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PRAGMATIC SECURITY AUTOMATION FOR CLOUD

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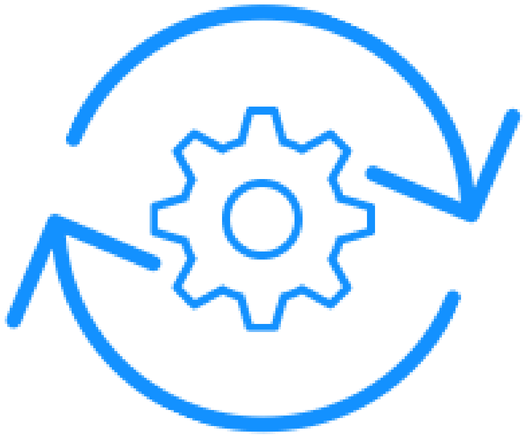
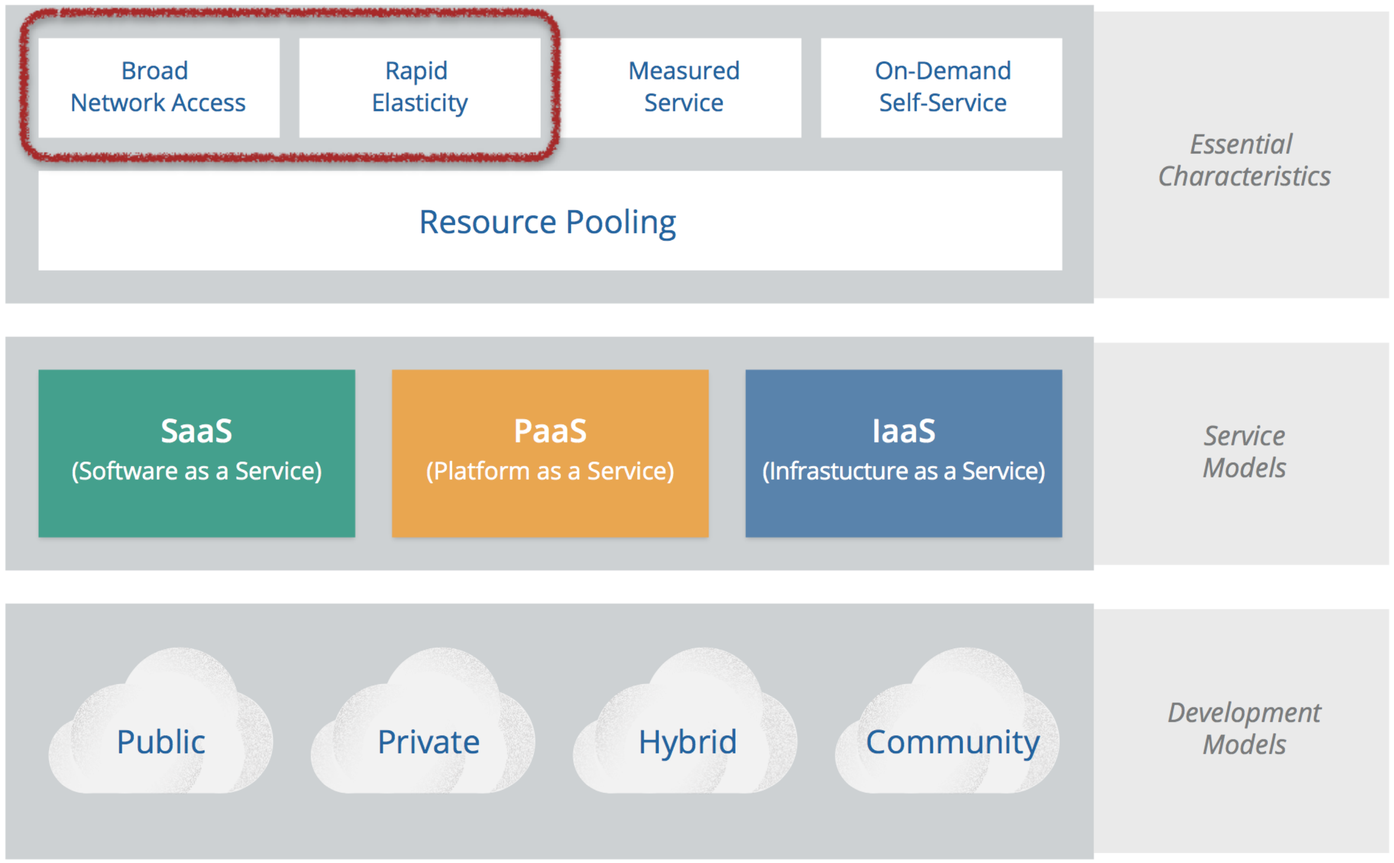
Cloud is Fundamentally Different

Abstraction



Automation

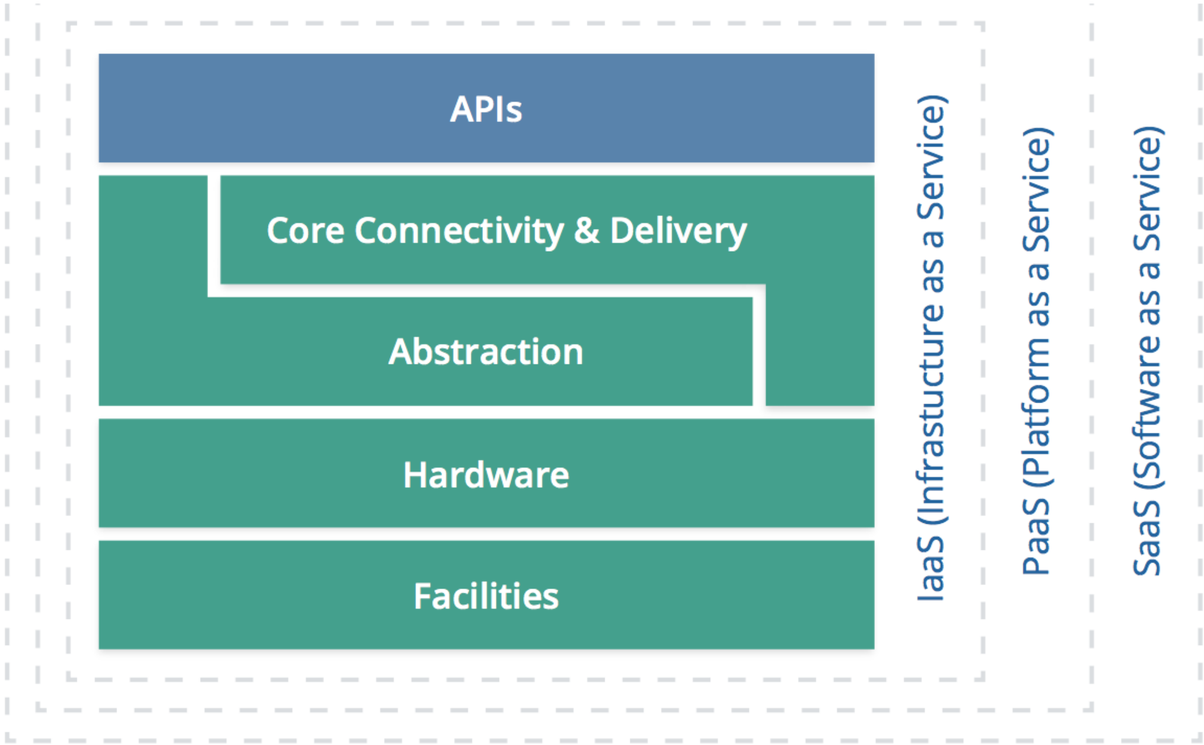
Automation is Inherent



The NIST Model (courtesy the CSA)

APIs are Ubiquitous

Cloud Security Alliance IaaS Reference Model

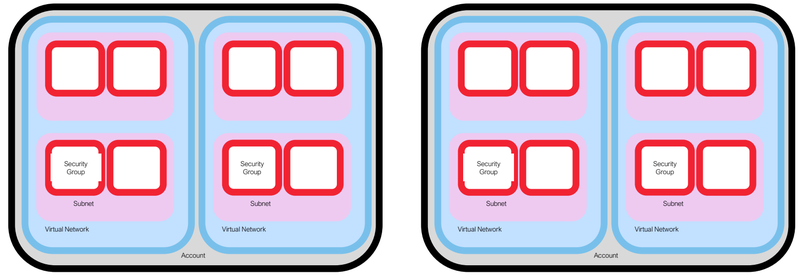


Cloud Security Must Be Cloud Native

Management Plane

Volatility/Velocity

Distribution/Segregation

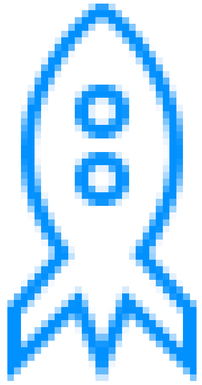


The Categories

Guardrails

Continuously assess and enforce operational and security policies

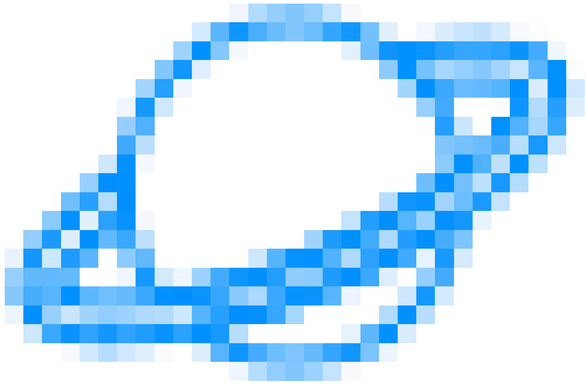
Fix security group or S3 misconfigurations



Workflows

Streamline and accelerate IT operations and security through automated workflows

Incident response

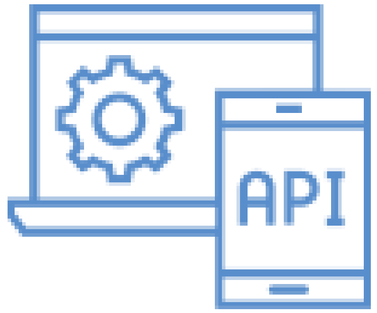


Orchestrations

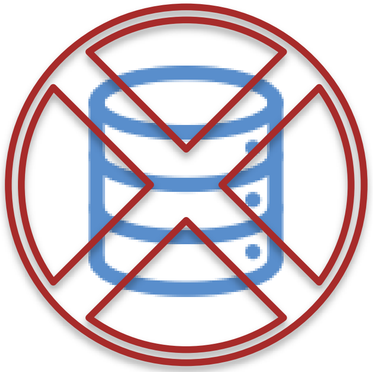
Empower new capabilities through advanced orchestration of infrastructure, operations, and security

Automatic WAF insertion and configuration

The Principles



Software Defined Security



Stateless Security

Event Driven Security

Continuous Feedback Loops

The Foundation

Cloud Service Provider

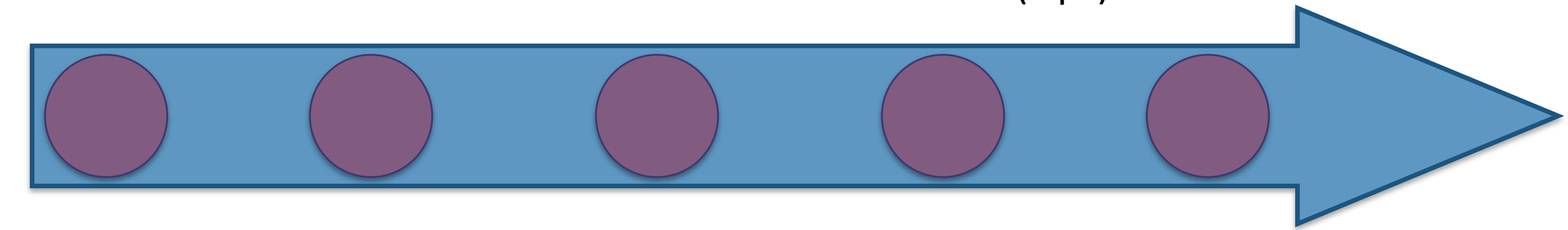
- API and full administrative activity logging
- Events/triggers/rules
- Function as a Service (Serverless)
- Notification service

Critical Capabilities

Cloud Consumer (you)

- Continuous Integration Pipeline
- Version control repository
- Full IAM access to accounts/subscriptions/ projects
- Security development team (person)

The Process

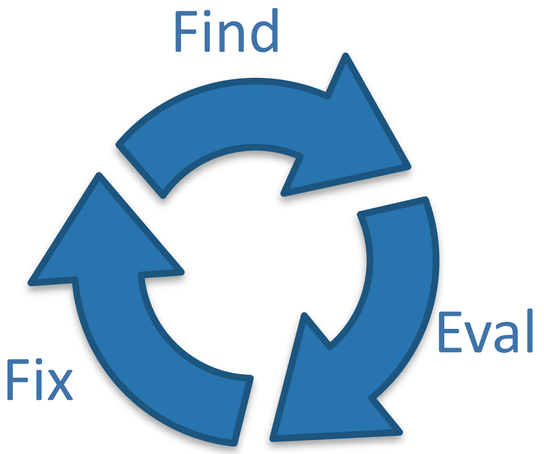

Eval FOSS/Existing tools
Build Initial Automations (Ops)
Define Your Problem
Determine Tech Stack
Expand for Scale/Scope

Things We Are Skipping (for time)

- How to configure all the core monitoring/logging
- Setting up IAM and permissions
- The details of implementation on Azure and GCP
  - We will list the core capabilities, but can't cover all 3 with real examples in 45 minutes

What's a Guardrail?

- Define and set limits
  - Can be "allow" or "deny"
- Find deviations
  - Assessment or event based
- Evaluate the issue
- Fix/remediate
  - Automatically or manually depending on rules



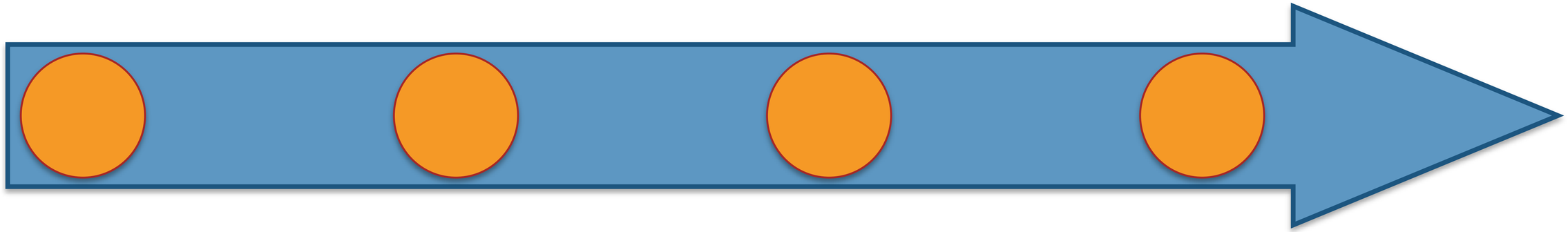
Example Guardrails

- If you find a public S3 bucket, restrict it to our known network addresses
  - Unless it is approved or tagged
- Don't allow internal security groups with all ports and protocols open in Prod
  - But allow in Dev
- Require MFA for API access for any user that needs MFA for console access
- Create our baseline IAM policies and roles for all new accounts
  - Based on the environment
- Validate that monitoring and alerting is properly configured
  - And fix if not
- Disable access keys that haven't been used in 90 days
- Find instances with an IAM role that allows power user or greater access via API
  - Restrict the privileges
- Identify all cross-network peering from accounts we don't own
  - Then check the security group permissions

What Makes a *Good* Guardrail?

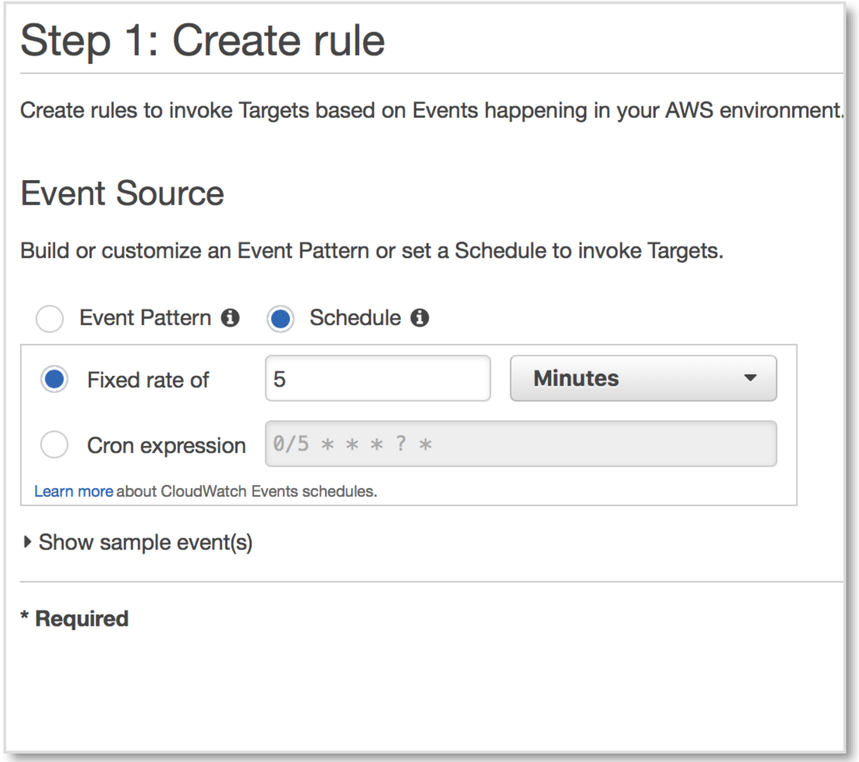
- Accounts for different environments
  - At least Dev vs. Prod
- Handles exceptions
  - And is capable of remembering them
- Understands state and context
- Doesn't bog down the alert queue
- Can remediate automatically
  - Either completely, or after manual approval
- Ops communications/notifications
- Education, not Blamification

Building a Guardrail



Our Guardrail

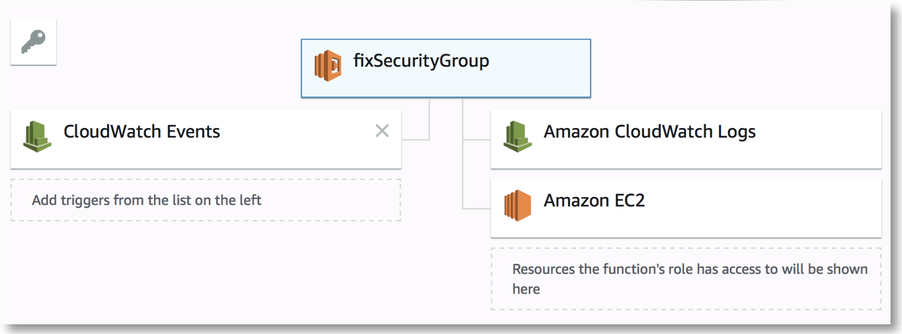
- Criteria/Issues
  - All instances with port 22 open to the 0.0.0.0/0 (the Internet)
- Filters
  - Region is us-west-2p (could be VPC/tag/etc)
- Trigger
  - Time = every 5 minutes
- Action
  - Restrict to known IP range

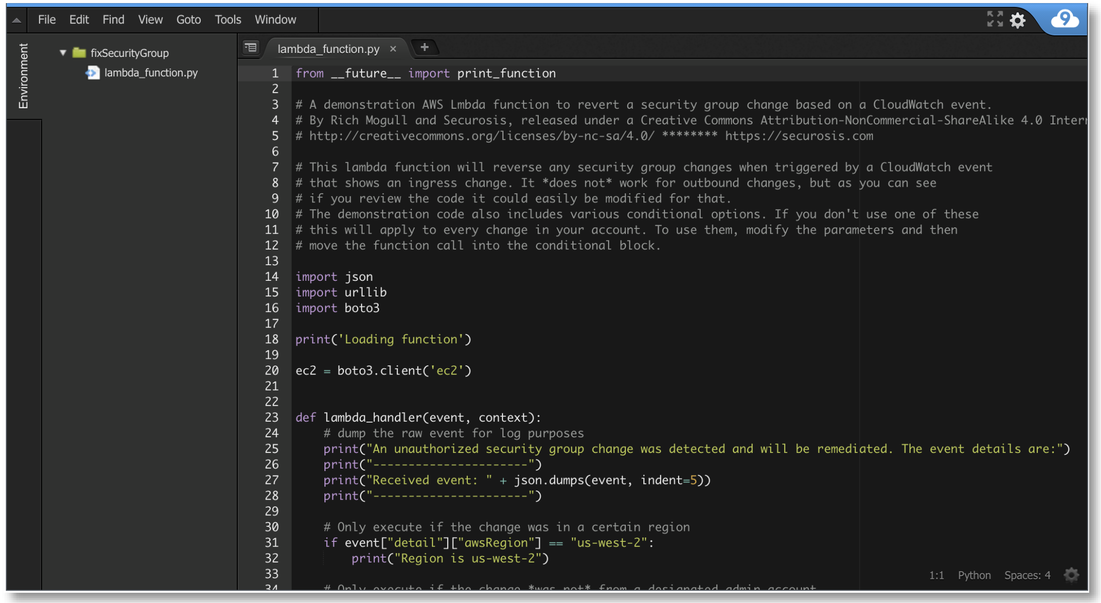


Demo

Our Event-Driven Guardrail

- Criteria/Issues
  - New inbound security group rule added
- Filters
  - IAM user, VPC, Tag
- Trigger
  - API event (CloudTrail)
- Action
  - Reverse + Notify

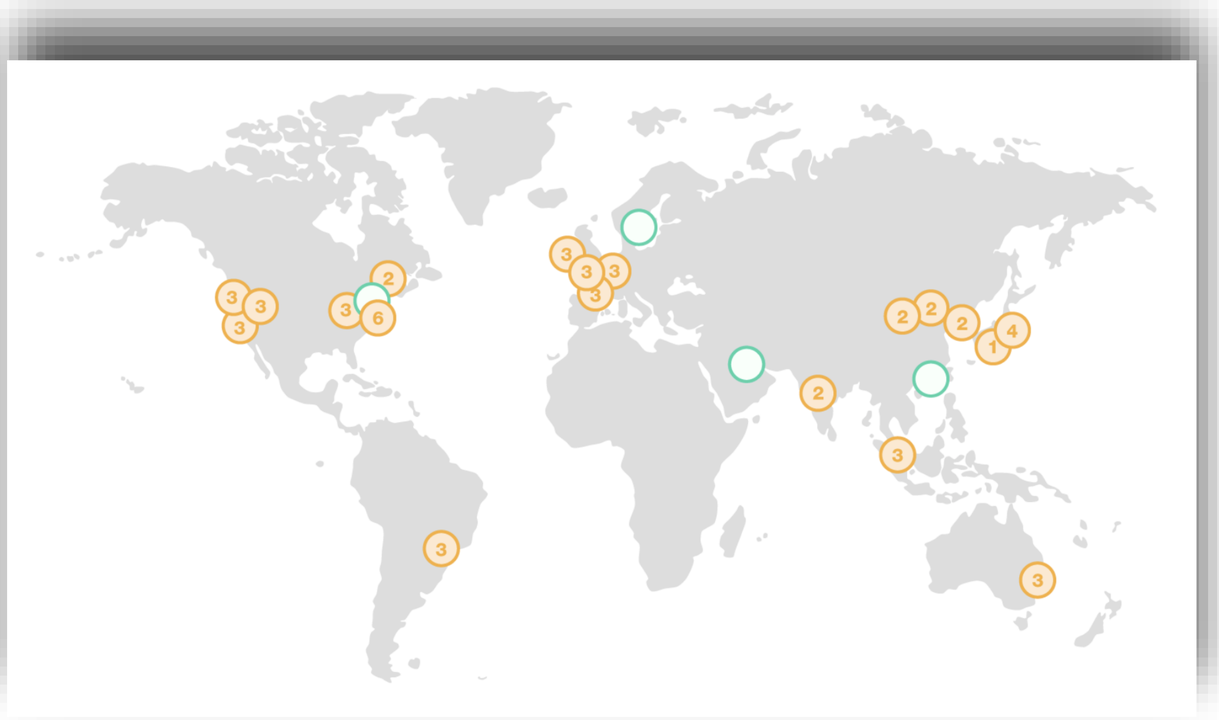




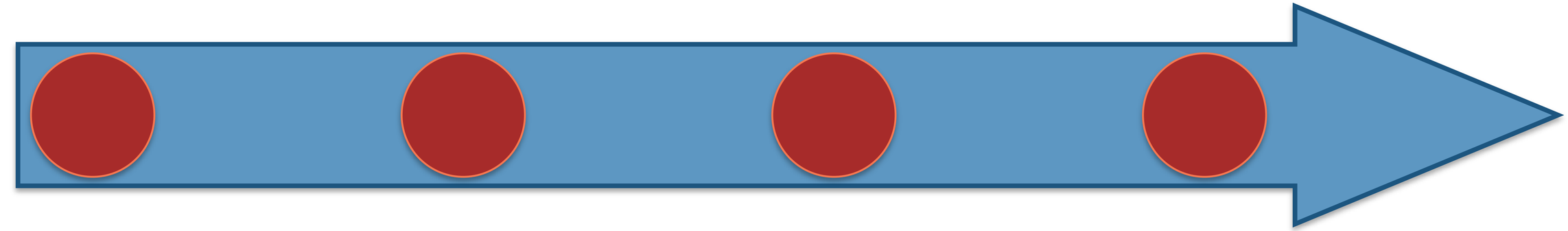
Demo

Expanding to Enterprise Scale

- Hitting all 14 regions simultaneously
- Multiplex
- Central event stream
- Queues/SNS
- AuthN/AuthZ



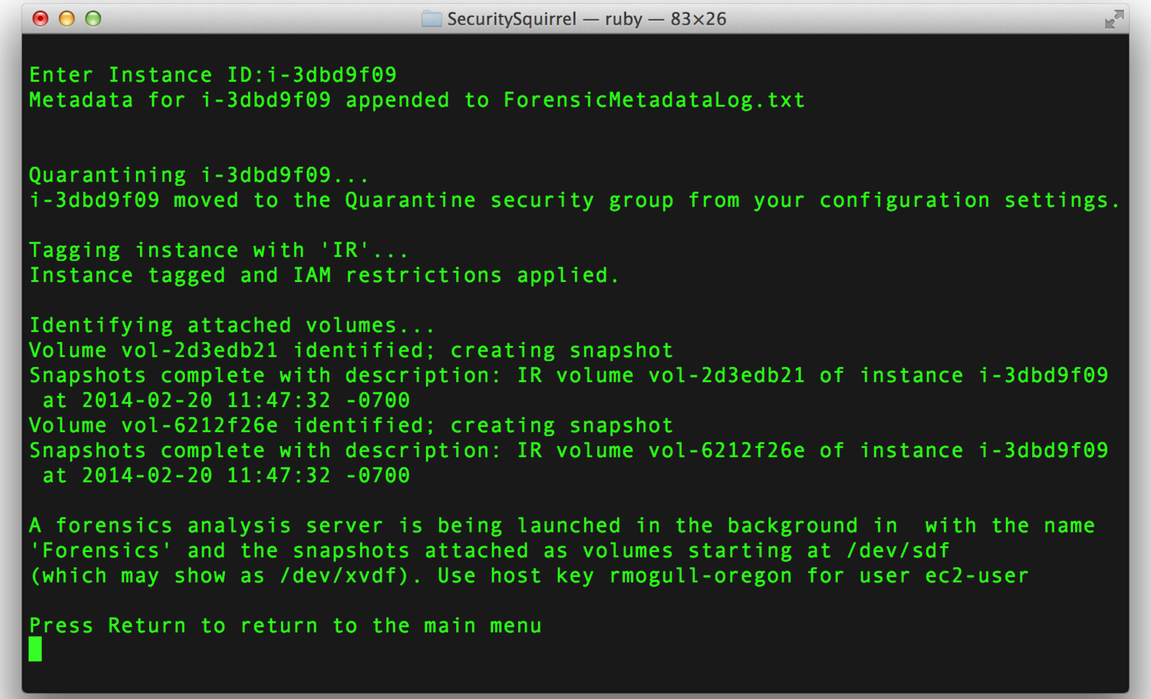
Building a Workflow



Can be built on Guardrails and support Orchestrations

Our Workflow

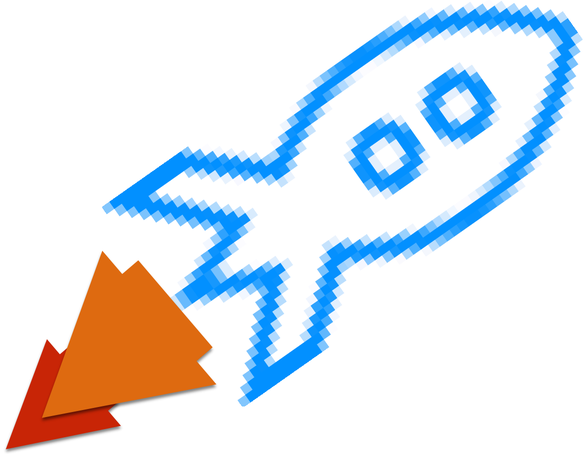
- Steps (Incident Response)
  - Collect metadata (before we change it)
  - Quarantine on the network and in AWS
  - Snapshot all storage and attach for forensics
  - Analyze
- Inputs
  - Instance ID
- Execution Model
  - Command line (container or remote)
- Modularize Code
  - Classes for analyze vs. respond
  - All methods reusable



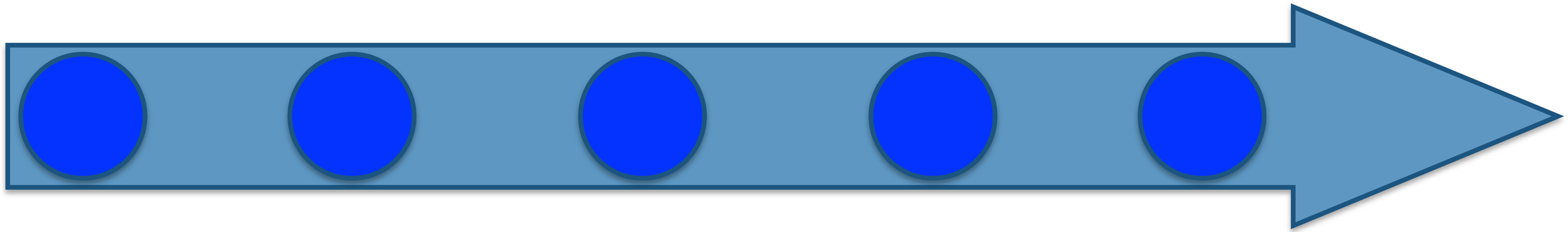
Demo

Workflows Advice

- Workflows are to speed up common, manual tasks
  - Guardrails are for automated enforcement
  - The line between a guardrail action and an Workflows is often thin
- Execution environment matters
  - Lambda vs. containers vs. your laptop
- Use your pipeline
  - Continuous integration servers (Jenkins) make great platforms for repeat automation, not just security testing
- Make a static console
  - E.g. S3 + API Gateway + SQS

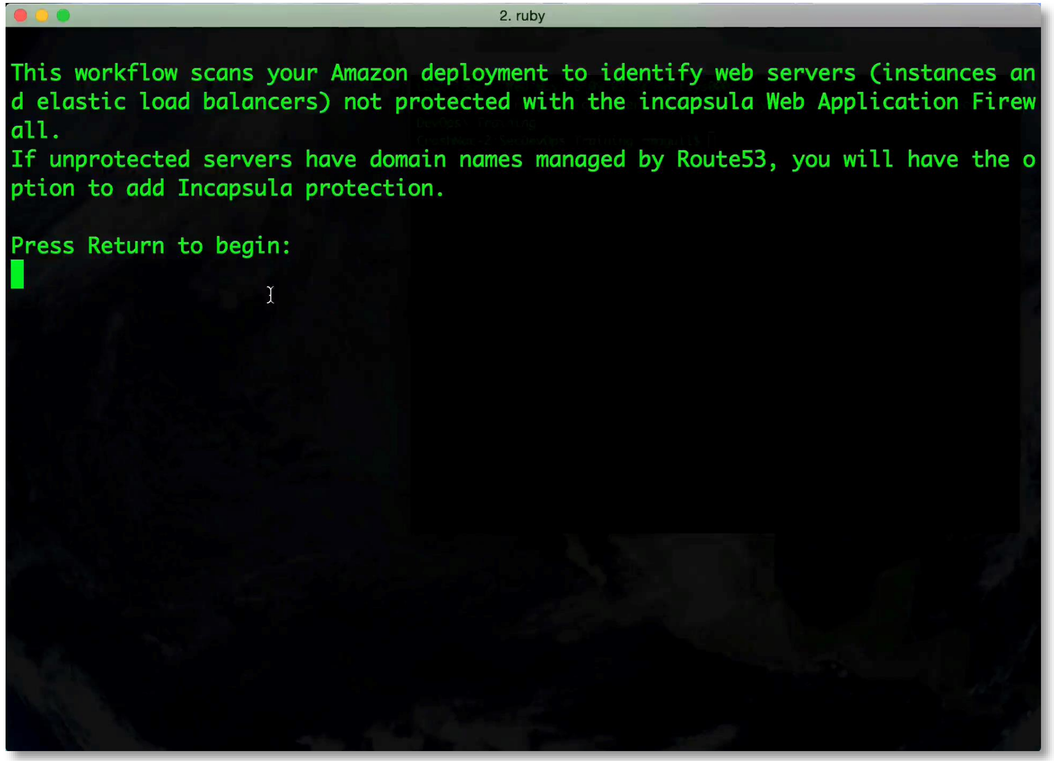


Building a Orchestration



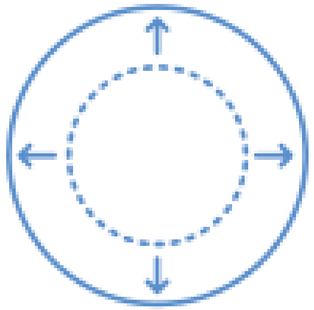
Our Orchestration

- Apps/API
  - EC2 + Route 53 + Incapsula
- SDK
  - AWS Ruby + REST client
- Flow/Value
  - ID public web servers -> determine DNS -> check WAF -> add WAF
  - Limit: default AWS domain names
- Modularize
  - Find web instances, ELBs
  - Change DNS, add Incapsula
- Integrate into code
  - See video

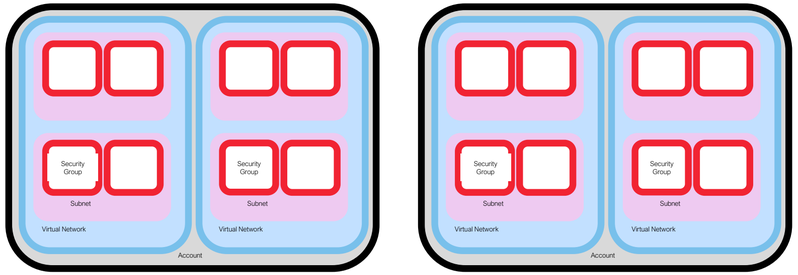


Demo

Complexities



Scaling

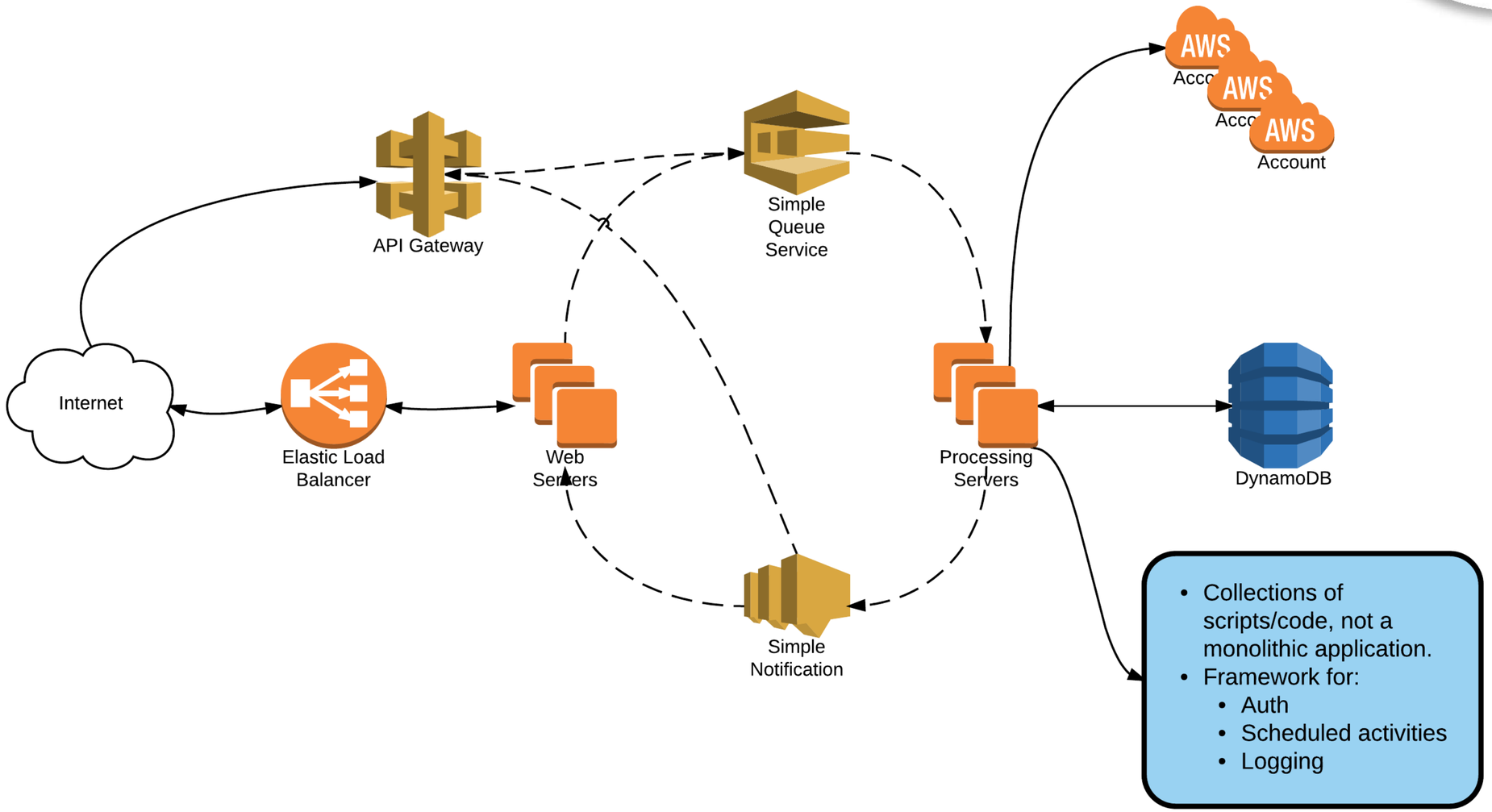


Multiple Accounts

Multiple Providers

Circuit Breakers

Architecting For Enterprise Scale



Where to Start

- Start with something simple
  - Build it in one account/subscription/project
  - Event + Notification is super easy to start
  - Then go with your first FaaS
  - Desktop first, then FaaS for execution environment
- Build a library
  - Experiment with execution environments, but standardize quickly
- Add enterprise scaling capabilities
  - Will depend on your execution environment/model
  - Build it in the cloud and leverage PaaS options
- Make sure you use CI/CD for long term management

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