
pyliddwrap Documentation

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Wrap ldd **nix* utility to determine shared libraries required by a program.

class `lddwrap.Dependency` (*found, soname=None, path=None, mem_address=None, unused=None*)
Represent a shared library required by a program.

Variables

- **found** (*bool*) – True if ldd could resolve the library
- **soname** (*Optional[str]*) – library name
- **path** (*Optional[pathlib.Path]*) – path to the library
- **mem_address** (*Optional[str]*) – hex memory location
- **unused** (*Optional[bool]*) – library not used

Establishes

- `not (self.mem_address is None and self.found) or (self.soname is not None and self.path is not None)`
- `not (self.path is None and self.found) or (self.soname is not None and self.mem_address is not None)`
- `not (self.soname is None and self.found) or (self.path is not None and self.mem_address is not None)`

as_mapping()

Transform the dependency to a mapping.

Can be converted to JSON and similar formats.

Return type `Mapping[str, Any]`

`lddwrap.list_dependencies` (*path, unused=False, env=None*)

Retrieve a list of dependencies of the given binary.

```
>>> path = pathlib.Path("/bin/ls")
>>> deps = list_dependencies(path=path)
>>> deps[0].soname
'linux-vdso.so.1'
```

Parameters

- **path** (Path) – path to a file
- **unused** (bool) – if set, check if dependencies are actually used by the program
- **env** (Optional[Dict[str, str]]) – the environment to use.

If `env` is `None`, currently active env will be used. Otherwise specified env is used.

Return type List[*Dependency*]

Returns list of dependencies

Requires

- `path.is_file()`

2.1 pylddwrap

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Pylddwrap wraps `ldd` *nix utility to determine shared libraries required by a program.

We need to dynamically package subset of our system at deployment time. Consequently, we have to determine the dependencies on shared libraries of our binaries programmatically.

The output of `ldd` Linux command, while informative, is not structured enough to be easily integrated into a program. At the time of this writing, we only found two alternative `ldd` wrappers on Internet [python-ldd](#) and [ldd.py](#), but their output was either too basic for our use case or the project was still incipient.

Pylddwrap, in contrast, returns a well-structured list of the dependencies. The command-line tool outputs the dependencies either as a table (for visual inspection) or as a JSON-formatted string (for use with other tools). The included Python module `lddwrap` returns a Python object with type annotations so that it can be used readily by the deployment scripts and other modules.

For more information on the `ldd` tool, please see [ldd manual](#).

2.2 Usage

2.2.1 Command-Line Tool pylddwrap

- Assume we need the dependencies of the `/bin/ls`. The following command gives them as a table:

```
pylddwrap /bin/ls
```

- The output of the command looks like this:

soname	path	found	mem_address
↪ unused			
-----+-----+-----+-----			
↪ +-----			
linux-vdso.so.1	None	True	0x00007ffd8750f000
↪ False			
libselinux.so.1	/lib/x86_64-linux-gnu/libselinux.so.1	True	0x00007f4e73dc3000
↪ True			
libc.so.6	/lib/x86_64-linux-gnu/libc.so.6	True	0x00007f4e739f9000
↪ False			
libpcre.so.3	/lib/x86_64-linux-gnu/libpcre.so.3	True	0x00007f4e73789000
↪ False			
libdl.so.2	/lib/x86_64-linux-gnu/libdl.so.2	True	0x00007f4e73585000
↪ False			
None	/lib64/ld-linux-x86-64.so.2	True	0x00007f4e73fe5000
↪ False			
libpthread.so.0	/lib/x86_64-linux-gnu/libpthread.so.0	True	0x00007f4e73368000
↪ False			

- To obtain the dependencies as JSON, invoke:

```
pylddwrap --format json /bin/ls
```

- The JSON output is structured like this:

```
[
  {
    "soname": "linux-vdso.so.1",
    "path": "None",
    "found": true,
    "mem_address": "0x00007ffed857f000",
    "unused": false
  },
  ...
]
```

- You can also sort the table with `--sorted` which will sort by soname:

```
pylddwrap /bin/pwd --sorted
```

- Pylddwrap gives the table sorted by soname:

soname	path	found	mem_address
↪ unused			
-----+-----+-----+-----			
↪ -			
None	/lib64/ld-linux-x86-64.so.2	True	0x00007fd54894d000

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libc.so.6	/lib/x86_64-linux-gnu/libc.so.6	True	0x00007fd548353000	False
linux-vdso.so.1	None	True	0x00007ffe0953f000	False

Alternatively, you can sort by any other column. For example, to sort by path:

```
pylddwrap /bin/pwd --sorted path
```

- The output will be:

soname	path	found	mem_address	<u>↳</u>
↳ unused				
-----+-----+-----+-----+-----				
↳ -				
linux-vdso.so.1	None	True	0x00007ffe0953f000	False
libc.so.6	/lib/x86_64-linux-gnu/libc.so.6	True	0x00007fd548353000	False
None	/lib64/ld-linux-x86-64.so.2	True	0x00007fd54894d000	False

2.2.2 lddwrap Python Module

We provide lddwrap Python module which you can integrate into your deployment scripts and other modules.

- The following example shows how to list the dependencies of /bin/ls:

```
import pathlib
import lddwrap

path = pathlib.Path("/bin/ls")
deps = lddwrap.list_dependencies(path=path)
for dep in deps:
    print(dep)

"""
soname: linux-vdso.so.1, path: None, found: True, mem_address: (0x00007ffe8e2fb000), ↳
↳ unused: None
soname: libselinux.so.1, path: /lib/x86_64-linux-gnu/libselinux.so.1, found: True, ↳
↳ mem_address: (0x00007f7759ccc000), unused: None
soname: libc.so.6, path: /lib/x86_64-linux-gnu/libc.so.6, found: True, mem_address: ↳
↳ (0x00007f7759902000), unused: None
...
"""
```

- List all dependencies of the /bin/ls utility and check if the direct dependencies are used. If unused for list_dependencies is set to False then the unused variable of the dependencies will not be determined and are therefore unknown and set to None. Otherwise information about direct usage will be retrieved and added to the dependencies.

```
import pathlib
import lddwrap

path = pathlib.Path("/bin/ls")
deps = lddwrap.list_dependencies(path=path, unused=True)
print(deps[1])
# soname: libselinux.so.1,
# path: /lib/x86_64-linux-gnu/libselinux.so.1,
# found: True,
```

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```
# mem_address: (0x00007f5a6064a000),  
# unused: True
```

- Lddwrap operates normally with the environment variables of the caller. In cases where your dependencies are determined differently than the current environment, you pass a separate environment (in form of a dictionary) as an argument:

```
import os  
import pathlib  
import lddwrap  
  
env = os.environ.copy()  
env['LD_LIBRARY_PATH'] = "some/important/path"  
path = pathlib.Path("/bin/ls")  
deps = lddwrap.list_dependencies(path=path, env=env)
```

2.3 Installation

- Install pylddwrap with pip:

```
pip3 install pylddwrap
```

2.4 Development

- Check out the repository.
- In the repository root, create the virtual environment:

```
python3 -m venv venv3
```

- Activate the virtual environment:

```
source venv3/bin/activate
```

- Install the development dependencies:

```
pip3 install -e .[dev]
```

- Tests can be run directly using unittest:

```
python3 -m unittest discover tests/
```

2.4.1 Pre-commit Checks

We provide a set of pre-commit checks that lint and check code for formatting.

Namely, we use:

- `yapf` to check the formatting.
- The style of the docstrings is checked with `pydocstyle`.

- Static type analysis is performed with `mypy`.
- Various linter checks are done with `pylint`.

Apply the automatic formatting by running the `format` environment:

```
tox -e format
```

Run the pre-commit checks and tests using `tox`:

```
tox
```

2.5 Versioning

We follow [Semantic Versioning](#). The version `X.Y.Z` indicates:

- `X` is the major version (backward-incompatible),
- `Y` is the minor version (backward-compatible), and
- `Z` is the patch version (backward-compatible bug fix).

3.1 1.2.1

- Removed support for Python 3.5 (#23)
- Improved support of statically linked libraries (#22)

3.2 1.2.0

- Ignore not-indented ldd output (#14)
- Added handling of static libraries (#13)

3.3 1.1.0

- Added `--sorted` command-line option
- Refactored for easier and more thorough testing

3.4 1.0.2

- Added support for Python 3.7 and 3.8

3.5 1.0.1

- Fixed license badge in the Readme

3.6 1.0.0

- Initial version

CHAPTER 4

Indices and tables

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