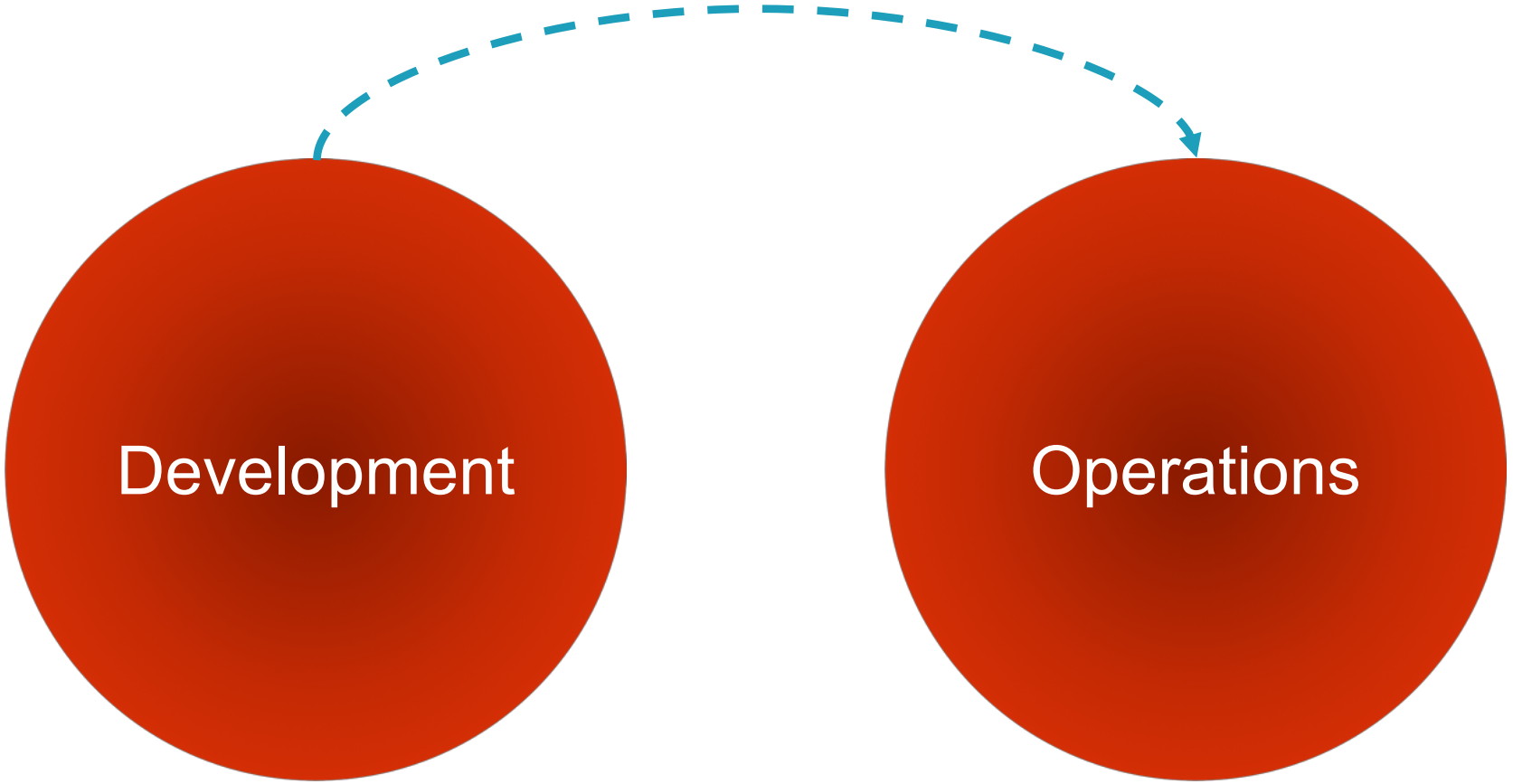
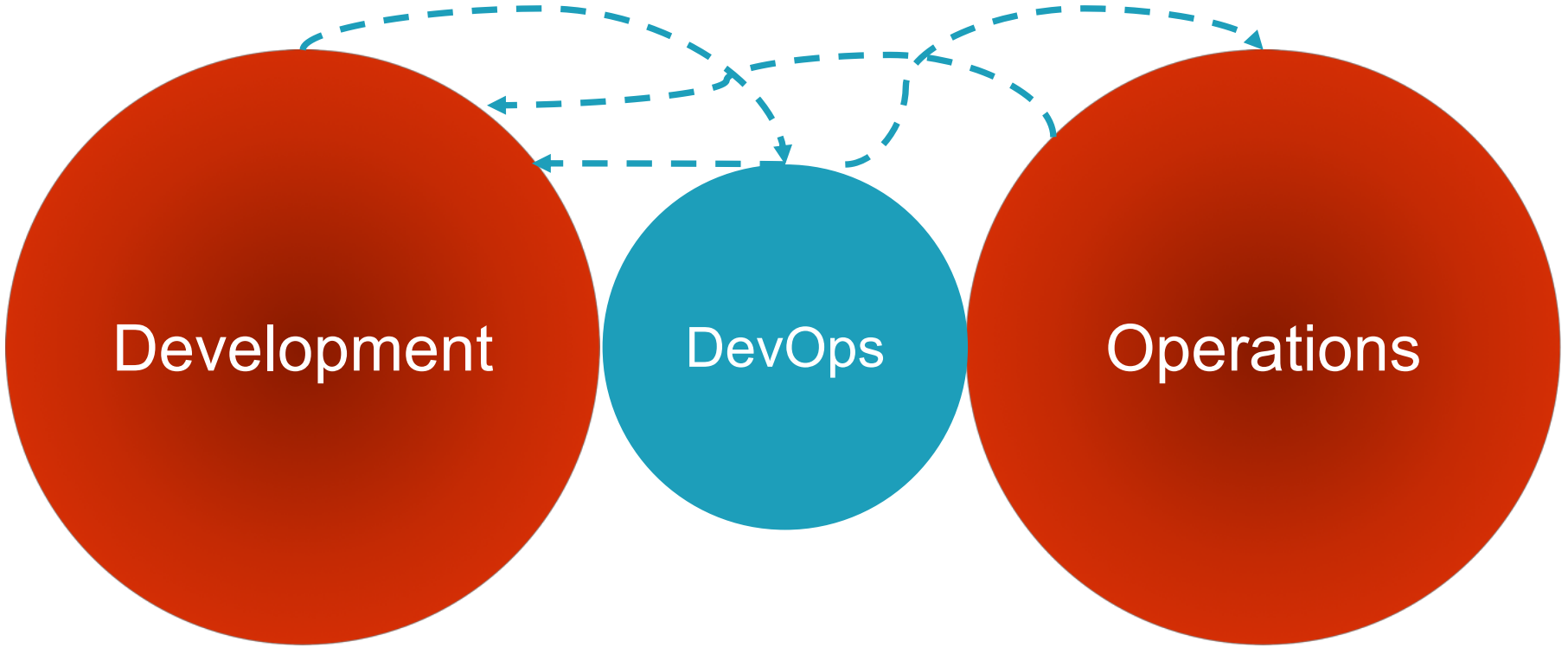
DevOps Anti-Patterns

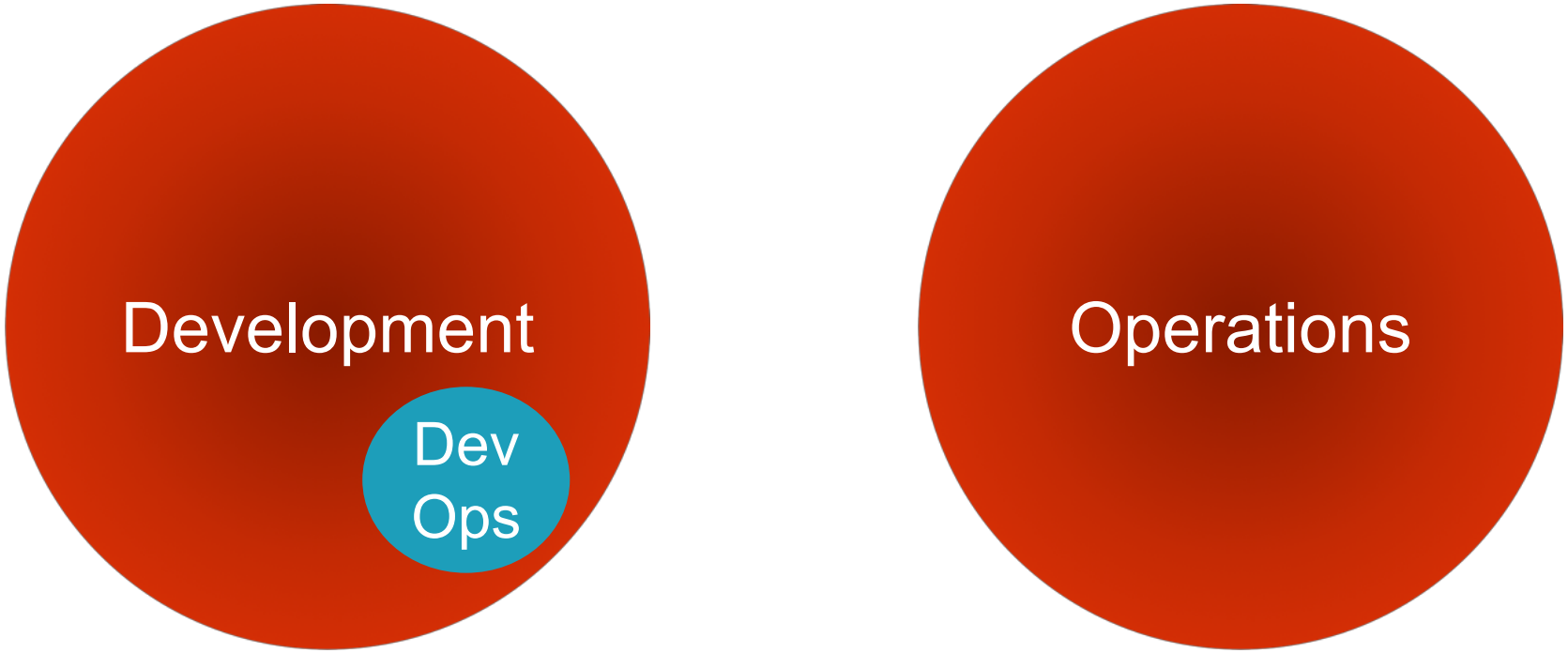
Anti-Pattern: “Throw it Over the Wall”



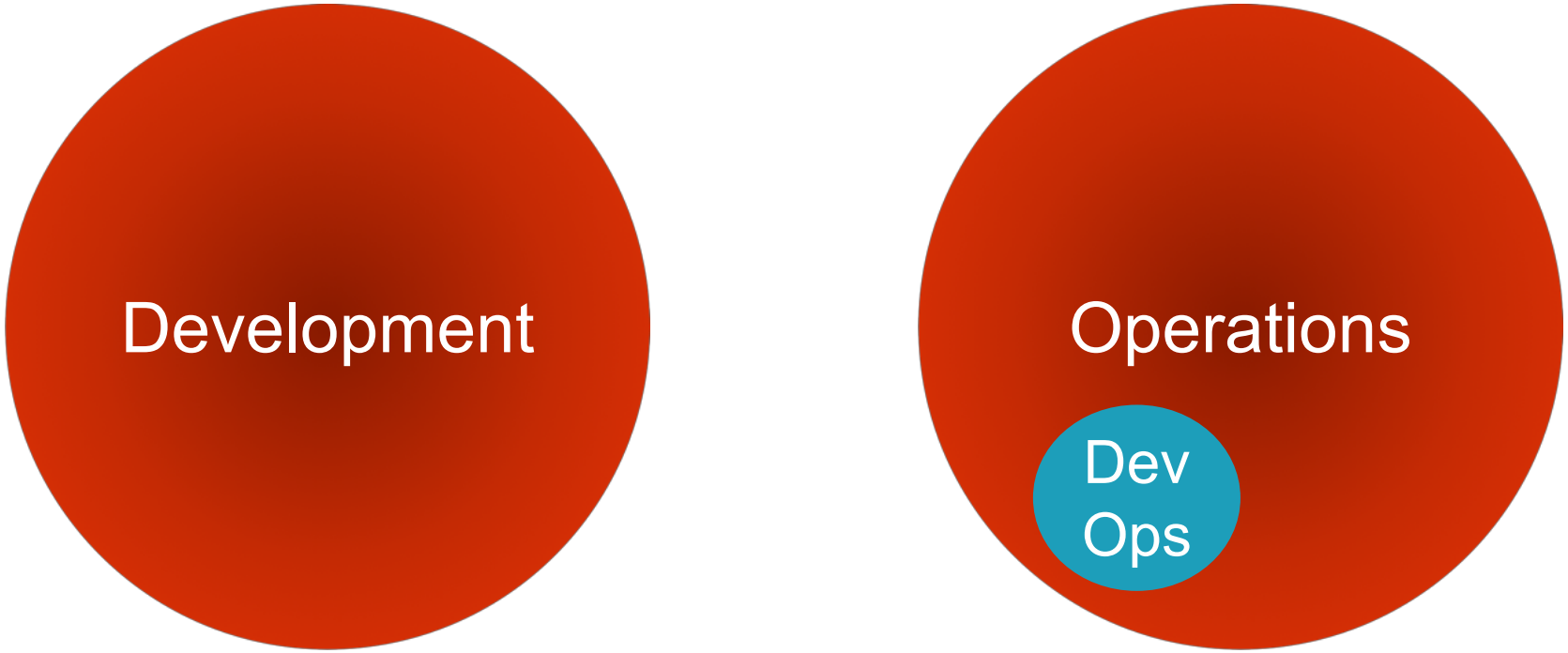
Anti-Pattern: “DevOps Team Silo”



Anti-Pattern: “NoOps” Approach

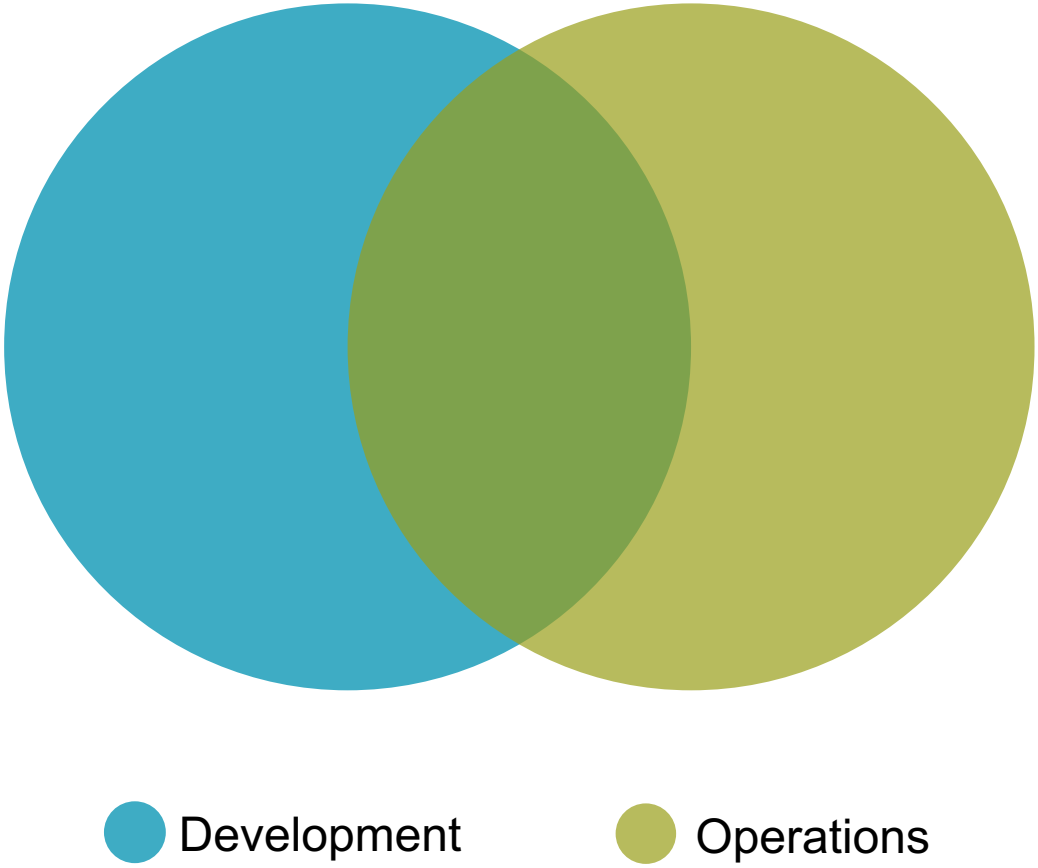


Anti-Pattern: “Ops Will Handle it”

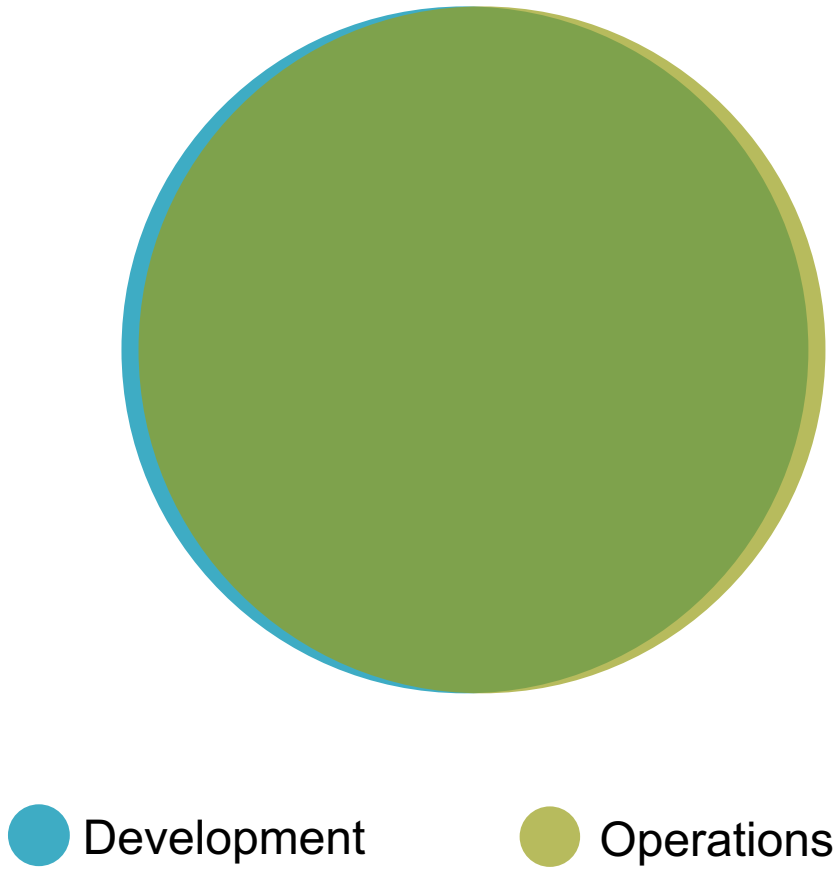


Anti-Pattern: “Ops Will Handle it”

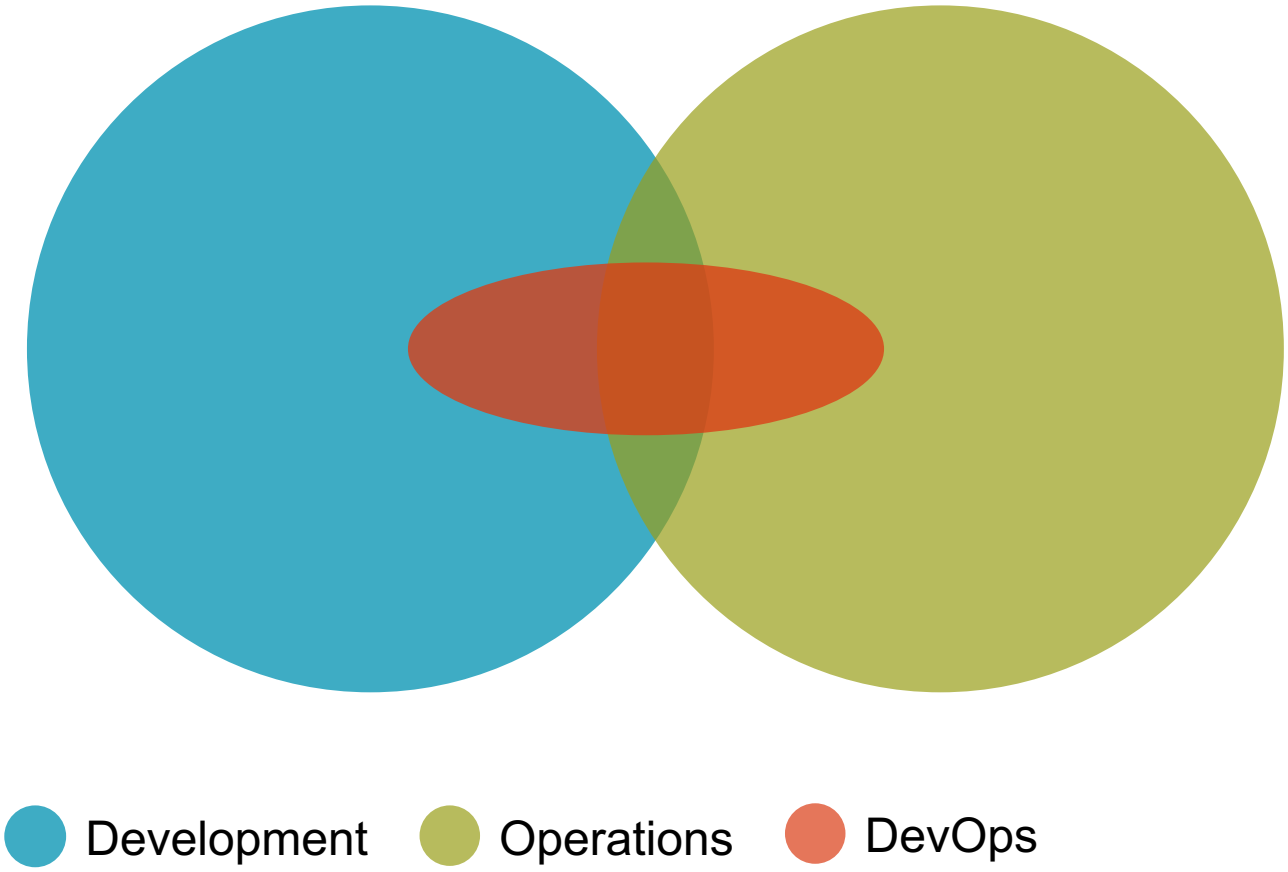
Development and Operations Collaboration



Dev and Ops Fully Shared Responsibilities



DevOps-as-a-Service



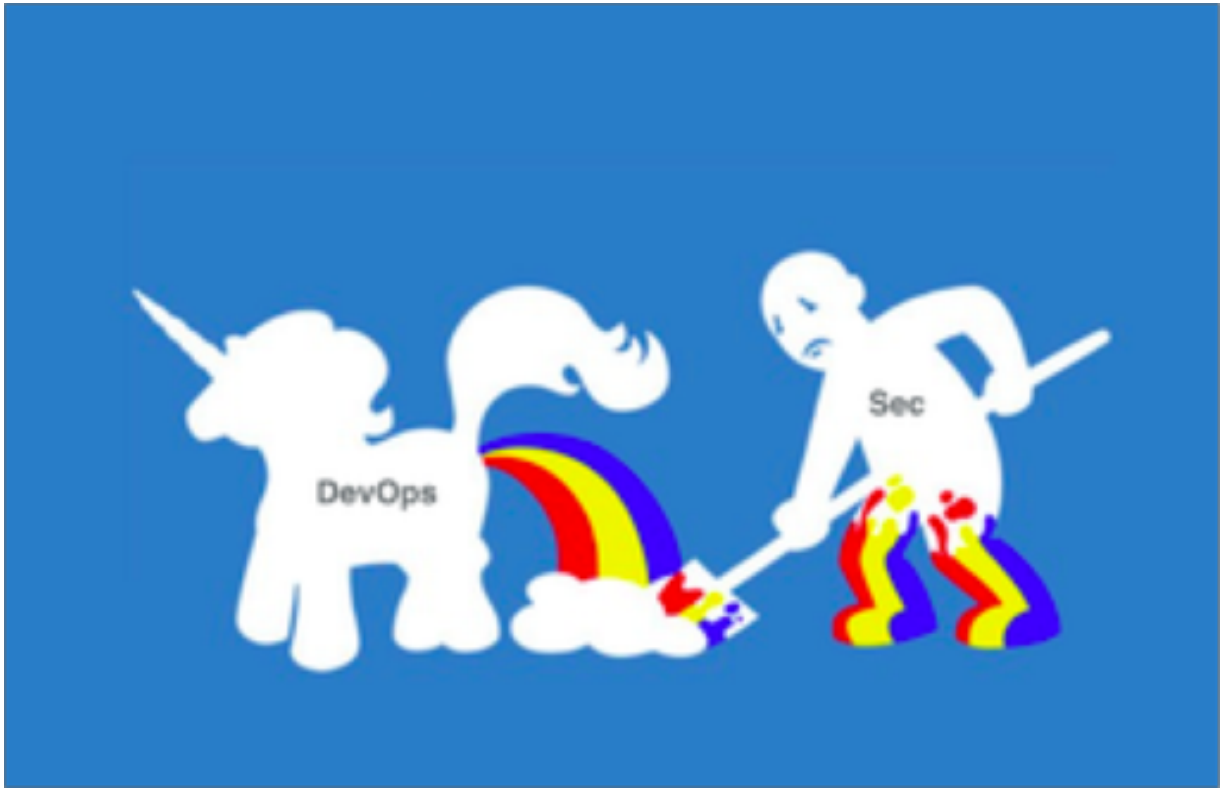
Process

- Collaboration Across Teams
- Cross-Training
- Support Business Agility
- Breaking Down Silos
- Automation of Repetitive Tasks
- “Everything” as Code
- Test, Measure, and Monitor

People

Tools

We want to turn this…



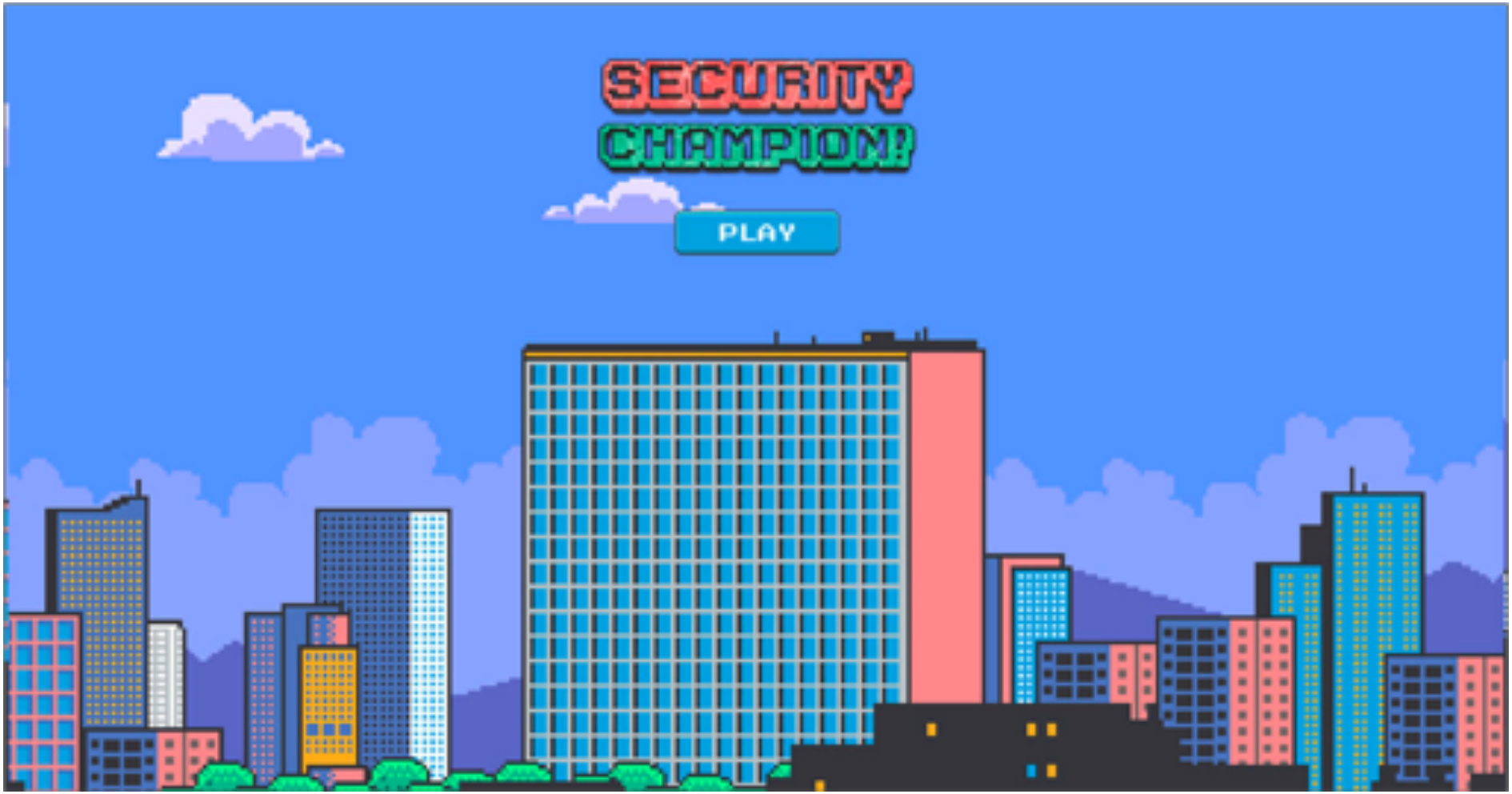
Into this!

“DevSecOps is the process of incorporating and enforcing meaningful security controls without slowing down deployment velocity.”

Enabling DevSecOps Through *People*

Break Down the Silos

Build a Team Beyond Yourself



Be Approachable

Train Others

Radical Transparency

Communication and Collaboration

- Critical piece to the DevOps puzzle
- A culture of trust and empowerment makes for a healthy workplace
- Move towards shipping software faster and more confidently
- Embrace cross-team communication and training
- Feedback available from each step of the pipeline
- Security is a great fit in modern DevOps cultures

Case Study: The ”Two Pizza” Team

Enabling DevSecOps Through *Process*

DevSecOps Pipelines

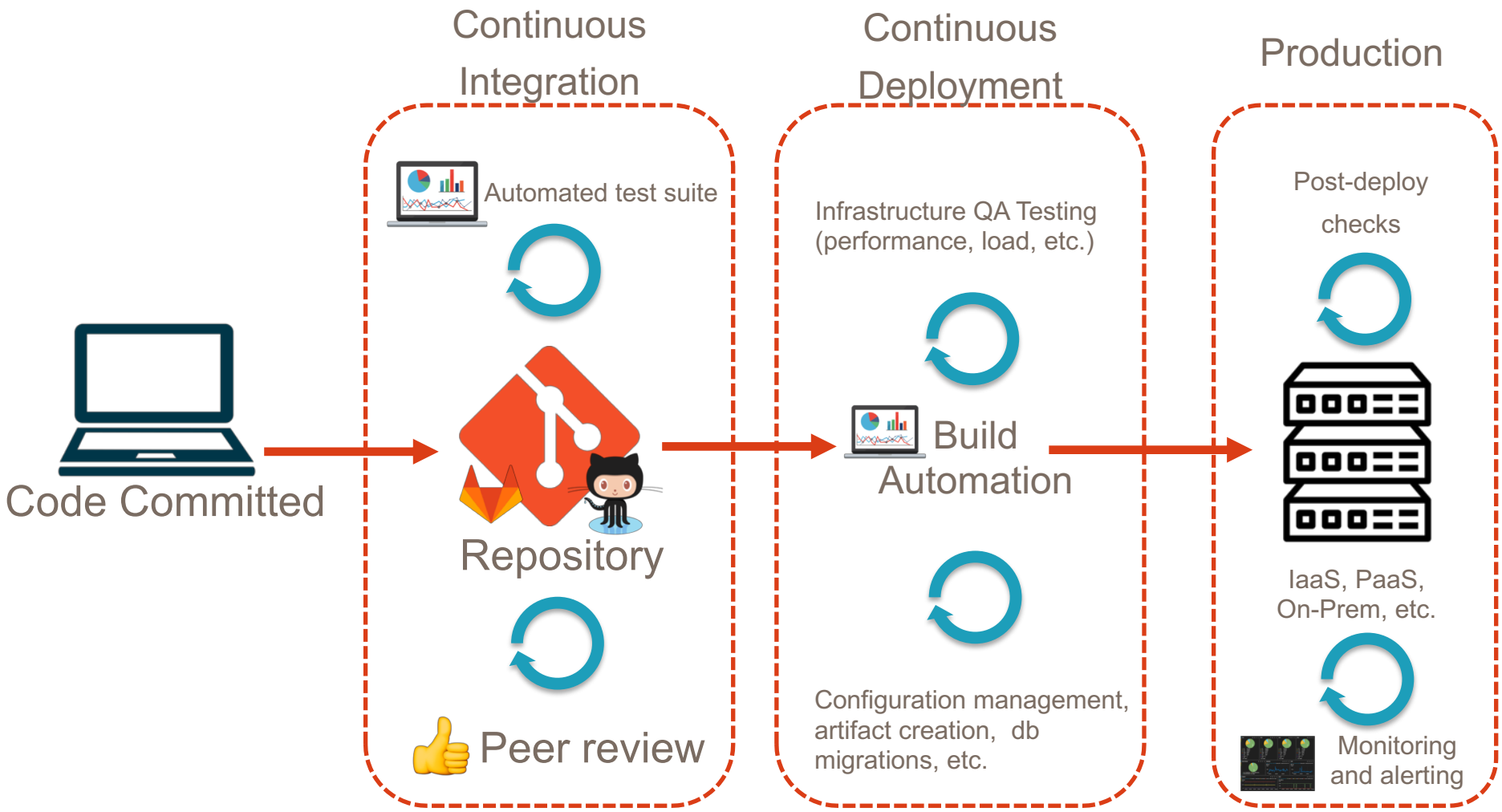
DevOps Processes

- Automate ***building*** the dev and production environment
- Automate software ***testing*** (including security)
- Automate ***deploying*** software and services
- Automate ***monitoring*** and ***alerting***
- ***Tune*** your tools to become more automated and hands-off
- Build the pipeline ***slowly*** and don't fear failure!
- Be careful with ***sensitive areas*** which are difficult to automate (access control, biz logic, complex actions)

Key Goals of DevSecOps Pipelines

- Optimize the critical resource: **Security personnel**
- Automate things that don't require a human brain
- Drive up consistency
- Increase tracking of work status
- Increase flow through the system
- Increase visibility and metrics
- Reduce any dev team friction with application security

Pipeline Security



Development (Pre-Commit)

Code Committed

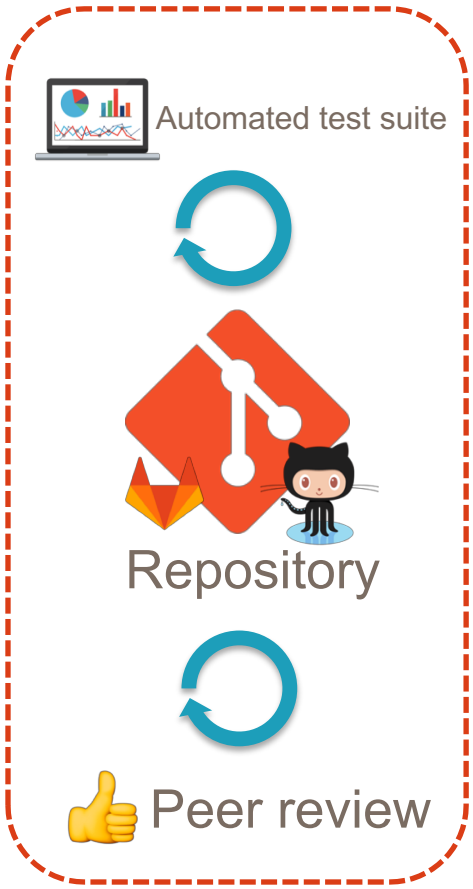
- Developer laptops are the first line of defense in a DevSecOps pipeline
- Moving security to the left prevents costly mistakes and vulnerabilities later
- Required Git pre-commit hooks can offer a simple, effective feedback loop
  - Static analysis scans in the IDE
  - Peer review from security engineers
  - Lightweight, threat modeling in sensitive areas

Git-Secrets

https://github.com/awslabs/git-secrets

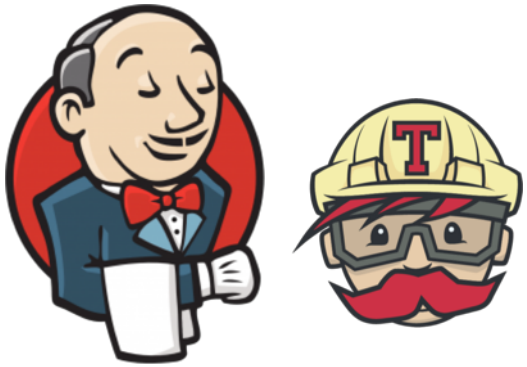
Brakeman Static Scanning (Git Pre-Commit Hook)

Continuous Integration (Commit Stage)



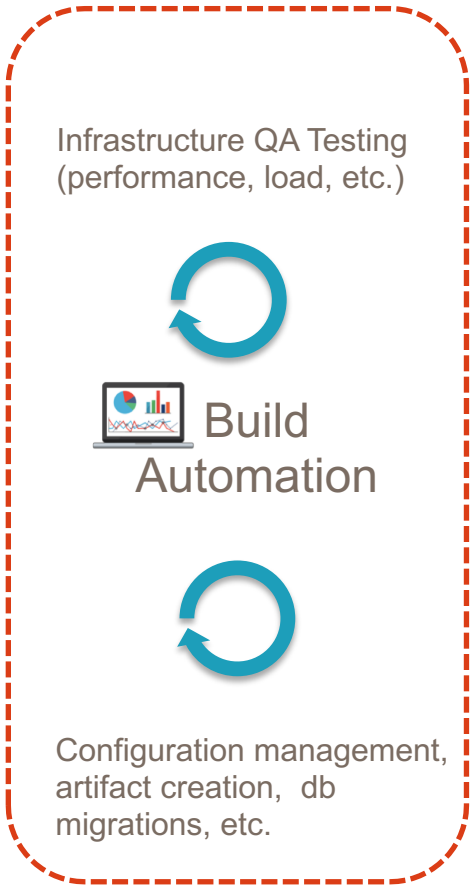
- Basic automated testing is performed after a commit is made
- Must be quick and offer instant feedback
- Key place to include security checks that run in parallel with integration tests, unit tests, etc.
  - Identify risk in third-party components
  - ***Incremental*** static security scanning
  - Alerting on changes to high-risk areas
  - Digital signatures for binaries

Continuous Integration (Commit Stage)



- CI server may include a dedicated security worker
- Third-party dependency checking performed in CI
  - OWASP Dependency Check
  - Node Security Project
  - Bundler-Audit
  - SRC:CLR
- Custom alerts set on repositories and sent to “on-call” security teams
  - Is someone changing pw hashing algorithm?
  - Is a new password policy enabled?

Continuous Deployment (Acceptance)



- Triggered by successful commit and passing build
- Utilize parallel, out-of-band processes for heavyweight security tasks
- IaaS and Config Management should provision latest, known-good environment state (as close to production as possible)
- Security checks during acceptance:
  - Comprehensive fuzzing
  - Dynamic Scanning (DAST)
  - Deep static analysis
  - Manual security testing

Continuous Deployment (Acceptance)

- Zap Baseline scan incorporated into CI stage of the deployment pipeline
- Runs a basic scan scan from a simple Docker run command
- By default will output all results of passive scan rules
- Highly configurable but still struggles in certain areas

https://github.com/zaproxy/community-scripts/tree/master/api/mass-baseline

Production (Post-Deployment)

- After all security checks have passed and deployment is complete
- Security teams job does not stop here:
  - Monitoring and Alerting
  - Runtime Defense (RASP)
  - Red Teaming
  - Bug Bounties
  - External Assessments
  - Web Application Firewalls
  - Vulnerability Management

Enabling DevSecOps Through *Technology*

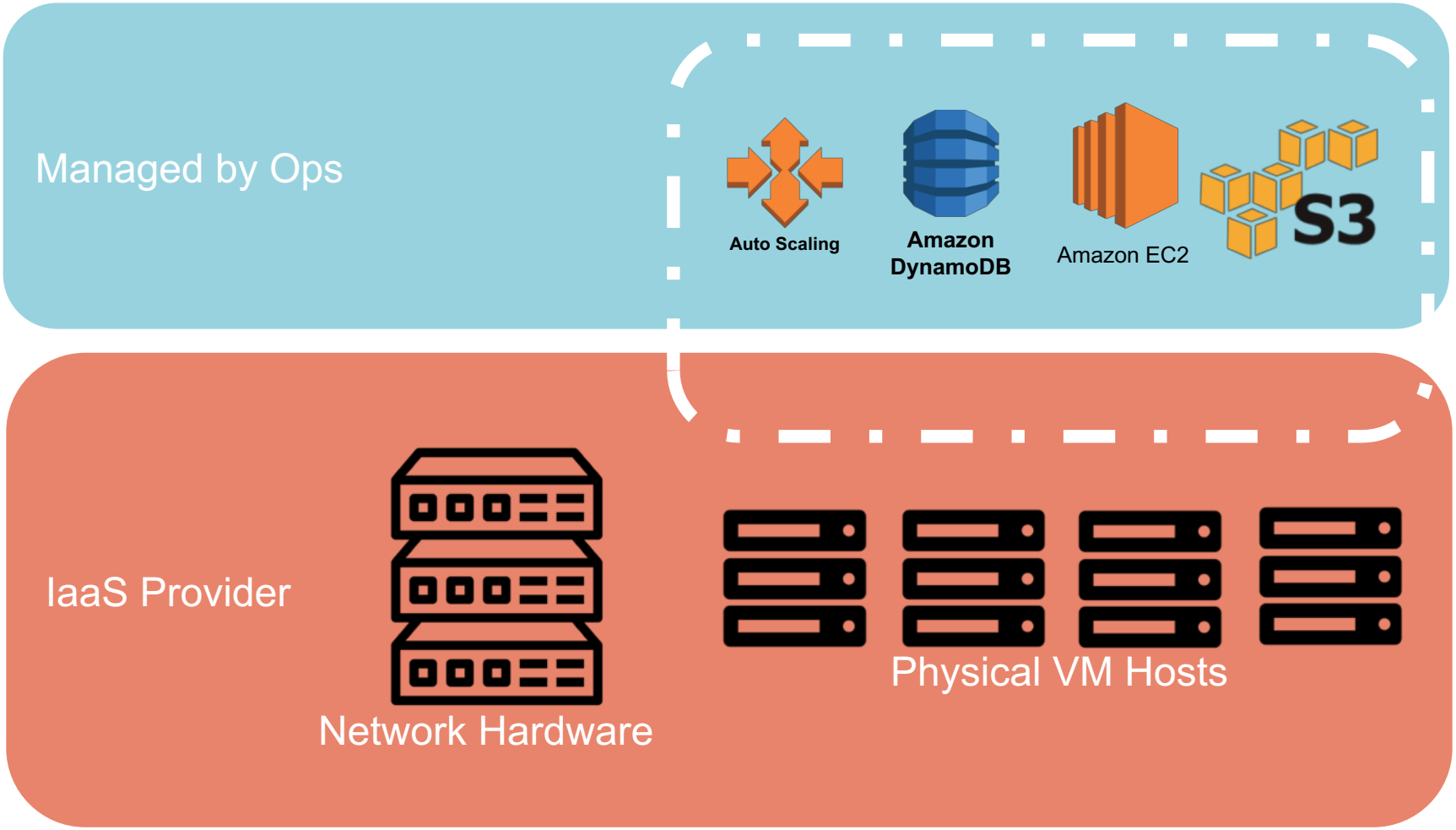
Where are we going?

- Infrastructure as a Service
- Secrets Storage
- Logging and Monitoring
- Containers and Microservices

Infrastructure-as-a-Service (IaaS)

- Delivery of a complete computing foundation
  - Servers (virtualized, physical, or “serverless”)
  - Network
  - Storage
- Infrastructure is exposed to operators using a service
  - Programming network and infrastructure through APIs vs. buying and building physical hardware
- Can be operated by a third-party, hosted in-house (K8s), or a hybrid model

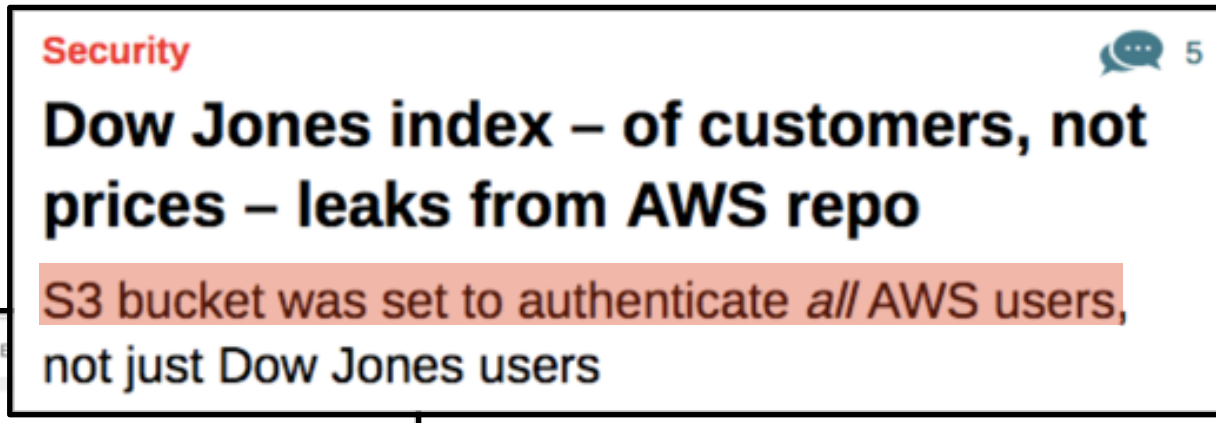
Infrastructure-as-a-Service

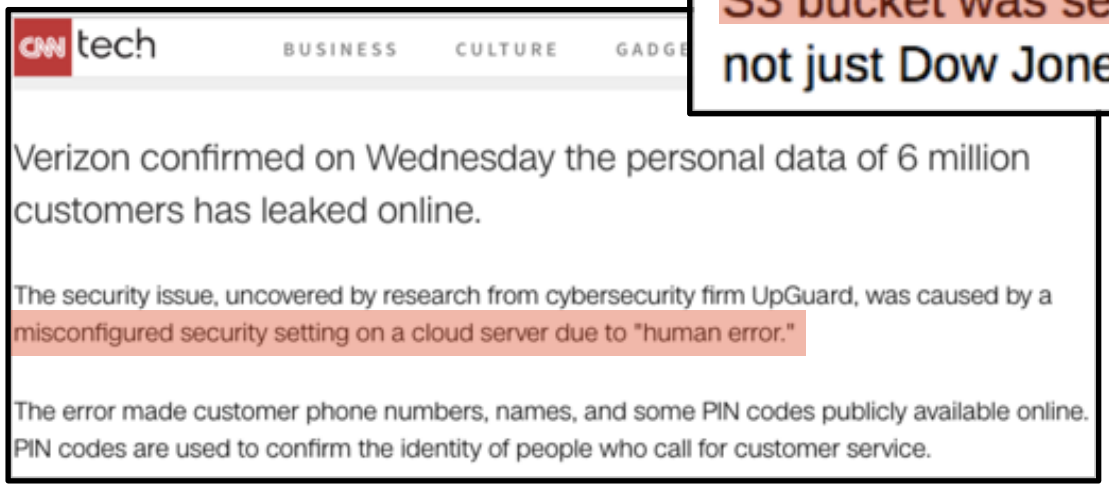


IaaS Security Considerations

- "The Cloud" doesn't *do* security for you – this is your responsibility
- Network and Data Security
- Auditing Capabilities
- Compliance Requirements
  - SOC, PCI, HIPAA, etc.
- Encryption Capabilities
- Third-Party Certificates and Audits
- Secrets Storage, Built-in Security Features, etc.

The Cloud Won't Protect You





Distributing Secrets

- Software systems often need access to a shared credential to operate:
  - Database password
  - Third-Party API key
  - Microservices
- Secret management is full of opinions and could be a course itself
- Many options exist – Choose your own adventure!

Commandments of Sane Secret Management

- Secrets should not be written to disk in cleartext
- Secrets should not be transmitted in cleartext
- Access to secrets should be recorded
- Operator access to secrets should be limited
- Access control to secrets should be granular
- Secrets distribution infrastructure should be mutually authenticated
- Secrets should be version-controlled

HashiCorp's Vault

```
➜ devsecops vault server -dev
==> Vault server configuration:

                 Cgo: disabled
      Cluster Address: https://127.0.0.1:8201
           Listener 1: tcp (addr: "127.0.0.1:8200", cluster address: "127.0.0.1:8201", tls: "disabled")
            Log Level: info
                Mlock: supported: false, enabled: false
     Redirect Address: http://127.0.0.1:8200
              Storage: inmem
              Version: Vault v0.7.3
          Version Sha: 0b20ae0b9b7a748d607082b1add3663a28e31b68
```

Which is the most secure way to pass secrets to an app running in a container?

1. Pass secrets as an environment variable
2. Mount volume in container that has secrets in a file
3. Build the secrets into the container image
4. Query a ”Secrets API” over your network
5. Other