Cloud Native Application Development
The Twelve Factor App Methodology

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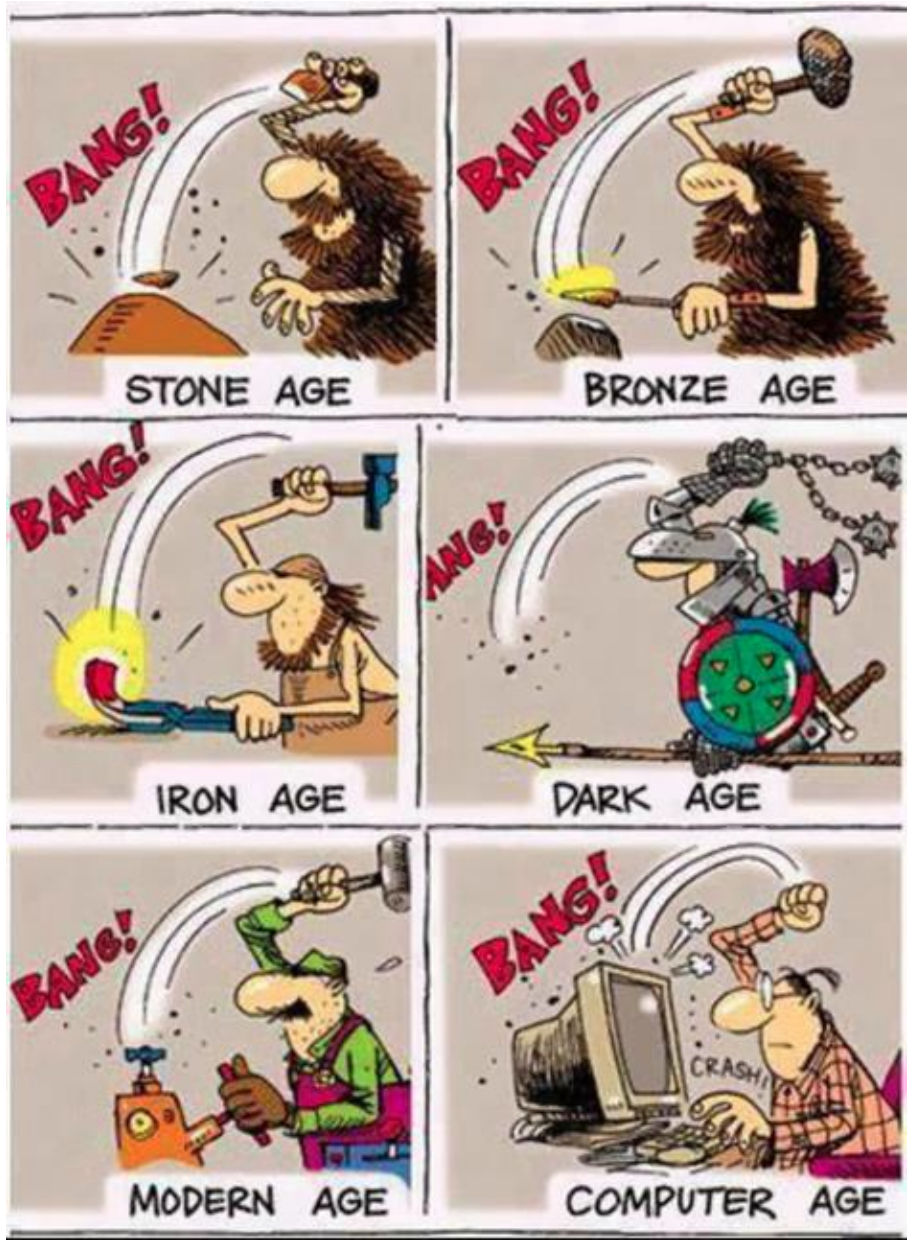
Red Hat

Humans had been problem solvers...

until they've decided to become PROGRAMMERS



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The Twelve-Factor App

- **A methodology**
- Manifesto
- Best practices
- Principles

Created by heroku https://12factor.net/

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1. Codebase
2. Dependencies
3. Config
4. Backing services
5. Build, release, run
6. Processes
7. Port binding
8. Concurrency
9. Disposability
10. Dev/prod parity
11. Logs
12. Admin processes

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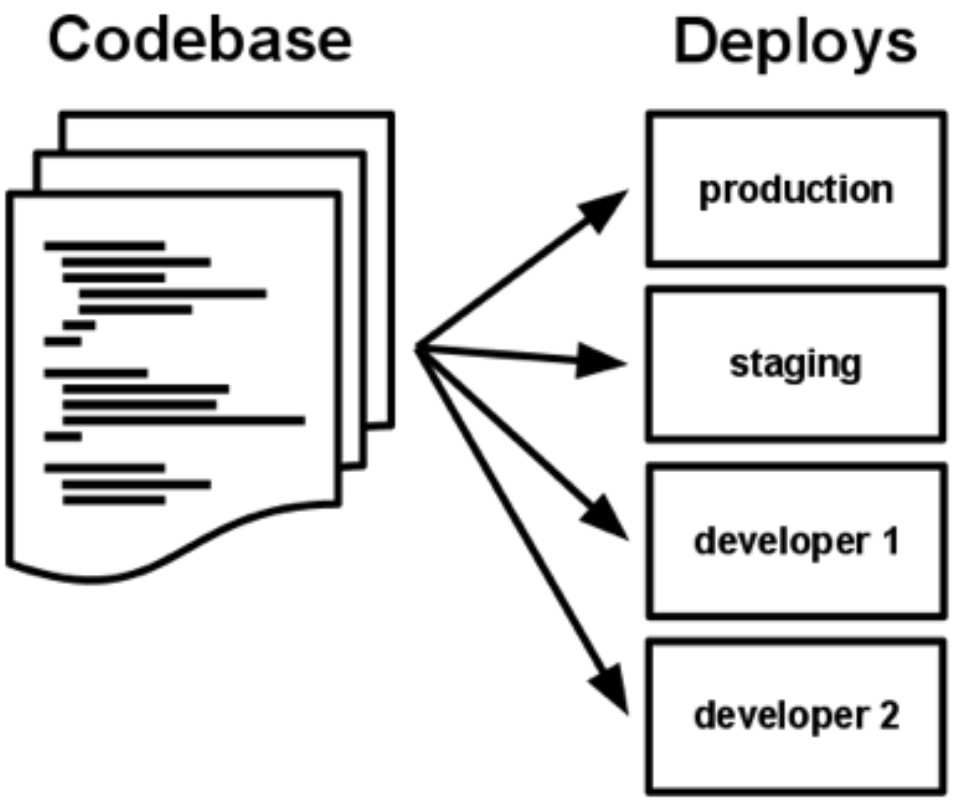
1 - Codebase

One codebase tracked in revision control, many deploys



One codebase = one app

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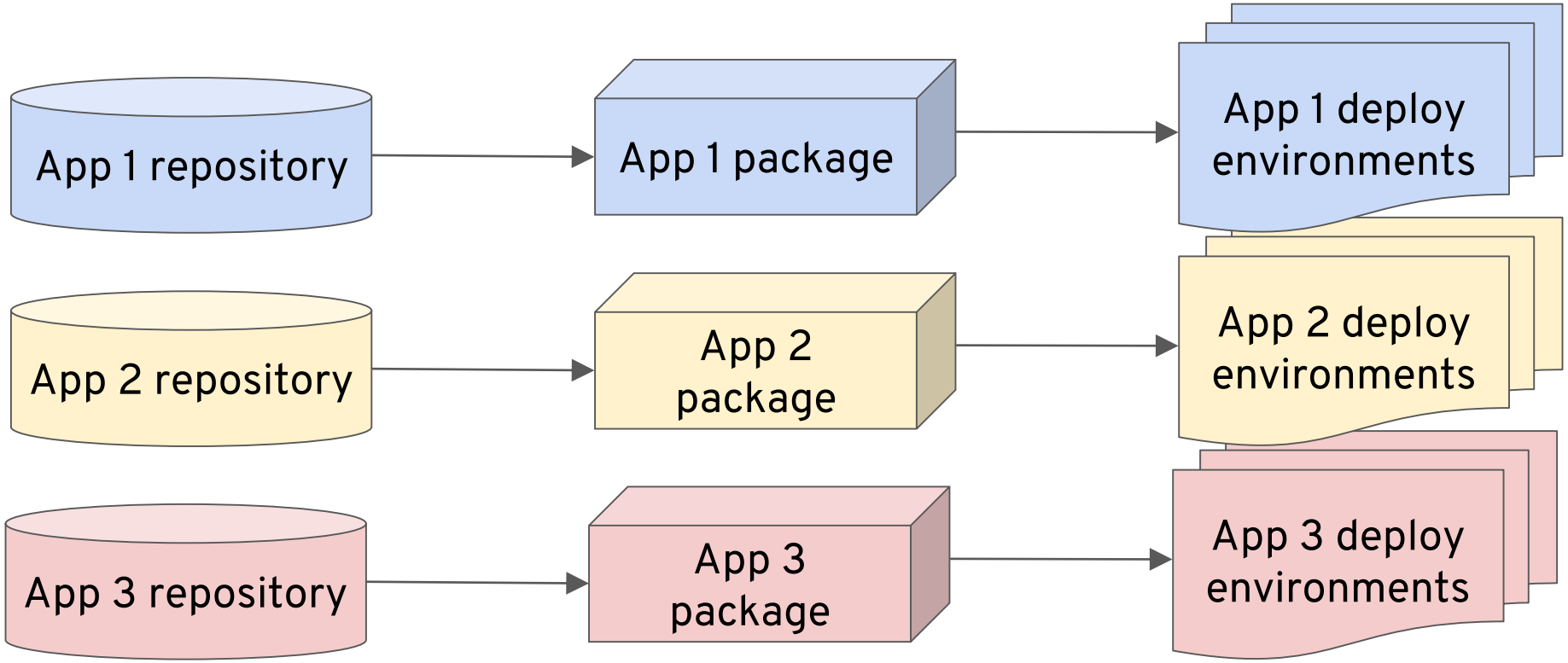
1 - **Codebase** (What does it mean?)

Use Version Control - But use it the right way!



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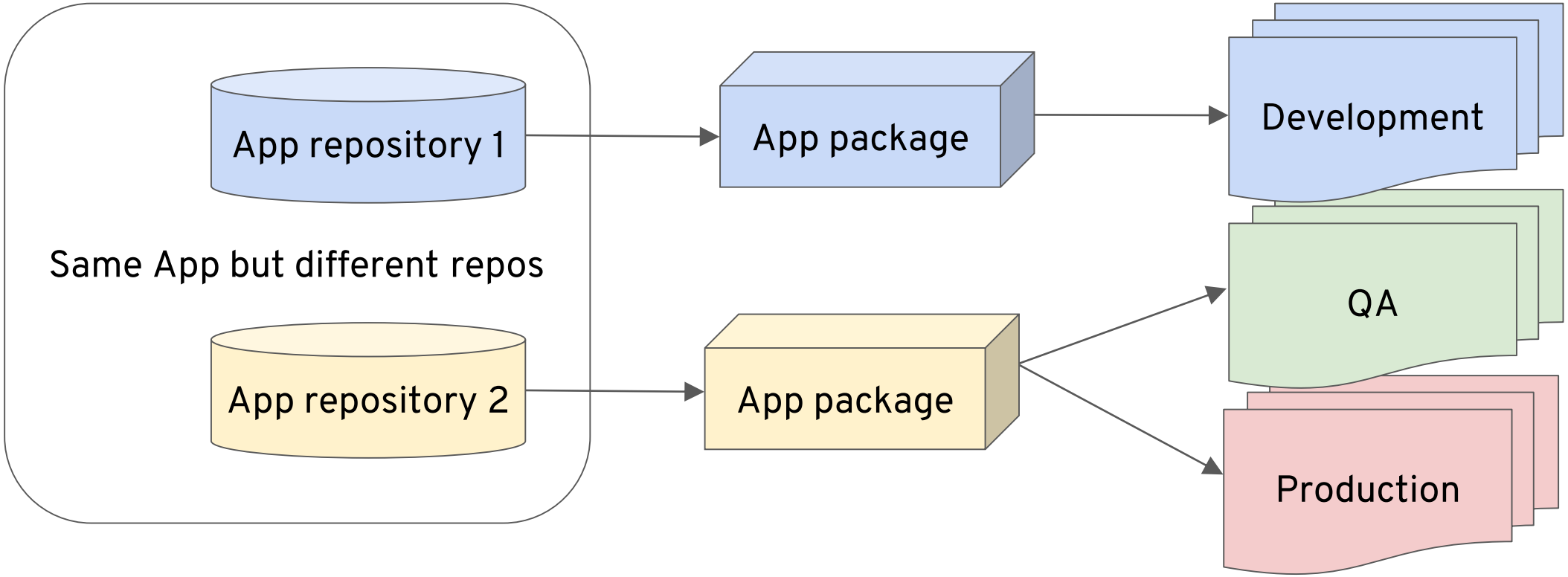
1 - **Codebase** (DO NOTs)

DO NOT have different codebases for different deployments



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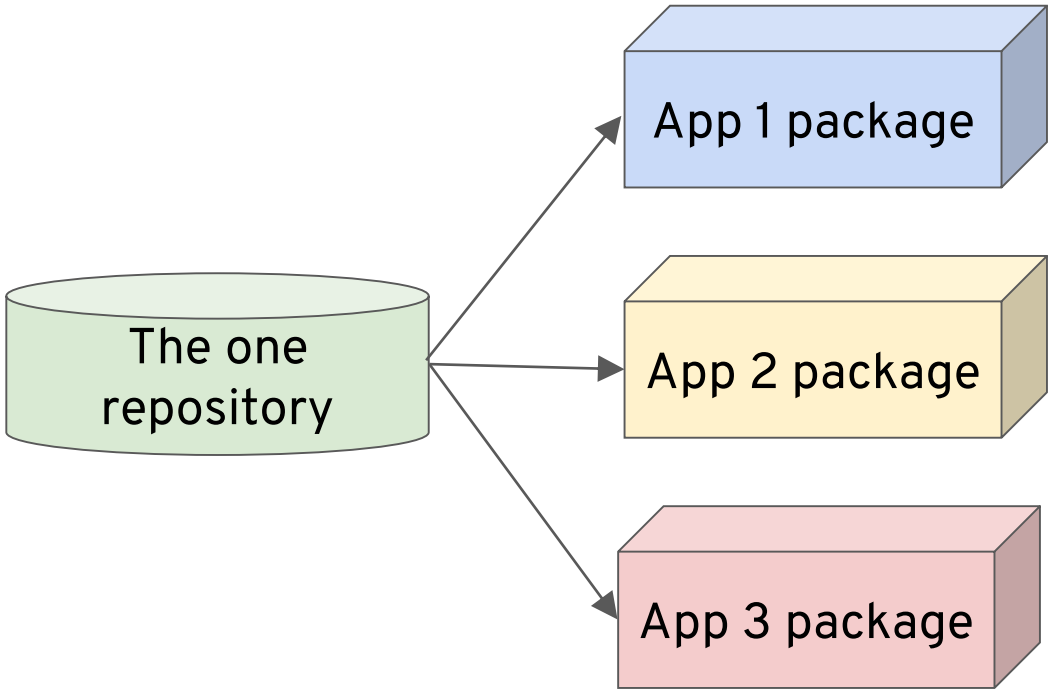
1 - **Codebase** (DO NOTs)

DO NOT have multiple apps and docs in the same repository



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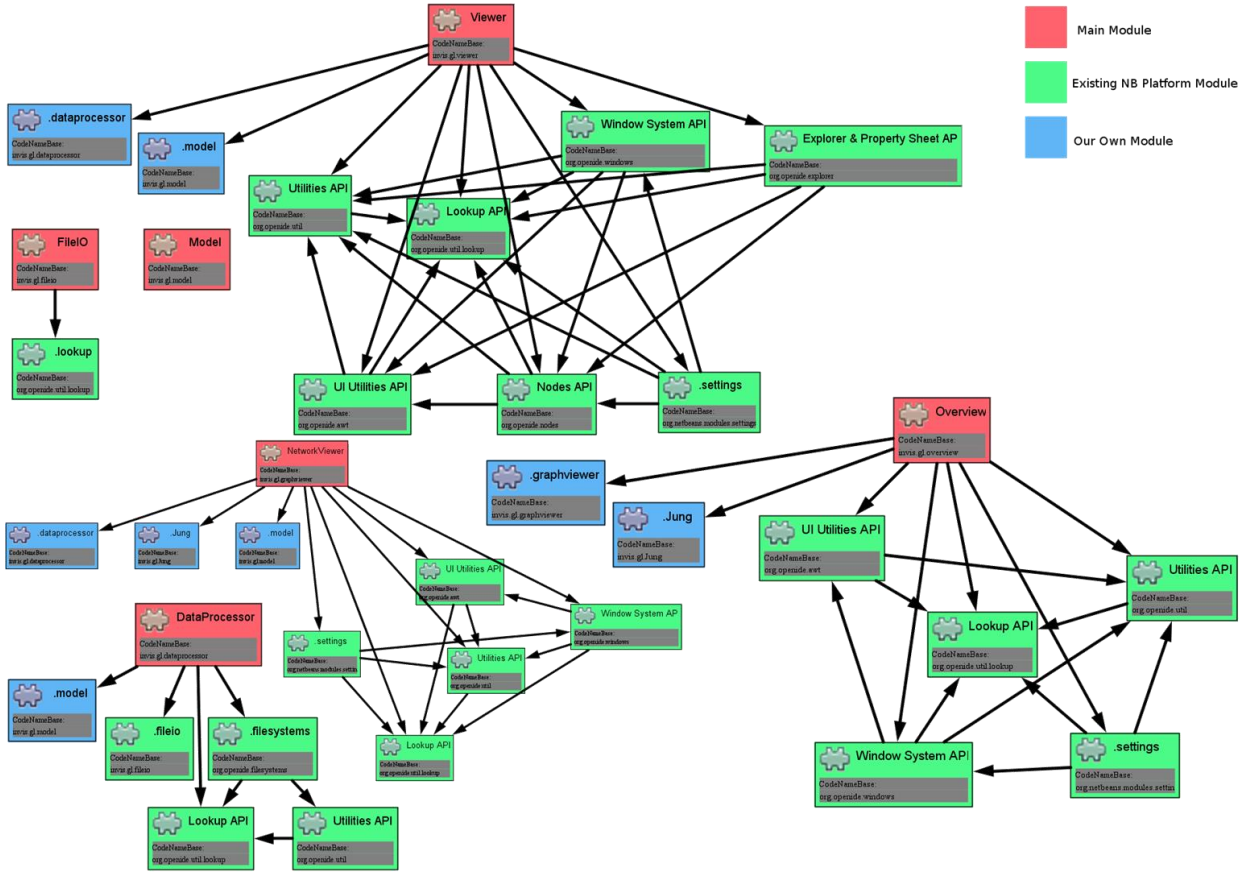
2 - Dependencies

Explicitly declare and isolate dependencies

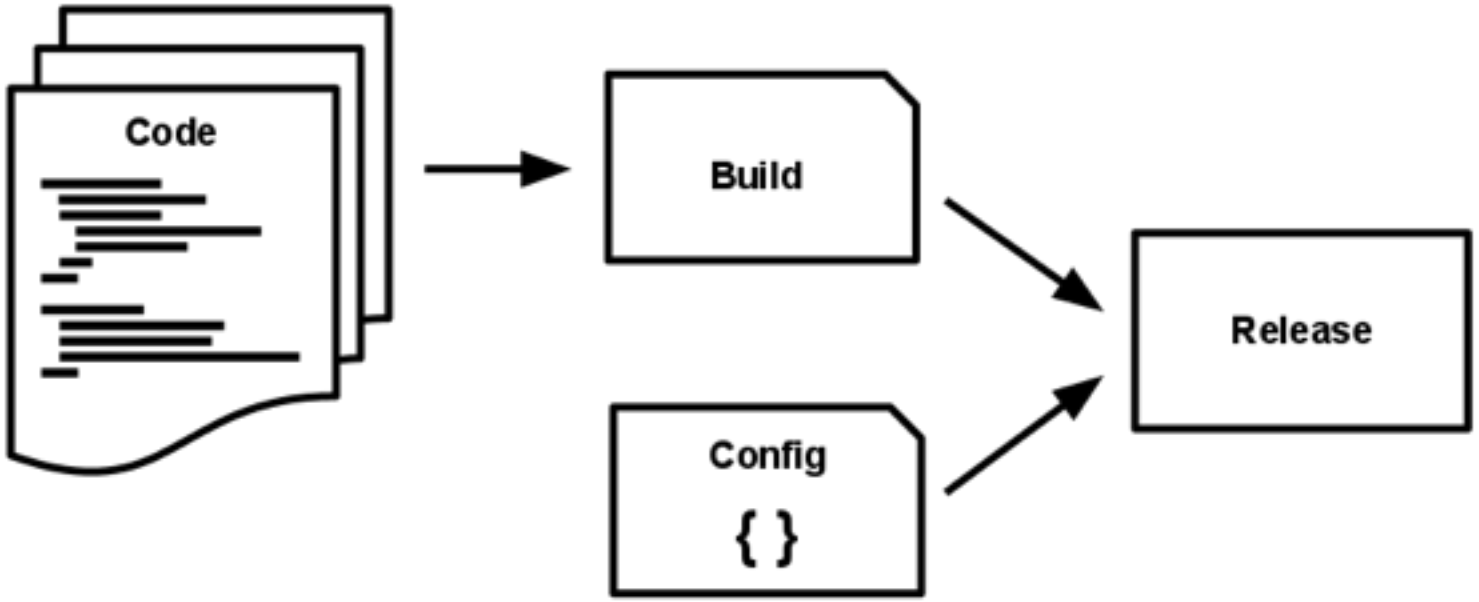


2 - **Dependencies** (What does it mean?)

- Use a package manager to avoid dependency hell.
- Don't commit dependencies in the codebase repository.

5 - Build, release, run

Strictly separate build and run stages



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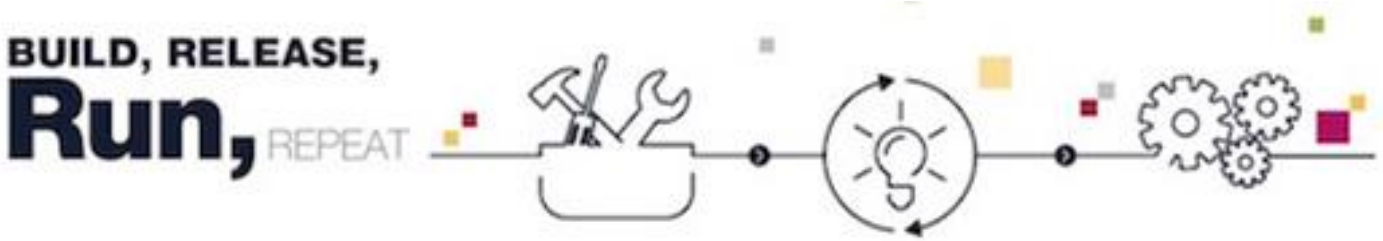
5 - **Build, release, run** (What does it mean?)

Use strict separation between the build, release, and run stages.



- Every release should always have a unique release ID
- Releases should allow rollbacks

Stage	Who?	What?	Why?
Build	CI	WAR / JAR / etc	Avoid "It works in my machine"
Release	CD	Container image	Deployments / Updates and Rollbacks
Run	Platform	Container instance	Speed, Management, Orchestration

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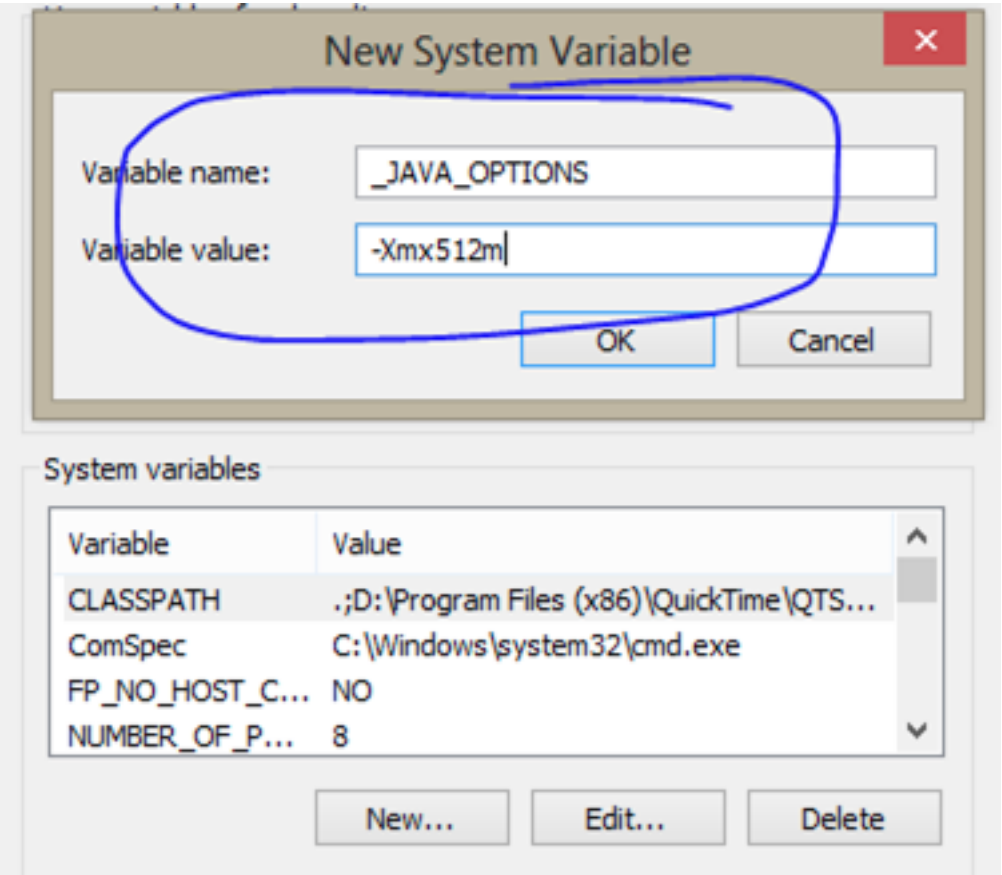
3 - Config

Store config in the environment



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3 - **Config** (What does it mean?)

If you have to repackage your application, you're doing it wrong!

Prefer to store the config in Environment Variables

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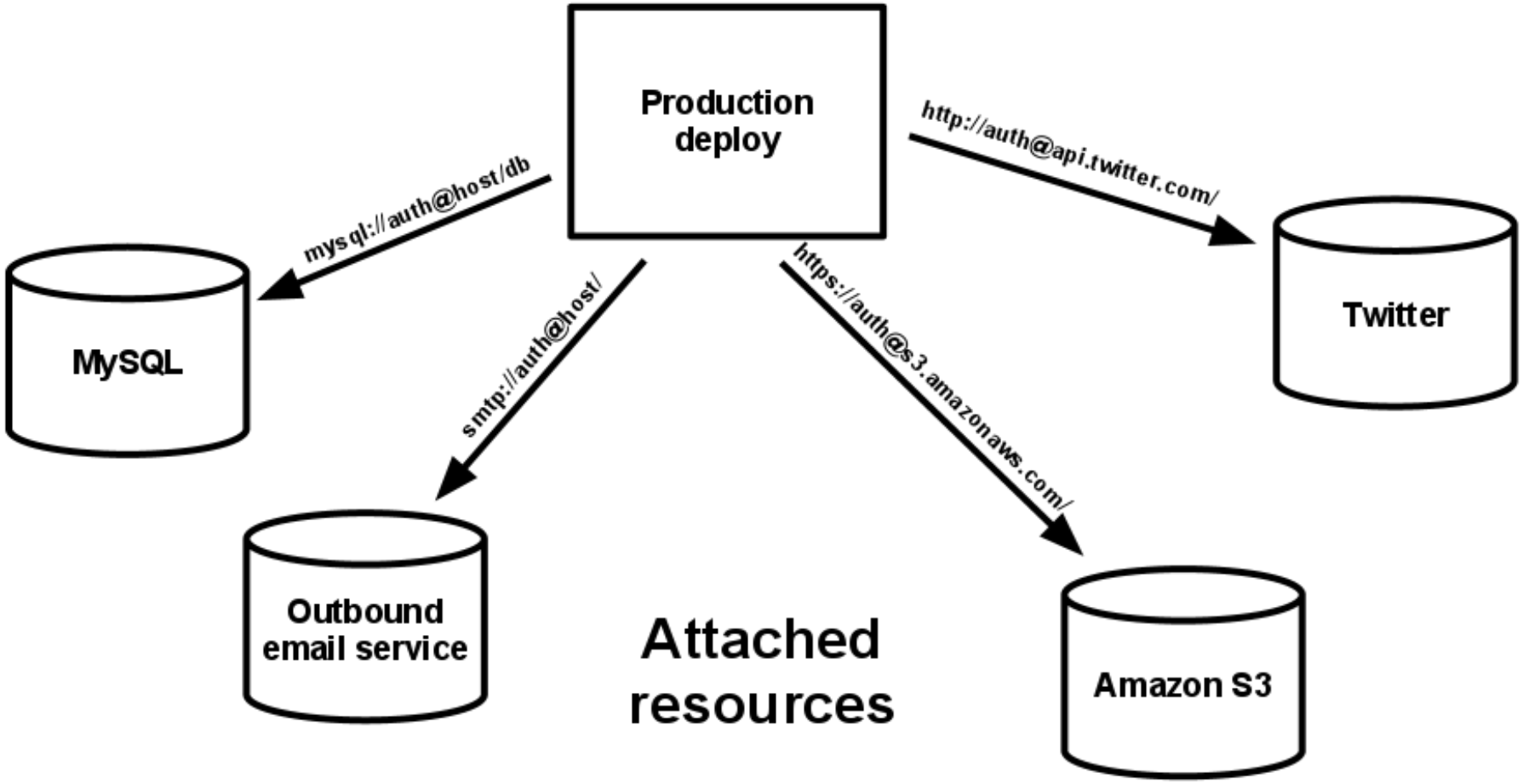
4 - Backing Services

Treat backing services as attached resources



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6 - **Processes** (What does it mean?)

Execute the app as one or more stateless processes

Twelve-factor processes are stateless and share-nothing

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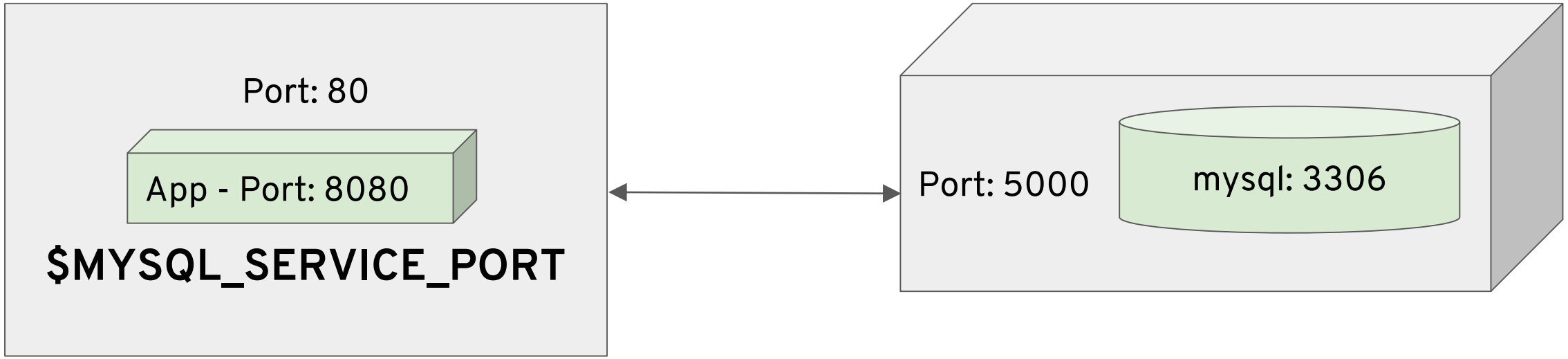
7 - **Port Binding** (What does it mean?)

Export services via port binding

The twelve-factor app is completely self-contained



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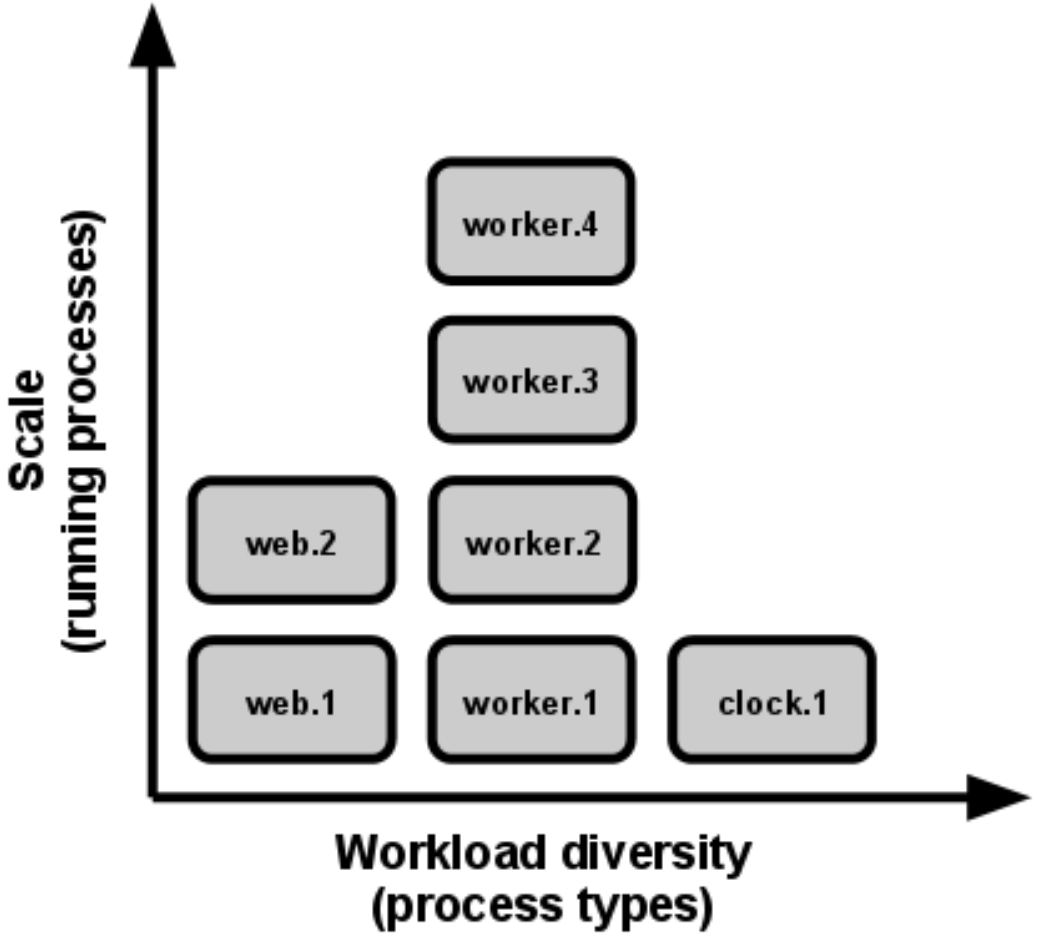
8 - Concurrency

Scale out via the process model



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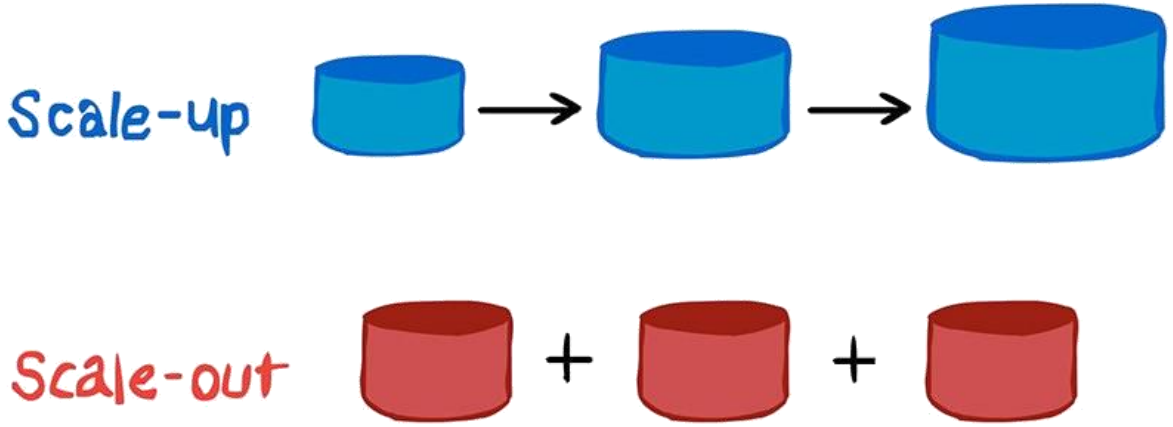
8 - Concurrency

- You can scale **up** and **out**
- Scale **processes** types
- Workload **diversity**
- It "*advocates*" for **Microservices**



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9 - Disposability

Maximize robustness with fast startup and graceful shutdown

- Processes can be **started or stopped at a moment's notice**
- Processes should **minimize startup time**
- Processes **shutdown gracefully when they receive a SIGTERM**
- Processes **should also be robust against sudden death**

- You cannot **scale, deploy, release, recover fast** if you cannot **start fast**!
- You **cannot start** if you did not **shutdown gracefully**!

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10 - Dev/prod parity

Keep development, staging, and production as similar as possible

Migrating manually directly to staging / production - **not** a great idea.

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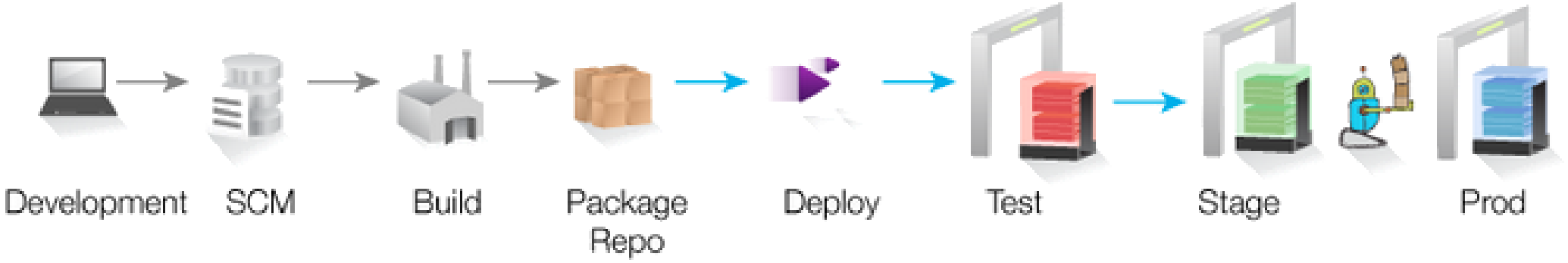
10 - Dev/prod parity

The twelve-factor app is designed for continuous deployment by keeping the gap between development and production small



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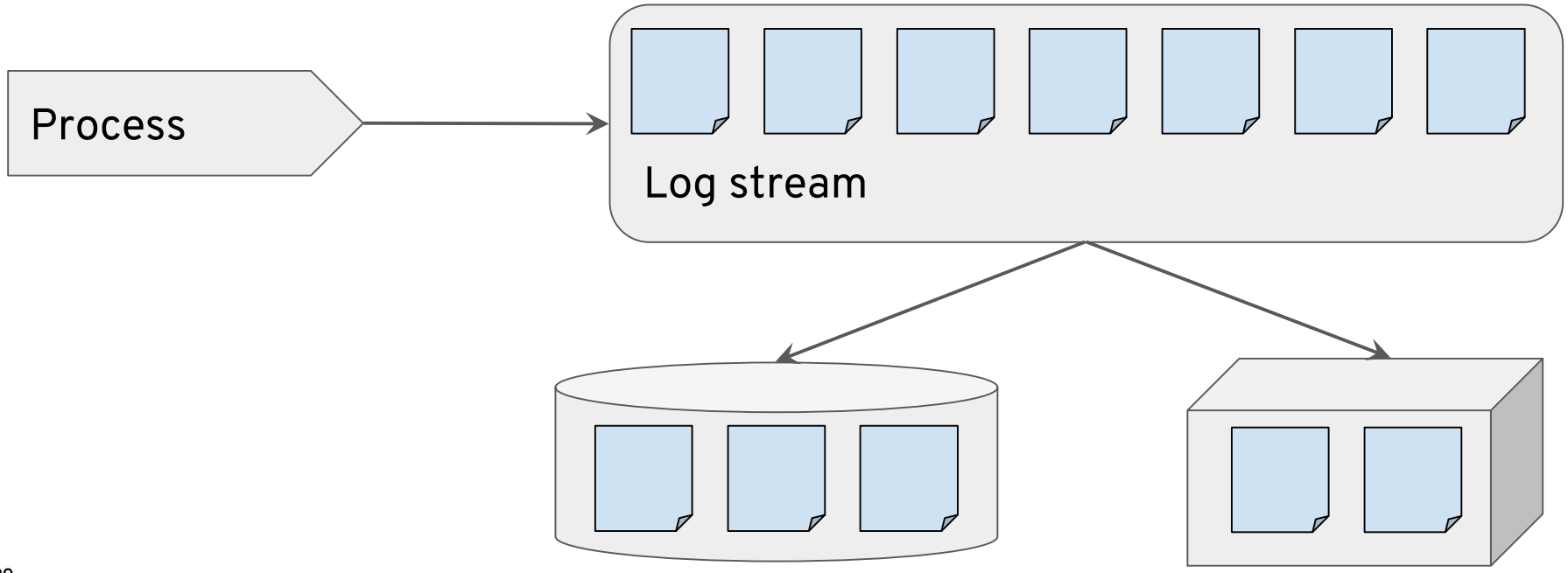
11 - Logging

Treat logs as event streams

A twelve-factor app **never** concerns itself with **routing** or **storage** of its **output stream**



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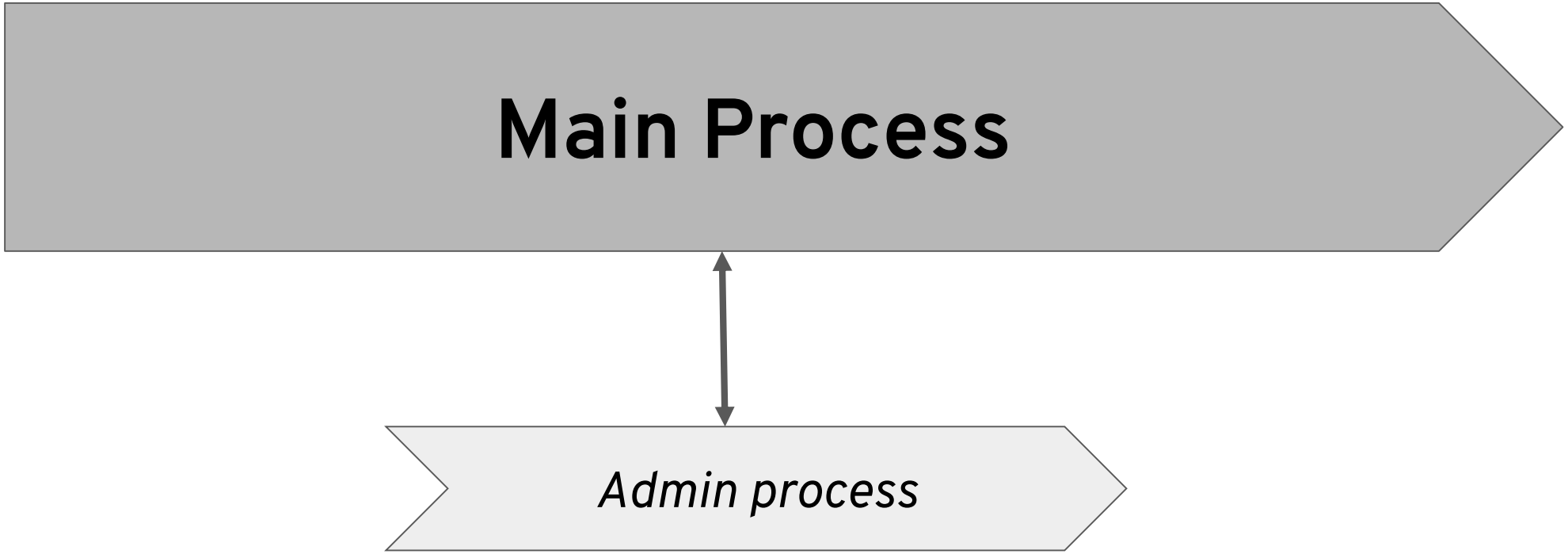
12 - Admin processes

Run admin/management tasks as one-off processes



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Summary

- Methodology: Technology and language agnostic
- OpenShift: Technology and language agnostic
- But satisfied by
  - Containers,
  - Microservices,
  - and CI/CD Pipelines
- Focused on DevOps

- More info: https://12factor.net/
- Demo app: https://github.com/rbaumgar/12factor-app

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