DevSecOps:
Getting There From Here

Dave Shackleford

SANS and Voodoo Security

Meet Kyle

- Kyle works in information security
- Like MOST infosec professionals, Kyle is:
  - Witty
  - Handsome
  - Brilliant

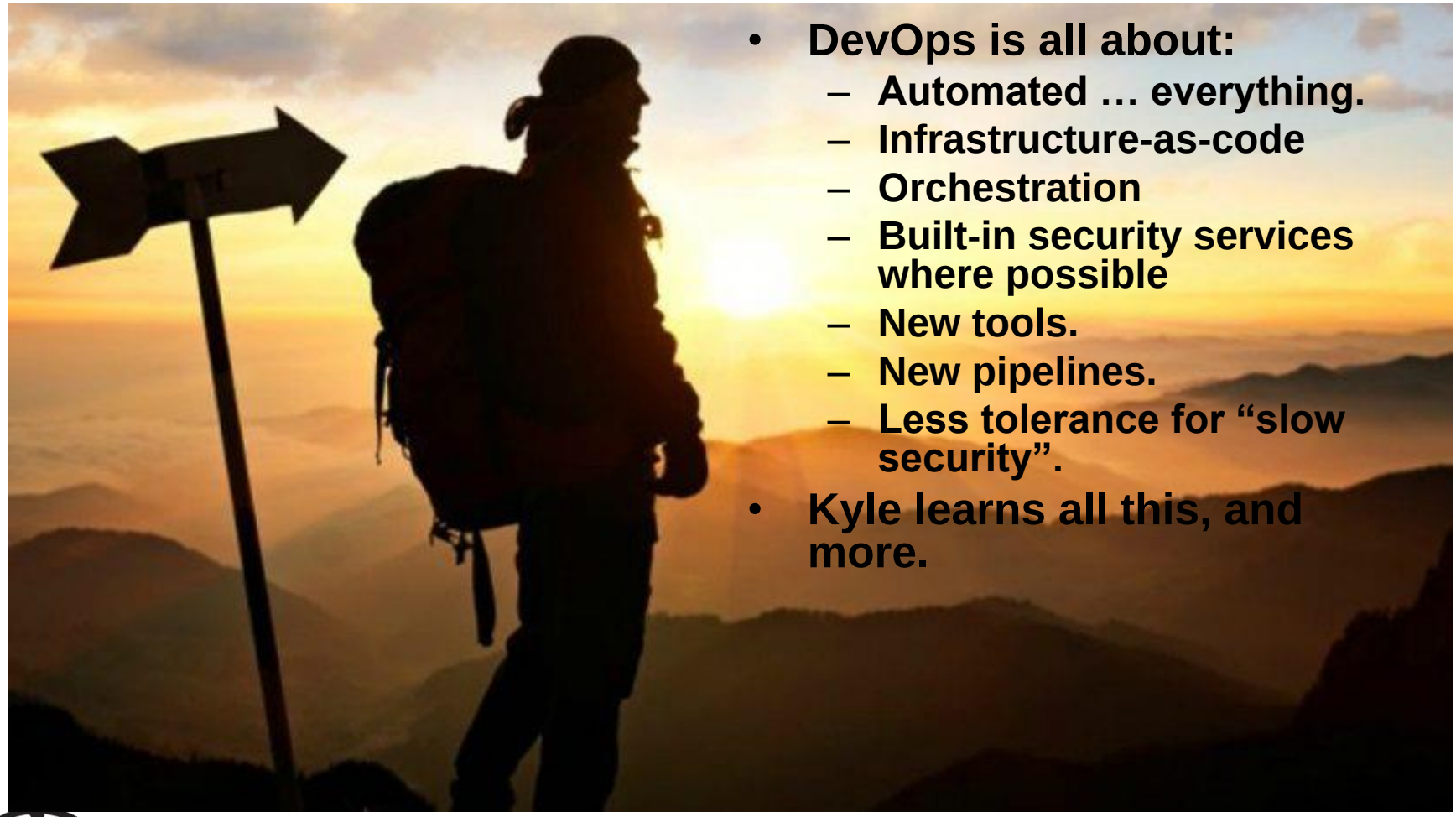
However…

- Kyle has a PROBLEM.
- Kyle's organization is moving to CLOUD.
- Kyle has to figure out CLOUD SECURITY.

Dev and Ops and DevOps

- KyleCo has a Dev team.
- KyleCo has an Ops team.
- The CIO is a fan of this new concept called “DevOps”.
- Kyle has no idea what he’s talking about.
- But Kyle can learn.

Kyle's Journey



- DevOps is all about:
  - Automated … everything.
  - Infrastructure-as-code
  - Orchestration
  - Built-in security services where possible
  - New tools.
  - New pipelines.
  - Less tolerance for "slow security".
- Kyle learns all this, and more.

So…the problem?

- Kyle learns a few hard truths QUICKLY
  - DevOps works differently
  - DevOps works faster in many ways
  - DevOps expects everything to be integrated
- There's also a problem with POLITICS
  - The CIO wants to embrace DevOps
  - Politically, DevOps > Infosec
  - Poor infosec.

So Kyle Has to Change His Mojo

- In infosec, we've got some big changes to make
- First, we've got to build a new governance model in IT and development
- Second, we may need some new skills!
- Finally, we'll need to understand "security as code" much better

STEP 1: GOVERNANCE

Governance Models

- There are sophisticated governance models out there, but here's the basics:
  - Monarchy Model (Top Execs, Top-Down)
  - Business Unit Execs / Divisional Model
  - Collaborative / Group Decision Model
- How does cloud and DevOps change these?

What's Involved in Governance?

- There are many aspects of governance to consider
  - Security policy
  - Procurement and risk assessment practices
  - Change management
- There are many more, but these are the big ones for cloud and DevOps

Security Policy for DevOps

- Do you need a specific policy for DevOps alone?
  - Not likely.
- What goes into a policy?
  - Acceptable cloud deployment models/practices
  - Data types that can/cannot go to the cloud
  - Key/credential/data protection requirements
  - Compliance requirements

Procurement / Risk Assessment

- DevOps and Risk Assessment?
  - Nah, not really
- HOWEVER:
  - Vendor mgmt. and procurement should consider DevOps requirements
  - This can include:
    - APIs
    - Logging/monitoring
    - Support for specific tools/automation models

Changes for Change Control

- Traditional change control really falls apart in a DevOps model
- Security professionals will need to work with DevOps teams to determine:
  - Which changes need traditional tracking
  - Which changes can be “log and review”
  - Review cycles and review board groups

STEP 2: SKILLS

Security Pros Need New Skills

- In its 2016 “State of Cloud Security” report, the Cloud Security Alliance (CSA) acknowledged a significant skills gap in cloud security
- DevOps integration may require some new skills focus:
  - Coding
  - Orchestration/automation
  - Web services
  - Virtualization/containers

Skills: Coding

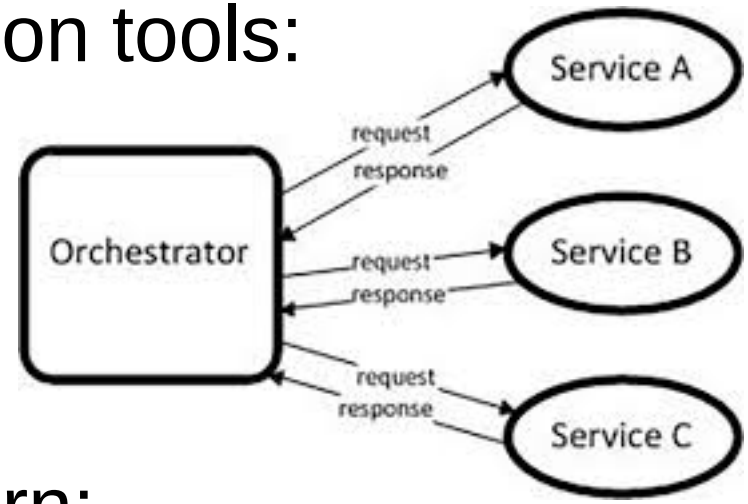
- Security pros don’t need to be full-fledged developers
- Some code skills may be helpful, though:
  - Python
  - Ruby
  - Shell scripting
- Being comfortable with formats like YAML and JSON is also important

Skills: Virtualization/Containers

- Most DevOps environments and cloud deployments rely on VMs and containers
- Security teams need to understand how to secure VMs and container technologies
- Key concepts include:
  - Hypervisor lockdown
  - Virtual and software-defined networking
  - Container lockdown and scanning

Skills: Automation and Orchestration

- DevOps teams make extensive use of automation and orchestration tools:
  - Ansible
  - Chef/Puppet/Salt
  - Jenkins
  - Kubernetes/Docker Swarm
- Security teams need to learn:
  - Secrets management
  - Hardening these systems
  - Privilege control



Skills: Web Services/Microservices

- Many security teams are not familiar with microservices
- Microservices are “decoupled” application architectures, often found in DevOps and cloud deployment scenarios
- What’s often included?
  - Containers (sometimes virtual machines)
  - APIs (often RESTful and lightweight)
  - Scalable Cloud Infrastructure (software-defined environments)

STEP 3: SECURITY AS CODE

Security as Code?

- With DevOps and “Infrastructure as Code”, we define everything in a software-defined method:
  - Servers (usually VMs)
  - Containers
  - Application stacks
  - Networks
  - Roles/Privileges/Access models
- Security needs to be defined in this way, as well

Deployment Pipeline Security

- Security teams should focus on:
  - Code security
  - Code repositories' security
  - Automation tools
  - Orchestration platforms
  - Gateways and network connectivity
- Authentication/Authorization and privileged user monitoring and management are critical

Development/Deployment Integration

- We need to integrate into deployment pipelines
- Continuous Integration vs. Continuous Deployment
- Early: Static and Dynamic code analysis
- Early: Defined libraries and configs
- Later: Monitoring and Control in instances

Security as Code: Define Policies

- Define policies for components, networks, and more
- This might include:
  - Configurations (Puppet, Chef)
  - App deployment and automation (Ansible, Jenkins)
  - Additional orchestration and automation tools
- Cloud providers may offer tools, too (CloudFormation in AWS, for example)

Security as Code: Define security “stories”

- These will be specific use cases and requirements:
  - Input validation for app X
  - Use of TLS for all communications
  - Hardening to CIS Benchmark standards
- These are then implemented IN code and vetted, or via policy files and language

Security as Code: Internal Build and Deployment Security

- For the internal side of Security as Code, imagine the following:
  - Automated code scans upon check-in
  - Automated app scanning in test/staging
  - Automated Server, Container, and Network configuration checks via policy
  - Continuous monitoring of all core components in the Deployment Pipeline

Security as Code: Test policies regularly

- Using build testing tools like Test Kitchen and Vagrant can simplify internal policy validation
- Coordinate penetration tests and routine checks to validate policies' effectiveness
  - Are only required ports open?
  - Are credentials secured?
  - Are encryption keys secured?
  - Are privileges assigned properly?

Security as Code: Automate Production Feedback Loops

- Proper DevSecOps needs continuous monitoring
- You need detection and response playbooks, too:
  - Scheduled checks of X generates alert/log
  - Alert triggers automated process Y
- All of this needs to be automated
  - Some critical tasks may require a human sign-off

Wrapping Up

- So – how do we get to DevSecOps?
- First, adjust your governance model
- Second, invest in new skills
- Third, embrace “security as code” to integrate into dev and deployment pipelines
- DevOps teams need security integrated into **their** processes – it’s our job to get this done!