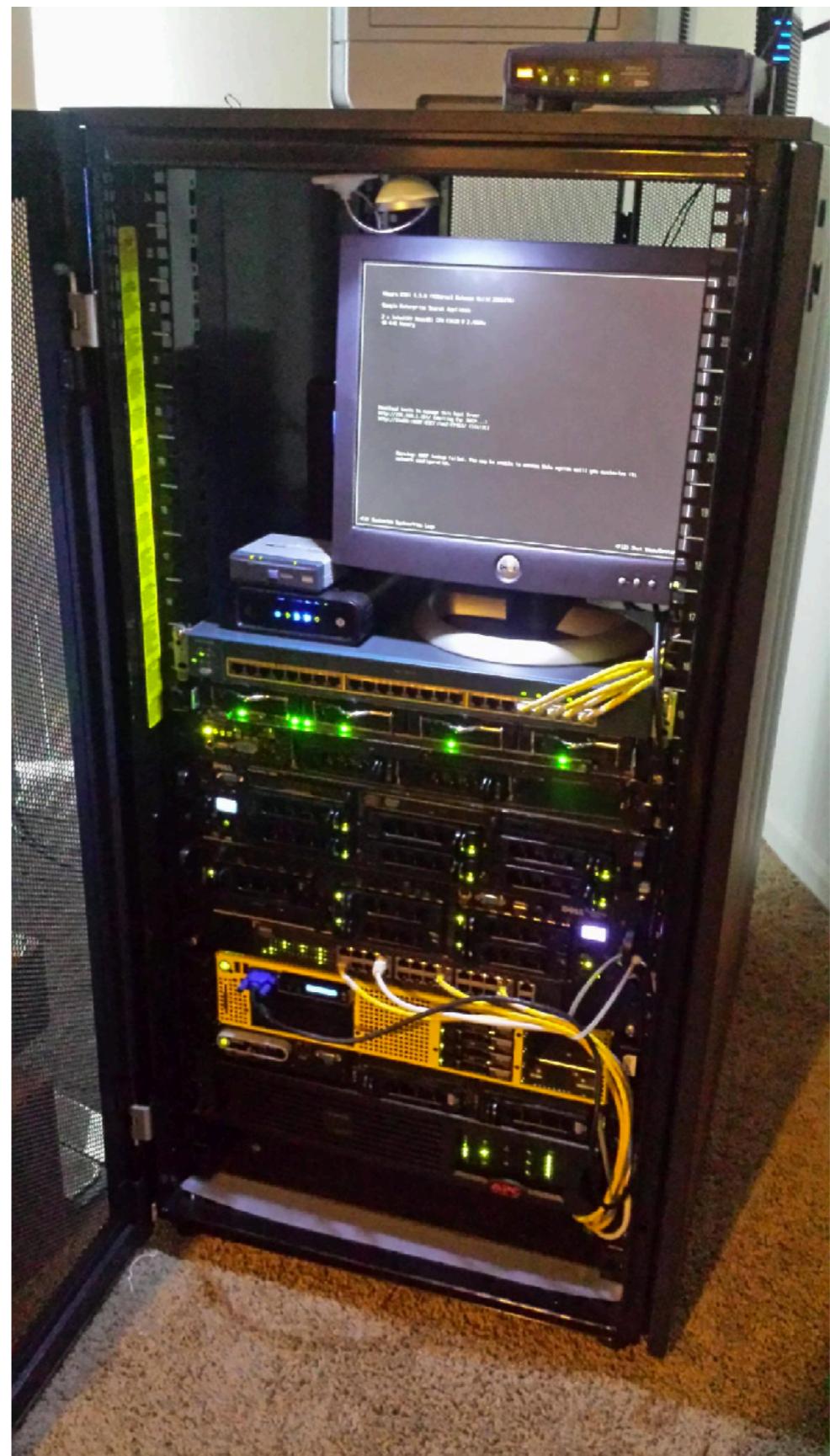


CLOUD TECHNOLOGY

AMANDA CHOW

LOCAL MACHINES



WHAT IS CLOUD TECHNOLOGY?

- ▶ The delivery of computing services and resources over the Internet
- ▶ This includes servers, storage, databases, networking, software, analytics and more
- ▶ On-demand self service, and pay-as-you-go

WHY CLOUD TECHNOLOGY?

- ▶ Cost - Less spending on initial hardware costs
- ▶ Speed - Launch within minutes, increasing flexibility
- ▶ Scale and Performance - Sharing resources to get economies of scale, scaling out and not just up
- ▶ Reliability - Data backup and disaster recovery easier to mirror to other sites

CLOUD PROVIDERS



阿里云计算
Alibaba Cloud Computing



IBM Cloud

CLOUD SERVICE MODELS

Local

Functions

Application

Containers (opt)

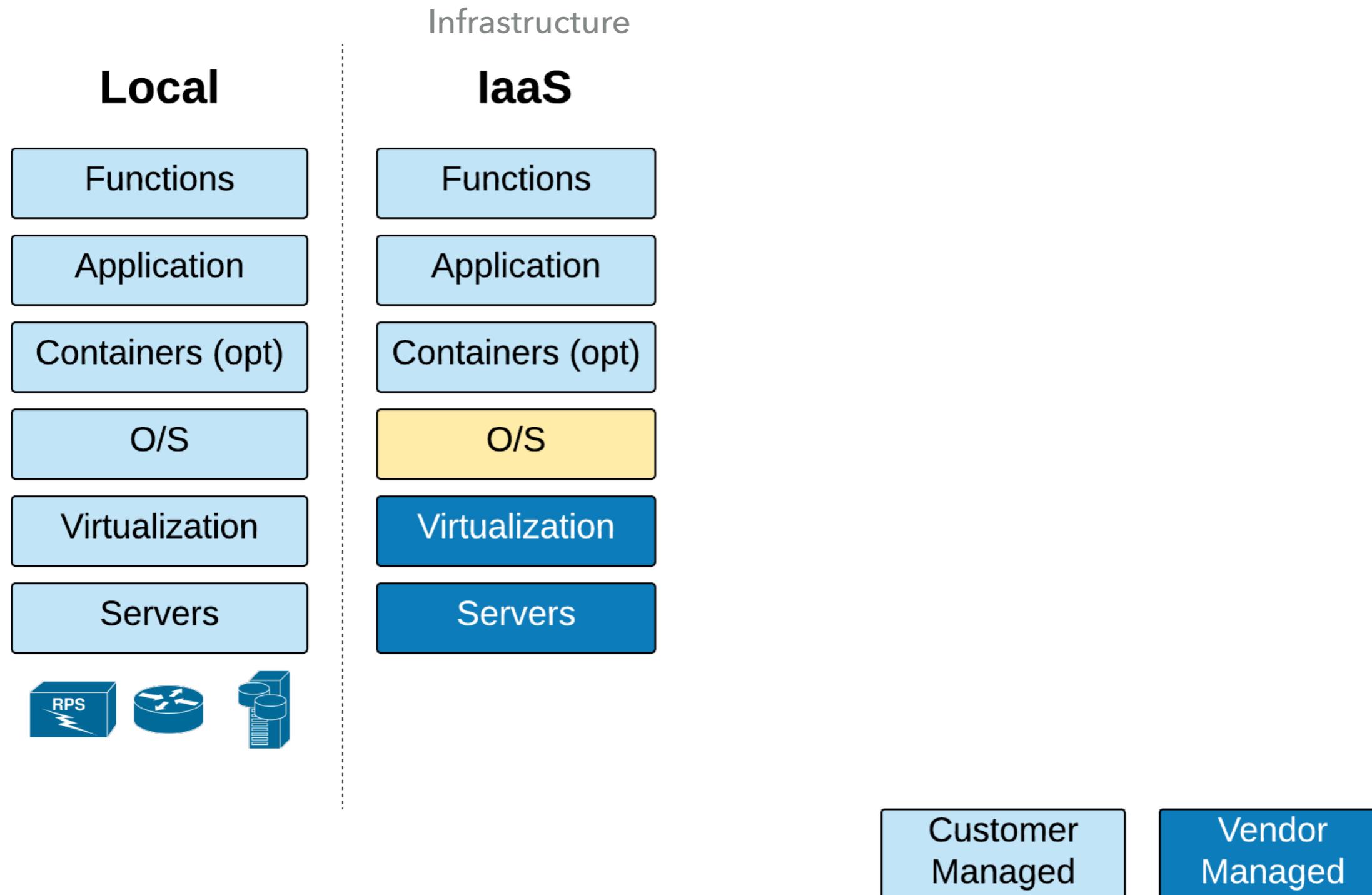
O/S

Virtualization

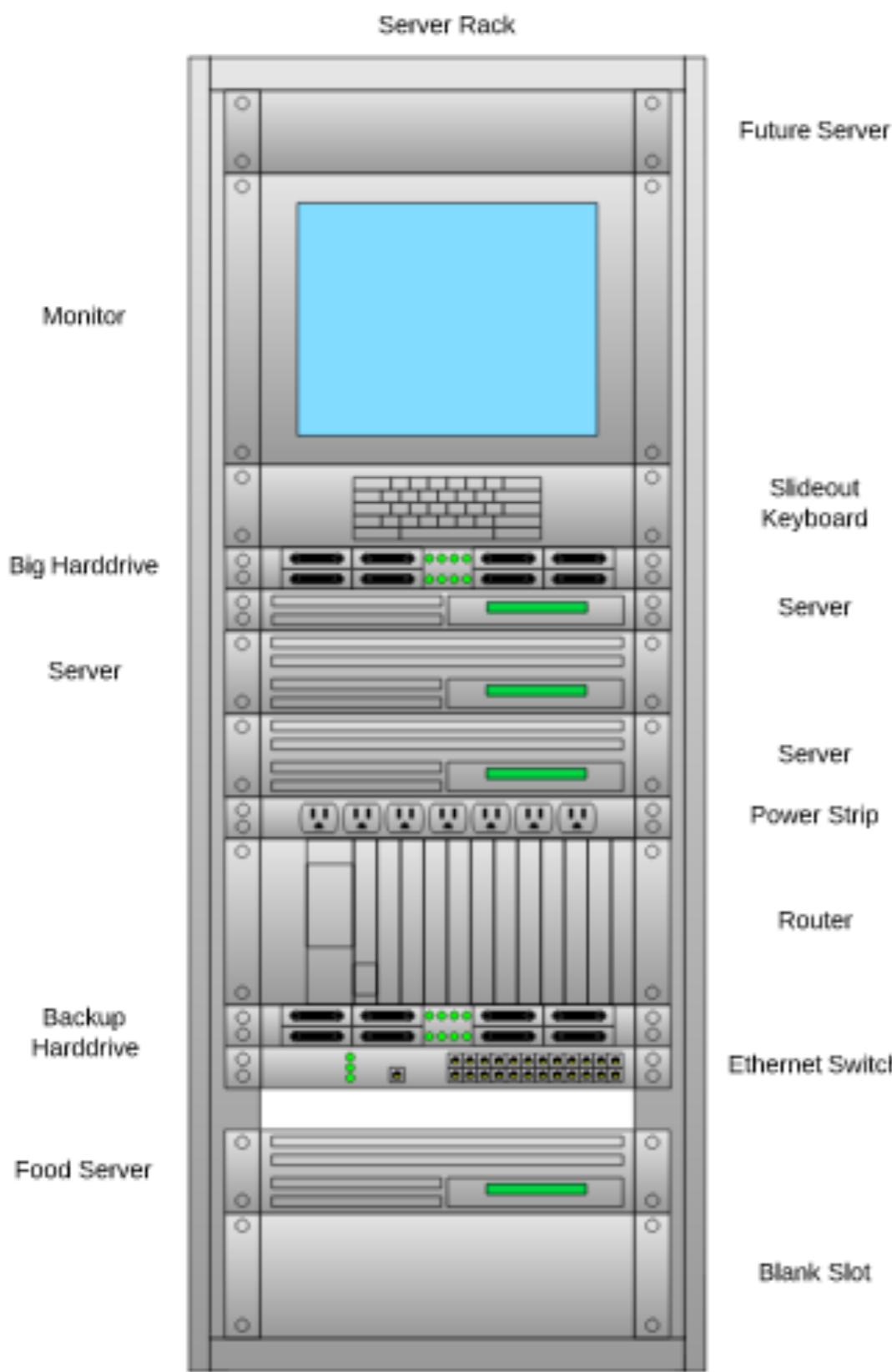
Servers



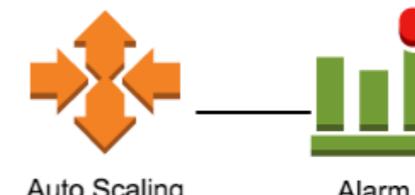
CLOUD SERVICE MODELS



SERVER RACK TO CLOUD INFRASTRUCTURE



Future Server



Auto Scaling



Alarm

Slideout Keyboard

Server

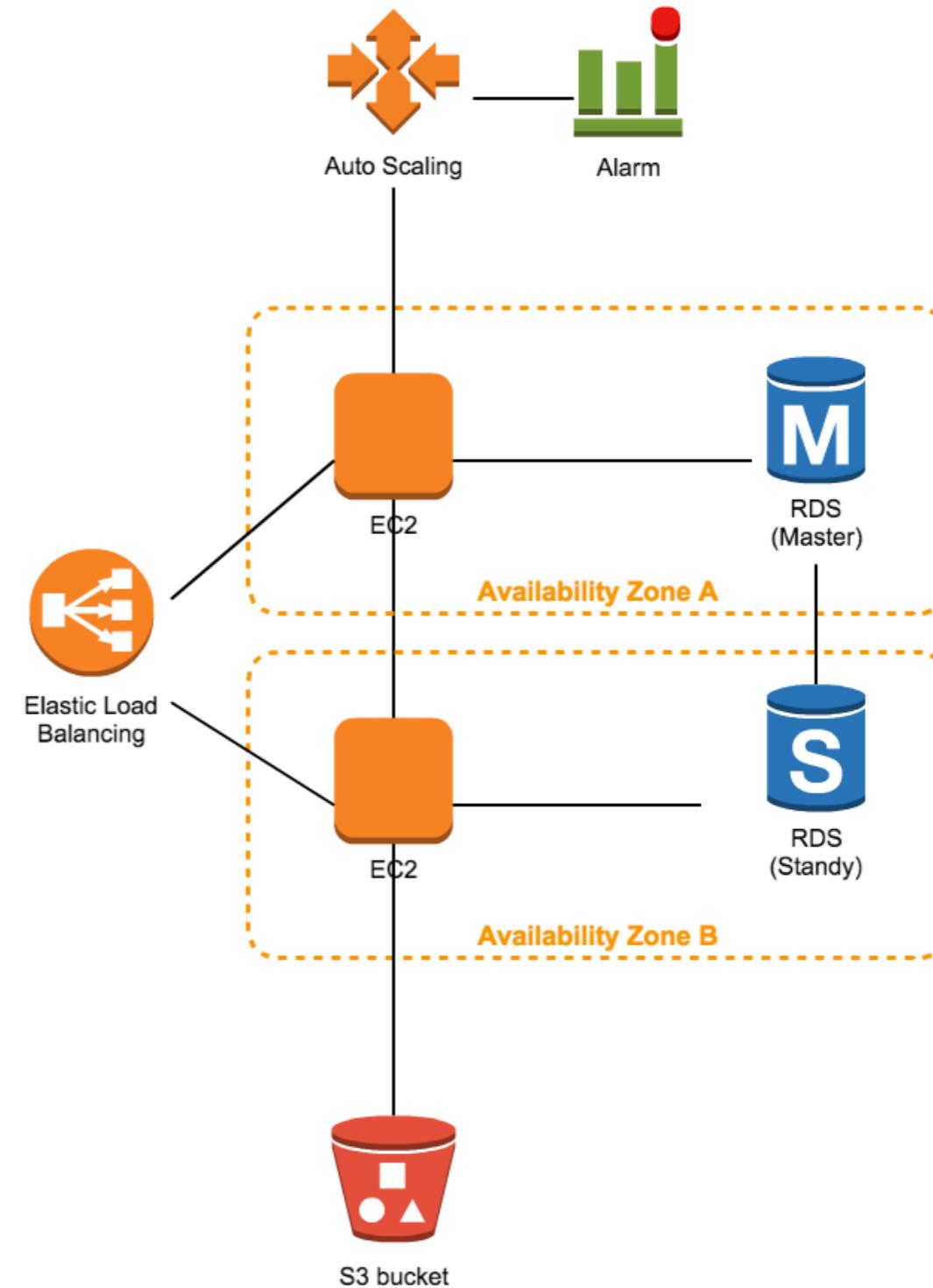
Server

Power Strip

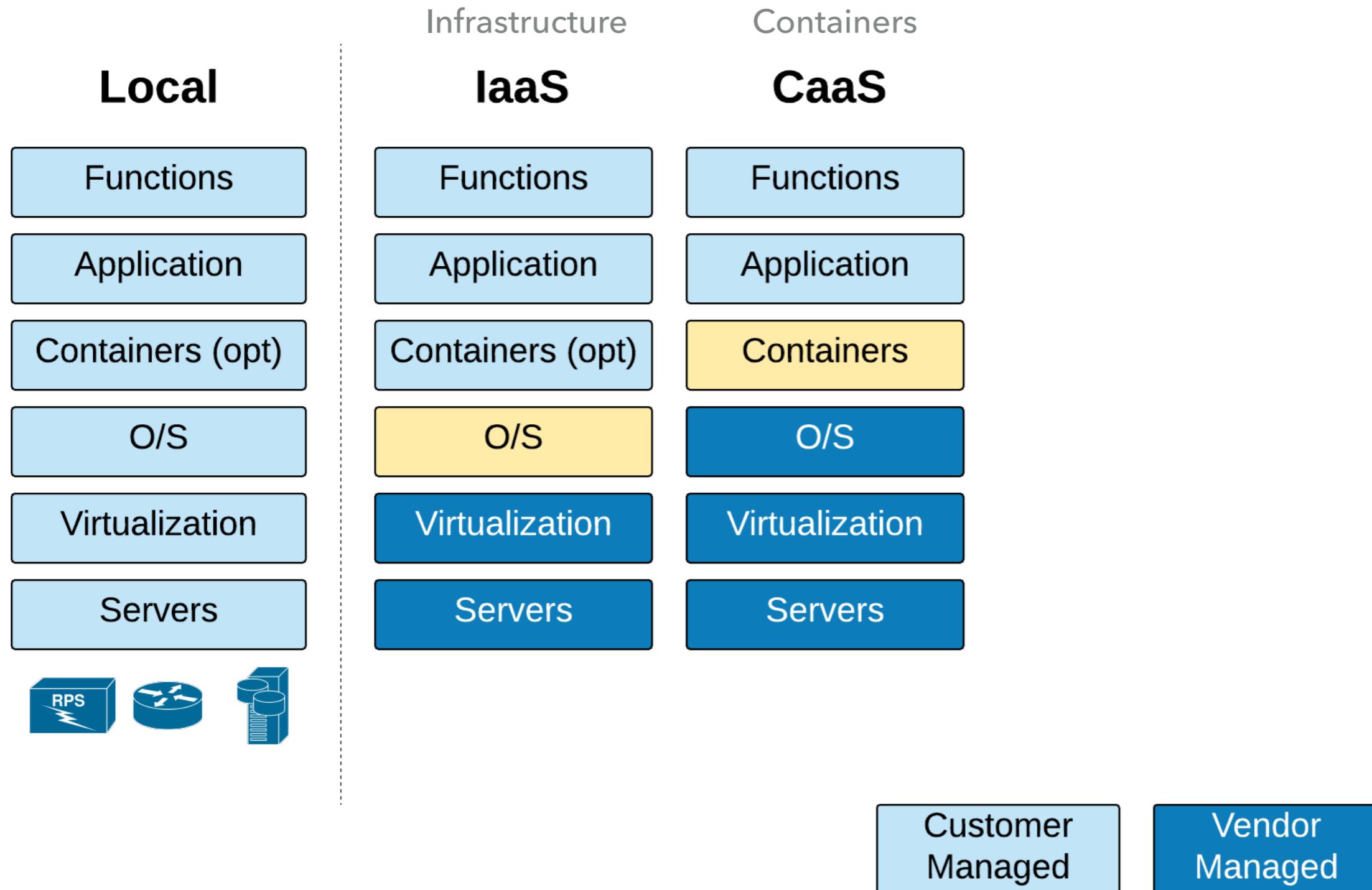
Router

Ethernet Switch

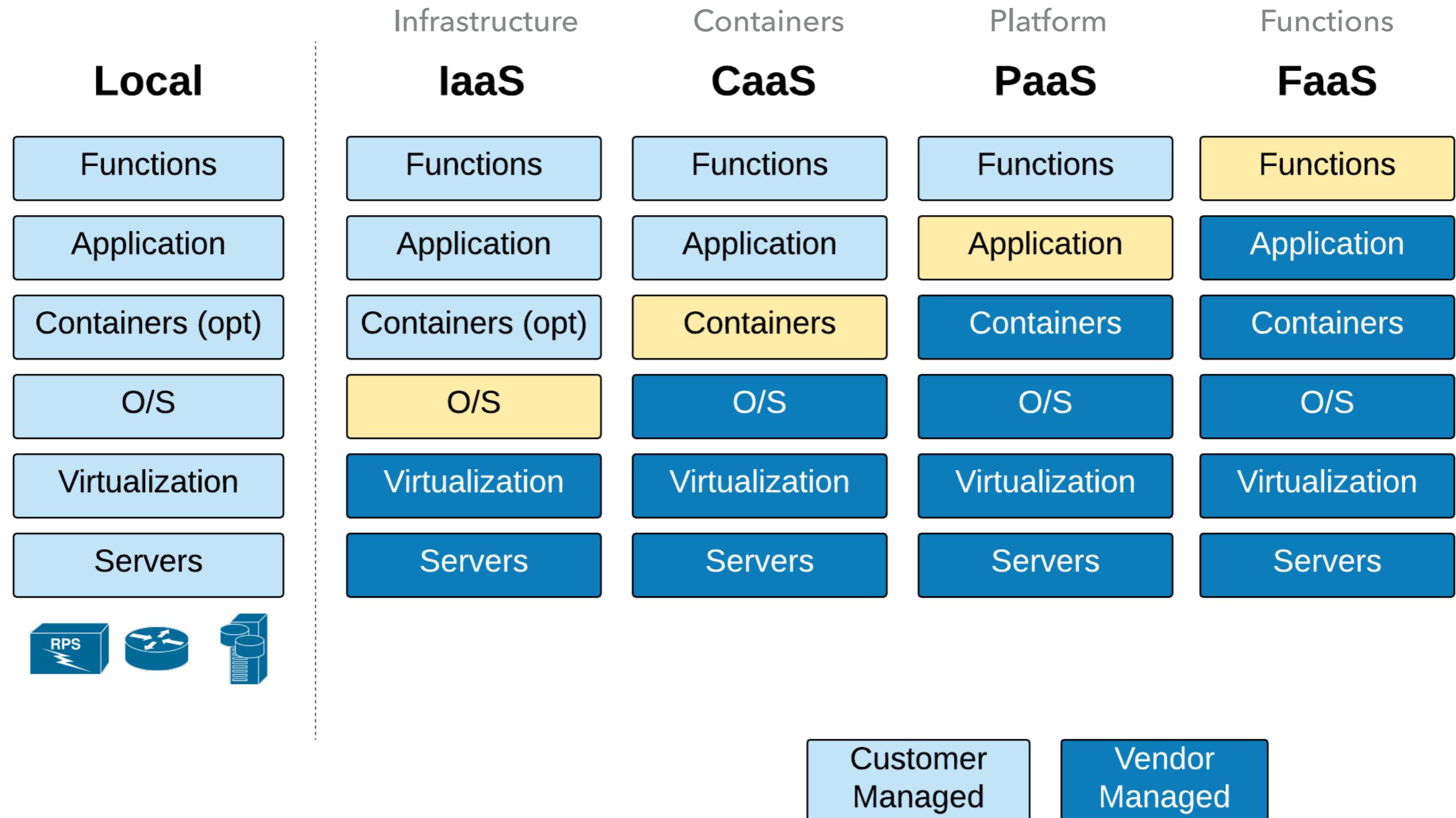
Blank Slot



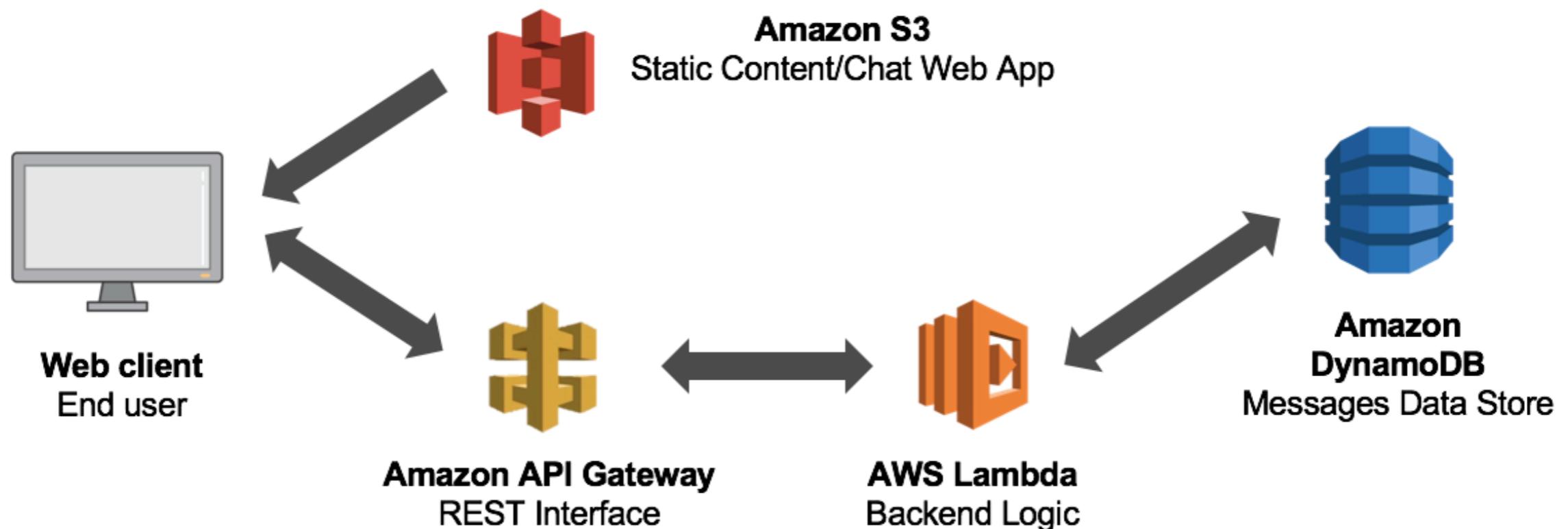
CLOUD SERVICE MODELS



CLOUD SERVICE MODELS



SERVERLESS ARCHITECTURE



SOFTWARE AS A SERVICE ?

CLOUD COMPUTE

	IaaS	CaaS	PaaS	FaaS
AWS	Elastic Cloud Compute (EC2)	ECS / Fargate	Elastic Beanstalk	Lambda
GCP	Cloud Engine	GKE (Kubernetes)	App Engine	Cloud Function
Others	Linode / DigitalOcean	OpenShift / DigitalOcean	Heroku	

CLOUD STORAGE

	Objects	Archive	SQL	NoSQL
AWS	Simple Storage Service (S3)	Glacier	RDS / Aurora / Athena	DynamoDB
GCP	Storage	Coldline	SQL	Datastore / Bigtable / Spanner

- ▶ Big Data and Machine Learning
 - ▶ GCP BigQuery, Cloud TPU, Cloud Vision
 - ▶ AWS Athena, EMR, Lex
- ▶ Identity
 - ▶ Firebase Authentication, AWS Cognito
- ▶ Messaging
 - ▶ Google Cloud Pub/Sub
 - ▶ AWS SQS, SNS, Message Queue



DATACENTERS







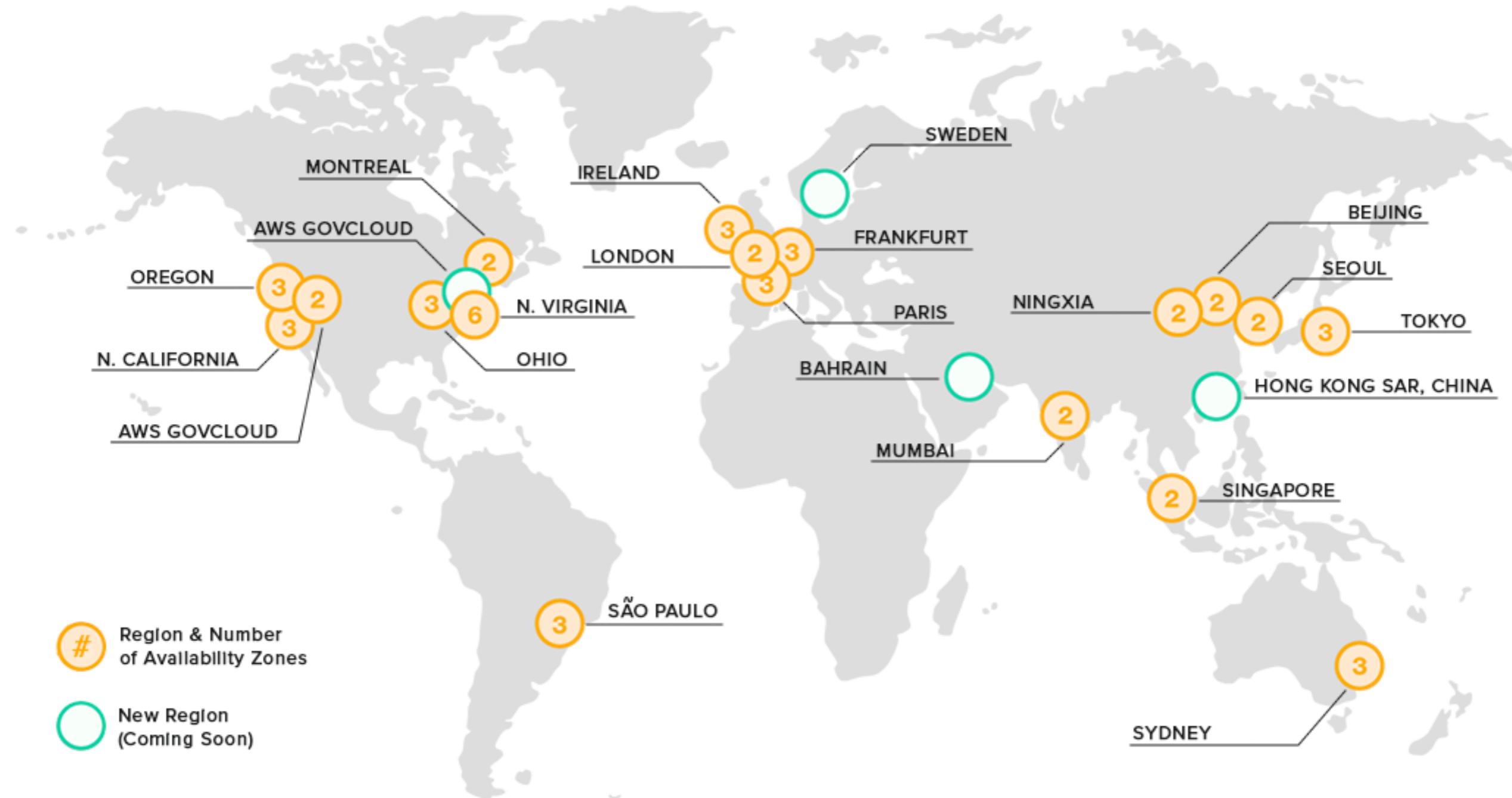
INSIDE A GOOGLE DATACENTER

<https://youtu.be/XZmGGAhqa0>

GLOBAL INFRASTRUCTURE

- ▶ Cloud services are spread across regions and availability zones, important for latency and disaster recovery
- ▶ Regions
 - ▶ Geographic locations that have at least two Availability Zones
- ▶ Availability Zones
 - ▶ Clusters of data centers
 - ▶ Isolated from failures in other AZs

AMAZON WEB SERVICES REGIONS

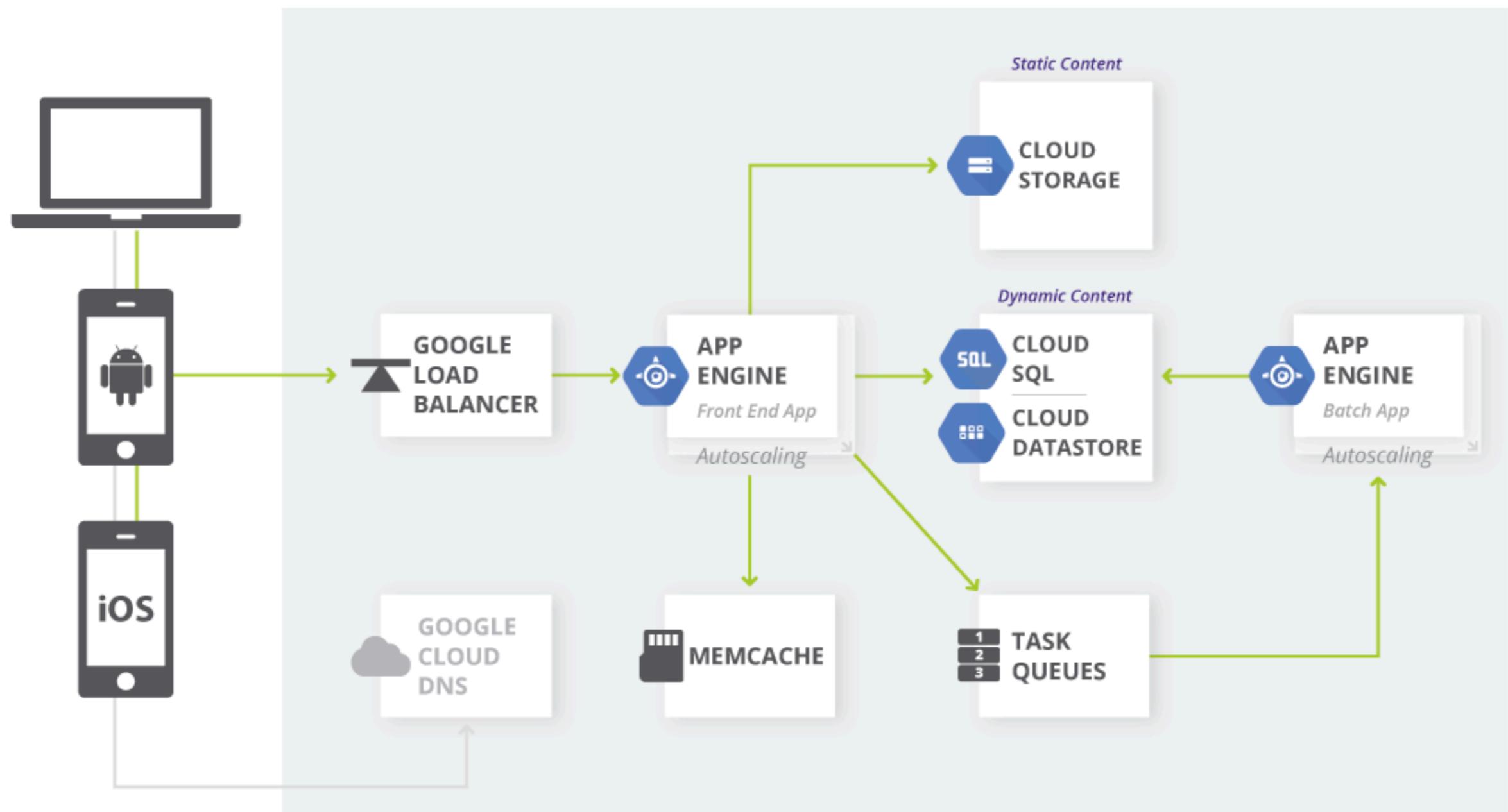


GOOGLE CLOUD PLATFORM REGIONS

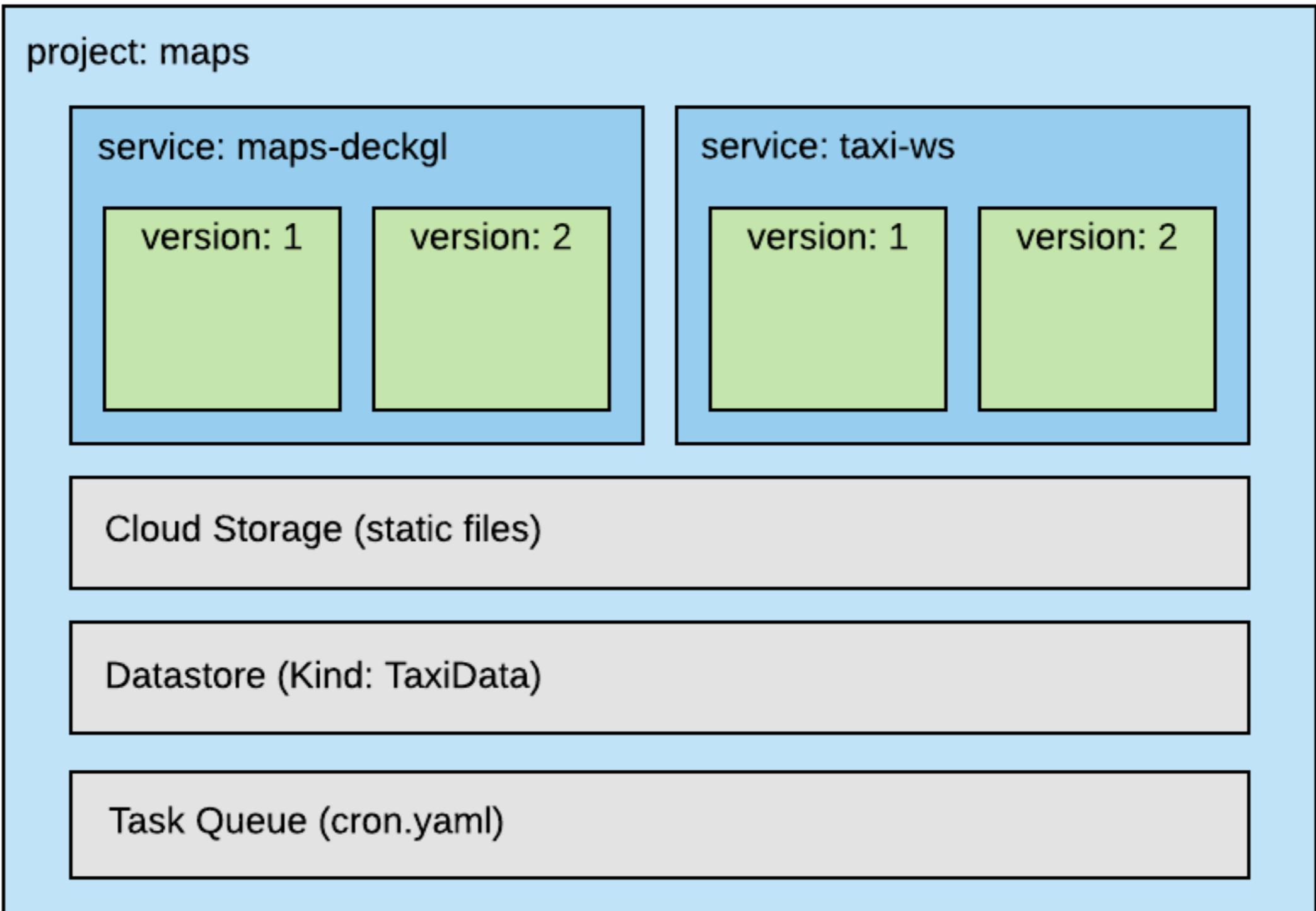


GOOGLE APP ENGINE DEMO

WORKFLOW



PROJECT STRUCTURE



TAXI-WS.JS

```
1  const request = require('request');
2  const express = require('express');
3  const cors = require('cors');
4
5  const taxidb = require('./models/taxi-datastore');
6  const app = express();
7  app.use(cors());
8
9  const TAXI_DATA_URL = 'https://api.data.gov.sg/v1/transport/taxi-availability';
10
11 app.get('/api/scrape', (req, res) => {
12   request(TAXI_DATA_URL, (error, response) => {
13     if (error) { return console.log(error); }
14     // console.log(response);
15     taxidb.create(response.body);
16   });
17   res.send("OK");
18 });
19
20 app.get('/api/get', (req, res) => {
21   taxidb.getTaxi().then((data) => {
22     res.send(data);
23   });
24 });
25
26 app.get('/api/list', (req, res) => {
27   let limit = req.query.limit || 5;
28   taxidb.getTaxis(limit).then((data) => {
29     res.send(data);
30   });
31 });
```

CONFIGURATION

taxi-ws/cron.yaml

```
1   cron:
2     - description: "hourly get data job"
3       url: /api/scrape
4       schedule: every 1 hours
5     target: taxi-ws
```

taxi-ws/taxi-ws.yaml

```
1   runtime: nodejs8
2   service: taxi-ws
```

maps-deckgl/app.yaml

```
1   runtime: nodejs8
2   handlers:
3     - url: /
4       static_files: build/index.html
5       upload: build/index.html
6     - url: /
7       static_dir: build
```

DEPLOY

```
tortuca_inc@cloudshell:~ (maps-213104)$ gcloud app deploy maps-deckgl/app.yaml taxi-ws/taxi-ws.yaml taxi-ws/cron.yaml
Services to deploy:

descriptor:      [/home/tortuca_inc/maps-deckgl/app.yaml]
source:          [/home/tortuca_inc/maps-deckgl]
target project:  [maps-213104]
target service:  [default]
target version:  [20180815t150917]
target url:      [https://maps-213104.appspot.com]

descriptor:      [/home/tortuca_inc/taxi-ws/taxi-ws.yaml]
source:          [/home/tortuca_inc/taxi-ws]
target project:  [maps-213104]
target service:  [taxi-ws]
target version:  [20180815t150917]
target url:      [https://taxi-ws-dot-maps-213104.appspot.com]

Configurations to update:

descriptor:      [/home/tortuca_inc/taxi-ws/cron.yaml]
type:            [cron jobs]
target project:  [maps-213104]
```

Singapore Taxi Availability

Locations of taxis in Singapore
using [deck.gl](#) (code)

Data source: [DATA.GOV.SG](#)

TIMESTAMP:

2018-08-14T09:38:00+08:00

TAXIS:

5073

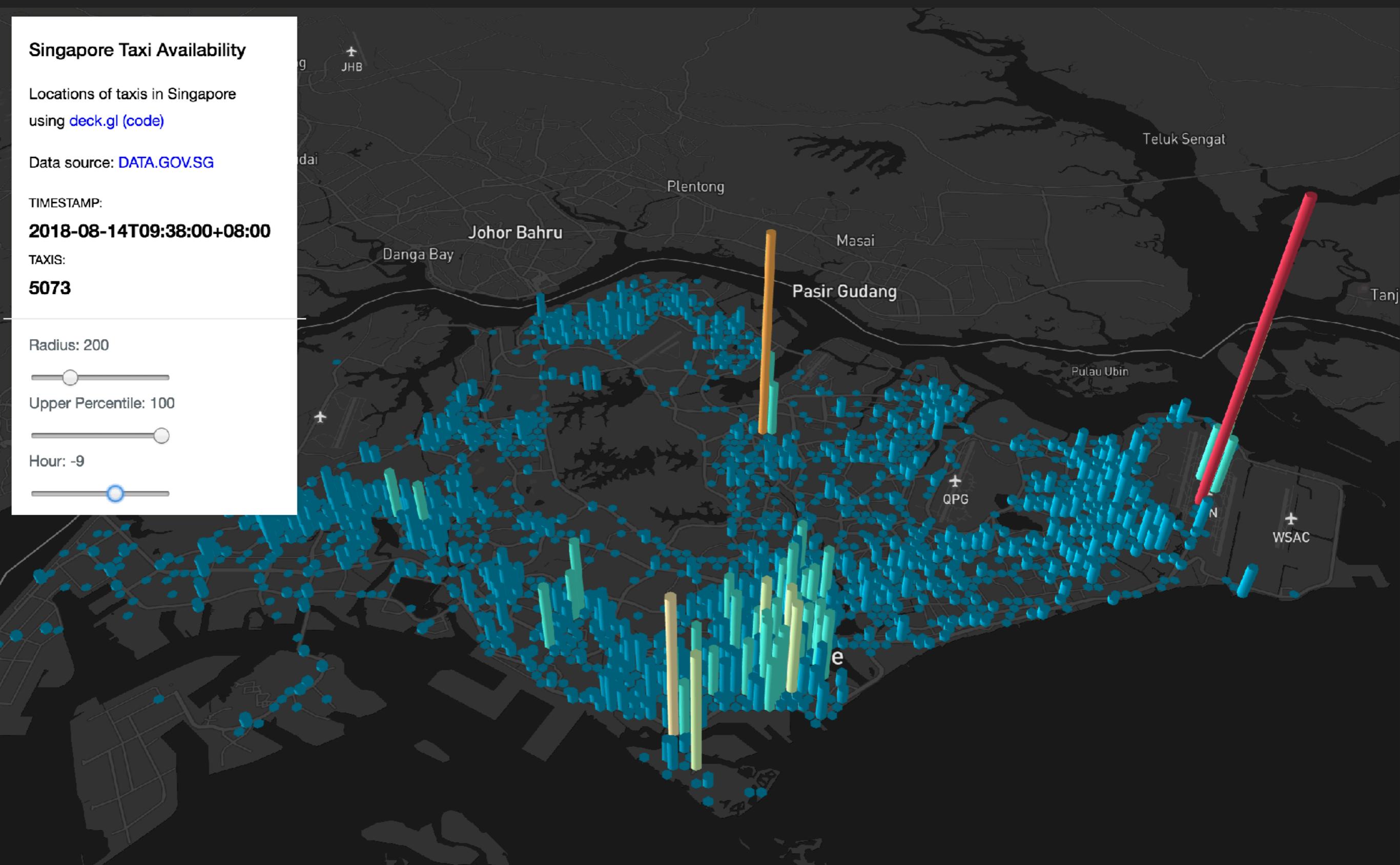
Radius: 200



Upper Percentile: 100



Hour: -9



PRICING

- ▶ Amazon Web Services
 - ▶ <https://aws.amazon.com/free/>
- ▶ Google Cloud Platform
 - ▶ <https://cloud.google.com/free/>
 - ▶ <https://cloud.google.com/free/docs/always-free-usage-limits>

CONFERENCES

- ▶ Google Cloud Summit
 - ▶ 13 Sep 2018 at Marina Bay Sands
 - ▶ <https://cloudplatformonline.com/2018-Summit-Singapore-Home.html>
- ▶ AWS Public Sector Summit
 - ▶ 2 Oct 2018 at Marina Bay Sands
 - ▶ <https://aws.amazon.com/summits/singapore-public-sector/>