June, 2018

Serverless and Kubernetes:

The best of both worlds

Google Cloud

What is serverless?

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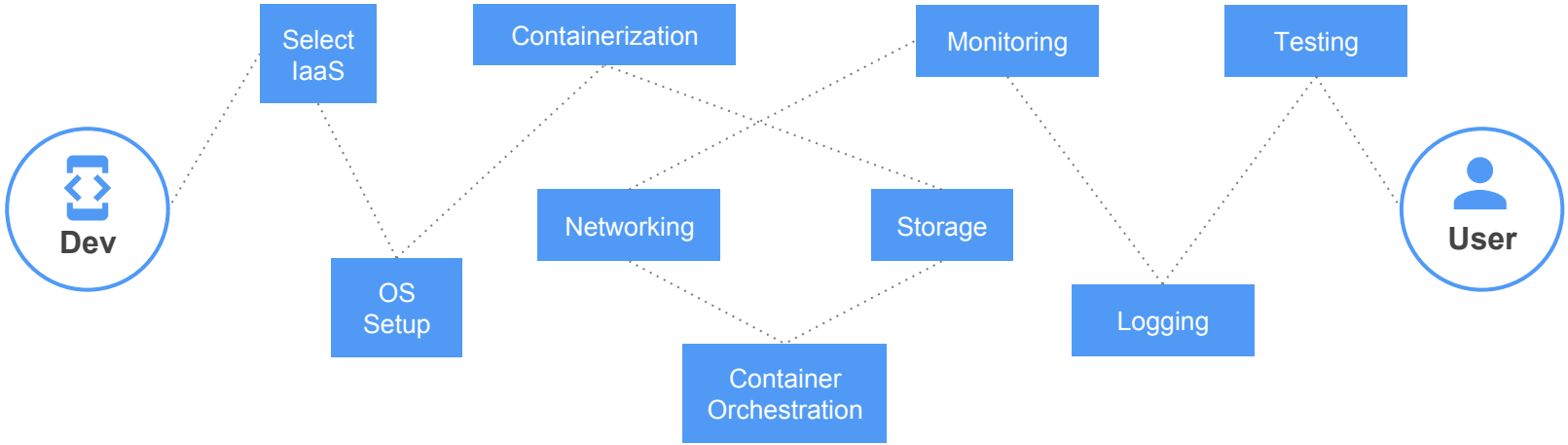
What's so hard about traditional app development?



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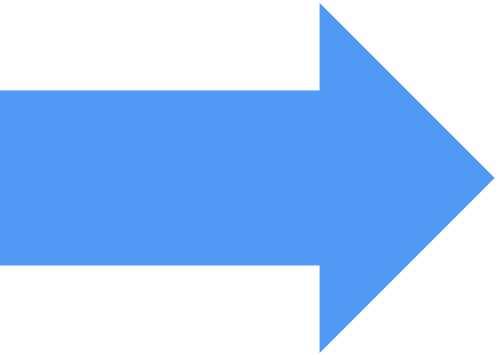
What should it take to deploy a function or app?

Spin up a VM instance	Spin up a VM instance
Provision server capacity	Provision server capacity
Specify DB requirements	Specify DB requirements
Write code	**Write code**
Patch server	Patch server
Scale capacity depending on workload size	Scale capacity depending on workload size

Benefits of serverless computing



Accelerated time to market

No server management

Pay only for usage

So, what really is Serverless?

Programming model

- ✓ Event-driven
- ✓ Horizontally scalable
- ✓ Microservices

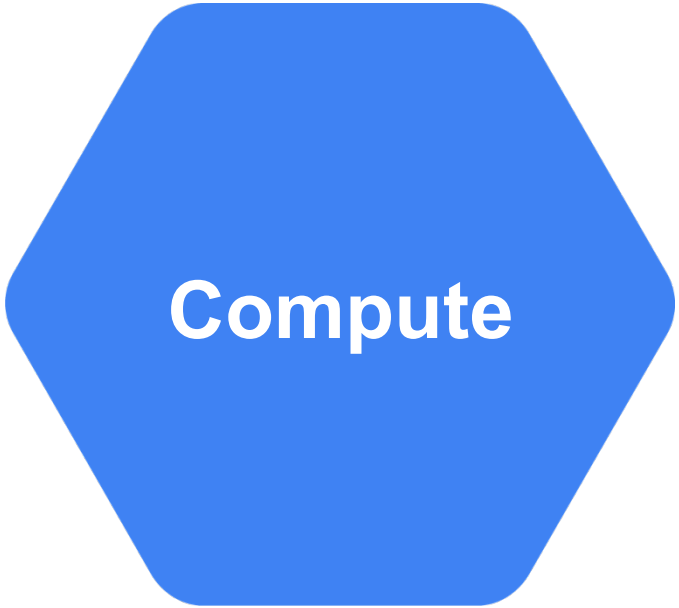
Operational model

- ✓ Zero ops
- ✓ Auto-scaling
- ✓ Managed security

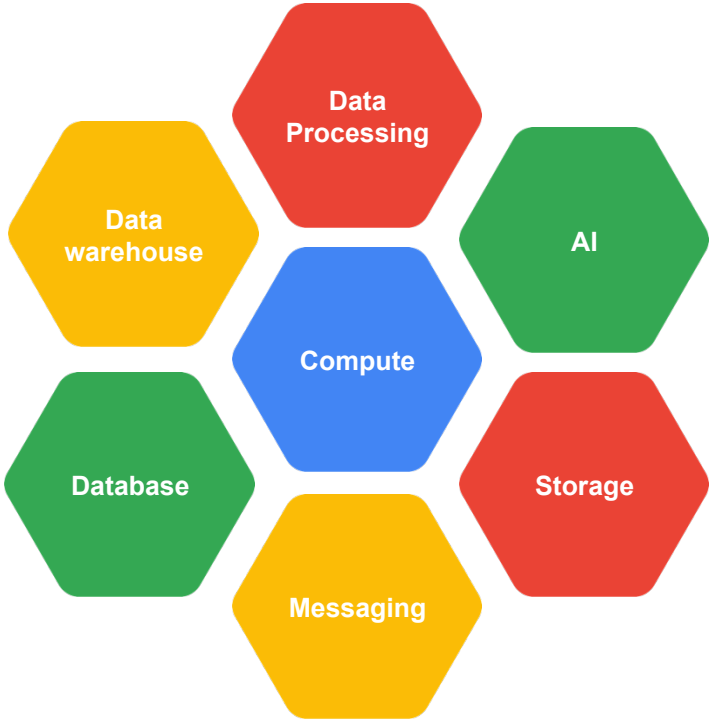
Billing model

- ✓ Pay for usage

Serverless



Serverless - not just for compute



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Secret:
Serverless is

Containers +
Automation +
Granular billing

The Kubernetes fit

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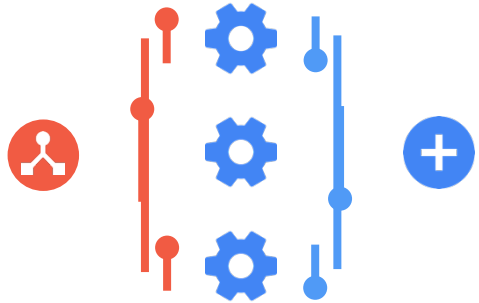
Kubernetes is a...

1. **Container platform (aka container orchestrator)**
2. **Declarative API-centric control plane**
3. Configuration distribution system
4. **Container Infrastructure as a Service (ClaaS)**
5. **Platform for automating management**
6. Services as a Platform (SaaP)
7. **Portable cloud abstraction**
8. Family of projects
9. Toolkit
10. **Ecosystem**

Container infrastructure as a service

- Under the hood: IaaS-like primitives
  - Instances / Groups
  - Networking, Load balancing, DNS for service discovery
  - Storage volumes
- Flexible, composable primitives that can be used à la carte
- Craft your own application topology
- But container- and (micro) service-level abstractions



```
apiVersion: v1
kind: Service
metadata:
  name: myapp
spec:
  selector:
      app: myapp
```

```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: myapp-main
spec:
  replicas: 3
  selector:
    matchLabels:
      app: myapp
      stage: main
```

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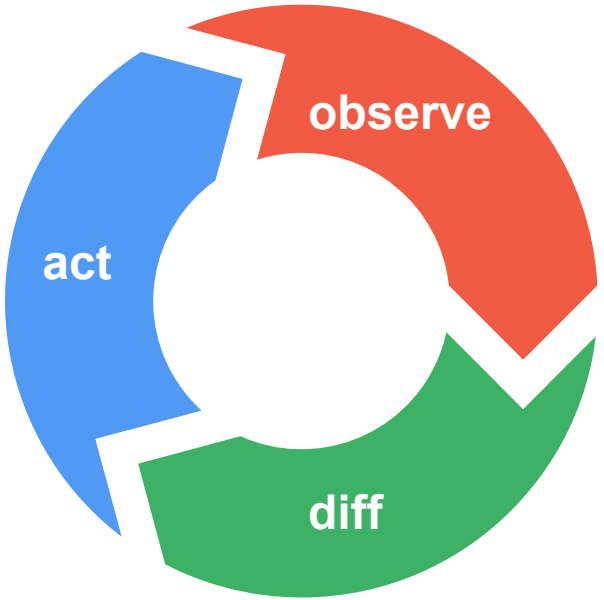
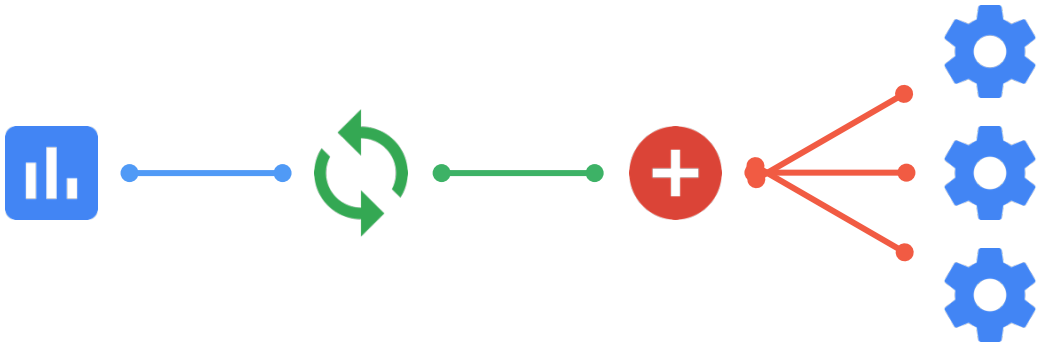
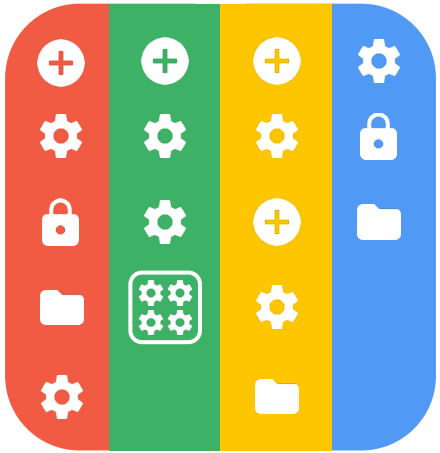
Declarative desired state model

- Controllers continuously drive **observed state → desired state**
- Open world -- anything can happen
- Status is reported asynchronously
- All state is visible via the API
- Watch API to distribute state changes
- Facilitates addition of automated processes



Platform for automating management





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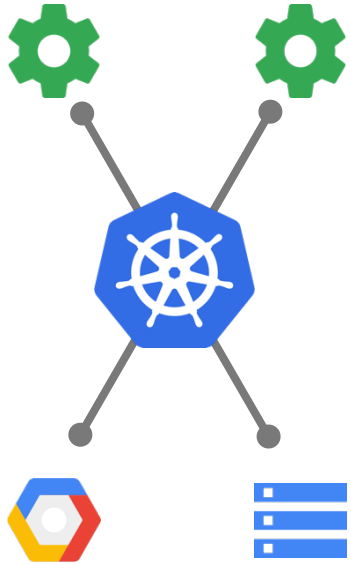
Portable cloud abstraction

- **Goal: write once, run anywhere**
- **Making Kubernetes more portable**
  - Container runtime, network, volume plugins
  - External cloud providers
  - Windows support
  - Portable bootstrapping and self-hosting
- **Certification to ensure portability**
- **Making applications more portable**
  - Don’t force apps to know about concepts that are cloud-provider-specific
  - Not just software-defined infrastructure, but application- and intent-oriented infrastructure
  - Run diverse types of workloads



The Kubernetes ecosystem

4,000+

Projects based on Kubernetes

442 Years of effort*

5,000+ Contributors

30k+ GitHub stars

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*Source: COCOMO Model

Bridge the gap

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Why is adopting serverless today hard?

1

Dependencies

Constrained runtimes, frameworks and packages

2

Lock-in

Unable to run your workloads on-prem, in the cloud or on a third party service provider

But really - why Kubernetes for serverless?

Extensibility
Large ecosystem of projects, contributors and community support

Portability
Run your code anywhere: on-prem, in the cloud or in 3rd party data center

Flexibility
Flexible, composable primitives that can be used à la carte

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Looking forward – serverless is:

Managed runtime environment		**Flexible, any runtime, any lib**
Patched for security updates		**Compatible, follow open standards**
Source-driven		Source-driven or **container-driven**
Functions		Functions, **apps & containers**
Single-purpose		Single-purpose & **multi-purpose**

Demo

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That’s a wrap.