What is Cloud Native and why should I care?

Alexis Richardson
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Open Source Cloud Computing for Applications

We curate & promote a trusted tool kit for modern architectures
Netflix pioneered the concept of cloud native as a practical tool

Are You Designing Systems That Are:

- Web-scale
- Global
- Highly-available
- Consumer-facing
- Cloud Native

Netflix Development Patterns for Scale, Performance & Availability (DMG206) | AWS re:Invent 2013

https://www.slideshare.net/AmazonWebServices/dmg206
Netflix wanted SPEED and ACCESS at SCALE

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Must Read!
Cloud native powers a whole industry today
So can anyone be like Netflix?
Maybe we can dream :-)

[Image of a donkey and an image of a unicorn with a crescent moon in the background]
The *Need for Speed.* This is real.

![Figure 1](image)

Comparison of IT performance metrics between high¹ and low performers

<table>
<thead>
<tr>
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<th>2015 (Super High vs. Low)</th>
<th>2014 (High vs. Low)</th>
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</thead>
<tbody>
<tr>
<td>Deployment Frequency</td>
<td>30x</td>
<td>30x</td>
</tr>
<tr>
<td>Deployment Lead Time</td>
<td>200x</td>
<td>200x</td>
</tr>
<tr>
<td>Mean Time to Recover (MTTR)</td>
<td>168x</td>
<td>48x</td>
</tr>
<tr>
<td>Change Success Rate</td>
<td>60x</td>
<td>3x</td>
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Puppet Labs state of devops 2015
So what is it about Cloud Native that helps me go fast
To learn more @Weaveworks we experimented on our own product

I FEEL LIKE I'M TAKING CRAZY PILLS!
Simplifying delivery for cloud-native development

Built on open source software, Weave Cloud is software-as-a-service that allows DevOps teams to connect, monitor and deploy containers and microservices.

WATCH DEMO
Our requirements don’t fit one pattern, eg “12 factor”
Weave Cloud business requirements

24-7-365, Global, Multi-tenant, Secure…. etc.

Team focus 100% on rapid app development; not VM admin & plumbing.

We can scale components up/down in line with use/cost

Don’t spend money on wiring (Prometheus ‘just works’ with Docker, Kubernetes..)

We can run the Weave Cloud app anywhere (open source & not only Amazon)
Our solution learnings: what mattered most to us?

1) Automation. Lots of automation. End to end. Automate all the things.
   → CI/CD! Orchestration! Observability!

2) You need to focus on the app not the infrastructure, e.g. using standard packaging that Just Works consistently anywhere. → Containers!

3) You need to understand and apply new cloud native patterns and tools for monitoring, logging, uptime management & more → Microservices & beyond!
The ABCDE of Automation

App is developed & tested locally

Built automatically using CI of our choice

Container image pushed automatically

Deployed automatically using Weave Cloud deploy service...

...to an Execution Environment of your choice

Source control

Configuration as code
Lesson Learnt: *Cloud Native needs good tools*

Open source

Run anywhere

Software you can trust, managed by credible teams & processes

Easy to monitor and control

Interoperates with other tools and common conventions
Lesson Learnt: *the infrastructure has to be boring*

To focus on your app, the infrastructure has to be boring.

Use containers.

Use PaaS/CaaS or any container platform you like.

Watch out for the 1% failure problem
Lesson Learnt: We need good PATTERNS

Microservices (and Microliths)

Cattle not Pets

Observability and Control baked in

Traffic Patterns - Blue/Green, Canary, smart routing & load balancing…

…
Cloud Native is Patterns
pause
Open Source Cloud Computing for Applications

We curate & promote a trusted tool kit for modern architectures
Cloud Native is Patterns

CNCF is & Tools
& Education
Patterns for what?

→ avoiding the pain by learning from others :-)
Patterns for what?

→ avoiding the pain by learning from others :-)

Availability
Microservices & Netflix for everyone

Automation
Deployment & Management

Acceleration
CI/CD & “the ABCDE” of automation

Anywhere!
Containers are portable
Patterns need Software
Tools you can trust

High quality, high velocity projects in CNCF today

- Kubernetes - container orchestration
- Prometheus - monitoring & analysis
- Fluentd - log forwarding
- OpenTracing - tracing interop
- Linkerd - traffic management
- Voting on: gRPC, CoreDNS
- More to come...
Cloud Native Landscape v0.9.3

Application Definition & Development

Languages & Frameworks
- Go
- Python
- Java

Databases
- MySQL
- PostgreSQL
- MongoDB

Streaming
- Kafka
-EventHubs

Source Code Management
- Github
- GitLab

Application Definition
- Habitat
-Rancher

Registry Services
- Docker Hub
- Quay

CI / CD
- Jenkins
- GitLab CI

3rd Party APIs
- OAuth

Orchestration & Management

Scheduling & Orchestration
- Mesos
- Nomad

Coordination & Service Discovery
- etcd
- Consul

Service Management
- Apache ZooKeeper

Runtime

Cloud-Native Storage
- AWS S3

Container Runtime
- Docker
- K8s

Cloud-Native Network
- OpenShift

Provisioning

Infrastructure Automation
- BOSH

Host Management / 10oring
- Ansible

Secure Images
- Aqua

Infrastructure

Cloud Providers
- Amazon Web Services
- Google Cloud
- Microsoft Azure

Other Services
- VMware
- OpenStack

Observability & Analysis

- New Relic
- AppDynamics
- Datadog

Marketing
- Splunk
- Dynatrace

Legal
- Apache
- MIT

http://github.com/cncf/landscape

@dankohn1  @lennypruss  @sraney
Cloud Native Reference Architecture

- Application Definition / Development
- Orchestration & Management
- Runtime
- Provisioning
- Infrastructure (Bare Metal/Cloud)
Example: Management

- Observability
  - View / Filter / Replay
  - Monitoring / Trace / Stream / Log
  - Business Intelligence

- Orchestration

- Coordination
  - Configuration
  - Discovery
  - DNS

- Service Management
  - Routing / Proxy / Load Balancer
  - Policy / Placement / Traffic Management
Assume we have the software ... why do we need a Foundation?
What even is a Foundation?
..a benevolent technocracy run by civilised robots?
..a federation of collaborating powers?
You use force, you create fear. Fear destroys trust. Trust is the basis of harmony. The hardliner believes harmony and unity can be brought by force. That's totally unscientific, totally wrong.

— Dalai Lama —
The Linux Foundation

Safeguards Linux for the long term

Provides a nexus for collaboration and trust

Is an ubiquitous open source brand

Good for customers & the community!

The LF is great because it makes it easy to bring together collaborators for projects like a common tool kit for cloud native applications → enter the CNCF
Let’s do it together
Common Open Source is not proprietary
Software is eating the world
Open Source is eating Software
Cloud is eating Open Source
Without a commons, we risk Cloud Lock In
Foundations curate open source to stop lock in

First it was the big software vendors
Then: big web companies like eBay, AirBnb
Now - big “traditional” companies too

→ Everyone wants to use open source, in a well managed commons, for the “boring infra” bits
Foundations provide Education

Easy - Fast - No Confusion

Guidance and clarity on “Cloud Native”
A badge of trust, quality & interoperability
A common set of tools, APIs & examples

Shared through a modern, trusted commons
Foundations Support Open Source Projects

**Infrastructure - Promotion - Interoperability**

Infrastructure support with compute and CI
Promotional support by exposing projects to a wider audience
Making sure that projects play nicely with each other .. and more.
Standards
Standards are...

An algorithm for identifying areas of disagreement and maximising them.

Standards are slow. And emerge slowly.

CNCF does not need standards, we need ease of interop and “glue” code

We like conventions that arise from real world use by the community & will strive to identify these and promote them as needed
3 phase plan

Build velocity by adding new projects

Accelerate projects & overall cloud native story

Standard tools emerge

https://www.cncf.io/blog/2016/11/08/cloud-native-software-can-trust
Bob Wise, Samsung: “An Ode To Boring”

“I call on the CNCF to formally foster a common community container implementation project backed by the Kubernetes, Mesos, and Cloud Foundry communities. We need a transparent, community-driven implementation ... to become the default container implementation for a wide number of open source orchestration systems”

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Appendix
Application Definition/ Deployment Layer

- Application Composition
- Application Delivery
- Application Development Frameworks
- Application Operational Tooling
- CI/CD
- Image Registry / Repository
- Governance and ops model
Orchestration & Management Layer

- Observability
  - View / Filter / Replay
  - Monitoring / Trace / Stream / Log
  - Business Intelligence

- Orchestration

- Coordination
  - Configuration
  - Discovery
  - DNS

- Service Management
  - Routing / Proxy / Load Balancer
  - Policy / Placement / Traffic Management
Runtime Layer

- Resource Management
  - Container Scheduling
  - Container Deployment

- Cloud Native – Network
  - Network Segmentation
  - SDN & APIs (eg CNI, libnetwork)

- Cloud Native – Data
  - Data Management
  - Databases & APIs

- Overall Container Service
  - (Some) PaaS/Platform Services
Provisioning Layer

- OS Management
- Secure Images
- Host level Devops Deployment Tooling & Provisioning
Infrastructure (Bare Metal/Cloud) Layer

- Out of scope for CNCF projects as we do not define infrastructure vendors or cloud solutions but part of reference architecture
- Potentially in the future we will provide “certification”