

A stylized, colorful illustration of a city skyline. On the left, a tall, slender tower with a distinctive top structure (resembling the Space Needle) stands out. The rest of the skyline is composed of various skyscrapers and buildings in shades of brown, grey, and blue. The entire scene is framed by a thin blue border.

Welcome to CloudLand!

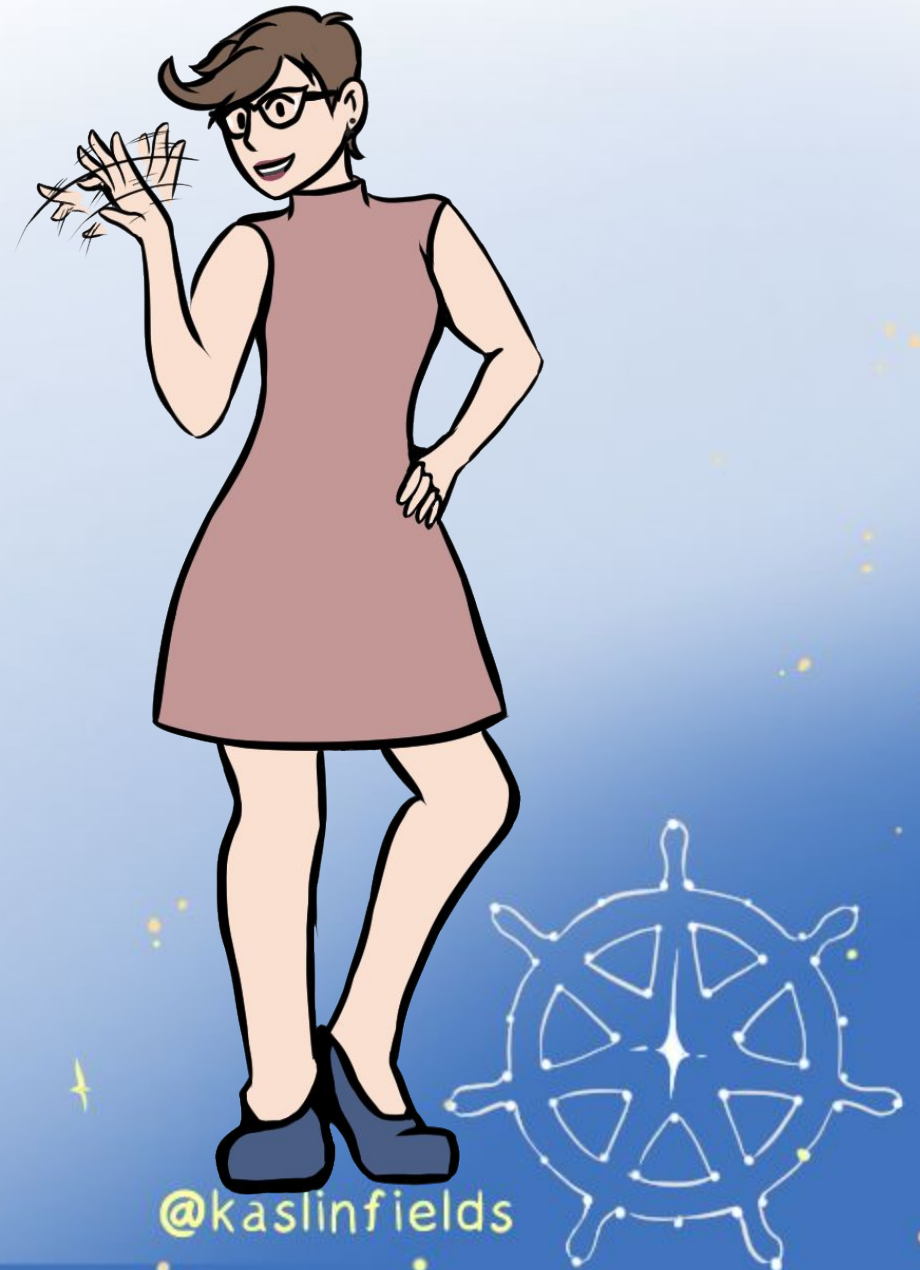
Kaslin Fields

CNCF Webinar

Friday, April 3rd 2020

Kaslin Fields

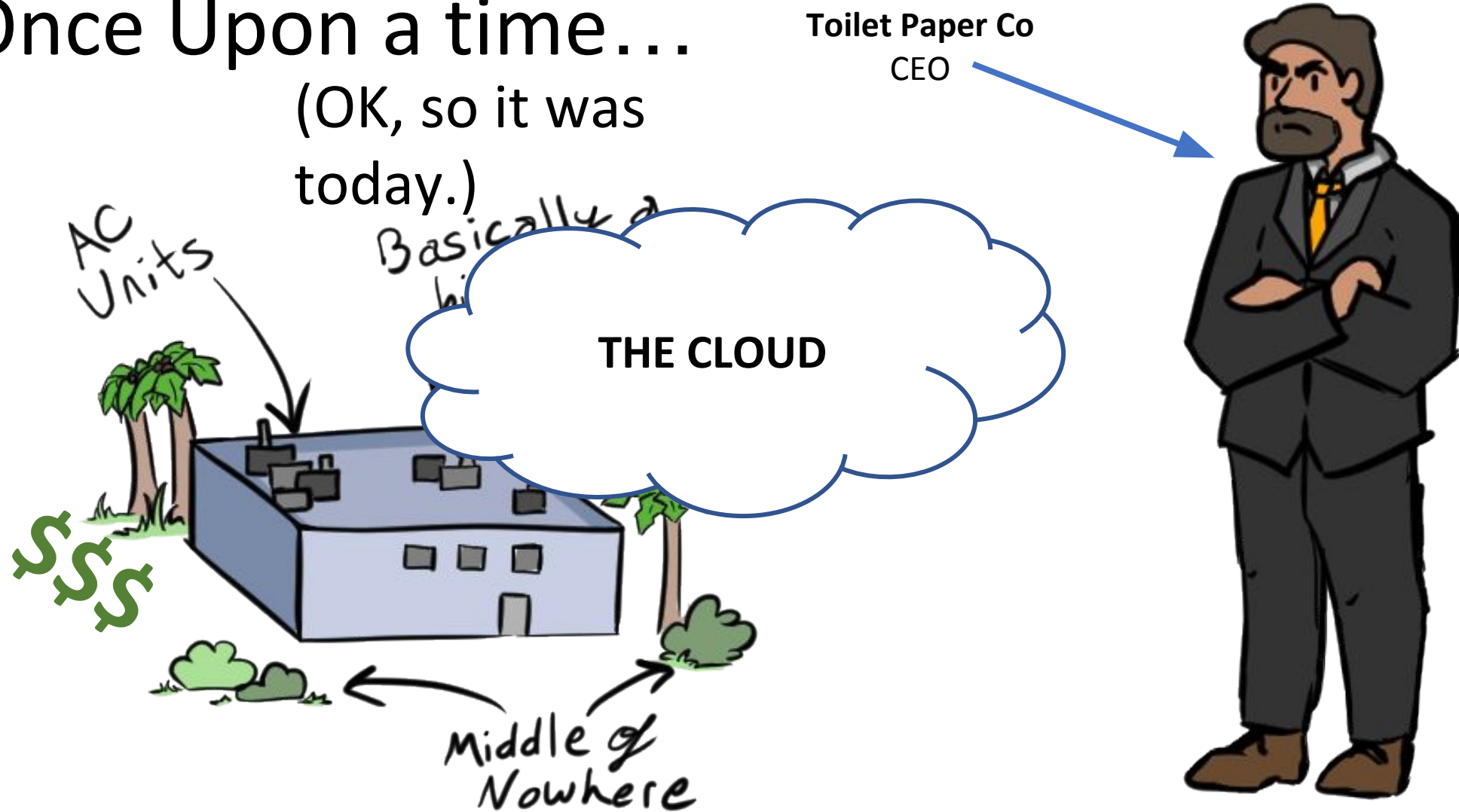
- Developer Advocate at Google
- CNCF Ambassador
- Cloud Native, DevOps, Kubernetes
- Tech Comic Creator (<https://kaslin.rocks>)



Tell me about Cloud Native!

Once Upon a time...

(OK, so it was today.)



- **“Lift and Shift”**

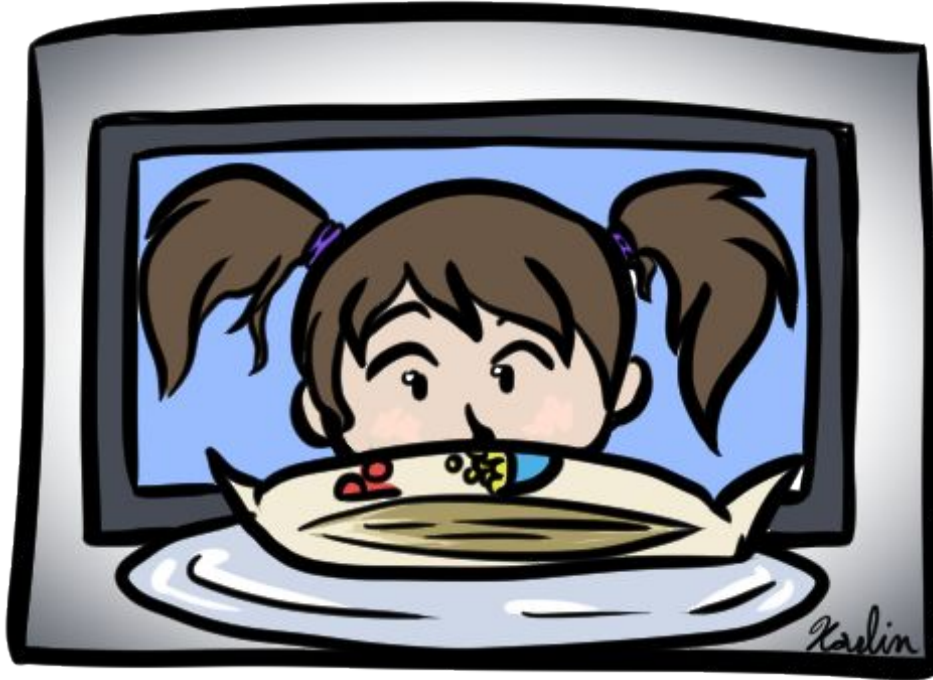
- Moving applications/systems as-is to the cloud

VS

- **Cloud Native**

- Using the unique capabilities of the cloud to your advantage
- This may mean re-architecting systems, and likely means designing new systems differently

In-House vs Cloud Native



VS



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Exercise 1

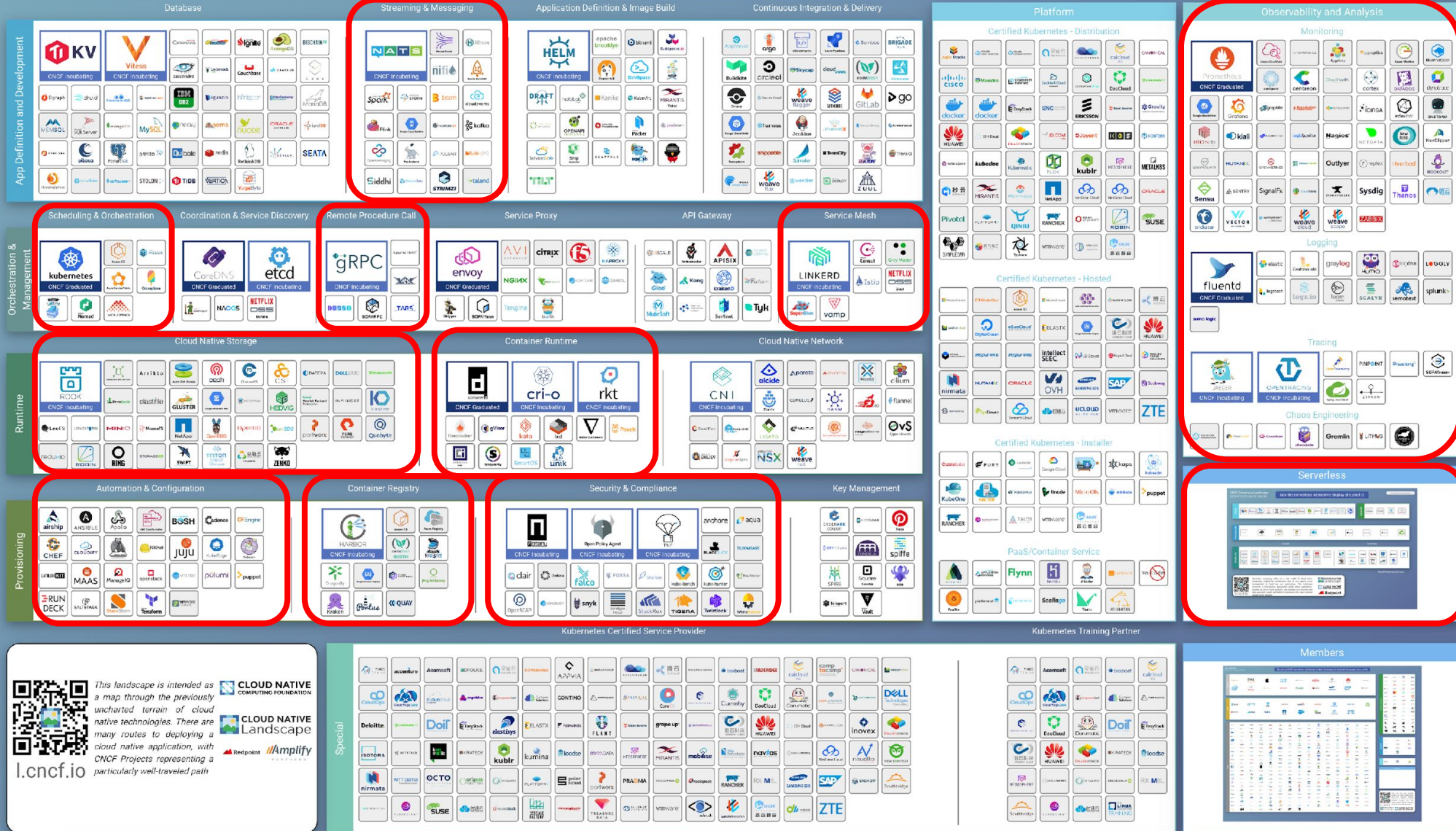
- Install something!
 - Nginx works great, maybe along with a simple “Hello World” web app
- Think about
 - What steps do I have to go through to do this? If I had to do it 500 times, how would I do that?

Cloud Native Computing Foundation (CNCF)

- Independent non-profit
- Mission: Promote the growth and adoption of Cloud Native Technologies
- Support and promote many “cloud native” open source projects
- Maintain a “Cloud Native Landscape” to help companies understand the breadth of Cloud Native software

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Kelsey Hightower ✓ @kelseyhightower · 14h

Don't forget an IDE with a powerful YAML editor.
[marketplace.visualstudio.com/items?itemName=...](https://marketplace.visualstudio.com/items?itemName=ms-kubernetes-tools.kubernetes)



Kelsey Hightower ✓ @kelseyhightower · 14h

So you want to roll your own application platform. All you need is:

Linux
Docker
Kubernetes
Istio
Prometheus
Fluentd
Grafana
Jaeger
Harbor
Open Policy Agent
Vault
Spinnaker and Jenkins

Oh, almost forgot, you're also going to need servers, people, and glue.
Bring lots of glue.



14



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What are the most exciting and unique things about going to an amusement park or festival?

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Amusement Park / Festival Food



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Containers

Benefits of Popcorn

- Efficient Storage
- Portable
- Stores small, but feeds a crowd
- Repeatable
- Quick and easy

Popcorn Kernels















Benefits of Containers

- Efficient Storage
- Portable
- Store once, can be spun up en masse
- Repeatable
- Quick startup time

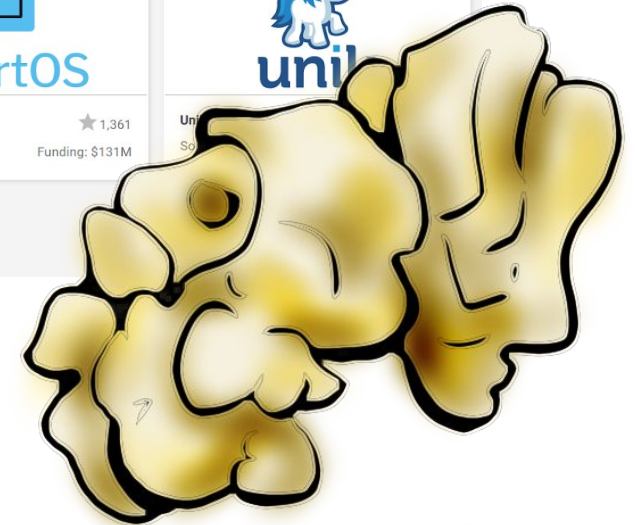
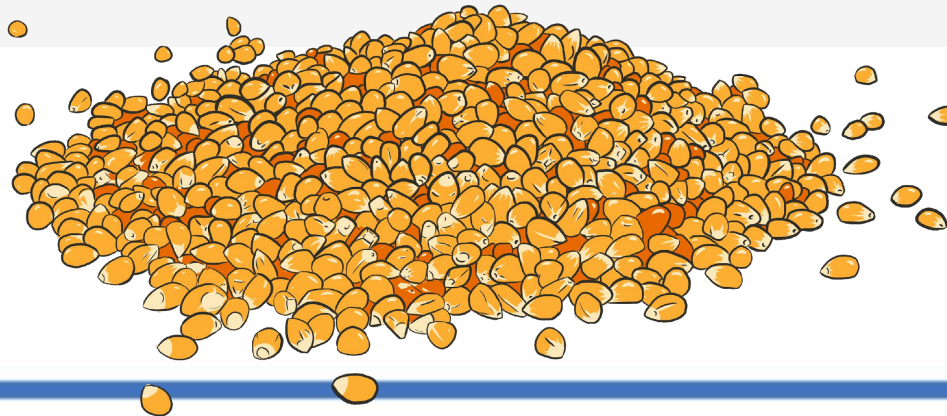
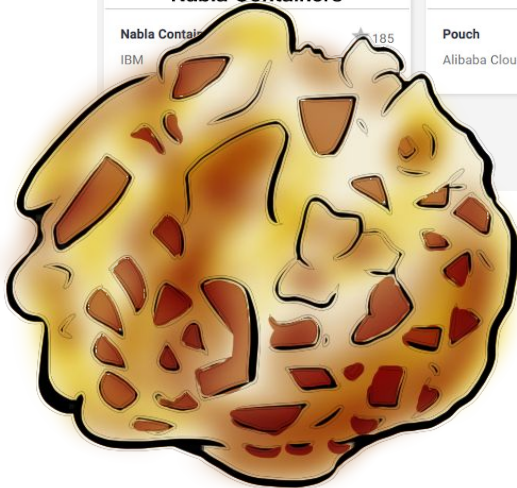
Container Runtimes

Speed, Security, Weight

Runtime - Container Runtime (12)

 containerd Cloud Native Computing Foundation (CNCF) ★ 5,165	 cri-o Cloud Native Computing Foundation (CNCF) ★ 2,282	 Firecracker Amazon Web Services ★ 10,593 MCap: \$1.02T	 gVisor Google ★ 9,513 MCap: \$996.9B	 kata Kata Containers OpenStack ★ 1,769	 lxd Canonical ★ 2,497 Funding: \$12.8M
 Nabla Containers Nabla Containers IBM ★ 185	 Pouch Alibaba Cloud ★ 4,131 MCap: \$579.08B	 runc Open Container Initiative (OCI) ★ 6,640	 Singularity Singularity Sylabs ★ 1,510	 SmartOS Joyent ★ 1,361 Funding: \$131M	 unikontainers Unikontainers So... ★ 1,361 Funding: \$131M

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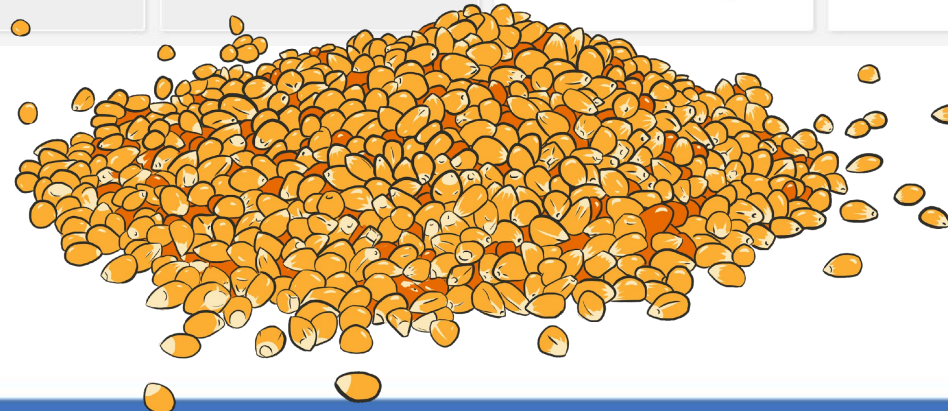
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Container Registries

Storage and Retrieval

Provisioning - Container Registry (12)

 Amazon ECR Amazon Elastic Container Registry (ECR) Amazon Web Services MCap: \$983.59B	 Azure Registry Azure Registry Microsoft MCap: \$1.36T	 codefresh REGISTRY Codefresh Registry Codefresh Funding: \$15M	 Docker Registry Docker ★ 5,198 Funding: \$307.86M	 Dragonfly Dragonfly Cloud Native Computing Foundation (CNCF) ★ 4,604	 Google Container Registry Google Container Registry Google MCap: \$951.62B
 HARBOR Harbor Cloud Native Computing Foundation (CNCF) ★ 10,995	 IBM Cloud Container Registry IBM Cloud Container Registry IBM MCap: \$119.24B	 JFrog Artifactory JFrog Artifactory JFrog Funding: \$226.5M	 Kraken Kraken Uber ★ 3,234 MCap: \$59.52B	 Portus Portus SUSE ★ 2,581 Funding: \$3.84M	 QUAY Quay Red Hat ★ 1,472 MCap: \$119.24B











Exercise 2

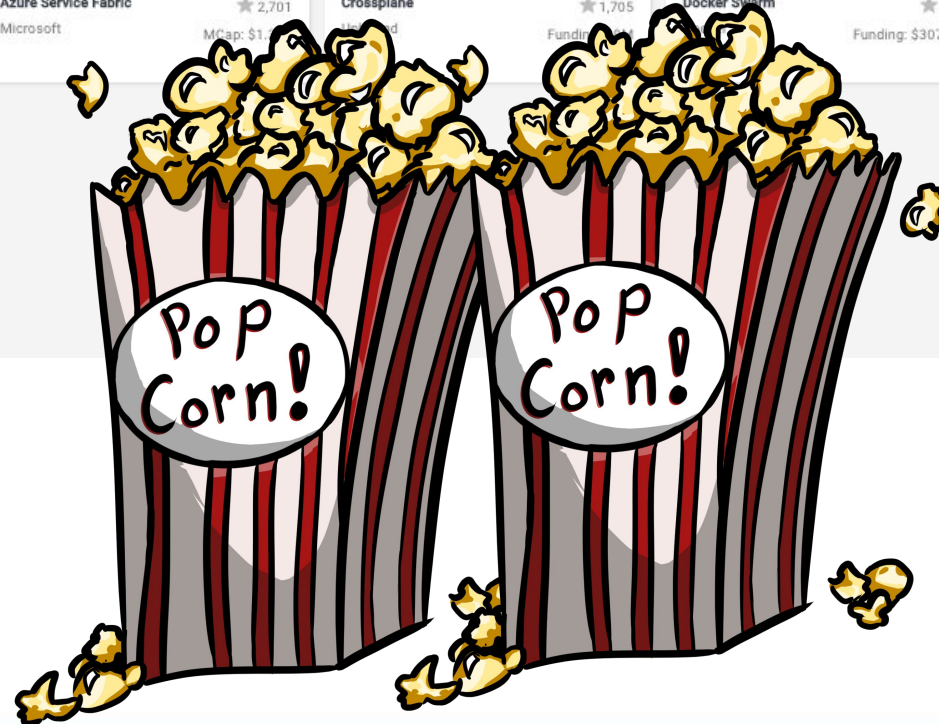
- Try to install that same thing, but using containers!
 - Nginx is a common example, available easily via dockerhub!
- Think about
 - What steps do I have to go through to do this? If I had to do it 500 times, how would I do that?
 - It should be a lot easier to do 500 times!

Container Orchestration

Operating at Scale

Orchestration & Management - Scheduling & Orchestration (8)

 Amazon ECS Amazon Elastic Container Service (ECS) Amazon Web Services MCap: \$983.59B	 Apache Mesos Apache Software Foundation ★ 4,439	 Azure Service Fabric Microsoft ★ 2,701 MCap: \$1.1B	 Crossplane Microsoft ★ 1,705 Funding: \$1.1M	 Docker Swarm Funding: \$307.86M ★ 2,317	 kubernetes Cloud Native Computing Foundation (CNCF) ★ 63,757
 Nomad HashiCorp ★ 5,852 Funding: \$174.18M	 VOLCANO Huawei Technologies ★ 778				



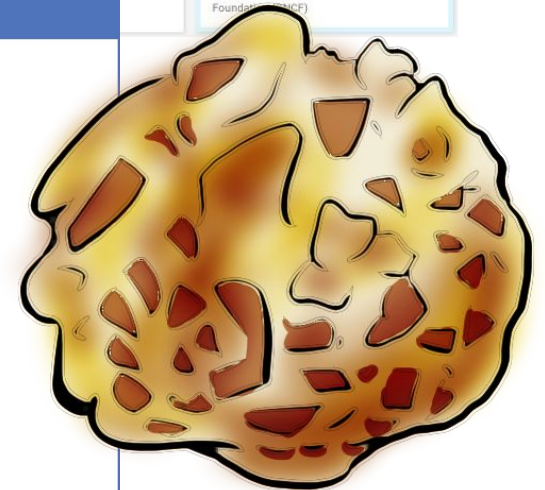
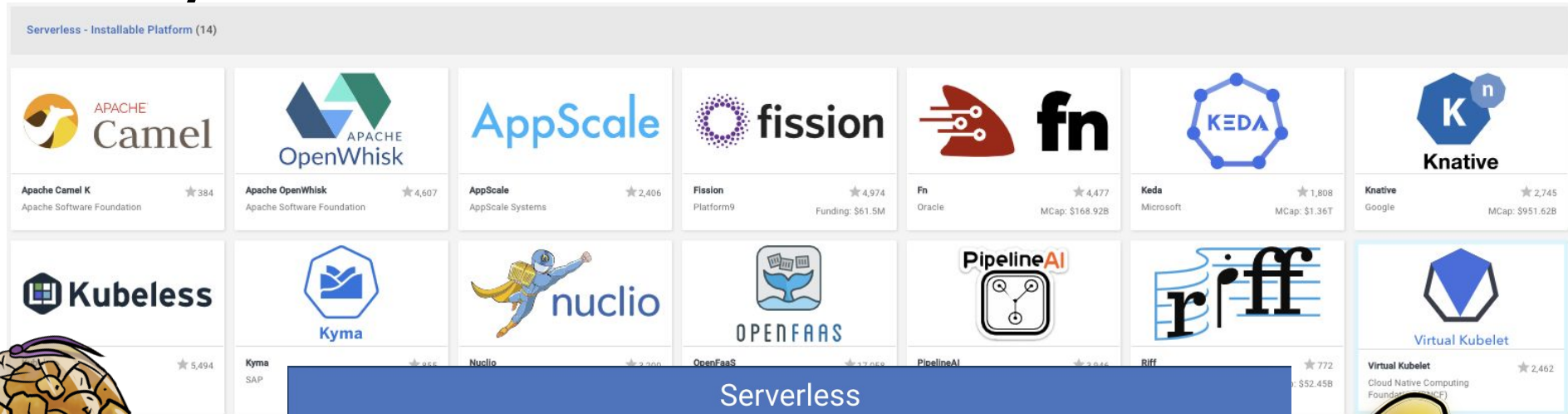
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Exercise 3

- Put that container image in dockerhub and try deploying it to a K8s Cluster!
 - Beginner (cloud)
 - Use a free trial [like GKE's free trial] to use a managed k8s cluster on a cloud provider
 - Beginner (local)
 - Use minikube on your local machine
 - Intermediate/Challenging
 - Go through Kubernetes The Hard Way
- Think about
 - If I had to run 500 of this container, how would Kubernetes help me do that?

Serverless / Functions as a Service

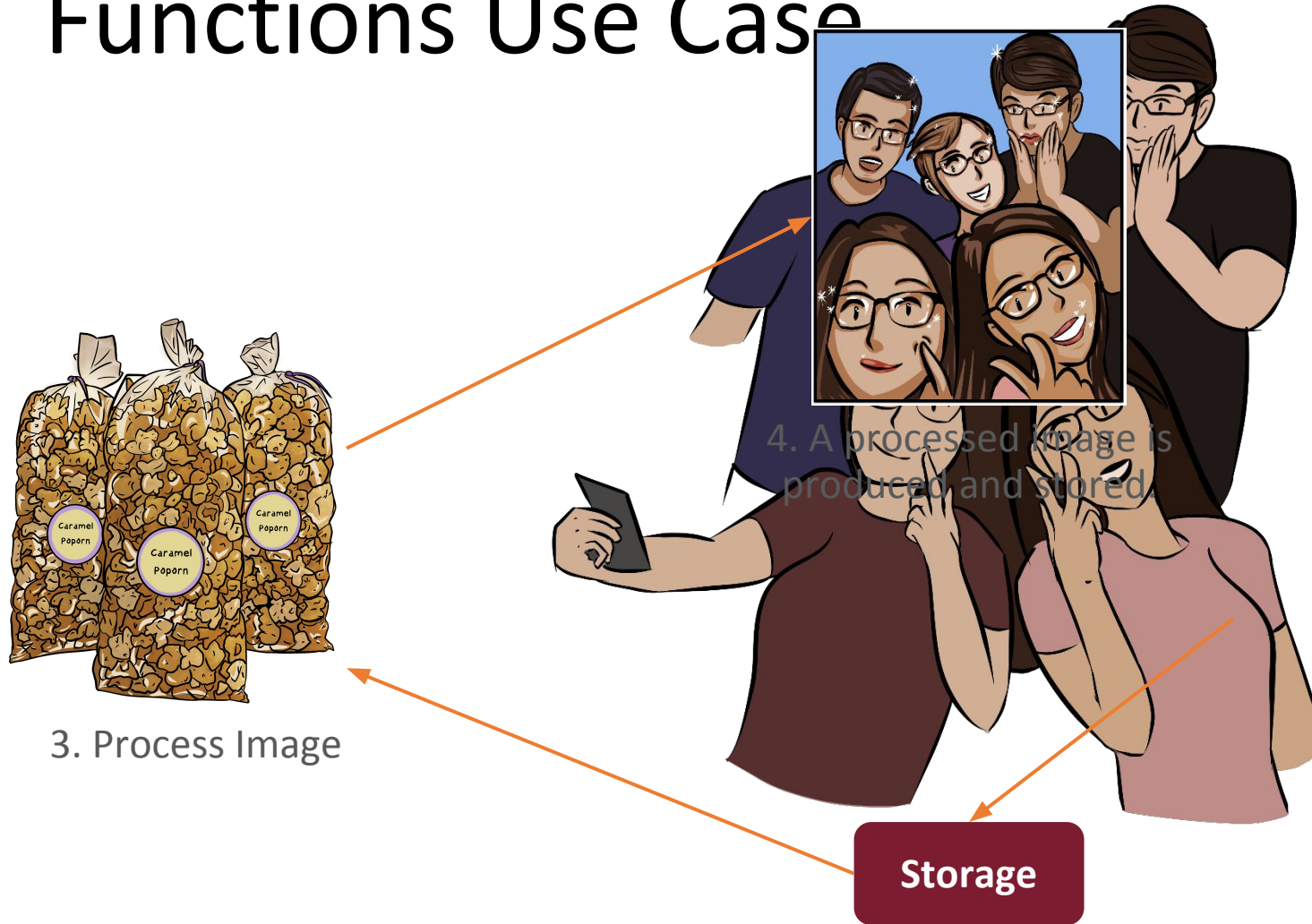
Focus on Code



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Functions Use Case

Focus on Code



1. Upload an image

2. The image being inserted to
object storage triggers an
event

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Exercise 4


























- Run that app/container via a functions as a service platform!
 - Use a cloud provider's free trial to do this
- Think about
 - What is the format like? Can I run the container? Can I run some application from code?
 - What would the cost be to run 500 of these once a month for 45min?

Infrastructure as Code

“GitOps”

DevOps - Manage your “Ops” like you manage your “Dev”



Provisioning - Automation & Configuration (25)					
 Airship OpenStack ★ 26	 ANSIBLE Ansible Red Hat ★ 42,044 MCap: \$119.24B	 Apollo Ctrip ★ 19,680 Funding: \$500K	 AWS CloudFormation Amazon Web Services MCap: \$983.59B	 BOSH Cloud Foundry Foundation ★ 1,879	 Cadence Workflow Uber ★ 3.4 MCap: \$59.5
 CFEngine CFEngine ★ 340 Funding: \$13M	 CHEF INFRA™ Chef Infra Chef Software ★ 6,163 Funding: \$105M	 CLOUDIFY Cloudify ★ 88 Funding: \$7M	 Digital Rebar RackN ★ 86 Funding: \$800K	 FOREMAN Foreman ★ 1,771	 JUJU Canonical ★ 1.6 Funding: \$12.8
 KubeEdge Cloud Native Computing Foundation (CNCF) ★ 2,256	 Kubicorn Kubicorn ★ 1,594	 LINUXKIT LinuxKit Docker ★ 6,090 Funding: \$307.86M	 MAAS Canonical ★ 107 Funding: \$12.8M	 ManageIQ ManageIQ ★ 1,005 Funding: \$5.4M	 openstack. OpenStack ★ 3.4
 pulumi Pulumi ★ 4,789 Funding: \$20M	 puppet Puppet ★ 5,684 Funding: \$149.5M	 RUN DECK RunDeck ★ 3,633 Funding: \$3M	 SALTSTACK SaltStack ★ 10,692 Funding: \$27.9M	 StackStorm StackStorm ★ 3,696	 Terraform HashiCorp ★ 21.0 Funding: \$174.1B
 vmware vSphere					

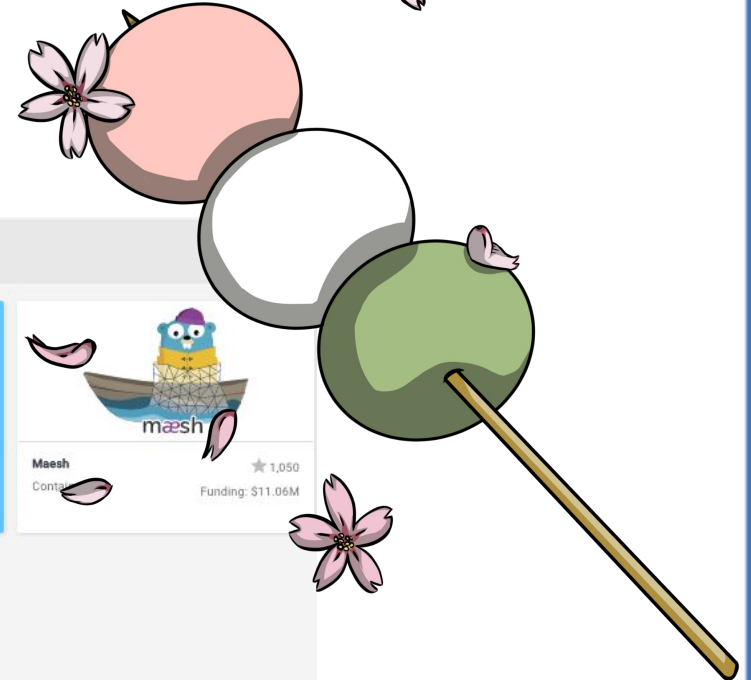
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Exercise 5

- Deploy your app via Terraform
 - There may be a terraform template already on github (ie. Nginx again)
- Think about
 - What tools does this service mesh give me?
 - What do I need to do to use those tools?

Service Mesh

Beyond Basics



Orchestration & Management - Service Mesh (10)					
 Consul HashiCorp ★ 18,585 Funding: \$174.18M	 Grey Matter Decipher Technology Studios	 Istio Google ★ 21,908 MCap: \$951.62B	 Kuma Kong ★ 1,309 Funding: \$69.1M	 LINKERD Linkerd Cloud Native Computing Foundation (CNCF) ★ 5,285	 Maesh Container ★ 1,050 Funding: \$11.06M
 NETFLIX OSS Zuul Netflix ★ 8,943 MCap: \$168.41B	 Service Mesh Interface (SMI) Microsoft ★ 425 MCap: \$1.36T	 SuperGloo Solo.io ★ 650 Funding: \$13.5M	 vamp Vamp.io ★ 637 Funding: \$3.53M		

*Day 2 Kubernetes
Boogaloo*

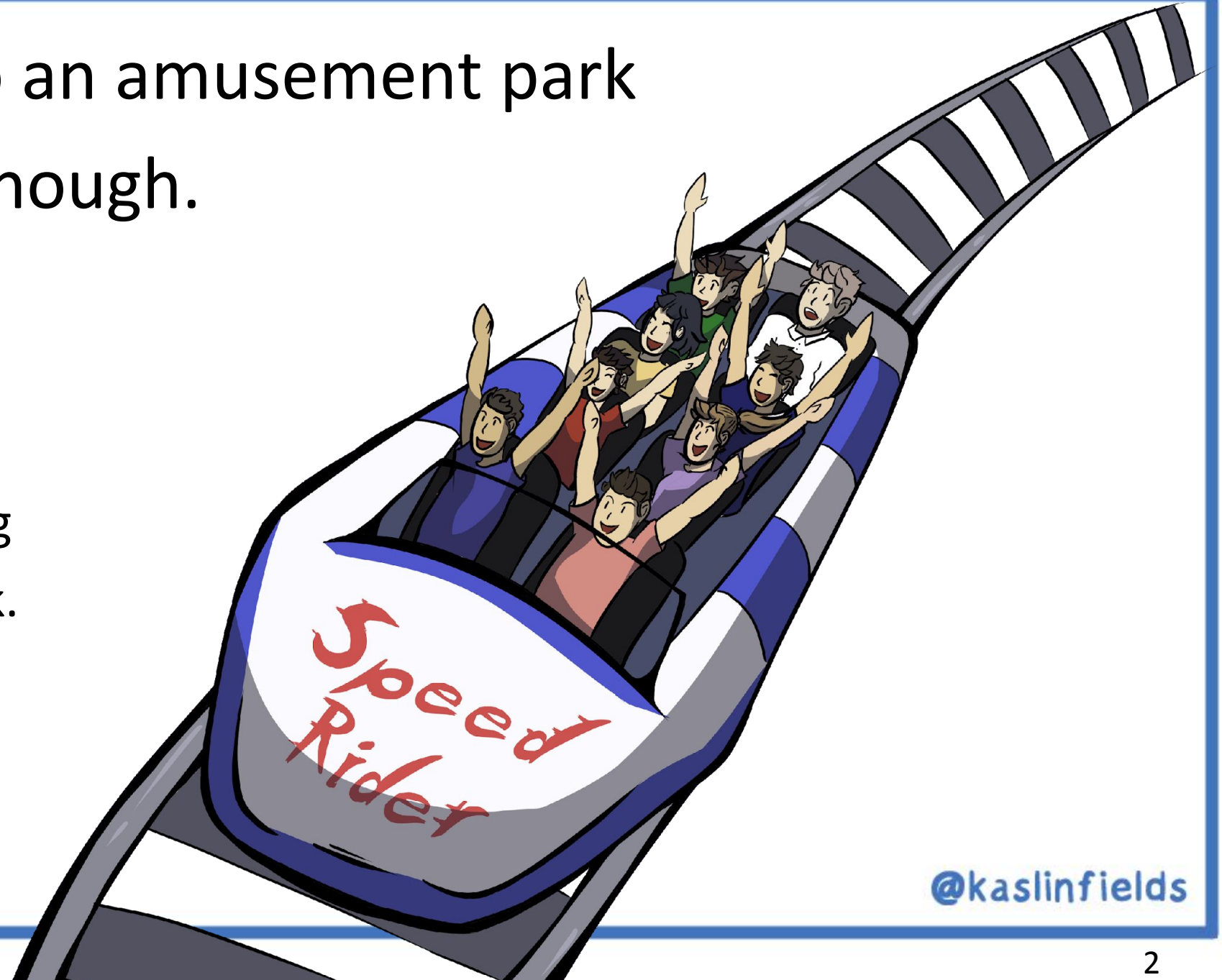
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Exercise 6

- Install a service mesh on your Kubernetes cluster from Exercise 3
 - Use a cloud provider's free trial to do this
- Think about
 - What benefits does having my infrastructure defined as code give me
 - Imagine the situation where you have to deploy this 500 times, AND it's constantly changing

There's more to an amusement park
than just food though.

Let's talk about
some other things
that go into running
an amusement park.

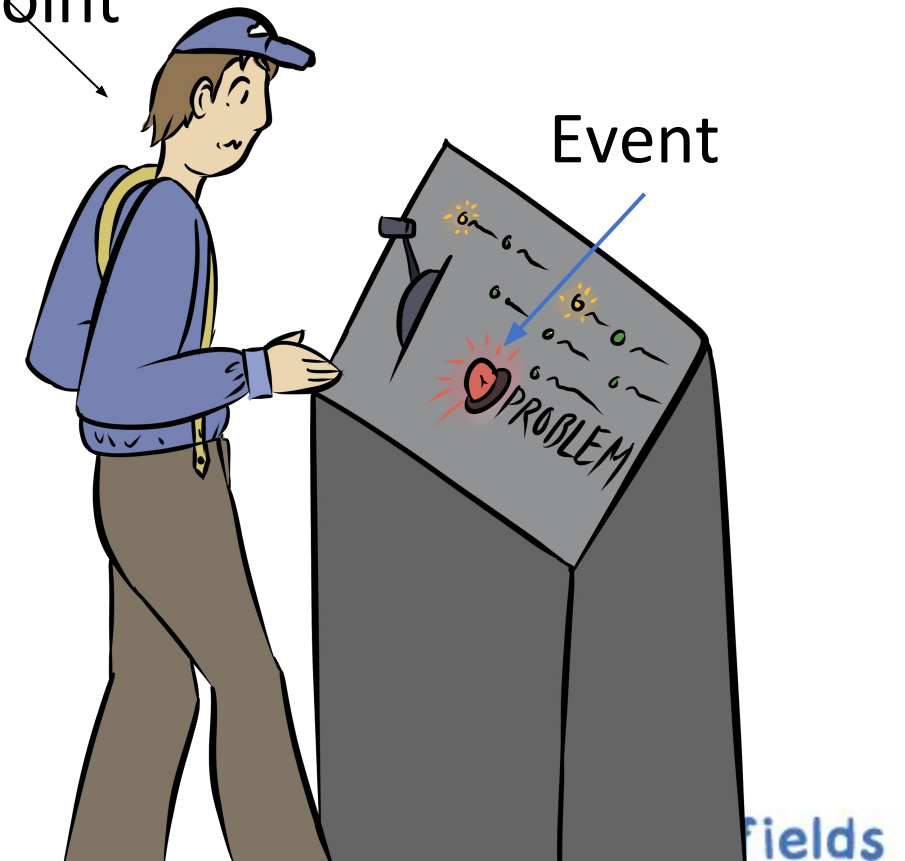


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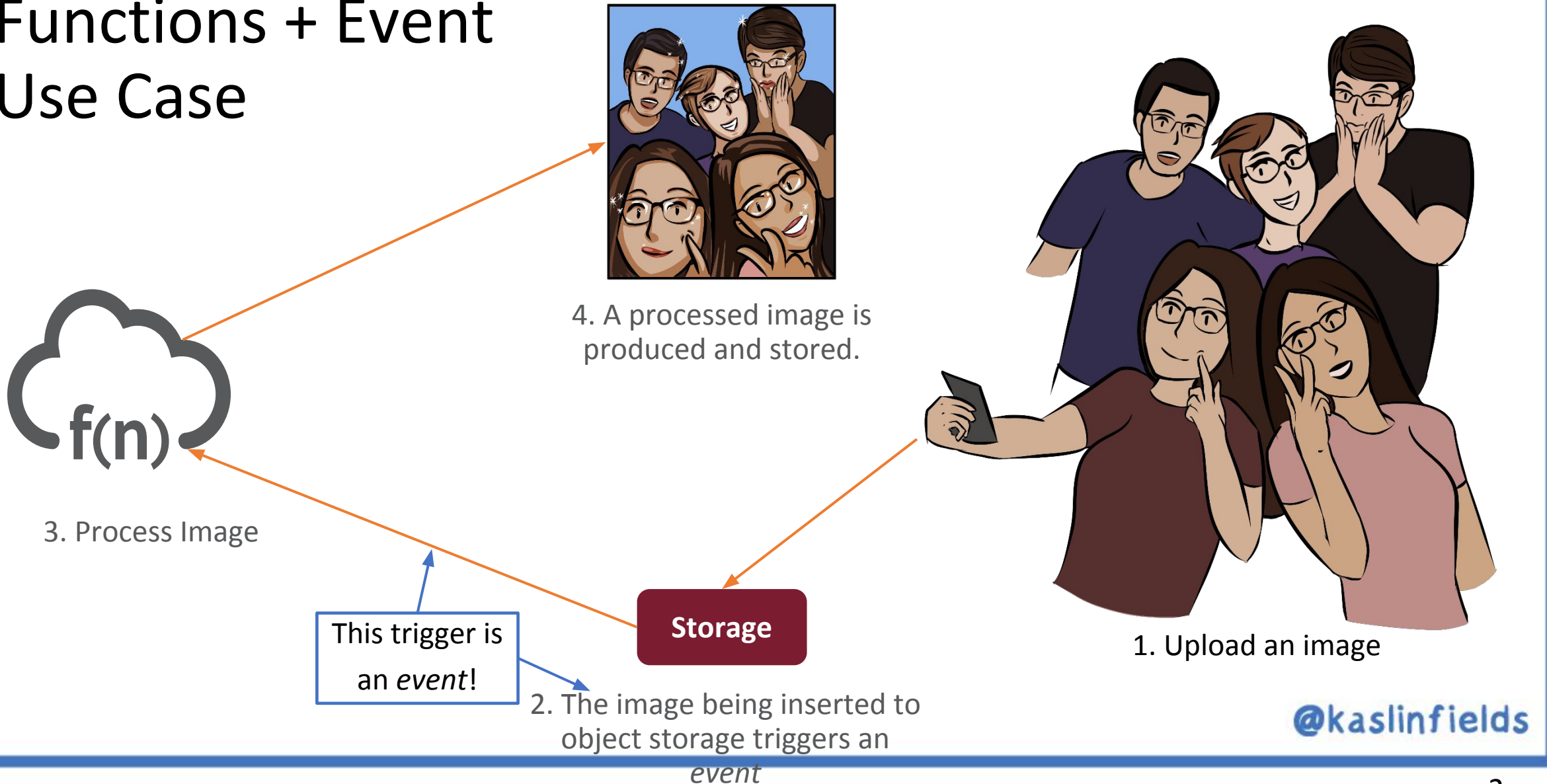
Cloud Events

- Something Happened!
 - Create a trigger which will send a message (an event) to the endpoint of your choice when a certain action occurs
 - For example, a new object is inserted into object storage
- Standardized
 - Events are based on a standardized format owned by the Cloud Native Computing Foundation (CNCF)

Event
Receiver/
Endpoint



Functions + Event Use Case



Observability

Ride	Wait Time/Status
Ferris Wheel	15min
Spinning Tea Cups	25min
Speed Rider	CLOSED
Viking Ship	10min

Know Your System, Know Your Business













































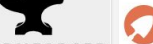













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Observability - Monitoring

*Know what's happening,
when it happens*

Observability and Analysis - Monitoring (56)

 Amazon CloudWatch Amazon CloudWatch Amazon Web Services MCap: \$965.88	 APPDYNAMICS AppDynamics AppDynamics Funding: \$364.5M	 Application High Availability Service Application High Availability Service Alibaba Cloud MCap: \$495.28B	 ManageEngine Applications Manager Applications Manager ManageEngine	 AppNeta AppNeta AppNeta Funding: \$63.18M	 appoptics AppOptics SolarWinds MCap: \$4.55B	 Aternity Aternity Riverbed Technology Funding: \$28.4M	 Azure Monitor Azure Monitor Microsoft MCap: \$1.13T	 beats Beats Elastic ★ 8,654 MCap: \$4.49B	 bluematador Blue Matador Blue Matador Funding: \$3.15M
 catchpoint Catchpoint Catchpoint Funding: \$49.77M	 centreon Centreon Centreon ★ 388	 CloudHealth CloudHealth Technologies CloudHealth Technologies Funding: \$85.7M	 cortex Cortex Cloud Native Computing Foundation (CNCF) ★ 2,460	 DATADOG Datadog Datadog MCap: \$10.25B	 dynatrace Dynatrace Dynatrace MCap: \$7.23B	 epsagon Epsagon Epsagon Funding: \$20M	 falcon Falcon Xiaomi ★ 5,579 MCap: \$244.86B	 Google Stackdriver Google Stackdriver Google MCap: \$776.77B	 Grafana Grafana Grafana Labs ★ 34,073 Funding: \$25.23M
 graphite Graphite Graphite ★ 4,868	 Honeybadger Honeybadger Honeybadger	 ICINGA Icinga Icinga ★ 1,386	 influxdata InfluxData InfluxData ★ 18,511 Funding: \$119.89M	 INSTANA Instana Instana Funding: \$97M	 IRONdb IRONdb Circonus Funding: \$6.8M	 kiali Kiali Red Hat ★ 1,803 MCap: \$93.71B	 LogicMonitor LogicMonitor LogicMonitor Funding: \$142.93M	 mackerel Mackerel Mackerel	 Nagios Nagios Nagios ★ 782
 NETDATA Netdata Netdata ★ 45,594 Funding: \$20.5M	 New Relic New Relic New Relic MCap: \$2.77B	 NexClipper NexClipper NexCloud ★ 447	 NODESOURCE NodeSource NodeSource Funding: \$33.4M	 OPENMETRICS OpenMetrics Cloud Native Computing Foundation (CNCF) ★ 889	 OPENTSDB OpenTSDB OpenTSDB ★ 4,009	 OverOps OverOps OverOps Funding: \$49.5M	 Prometheus Prometheus Cloud Native Computing Foundation (CNCF) ★ 25,378	 replex Replex Replex Funding: \$4.15M	 ROOKOUT Rookout Rookout Funding: \$12.2M
 Sensu Sensu Sensu ★ 2,966 Funding: \$12.5M	 SENTRY Sentry Sentry ★ 24,341 Funding: \$66.5M	 SignalFx SignalFx SignalFx Funding: \$178.5M	 StackState StackState StackState Funding: \$5M	 STORMFORGER StormForge StormForge	 sysdig Sysdig Sysdig ★ 6,041 Funding: \$191.5M	 Thanos Thanos Cloud Native Computing Foundation (CNCF) ★ 5,340	 听云 TINGYUN Tingyun Tingyun	 trickster Trickster Comcast ★ 1,063 MCap: \$157.72B	 turbonomic Turbonomic Turbonomic Funding: \$149.5M
 VECTOR By Timber.io Vector Timber ★ 3,620 Funding: \$2.28M	 VICTORIA METRICS VictoriaMetrics VictoriaMetrics ★ 1,975	 WAVEFRONT by VMware Wavefront VMware MCap: \$47B	 weave cloud Weave Cloud WeaveWorks Funding: \$20M	 weave scope Weave Scope WeaveWorks ★ 4,199 Funding: \$28M	 ZABBIX Zabbix Zabbix ★ 814				



















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Observability - Logging

Know what happened before

Observability and Analysis - Logging (16)












 Alibaba Cloud Log Service Alibaba Cloud MCap: \$495.28B	 elastic Elastic ★ 47,762 MCap: \$4.49B	 fluentd Cloud Native Computing Foundation (CNCF) ★ 8,960	 Grafana loki Grafana Labs ★ 8,901 Funding: \$25.23M	 graylog Graylog ★ 5,242 Funding: \$9.4M	 humio Humio Funding: \$11.83M
 logdna LogDNA Funding: \$33.42M	 LOGGLY Loggly Funding: \$47.4M	 logstash Elastic ★ 11,190 MCap: \$4.49B	 logz.io Logz.io Funding: \$98.9M	 loom Systems Loom Systems Funding: \$16M	 日志易 rizhiyi.com Funding: \$11.36M
 SCALYR Scalyr Funding: \$27.6M	 sematext Sematext	 splunk Splunk MCap: \$18.89B	 sumo logic Sumo Logic Funding: \$340M		

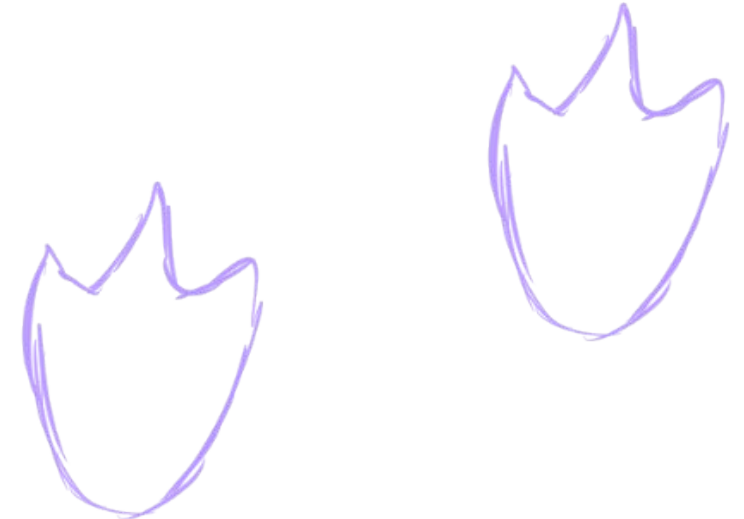


Observability - Tracing

Follow where the trail leads

Observability and Analysis - Tracing (11)

 elastic apm Elastic APM Elastic ★ 745 MCap: \$3.97B	 honeycomb.io Honeycomb Honeycomb Funding: \$26.9M	 Jaeger Cloud Native Computing Foundation (CNCF) ★ 10,545	 LIGHTSTEP LightStep LightStep Funding: \$70M	 OpenTelemetry Cloud Native Computing Foundation (CNCF) ★ 540
 OPENTRACING OpenTracing Cloud Native Computing Foundation (CNCF) ★ 2,304	 PINPOINT Pinpoint Pinpoint ★ 10,104	 Skywalking SkyWalking Apache Software Foundation ★ 12,814	 SOFATracer SOFATracer Ant Financial ★ 738 MCap: \$513.04B	 Spring Cloud Sleuth Spring Cloud Sleuth VMware ★ 1,234 MCap: \$49.41B
 ZIPKIN Zipkin Zipkin ★ 12,637				




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Security & Compliance




























*If you want people to do things right,
make it hard for them to do wrong.*

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Streaming & Messaging

Consume Data at Scale

App Definition and Development - Streaming & Messaging (25)

 Amazon Kinesis Amazon Kinesis Amazon Web Services MCap: \$983.59B	 Apache Heron Apache Heron Apache Software Foundation ★ 3,443	 Apache Nifi Apache Nifi Apache Software Foundation ★ 1,916	 Apache RocketMQ Apache RocketMQ Apache Software Foundation ★ 10,329	 Apache Spark Apache Spark Apache Software Foundation ★ 25,287	 Apache Storm Apache Storm Apache Software Foundation ★ 6,003
 Azure Event Hubs Azure Event Hubs Microsoft MCap: \$1.36T	 beam Beam Apache Software Foundation ★ 3,765	 cloudevents CloudEvents Cloud Native Computing Foundation (CNCF) ★ 1,661	 deepstream deepstream deepstreamHub ★ 6,598 Funding: \$1M	 Flink Flink Apache Software Foundation ★ 12,221	 Google Cloud Dataflow Google Cloud Dataflow Google MCap: \$951.62B
 hazelcast JET Hazelcast Jet Hazelcast ★ 414 Funding: \$63.58M	 kafka Kafka Apache Software Foundation ★ 15,043	 KubeMQ KubeMQ KubeMQ ★ 1,661	 Lightbend Lightbend Lightbend ★ 10,329 Funding: \$52.14M	 NATS NATS Cloud Native Computing Foundation (CNCF) ★ 7,342	 OpenMessaging OpenMessaging Linux Foundation ★ 647
 Pachyderm Pachyderm Pachyderm ★ 4,275 Funding: \$12.12M	 PULSAR Pulsar Apache Software Foundation ★ 5,167	 RabbitMQ RabbitMQ Rabbit Technologies ★ 6,858	 Siddhi Siddhi WSO2 ★ 986 Funding: \$40.5M	 StreamSets StreamSets StreamSets ★ 927 Funding: \$67.5M	 STRIMZI Strimzi Cloud Native Computing Foundation (CNCF) ★ 1,182
 talend Talend Data Streams Talend MCap: \$1.07B					

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Remote Procedure Call

Orchestration & Management - Remote Procedure Call (6)

 Apache Thrift™ Apache Thrift Apache Software Foundation ★ 7,246	 Avro Avro Apache Software Foundation ★ 1,497	 Dubbo Dubbo Apache Software Foundation ★ 31,222	 gRPC gRPC Cloud Native Computing Foundation (CNCF) ★ 25,066	 SOFARPC SOFARPC Ant Financial ★ 3,029 MCap: \$572.74B	 TARS TARS Linux Foundation
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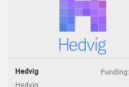











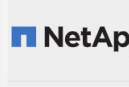



























Distributed Systems, Distributed Communication

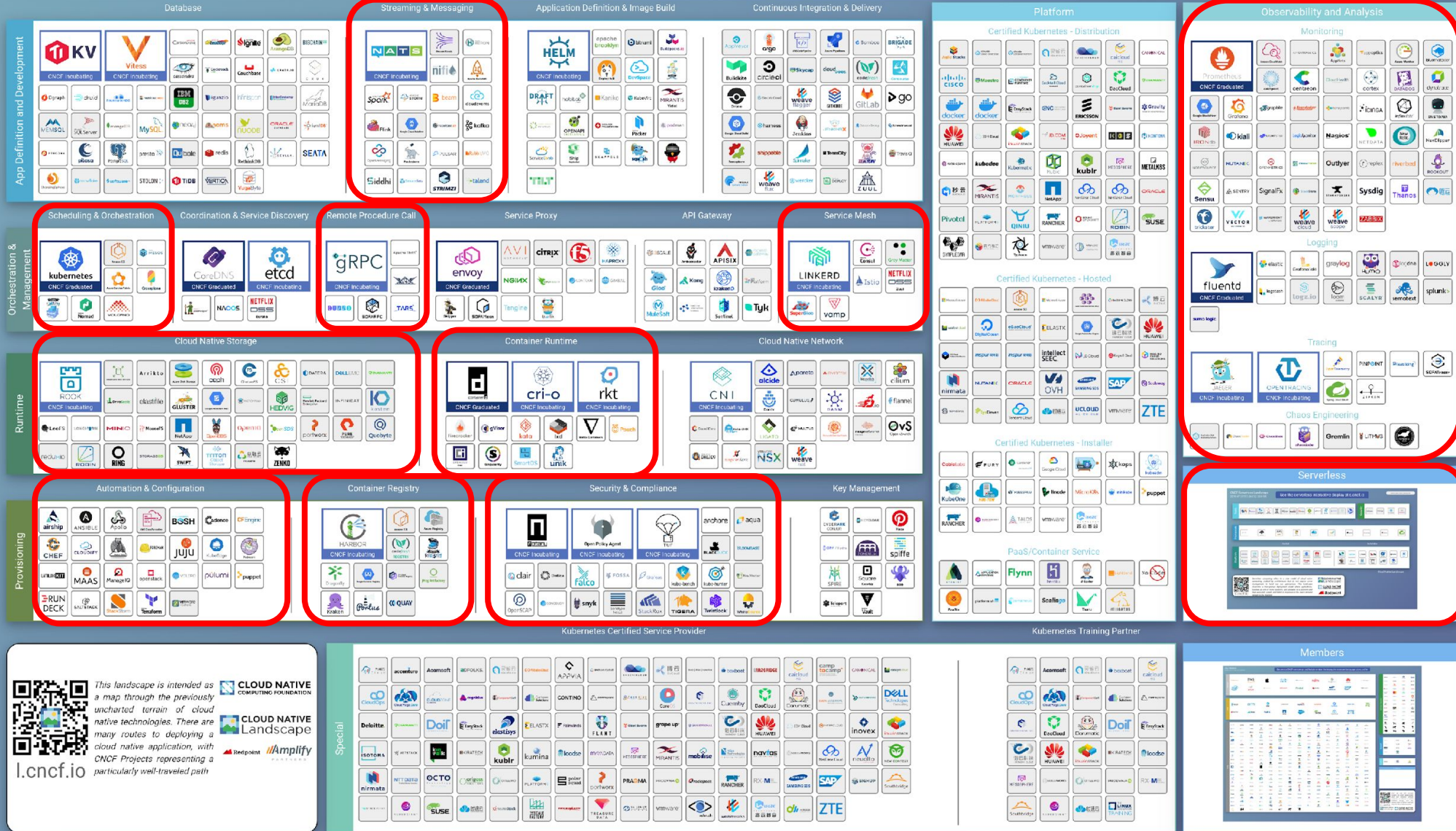


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Cloud Native Storage *If the system is distributed, where is the data?*



Runtime - Cloud Native Storage (41)											
 Alluxio ★ 4,533 Funding: \$16M	 Amazon Elastic Block Store (EBS) MCap: \$953.8B Amazon Web Services	 Arrikto Funding: \$2M	 Azure Disk Storage MCap: \$1.13T Microsoft	 Ceph Ceph Foundation ★ 7,507	 ChubaoFS ★ 1,657 Cloud Native Computing Foundation (CNCF)	 Container Storage Interface (CSI) ★ 602 Google MCap: \$779.77B	 Datera Funding: \$63.9M	 Dell EMC MCap: \$28.77B	 Diamanti Funding: \$78M	 DriveScale Funding: \$2M	 Elasticfile Funding: \$74M
 Dell EMC MCap: \$28.77B	 Diamanti Funding: \$78M	 DriveScale Funding: \$2M	 Elasticfile Funding: \$74M	 Gluster ★ 2,477 Red Hat MCap: \$93.71B	 Google Persistent Disk ★ Cap: \$779.77B Google	 Hedvig Funding: \$32M	 Hitachi	 HPE Storage MCap: \$11.52B Hewlett Packard Enterprise	 INFINIDAT Funding: \$325M	 Kasten Funding: \$17M	 Longhorn ★ 1,285 Cloud Native Computing Foundation (CNCF)
 HPE Storage MCap: \$11.52B Hewlett Packard Enterprise	 INFINIDAT Funding: \$325M	 Kasten Funding: \$17M	 Longhorn ★ 1,285 Cloud Native Computing Foundation (CNCF)	 MinIO ★ 20,872 Funding: \$23.3M	 MooseFS ★ 807 Tuxera	 NetApp MCap: \$8.47B	 Nutanix Objects MCap: \$3.58B	 OpenEBS ★ 6,017 Cloud Native Computing Foundation (CNCF)	 OpenIO ★ 292 Funding: \$5M	 OpenSDS ★ 671	 Portworx Funding: \$55.5M
 OpenEBS ★ 6,017 Cloud Native Computing Foundation (CNCF)	 OpenIO ★ 292 Funding: \$5M	 OpenSDS ★ 671	 Portworx Funding: \$55.5M	 Pure Storage MCap: \$3.22B	 Quobyte Quobyte	 ReduX.io Funding: \$58.4M	 Robin Systems Funding: \$46M	 Rook ★ 6,949 Cloud Native Computing Foundation (CNCF)	 Scality RING Funding: \$132M	 StorageOS Funding: \$10M	 Swift ★ 2,025 OpenStack
 Rook ★ 6,949 Cloud Native Computing Foundation (CNCF)	 Scality RING Funding: \$132M	 StorageOS Funding: \$10M	 Swift ★ 2,025 OpenStack	 Triton Object Storage ★ 595 Joyent Funding: \$131M	 Velero ★ 3,491 VMware MCap: \$47B	 XSKY Funding: \$66.36M	 YRCLOUDFILE Funding: \$7.27M	 Zenko ★ 288 Scality Funding: \$152M			
 Zenko ★ 288 Scality Funding: \$152M											



Thanks for Visiting Cloud Land!



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