Cloud First Application, Infrastructure, & Migration

Cloud Lift & Shift and Infrastructure Activities
September 12, 2017

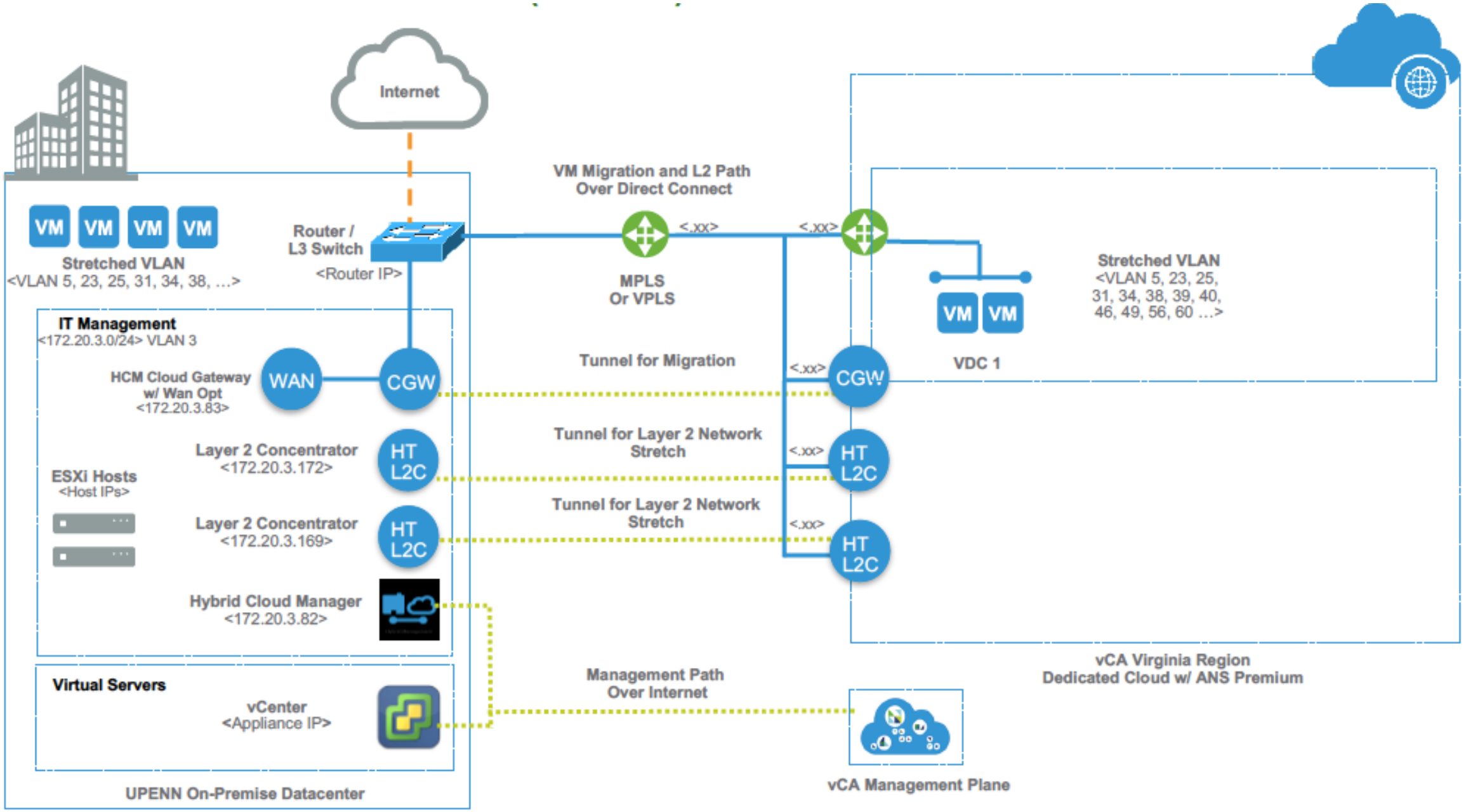
ISC's Cloud First Program

Two path approach for infrastructure

- Lift & Shift
- Cloud Native

Lift & Shift – where we were:

- Goal was to move all Test/Dev VMs from on premise to vCloud Air
- Migration process was established for a smoother relocation
- So far we have moved a little over 200 VMs
- vCloud Air was just a datacenter Layer 2 extension requiring no IP address changes for the VMs
- Allowed for VMs to go back and forth as needed


Internet
VM
VM
VM
VM
Stretched VLAN
<VLAN 5, 23, 25, 31, 34, 38, …>
Router /
L3 Switch
<Router IP>
VM Migration and L2 Path
Over Direct Connect
<.xx>
<.xx>
MPLS
Or VPLS
Stretched VLAN
<VLAN 5, 23, 25,
31, 34, 38, 39, 40,
46, 49, 56, 60 …>
VM
VM
VDC 1
IT Management
<172.20.3.0/24> VLAN 3
HCM Cloud Gateway
w/ Wan Opt
<172.20.3.83>
WAN
CGW
Tunnel for Migration
<.xx>
CGW
Layer 2 Concentrator
<172.20.3.172>
HT
L2C
Tunnel for Layer 2 Network
Stretch
<.xx>
HT
L2C
ESXi Hosts
<Host IPs>
Layer 2 Concentrator
<172.20.3.169>
HT
L2C
Tunnel for Layer 2 Network
Stretch
<.xx>
HT
L2C
Hybrid Cloud Manager
<172.20.3.82>
Virtual Servers
vCenter
<Appliance IP>
Management Path
Over Internet
vCA Virginia Region
Dedicated Cloud w/ ANS Premium
UPENN On-Premise Datacenter
vCA Management Plane

Lift & Shift – Operational challenges:

- There are challenges with any new deployment
- We worked with our clients to troubleshoot issues
- We had to adjust our procedures in some cases

Lessons learned:

- We should automate our guest VM builds and management
- Aggressive schedule for dev/test ok, prod more measured

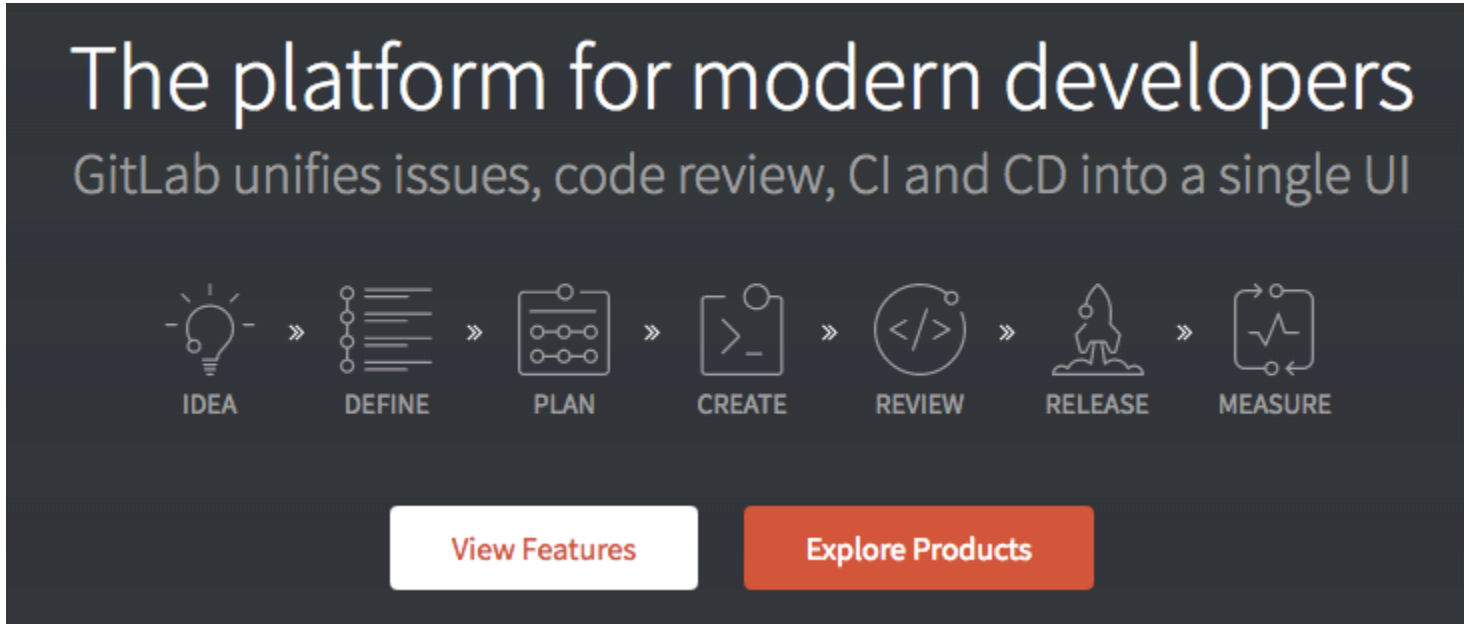
Lift & Shift – Operational challenges:

- Because hosts are indistinguishable from on-prem hosts, using on-prem monitoring
- BPPM/Akips/Spectrum
- Existing virtualization platform mgmt tools - vROps/vCenter
- Adding integrations to existing monitoring/notification tools

Cloud Native Infrastructure Dev Terms:

- Gitlab
- Jenkins
- Cloud Formation
- Continuous Integration
- Continuous Delivery
- Continuous Deploy

Gitlab


The platform for modern developers
GitLab unifies issues, code review, CI and CD into a single UI
IDEA
DEFINE
PLAN
CREATE
REVIEW
RELEASE
MEASURE
View Features
Explore Products

Jenkins

Easy to install

Easy to configure

Extensible

That time we met Mr. Jenkins

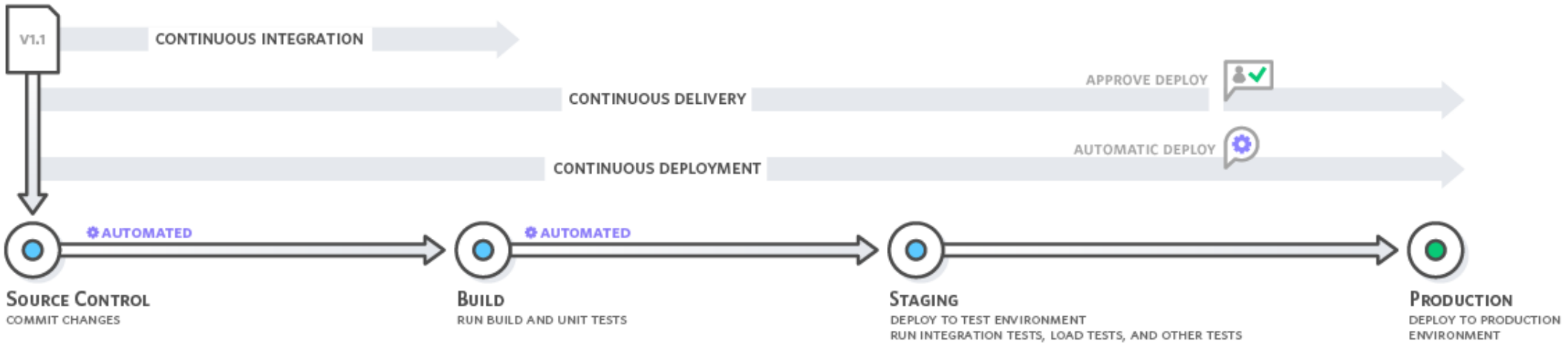
AWS Cloud Formation

Declarative and Flexible

Infrastructure as Code

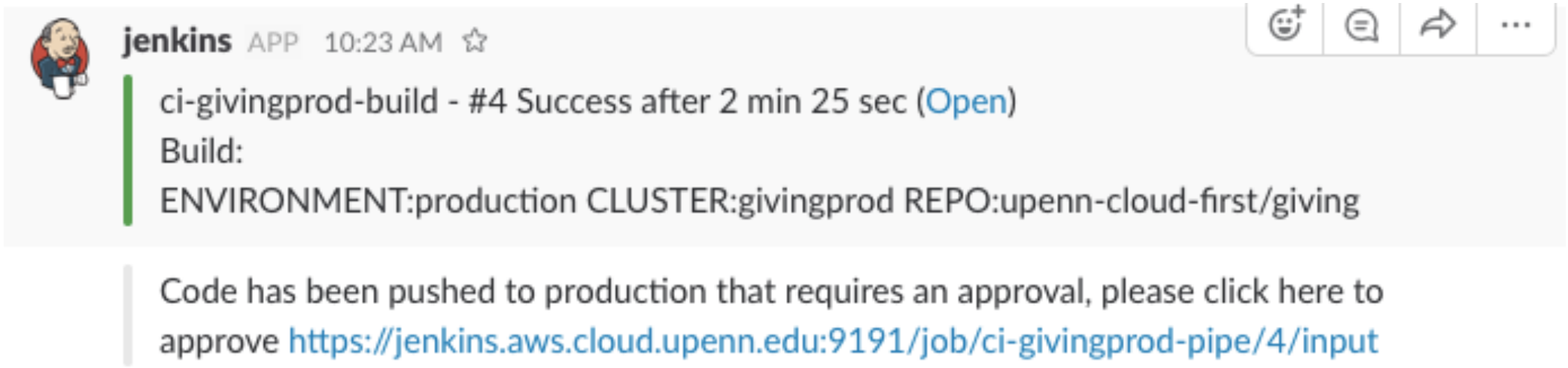
Parameterized

CI - Continuous Integration

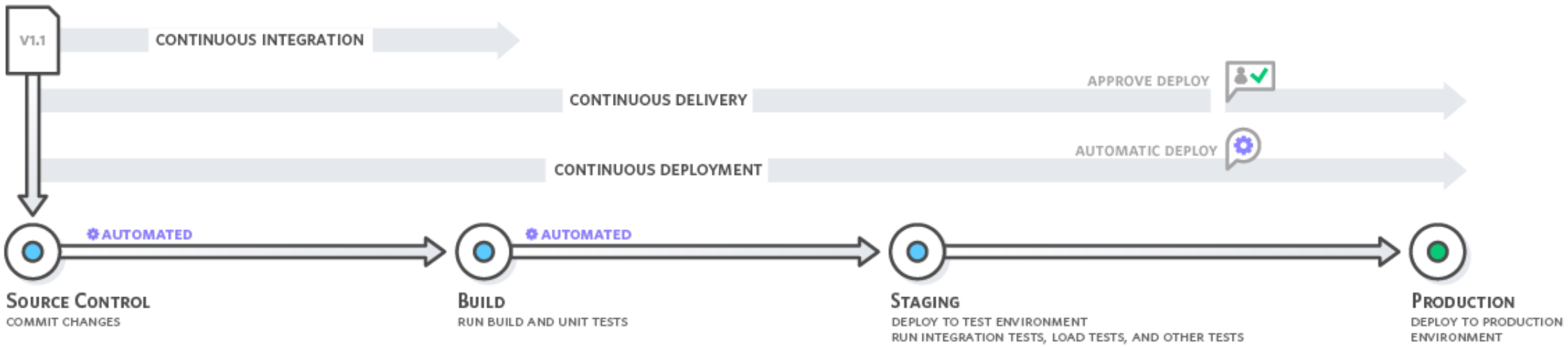


Source: https://aws.amazon.com/devops/continuous-integration/

CD - Continuous Delivery



CD - Continuous Deploy

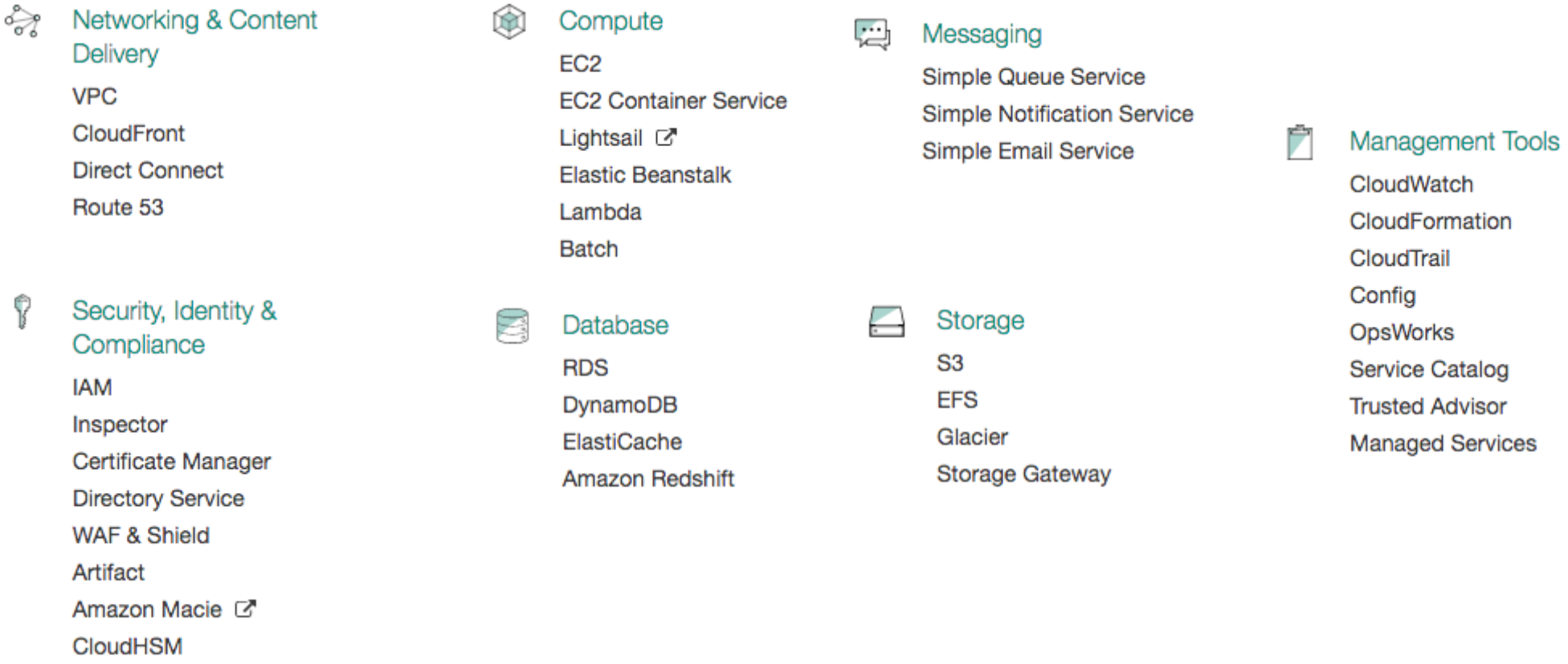


Source: https://aws.amazon.com/devops/continuous-integration/

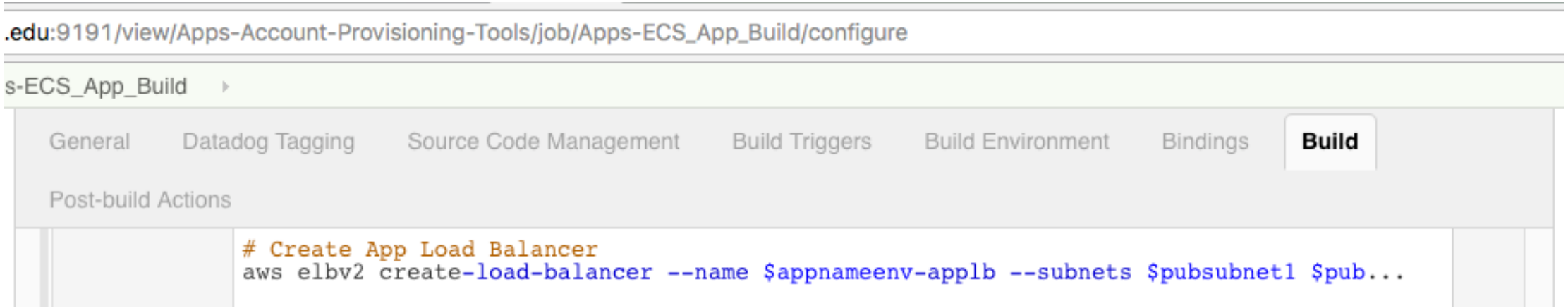
Process Evolution

Crawling

You can't automate something you don't fully and completely understand



Walking


.edu:9191/view/Apps-Account-Provisioning-Tools/job/Apps-ECS_App_Build/configure
s-ECS_App_Build
General
Datadog Tagging
Source Code Management
Build Triggers
Build Environment
Bindings
Build
Post-build Actions
Create App Load Balancer
aws elbv2 create-load-balancer --name $appnameenv-applb --subnets $pubsubnet1 $pub...

Running

upenn-cloud-first / cloudformation

```
  Service:
    Type: 'AWS::ECS::Service'
    DependsOn:
      - ListenerRule
      - ServiceRole
    Properties:
      Cluster: !Ref Cluster
      Role: !Ref ServiceRole
      DesiredCount: !Ref DesiredCount
      TaskDefinition: !Ref TaskDefinition
      PlacementStrategies:
        - Type: spread
          Field: 'attribute:ecs.availability-zone'
        - Type: spread
          Field: instanceId
      LoadBalancers:
        - ContainerName: !Sub '${AWS::StackName}-container'
          ContainerPort: 443
          TargetGroupArn: !Ref TargetGroup
```

Evolve

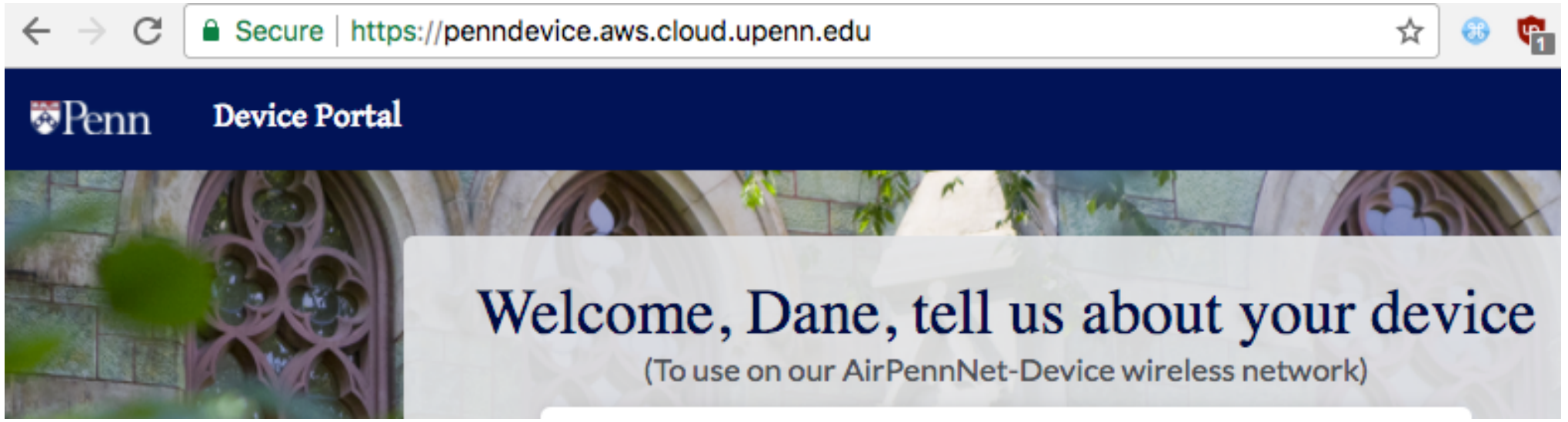
6 Completed	1 Timeouts

Started: 18:34 UTC 22 Aug 2017

Session	OS	Browser / Device	Duration
4c1152c2e2e74327a2cfab7df7c8cc0e8f685b56	Win 7	Firefox 55.0	11s
57903e6c312dca2cc325db0aeacd6184bb82dbdc	Win 7	Firefox 55.0	13s
b1d0c009cd003ad2e4eae97b2610edd1e10bd260	Win 7	Firefox 55.0	36s
d3a18679e80690534faa8bff3c3a63e2e4034b6a	Win 7	Firefox 55.0	10s
ac9ccb75ba33dba68791f257547a9a9c9412aa4a	Win 7	Firefox 55.0	21s
4884f9d502db2510051d250bc6727d0fbab18499	Win 7	Firefox 55.0	1m 55s
0aa333b3249f5f9d5533dd1c33a7d4d2da167fe3	Win 7	Firefox 55.0	23s

App Update: Developer perspective

```
penndevice danefett$ git push origin production
```

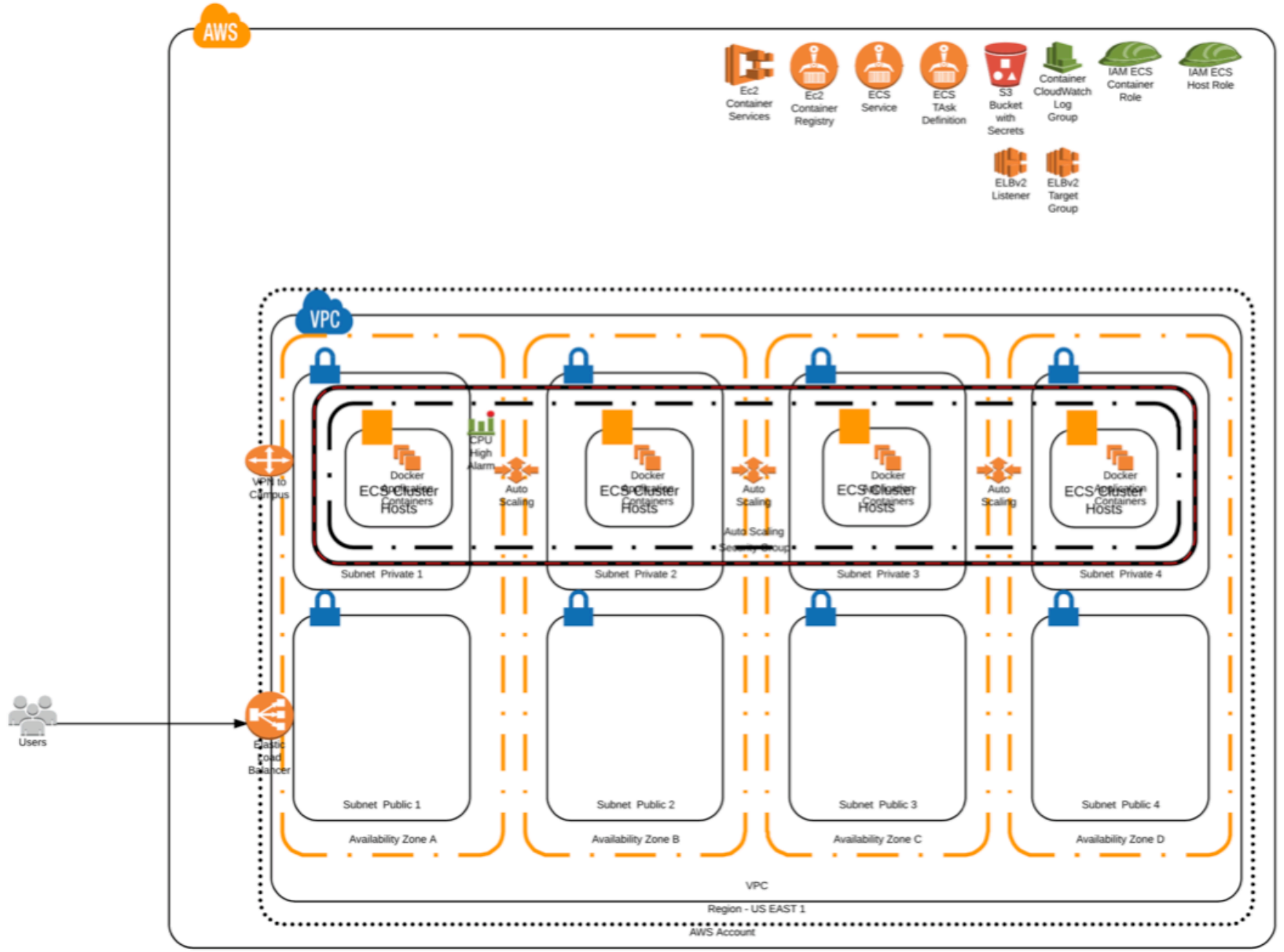


Behind the Scenes

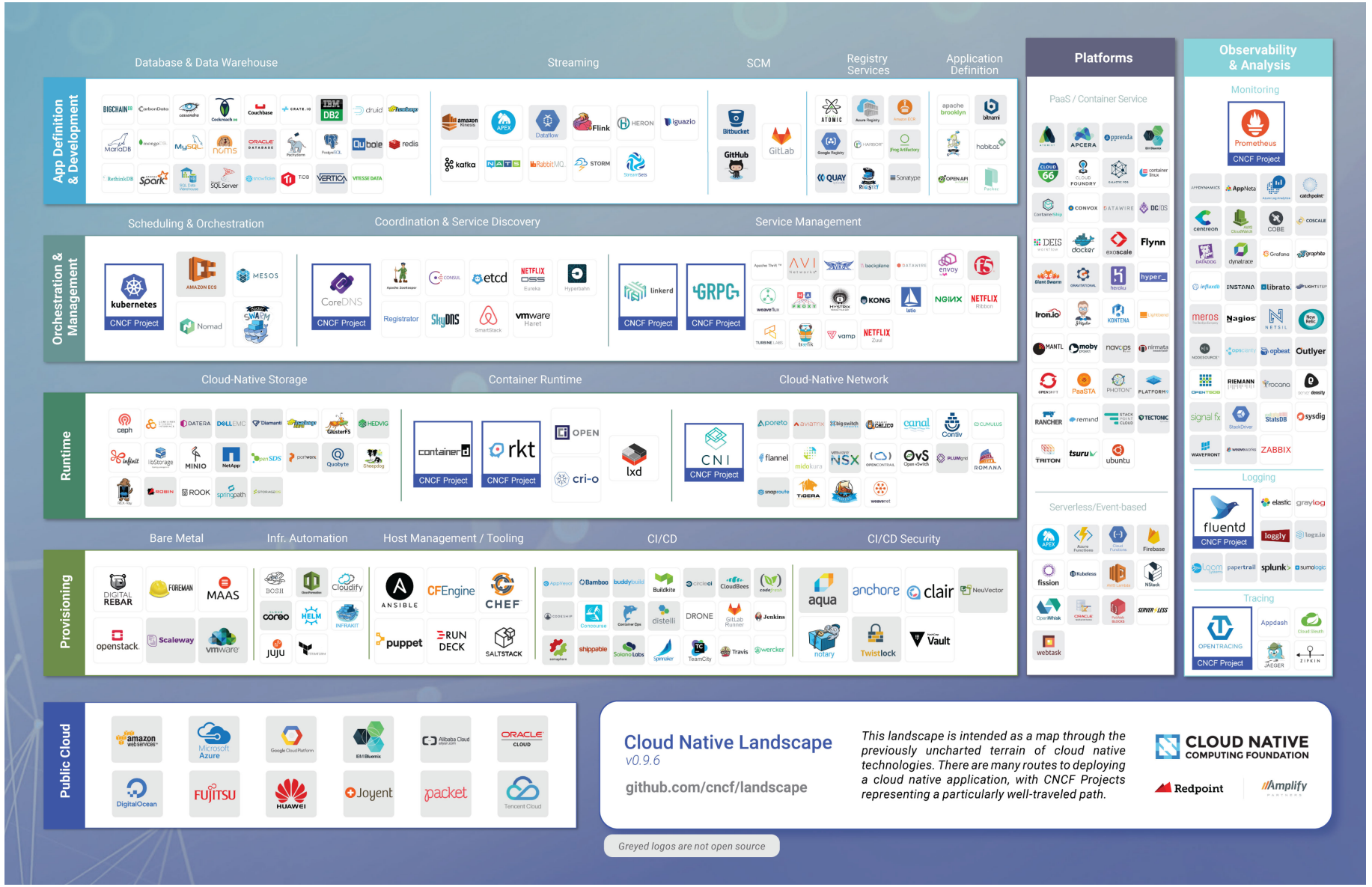
Our Cloud Formation stacks contain some of the following resources:

- Docker ECR Image Repository
- AutoScaling Role
- Utilization Alarms
- Log Groups
- ELB Listener
- Load Balancer
- Load Balancer Security Group
- Scaling Policy
- Service
- Service Role
- Task Definition
- Task Role

Under the Hood – Supporting Infrastructure



Big Deal?!?


Database & Data Warehouse
Streaming
SCM
Registry Services
Application Definition
App Definition & Development
Scheduling & Orchestration
Coordination & Service Discovery
Service Management
Orchestration & Management
kubernetes
CNCF Project
CoreDNS
CNCF Project
linkerd
CNCF Project
GRPC
CNCF Project
Cloud-Native Storage
Container Runtime
Cloud-Native Network
Runtime
container
CNCF Project
rkt
CNCF Project
CNI
CNCF Project
Bare Metal
Infr. Automation
Host Management / Tooling
CI/CD
CI/CD Security
Provisioning
Public Cloud
Platforms
PaaS / Container Service
Serverless/Event-based
Observability & Analysis
Monitoring
Prometheus
CNCF Project
Logging
fluentd
CNCF Project
Tracing
OPENTRACING
CNCF Project
Cloud Native Landscape
v0.9.6
github.com/cncf/landscape
This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.
CLOUD NATIVE COMPUTING FOUNDATION
Redpoint
Amplify
Greyed logos are not open source

Monitoring Native Cloud

Cloud – What's Next?

Select new technology for disaster recovery/backup

Evaluate and select cloud vendor for production workloads

What's Next :
Cloud Based Disaster Recovery

- Protection for all platforms – Physical, Virtual, Cloud based
- Support multiple cloud vendors for recovery options
- Multi tenant support – client protection
- Fully automated recovery – click and recover
- Flexible data protection plan
  - Configurable Recovery Time Objectives
  - Configurable Recovery Point Objectives
  - Flexible System recovery – any system, any time

What’s Next :
Cloud and production workloads

- Flexible network configurations
- Configurable HA features for infrastructure
- Capabilities to meet security and compliance requirements
- Simplified system migration
- Full API support for automation
- Extensive 3rd party integration support