (rollnw.script.NssTokenType attribute), 370  
 srclight1 (rollnw.Tile attribute), 342  
 srclight2 (rollnw.Tile attribute), 342  
 SREQ (rollnw.script.NssTokenType attribute), 370  
 ssf (rollnw.ResourceType attribute), 338  
 stacksize (rollnw.Item attribute), 324  
 start (rollnw.script.SourceRange attribute), 373  
 start() (in module rollnw.kernel), 349  
 start\_day (rollnw.Module attribute), 330  
 start\_hour (rollnw.Module attribute), 330  
 start\_month (rollnw.Module attribute), 330  
 start\_movie (rollnw.Module attribute), 330  
 start\_year (rollnw.Module attribute), 330  
 starting\_package (rollnw.Creature attribute), 312  
 stat() (rollnw.Container method), 310  
 Statement (class in rollnw.script), 373  
 static (rollnw.Placeable attribute), 333  
 stats (rollnw.Creature attribute), 312  
 stats() (rollnw.kernel.EffectSystem method), 347

- steal (*rollnw.DialogAnimation* attribute), 314
  - still (*rollnw.SpellMetaMagic* attribute), 341
  - stolen (*rollnw.Item* attribute), 324
  - Store (class in *rollnw*), 341
  - store (*rollnw.ObjectType* attribute), 332
  - store() (*rollnw.kernel.Objects* method), 348
  - stores (*rollnw.Area* attribute), 306
  - StoreScripts (class in *rollnw*), 342
  - STRING (*rollnw.script.NssTokenType* attribute), 372
  - STRING\_CONST (*rollnw.script.NssTokenType* attribute), 371
  - STRING\_RAW\_CONST (*rollnw.script.NssTokenType* attribute), 371
  - Strings (class in *rollnw.kernel*), 348
  - strings() (in module *rollnw.kernel*), 349
  - strref() (*rollnw.LocString* method), 328
  - STRUCT (*rollnw.script.NssTokenType* attribute), 372
  - StructDecl (class in *rollnw.script*), 373
  - subrace (*rollnw.Creature* attribute), 312
  - subtype (*rollnw.EffectHandle* attribute), 319
  - subtype (*rollnw.ItemProperty* attribute), 326
  - sun\_shadows (*rollnw.AreaWeather* attribute), 308
  - supermodel (*rollnw.model.MdlModel* attribute), 355
  - supermodel\_name (*rollnw.model.MdlModel* attribute), 355
  - supernatural (*rollnw.EffectCategory* attribute), 319
  - SWITCH (*rollnw.script.NssTokenType* attribute), 372
  - SwitchStatement (class in *rollnw.script*), 373
  - Symbol (class in *rollnw.script*), 373
- ## T
- tag (*rollnw.Common* attribute), 310
  - tag (*rollnw.Module* attribute), 330
  - tail (*rollnw.Appearance* attribute), 305
  - TALENT (*rollnw.script.NssTokenType* attribute), 372
  - talk\_forceful (*rollnw.DialogAnimation* attribute), 314
  - talk\_laugh (*rollnw.DialogAnimation* attribute), 314
  - talk\_normal (*rollnw.DialogAnimation* attribute), 314
  - talk\_pleading (*rollnw.DialogAnimation* attribute), 314
  - tangent (*rollnw.model.SkinVertex* attribute), 358
  - tangent (*rollnw.model.Vertex* attribute), 358
  - target (*rollnw.AttackData* attribute), 308
  - target (*rollnw.script.SwitchStatement* attribute), 373
  - target\_is\_creature (*rollnw.AttackData* attribute), 308
  - target\_state (*rollnw.AttackData* attribute), 308
  - target\_state (*rollnw.CombatInfo* attribute), 310
  - tattoo1 (*rollnw.Appearance* attribute), 306
  - tattoo2 (*rollnw.Appearance* attribute), 306
  - taunt (*rollnw.DialogAnimation* attribute), 314
  - test (*rollnw.script.ConditionalExpression* attribute), 363
  - test (*rollnw.script.DoStatement* attribute), 365
  - test (*rollnw.script.ForStatement* attribute), 366
  - test (*rollnw.script.IfStatement* attribute), 366
  - test (*rollnw.script.WhileStatement* attribute), 374
  - tex (*rollnw.ResourceType* attribute), 336
  - tex\_coords (*rollnw.model.SkinVertex* attribute), 358
  - tex\_coords (*rollnw.model.Vertex* attribute), 358
  - text (*rollnw.DialogNode* attribute), 315
  - texture (*rollnw.model.MdlEmitterNode* attribute), 353
  - texture (*rollnw.ResourceType* attribute), 336
  - textures (*rollnw.model.MdlLightNode* attribute), 354
  - textures (*rollnw.model.MdlTrimeshNode* attribute), 357
  - tga (*rollnw.ResourceType* attribute), 336
  - thg (*rollnw.ResourceType* attribute), 336
  - thigh\_left (*rollnw.BodyParts* attribute), 309
  - thigh\_right (*rollnw.BodyParts* attribute), 309
  - threat\_range (*rollnw.AttackData* attribute), 308
  - threshold (*rollnw.model.MdlControllerType* attribute), 352
  - tightness (*rollnw.model.MdlDanglymeshNode* attribute), 352
  - TILDE (*rollnw.script.NssTokenType* attribute), 371
  - Tile (class in *rollnw*), 342
  - tile (*rollnw.model.MdlClassification* attribute), 350
  - tile (*rollnw.ObjectType* attribute), 332
  - tilefade (*rollnw.model.MdlTrimeshNode* attribute), 357
  - tiles (*rollnw.Area* attribute), 306
  - tileset (*rollnw.Area* attribute), 307
  - time (*rollnw.model.MdlAnimationEvent* attribute), 350
  - time\_offset (*rollnw.model.MdlControllerKey* attribute), 350
  - TIMES (*rollnw.script.NssTokenType* attribute), 370
  - times (*rollnw.Sound* attribute), 340
  - TIMESEQ (*rollnw.script.NssTokenType* attribute), 370
  - Tlk (class in *rollnw*), 342
  - tlk (*rollnw.Module* attribute), 330
  - tlk (*rollnw.ResourceType* attribute), 337
  - tml (*rollnw.ResourceType* attribute), 338
  - to\_base\_id() (*rollnw.Language* static method), 326
  - to\_bool (C++ function), 290
  - to\_dict() (*rollnw.LocString* method), 328
  - to\_runtime\_id() (*rollnw.Language* static method), 326
  - to\_string() (*rollnw.Language* static method), 326
  - transition\_time (*rollnw.model.MdlAnimation* attribute), 350
  - transparencyhint (*rollnw.model.MdlTrimeshNode* attribute), 357
  - Trap (class in *rollnw*), 343
  - trap (*rollnw.Door* attribute), 317
  - trap (*rollnw.Placeable* attribute), 333
  - trap (*rollnw.Trigger* attribute), 344
  - triangle (*rollnw.model.MdlTriangleMode* attribute), 357
  - triangle\_strip (*rollnw.model.MdlTriangleMode* attribute), 357
  - Trigger (class in *rollnw*), 343
  - trigger (*rollnw.ObjectType* attribute), 332



`trigger()` (*rollnw.kernel.Objects* method), 348  
`triggers` (*rollnw.Area* attribute), 307  
`TriggerScripts` (class in *rollnw*), 344  
`trimesh` (*rollnw.model.MdlNodeType* attribute), 356  
`true_branch` (*rollnw.script.ConditionalExpression* attribute), 363  
`true_branch` (*rollnw.script.IfStatement* attribute), 366  
`ttf` (*rollnw.ResourceType* attribute), 338  
`tvert_idx` (*rollnw.model.MdlFace* attribute), 353  
`TwoDA` (class in *rollnw*), 344  
`twoda` (*rollnw.ResourceType* attribute), 337  
`TwoDACache` (class in *rollnw.kernel*), 348  
`twosidedtex` (*rollnw.model.MdlEmitterNode* attribute), 353  
`txi` (*rollnw.ResourceType* attribute), 337  
`txt` (*rollnw.ResourceType* attribute), 336  
`type` (*rollnw.AttackData* attribute), 308  
`type` (*rollnw.DialogNode* attribute), 315  
`type` (*rollnw.DialogPtr* attribute), 316  
`type` (*rollnw.EffectHandle* attribute), 319  
`type` (*rollnw.ItemProperty* attribute), 326  
`type` (*rollnw.model.MdlControllerKey* attribute), 350  
`type` (*rollnw.model.MdlGeometry* attribute), 353  
`type` (*rollnw.model.MdlNode* attribute), 355  
`type` (*rollnw.ObjectHandle* attribute), 331  
`type` (*rollnw.Resource* attribute), 335  
`type` (*rollnw.script.Diagnostic* attribute), 364  
`type` (*rollnw.script.NssToken* attribute), 369  
`type` (*rollnw.script.Symbol* attribute), 373  
`type` (*rollnw.script.SymbolKind* attribute), 374  
`type` (*rollnw.Trap* attribute), 343  
`type` (*rollnw.Trigger* attribute), 344

## U

`UnaryExpression` (class in *rollnw.script*), 374  
`underground` (*rollnw.AreaFlags* attribute), 307  
`unequip_item()` (in module *rollnw.nwnI*), 361  
`unlimited` (*rollnw.SpellFlags* attribute), 341  
`unload_module()` (in module *rollnw.kernel*), 349  
`unlock_dc` (*rollnw.Lock* attribute), 329  
`update` (*rollnw.model.MdlEmitterNode* attribute), 353  
`update_sel` (*rollnw.model.MdlEmitterNode* attribute), 353  
`useable` (*rollnw.Placeable* attribute), 333  
`used` (*rollnw.script.Include* attribute), 367  
`user_path()` (*rollnw.kernel.Config* method), 346  
`USR` (*rollnw.script.NssTokenType* attribute), 371  
`USREQ` (*rollnw.script.NssTokenType* attribute), 371  
`utc` (*rollnw.ResourceType* attribute), 337  
`utd` (*rollnw.ResourceType* attribute), 337  
`ute` (*rollnw.ResourceType* attribute), 337  
`utg` (*rollnw.ResourceType* attribute), 338  
`uti` (*rollnw.ResourceType* attribute), 337  
`utm` (*rollnw.ResourceType* attribute), 338

`utp` (*rollnw.ResourceType* attribute), 337  
`uts` (*rollnw.ResourceType* attribute), 337  
`utt` (*rollnw.ResourceType* attribute), 337  
`utw` (*rollnw.ResourceType* attribute), 338  
`uuid` (*rollnw.Module* property), 330

## V

`v1_69` (*rollnw.GameVersion* attribute), 322  
`valid()` (*rollnw.Container* method), 310  
`valid()` (*rollnw.Dialog* method), 314  
`valid()` (*rollnw.Image* method), 323  
`valid()` (*rollnw.Ini* method), 323  
`valid()` (*rollnw.kernel.Objects* method), 348  
`valid()` (*rollnw.model.Mdl* method), 349  
`valid()` (*rollnw.ObjectHandle* method), 331  
`valid()` (*rollnw.Plt* method), 334  
`valid()` (*rollnw.Resource* method), 335  
`valid()` (*rollnw.Tlk* method), 343  
`var` (*rollnw.script.VariableExpression* attribute), 374  
`VarDecl` (class in *rollnw.script*), 374  
`variable` (*rollnw.script.SymbolKind* attribute), 374  
`VariableExpression` (class in *rollnw.script*), 374  
`VECTOR` (*rollnw.script.NssTokenType* attribute), 372  
`Vector2` (class in *rollnw*), 345  
`Vector3` (class in *rollnw*), 345  
`Vector4` (class in *rollnw*), 345  
`vEE` (*rollnw.GameVersion* attribute), 322  
`velocity` (*rollnw.model.MdlControllerType* attribute), 352  
`version` (*rollnw.Area* attribute), 307  
`version` (*rollnw.EffectID* attribute), 319  
`version` (*rollnw.Module* attribute), 330  
`version` (*rollnw.ObjectHandle* attribute), 331  
`versus()` (*rollnw.Effect* method), 318  
`vert_idx` (*rollnw.model.MdlFace* attribute), 353  
`Vertex` (class in *rollnw.model*), 358  
`vertical_displacement`  
    (*rollnw.model.MdlControllerType* attribute), 352  
`vertices` (*rollnw.model.MdlSkinNode* attribute), 356  
`vertices` (*rollnw.model.MdlTrimeshNode* attribute), 357  
`victory_1` (*rollnw.DialogAnimation* attribute), 314  
`victory_2` (*rollnw.DialogAnimation* attribute), 314  
`victory_3` (*rollnw.DialogAnimation* attribute), 314  
`view` (*rollnw.script.Symbol* attribute), 374  
`view()` (*rollnw.script.SourceLocation* method), 372  
`view_from_range()` (*rollnw.script.Nss* method), 368  
`VOID` (*rollnw.script.NssTokenType* attribute), 372  
`volume` (*rollnw.Sound* attribute), 340  
`volume_variation` (*rollnw.Sound* attribute), 340

## W

`w` (*rollnw.IVector4* attribute), 322  
`W` (*rollnw.Vector4* attribute), 345



walkrate (*rollnw.Creature* attribute), 312  
warning (*rollnw.script.DiagnosticSeverity* attribute), 365  
warnings() (*rollnw.script.Nss* method), 369  
wav (*rollnw.ResourceType* attribute), 336  
Waypoint (class in *rollnw*), 345  
waypoint (*rollnw.ObjectType* attribute), 332  
waypoint() (*rollnw.kernel.Objects* method), 348  
waypoints (*rollnw.Area* attribute), 307  
wbm (*rollnw.ResourceType* attribute), 338  
weapon\_is\_finessable() (in module *rollnw.nwn1*), 361  
weapon\_iteration() (in module *rollnw.nwn1*), 361  
weapons (*rollnw.Store* attribute), 342  
weather (*rollnw.Area* attribute), 307  
weights (*rollnw.model.SkinVertex* attribute), 358  
WHILE (*rollnw.script.NssTokenType* attribute), 372  
WhileStatement (class in *rollnw.script*), 374  
width (*rollnw.Area* attribute), 307  
width() (*rollnw.Image* method), 323  
width() (*rollnw.Placement* method), 334  
will (*rollnw.Saves* attribute), 339  
wind\_power (*rollnw.AreaWeather* attribute), 308  
wings (*rollnw.Appearance* attribute), 306  
wirecolor (*rollnw.model.MdlControllerType* attribute), 352  
wok (*rollnw.ResourceType* attribute), 337  
word\_count (*rollnw.Dialog* attribute), 314  
working\_directory() (*rollnw.Container* method), 311  
worship (*rollnw.DialogAnimation* attribute), 314  
write\_to() (*rollnw.Image* method), 323

## X

x (*rollnw.InventoryItem* attribute), 323  
x (*rollnw.IVector4* attribute), 322  
x (*rollnw.script.LiteralVectorExpression* attribute), 367  
x (*rollnw.Vector2* attribute), 345  
x (*rollnw.Vector3* attribute), 345  
x (*rollnw.Vector4* attribute), 345  
xbc (*rollnw.ResourceType* attribute), 338  
xgrid (*rollnw.model.MdlEmitterNode* attribute), 353  
XOR (*rollnw.script.NssTokenType* attribute), 371  
XOREQ (*rollnw.script.NssTokenType* attribute), 371  
xpscale (*rollnw.Module* attribute), 330  
xsize (*rollnw.model.MdlControllerType* attribute), 352

## Y

y (*rollnw.InventoryItem* attribute), 323  
y (*rollnw.IVector4* attribute), 322  
y (*rollnw.script.LiteralVectorExpression* attribute), 367  
y (*rollnw.Vector2* attribute), 345  
y (*rollnw.Vector3* attribute), 345  
y (*rollnw.Vector4* attribute), 345  
ygrid (*rollnw.model.MdlEmitterNode* attribute), 353  
ysize (*rollnw.model.MdlControllerType* attribute), 352

## Z

z (*rollnw.IVector4* attribute), 322  
z (*rollnw.script.LiteralVectorExpression* attribute), 367  
z (*rollnw.Vector3* attribute), 345  
z (*rollnw.Vector4* attribute), 345  
Zip (class in *rollnw*), 345