IBM Bluemix Digital Innovation Platform

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Innovation is the new currency

"Two guys in a coffee shop can have access to the same computing power as a Fortune 500 company."

Jim Deters
Founder, Galvanize

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IBM Bluemix Overview

Infrastructure as a Service	Platform as a Service
Code	Code
Data	Data
Runtime	Runtime
Middleware	Middleware
OS	OS
Virtualization	Virtualization
Servers	Servers
Storage	Storage
Networking	Networking

Built on open technologies

.js .rb on rails .go .php CLOUD FOUNDRY .rb sinatra .py .java liberty .net

docker

openstack

With security in mind

AICPA SOC

U.S. • EU SAFEHARBOR U.S. DEPARTMENT OF COMMERCE

ISO 27001 Certified

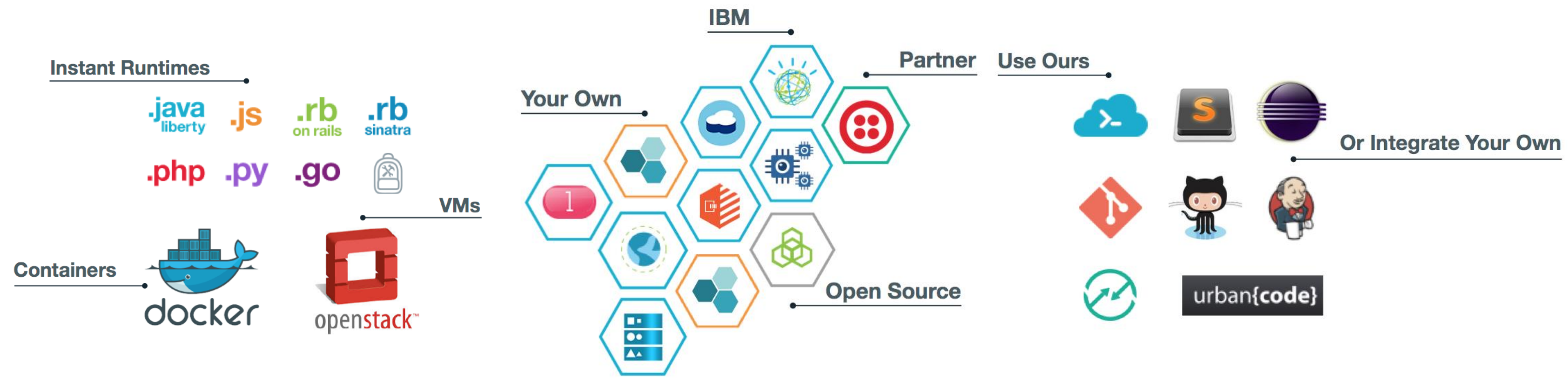
CSA cloud security alliance

Build awesome app in no time

RUN APPS YOUR WAY

CATALOG OF SERVICES / APIs

FLEXIBLE TOOLING



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Total cost of ownership

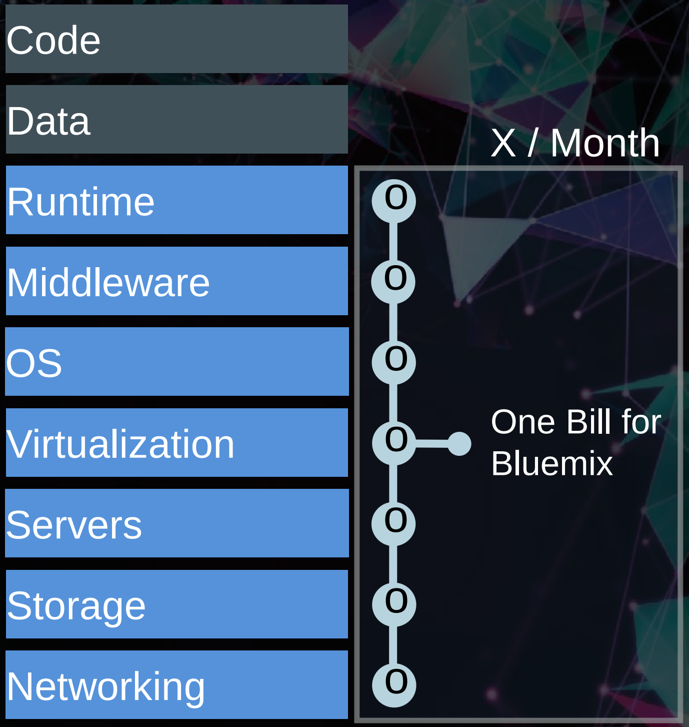
Comparison between Dedicated and Local.

- ⚫ Customer Managed
- 🔵 IBM Managed

- O perational Expense
- C apital Expense

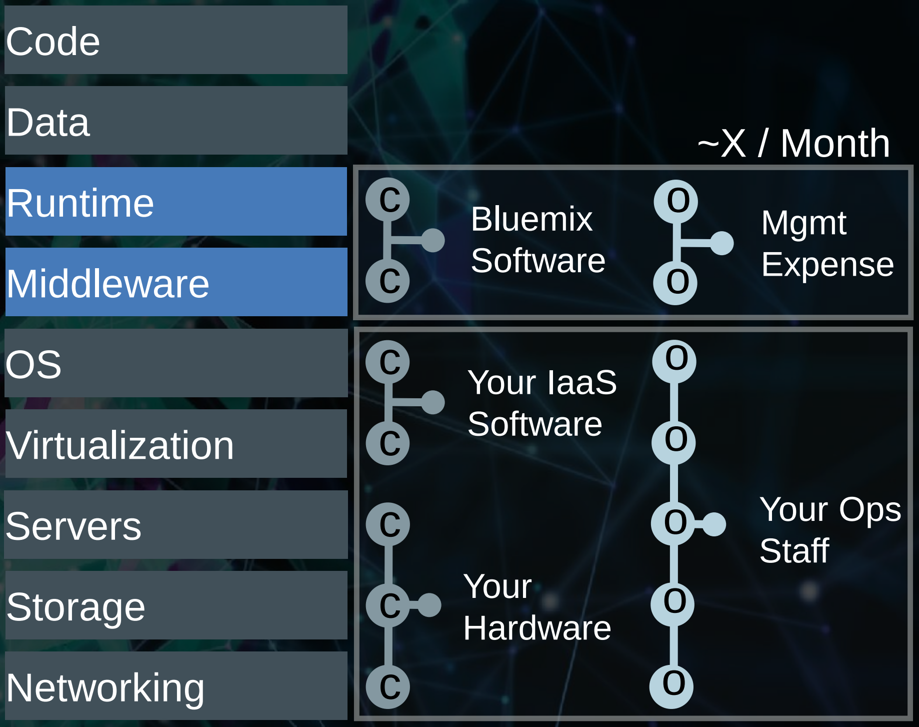
Bluemix Dedicated

IBM Managed **Single Tenant** Platform



Bluemix Local

IBM Managed **On-Prem** Platform



~4X / Month*

*Based on 10 FTE + SoftLayer infrastructure costs

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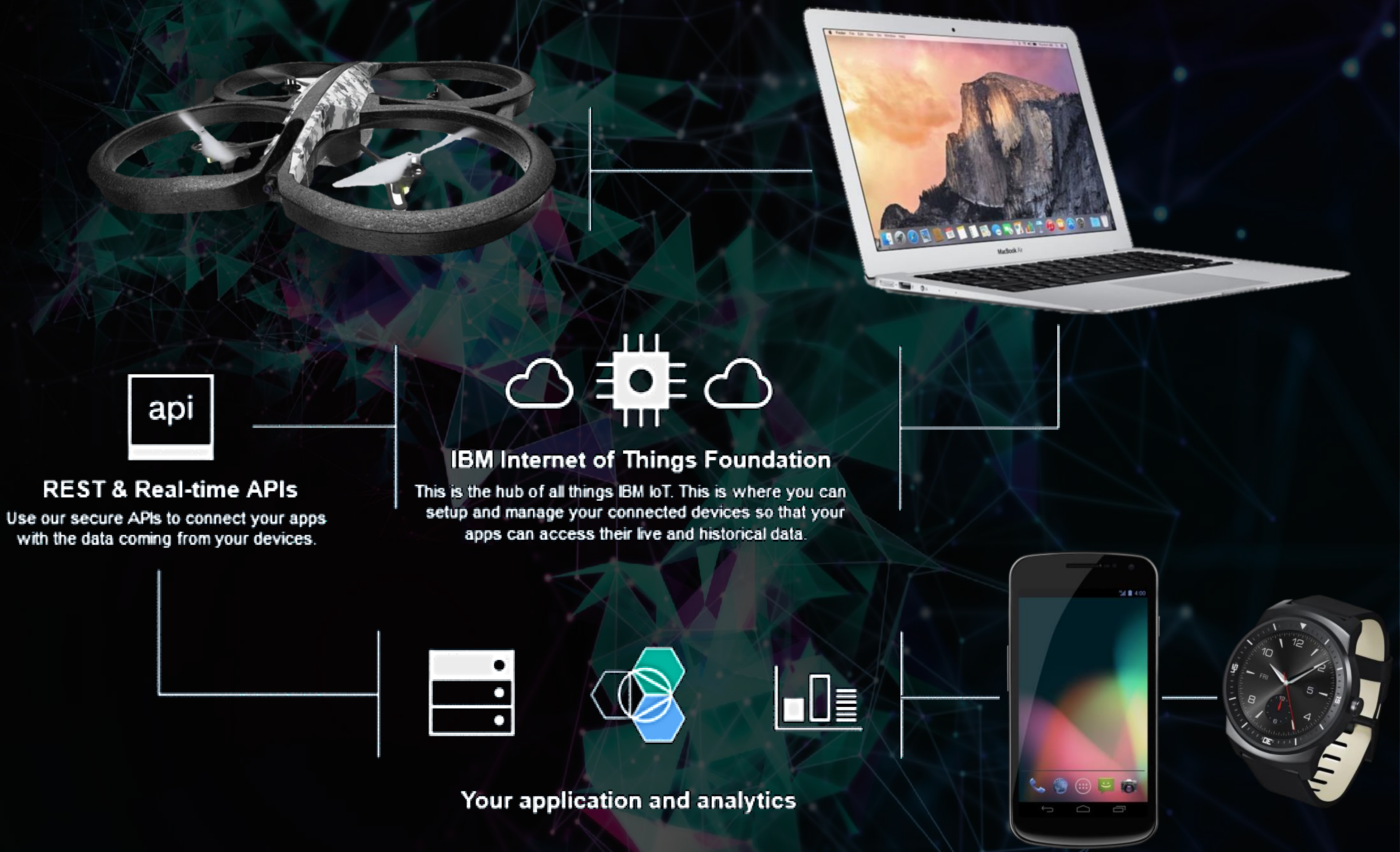
Demo

DEMO 2

DEMO 2



REST & Real-time APIs

Use our secure APIs to connect your apps with the data coming from your devices.

IBM Internet of Things Foundation

This is the hub of all things IBM IoT. This is where you can setup and manage your connected devices so that your apps can access their live and historical data.

Your application and analytics

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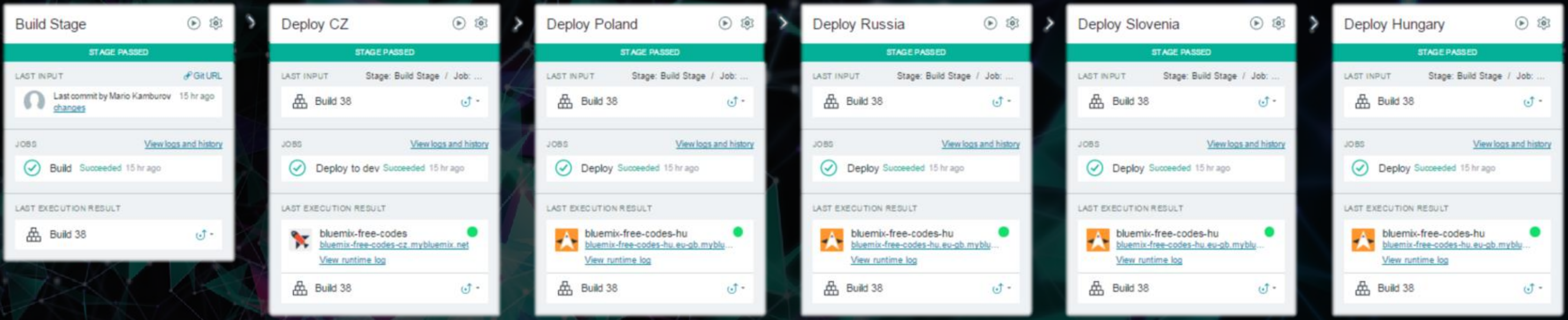
DevOps pipeline



Build Stage
STAGE PASSED
LAST INPUT — Git URL
Last commit by Mario Kamburov 15 hr ago
changes
JOBS — View logs and history
Build Succeeded 15 hr ago
LAST EXECUTION RESULT
Build 38

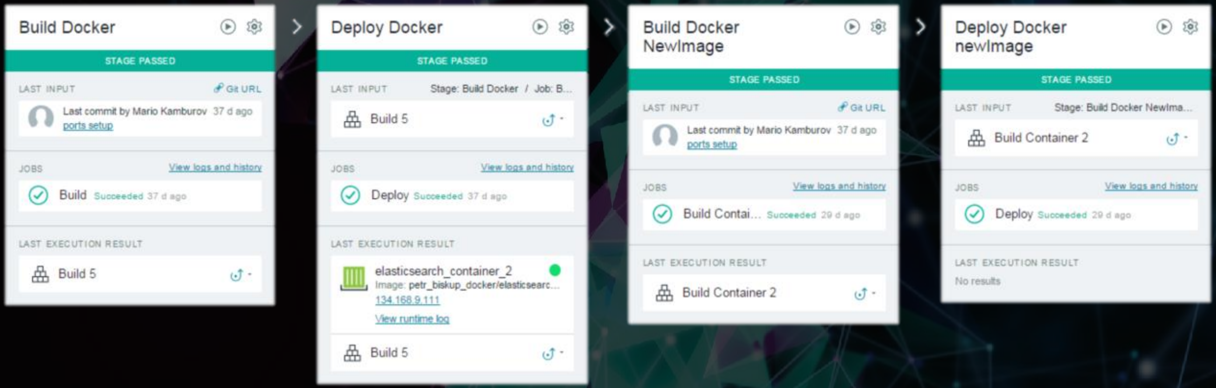
Deploy CZ
STAGE PASSED
LAST INPUT — Stage: Build Stage / Job: ...
Build 38
JOBS — View logs and history
Deploy to dev Succeeded 15 hr ago
LAST EXECUTION RESULT
bluemix-free-codes
bluemix-free-codes-cz.mybluemix.net
View runtime log
Build 38

Deploy Poland
STAGE PASSED
LAST INPUT — Stage: Build Stage / Job: ...
Build 38
JOBS — View logs and history
Deploy Succeeded 15 hr ago
LAST EXECUTION RESULT
bluemix-free-codes-hu
bluemix-free-codes-hu.eu-gb.myblu...
View runtime log
Build 38

Deploy Russia
STAGE PASSED
LAST INPUT — Stage: Build Stage / Job: ...
Build 38
JOBS — View logs and history
Deploy Succeeded 15 hr ago
LAST EXECUTION RESULT
bluemix-free-codes-hu
bluemix-free-codes-hu.eu-gb.myblu...
View runtime log
Build 38

Deploy Slovenia
STAGE PASSED
LAST INPUT — Stage: Build Stage / Job: ...
Build 38
JOBS — View logs and history
Deploy Succeeded 15 hr ago
LAST EXECUTION RESULT
bluemix-free-codes-hu
bluemix-free-codes-hu.eu-gb.myblu...
View runtime log
Build 38

Deploy Hungary
STAGE PASSED
LAST INPUT — Stage: Build Stage / Job: ...
Build 38
JOBS — View logs and history
Deploy Succeeded 15 hr ago
LAST EXECUTION RESULT
bluemix-free-codes-hu
bluemix-free-codes-hu.eu-gb.myblu...
View runtime log
Build 38



Build Docker
STAGE PASSED
LAST INPUT — Git URL
Last commit by Mario Kamburov 37 d ago
ports setup
JOBS — View logs and history
Build Succeeded 37 d ago
LAST EXECUTION RESULT
Build 5

Deploy Docker
STAGE PASSED
LAST INPUT — Stage: Build Docker / Job: B...
Build 5
JOBS — View logs and history
Deploy Succeeded 37 d ago
LAST EXECUTION RESULT
elasticsearch_container_2
Image: petr_biskup_docker/elasticsearc...
134.168.9.111
View runtime log
Build 5

Build Docker NewImage
STAGE PASSED
LAST INPUT — Git URL
Last commit by Mario Kamburov 37 d ago
ports setup
JOBS — View logs and history
Build Contai... Succeeded 29 d ago
LAST EXECUTION RESULT
Build Container 2

Deploy Docker newImage
STAGE PASSED
LAST INPUT — Stage: Build Docker NewIma...
Build Container 2
JOBS — View logs and history
Deploy Succeeded 29 d ago
LAST EXECUTION RESULT
No results

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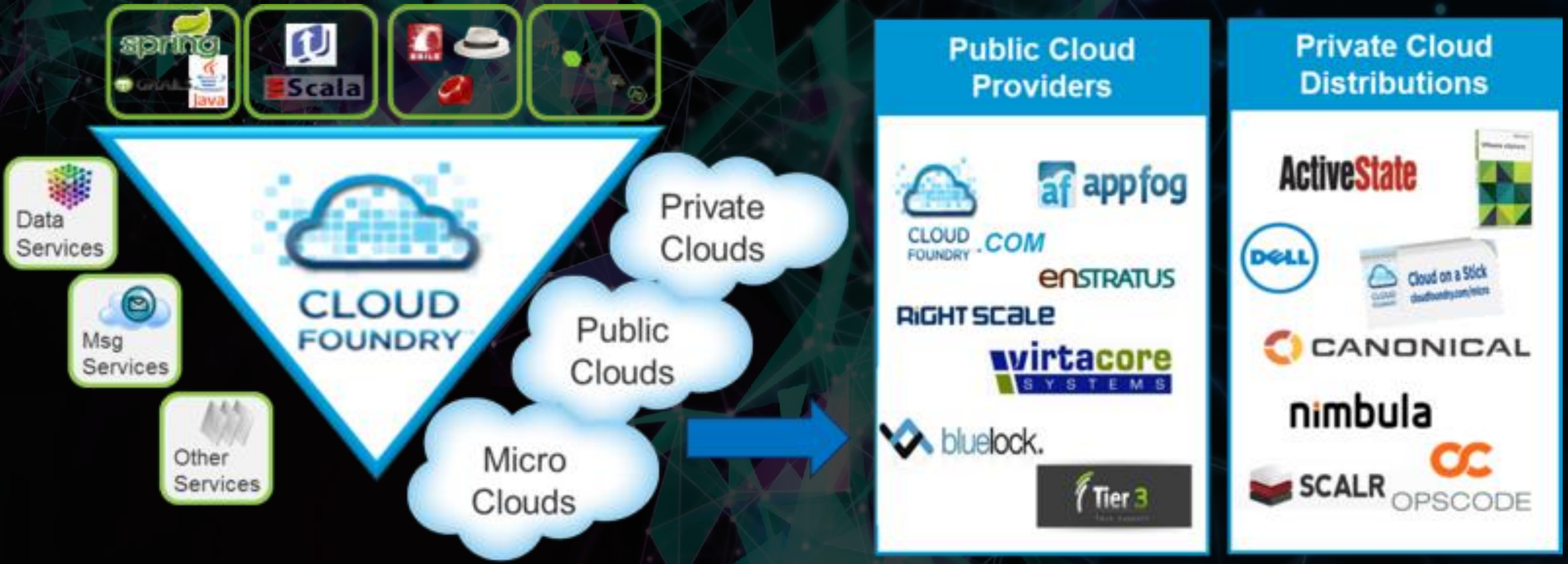
Under the hood

What is Cloud Foundry?

*An open platform-as-a-service (PaaS). The system supports **multiple** frameworks, **multiple** application infrastructure services and deployment to **multiple** clouds.*



Making Multi-Cloud a Reality

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Languages/Frameworks/Services

- **Multi-Language**

  Ruby, Java, Scala, Node.js, Erlang, Python, PHP..

- **Multi-Framework**

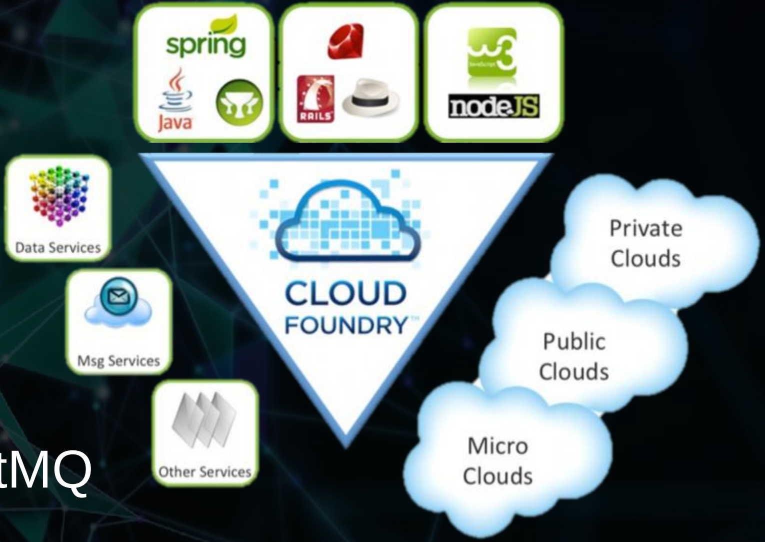
  Rails, Sinatra, Spring, Grails, Express, Lift

- **Multi-Services**

  MySQL, Postgres, MongoDB, Redis, RabbitMQ

- **Multi-Cloud, Multi-IaaS**

  Public Cloud, MicroCloud, Private Cloud



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Cloud Foundry Goals & Principles

- No single point of failure
- Distributed state
- Self healing
- Horizontally scalable

- Loose coupling
- Event-driven
- Asynchronous
- Idempotent
- Language independent communication

https://www.youtube.com/watch?v=Me2_-FIIYec

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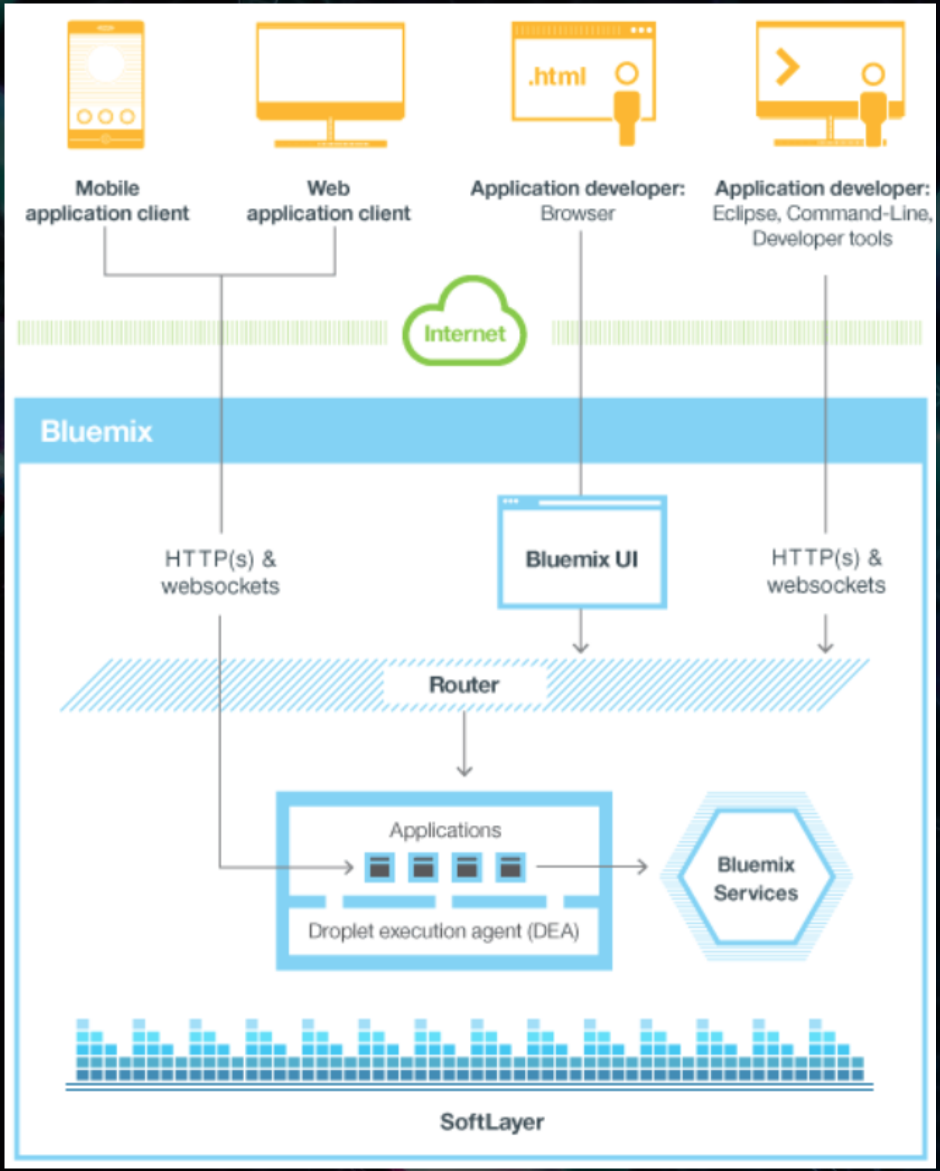
Bluemix High Level Architecture


.html
Mobile application client
Web application client
Application developer: Browser
Application developer: Eclipse, Command-Line, Developer tools
Internet
Bluemix
HTTP(s) & websockets
Bluemix UI
HTTP(s) & websockets
Router
Applications
Droplet execution agent (DEA)
Bluemix Services
SoftLayer

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Cloud Foundry Layers

- clients
- Inner shell
- Outer shell (BOSH)
- Infrastructure as a Service
- Hardware (CPU, Storage, Memory, Network)

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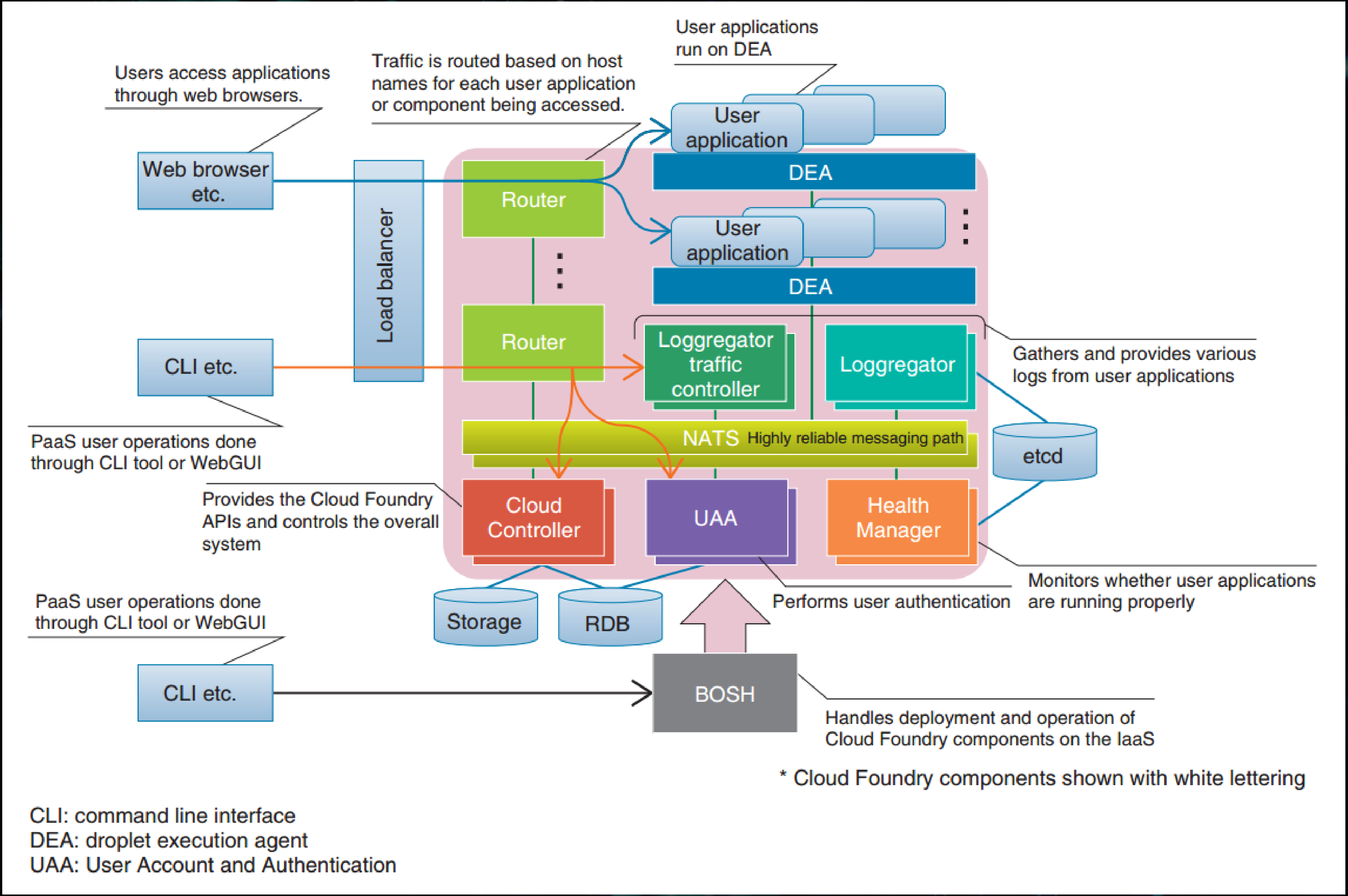
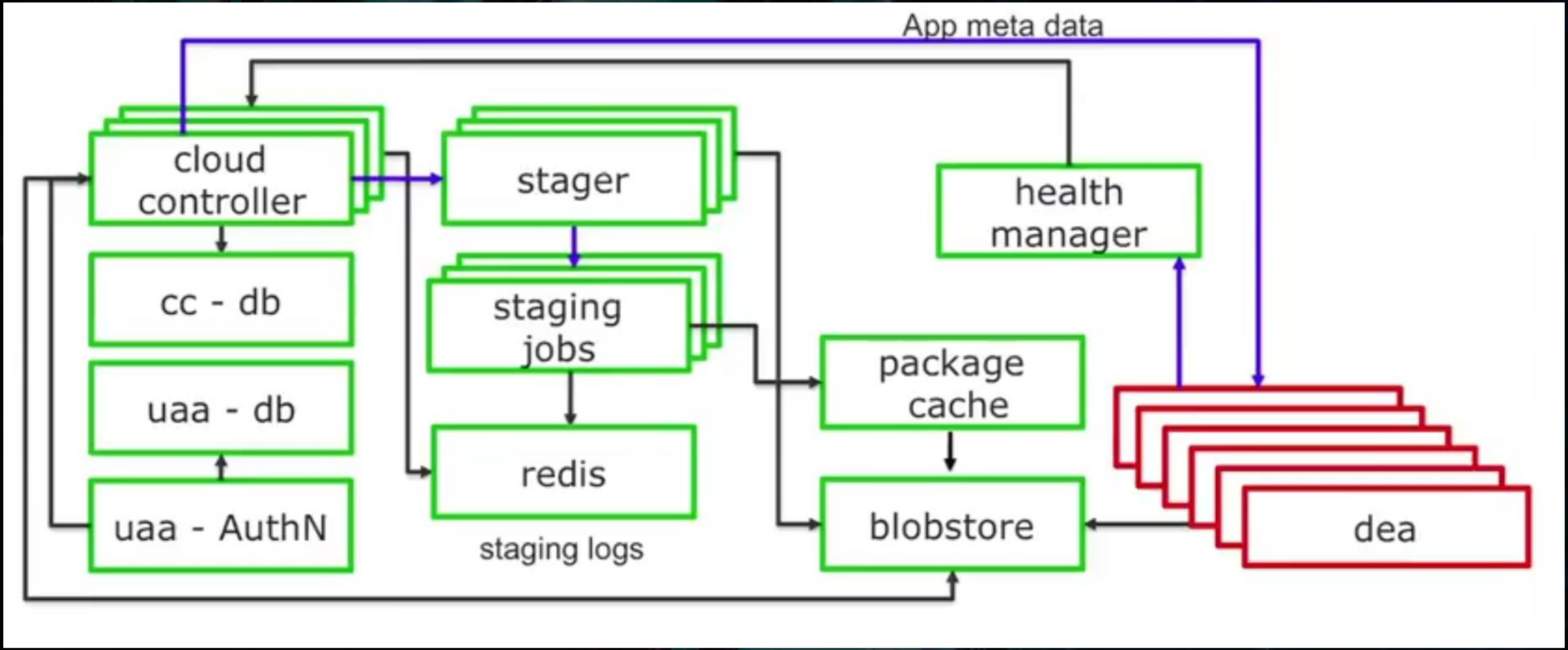
Cloud Foundry deep dive architecture


User applications run on DEA
Users access applications through web browsers.
Traffic is routed based on host names for each user application or component being accessed.
User application
Web browser etc.
Load balancer
Router
DEA
User application
DEA
Router
CLI etc.
Loggregator traffic controller
Loggregator
Gathers and provides various logs from user applications
PaaS user operations done through CLI tool or WebGUI
NATS Highly reliable messaging path
etcd
Provides the Cloud Foundry APIs and controls the overall system
Cloud Controller
UAA
Health Manager
PaaS user operations done through CLI tool or WebGUI
Storage
RDB
Performs user authentication
Monitors whether user applications are running properly
CLI etc.
BOSH
Handles deployment and operation of Cloud Foundry components on the IaaS

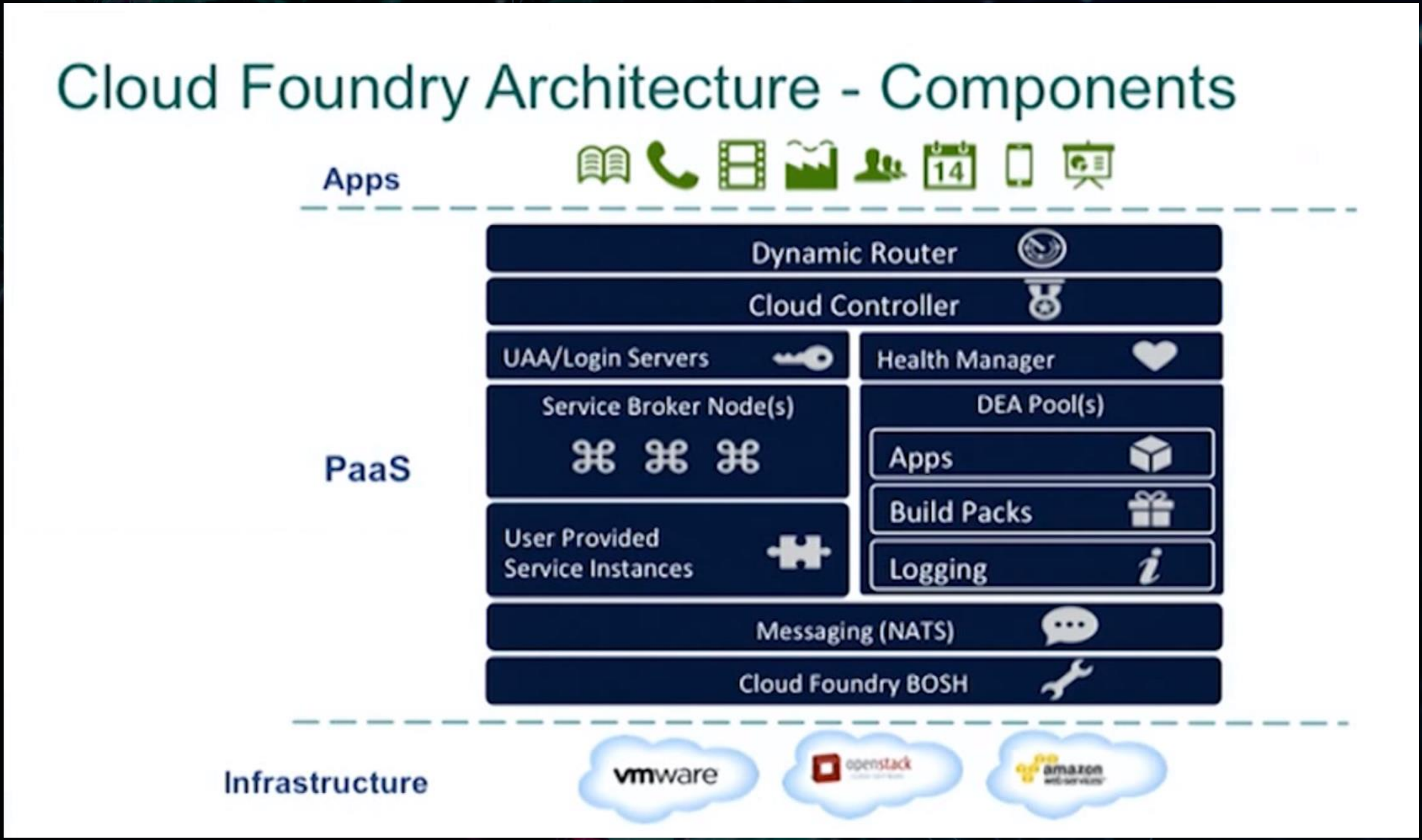
* Cloud Foundry components shown with white lettering

CLI: command line interface
DEA: droplet execution agent
UAA: User Account and Authentication

Cloud Foundry deep dive architecture



Cloud Foundry deep dive architecture



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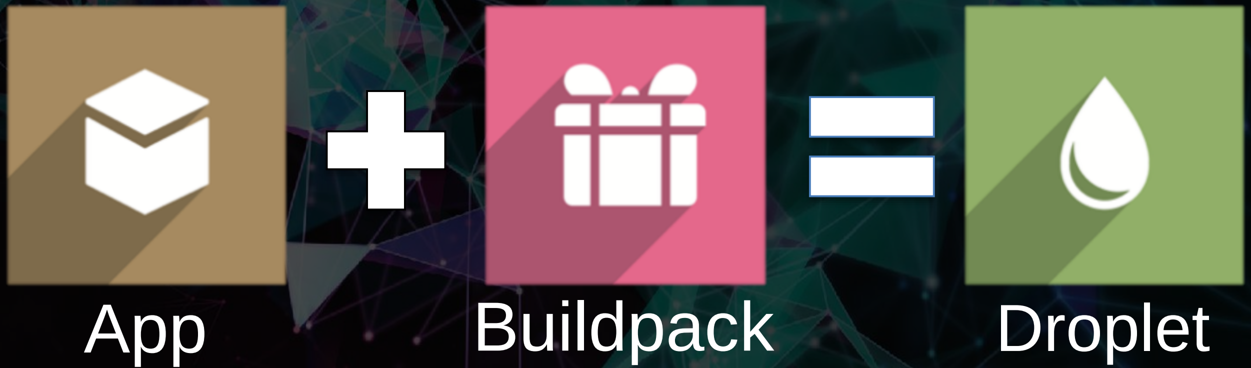
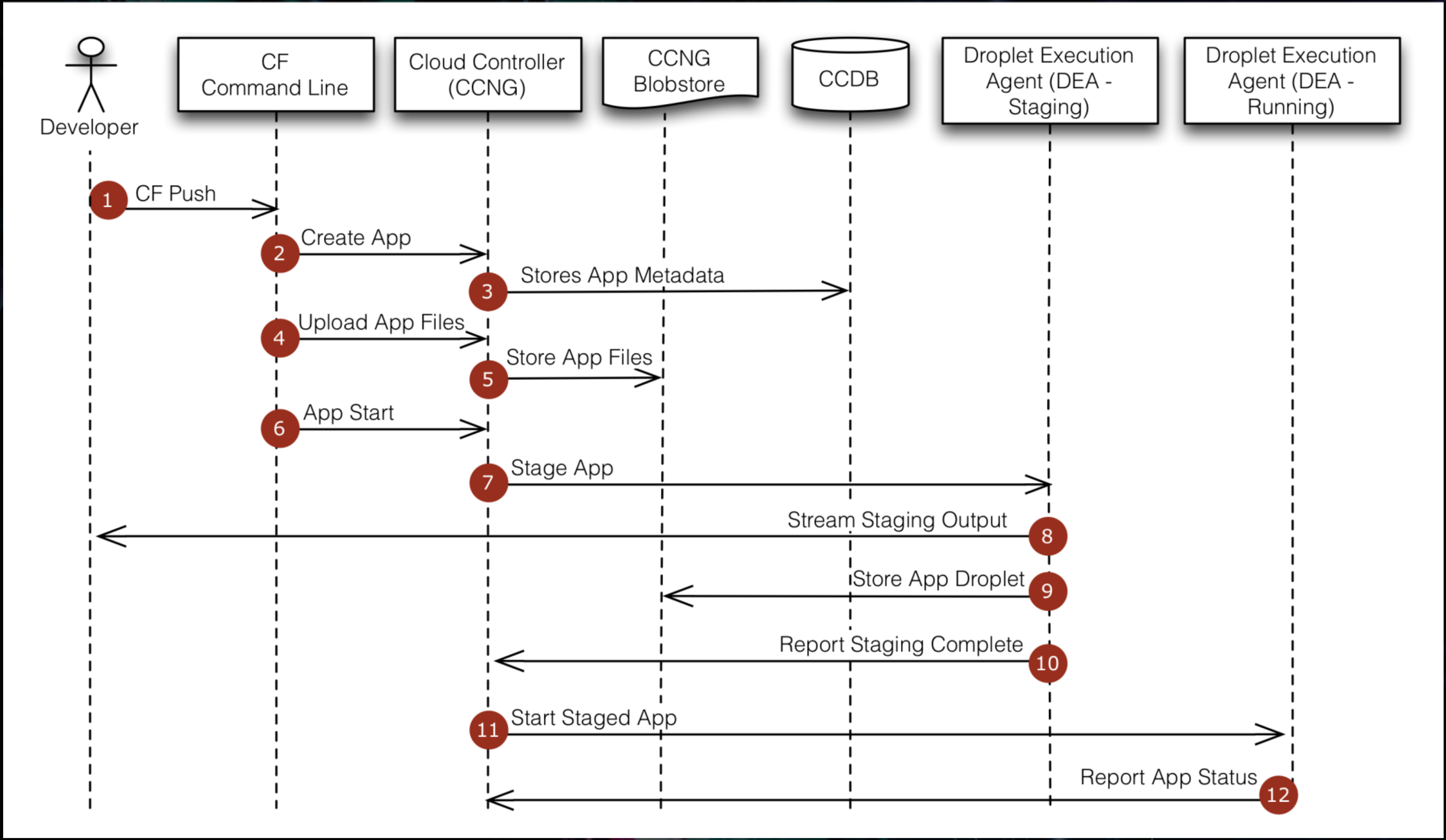
Buildpacks

Defines the rules to create a fully-contained execution environment



A Droplet is a fully self-sufficient, referentially correct package that can be executed in an isolated environment

Cloud Foundry – Application Staging



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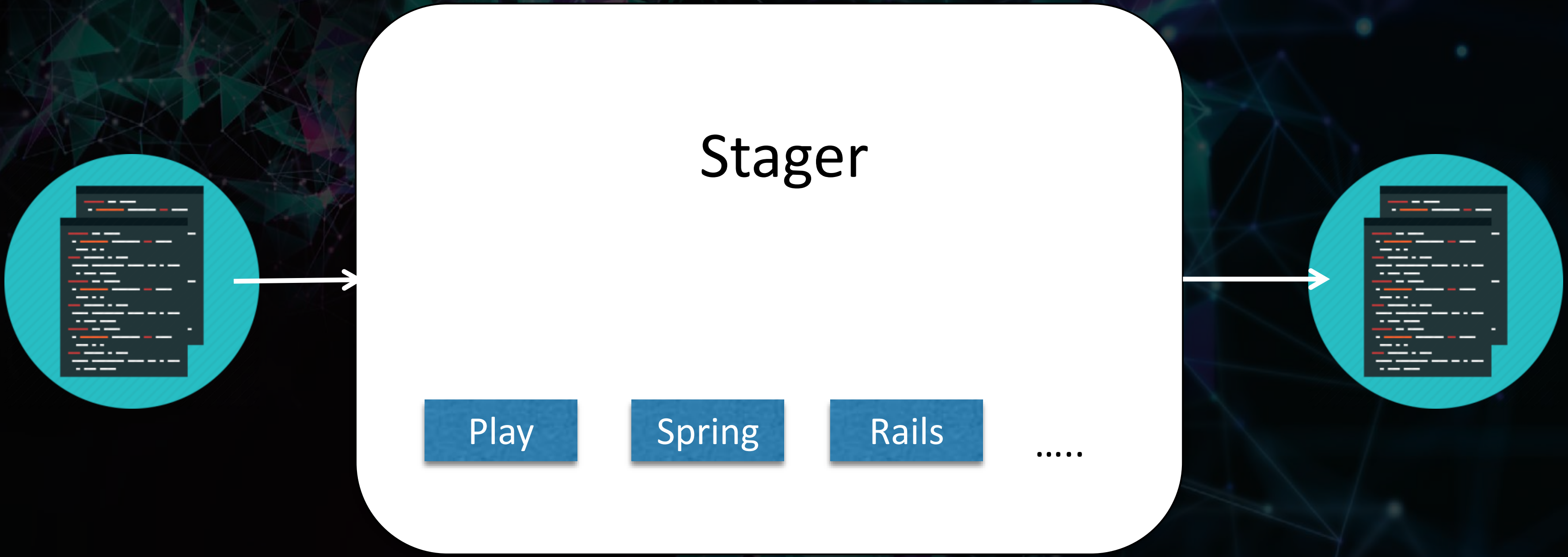
Cloud Foundry – Application Staging



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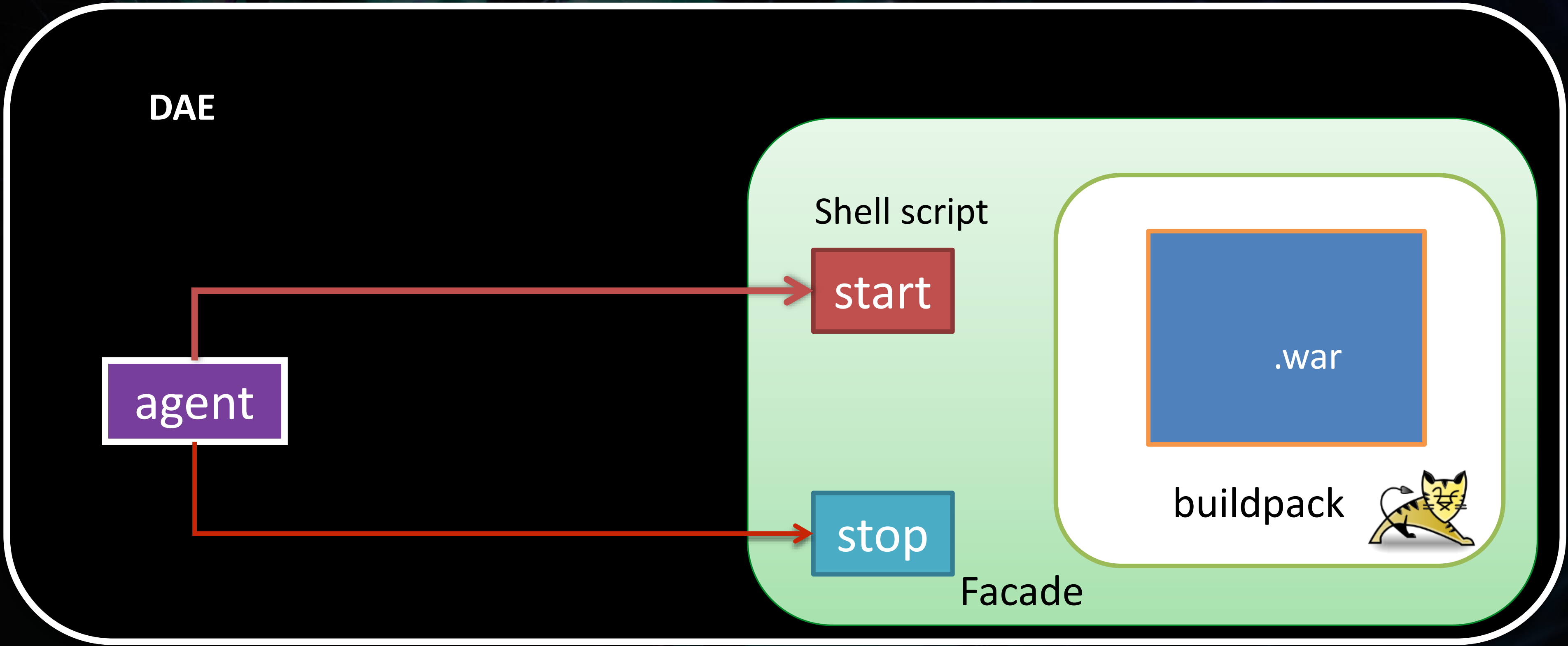
Staging process (Spring application)



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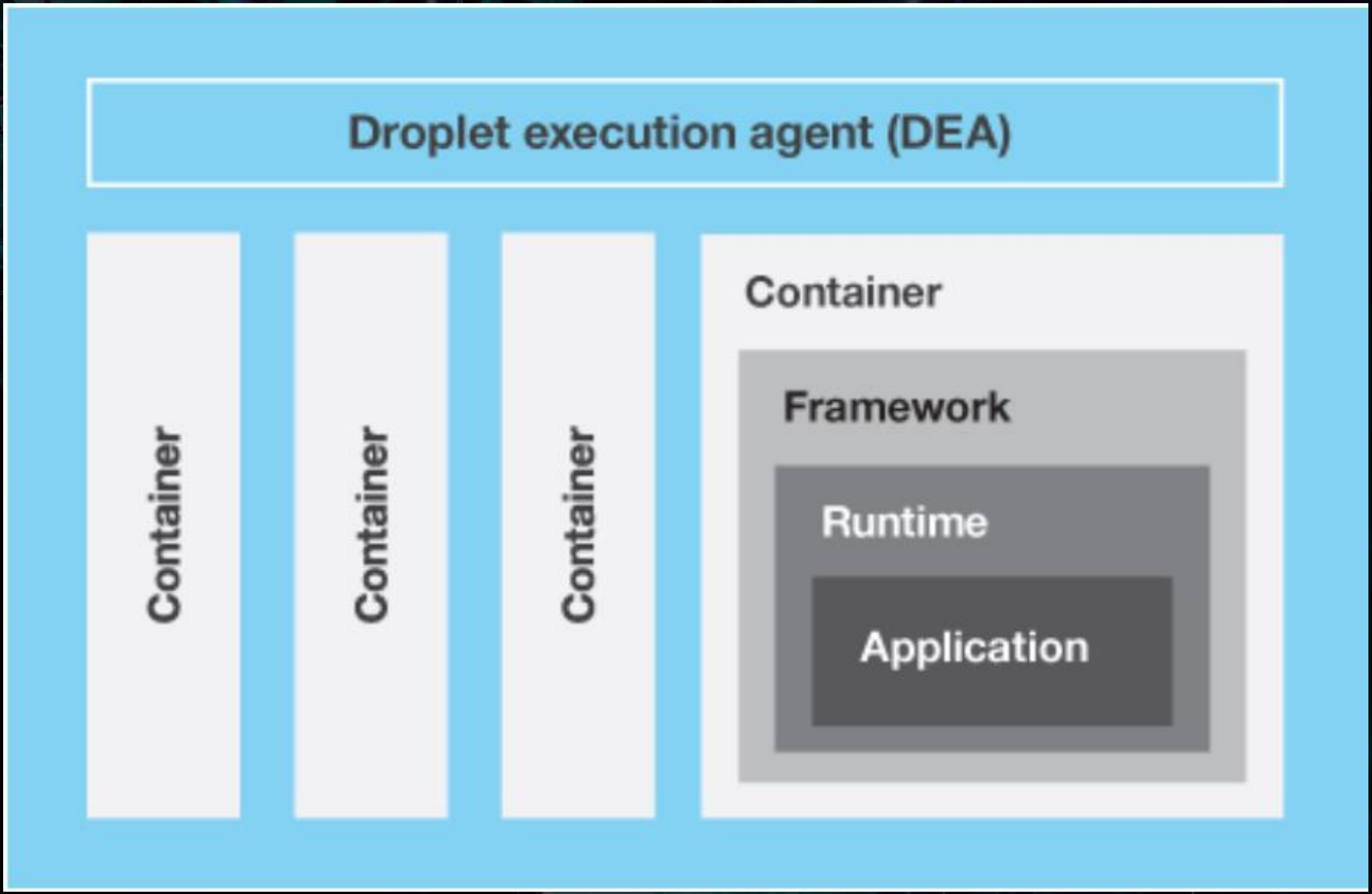
Design of a VM



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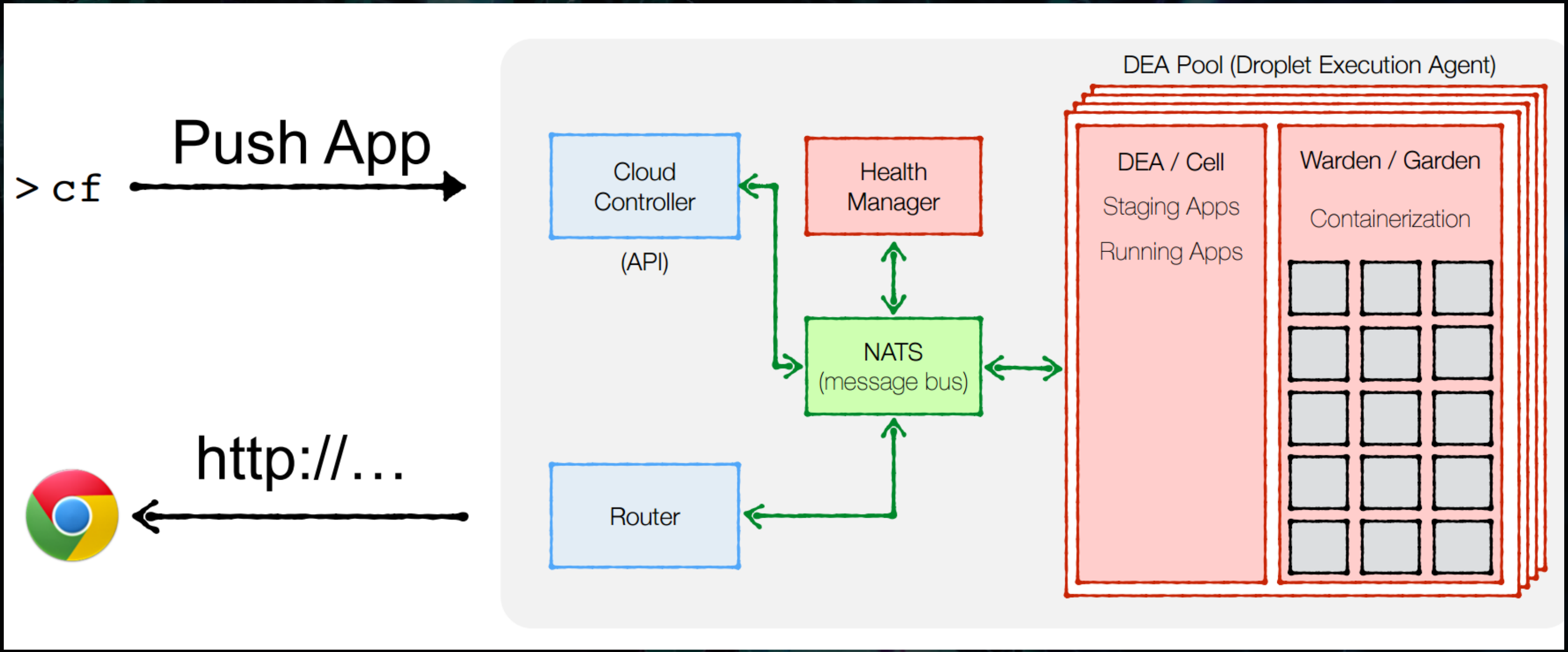
Workflow



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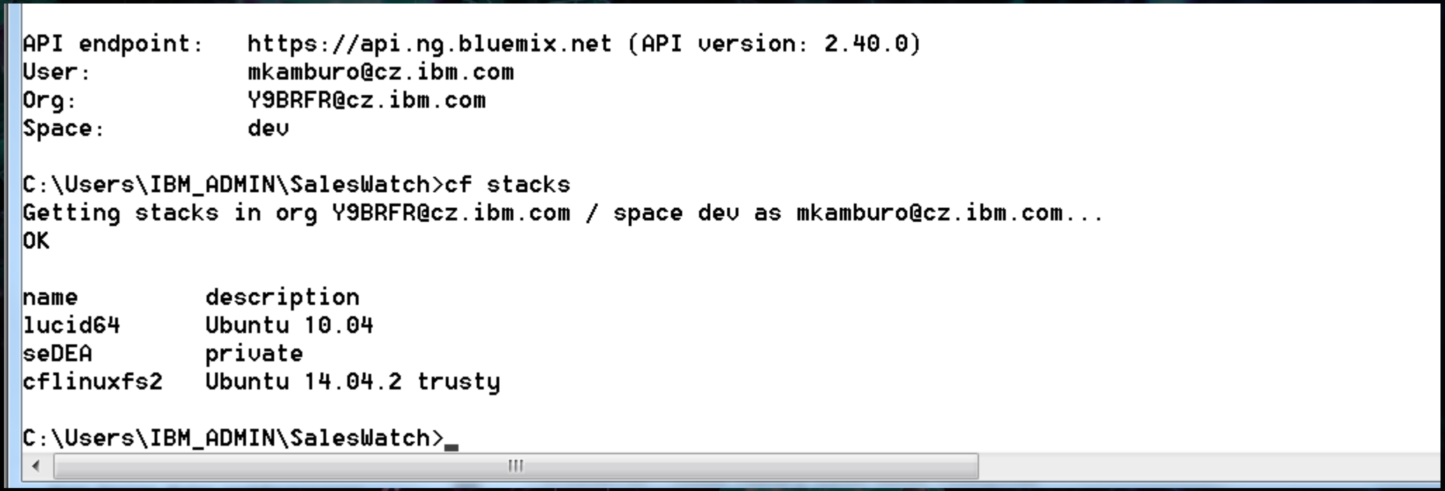
CF Stacks



```
API endpoint:   https://api.ng.bluemix.net (API version: 2.40.0)
User:           mkamburo@cz.ibm.com
Org:            Y9BRFR@cz.ibm.com
Space:          dev

C:\Users\IBM_ADMIN\SalesWatch>cf stacks
Getting stacks in org Y9BRFR@cz.ibm.com / space dev as mkamburo@cz.ibm.com...
OK

name          description
lucid64       Ubuntu 10.04
seDEA         private
cflinuxfs2    Ubuntu 14.04.2 trusty

C:\Users\IBM_ADMIN\SalesWatch>_
```

A stack is a prebuilt root filesystem (rootfs) which works in tandem with a buildpack and is used to support running applications.

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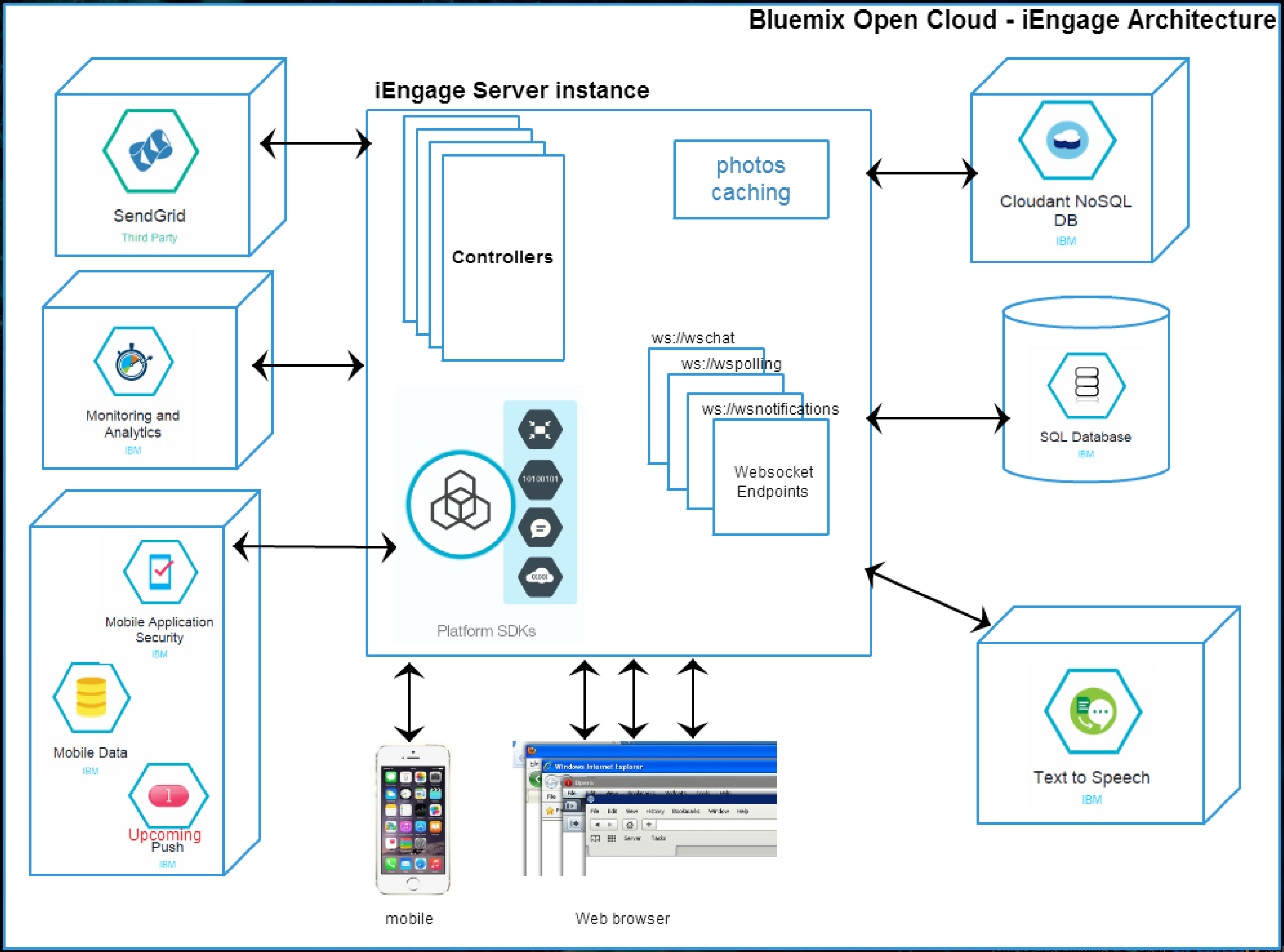
Use Cases
&
Best practises

Solution Architecture



http://iengage.mybluemix.net/

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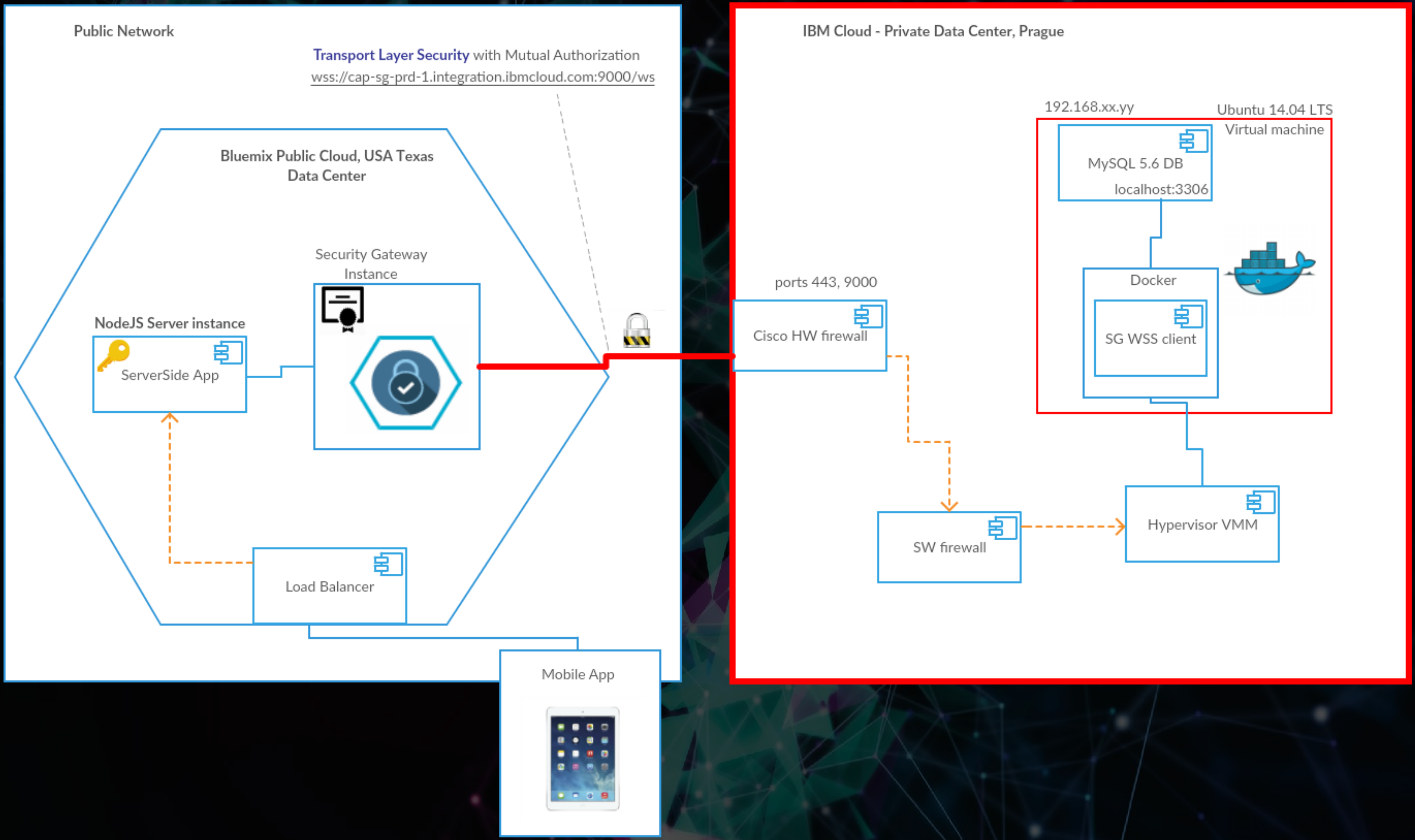
Hybrid cloud



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Parsing VCAP_SERVICES

Node

```
if (process.env.VCAP_SERVICES) {
    var env = JSON.parse(process.env.VCAP_SERVICES);
    var credentials = env['mysql-5.5'][0].credentials;
    …
}
```

Ruby

```
mysql_dbs = JSON.parse(ENV['VCAP_SERVICES'])["mysql-5.5"]
credentials = mysql_dbs.first["credentials"]
```

Java

```
String vcap_services = System.getenv("VCAP_SERVICES");
if (vcap_services != null && vcap_services.length() > 0) {
   JsonRootNode root = new JdomParser().parse(vcap_services);
   JsonNode mysqlNode = root.getNode(”mysql-5.5");
   JsonNode credentials = mysqlNode.getNode(0).getNode("credentials");
   …
}
```

Note Java buildpack parses VCAP_SERVICES and can auto configure bound services – see Bluemix Liberty for Java documentation

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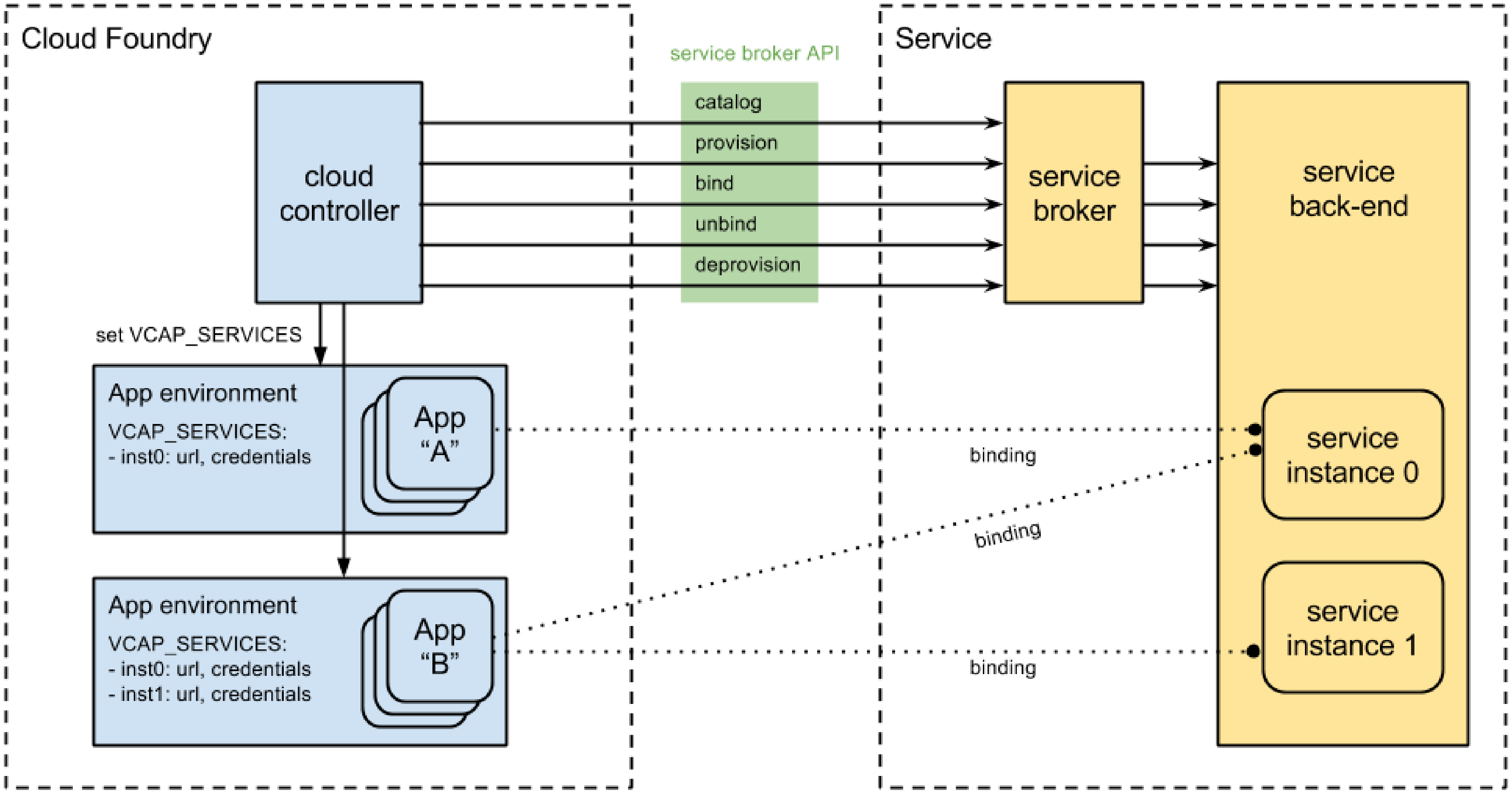
Cloud Foundry - Services



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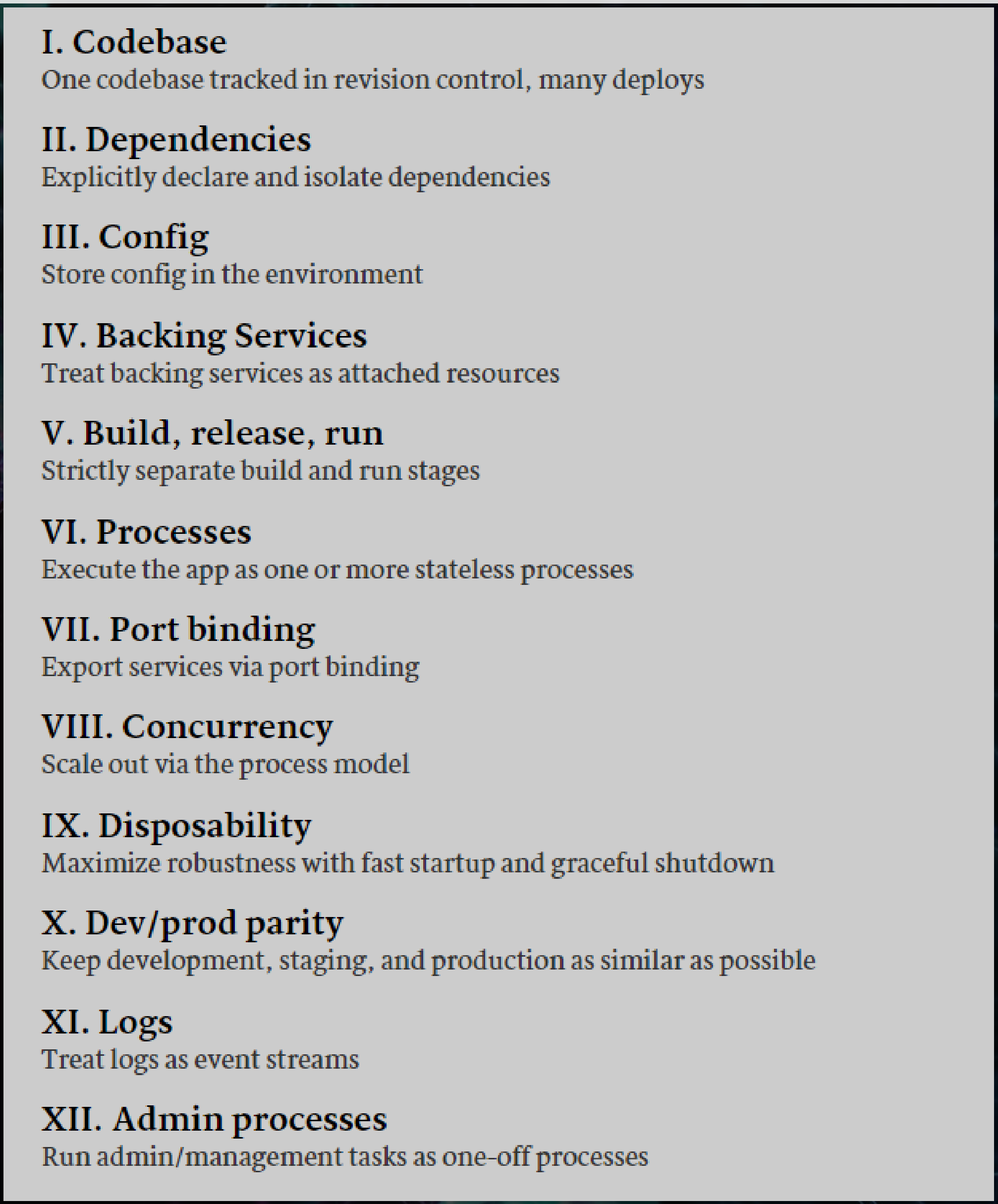
12 Factors for cloud development



I. Codebase
One codebase tracked in revision control, many deploys

II. Dependencies
Explicitly declare and isolate dependencies

III. Config
Store config in the environment

IV. Backing Services
Treat backing services as attached resources

V. Build, release, run
Strictly separate build and run stages

VI. Processes
Execute the app as one or more stateless processes

VII. Port binding
Export services via port binding

VIII. Concurrency
Scale out via the process model

IX. Disposability
Maximize robustness with fast startup and graceful shutdown

X. Dev/prod parity
Keep development, staging, and production as similar as possible

XI. Logs
Treat logs as event streams

XII. Admin processes
Run admin/management tasks as one-off processes

http://12factor.net/

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9 rules for cloud applications

1. Don’t code your application directly to a specific topology
2. Don’t assume the local file system is permanent
3. Don’t keep session state in your application
4. Don’t log to the file system
5. Don’t assume any specific infrastructure dependency
6. Don’t use infrastructure APIs from within your application
7. Don’t use obscure protocols
8. Don’t rely on OS-specific features
9. Don’t manually install your application

Read the article : http://www.ibm.com/developerworks/websphere/techjournal/1404_brown/1404_brown.html

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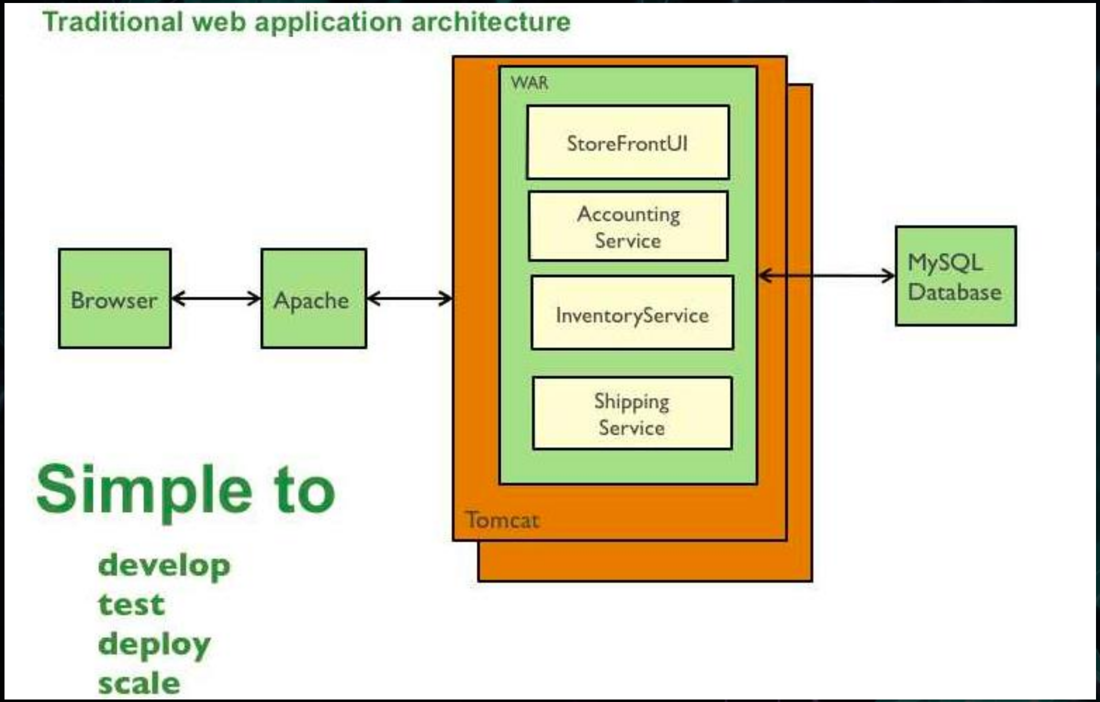
Monolith vs. Microservices



DevOps Borat
@DEVOPS_BORAT

Cultural Learnings of DevOps for Make Benefit Glorious Teams of Devs and Ops.

Kazakhstan
imdb.com/title/tt044345...
Joined July 2010

"To make error is human. To propagate error to all server in automatic way is **#devops**." –DevOps Borat.

With each service being completely different architecture wise and language it is in it would be near impossible for a central "ops" team to manage all the apps.

For example, if Dave a front-end dev wants to change the color of a button, it would require the whole app to be built, tested, and re-deployed for a tiny change.

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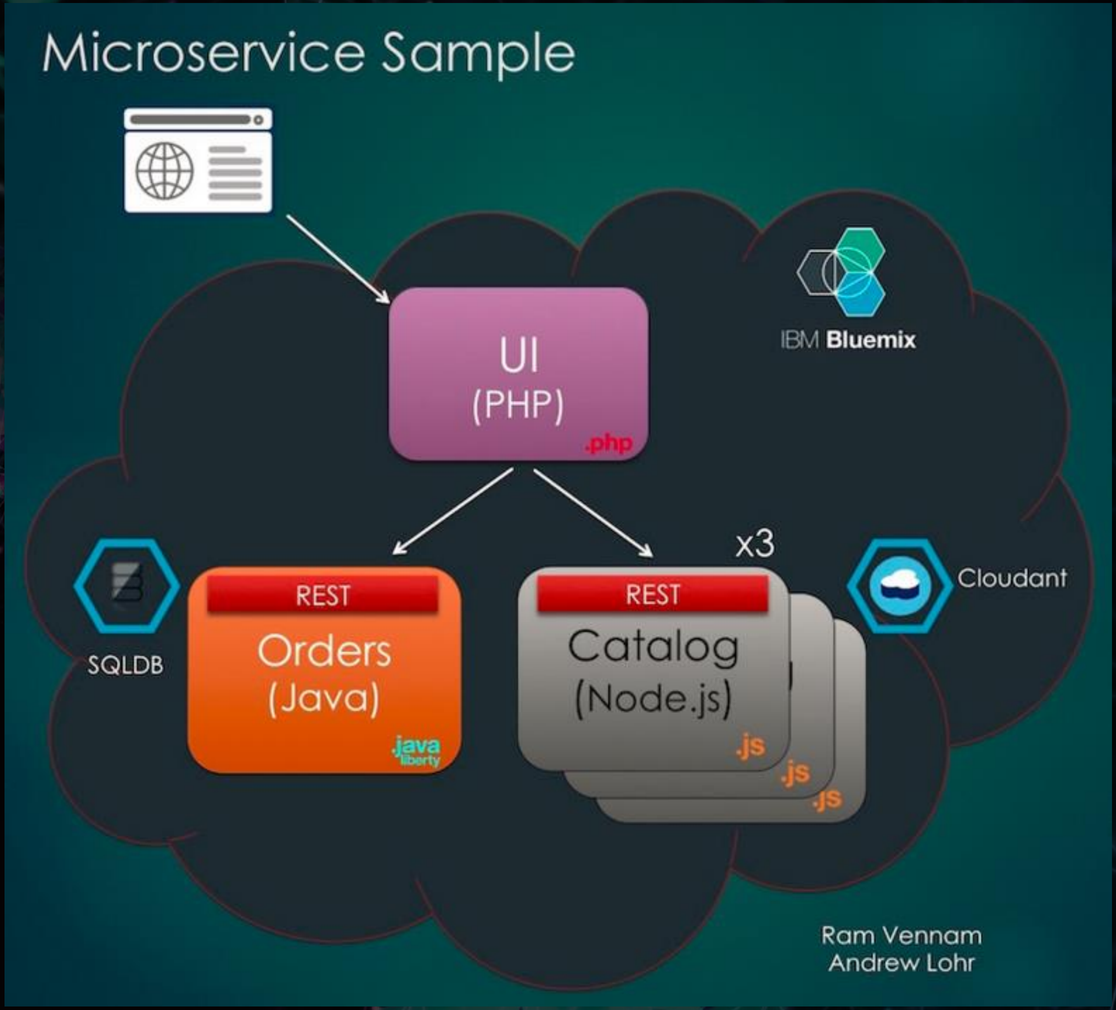
Microservices architecture example



http://microservices-ui-mkamburo-141.mybluemix.net/

http://microservices-catalogapi-mkamburo-142.mybluemix.net

http://microservices-ordersapi-mkamburo-141.mybluemix.net/rest/orders

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Links

- https://www.youtube.com/watch?v=p48KslXmP7A
- http://cloudacademy.com/blog/cloud-foundry-components/
- https://developer.ibm.com/bluemix/2015/03/16/sample-application-using-microservices-bluemix/
- https://www.youtube.com/watch?v=y4zor2y-yck
- https://www.youtube.com/watch?v=oXExLtmw0q4

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Thank you!

Register at:

Bluemix.net

to get your 30 days free tria