DevOps Info Service — CI/CD Pipeline Documentation

1. Overview

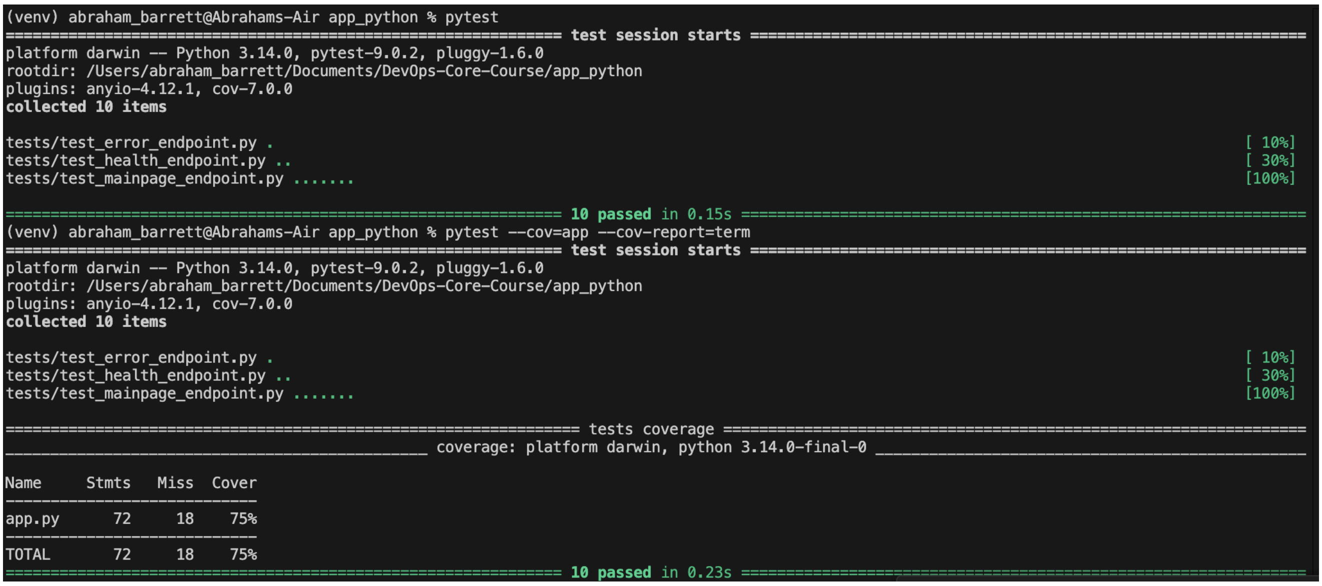
Testing Framework: pytest

Why pytest?

- Simple and intuitive syntax with minimal boilerplate code
- Powerful fixture system for test setup/teardown
- Excellent plugin ecosystem (pytest-cov for coverage, etc.)
- Industry standard for Python testing
- Better assertion introspection than unittest

Test Coverage:

Endpoint	Tests	What's Tested
`GET /`	7 tests	Status code, response structure, service info, system info, runtime progression, request info, endpoints list
`GET /health`	2 tests	Status code, response structure (status, uptime, timestamp)
`404 Handler`	1 test	Error response format and status code



```
(venv) abraham_barrett@Abrahams-Air app_python % pytest
============================================================== test session starts ===============================================================
platform darwin -- Python 3.14.0, pytest-9.0.2, pluggy-1.6.0
rootdir: /Users/abraham_barrett/Documents/DevOps-Core-Course/app_python
plugins: anyio-4.12.1, cov-7.0.0
collected 10 items

tests/test_error_endpoint.py .                                                                                                              [ 10%]
tests/test_health_endpoint.py ..                                                                                                            [ 30%]
tests/test_mainpage_endpoint.py .......                                                                                                     [100%]

============================================================== 10 passed in 0.15s ================================================================
(venv) abraham_barrett@Abrahams-Air app_python % pytest --cov=app --cov-report=term
============================================================== test session starts ===============================================================
platform darwin -- Python 3.14.0, pytest-9.0.2, pluggy-1.6.0
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collected 10 items

tests/test_error_endpoint.py .                                                                                                              [ 10%]
tests/test_health_endpoint.py ..                                                                                                            [ 30%]
tests/test_mainpage_endpoint.py .......                                                                                                     [100%]

================================================================ tests coverage ==================================================================
_______________________________________________ coverage: platform darwin, python 3.14.0-final-0 ________________________________________________

Name      Stmts   Miss  Cover
-----------------------------
app.py       72     18    75%
-----------------------------
TOTAL        72     18    75%
============================================================== 10 passed in 0.23s ================================================================
```

CI Workflow Configuration

Triggers:

- Push: master, main, lab03 branches
- Pull Request: master branch
- Path filters: Only runs when app_python/ or workflow files change

Why these triggers?

- Running on lab03 branch enables testing during development
- PR checks prevent merging broken code
- Path filters optimize resource usage — no need to run Python CI when only Go/Rust code changes
- Versioning Strategy: Calendar Versioning (CalVer)

Format: YYYY.MM.build-number (e.g., 2025.03.42)

Rationale:

This is a service, not a library — users don't need SemVer's breaking change semantics
CalVer provides immediate context about when the image was built
Dates are human-readable and eliminate version number debates
Perfect for continuous deployment workflow
Combined with build number ensures uniqueness

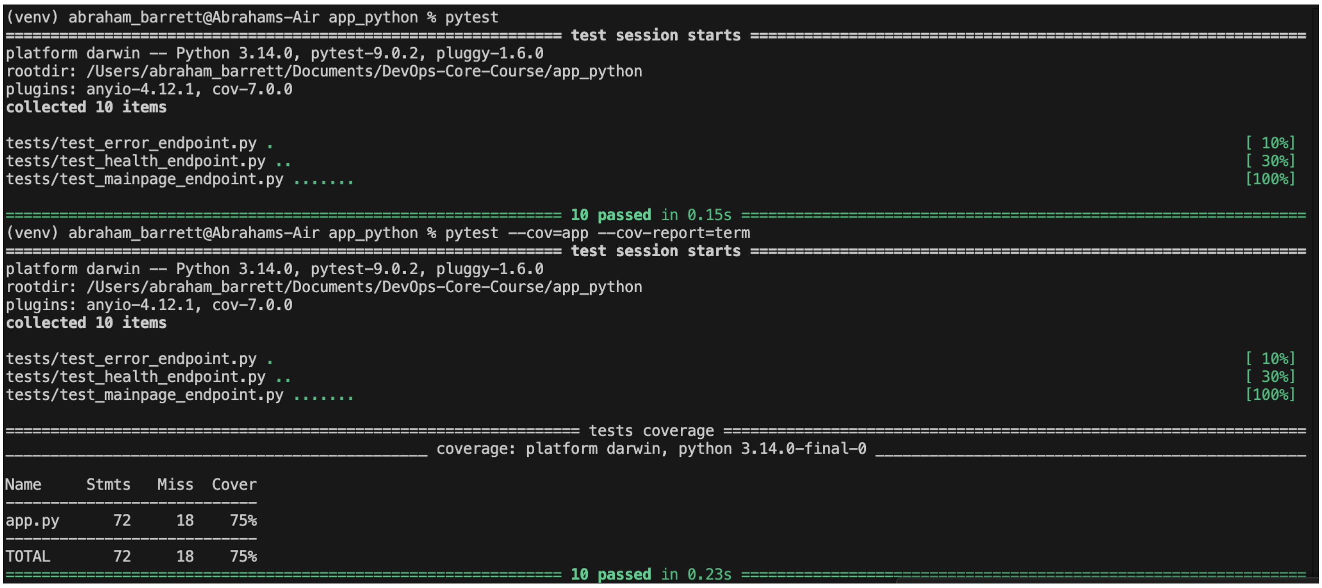
Docker Tags:

- abrahambarrett228/devops-info-service:2025.03 — Monthly release track
- abrahambarrett228/devops-info-service:2025.03.42 — Specific build
- abrahambarrett228/devops-info-service:latest — Latest stable build

2. Workflow Evidence

Successful GitHub Actions Run

Local Tests Passing



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tests/test_health_endpoint.py ..                                                                                                          [ 30%]
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Docker Hub Image

3. CI Best Practices Implemented

Practice	Implementation	Why It Matters
1. Dependency Caching	`actions/setup-python` with `cache: pip`	— Saves time per run by reusing pip cache
2. Fail Fast	`needs: test` in docker job	Prevents publishing broken images — if tests fail, Docker build never starts
3. Conditional Deployment	`if: github.ref == 'refs/heads/master'`	Only push Docker images from protected branches — prevents spam from feature branches
4. Concurrency Control	`concurrency.cancel-in-progress: true`	Cancels outdated workflow runs — saves resources on force-pushes
5. Path Filtering	`on.push.paths: ['app_python/**']`	CI runs only when relevant files change — saves 100% of runtime when editing docs
6. Security Scanning	Snyk with high severity threshold	🔒 Catches vulnerable dependencies before production
7. Coverage Threshold	`--cov-fail-under=70`	Enforces minimum test coverage — prevents coverage regression

4. Key Decisions

Versioning Strategy: CalVer

Why not SemVer? This is a web service, not a library. Users don't pin versions in requirements.txt — they pull the latest Docker image. CalVer tells me immediately when an image was built. The date format 2025.03 is instantly recognizable and eliminates debates about "is this a major or minor change?" For continuous deployment, dates make more sense than arbitrary version numbers.
Docker Tags

CI generates three tags: latest, monthly version (2025.03), and specific build (2025.03.42). latest is for convenience, monthly tags provide stable release tracks, and build-specific tags enable rollbacks. The build number from GitHub Actions guarantees uniqueness even if multiple builds happen on the same day.

Test Coverage:

Coverage is enforced at 70% but consistently runs at 75%.

What's covered:

All endpoint response structures and status codes
Dynamic behavior (uptime progression, timestamp formatting)

Error handling (404 responses)
Service metadata validation

Workflow Triggers

I chose to run on both push to lab03/main and PRs to master. Running on development branches lets me catch issues early without creating PRs. PR checks act as a quality gate — no broken code reaches master. Path filters prevent wasting resources when I update only the Go app or documentation.
Test Coverage Strategy