

# Best Practices for CI in Python

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# Acknowledgement of Country

Belmont (in San Francisco Bay Area Peninsula)  
Ancestral homeland of the Ramaytush Ohlone people

# Continuous Integration: The Talk: The Steps

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- ▶ What makes continuous integration

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- ▶ What makes continuous integration good

# Continuous Integration: The Talk: The Steps

- ▶ What makes continuous integration
- ▶ What makes continuous integration good
- ▶ How to make your continuous integration good

# What makes continuous integration?

The gears in the machine

# (Usual) Requirements for Continuous Integration

Local "build":



# (Usual) Requirements for Continuous Integration

Local "build":  
Lint

# (Usual) Requirements for Continuous Integration

Local "build":

Lint

Test

# (Usual) Requirements for Continuous Integration

Local "build":

Lint

Test

Package

# Continuous Integration: Run Build on Server

When?

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Classic: Nightly

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Exotica (Merge trains and more)



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Exotica (Merge trains and more)

Continuous Delivery and Deployment

# Continuous Integration: Patch Builds

Focus of talk

# Continuous Integration: Patch Builds

Focus of talk

Automated gate: "is patch good?"

# Continuous Integration: Runners

Architecture:

- ▶ CI coordinator
- ▶ CI runners

# Continuous Integration: Build logs

Modern frameworks:

# Continuous Integration: Build logs

Modern frameworks:  
Collect live from runners

# Continuous Integration: Build logs

Modern frameworks:

Collect live from runners

Retain "forever"

# What makes continuous integration good?

Paint the target



## CI criteria: accuracy

Is the answer correct?

## CI criteria: actionability

If patch is not good, how clear is it how to fix?

## CI criteria: actionability

If patch is not good, how clear is it how to fix?  
How to reproduce locally?

# CI criteria: promptness

How long does it take to answer?

# CI criteria: cost

Mostly the runner compute cost

# How to improve your CI

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Improve accuracy

# How to improve your CI

Improve accuracy

Improve actionability



# How to improve your CI

Improve accuracy  
Improve actionability  
Improve promptness

# How to improve your CI

- Improve accuracy
- Improve actionability
- Improve promptness
- Improve cost

# CI accuracy: use containers

Container images with:

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Container images with:  
Version of Python

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Container images with:

Version of Python

Other non-Python dependencies

# CI accuracy: use containers

Container images with:

Version of Python

Other non-Python dependencies

Pin the image tag!

# CI accuracy: pin versions

Test against pinned dependencies

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Test against pinned dependencies

Upgrade pins in a dedicated patch



# CI accuracy: pin versions

Test against pinned dependencies  
Upgrade pins in a dedicated patch  
(There are services)

# CI accuracy: test quality

Monitor and improve test quality

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Monitor and improve test quality  
(This is a whole 'nother talk)

CI actionability: set verbosity to 11

Use verbosity options in test runners/linters/etc.

# CI actionability: set verbosity to 11

Use verbosity options in test runners/linters/etc.  
Logs can be filtered more easily than unfiltered

# CI actionability: test failure verbosity

Test assertion failure in test for verbosity

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Test assertion failure in test for verbosity  
When raising exception, add details!

# CI actionability: environmental details

Spew details on environment to logs



# CI actionability: environmental details

Spew details on environment to logs  
Environment variables

# CI actionability: environmental details

Spew details on environment to logs  
Environment variables  
Platform

# CI actionability: environmental details

Spew details on environment to logs  
Environment variables  
Platform  
Etc.

# CI actionability: environmental details

Spew details on environment to logs

Environment variables

Platform

Etc.

(Don't put secrets in environment)

# CI promptness: caching

Use CI primitives to cache downloads

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Container layer caching

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Container layer caching(complicated but worth it)

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Local PyPI and Container caching proxies



# CI promptness: pooling

Reuse connections, downloads, etc.

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Reuse connections, downloads, etc.  
Think carefully how to break up tests

# CI promptness: fail fast

Order tests based on likelihood to fail

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Order tests based on likelihood to fail  
Open source solutions exist

# CI promptness: parallelize runs

Use CI primitives to parallelize independent runs

# CI promptness: parallelize tests

Use tester primitives to parallelize independent runs

# CI promptness: mock slowness

Mock out slow things

# CI cost: kill useless runs

Example: Commit added to patch



CI cost: stop runs early

Do you need to finish if it fails?

# CI cost: stop runs early

Do you need to finish if it fails?  
(Sometimes! Trade-offs)

# CI cost: better tests

Examples: Better stubbing/mocking instead of real services

# CI quality: trade-offs

Accuracy

# CI quality: trade-offs

Accuracy

Actionability

# CI quality: trade-offs

Accuracy

Actionability

Promptness

# CI quality: trade-offs

Accuracy

Actionability

Promptness

Cost

# CI quality: trade-offs

Accuracy

Actionability

Promptness

Cost

Effort!



# CI quality: trade-offs

Accuracy

Actionability

Promptness

Cost

Effort!

Decide!

## CI quality: measure

Given trade-offs, is this ok?

# CI quality: improve

What needs to be better?

CI quality: repeat

Keep your eye on the ball!

# Best Practices Should be Practiced

Apply this to your favorite CI flow!

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Apply this to your favorite CI flow!  
Reach out – <https://cobordism.com>