Week 8

Road To Cloud

Cassandra Cloud-Native Workshop Series

Building Cloud-Native apps with Cassandra Expertise


DATASTAX
#8/8 Road to Cloud

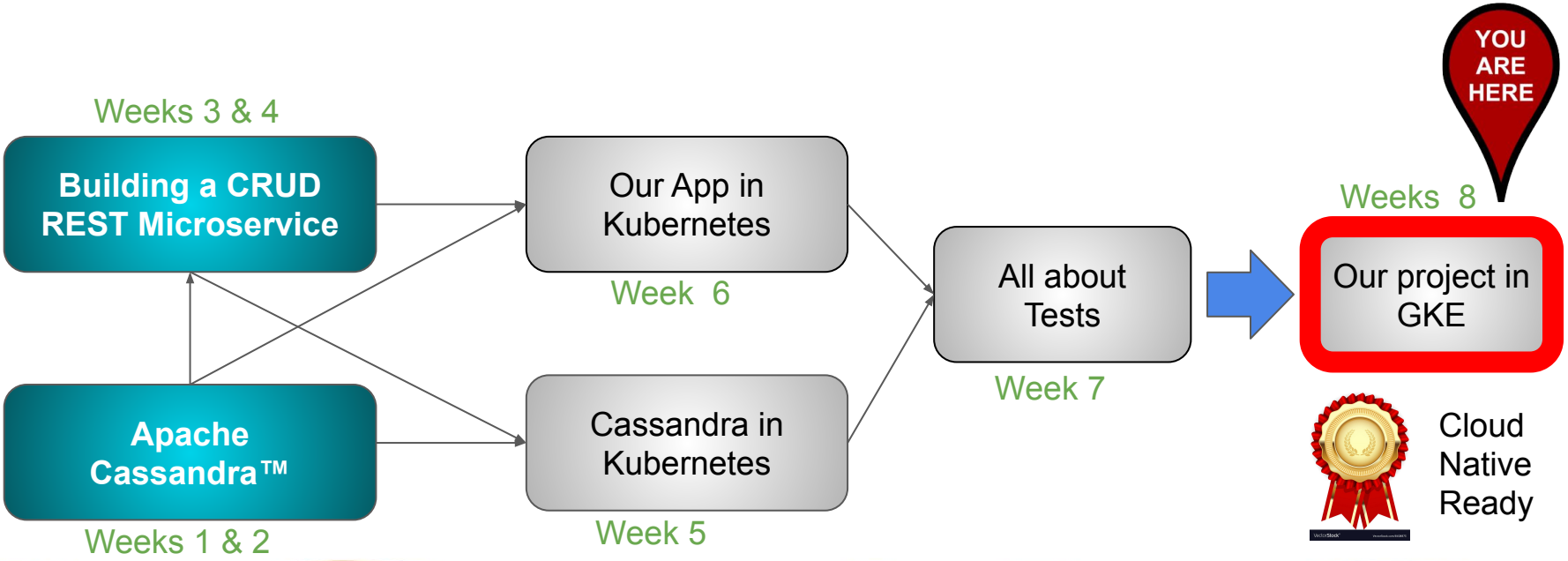
DataStax Developer Special Unit !

David Jones-Gilardi	Eric Zietlow	Erick Ramirez	Cédrick Lunven	Bettina Swynnerton	Jack Fryer	Aleksandr Volochnev

MATERIALS → bit.ly/CassandraWorkshopMaterials

DATASTAX + Apache Cassandra

Last stop !


YOU ARE HERE
Weeks 3 & 4
Building a CRUD REST Microservice
Apache Cassandra™
Weeks 1 & 2
Our App in Kubernetes
Week 6
Cassandra in Kubernetes
Week 5
All about Tests
Week 7
Weeks 8
Our project in GKE
Cloud Native Ready

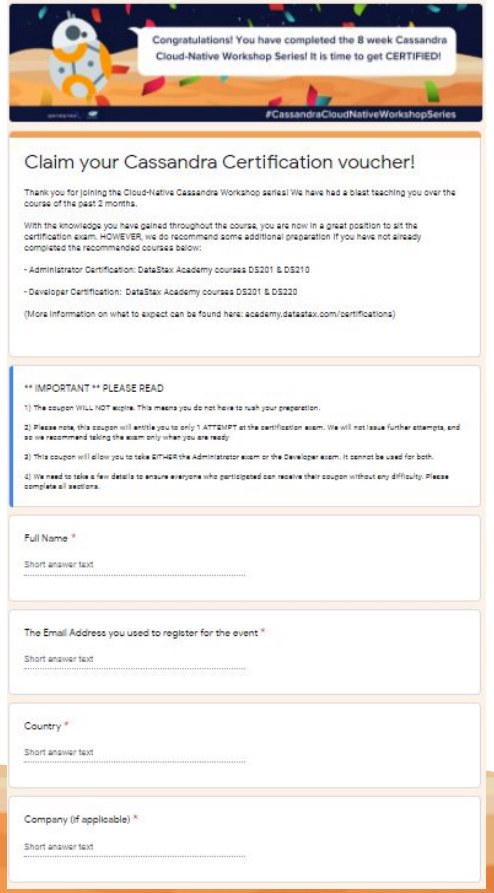
A word on certification vouchers

What do I need to do to get a voucher?

Early *NEXT WEEK* you will receive an email with a link to claim your certification voucher

You **must complete the form** if you would like to receive the voucher.

The form will be sent ***NEXT WEEK***



Developer Workshop Series **Week 8**

- ➔ Housekeeping and setup
- ➔ Cloud Computing Overview
- ➔ Cloud Providers and Services
- ➔ Deploy our Application in GKE 1
- ➔ Deploy our Application in GKE 2
- ➔ Conclusion

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Livestreams

YouTube

Twitch

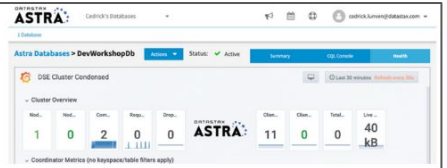
Live Questions

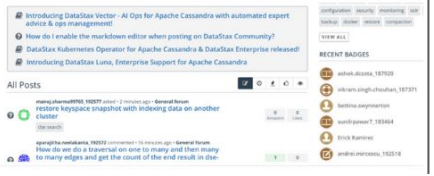
YouTube

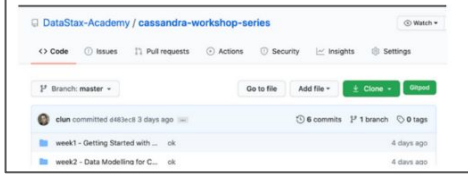
Discord

Materials & Help

DATASTAX COMMUNITY







Astra.datastax.com

cassandra

GitHub

Google Cloud

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menti.com
46 74 04
Mentimeter
What is the most desirable feature of your ideal workplace?
Flexible time
Social factor
Big paycheck
Available on the iPhone
App Store
GET IT ON
Google play

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Cloud Computing

- **On-demand** availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user.
- Becomes popular in **2006** with creation of Amazon web services (AWS) and their first service Elastic cloud computing

Principles and Advantages

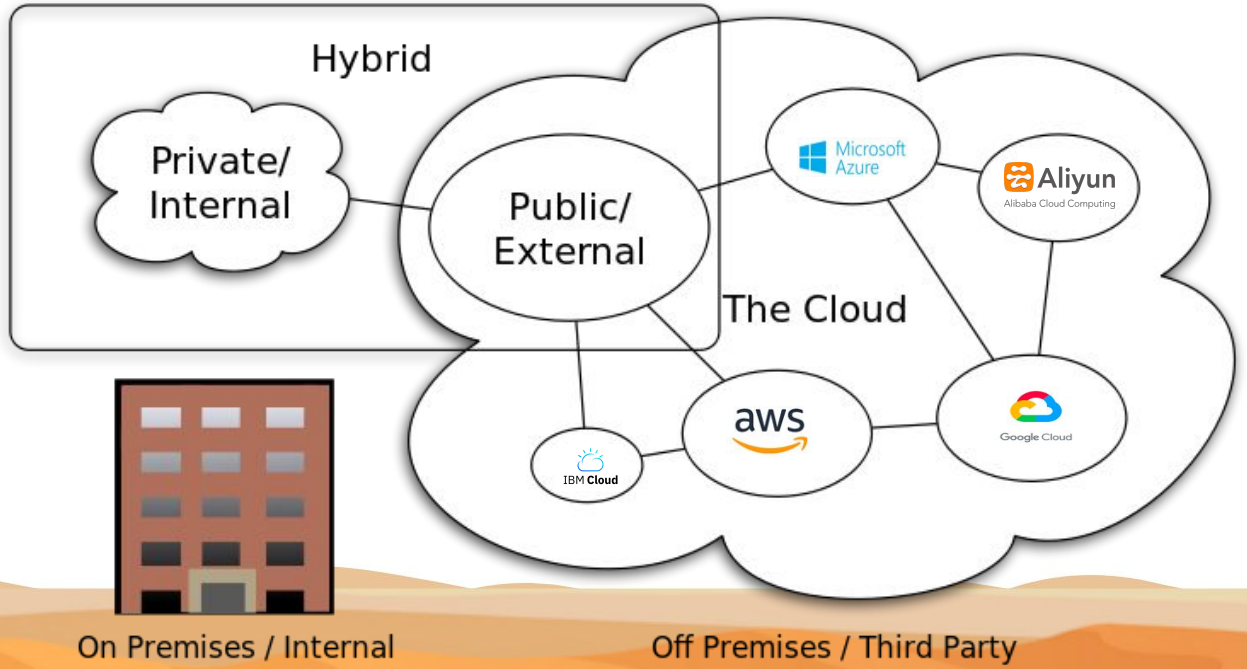
Principles

- On-demand & Self-service
- Broad network access
- rapid elasticity
- measured Service = pay-as-you-go
- resources pooling = mutualization

(some) Advantages

- **Cost Savings**
- Disaster recovery
- Security
- Loss Prevention
- Flexibility
- Automatic updates
- Mobility
- Insights

Deployment Models

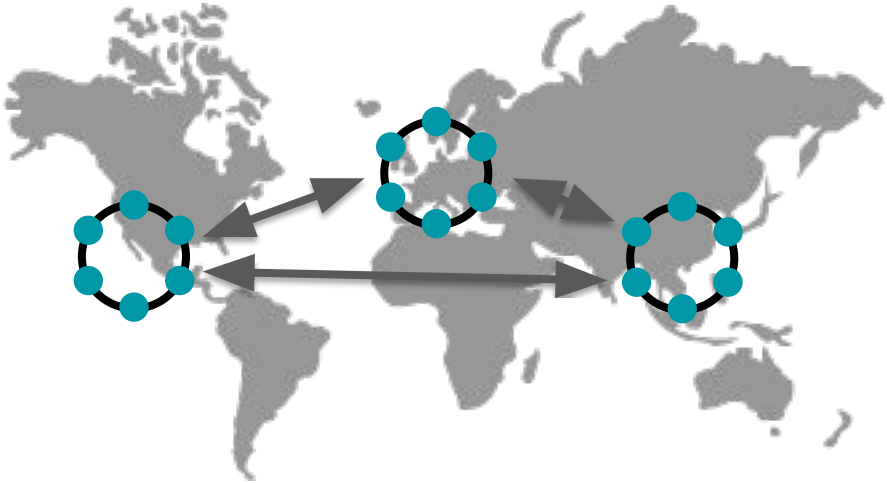


- PUBLIC-CLOUD
- PRIVATE-CLOUD
- HYBRID-CLOUD
- MULTI-CLOUD

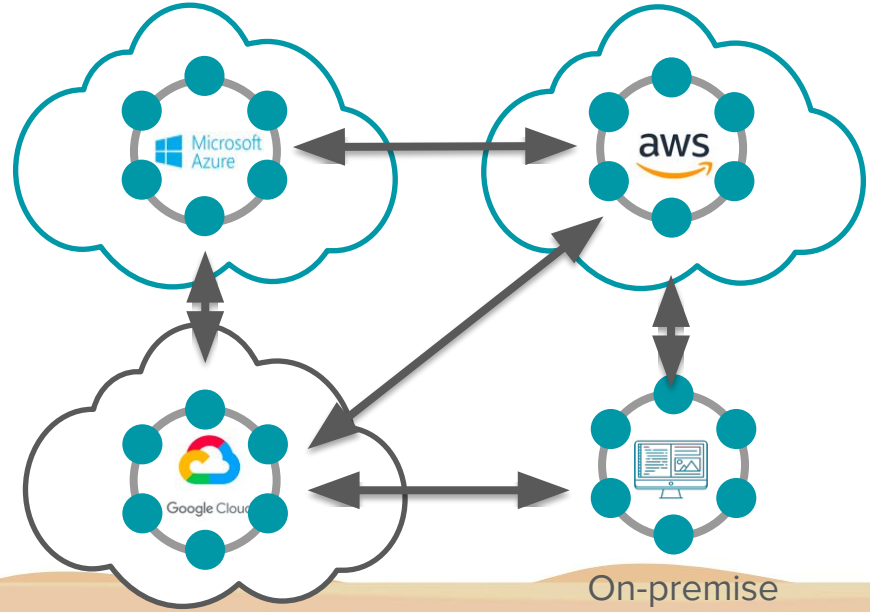
- Community Cloud
- Distributed Cloud

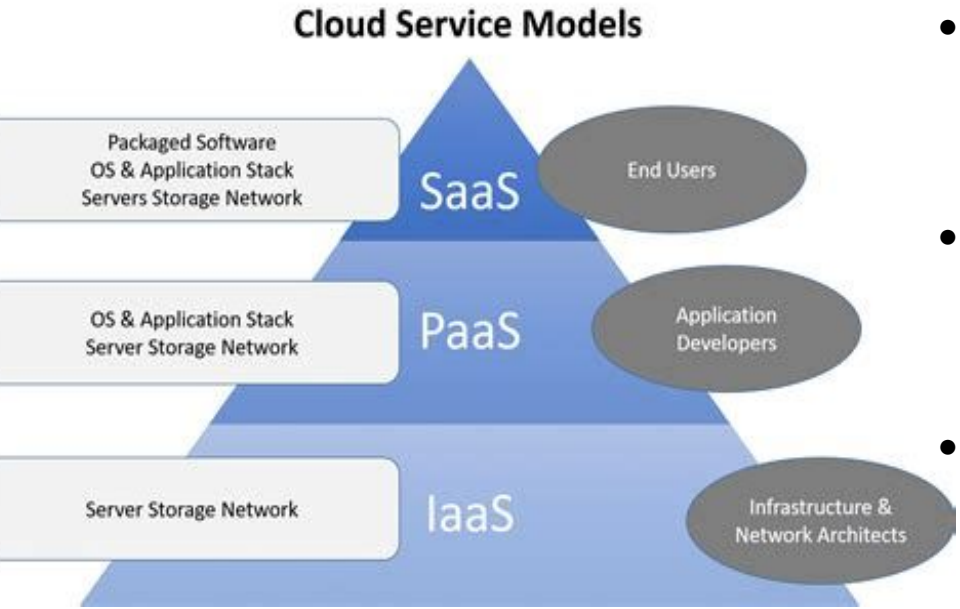
Cassandra fit Cloud Deployments ?

- Geographic Distribution



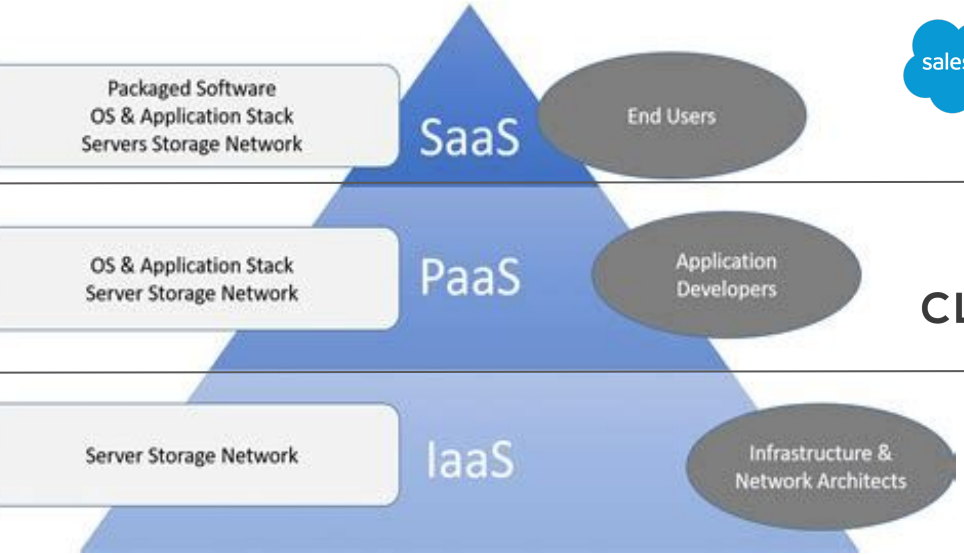
- Hybrid-Cloud and Multi-Cloud





- **Software-as-a-Service:** applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser or a program interface.
- **Platform-as-a-Service:** deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider.
- **Infrastructure-as-a-Service:** APIs to abstract various low-level details of underlying network infrastructure like physical computing resources, location, data partitioning, scaling, security, backup,

Cloud Service Models



salesforce

DATASTAX ASTRA

workday.

shopify

heroku

CLOUD FOUNDRY

amazon web services
Elastic Beanstalk

Google App Engine

OPENSHIFT

amazon web services™

Azure

Google Cloud Platform

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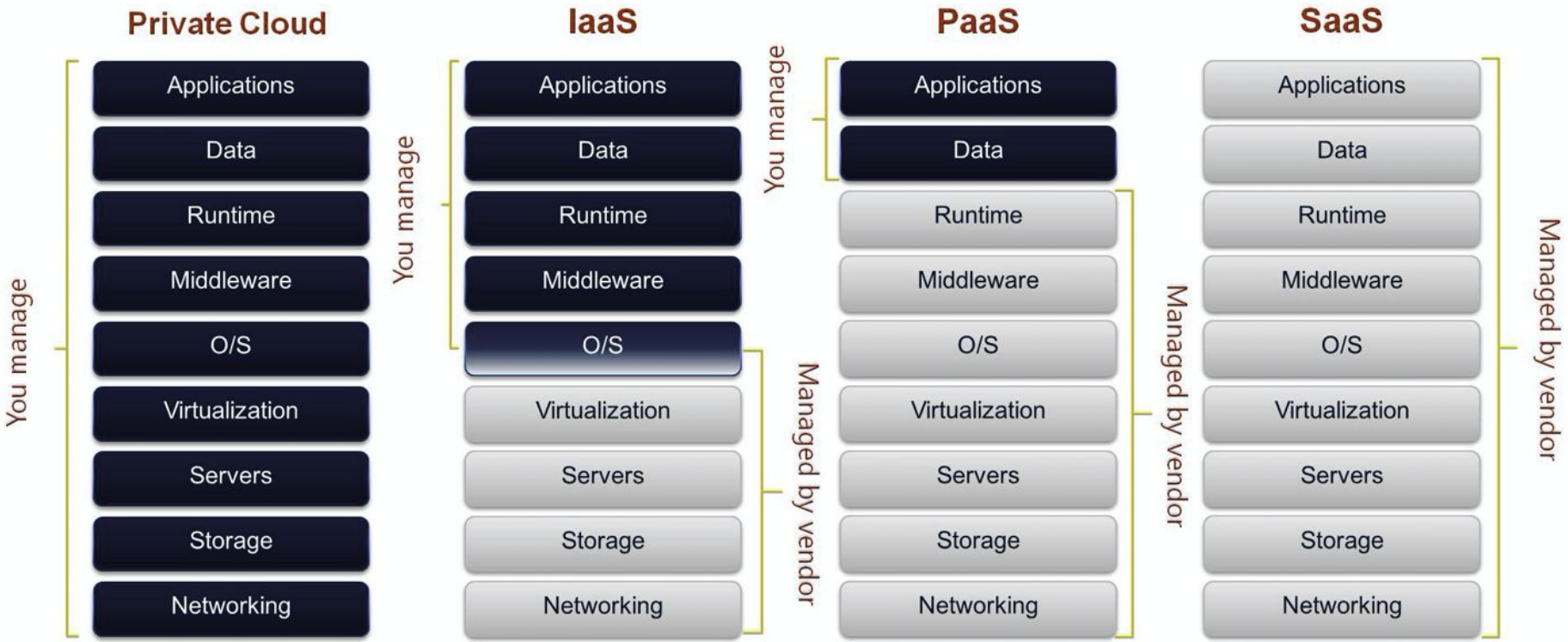

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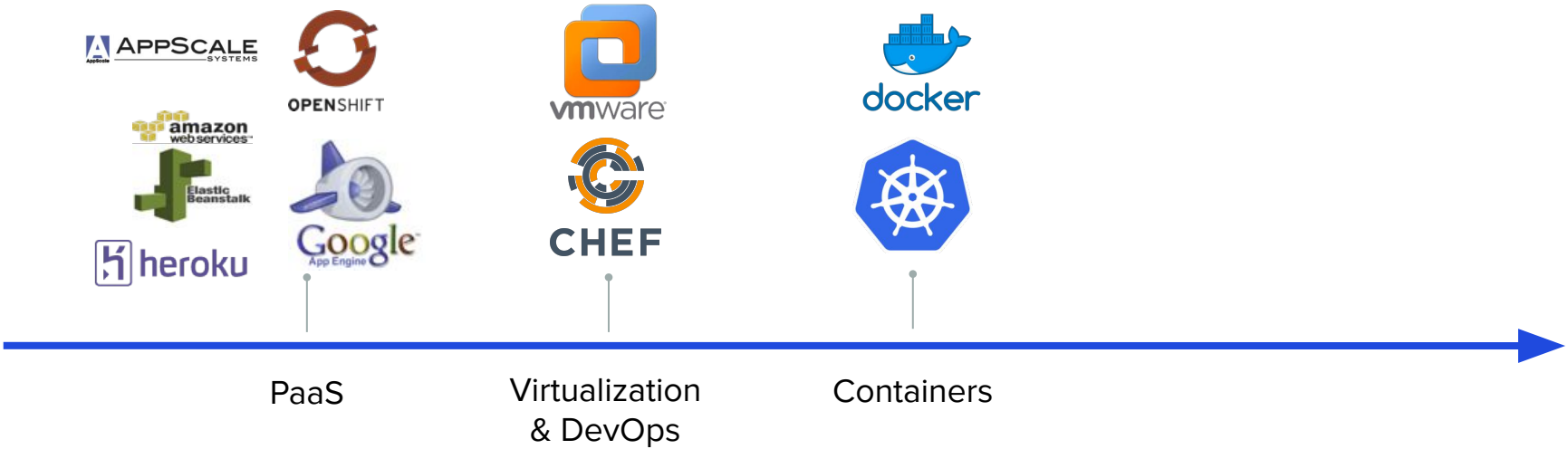
Business Management
Adaptive Planning
AppNeta
aria
Billcom
BULLHORN
Certain
citrix
clarizen
Corefino SERVICES, LLC
Cornerstone
coupa
COVARIO
cvent
CyberShift
HALOGEN
hostanalytics
HUBSPAN
Intacct
LATTICE ENGINES
liveops
Marin SOFTWARE
NetApp
NETSUITE
ORACLE
oDesk
pivotlink
RingCentral
workday.
zuora
productecv
Tools
Acquia
APPIR10
bluewolf
Cloud 9
cloudshare
contactual
Corent
DATAZEN
factory.
DOTNETNUKE
jive
COLLABNET.
Paglo
PowerReviews
puppet labs
New Relic
sonian
stoneware, inc.
+ableau SOFTWARE
webtrends
zendesk
Vertical Apps
41st Parameter
CoreCloud
CENZIC
DocuSign
iovation
iPipeline
Jobvite
nextpoint
PERIMETER
Portico
TRICIPHER
WhiteHat SECURITY
Cloud Security
CloudPassage
PROLEXIC
DDoS Attacks End Here.
QUALYS
radware
Symplified
VERACODE
CRM
aprimo
ELOQUA
THE POWER TO SUCCEED.
HubSpot
Marketo
MaxHire
salesforce
Silverpop
Zoho Work. Online
SUGARCRM.
SaaS
Development & Testing
CLOUD FOUNDRY
cloudera
Engine Yard
dotCloud
Mu Dynamics
redhat
SOASTA
standingcloud
Application Platform
10gen
active endpoints
Segnyte
EUCALYPTUS
OpSource
venda
Database
COUCHBASE
DEPHIX
ORACLE
LONGJUMP
Integration
Aerohive NETWORKS
apigee
AppScale
BOOMI
ca 3tera
CAST IRON SYSTEMS
Connect
INFORMATICA
IntelePeer
Palantir
Windows Azure AppFabric
General
at&t
enomaly
Google
Microsoft SQL Azure
force.com
verizon
IBM Cloud Service Provider Platform
PaaS
Cloud Management
abiquo
aspera
bmc software
ca Technologies
CLOUDSWITCH
GOGRID
Kaavo
MaaS360
RIGHTSCALE
Path
service now
Skytap
zeus
zimory
Virtualization
MeghaWare (CloudOptix)
CLOUD
pano LOGIC
vmware
Networking
Aryaka
cisco
embrane
hp
JUNIPER
SPICEWORKS
terremark
Content Delivery Networks
Akamai
ca 3tera
INTERNAP
Storage
Appistry
box
CORAID
fluidinfo
Dropbox
nasuni
IBM CloudBurst
NephoScale
NUTANIX
parascale
RainStor
ReliaCloud
SPANNING
SYMMETRIX (EMC)
Computing
amazon web services
bluelock.
CALXEDA
ELASTRA
EMC²
flexiscale
FUSION-IO
Go Daddy.com
Joyent
nicira
nimbula
Novell
rackspace HOSTING
sentilla
IaaS
Created by:
CloudTimes

From PaaS to Containers-as-a-service (CaaS)



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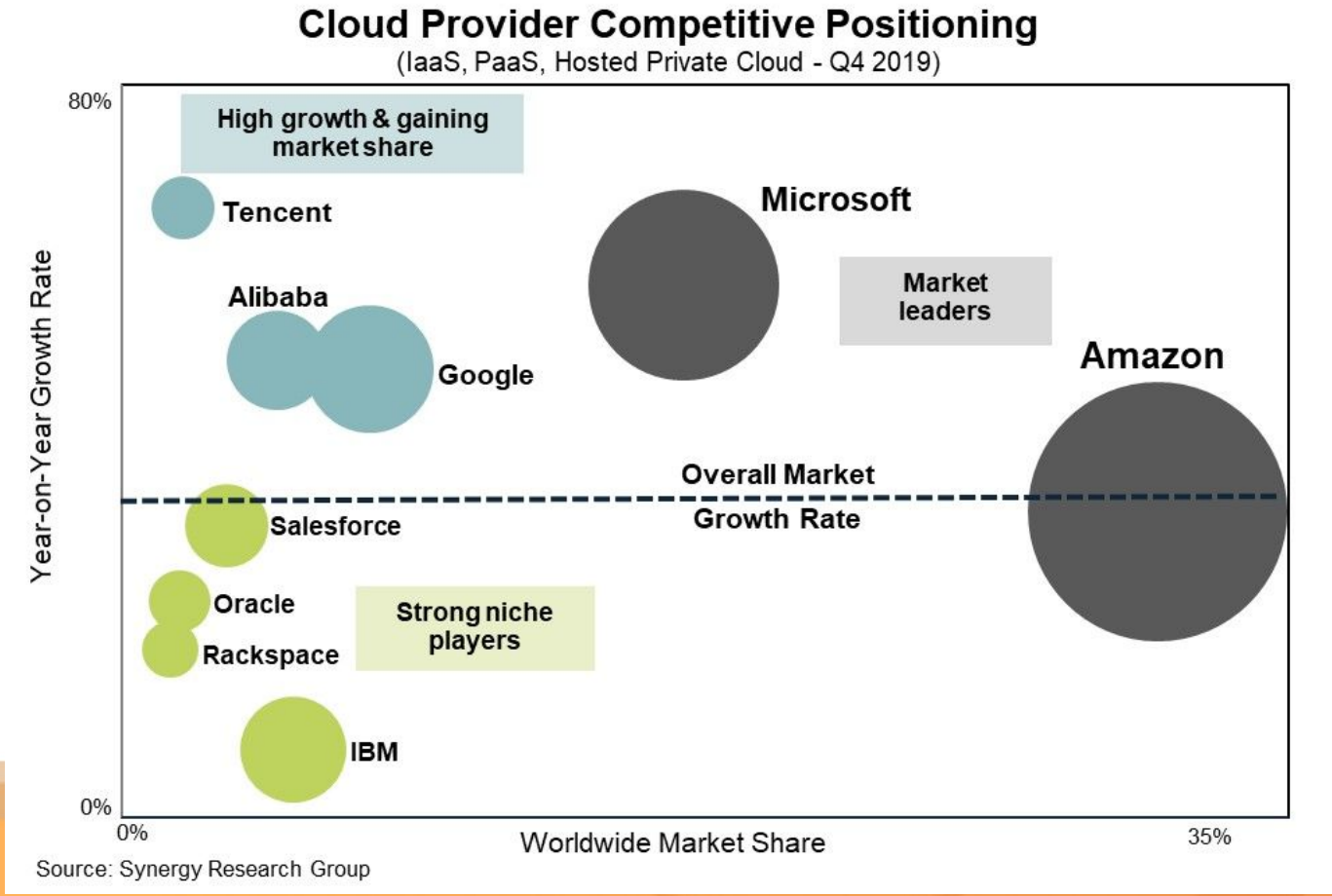
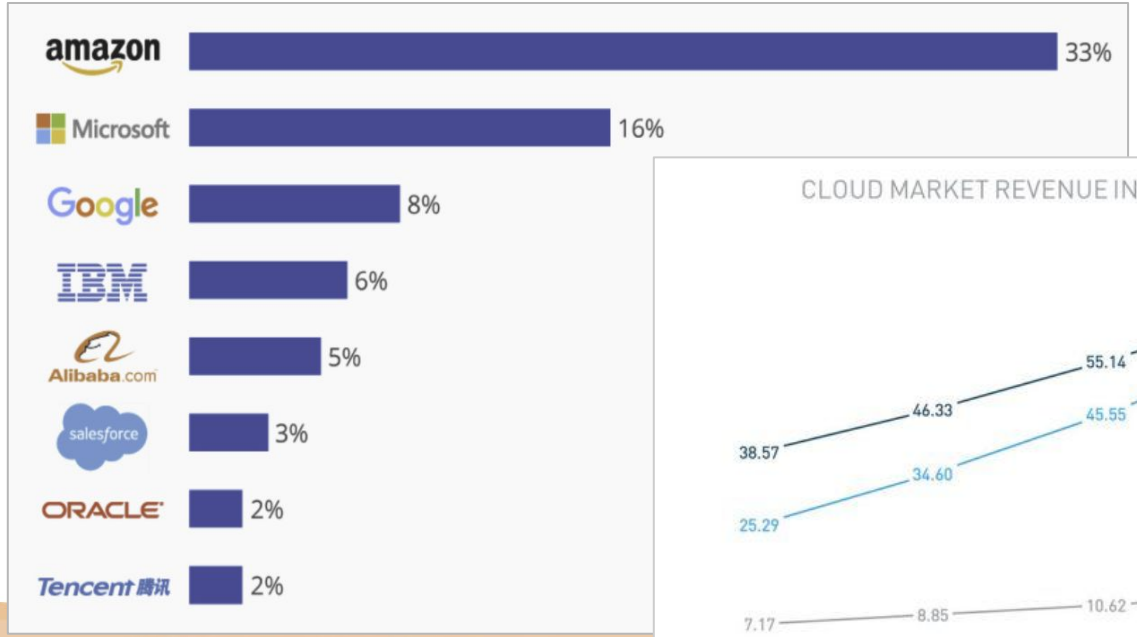
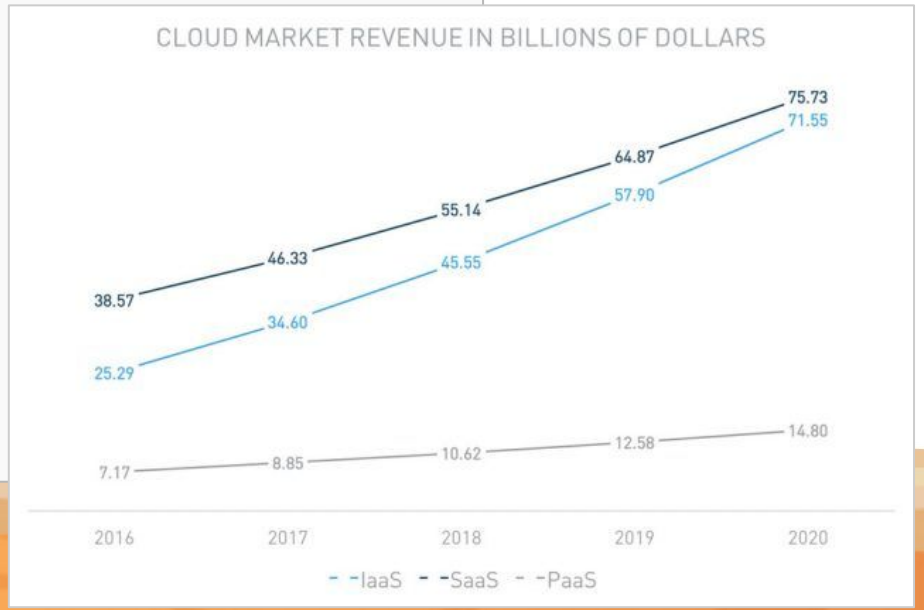
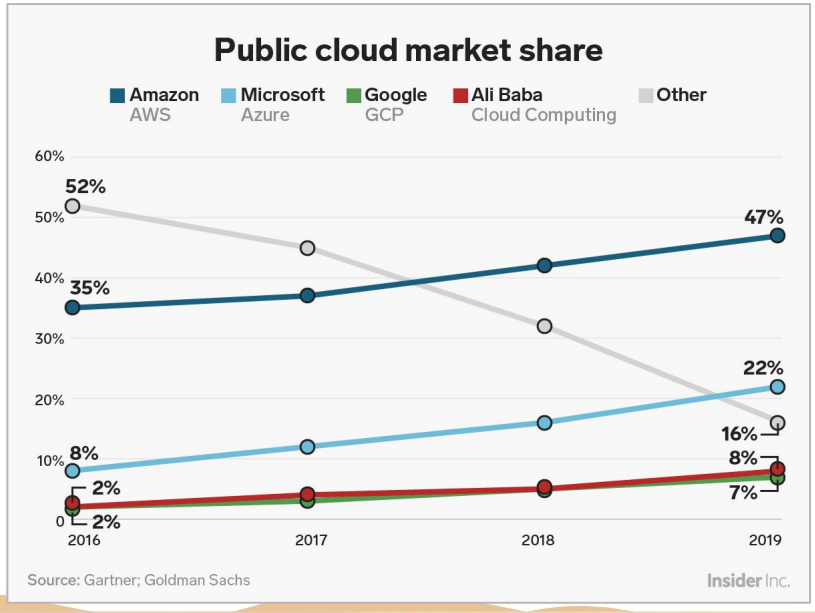

Cloud Provider Competitive Positioning
(IaaS, PaaS, Hosted Private Cloud - Q4 2019)
80%
High growth & gaining market share
Tencent
Microsoft
Market leaders
Alibaba
Google
Amazon
Year-on-Year Growth Rate
Overall Market Growth Rate
Salesforce
Oracle
Rackspace
Strong niche players
IBM
0%
0%
Worldwide Market Share
35%
Source: Synergy Research Group

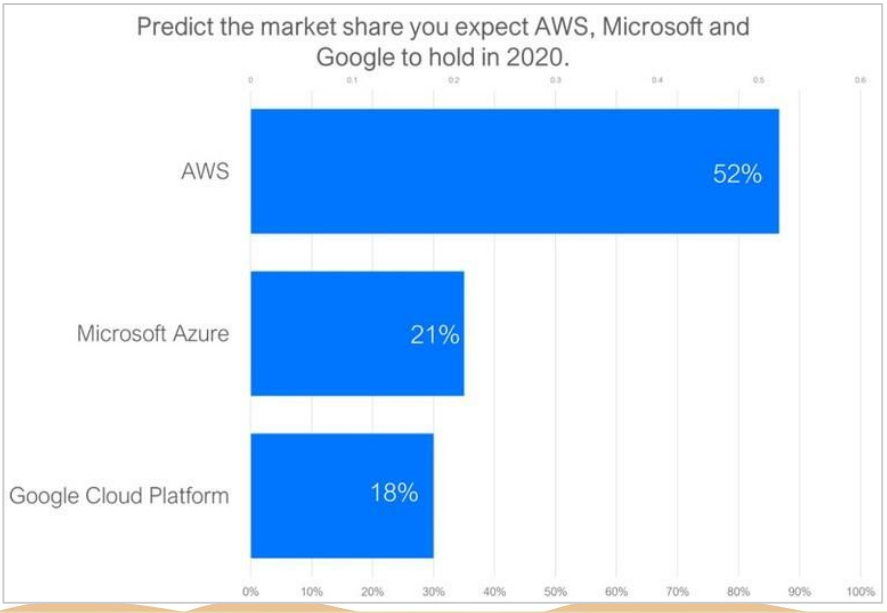
Cloud market revenue





Public cloud market share

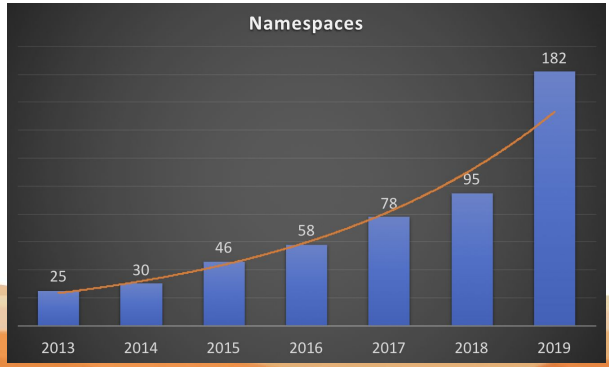





amazon
web services™

Amazon Web Services (AWS)

- Created in 2006
- Global Infrastructure
  - **24 regions**
  - **77 Availability zones**
- **219 “Services”**



Amazon Web Services (AWS) LINK


Analytics


Application Integration


AR & VR


AWS Cost Management


Blockchain


Business Applications


Compute


Containers


Customer Engagement


Database


Developer Tools


End User Computing


Game Tech


Internet of Things


Machine Learning


Management & Governance


Media Services


Migration & Transfer


Mobile


Networking & Content Delivery


Quantum Technologies


Robotics


Satellite


Security, Identity & Compliance


Storage

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10 AWS Services you should know

- **Compute**
  - IaaS: AWS Elastic Compute Cloud (EC2)
  - PaaS: AWS Elastic Beanstalk
  - FaaS: AWS Lambda

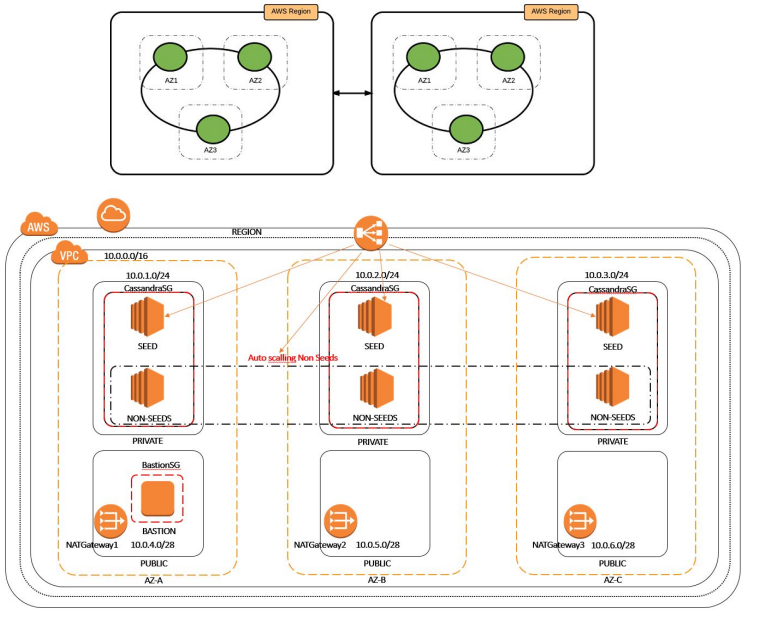
- **Containers**
  - Amazon Elastic Container Service (ECS)
  - Amazon Elastic Kubernetes Service (EKS)

- **Storage**
  - Amazon Simple Storage Service (S3)
  - Amazon Elastic Block Store (EBS)

- **Networking**
  - Amazon VPC
  - Amazon Route 53
  - Amazon CloudFront

Deploy Cassandra on AWS

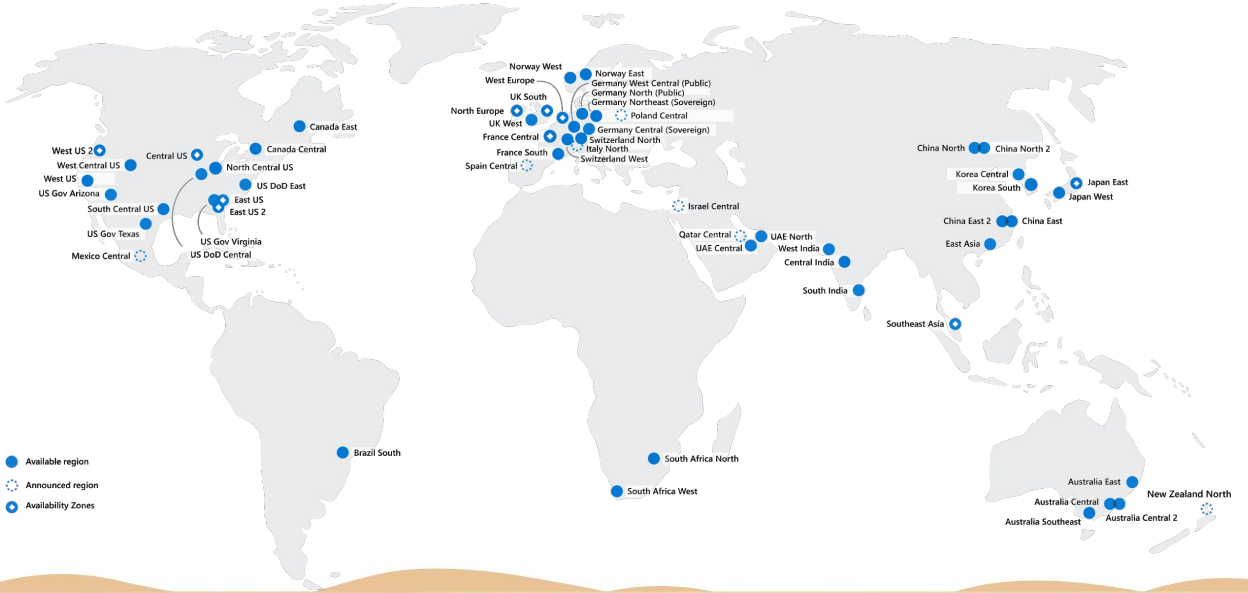
- **IaaS**
  - Instantiate EC2 and install Cassandra
  - Prebuilt Images and AMI for Apache Cassandra
- **PaaS**
  - Amazon Marketplace
  - DataStax DMS
- **SaaS**
  - Use ASTRA on AWS instances
  - Amazon Keyspaces
- **CaaS**
  - Use cass-operator in EKS



Microsoft Azure

Azure

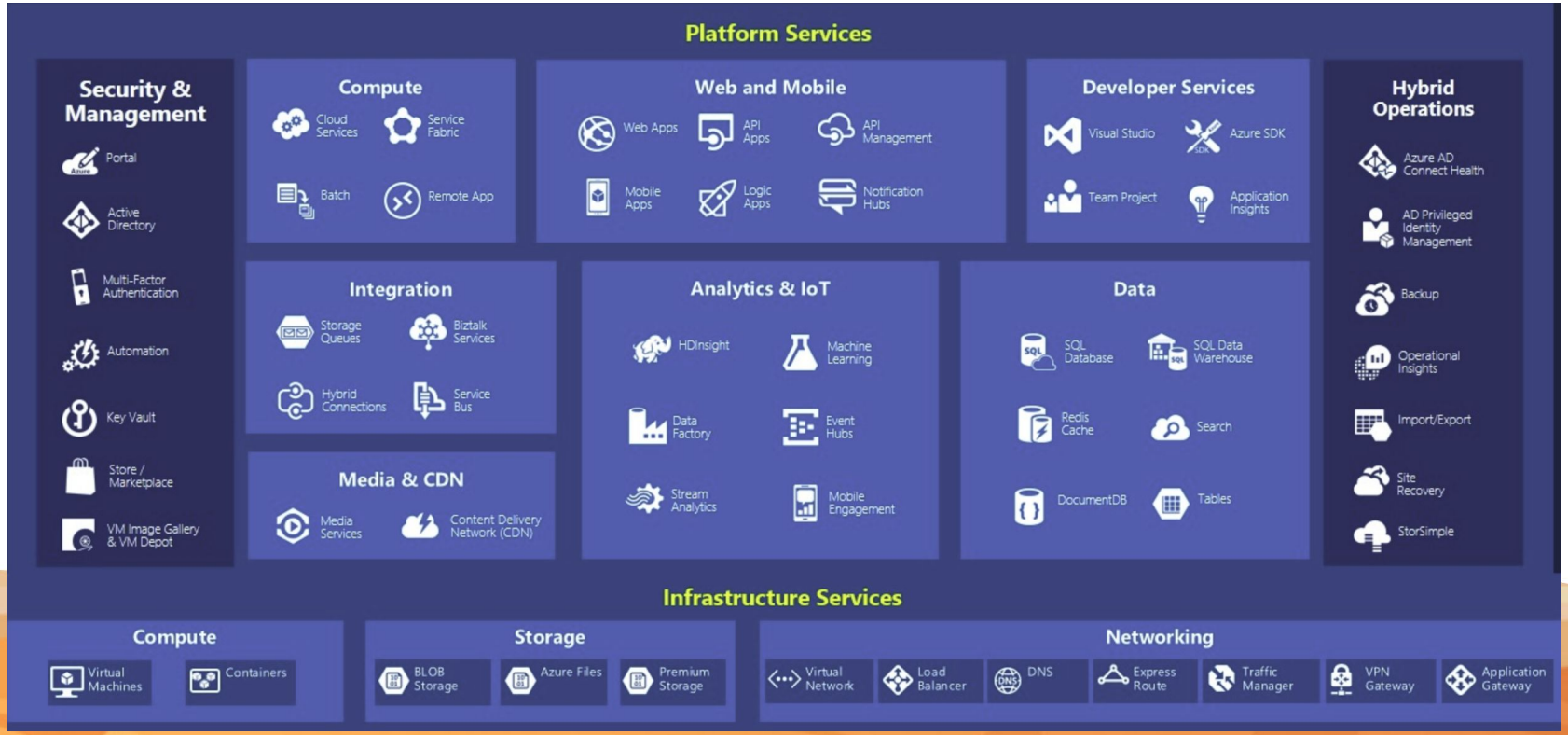
Microsoft Azure



- Created in 2010
- Global Infrastructure
  - **40 regions**
  - **50 Availability zones**

Microsoft Azure Services

Microsoft Azure



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10 Azure Services you should know

Microsoft Azure

- **Compute**
  - IaaS: Azure virtual machines
  - PaaS: Azure App Service
  - FaaS: Azure Functions
  - CaaS: Azure Kubernetes services (AKS)

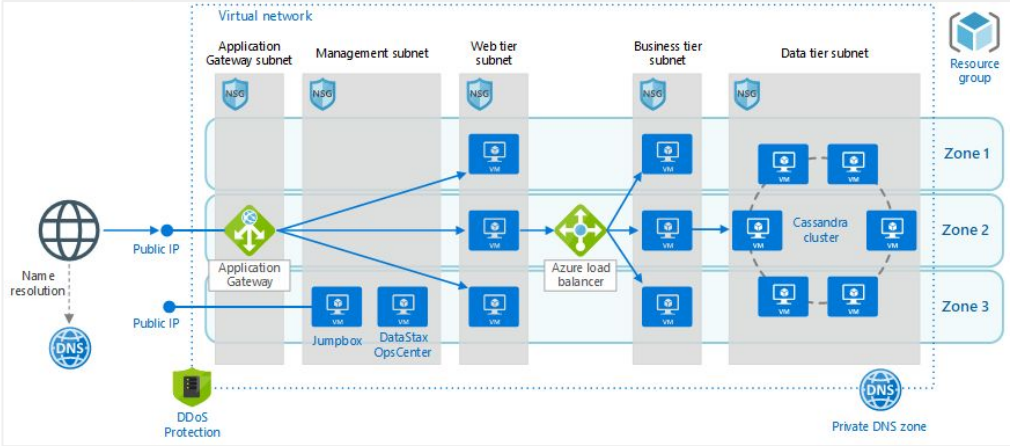
- **Databases**
  - Cosmos DB

- **Storage**
  - Disk Storage (blocks)
  - Azure Blob Storage (objects)

- **Networking**
  - Azure Virtual Network (Vnet)
  - Azure CDN
  - Azure DNS

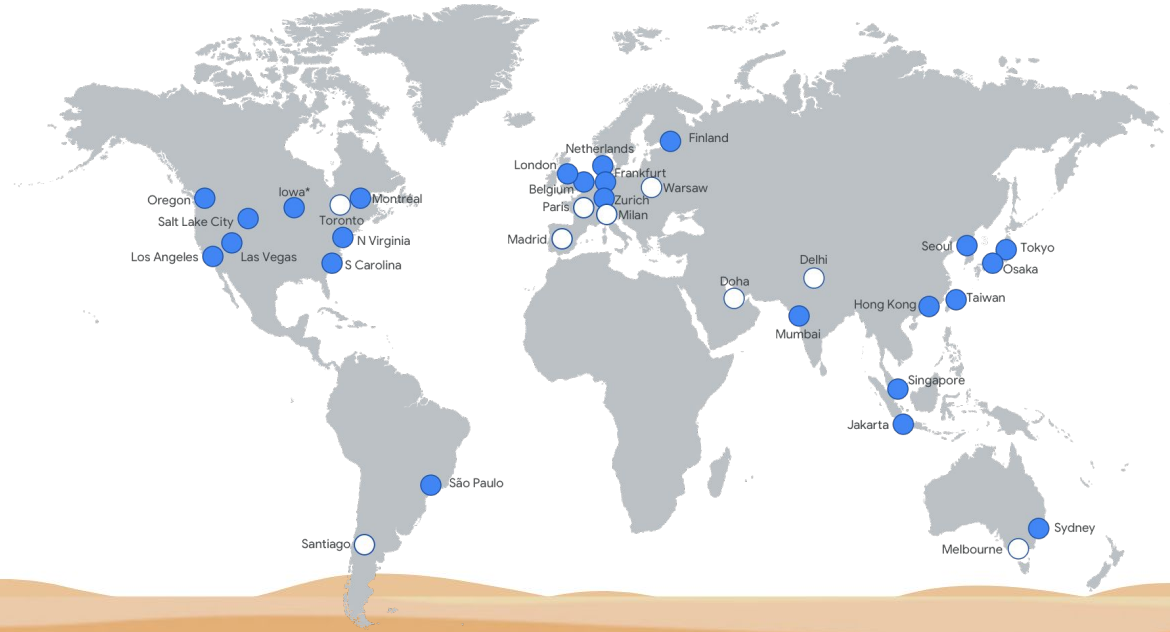
Deploy Cassandra on Azure

- **IaaS**
  - Create virtual machines and install Cassandra
  - Prebuilt Images for Apache Cassandra
- **PaaS**
  - Azure Marketplace (managed service)
  - DataStax DMS
- **SaaS**
  - Use ASTRA on Azure (beta)
  - CosmosDB(-ish)
- **CaaS**
  - Use cass-operator in AKS



Google Cloud Platform

Google Cloud Platform (GCP)



- Created in 2008
- Global Infrastructure
  - **24 regions**
  - **73 Availability zones**

- **34 "Services"**
  - Compute
  - Storage
  - Big Data
  - Machine Learning

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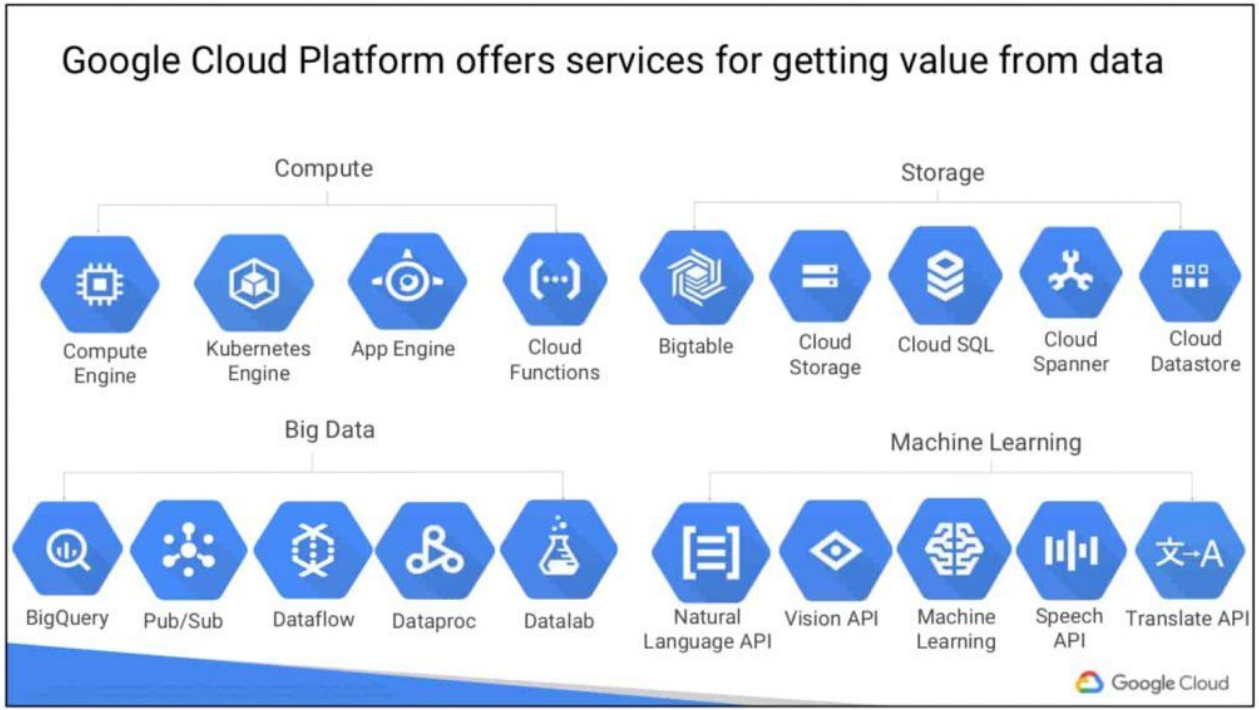
GCP Services

Google Cloud Platform



10 GCP Services you should know

Google Cloud Platform

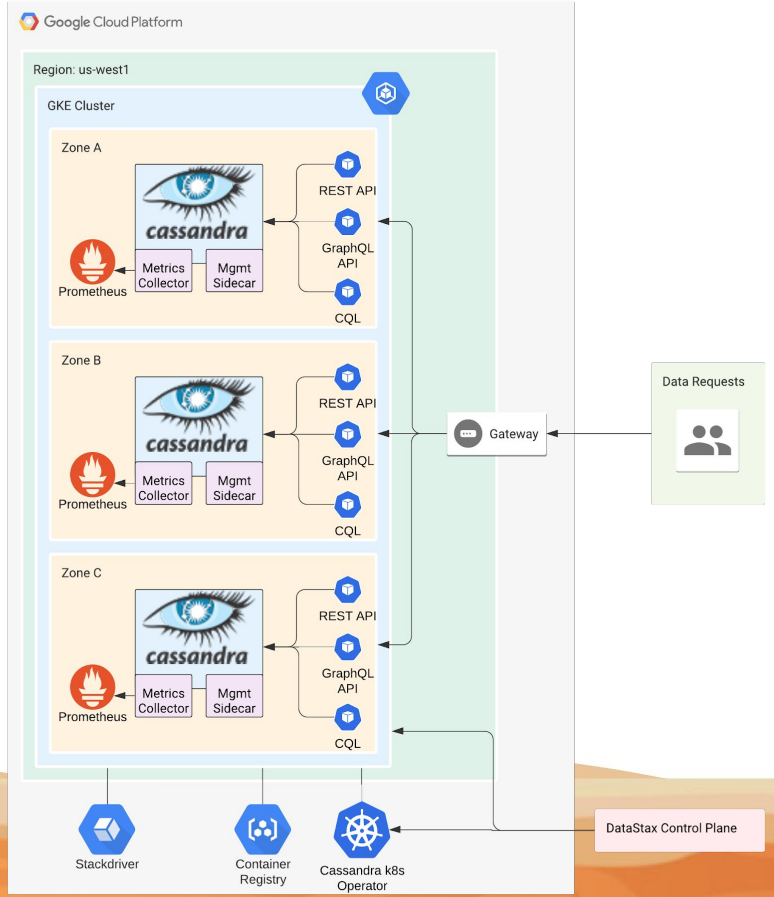
- **Compute**
  - IaaS: Compute engine (machines)
  - PaaS: Application engine (run apps)
  - FaaS: Cloud functions (serverless)
  - CaaS: Kubernetes Engine
- **Data Analytics**
  - Google Big Query

- **Storage**
  - Persistent Disk (blocks)
  - Google Cloud Storage (objects)
- **Network**
  - Google Virtual Private Cloud
  - Google CDN
  - Google Cloud DNS

https://cloud.google.com/docs/compare/aws/

Deploy Cassandra on GCP

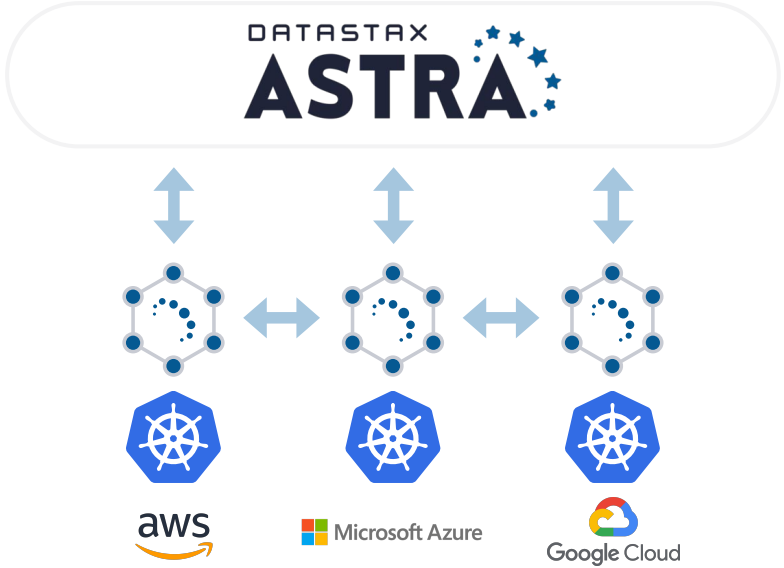
- **IaaS**
  - Use Google Compute Engine
    - https://github.com/DSPN/google-compute-engine-dse
  - Prebuilt Images for Apache Cassandra
- **PaaS**
  - Google Cloud Launcher (Marketplace)
  - DataStax DMS
- **The SaaS way**
  - Use ASTRA targetting GCP
  - Use ASTRA from google cloud console
- **The CaaS/KaaS way**
  - Use the cass-operator in GKE



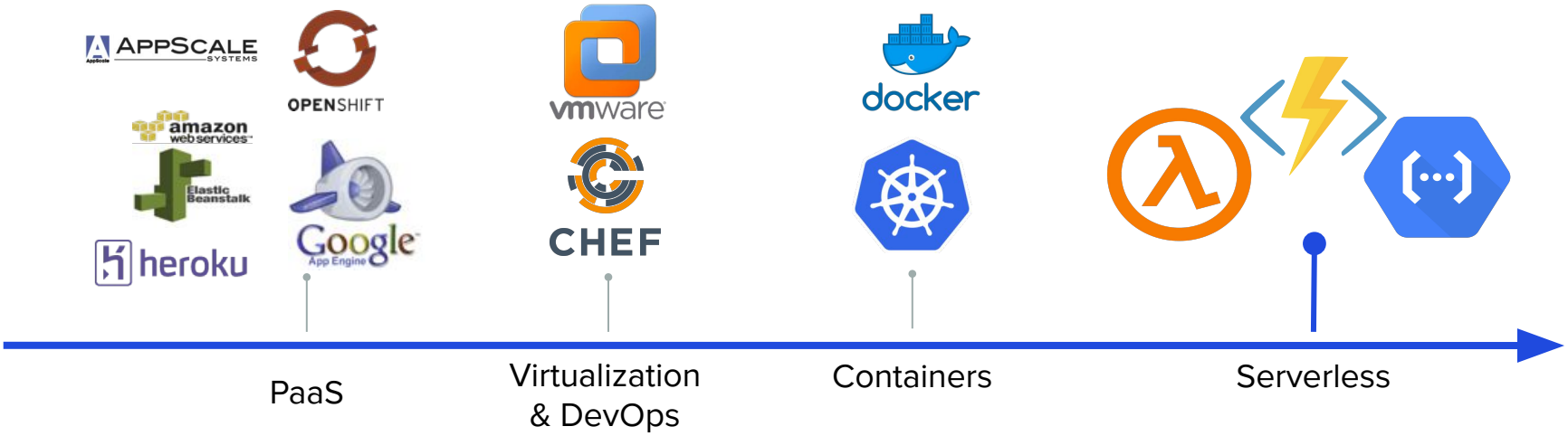
DataStax ASTRA
Cassandra made easy in the cloud

Build multi-cloud, multi-region applications with zero lock-in, zero-ops, massively scalable database as-a-service.

The power and reliability of Apache Cassandra combined with rich data APIs and optimized for developers building cloud-native applications.



From Containers to Function-as-a-service (FAAS)



Serverless

Cloud Provider serverless offerings

Cloud Agnostic serverless tooling

Serverless Best Practice with Driver

1. Create the driver connection to the database outside of the function entrypoint
2. Be aware of the number of client connections to your database

3. Consider the query characteristics compared to the function runtime
4. Optionally reduce startup time by disabling driver metadata & pooling warmup

5. Disable the driver heartbeats that ping idle connections
6. Move the data access and business logic away from the function entrypoint

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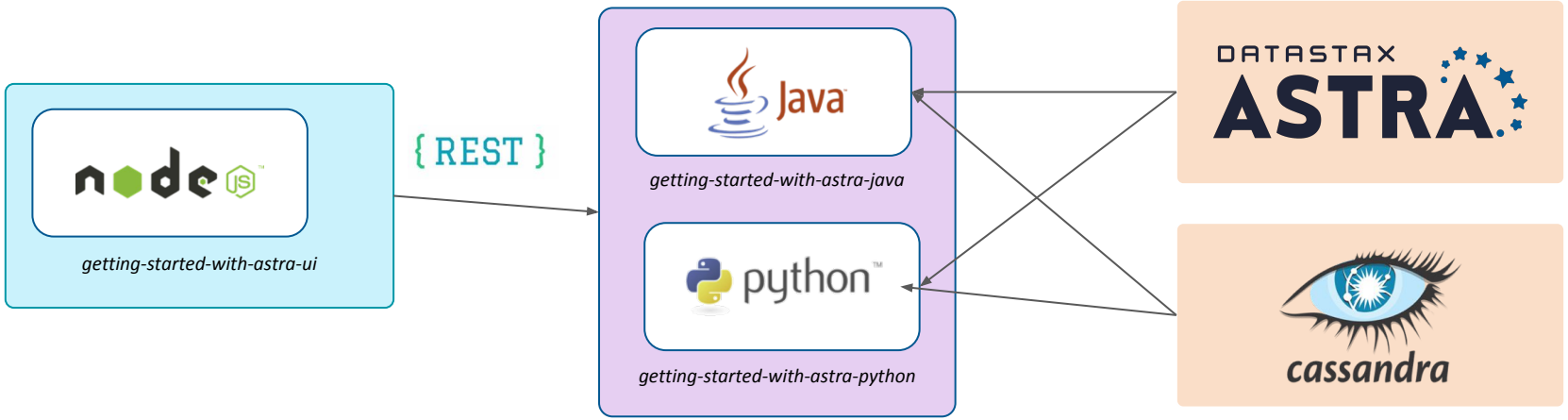
Logical Architecture of our Application



Exercise 1

Google Cloud Platform

Exercise 1 - Minimal deployment

Explore the cluster

We have three worker nodes:

```
kubectl get nodes
NAME                                              STATUS   ROLES    AGE     VERSION
gke-my-first-cluster-1-default-pool-b98b0390-4zfw   Ready    <none>   6m20s   v1.17.9-gke.600
gke-my-first-cluster-1-default-pool-b98b0390-jvnw   Ready    <none>   6m19s   v1.17.9-gke.600
gke-my-first-cluster-1-default-pool-b98b0390-jw8m   Ready    <none>   6m18s   v1.17.9-gke.600
```

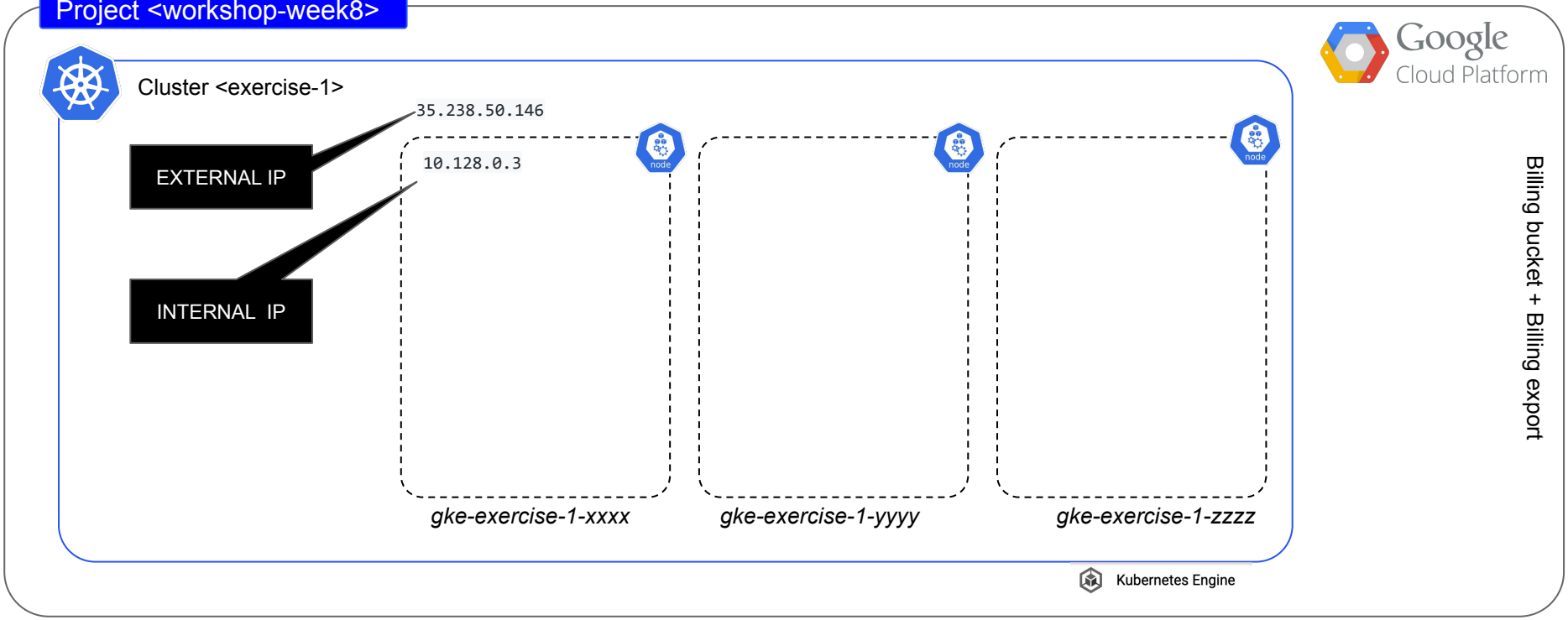
To get to the external IP addresses:

```
$ kubectl get nodes -o wide
NAME                                              STATUS   ROLES    AGE     VERSION           INTERNAL-IP   EXTERNAL-IP
RSION   CONTAINER-RUNTIME
gke-my-first-cluster-1-default-pool-b98b0390-4zfw   Ready    <none>   6m37s   v1.17.9-gke.600   10.128.0.3    35.238.50.14
        docker://19.3.6
gke-my-first-cluster-1-default-pool-b98b0390-jvnw   Ready    <none>   6m36s   v1.17.9-gke.600   10.128.0.2    35.225.144.2
        docker://19.3.6
gke-my-first-cluster-1-default-pool-b98b0390-jw8m   Ready    <none>   6m35s   v1.17.9-gke.600   10.128.0.4    130.211.127.
        docker://19.3.6
```

We will need the external IP addresses to access our cluster from anywhere.

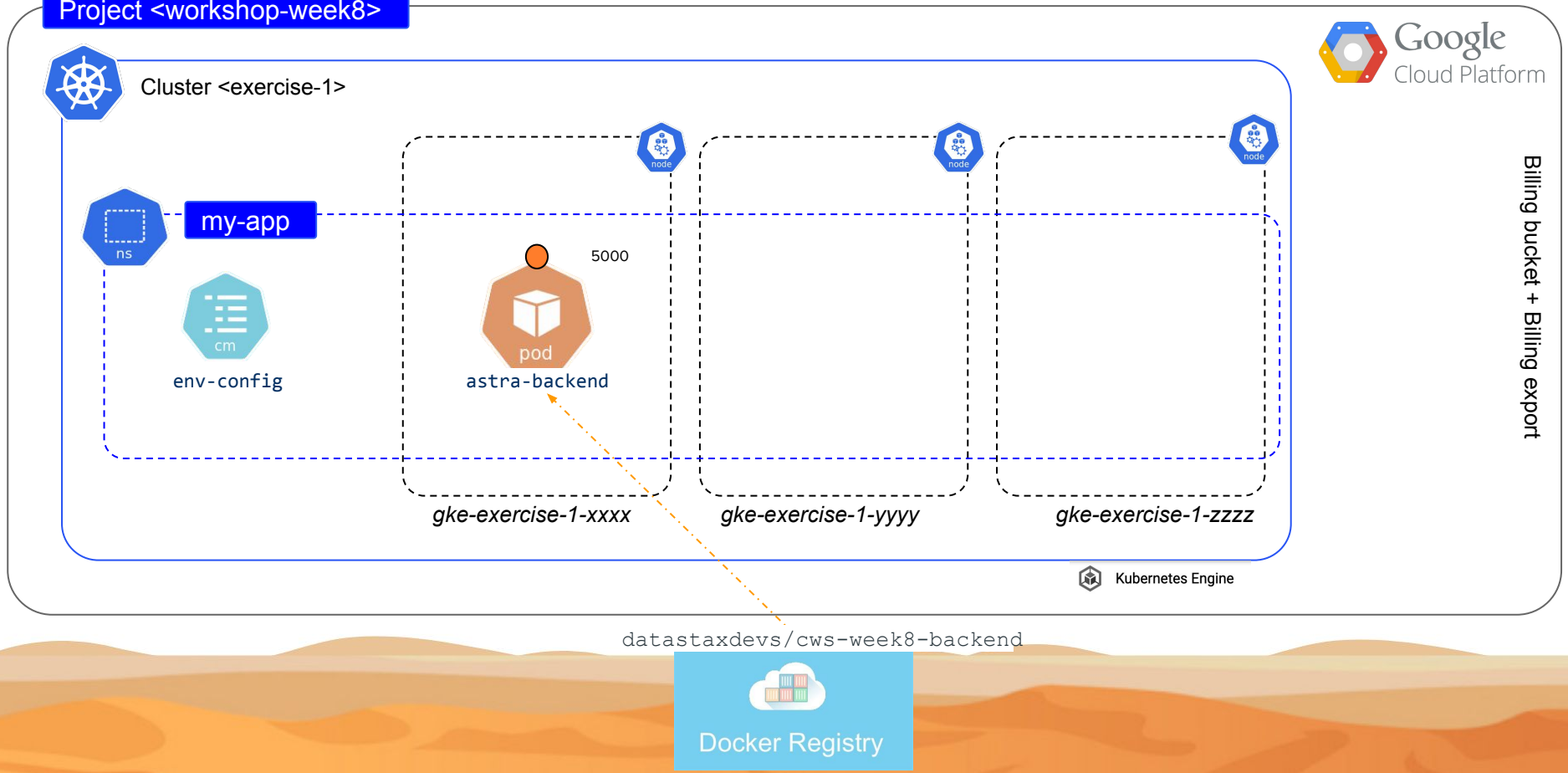
Optional: Publish your application to docker hub

Before you can create pods using your application docker images, you need to publish them to an accessible repository. I published them to Dockerhub, so that you can use them for your pods.



MATERIALS → bit.ly/CassandraWorkshopMaterials

DATASTAX + Apache Cassandra



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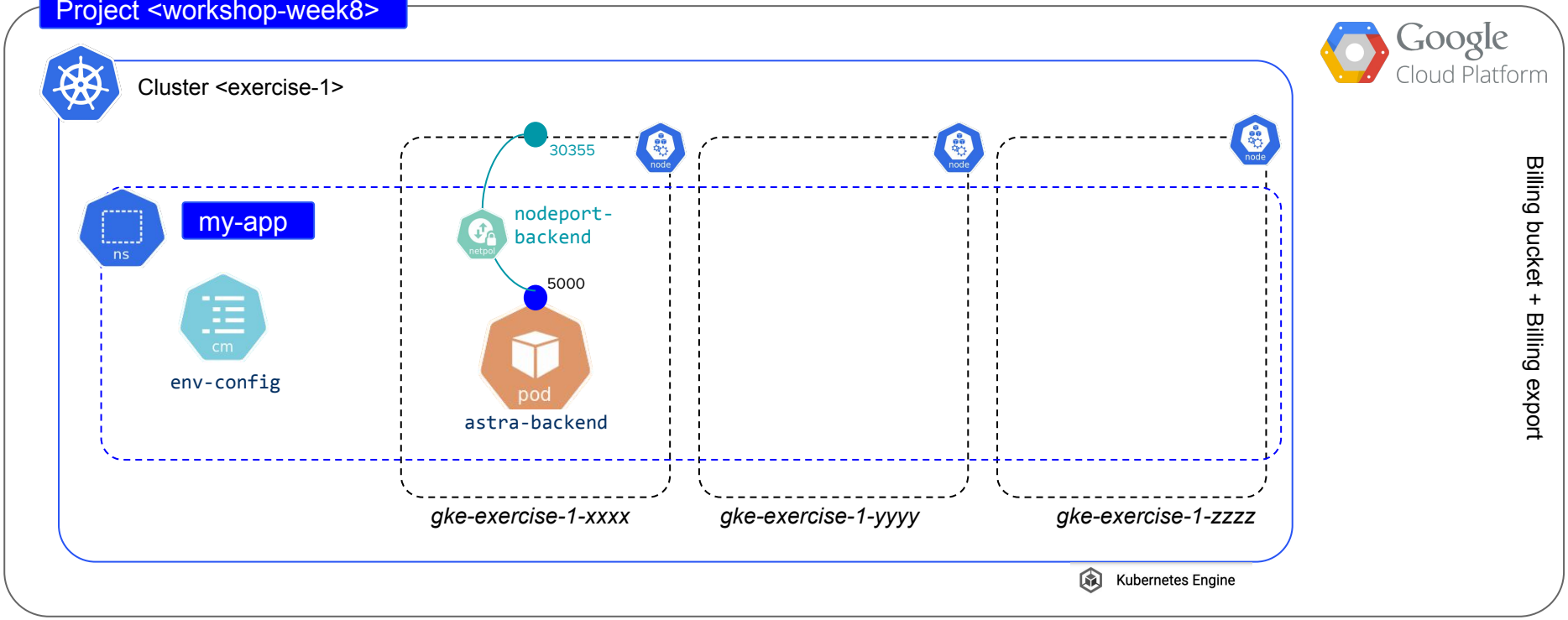
DATASTAX + Apache Cassandra



Docker Registry

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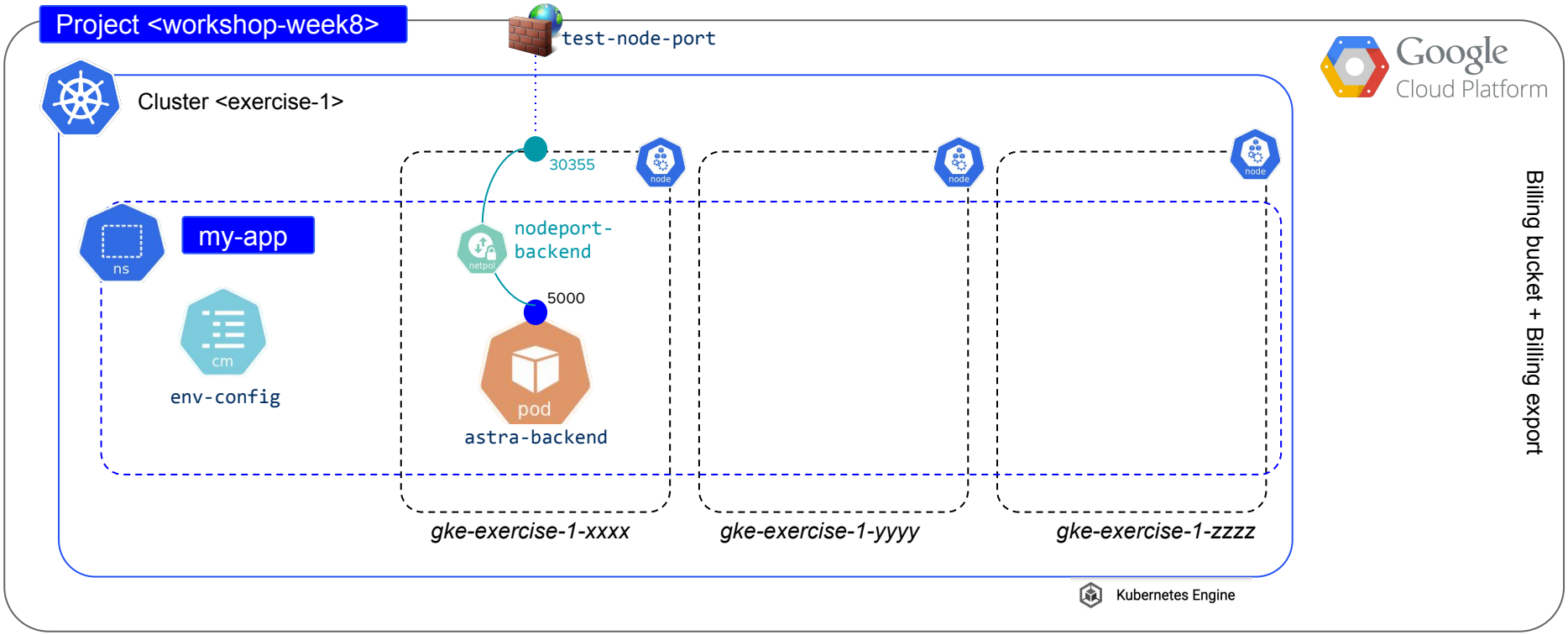
DATASTAX + Apache Cassandra



Docker Registry

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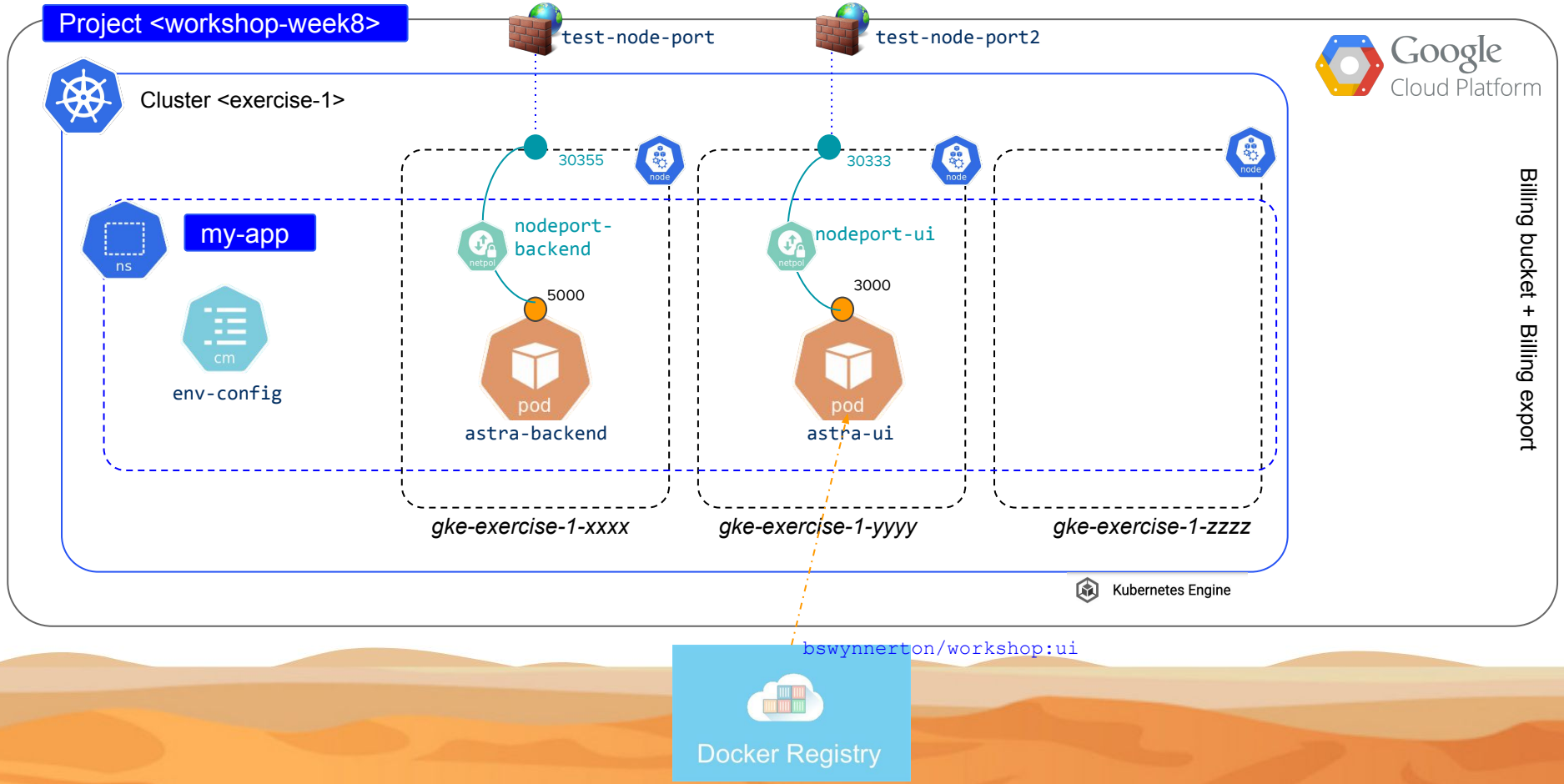
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test-node-port
test-node-port2
Google Cloud Platform
Cluster <exercise-1>
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30333
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node
node
my-app
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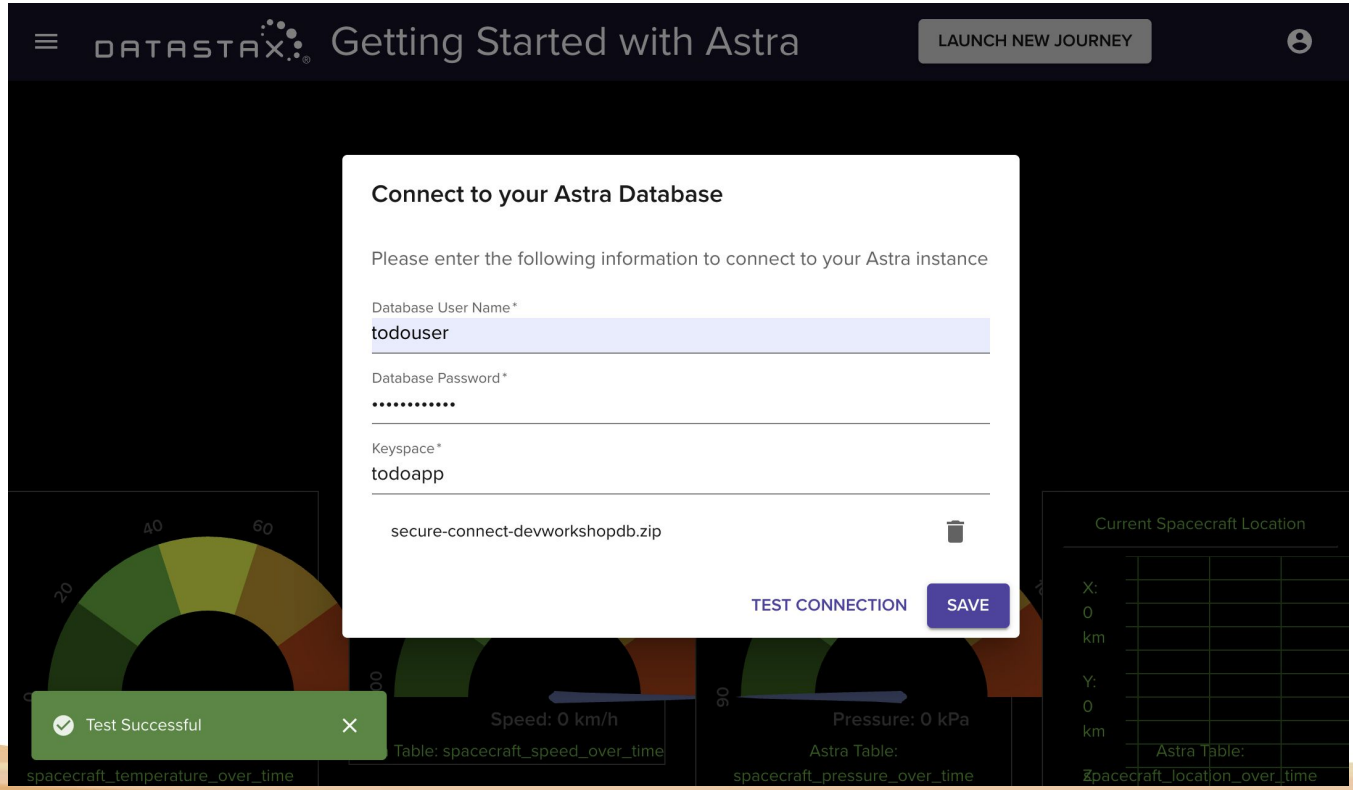
nodeport-backend
netpol
nodeport-ui
netpol
5000
3000
cm
env-config
pod
astra-backend
pod
astra-ui
gke-exercise-1-xxxx
gke-exercise-1-yyyy
gke-exercise-1-zzzz
Billing bucket + Billing export
Kubernetes Engine
bswynnerton/workshop:ui
Docker Registry

Happiness



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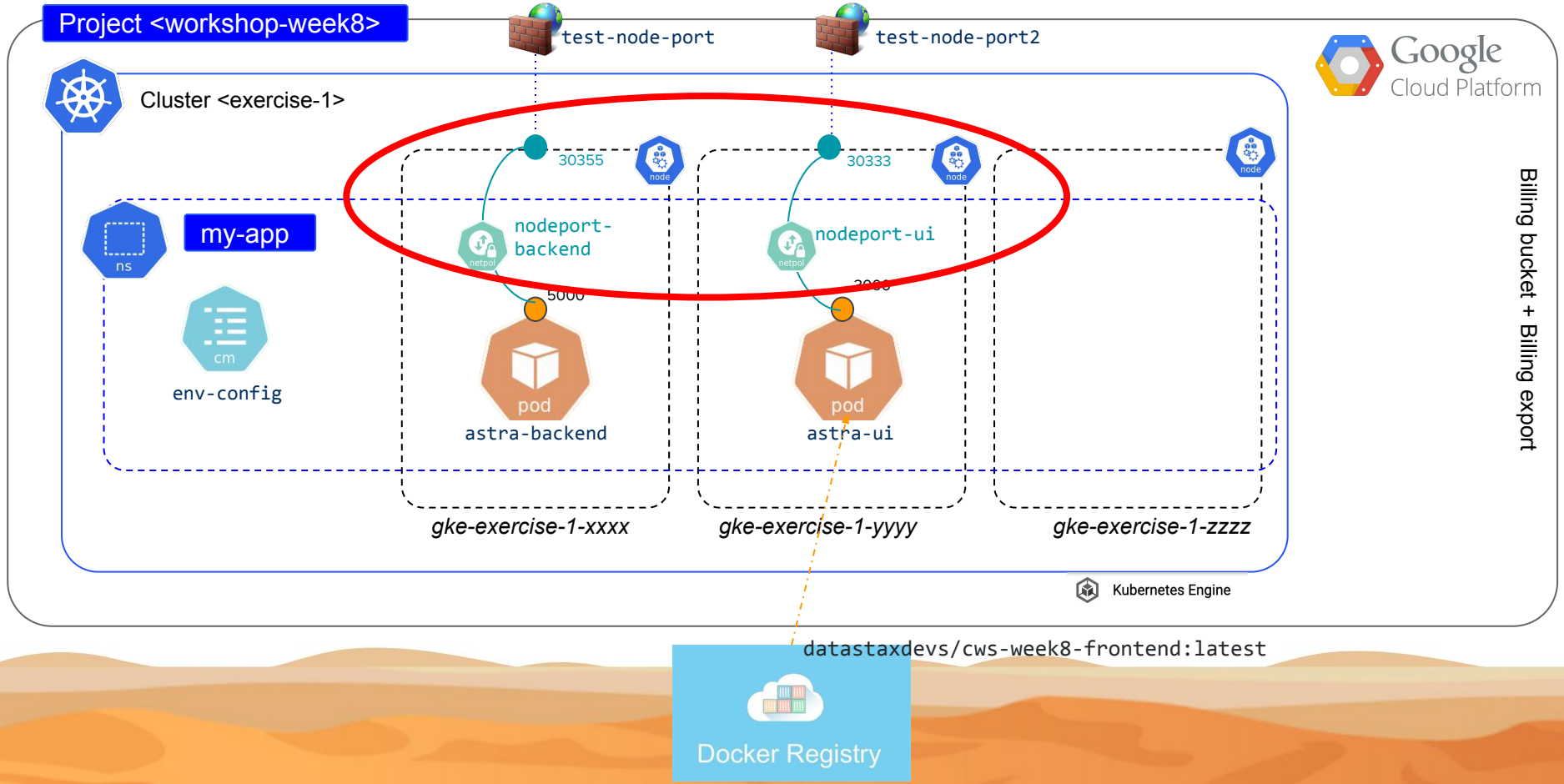
Developer Workshop Series **Week 8**

- ➔ Housekeeping and setup
- ➔ Cloud Computing Overview
- ➔ Cloud Providers and Services
- ➔ Deploy our Application in GKE 1
- ➔ Deploy our Application in GKE 2
- ➔ Wrap up and Conclusion

MATERIALS ➔ bit.ly/CassandraWorkshopMaterials

DATASTAX + Apache Cassandra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Google Cloud Platform
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my-app
ns
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nodeport-ui
netpol
5000
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env-config
pod
astra-backend
pod
astra-ui
gke-exercise-1-xxxx
gke-exercise-1-yyyy
gke-exercise-1-zzzz
Billing bucket + Billing export
Kubernetes Engine
datastaxdevs/cws-week8-frontend:latest
Docker Registry

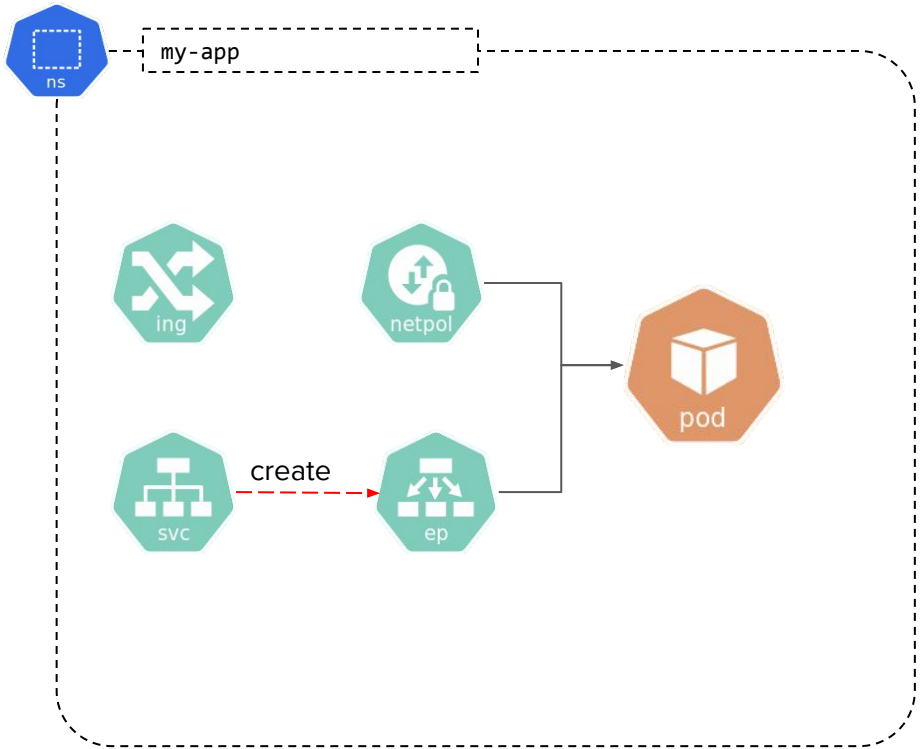
Primitives Services

Ingress is a collection of rules that allow inbound connections to reach the endpoints defined by a backend.

Service is a **named** abstraction of software service with ports to listen on and selector to determine which pods will answer requests.

EndPoint is a collection of endpoints that implement the actual service..

NetworkPolicy: Describes what network traffic is allowed for a set of Pods.



Exercise 2

Google Cloud Platform

Exercise 2 - Deployments and Load Balancers

Nodeports are easy to set up, but they have a big disadvantage: they are bound to a particular kubernetes worker node. If a pod gets deleted and recreated, it might get scheduled on a different worker node, and we won't be able to reach it anymore via the nodeport.

A way to abstract this node binding is to deploy the pods as deployments and to use load balancer services to address the pods in the deployment and correctly route any external traffic.

Let's reconfigure our kubernetes cluster for this exercise:

```
kubectl  delete namespace my-app
```

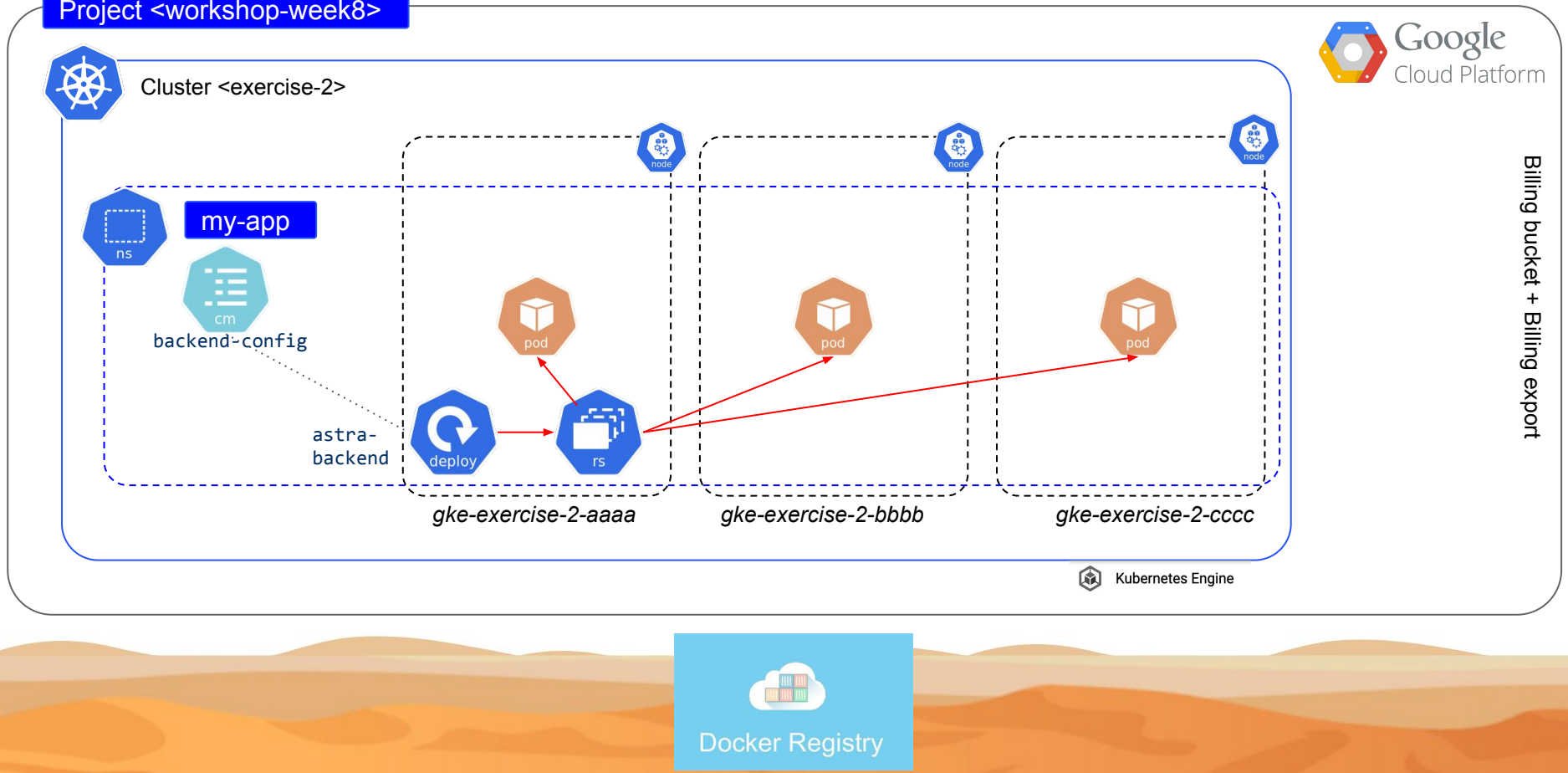
Wait a moment until all pods and services are deleted.

1 - Recreate a namespace

```
kubectl create namespace my-app
```

2 - Create separate config map for backend

```
touch backendConfig.yaml
```



Docker Registry

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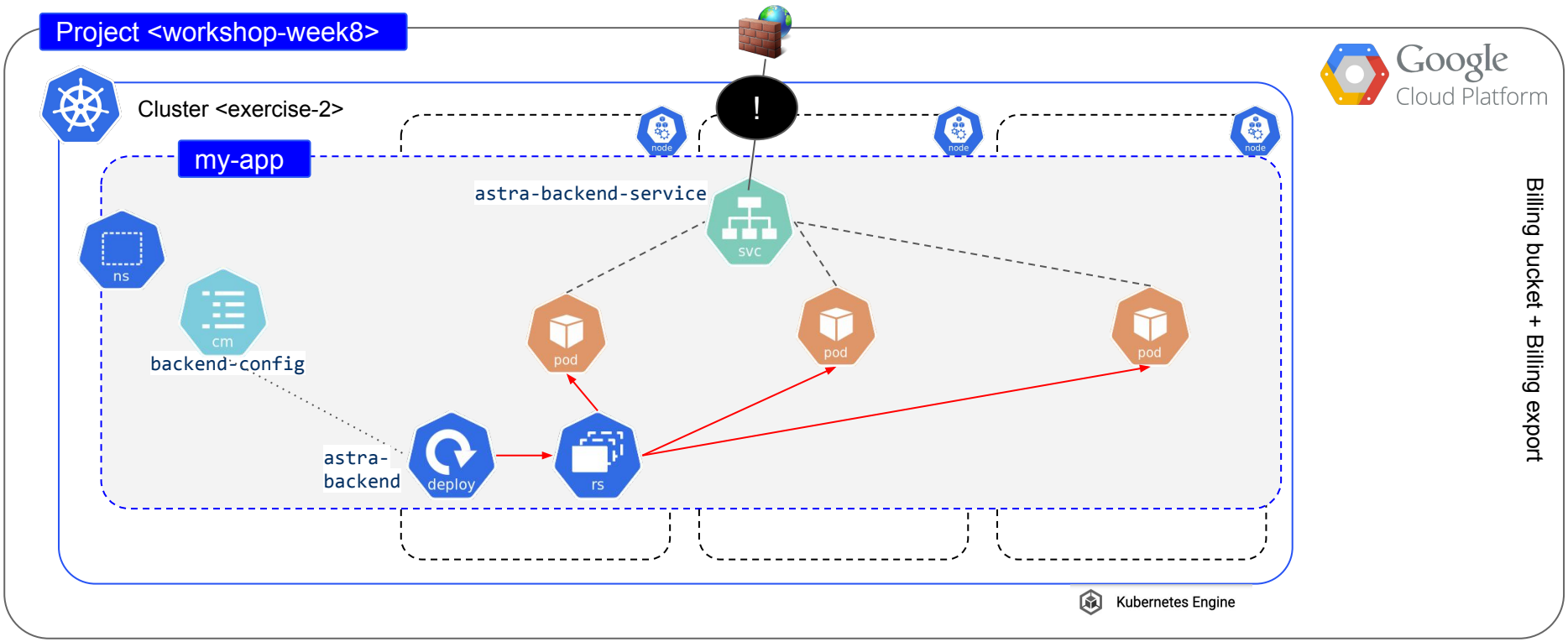

Docker Registry

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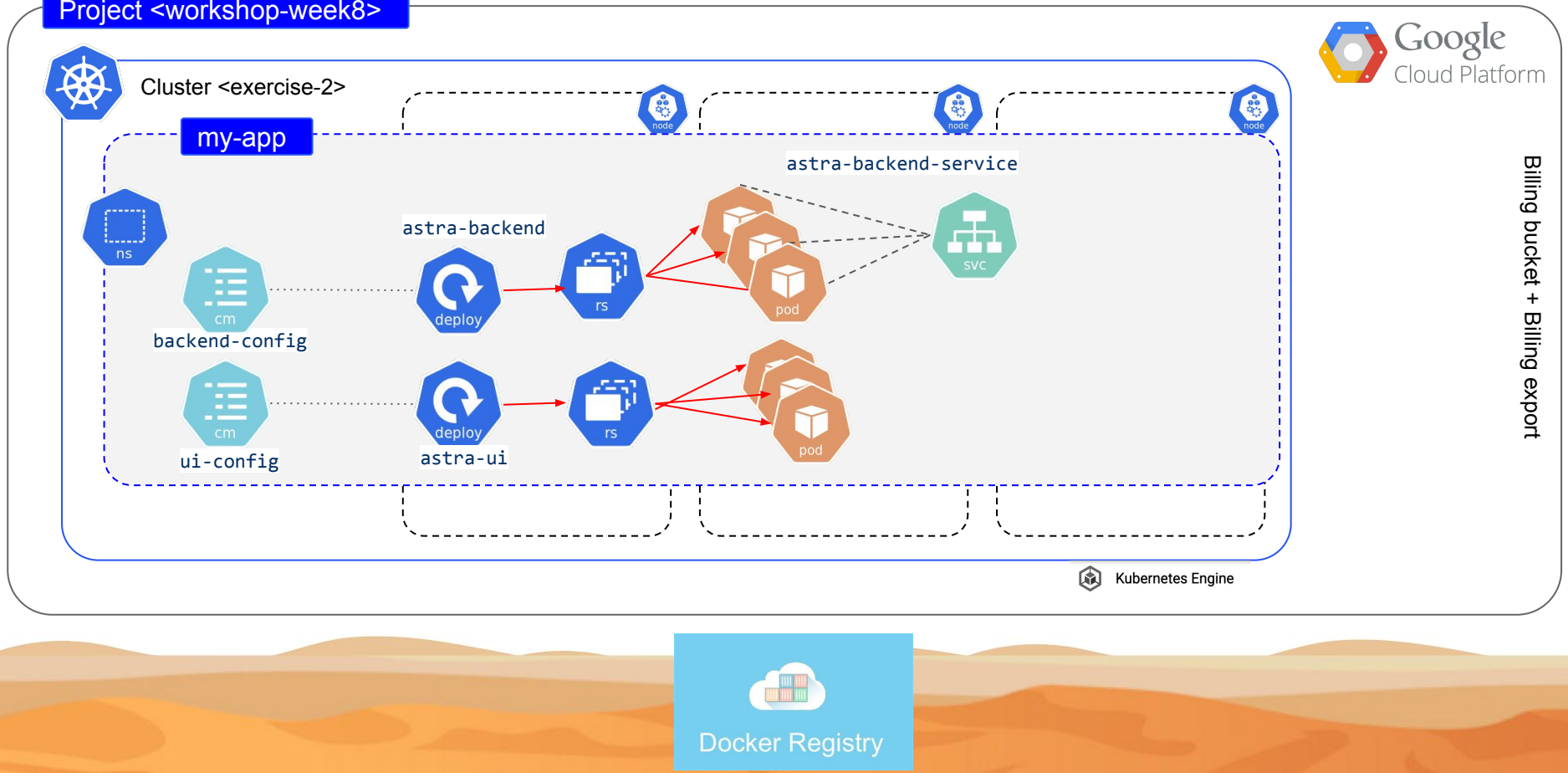
DATASTAX + Apache Cassandra



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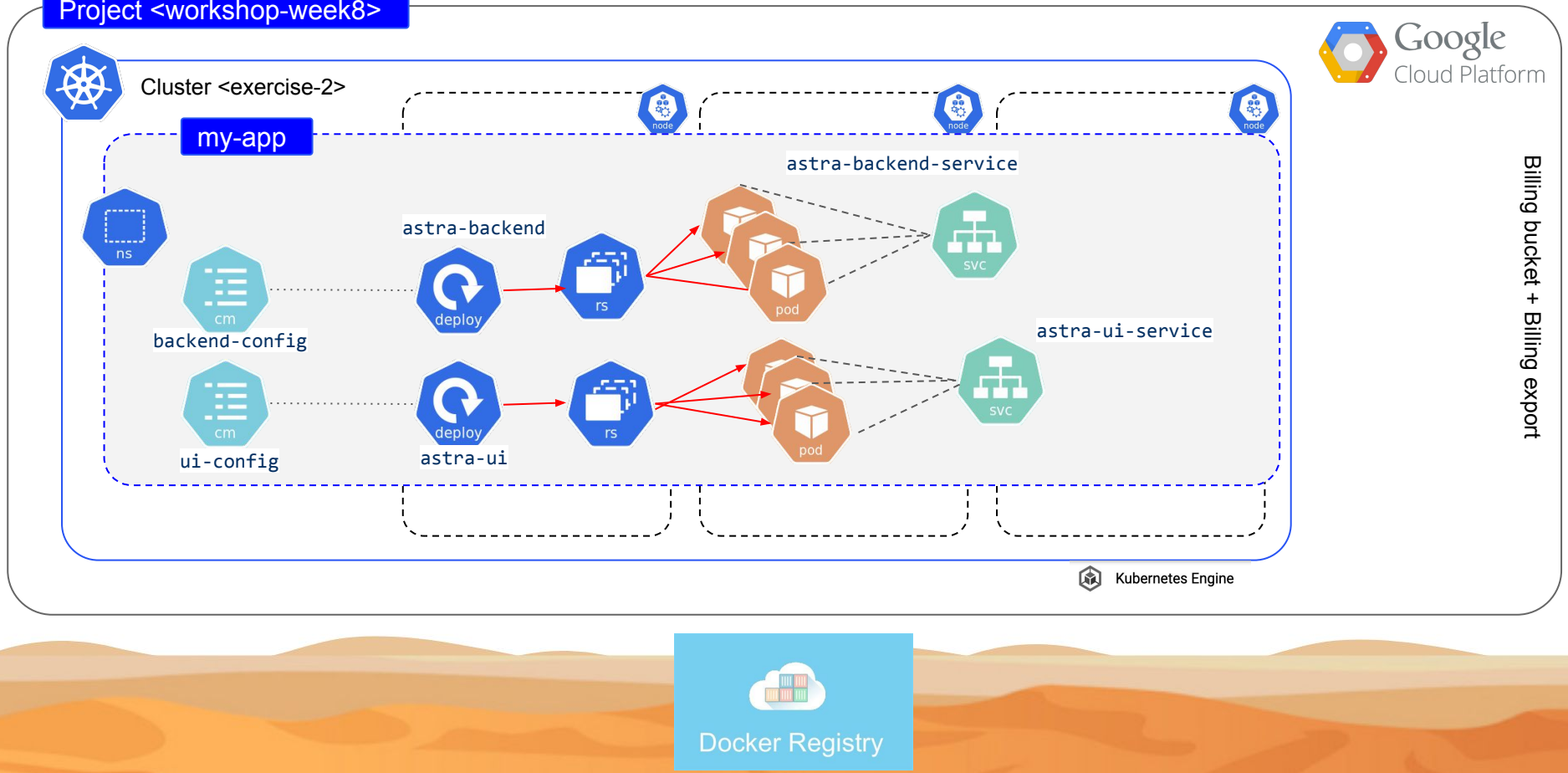
DATASTAX + Apache Cassandra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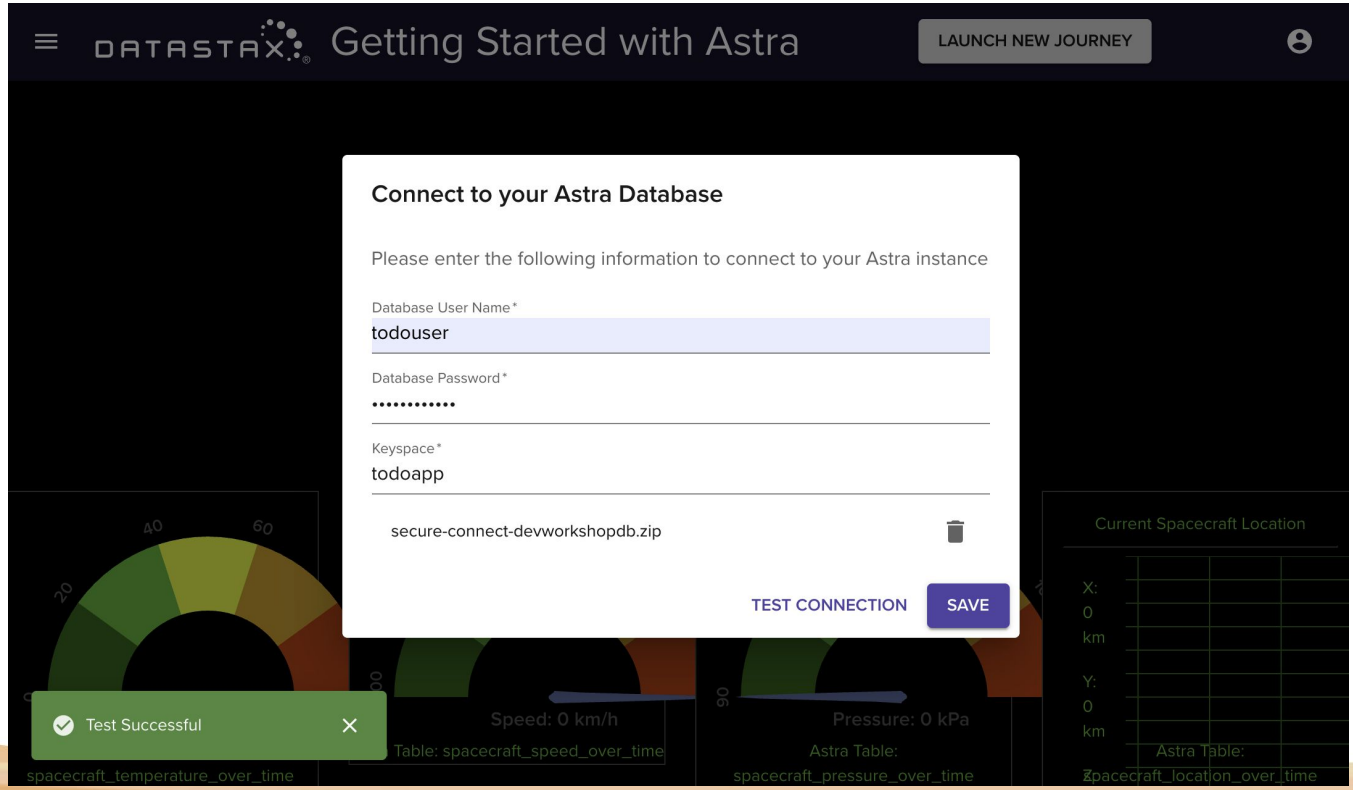
Google Cloud Platform
Cluster <exercise-2>
node
node
node
my-app
astra-backend-service
ns
astra-backend
cm
backend-config
deploy
rs
pod
svc
astra-ui-service
cm
ui-config
deploy
astra-ui
rs
pod
svc
Billing bucket + Billing export
Kubernetes Engine
Docker Registry
MATERIALS
bit.ly/CassandraWorkshopMaterials
DATASTAX

Happiness Again !



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Developer Workshop Series **Week 8**

- Housekeeping and setup
- Cloud Computing Overview
- Cloud Providers and Services
- Options to deploy our application
- Hands-on and demos with GKE
- Wrap-up and Conclusion

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Few hours left for Astrakathon !!

- **END DATE IS NOW SET AFTER THE 8TH WEEK WORKSHOP**
  - **AUGUST 20TH 12pm PST.**

- **August 26th we will do an “ASK ME, ASK YOU ANYTHING” Special Episode with a lot of surprises and where we will announce winners.**

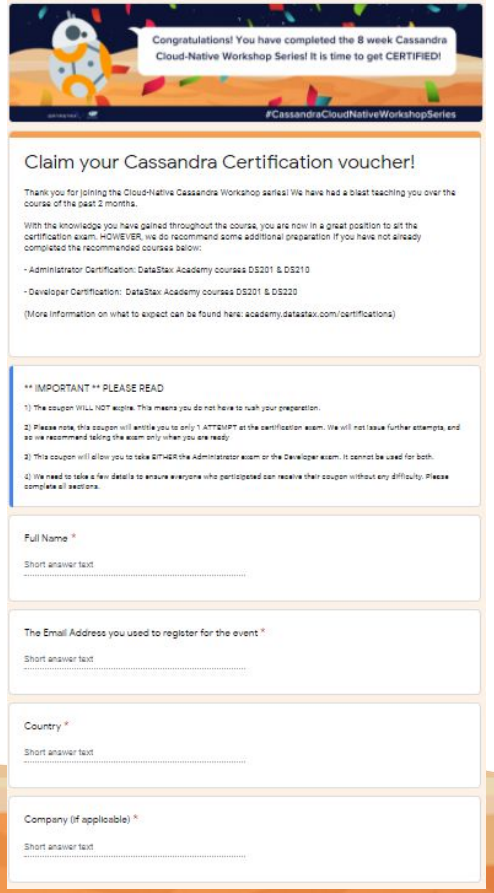
A word on certification vouchers

What do I need to do to get a voucher?

Early *NEXT WEEK* you will receive an email with a link to claim your certification voucher

You **must complete the form** if you would like to receive the voucher.

The form will be sent ***NEXT WEEK***



What Coming ?

- **08/26 : The HYDRA Episode : Ask us Anything**
- **02/09: All you need to know for Cassandra Certification + DRY RUN**

THANK YOU !

AGAIN !

#ASK US ANYTHING