# List of Open Source Software (OSS) in Deliverables

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| Name of OSS Version of OSS Website Link License of OSS Usage of OSS |

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| Conda | 24.5.0 | <https://anaconda.org/anaconda/conda> | BSD | BIRCH uses the Conda package manager to manage the environment. |
| Defects4J | 2.0.1 | <https://github.com/rjust/defects4j> | MIT | Dataset of reproducible bugs |
| bzip2 | 1.0.8 | <https://sourceware.org/bzip2/> | BSD-style | For compressing results files |
| ca-certificates | 2024.3.11 | <https://www.mozilla.org/en-US/about/governance/policies/security-group/certs/> | MPL-2.0 | Certificate Authority bundle (Comes by default with Conda) |
| expat | 2.6.2 | <https://libexpat.github.io/> | MIT | XML parsing library (Comes by default with Conda) |
| libcxx | 14.0.6 | <https://libcxx.llvm.org/> | Apache-2.0 with LLVM Exception | C++ Standard Library (Comes by default with Conda) |
| libffi | 3.4.4 | <https://sourceware.org/libffi/> | MIT | Foreign Function Interface library (Comes by default with Conda) |
| ncurses | 6.4 | <https://invisible-island.net/ncurses/> | MIT | Terminal handling library (Comes by default with Conda) |
| openssl | 3.0.14 | <https://www.openssl.org/> | Apache-2.0 | Cryptography library (Comes by default with Conda) |
| pip | 24.0 | <https://pip.pypa.io/> | MIT | Python package installer |
| python | 3.12.3 | <https://www.python.org/> | PSF License | BIRCH is developed using Python |
| readline | 8.2 | <https://tiswww.case.edu/php/chet/readline/rltop.html> | GPL-3.0 | Line editing library (Comes by default with Conda) |
| setuptools | 69.5.1 | <https://github.com/pypa/setuptools> | MIT | Python package development tools (Comes by default with Conda) |
| sqlite | 3.45.3 | <https://www.sqlite.org/> | Public Domain | Database engine (Comes by default with Conda) |
| tk | 8.6.14 | <https://www.tcl.tk/> | TCL/TK License | GUI toolkit (Comes by default with Conda) |
| wheel | 0.43.0 | <https://github.com/pypa/wheel> | MIT | Python built-package format (Comes by default with Conda) |
| xz | 5.4.6 | <https://tukaani.org/xz/> | Public Domain | Compression library (Comes by default with Conda) |
| zlib | 1.2.13 | <https://www.zlib.net/> | Zlib License | Compression library (Comes by default with Conda) |
| aiohttp | 3.9.5 | <https://docs.aiohttp.org/> | Apache-2.0 | Async HTTP client/server (transitive dependency for litellm) |
| aiosignal | 1.3.1 | <https://github.com/aio-libs/aiosignal> | Apache-2.0 | Async signals (transitive dependency for litellm) |
| annotated-types | 0.7.0 | <https://github.com/annotated-types/annotated-types> | MIT | Type annotation utilities (transitive dependency for openai) |
| anyio | 4.4.0 | <https://github.com/agronholm/anyio> | MIT | Async I/O library (transitive dependency for openai) |
| attrs | 23.2.0 | <https://www.attrs.org/> | MIT | Python class attributes (transitive dependency for selenium) |
| beautifulsoup4 | 4.12.3 | <https://www.crummy.com/software/BeautifulSoup/> | MIT | Transitive dependency for bs4 |
| boto3 | 1.34.54 | <https://aws.amazon.com/sdk-for-python/> | Apache-2.0 | AWS SDK for Python to interacting with Bedrock Models |
| botocore | 1.34.113 | <https://github.com/boto/botocore> | Apache-2.0 | AWS SDK Core (transitive dependency for boto3) |
| bs4 | 0.0.2 | <https://www.crummy.com/software/BeautifulSoup/> | MIT | To extract bug descriptions from HTML pages. |
| certifi | 2024.2.2 | <https://github.com/certifi/python-certifi> | MPL-2.0 | Certificate bundle (transitive dependency for openai) |
| charset-normalizer | 3.3.2 | <https://github.com/Ousret/charset_normalizer> | MIT | Character encoding detector (transitive dependency for requests) |
| click | 8.1.7 | <https://palletsprojects.com/p/click/> | BSD-3-Clause | Command line interface (transitive dependency for litellm) |
| distro | 1.9.0 | <https://github.com/python-distro/distro> | Apache-2.0 | OS platform information (transitive dependency for openai) |
| filelock | 3.14.0 | <https://github.com/tox-dev/py-filelock> | Public Domain | File locking library (transitive dependency for tokenizers) |
| frozenlist | 1.4.1 | <https://github.com/aio-libs/frozenlist> | Apache-2.0 | Immutable list implementation (transitive dependency for litellm) |
| fsspec | 2024.5.0 | <https://filesystem-spec.readthedocs.io/> | BSD-3-Clause | Filesystem interfaces (transitive dependency for tokenizers) |
| h11 | 0.14.0 | <https://github.com/python-hyper/h11> | MIT | HTTP/1.1 protocol (transitive dependency for openai) |
| httpcore | 1.0.5 | <https://www.encode.io/httpcore/> | BSD-3-Clause | HTTP transport library (transitive dependency for openai) |
| httpx | 0.27.0 | <https://www.python-httpx.org/> | BSD-3-Clause | HTTP client (transitive dependency for openai) |
| huggingface-hub | 0.23.2 | <https://huggingface.co/docs/hub/> | Apache-2.0 | ML model hub client (transitive dependency for tokenizers) |
| idna | 3.7 | <https://github.com/kjd/idna> | BSD-3-Clause | Internationalized domain names (transitive dependency for litellm) |
| importlib-metadata | 7.1.0 | <https://github.com/python/importlib_metadata> | Apache-2.0 | Import metadata reader (transitive dependency for litellm) |
| jinja2 | 3.1.4 | <https://palletsprojects.com/p/jinja/> | BSD-3-Clause | Renders prompt templates dynamically based on the provided context using Jinja2. |
| jmespath | 1.0.1 | <https://github.com/jmespath/jmespath.py> | MIT | JSON query language (transitive dependency for boto3) |
| litellm | 1.37.19 | <https://github.com/BerriAI/litellm> | MIT | We used this library for interacting with various LLMs. Handles model completions and API communication. |
| markupsafe | 2.1.5 | <https://palletsprojects.com/p/markupsafe/> | BSD-3-Clause | String escaping (transitive dependency for jinja) |
| multidict | 6.0.5 | <https://github.com/aio-libs/multidict> | Apache-2.0 | Dictionary with multiple values (transitive dependency for litellm) |
| openai | 1.30.3 | <https://github.com/openai/openai-python> | MIT | OpenAI API client (transitive dependency for litellm) |
| outcome | 1.3.0.post0 | <https://github.com/python-trio/outcome> | MIT | Error handling (transitive dependency for selenium) |
| packaging | 24.0 | <https://github.com/pypa/packaging> | Apache-2.0, BSD-2-Clause | Package metadata (transitive dependency for tokenizers) |
| pydantic | 2.7.1 | <https://docs.pydantic.dev/> | MIT | Data validation (transitive dependency for openai) |
| pydantic-core | 2.18.2 | <https://github.com/pydantic/pydantic-core> | MIT | Pydantic core functionality (transitive dependency for openai) |
| pysocks | 1.7.1 | <https://github.com/Anorov/PySocks> | BSD-3-Clause | SOCKS proxy client |
| python-dateutil | 2.9.0.post0 | <https://github.com/dateutil/dateutil> | Apache-2.0, BSD-3-Clause | Date utilities (transitive dependency for boto3) |
| python-dotenv | 1.0.1 | <https://github.com/theskumar/python-dotenv> | BSD-3-Clause | Loads environment variables from a .env file to configure API keys, database credentials, or other sensitive settings. |
| pyyaml | 6.0.1 | <https://pyyaml.org/> | MIT | YAML parser (transitive dependency for tokenizers) |
| regex | 2024.5.15 | <https://github.com/mrabarnett/mrab-regex> | Apache-2.0 | Regular expressions (transitive dependency for tiktoken) |
| requests | 2.32.2 | <https://requests.readthedocs.io/> | Apache-2.0 | HTTP library (transitive dependency for tokenizers) |
| s3transfer | 0.10.1 | <https://github.com/boto/s3transfer> | Apache-2.0 | S3 file transfer (transitive dependency for boto3) |
| selenium | 4.22.0 | <https://www.selenium.dev/> | Apache-2.0 | Automated browser interactions to fetch webpage content using ChromeDriver |
| six | 1.16.0 | <https://github.com/benjaminp/six> | MIT | Python 2/3 compatibility (transitive dependency for boto3) |
| sniffio | 1.3.1 | <https://github.com/python-trio/sniffio> | MIT | Async library detection (transitive dependency for openai) |
| sortedcontainers | 2.4.0 | <http://www.grantjenks.com/docs/sortedcontainers/> | Apache-2.0 | Sorted collections (transitive dependency for selenium) |
| soupsieve | 2.5 | <https://facelessuser.github.io/soupsieve/> | MIT | CSS selector engine (transitive dependency for beautifulsoup4) |
| tiktoken | 0.7.0 | <https://github.com/openai/tiktoken> | MIT | For counting number of tokens in the prompt |
| tokenizers | 0.19.1 | <https://github.com/huggingface/tokenizers> | Apache-2.0 | Fast tokenizers (to tokenize text and count it) |
| tqdm | 4.66.4 | <https://tqdm.github.io/> | MIT, MPL-2.0 | Progress bar (transitive dependency for openai) |
| trio | 0.25.1 | <https://github.com/python-trio/trio> | MIT | Async I/O framework (transitive dependency for selenium) |
| trio-websocket | 0.11.1 | <https://github.com/python-trio/trio-websocket> | MIT | WebSocket client (transitive dependency for selenium) |
| typing-extensions | 4.12.0 | <https://github.com/python/typing_extensions> | PSF-2.0 | Typing backports (transitive dependency for openai) |
| urllib3 | 2.2.1 | <https://urllib3.readthedocs.io/> | MIT | HTTP client (transitive dependency for boto3) |
| websocket-client | 1.8.0 | <https://github.com/websocket-client/websocket-client> | Apache-2.0 | WebSocket client (transitive dependency for selenium) |
| wsproto | 1.2.0 | <https://github.com/python-hyper/wsproto> | MIT | WebSocket protocol (transitive dependency for selenium) |
| yarl | 1.9.4 | <https://github.com/aio-libs/yarl> | Apache-2.0 | URL handling (transitive dependency for litellm) |
| zipp | 3.19.0 | <https://github.com/jaraco/zipp> | MIT | Zipfile tools (transitive dependency for litellm) |
| javalang | 0.13.0 | <https://github.com/c2nes/javalang> | MIT | Parsing Java code to analyze AST (Abstract Syntax Tree) nodes, used in finding enclosing block for Java code structure analysis. |
| toml | 0.10.2 | <https://github.com/uiri/toml> | MIT | Loads TOML configuration files (e.g., mixtral\_prompts.toml and gpt\_prompts.toml) with prompt templates. |
| webdriver\_manager | 4.0.2 | <https://github.com/SergeyPirogov/webdriver_manager> | Apache-2.0 | Used to download and manages the appropriate version of ChromeDriver required for Selenium automation. |