

# **Effective Programming Practices for Economists**

## **Reproducible Research**

### **Writing (py)tasks with multiple outputs**

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# Tiny example, extended



- How do we tell pytask that we have two products for `task_plot_life_expectancy`?`
- How would we tell pytask that we had more than one dependency?

# Contents of task\_clean\_data.py

```
from pathlib import Path

import pandas as pd

BLD = Path(__file__).parent / "bld"

def task_clean_data(raw_file=Path("gapminder.arrow"), produces=BLD / "data.pkl"):
    raw = pd.read_feather(raw_file)
    clean = _clean_data(raw)
    clean.to_pickle(produces)

def _clean_data(raw):
    df = raw.rename(
        columns={
            "lifeExp": "life_exp",
            "gdpPercap": "gdp_per_cap",
        },
    )
    return df
```

# Contents of task\_plot\_life\_expectancy.py

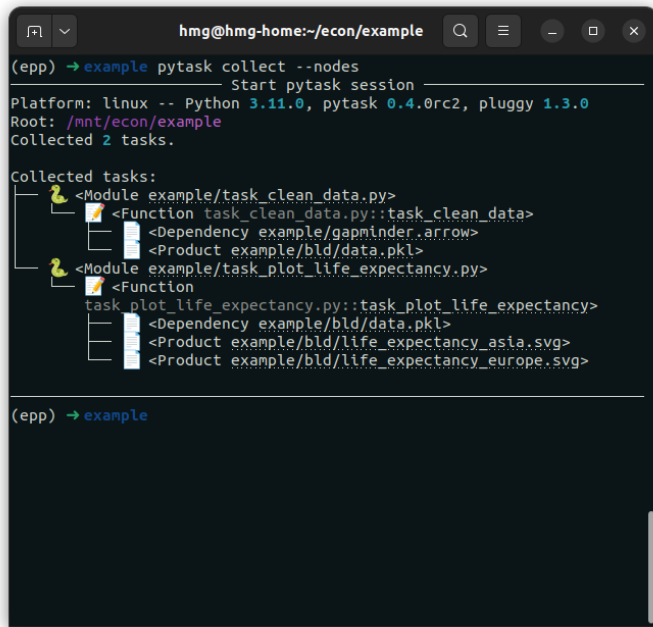
```
BLD = Path(__file__).parent / "bld"

products = {
    "Asia": BLD / "life_expectancy_asia.svg",
    "Europe": BLD / "life_expectancy_europe.svg"
}

def task_plot_life_expectancy(
    data_file=BLD / "data.pkl",
    produces=products,
):
    df = pd.read_pickle(data_file)
    for region, fig_file in produces.items():
        fig = _plot_life_expectancy(df[df["continent"] == region])
        fig.write_image(fig_file)
```

# Verify Dependency graph (DAG, tree)

- Inspect function signatures to build a dependency graph
- Both values of `'products'` dict passed to `'produces'` argument have become nodes!

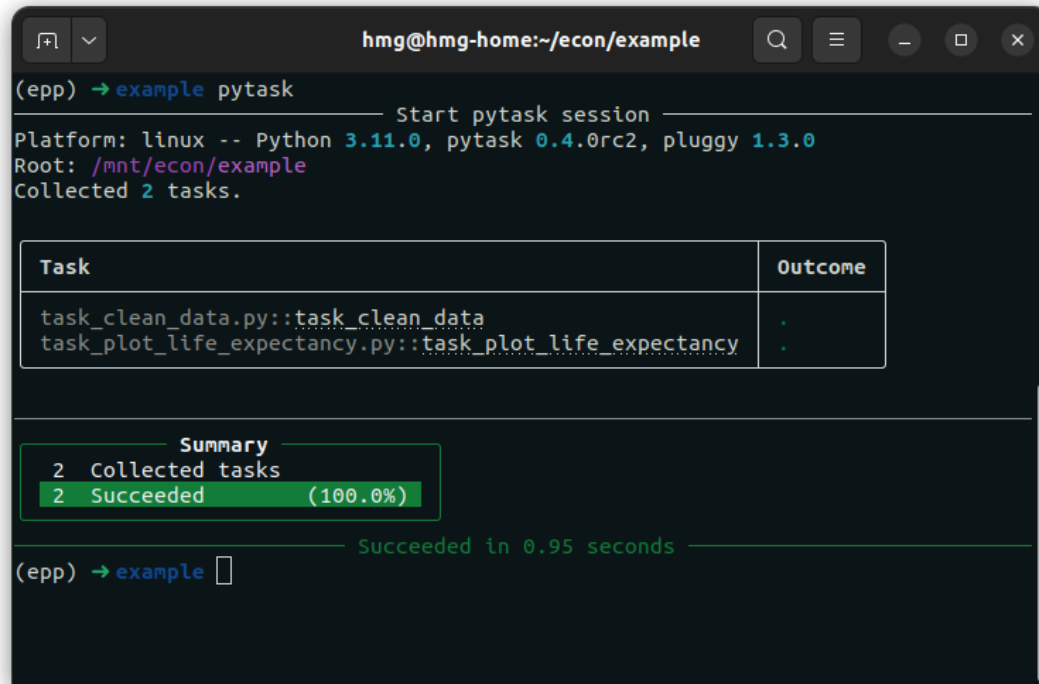


```
hmg@hmg-home:~/econ/example
(epp) → example pytask collect --nodes
Start pytask session
Platform: linux -- Python 3.11.0, pytask 0.4.0rc2, pluggy 1.3.0
Root: /mnt/econ/example
Collected 2 tasks.

Collected tasks:
├── <Module example/task_clean_data.py>
│   ├── <Function task_clean_data.py::task_clean_data>
│   │   ├── <Dependency example/gapminder.arrow>
│   │   └── <Product example/bld/data.pkl>
└── <Module example/task_plot_life_expectancy.py>
    ├── <Function task_plot_life_expectancy.py::task_plot_life_expectancy>
    │   ├── <Dependency example/bld/data.pkl>
    │   ├── <Product example/bld/life_expectancy_asia.svg>
    │   └── <Product example/bld/life_expectancy_europe.svg>

(epp) → example
```

# Run pytask

A terminal window with a dark background. The title bar shows the user 'hmg' at 'hmg-home' in the directory '~/econ/example'. The prompt is '(epp)'. The user has entered '→ example pytask'. The output shows the start of a pytask session, platform and version information, and a list of two tasks. A table shows both tasks succeeded. A summary box highlights that 2 tasks succeeded (100.0%). The session ended with 'Succeeded in 0.95 seconds'. The prompt is now '(epp) → example' followed by a cursor.

```
hmg@hmg-home:~/econ/example

(epp) → example pytask
────────── Start pytask session ─────────
Platform: linux -- Python 3.11.0, pytask 0.4.0rc2, pluggy 1.3.0
Root: /mnt/econ/example
Collected 2 tasks.



| Task                                                    | Outcome |
|---------------------------------------------------------|---------|
| task_clean_data.py::task_clean_data                     | .       |
| task_plot_life_expectancy.py::task_plot_life_expectancy | .       |



Summary



2 Collected tasks
2 Succeeded (100.0%)



────────── Succeeded in 0.95 seconds ─────────
(epp) → example
```

# Multiple dependencies and products

- Defaults to keyword arguments may hold
  - a single `pathlib.Path`
  - a container of `pathlib.Path` objects
  - Container may be nested, so long as the atomic elements are `pathlib.Path` objects
- For dependencies, can pass as many different arguments with defaults as you like