

Python

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- uv

Working with json

Writing json to file

```
import json
with open('data.json', 'w', encoding='utf-8') as f:
    json.dump(data, f, ensure_ascii=False, indent=4)
```

uv

uv: Python Environment & Package Manager

A single Rust binary that replaces `pip`, `venv`, `pyenv`, `pipx`, and `poetry`. It guarantees the right Python version and packages are present before running your code, so you stop managing virtual environments by hand.

Use it when: you want edit-and-run Python scripts (scrapers, automation, data jobs) without `venv` setup, manual activation, or a compile step.

Mental Model

uv sits between you and Python. Three modes, each storing its environment differently:

Mode	When to use	Where the env lives
Inline script (PEP 723)	One <code>.py</code> file, ad-hoc scripts	Ephemeral, in the global cache
Project	Multi-file app, reproducible builds	Visible <code>.venv/</code> in the project folder
Tool install	Installing a CLI globally (e.g. <code>ruff</code>)	Isolated, like <code>pipx</code>

For a scraper / automation script, use **inline script** mode.

Install

```
# Linux / macOS (recommended, no existing Python needed)
```

```
curl -LsSf https://astral.sh/uv/install.sh | sh
```

```
# Windows (PowerShell)
```

```
powershell -ExecutionPolicy ByPass -c "irm https://astral.sh/uv/install.ps1 | iex"
```

Installs the `uv` binary to:

- Linux / macOS: `~/.local/bin`
- Windows: `%USERPROFILE%\local\bin`

“ Remember this path. cron and other minimal-environment runners do not include it in `PATH`.

Alternatives: `pipx install uv`, `pip install uv`, `brew install uv`. Update later with `uv self update`.

Inline Scripts (PEP 723)

Declare dependencies in a comment header at the top of the file. No `requirements.txt`, no project, no manual venv.

```
# scraper.py
# /// script
# requires-python = ">=3.12"
# dependencies = ["httpx", "polars", "PyMySQL"]
# ///

import httpx, polars as pl, pymysql
# your code here
```

Run it:

```
uv run scraper.py
```

First run resolves, downloads, and builds a cached environment, then executes. Subsequent runs reuse the cache and start almost instantly. `uv` rebuilds the env only when the dependency list or Python version changes.

Add a dependency without hand-editing the header:

```
uv add --script scraper.py requests
```

Make the file directly executable:

```
#!/usr/bin/env -S uv run --script
```

```
chmod +x scraper.py  
./scraper.py
```

Where the Cached venv Lives

Inline-script environments live in uv's **global cache**, not next to the file.

OS	Default cache path
Linux	<code>\$XDG_CACHE_HOME/uv</code> or <code>~/.cache/uv</code>
macOS	<code>~/Library/Caches/uv</code>
Windows	<code>%LOCALAPPDATA%\uv\cache</code>

Find it on any machine:

```
uv cache dir
```

- Folder names are hashes of the Python version, dependency versions, and script name. Not human-readable.
- The cache is **deduplicated**: each package version is downloaded and built once, then shared across all scripts and projects on the machine.
- Override the location with the `UV_CACHE_DIR` environment variable.

Housekeeping:

```
uv cache clean # wipe entire cache  
uv cache prune # remove stale entries only  
du -sh "$(uv cache dir)" # check size (Linux/macOS)
```

For **project** mode, the env is instead a normal `.venv/` in the project root, which you can inspect or delete directly.

Reproducibility (Pin Versions)

Unpinned dependencies will silently upgrade when a new release drops. For anything unattended, lock the versions:

```
uv lock --script scraper.py # creates scraper.py.lock
```

Once locked, `uv run`, `uv add --script`, and `uv tree --script` reuse the pinned versions.

For a collection of related scripts you want to rebuild on another machine, use a **project** instead: a folder with `pyproject.toml` + `uv.lock`, then `uv sync` on the new machine reproduces the exact Python version and dependencies.

Running in Cron

It works. Two things bite people, both about the environment, not uv.

1. PATH

cron uses a stripped-down `PATH` (typically `/usr/bin:/bin`) that excludes `~/local/bin`, so a bare `uv` fails with "command not found". Use the absolute path (find it with `which uv`).

2. HOME / cache

uv needs `HOME` set to locate `~/cache/uv`. User crontabs usually set this correctly. System crontabs, containers, and service accounts may not, so set it explicitly.

```
# crontab -e
HOME=/home/youruser
UV_CACHE_DIR=/home/youruser/.cache/uv

*/15 * * * * /home/youruser/.local/bin/uv run /home/youruser/scrapers/scraper.py >>
/home/youruser/logs/scraper.log 2>&1
```

Always redirect stdout and stderr to a log file, or failures vanish silently.

Cron checklist

- Pin dependencies (`uv lock --script`) so a 3am package update cannot break the job.

Warm the cache once by hand; the first run does the slow install work.

Test the exact command in a minimal shell before scheduling:

```
env -i HOME=/home/youruser /home/youruser/.local/bin/uv run scraper.py
```

Command Cheat Sheet

Command	Does
<code>uv run script.py</code>	Run a script (project or inline)
<code>uv add --script script.py pkg</code>	Add a dependency to an inline script
<code>uv lock --script script.py</code>	Pin versions for an inline script
<code>uv init</code>	Create a new project
<code>uv add pkg</code>	Add a dependency to a project
<code>uv sync</code>	Rebuild a project env from the lockfile
<code>uv python install 3.12</code>	Install a specific Python version
<code>uv tool install ruff</code>	Install a CLI tool globally (pipx-style)
<code>uv cache dir</code>	Show the cache location
<code>uv cache clean</code>	Wipe the cache
<code>uv self update</code>	Update uv itself

Gotchas

- **MariaDB driver:** avoid the official `mariadb` PyPI package; it builds a C extension and needs MariaDB Connector/C installed system-wide. Use **PyMySQL** (pure Python, no compile) or **SQLAlchemy + PyMySQL** instead.
 - **Unpinned scripts upgrade silently.** Lock anything that must not break unattended.
 - **cron PATH/HOME** as above.
 - **Cache and Python env should be on the same filesystem** for fast hard-linking; otherwise uv falls back to slow copies.
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Sources

- uv official docs: <https://docs.astral.sh/uv> (storage, cache, running scripts, CLI reference)
- PEP 723 (inline script metadata): <https://peps.python.org/pep-0723/>
- `uv-cache` man page (platform cache paths)

Last reviewed: June 2026. Verify install URLs and cache behavior against the current docs if uv has had a major version bump.