

Deploying Microservices Using Platform as a Service

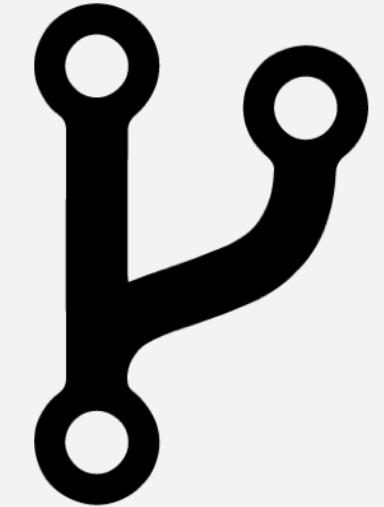


Fall 2020, CSCI-GA 2820, Graduate Division, Computer Science

Instructor:
John J Rofrano

Senior Technical Staff Member | DevOps Champion
IBM T.J. Watson Research Center
rofrano@cs.nyu.edu (@JohnRofrano)

Let's Get Forkin'



- The source for this lab can be FORKED from:

<https://github.com/nyu-devops/lab-bluemix-cf>



**You must fork the code so that you can push back
to your own copy and trigger the DevOps Pipeline
that we will set up**

Fork me on GitHub

Fork Me On GitHub

The screenshot shows a GitHub repository page for 'nyu-devops / lab-bluemix-cf'. The repository has 2 commits, 1 branch, 0 releases, 1 contributor, and is licensed under Apache-2.0. It includes topics like python, flask, redis, bluemix, and cloud-foundry. The commit history shows an initial load by rofrano, followed by commits for pets, static, .gitignore, LICENSE, and Procfile.

This repo demonstrates how deploy a simple Python Flask RESTful service using Bluemix Cloud Foundry

Branch: master ▾ New pull request

Create new file Upload files Find file Clone or download ▾

File	Commit Message	Time
.gitignore	Initial Load	29 seconds ago
LICENSE	Initial commit	a day ago
PProcfile	Initial Load	29 seconds ago
static	Initial Load	29 seconds ago
pets	Initial Load	29 seconds ago

Fork me on GitHub

Fork Me On GitHub

The screenshot shows a GitHub repository page for 'nyu-devops / lab-bluemix-cf'. The URL in the browser's address bar is highlighted with a red box. A red arrow points from the text 'Go to: http://github.com/nyu-devops/lab-bluemix-cf' to the highlighted URL.

Go to: <http://github.com/nyu-devops/lab-bluemix-cf>

This repo demonstrates how deploy a simple Python Flask RESTful service using Bluemix Cloud Foundry

python flask redis bluemix cloud-foundry Manage topics

2 commits 1 branch 0 releases 1 contributor Apache-2.0

Branch: master New pull request Create new file Upload files Find file Clone or download

File	Commit Message	Time
.gitignore	Initial Load	29 seconds ago
LICENSE	Initial commit	a day ago
Profile	Initial Load	29 seconds ago
pets	Initial Load	29 seconds ago
static	Initial Load	29 seconds ago

Fork Me On GitHub

Fork me on GitHub

A screenshot of a GitHub repository page for 'nyu-devops / lab-bluemix-cf'. The page shows basic repository statistics: 2 commits, 1 branch, 0 releases, 1 contributor, and Apache-2.0 license. A large orange call-to-action button in the center says 'Fork the code to your own account'. At the top right, there is a 'Fork' button which is highlighted with a red box and a red arrow pointing to it from the text on the right.

This repo demonstrates how deploy a simple Python Flask RESTful service using Bluemix Cloud Foundry

Edit

python flask redis bluemix cloud-foundry Manage topics

2 commits 1 branch 0 releases 1 contributor Apache-2.0

Branch: master New pull request Create new file Upload files Find file Clone or download

rofrano Initial Load ... Latest commit c4622c8 29 seconds ago

pets Initial Load 29 seconds ago

static Initial Load 29 seconds ago

.gitignore Initial Load 29 seconds ago

LICENSE Initial commit a day ago

Procfile Initial Load 29 seconds ago

Your New Forked Repo

The screenshot shows a GitHub repository page for `rofrano / lab-bluemix-cf`. A red box highlights the repository name and its origin: "forked from `nyu-devops/lab-bluemix-cf`". A red arrow points from this highlighted area to the text "Your repo knows that it was forked from nyu-devops" which is displayed in an orange box at the bottom of the page.

This repo demonstrates how to deploy a simple Python Flask RESTful service using Bluemix Cloud Foundry

rofrano / lab-bluemix-cf
forked from nyu-devops/lab-bluemix-cf

Issues 0 Pull requests 0 Projects 0 Wiki Insights Settings

14 commits 1 branch 0 releases 1 contributor

Branch: master ▾ New pull request Create new file Upload files Find file Clone or download ▾

This branch is 4 commits ahead of nyu-devops:master.

John J. Rofrano synced with upstream Latest commit 272169c 40 minutes ago

static synced with upstream 40 minutes ago

tests fixed problems with GUI and search a day ago

.cfignore fixed problems with GUI and search a day ago

What's in This Repo?

- Pet Demo using CouchDB as a persistent store
- `Vagrantfile` with:
 - Python 3 environment
 - CouchDB database in a Docker container
 - IBM Cloud / Cloud Foundry Command Line Interface
 - Port 5000 forwarded



Let's Create an API Key for IBM Cloud

Go to <http://cloud.ibm.com>

The screenshot shows the IBM Cloud login interface. On the left, the main landing page features a large "IBM Cloud" logo and a call to action: "Start building immediately using 190+ unique services." Below this are links for "Create an IBM Cloud account" and "Get a \$200 credit when you upgrade". The right side shows the login form with a red box highlighting the "ID" input field, which contains "IBMid". A red arrow points from the text "Login with your [nyu.edu](#) email" to this input field. The login form also includes a "Remember me" checkbox, "Forgot ID?", "Forgot password?", and a "Continue" button.

Welcome to
IBM Cloud

Start building immediately using
190+ unique services.

Create an IBM Cloud account

Get a \$200 credit when you upgrade

After you upgrade to a Pay-As-You-Go account, you can use the credit to try new services or scale your projects. The credit is valid for one month and can be used with any of our IBM Cloud offerings.

Learn more:
[Pricing](#) [Catalog](#) [Docs](#) [Status](#)

Follow us on

© Copyright IBM Corp. 2014, 2019. All rights reserved.

[Cookie Preferences](#)

Login with your [nyu.edu](#) email

Log in to IBM Cloud

ID
IBMid

Remember me

Forgot ID?
Forgot password?

Continue

Manage > Security > Platform API keys

The screenshot shows the IBM Cloud dashboard interface. At the top, there is a navigation bar with links for Catalog, Docs, Support, and Manage. A red box highlights the 'Manage' link, and a red arrow points from a red callout bubble containing the text 'Select Manage' towards it. Below the navigation bar, there are sections for Resource summary, Planned maintenance, Location status, and For you.

Select Manage

Resource summary

- Cloud Foundry apps
- Cloud Foundry services
- Services
- Apps
- Developer tools

Planned maintenance

- Next event: Tue, Mar 24, 2020 1:00 PM
Discovery service database migration
- Upcoming
 - The IBM Cloud Container Registry in AP-Sou...
 - Maintenance for Internet Services from Mar ...
 - Update the Hyper Protect Crypto Services us...

Location status

- Asia Pacific

For you

Watson Studio provides a suite of tools and a collaborative environment for data

Accelerate your cloud use with starter kits.

Manage > Security > Platform API keys

The screenshot shows the IBM Cloud Dashboard. At the top, there's a navigation bar with links for Catalog, Docs, Support, and Manage. The Manage link has a dropdown menu with options: Enterprise, Account, Billing and usage, Access (IAM), Maintenance, and View events. A red box and arrow highlight the 'Access (IAM)' option. Below the navigation bar, there's a 'Resource summary' section with links for Cloud Foundry apps, Cloud Foundry services, Services, Apps, and Developer tools. To the right of this is a timeline section showing events like 'Discovery service database migration' and 'Upcoming'. At the bottom, there are sections for Location status (Asia Pacific) and For you (Watson Studio).

Select Access (IAM)

Access (IAM)

Location status

View status

For you

Watson Studio provides a suite of tools

Accelerate your cloud use with starter kits.

Create a New Key

The screenshot shows the IBM Cloud Access (IAM) interface. On the left sidebar, under the 'Access (IAM)' section, the 'API keys' option is highlighted with a red box and a red arrow pointing to it from the text 'Select API keys'.

Select API keys

Manage access and users

Access starts with the user

Assign access to IAM, classic Cloud Foundry one place.

What's new: Managing access to classic infrastructure

To get started, select a user from your user list, and go to the classic infrastructure tab.

API keys

Overview

Users

Access groups

Service IDs

Authorizations

Settings

Users

Start on the Users page to assign access to IAM, classic infrastructure, and Cloud Foundry.

Access groups

Group users and service IDs for quick and efficient access management.

Resource groups

Organize your resources into customizable groupings to quickly assign access.

Service IDs

Create access identities for apps, databases, and more by using service IDs.

NYU

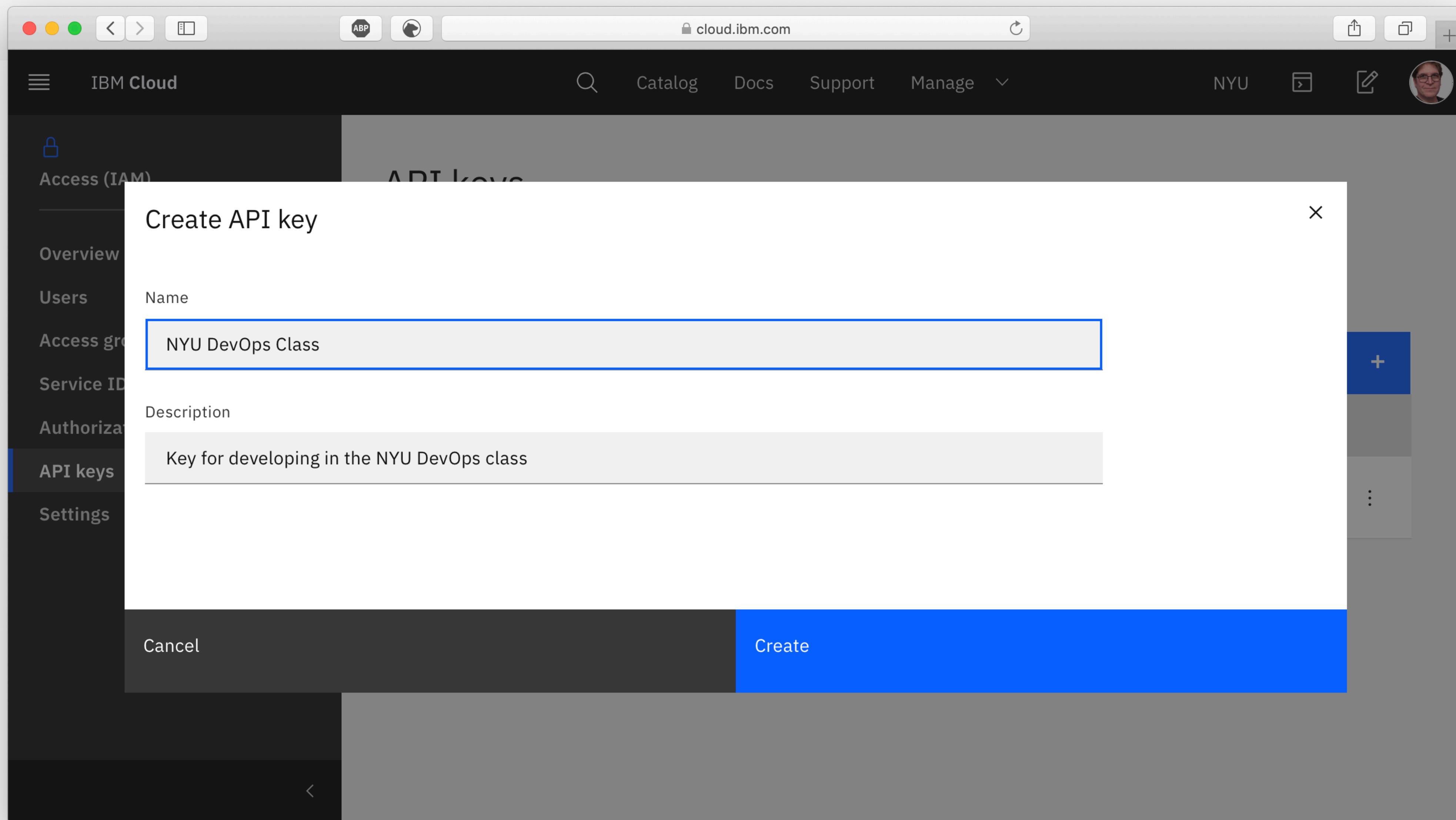
Invite users +

Create a New Key

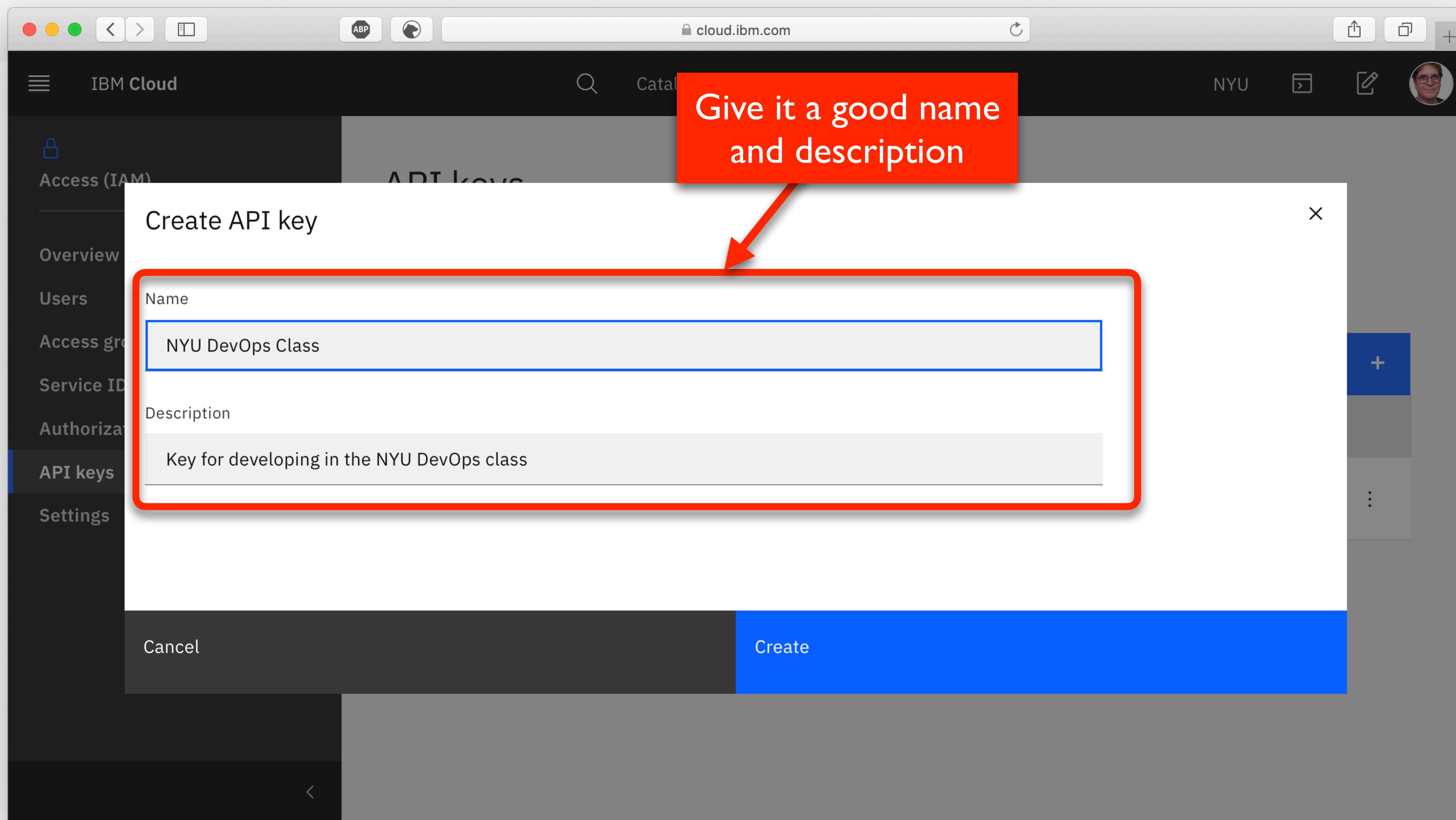
The screenshot shows the IBM Cloud interface for managing API keys. The left sidebar is dark with white text, listing several options: Access (IAM), Overview, Users, Access groups, Service IDs, Authorizations, API keys (which is selected and highlighted with a blue bar), and Settings. The main content area has a light gray background and displays the title "API keys". Below the title is a sub-instruction: "Create and manage your IBM Cloud API keys. Service API keys are managed by the individual services." In the center, there is a large orange button with white text that reads "Select Create an IBM Cloud API key". To the right of this button is a blue rectangular button with white text that says "Create an IBM Cloud API key" followed by a small "+" sign. A thick red arrow points from the text "Select Create an IBM Cloud API key" towards the blue button. Below the buttons is a table with the following data:

Status	Name	Description	Date Created	⋮
🔒	development	Key for NYU DevOps development	2017-10-11 13:44 GMT	⋮

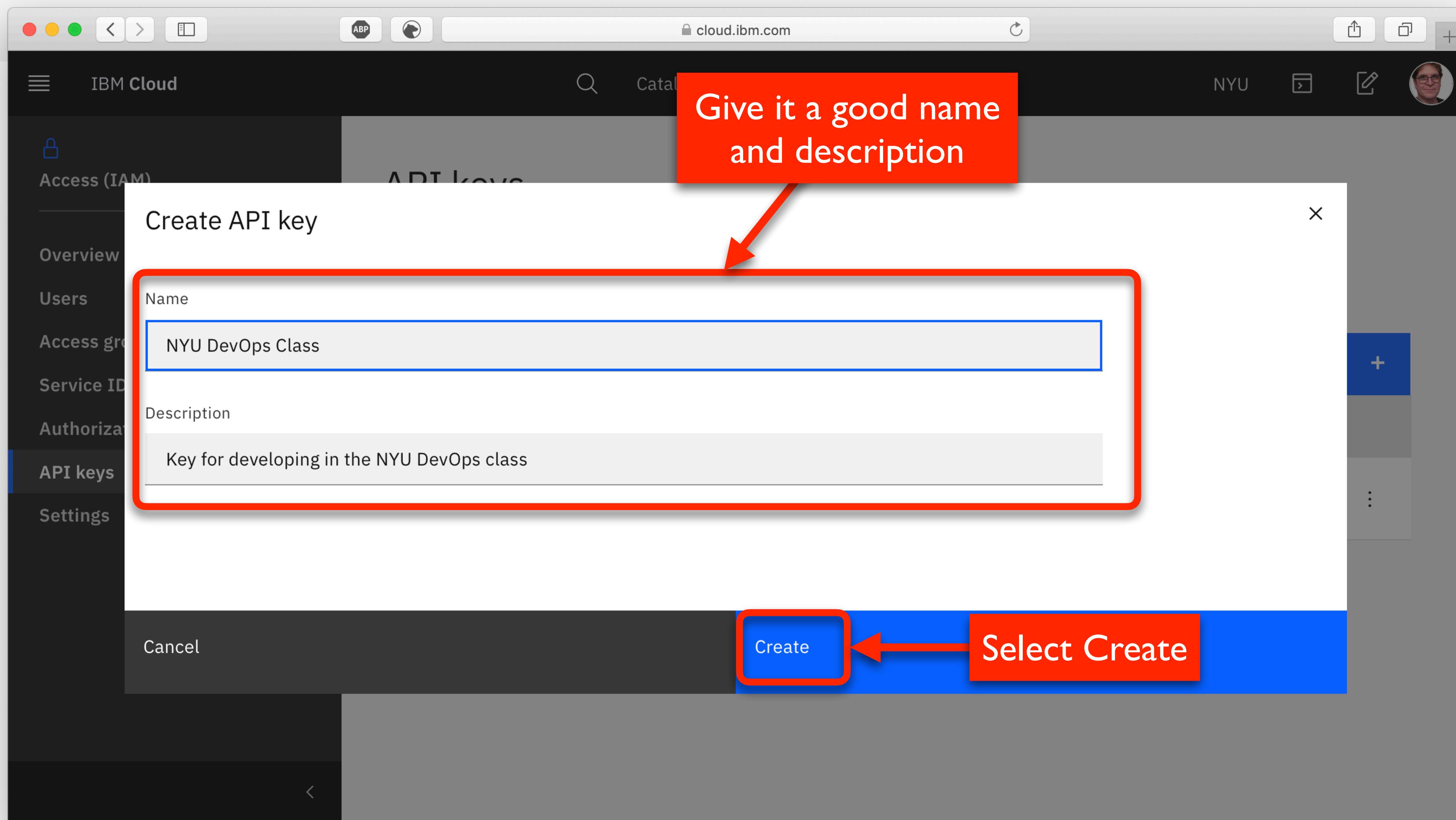
Give it a Descriptive Name



Give it a Descriptive Name



Give it a Descriptive Name



Save to your Hard Drive

The screenshot shows the IBM Cloud interface for managing API keys. The left sidebar is titled "Access (IAM)" and contains links for Overview, Users, Access groups, Service IDs, Authorizations, API keys (which is the active tab), and Settings. The main content area is titled "API keys" and displays a success message: "API key successfully created". It instructs the user to copy the API key or click download to save it. The API key itself is shown as a series of dots. Below the key are two buttons: "Copy" and "Download". A large red box and arrow highlight the "Download" button, with the text "Select Download" overlaid in a red box. At the bottom of the card, there is additional information: a padlock icon, "NYU DevOps Class", "Key for developing in the NYU DevOps class", "2020-03-21 20:42 GMT", and a more options menu icon.

API key successfully created

Copy the API key or click download to save it. You won't be able to see this API key again, so you can't retrieve it later.

API key

.....

Copy Download

NYU DevOps Class

Key for developing in the NYU DevOps class

2020-03-21 20:42 GMT

Select Download

Move Key to .Bluemix Folder

- You should now have a file called `apiKey.json` in your Downloads folder
- We want to move that to your `~/.bluemix` folder

Mac:

```
$ mkdir ~/.bluemix/  
$ mv ~/Downloads/apikey.json ~/.bluemix/apiKey.json
```

Windows:

```
C:> mkdir ~\.bluemix  
C:> copy ~\Downloads\apikey.json ~\.bluemix\apiKey.json
```

Use your key to Logon to IBM Cloud

- Now anytime you need to logon to IBM Cloud you can use the API Key instead of a userid and password like this:

```
$ ibmcloud login -a https://cloud.ibm.com --apikey @~/.bluemix/apiKey.json -r us-south
```



Cool!

Create the Vagrant VM

- Clone your Fork of the project and start Vagrant provisioning the VM

```
$ git clone https://github.com/<your_account>/lab-bluemix-cf.git  
$ cd lab-bluemix-cf  
$ vagrant up
```

**AND NOW BACK TO
OUR REGULARLY
SCHEDULED
PROGRAM**

What Will You Learn?

- Overview of Cloud Computing
- Gain a good overview of what Platform as a Service is
- How to deploy an application into IBM Cloud Cloud Foundry
- How to link a 3rd party service to your application
- Change your app, push your code, and watch it redeploy



CLOUD COMPUTING

What is cloud computing?

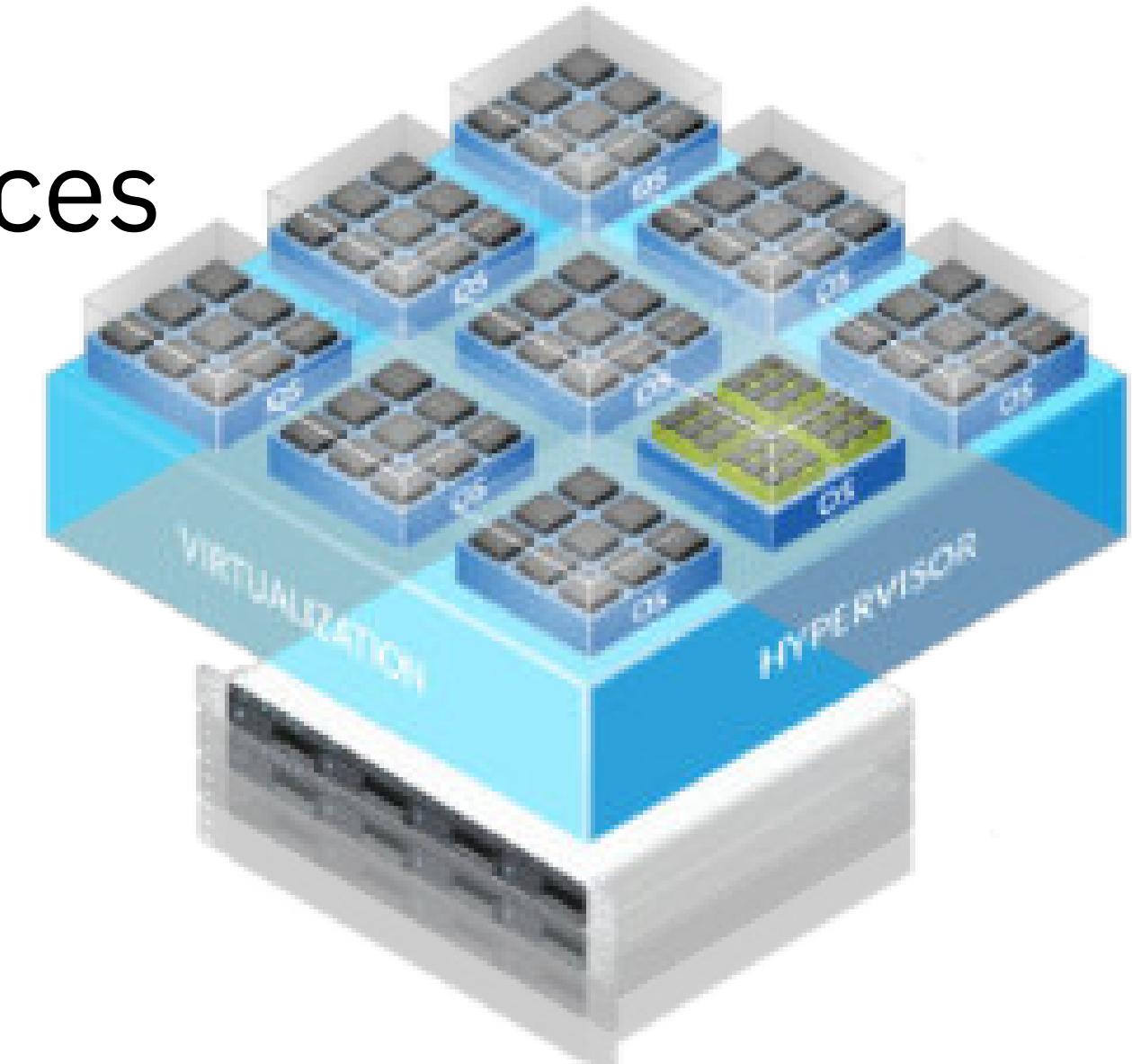


The National Institute of Standards and Technology (NIST) loosely describes cloud computing as:

"A model for enabling convenient, **on-demand** network access to a **shared pool** of **configurable computing resources**, such as networks, servers, storage, applications, and services, that can be **rapidly provisioned and released** with **minimal management effort** or service provider interaction."

What is Cloud Computing?

- A fundamental shift from physical infrastructure to virtual infrastructure
 - Seen as a major paradigm shift
- A rapid way of provisioning and later releasing computing services on the network
- Some important characteristics:
 - Rapid/automated provisioning and (later) release of services
 - Can be Pay-as-you-go
 - Appearance of infinite resources
 - Could be managed or unmanaged



Why use cloud services instead of running them yourself?

- You'll think, "if I was running my own Kafka cluster instead of using Kinesis, I could find the issue and fix it"
- That may be true, but you should remember two things:
 1. That would be a distraction from creating business value
 2. You would almost certainly be worse at running it.
 - You'd have more and worse incidents. It's a service provider's purpose in life to be good at it and they have economies of scale you don't.
- Moving past the "I could always build it myself" attitude can be hard.

A Framework for making the decision

Jared Short (@ShortJared)

My thinking on serverless these days in order of consideration.

- If the platform has it, use it
- If the market has it, buy it
- If you can reconsider requirements, do it
- If you have to build it, own it

5:36 PM · Feb 27, 2019 · Twitter for Android

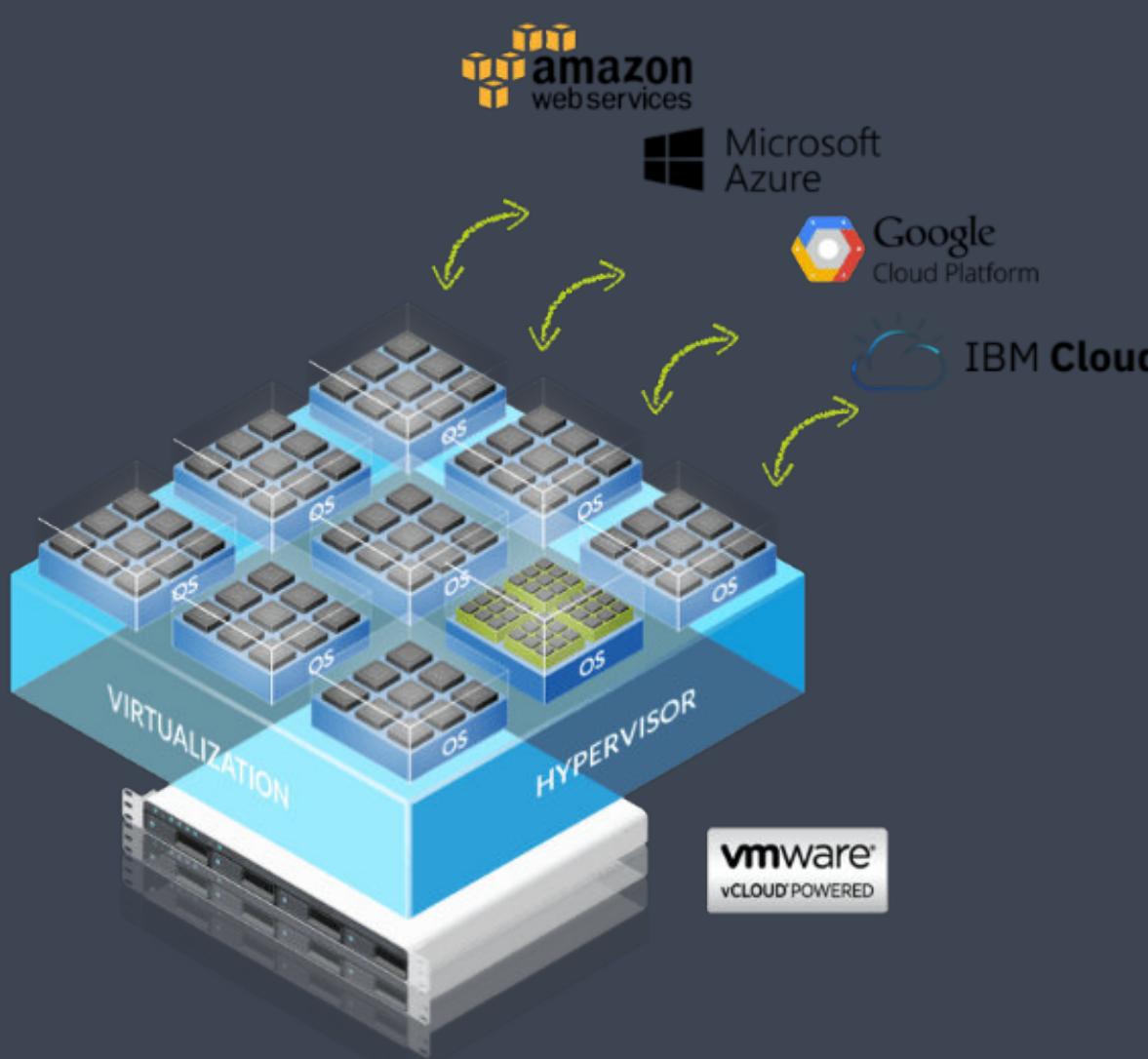
52 Retweets 147 Likes

Tenets of Cloud Computing

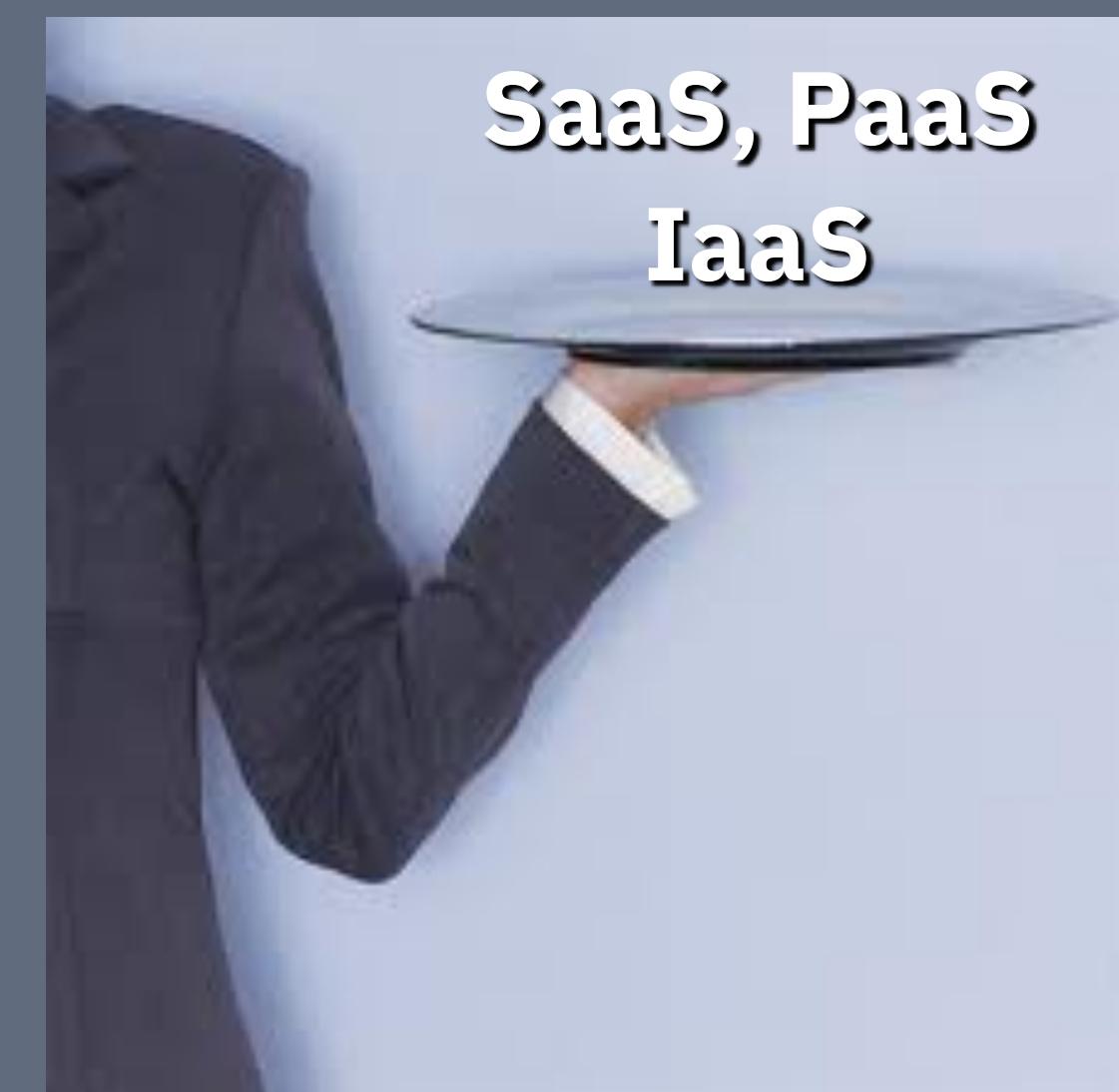
Utility Computing



Infinitely Shared Resources



Computing as a Service

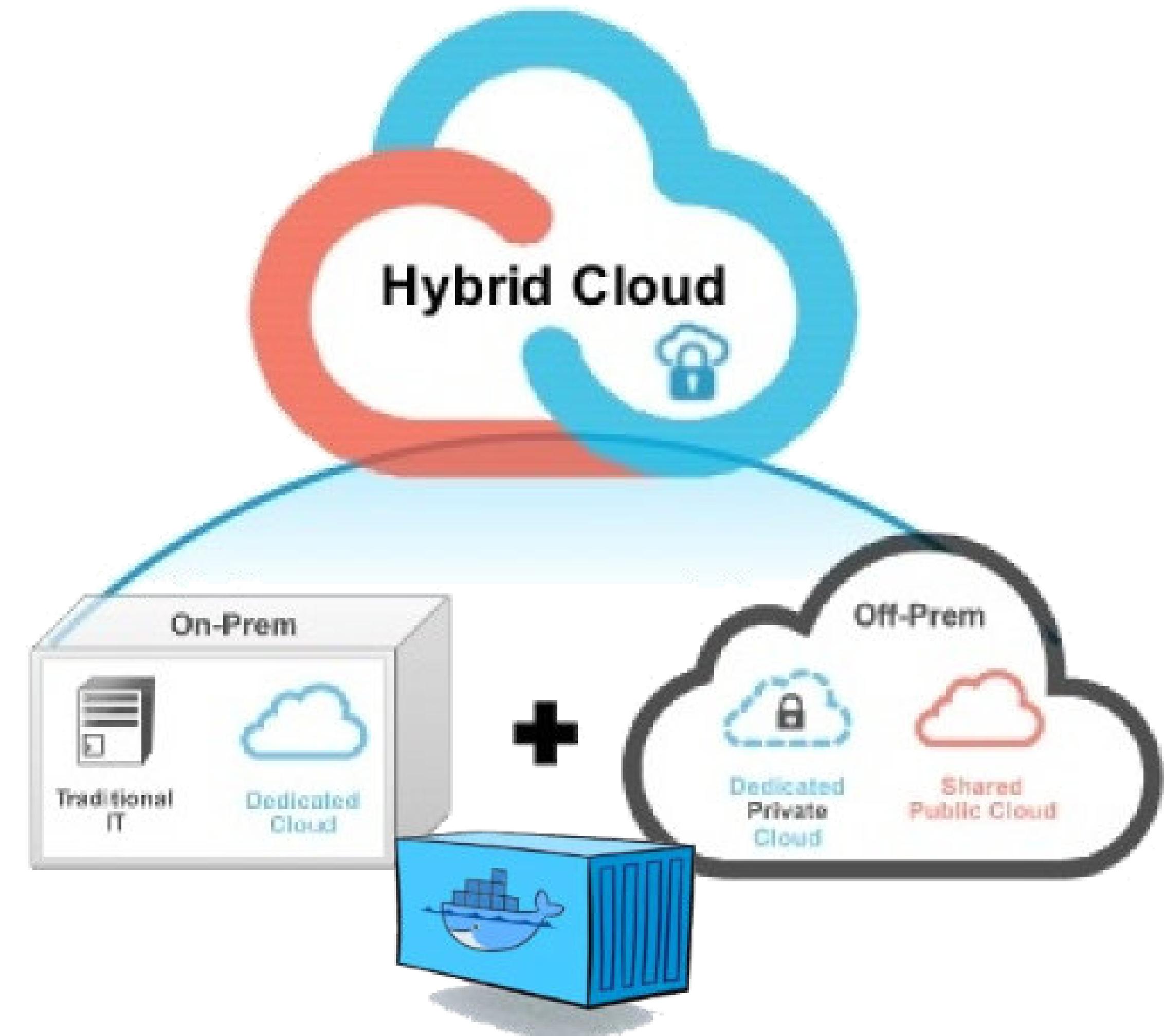


On-demand Provisioning

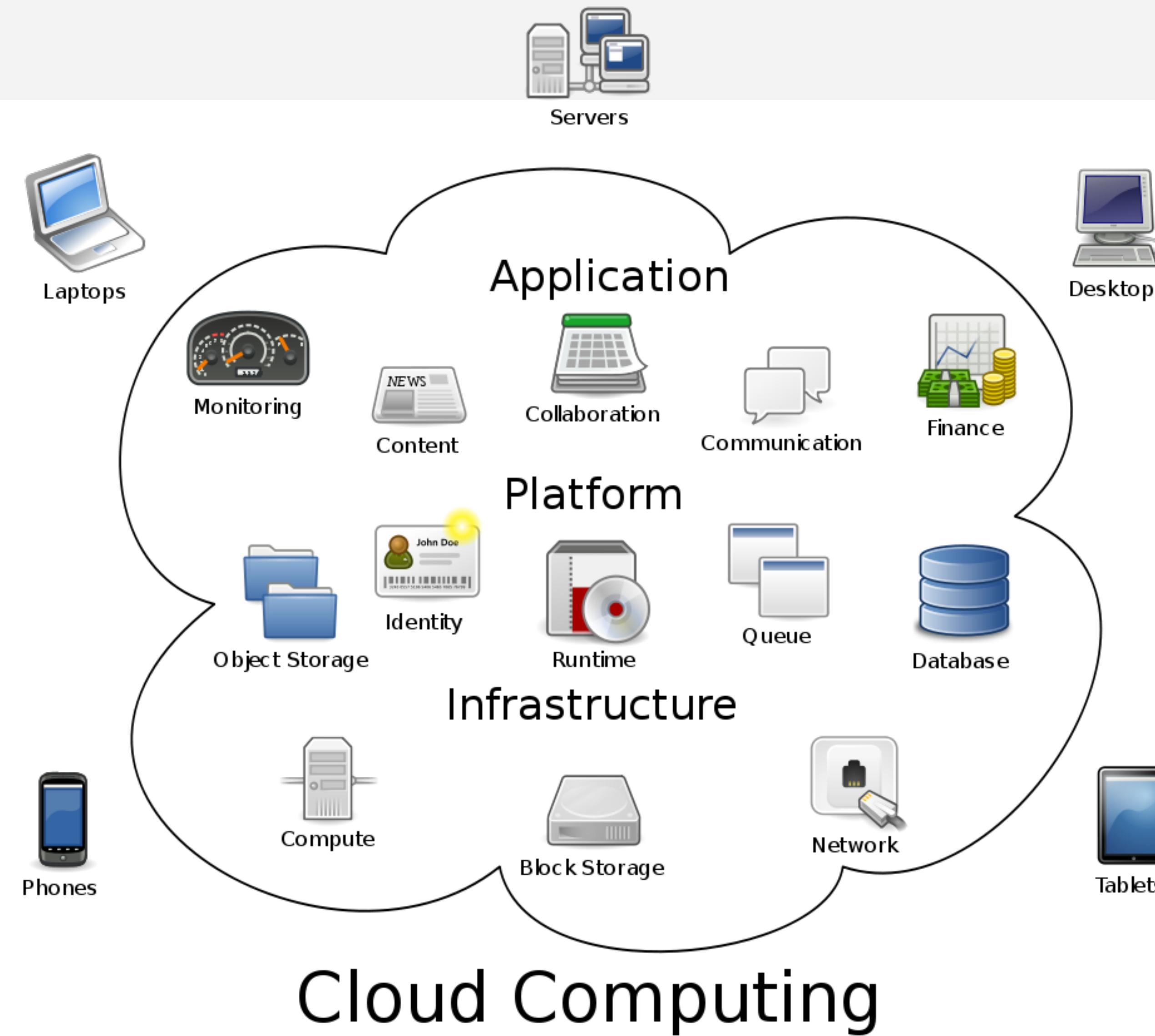


Types of Clouds

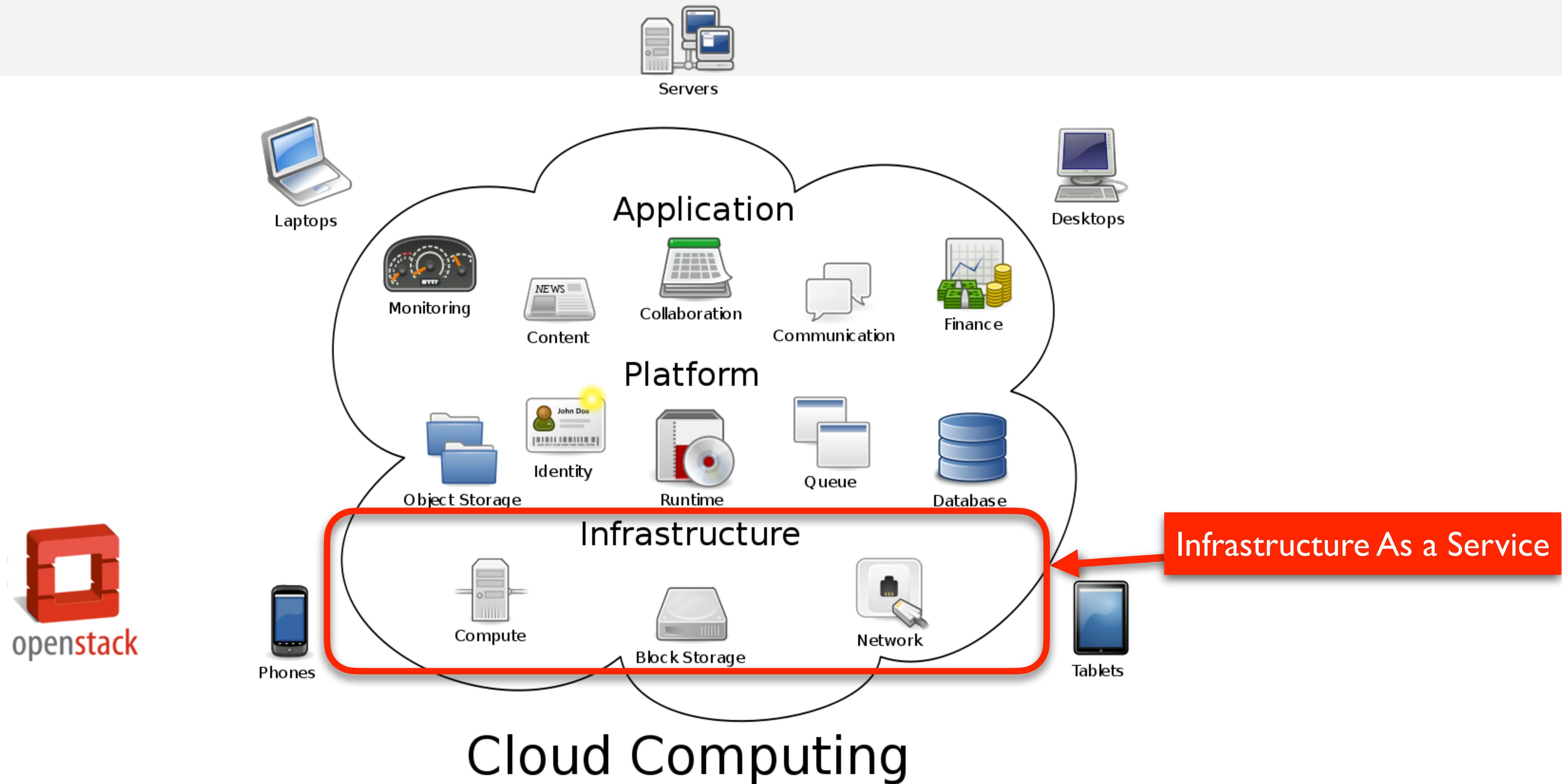
- Based on service provided
 - Software as a Service (SaaS)
 - Platform as a Service (PaaS)
 - Infrastructure as a Service (IaaS)
- Based on ownership
 - Public Clouds
 - Private Clouds
 - Hybrid Clouds
- Based on Location
 - On Premise
 - Off Premise



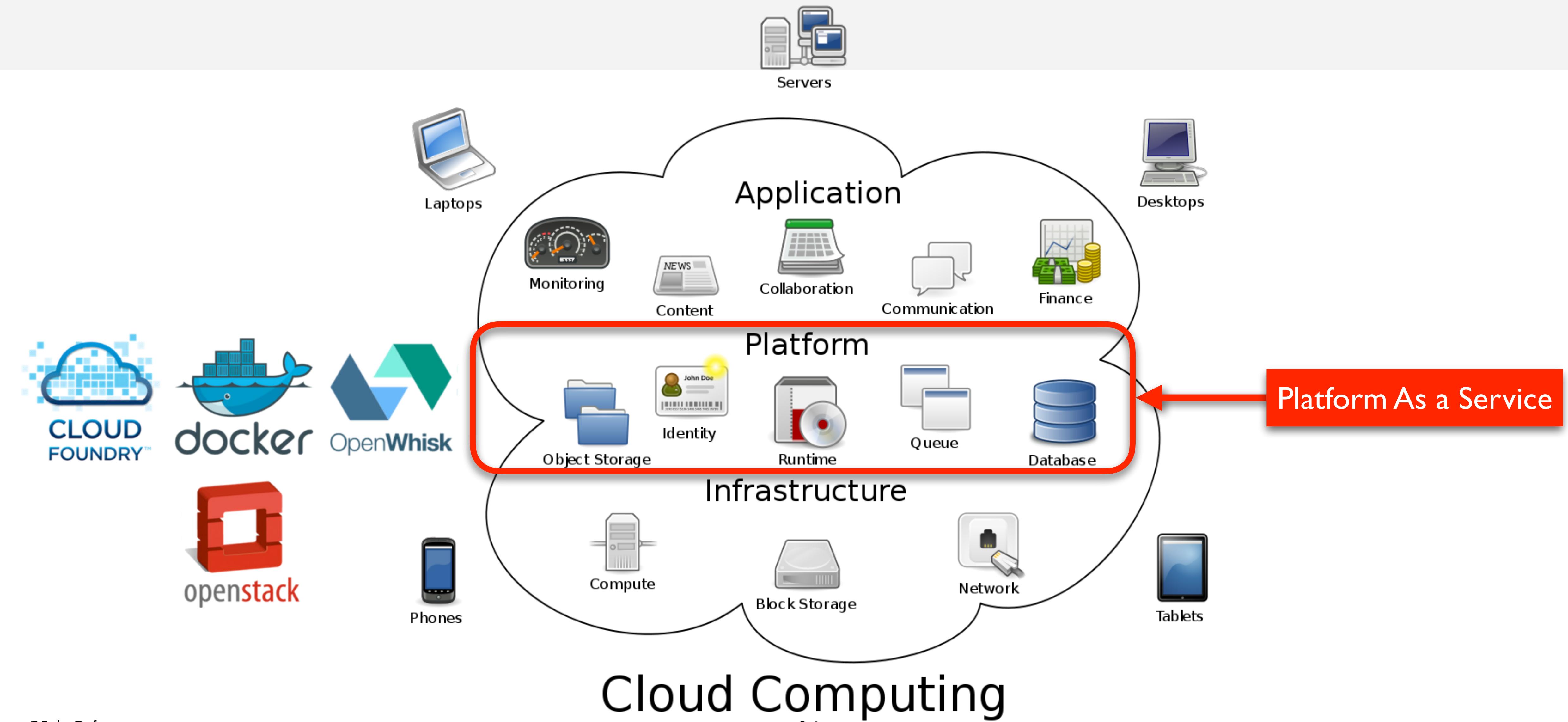
Computing As a Service



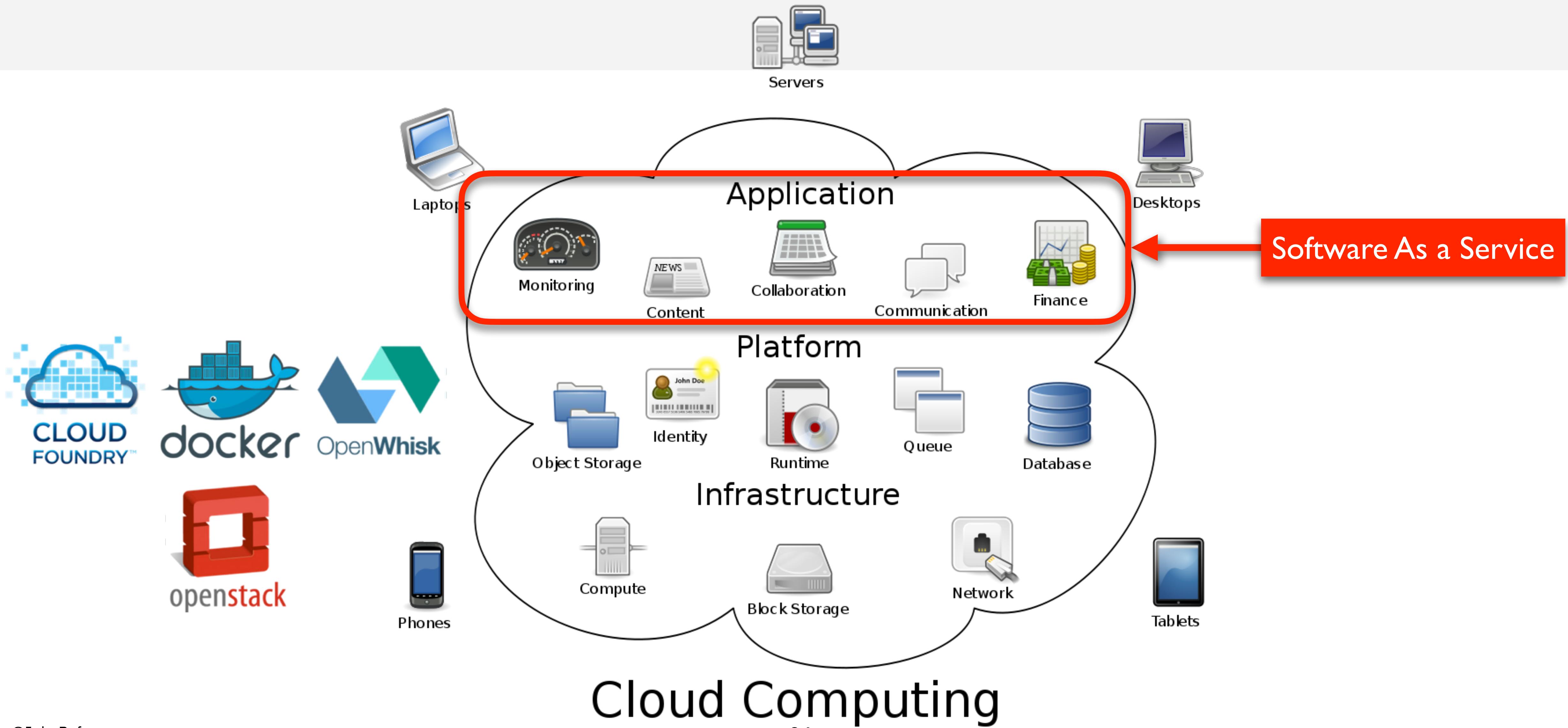
Computing As a Service



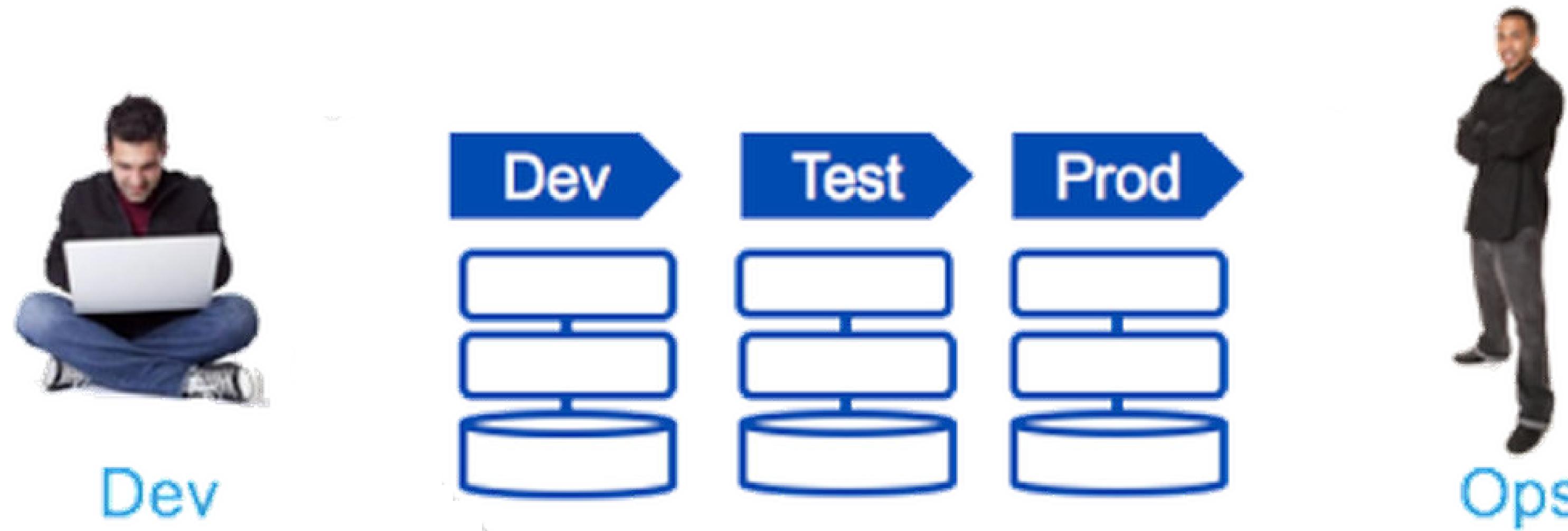
Computing As a Service



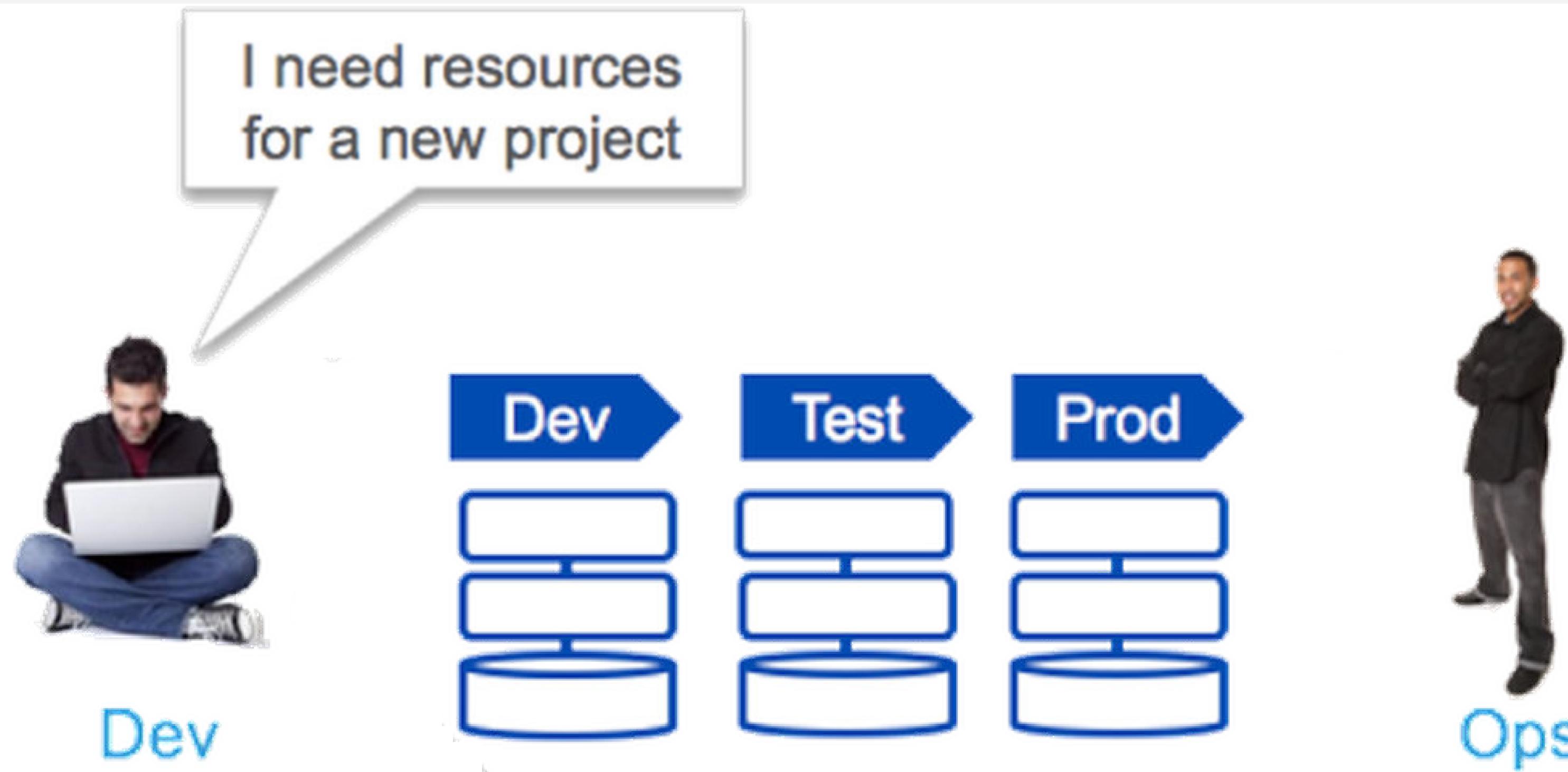
Computing As a Service



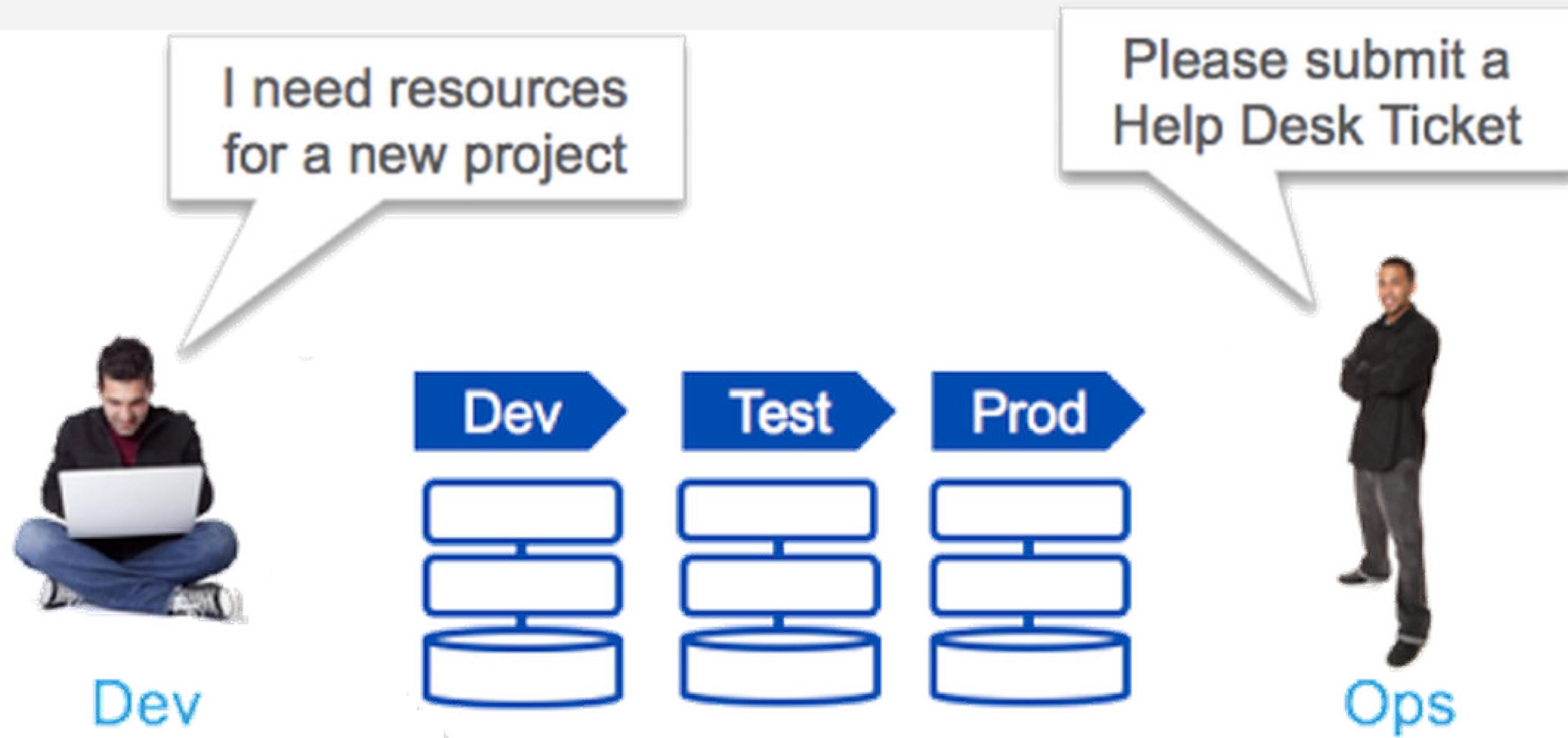
What is driving the move to Cloud?



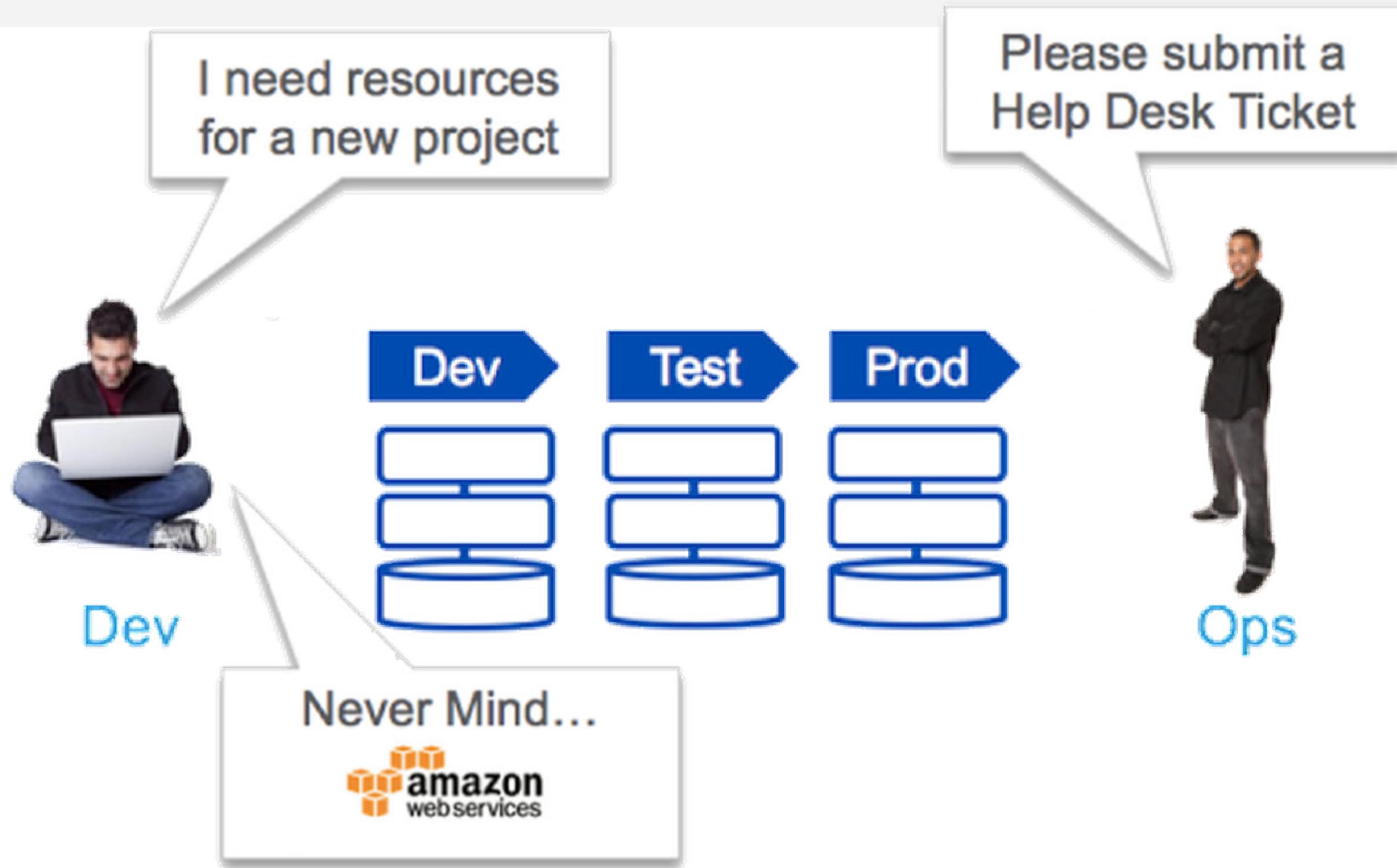
What is driving the move to Cloud?



What is driving the move to Cloud?



What is driving the move to Cloud?



Types of Cloud Migration

- Image Migration
 - Save an image of the server and restore it to a virtual machine
- Workload Migration
 - Build a new server in the cloud and re-install the application
- Cloud Native
 - Rewrite the application to take advantage of cloud architectures

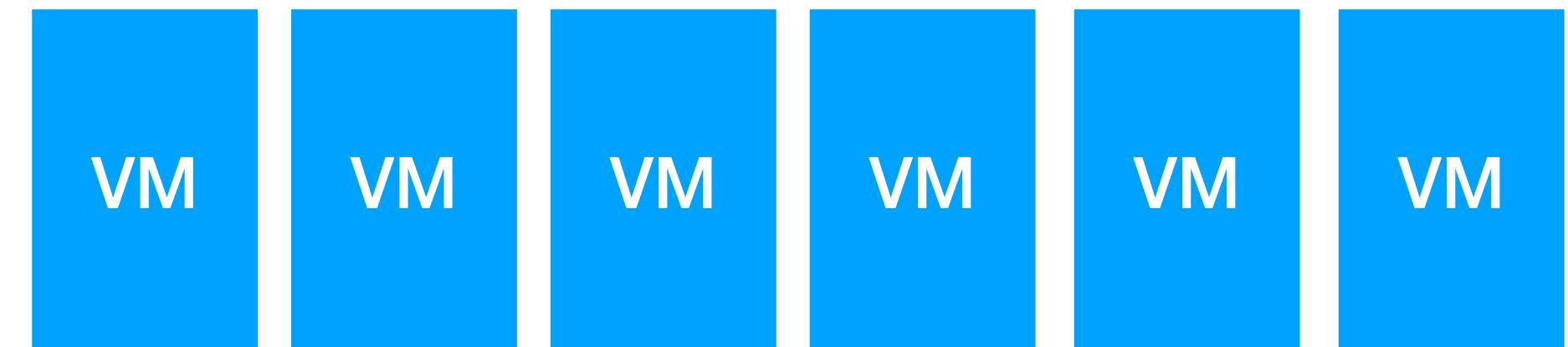


Cloud Enabled

- Image Migration and Workload Migration don't take full advantage of the Cloud
- You have the same number of VM's as you had Physical Servers
- Which means you need to manage the same number of servers in the end

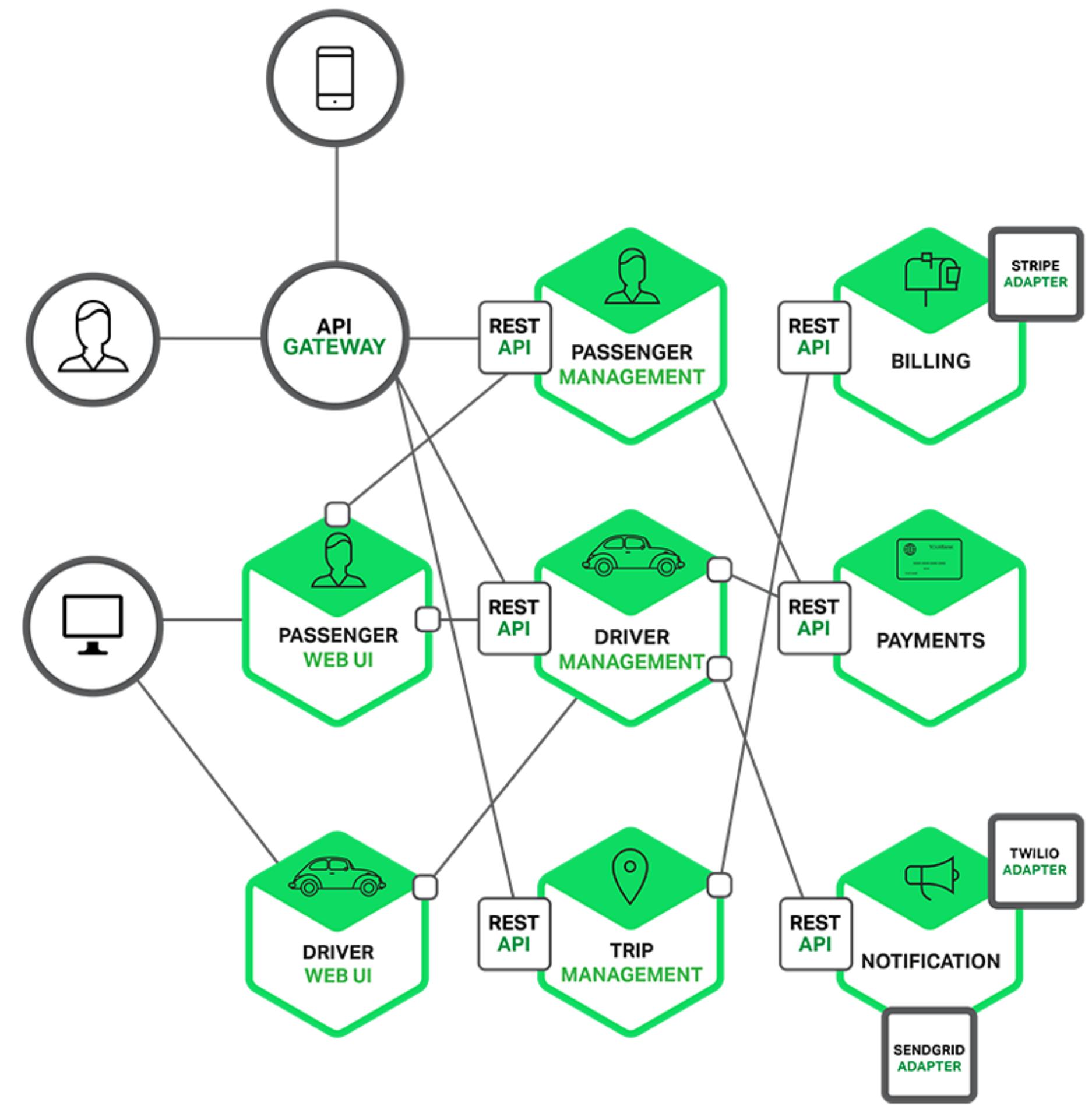


=



Cloud Native Applications

- The [Twelve-Factor App](#) describes patterns for cloud-native architectures which leverage microservices
- Applications are design as a collection of stateless microservices
- State is maintained in separate databases and persistent object stores
- Resilience and horizontal scaling is achieved through deploying multiple instances
- Failing instances are killed and re-spawned, not debugged and patched (cattle not pets)
- DevOps pipelines help manage continuous delivery of services



Microservices

- An architecture style aimed to achieve flexibility, resiliency and control, based on the following principles:
 - Loose Coupling bounded context
 - Independent life cycle: developed, deployed and scaled... and hopefully, fail independently
 - Design for resiliency
 - Polyglot
 - Built by autonomous teams with end-to-end responsibility, doing Continuous Delivery



Monolithic vs Microservices

Monolithic Applications

Web / Presentation
(Apache/Nginx)

eCommerce Application
(WebSphere/Tomcat/PHP/Django)

Database
(DB2, MySQL, PostgreSQL)

- Tightly coupled
- Mixed Concerns
- Large Deployment units
- Hard to Scale
- Long release cycles
- Slow on-boarding for new developers
- Slower feedback loop

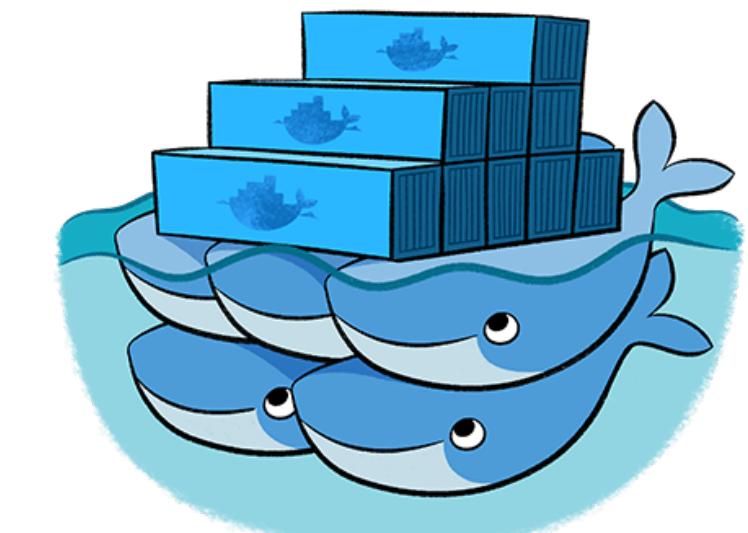
Microservices-based Applications



- Loosely coupled
- Minimal responsibility per service
- Small Deployment units
- Easy to Scale
- Short release cycles
- Fast on-boarding for new developers
- Develop quickly with fast feedback

Where to Deploy Our Microservice?

- Deploying to Virtual Machines means that you now have to manage VM's
 - Not desirable
 - Patching, upgrading, health check, etc.
- Deploying to a Platform frees you up to only worry about your application
- Cloud Native Deployment enables agility



IBM Cloud

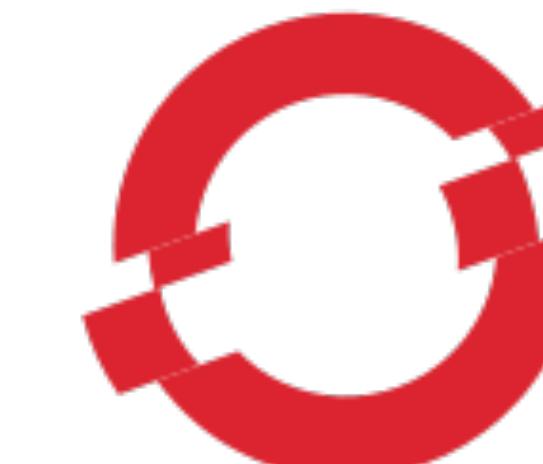
PaaS Providers



IBM Cloud



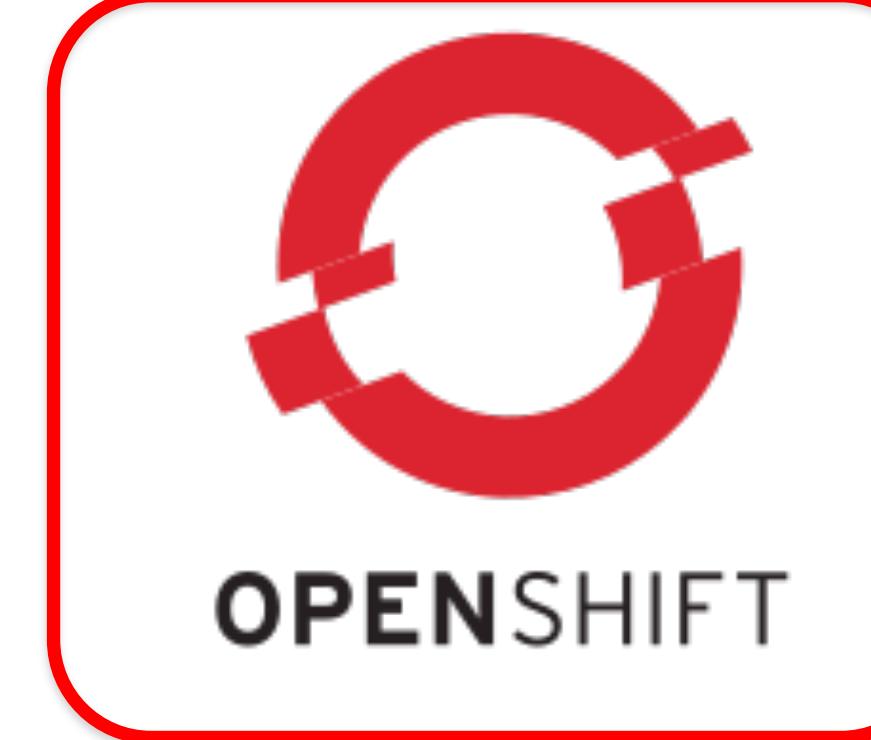
Google app engine

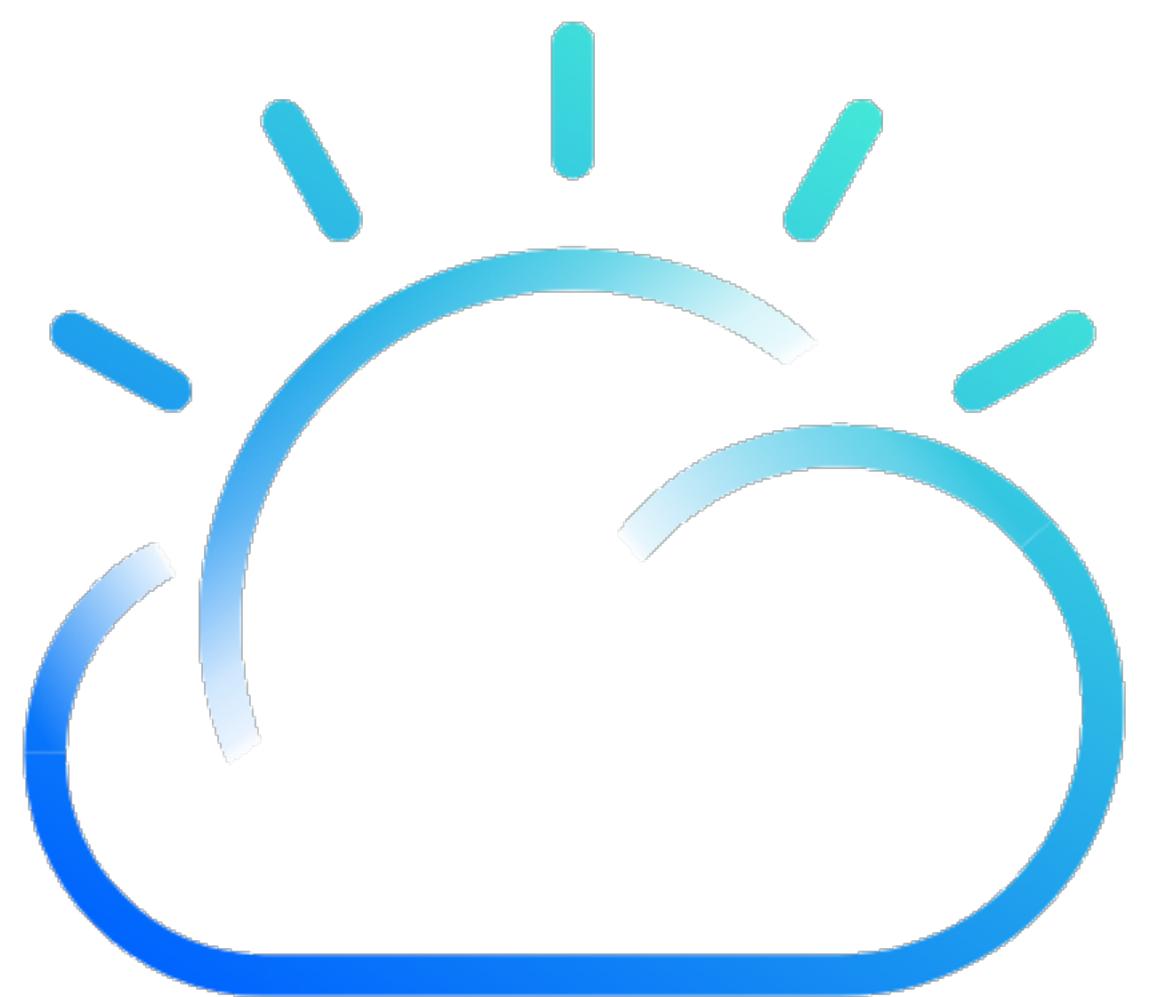


OPENSHIFT



PaaS Providers





IBM Cloud

IBM Cloud is a Mixture of Technologies



IBM Cloud is a mixture of:



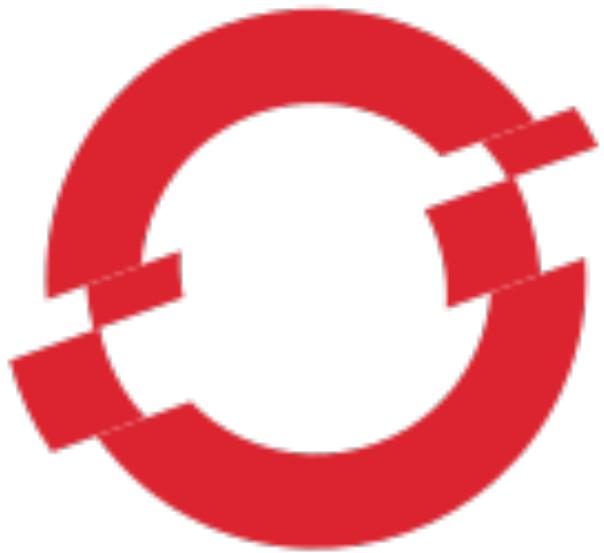
CLOUD FOUNDRY



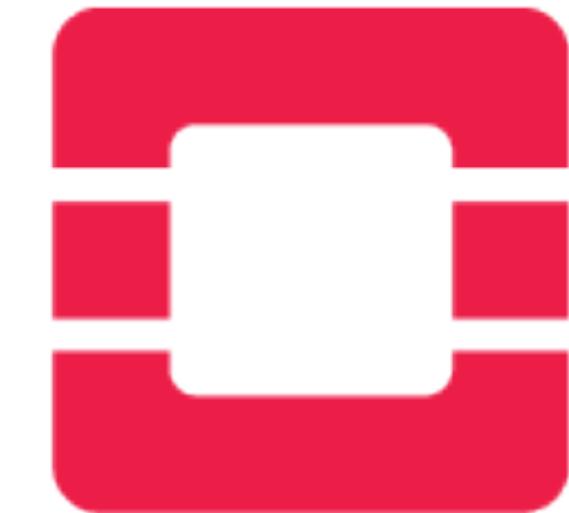
**Cloud Functions
(Serverless)**



Kubernetes



OPENSIFT

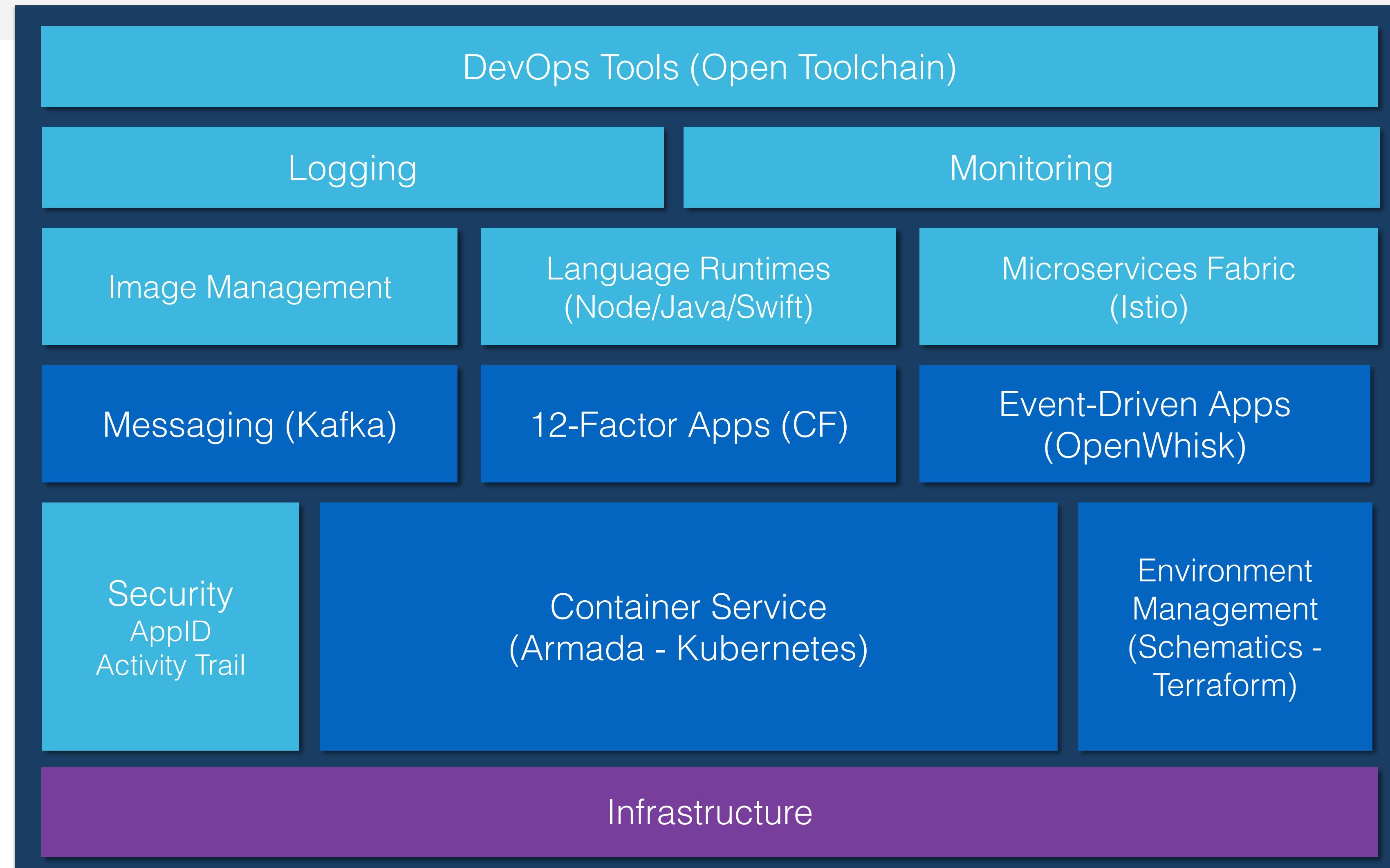


openstack.

Plus...



Cloud Developer Services



So... Which do you choose?

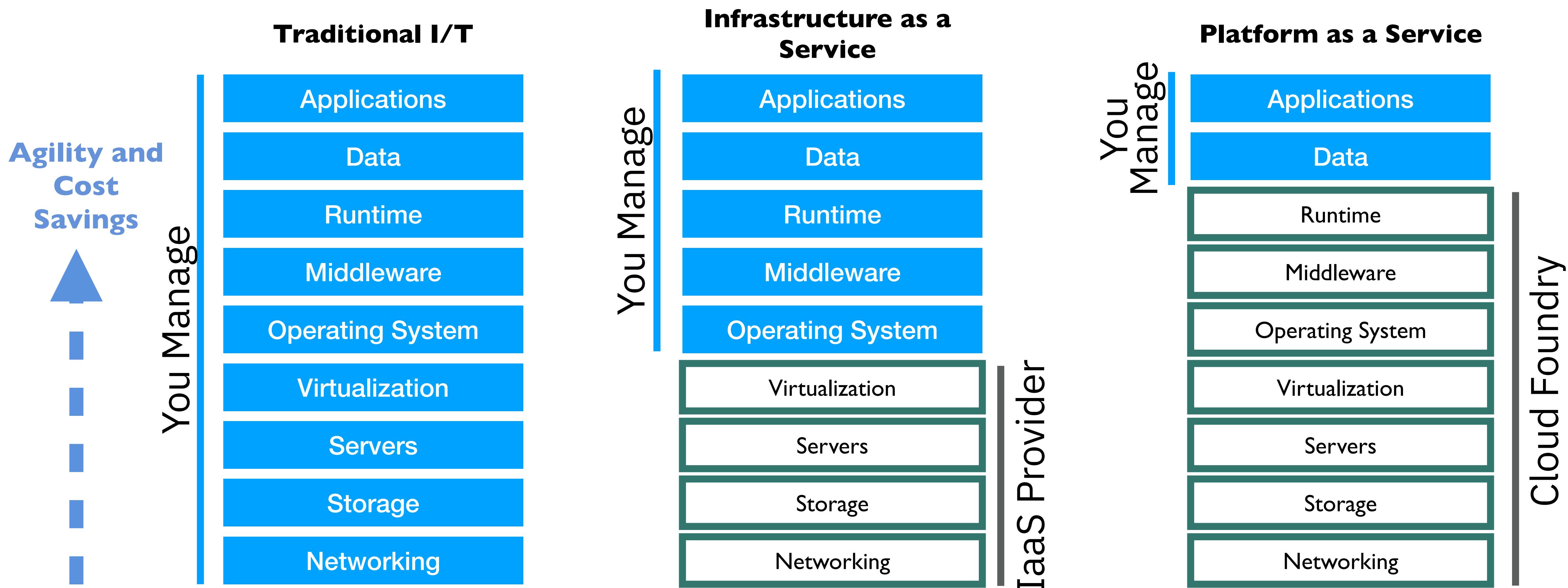
-_(ツ)_/-

Cloud Foundry

- Platform as a Service for running applications
- Offers a set of run-time environments that you deploy into:
 - Java, Python, NodeJS, Ruby, Go, Mobile, etc.
- Uses Heroku Buildpacks to provide environments
 - You can bring your own or use community buildbacks
- Deploying code is as easy as: cf push

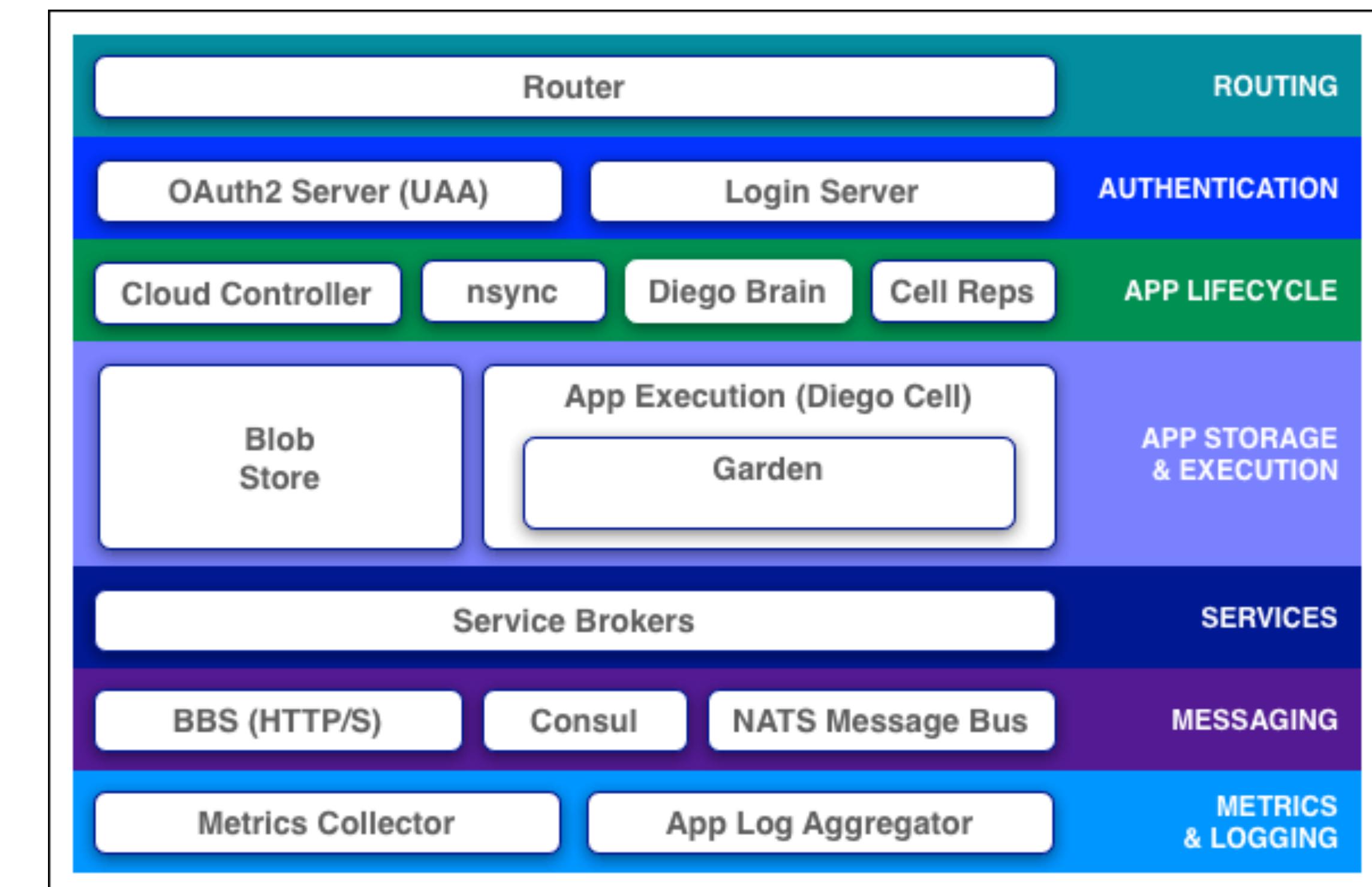


IaaS vs PaaS



Cloud Foundry Architecture

- The Cloud Foundry platform is abstracted as a set of large-scale distributed services.
- It uses Cloud Foundry Bosh to operate the underlying infrastructure from IaaS providers (e.g., VMware, Amazon AWS, OpenStack),
- Components are dynamically discoverable and loosely coupled, exposing health through HTTP endpoints so agents can collect state information (app status & system state) and act on it.



Kubernetes

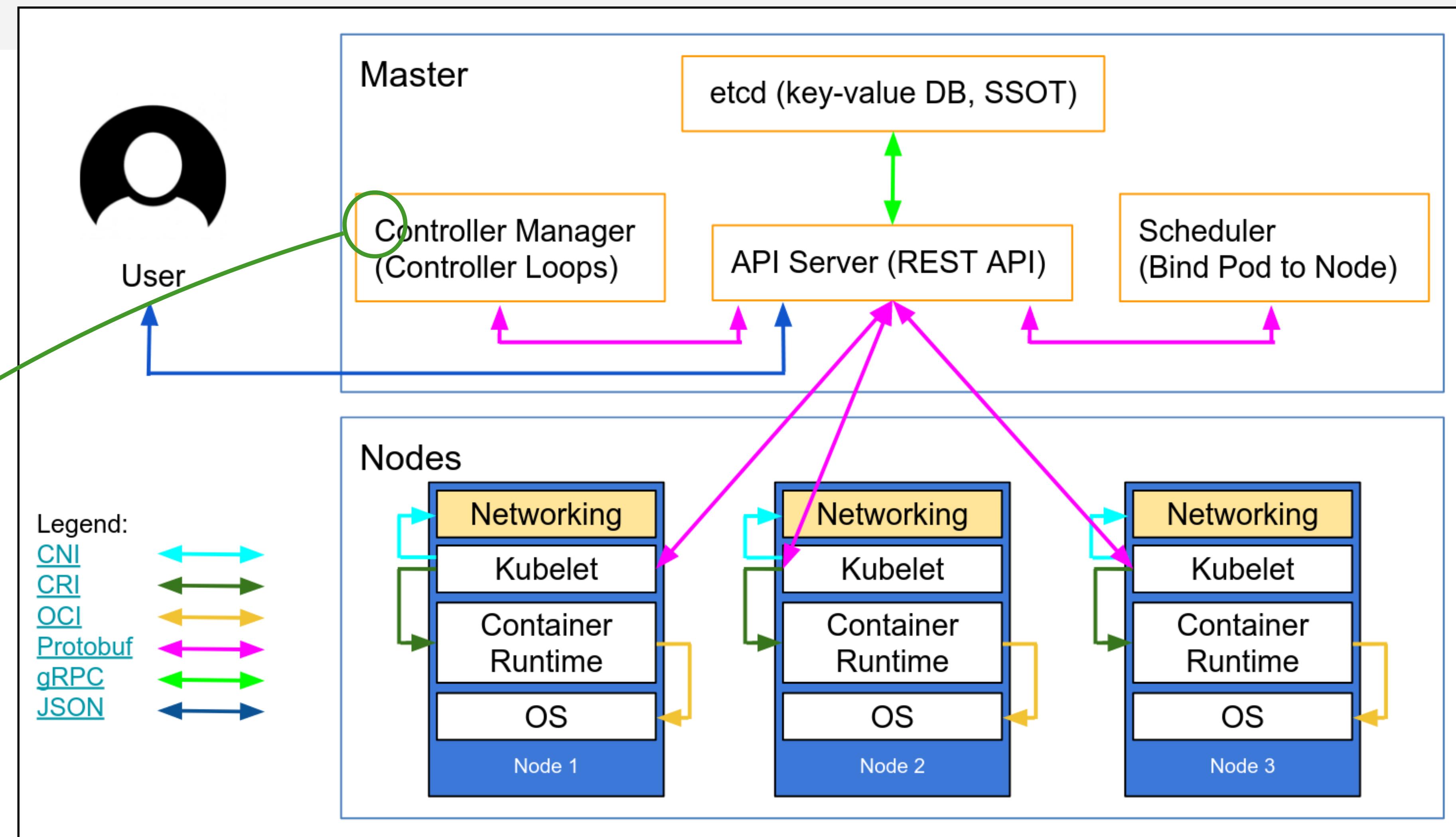
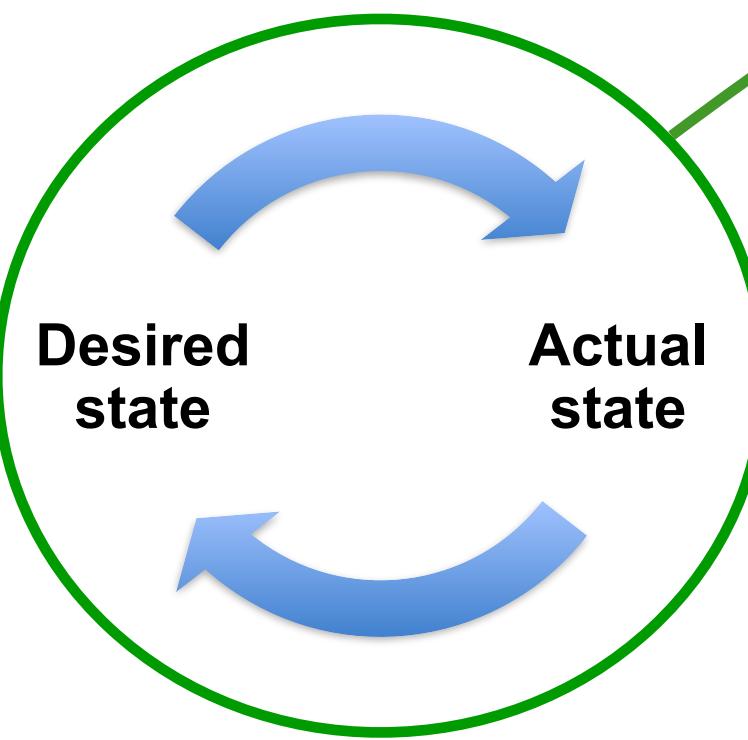
- An open-source system for automating deployment, scaling, and management of containerized applications.
- Groups containers that make up an application into logical units for easy management and discovery.
- Based on 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community



Kubernetes Physical Overview

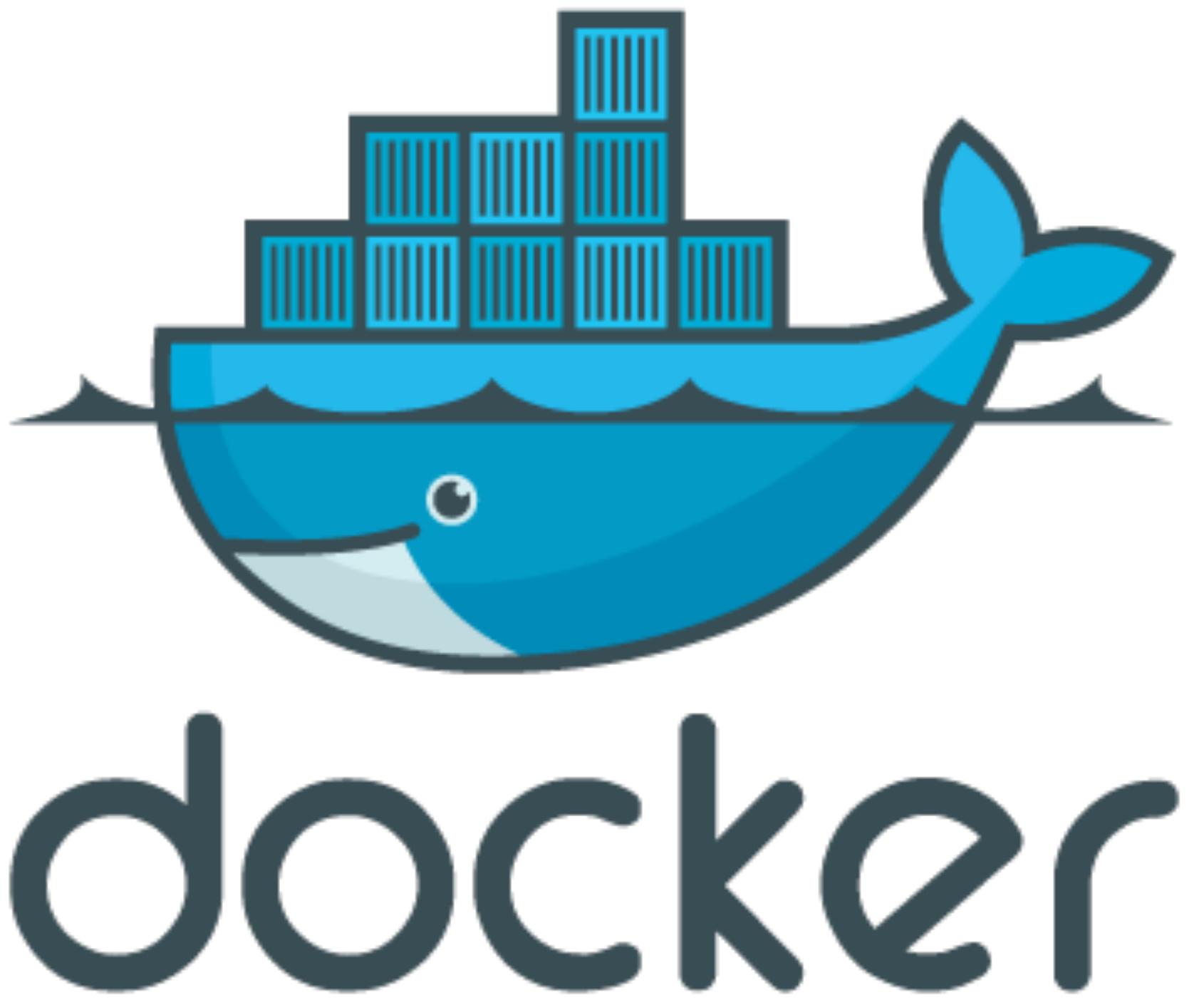
Declarative Model:

- You express the desired state
- Kubernetes maintains it



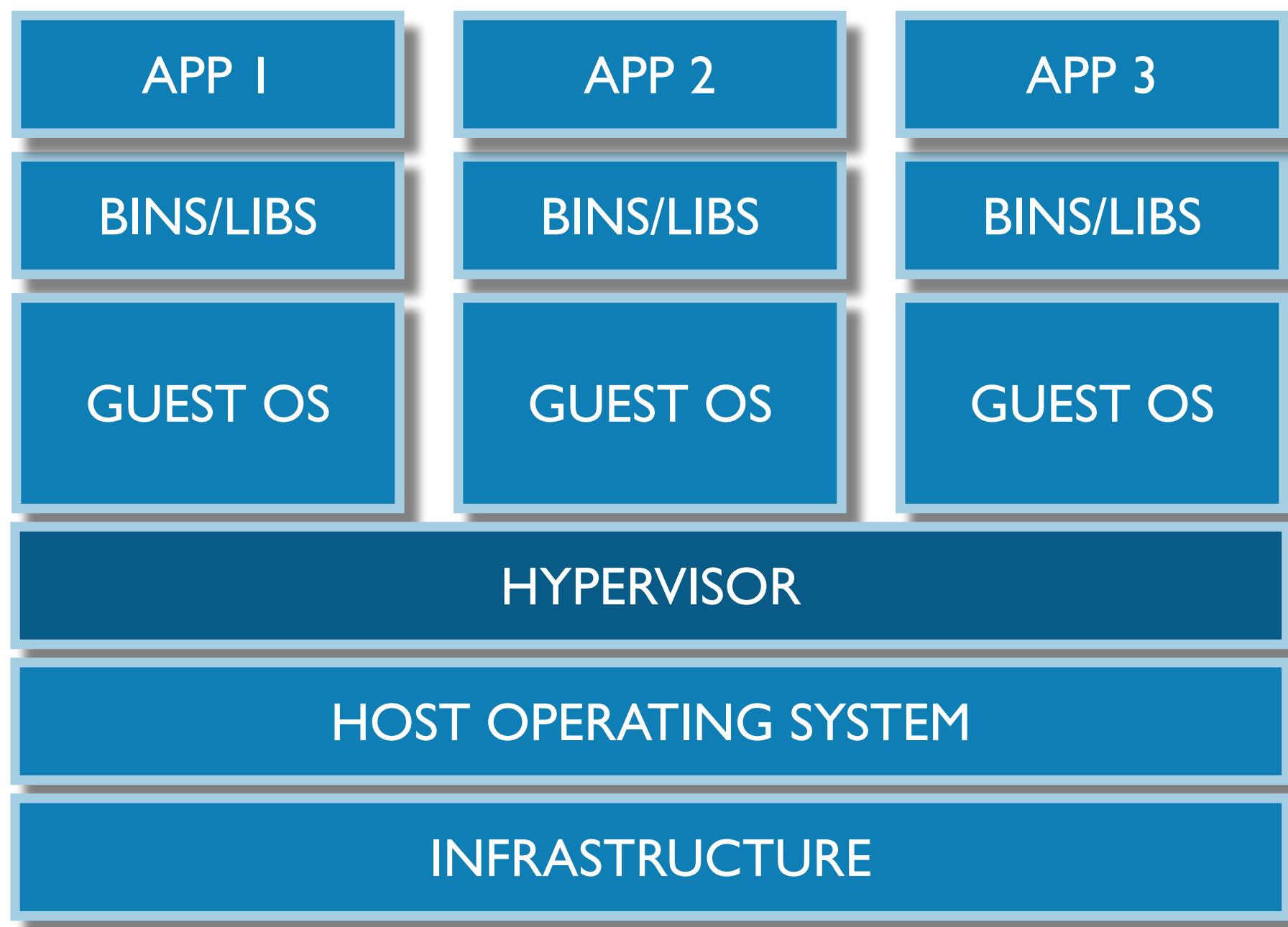
Docker

- Docker is a light-weight container service that runs on Linux
 - File system overlay
 - One Process Space
 - One Network Interface
 - Shares the Linux kernel
- Containers encapsulate a run-time environment
 - Your code, libraries, etc.
- Almost no overhead
 - Containers spin up in milliseconds
 - Native performance because there is no emulation
 - Package only what you need



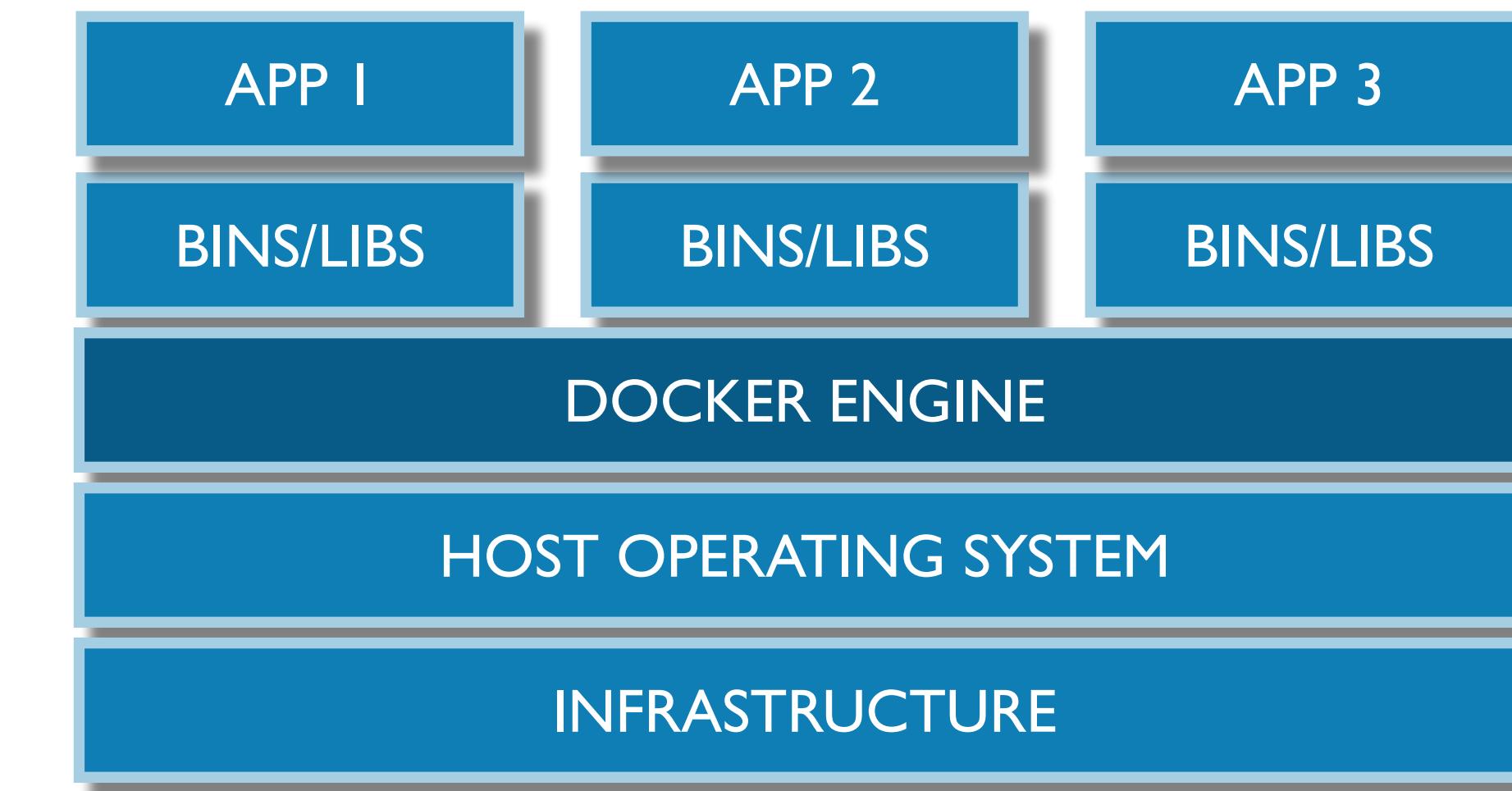
Containers vs Virtual Machines

- Virtual Machines are heavy-weight emulations of real hardware



VIRTUAL MACHINES

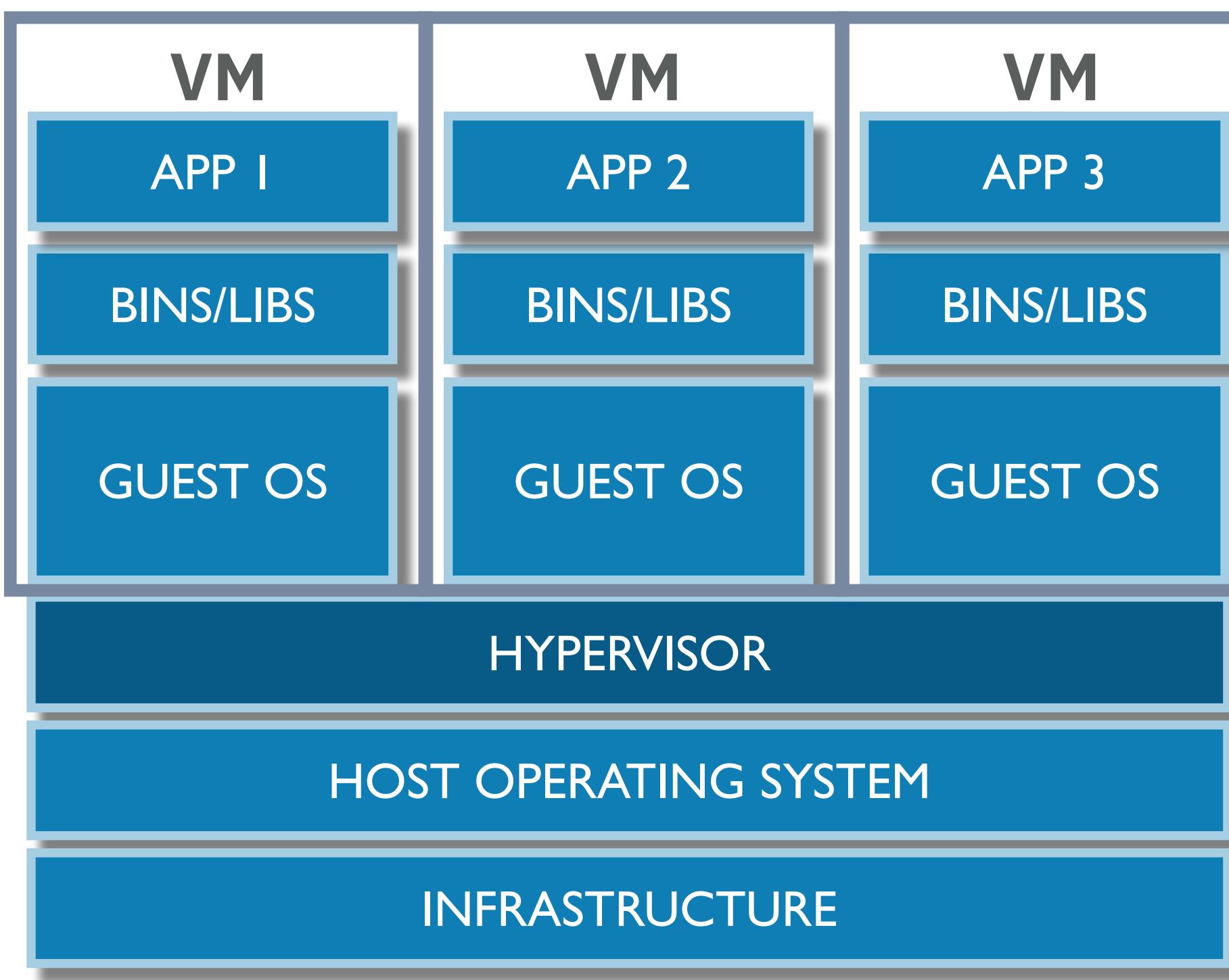
- Containers are light-weight like a process
- The app looks like it's running on the Host OS



DOCKER CONTAINERS

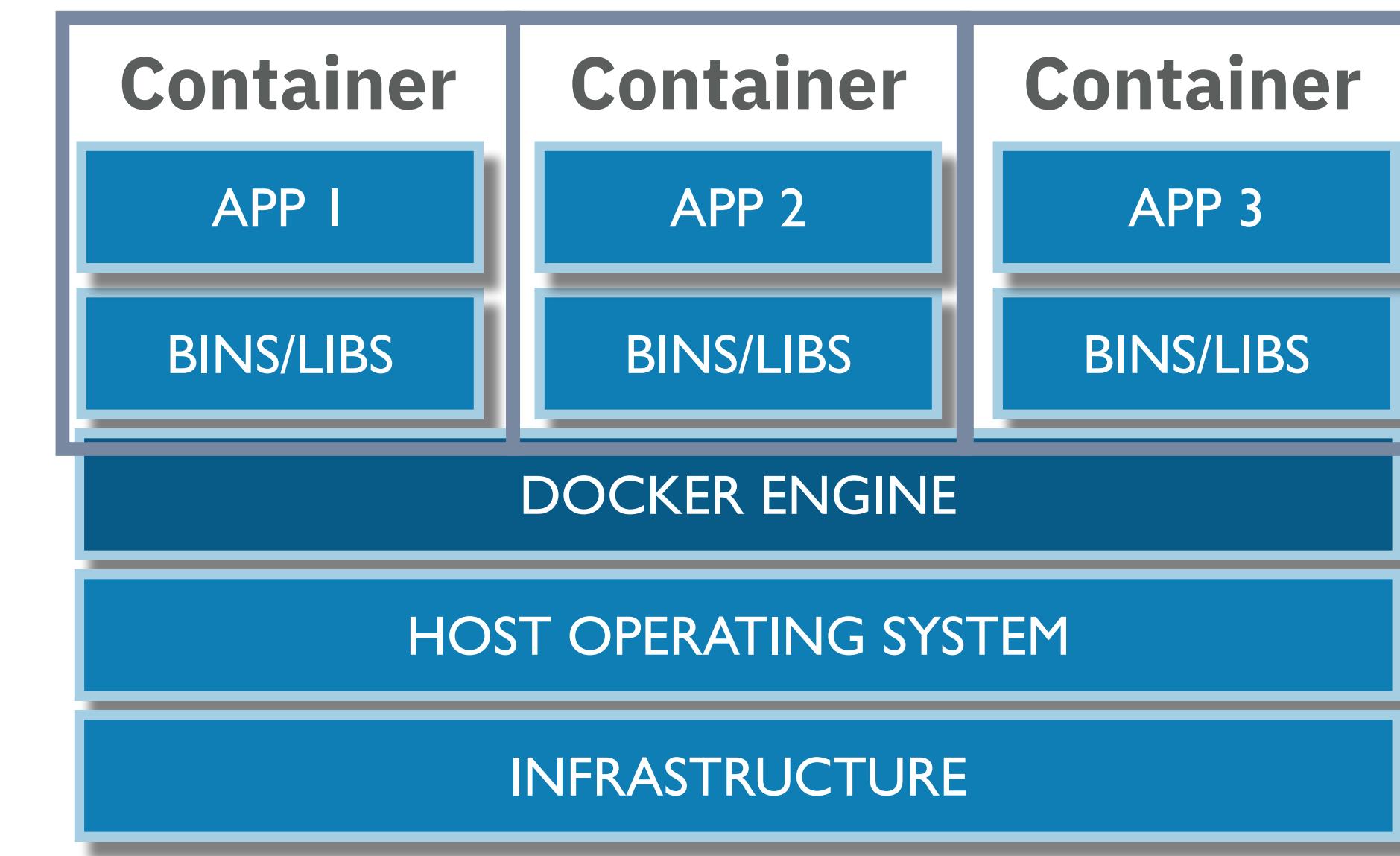
Containers vs Virtual Machines

- Virtual Machines are heavy-weight emulations of real hardware



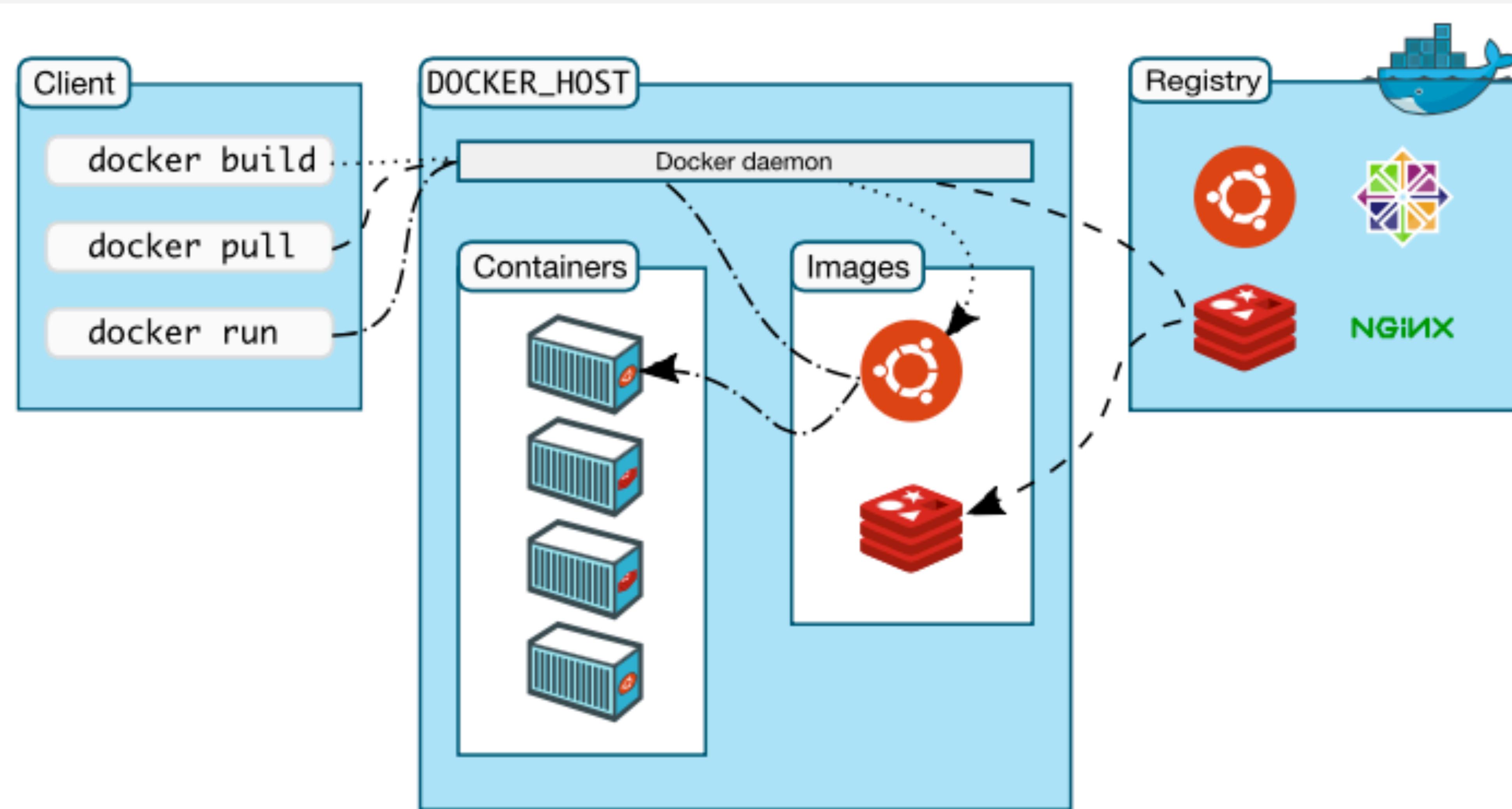
VIRTUAL MACHINES

- Containers are light-weight like a process
- The app looks like it's running on the Host OS

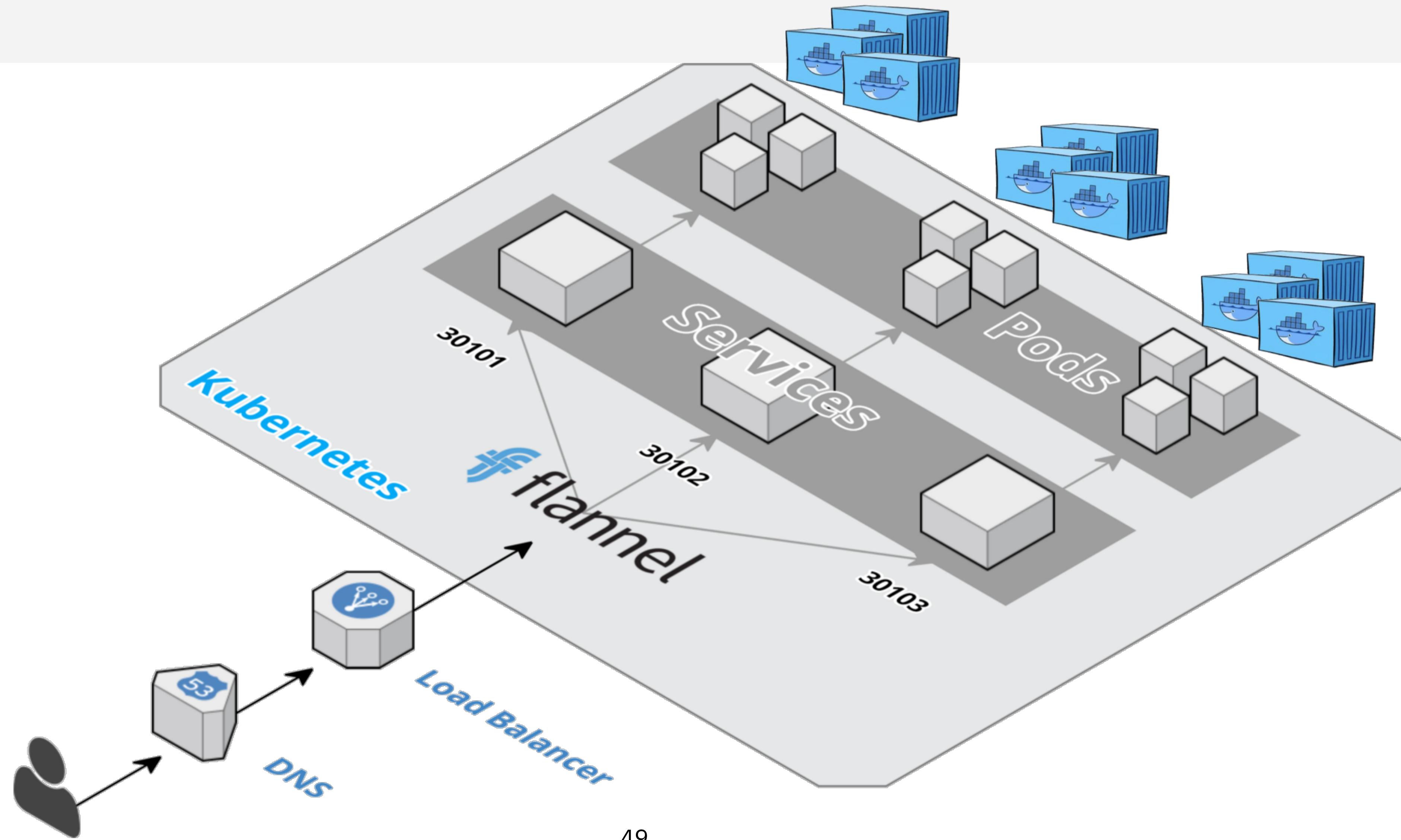


DOCKER CONTAINERS

Docker @ 20,000 feet



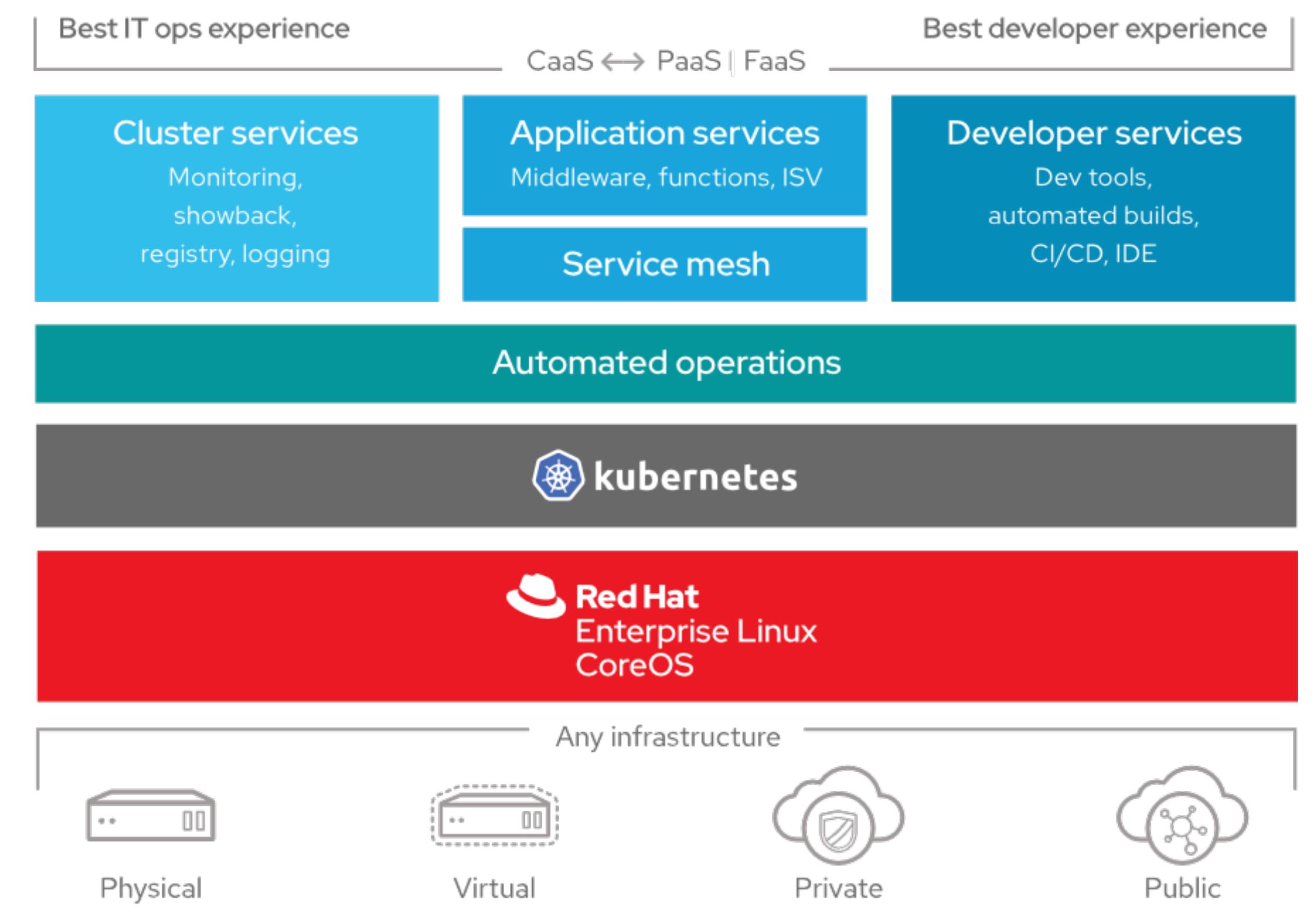
Docker with Kubernetes





Red Hat® OpenShift

- Open Source application platform based on Containers and Kubernetes
- Makes the Kubernetes experience easier for developers and operations
- OpenShift Provides:
 - Web Console for Developers
 - Source-2-Image (S2I)
 - Built-in CI/CD Pipeline
 - Validated integrations (Istio, K-Native, etc.)
 - Integrated container registry

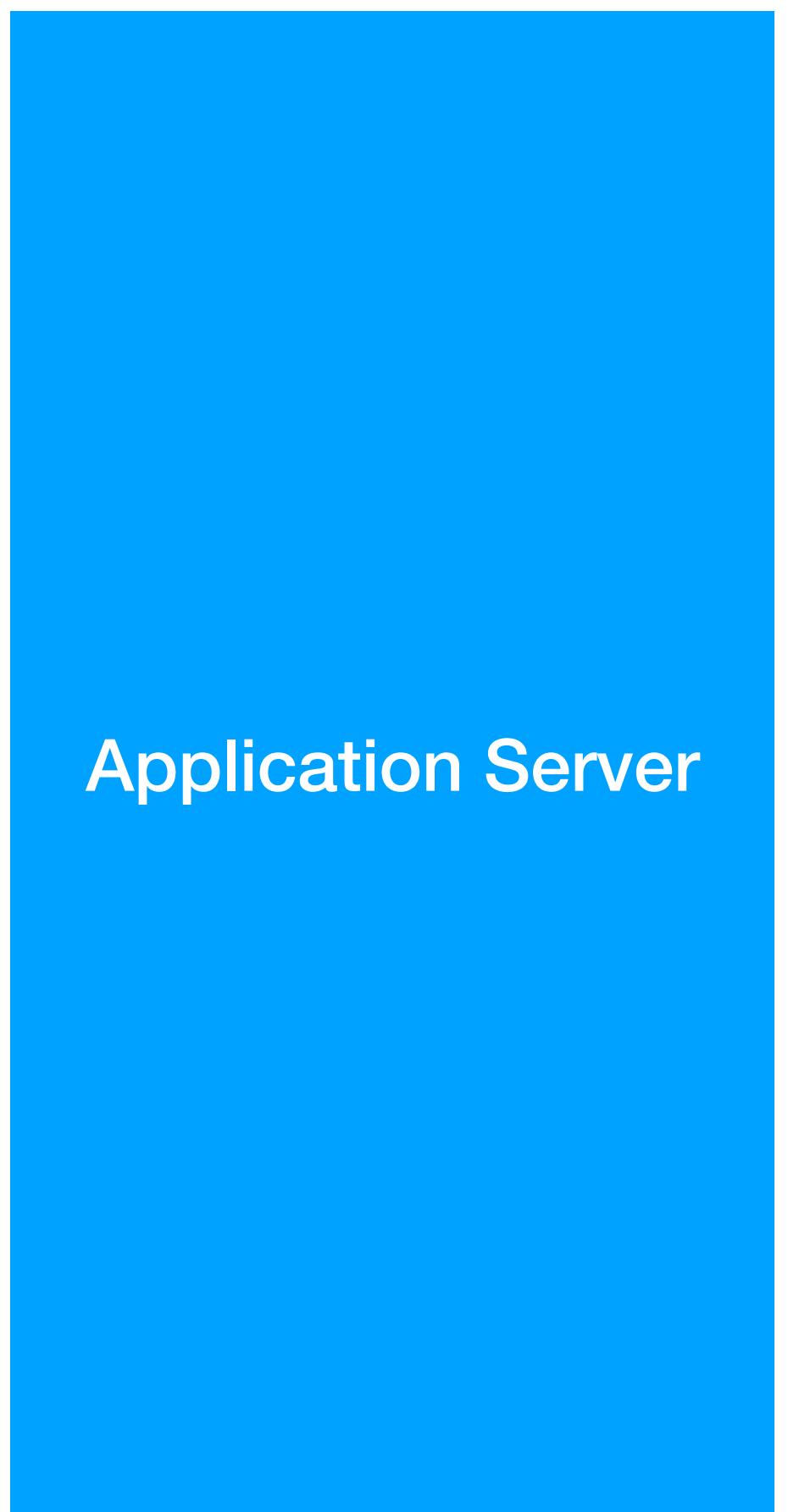
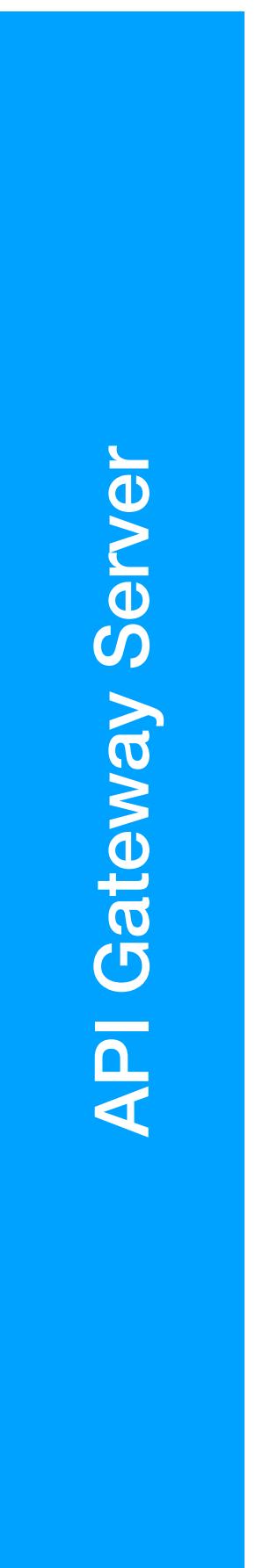
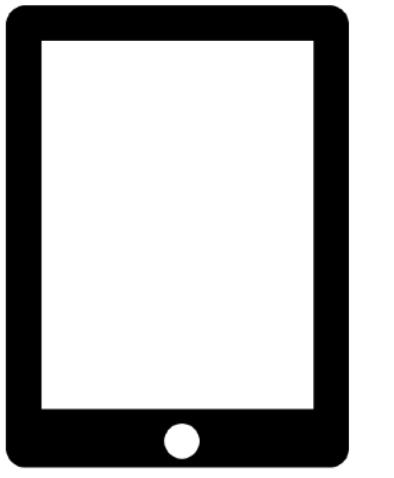


Serverless

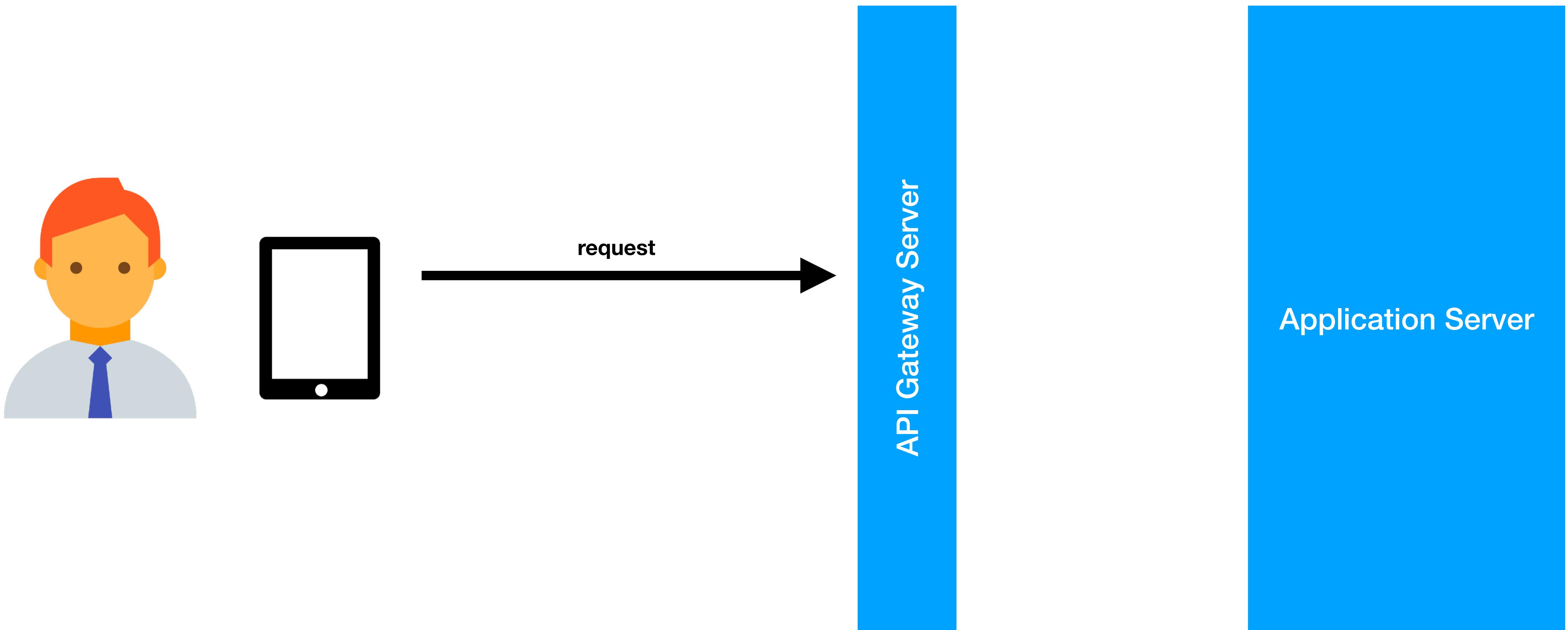
- You don't need to provision a server
- No permanent infrastructure
- Your software only runs when it is needed
- You only pay for actual use
- Ideal for event driven environments



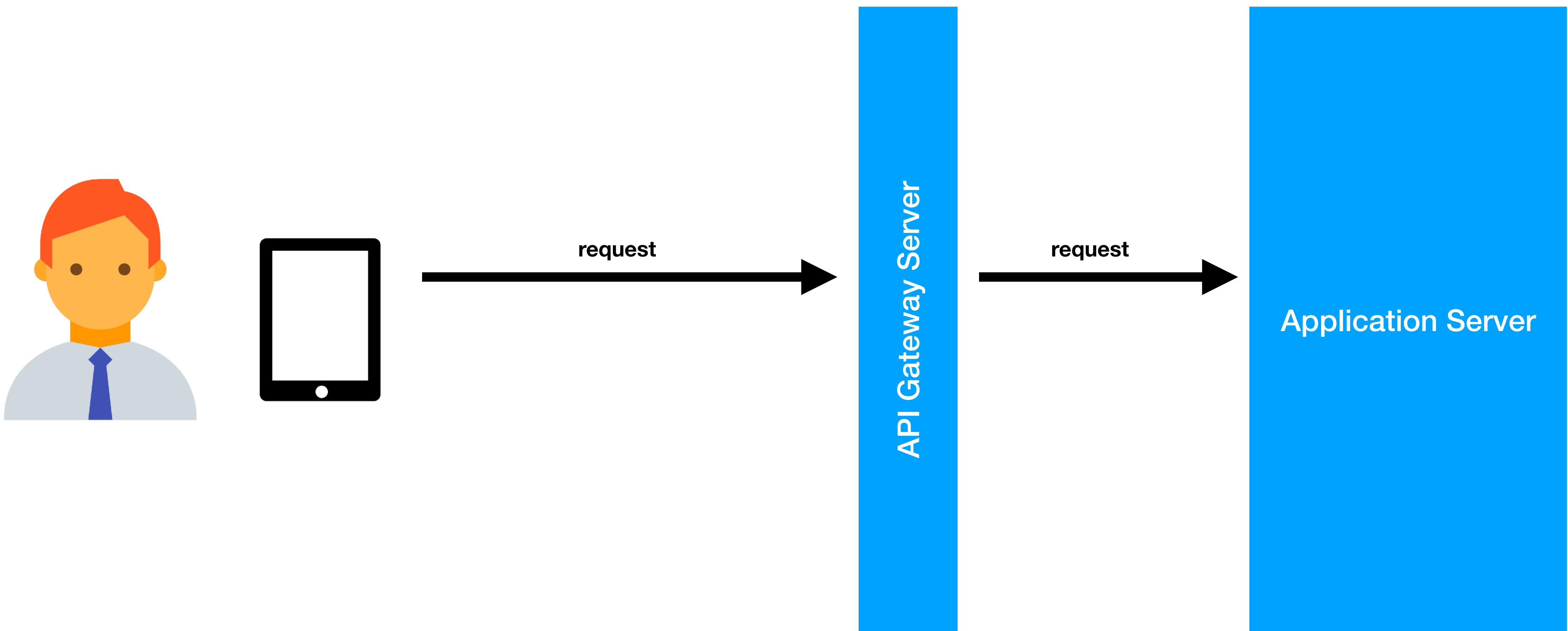
Traditional Web Request



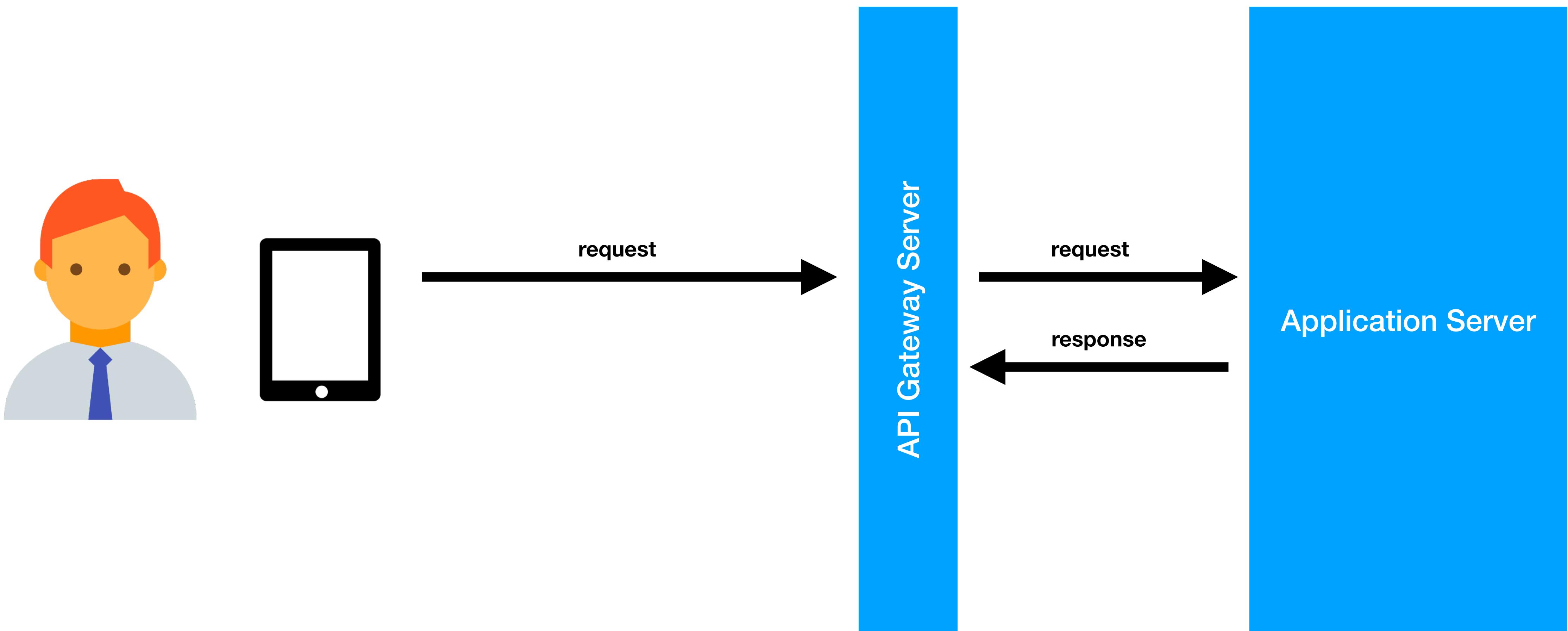
Traditional Web Request



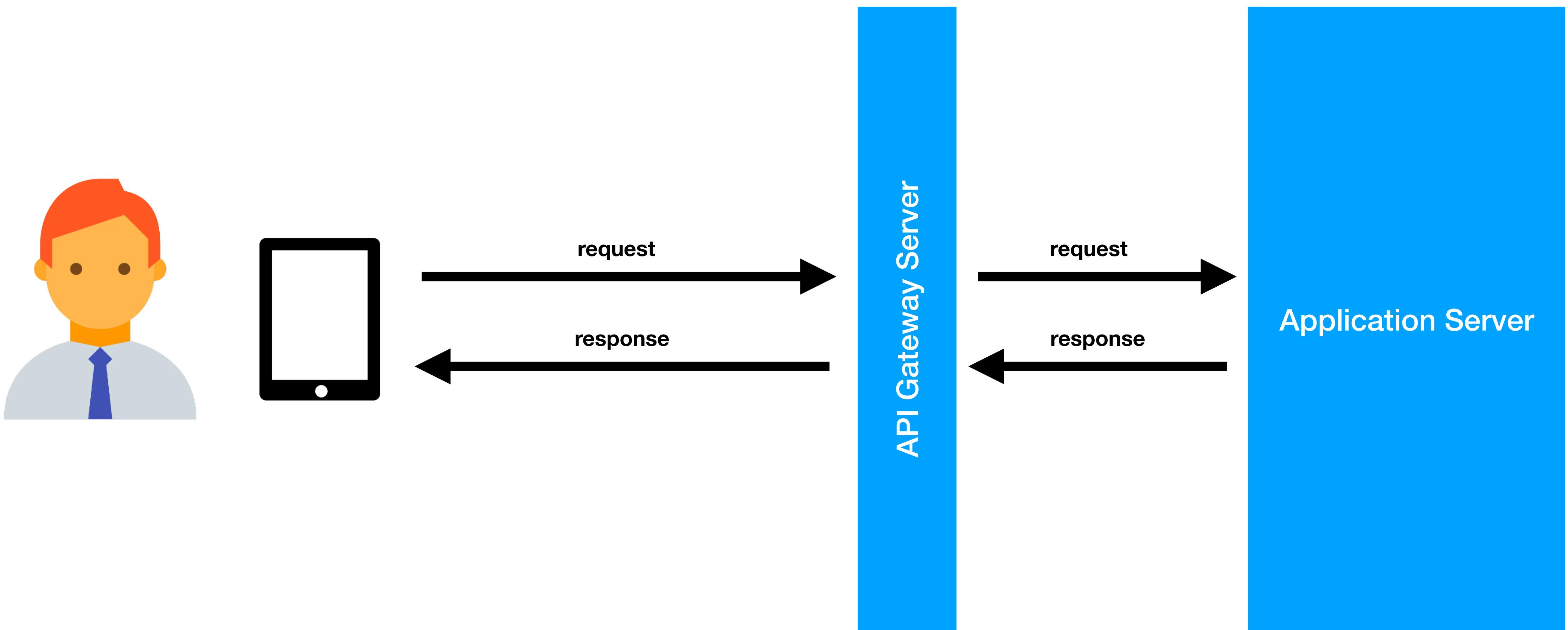
Traditional Web Request



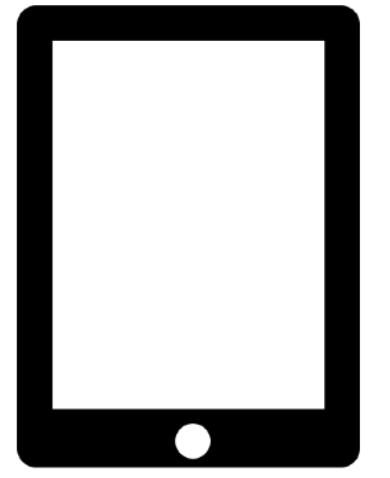
Traditional Web Request



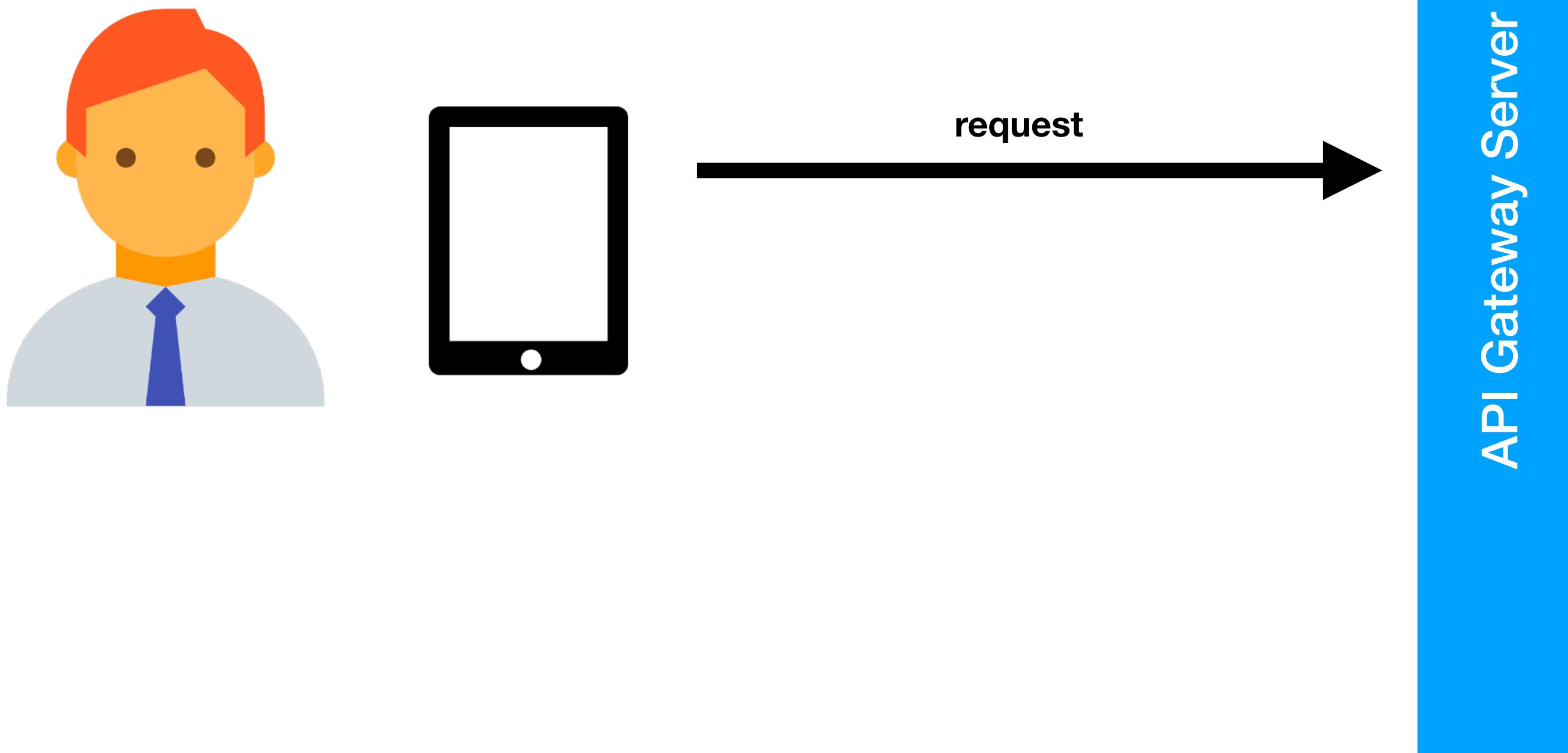
Traditional Web Request



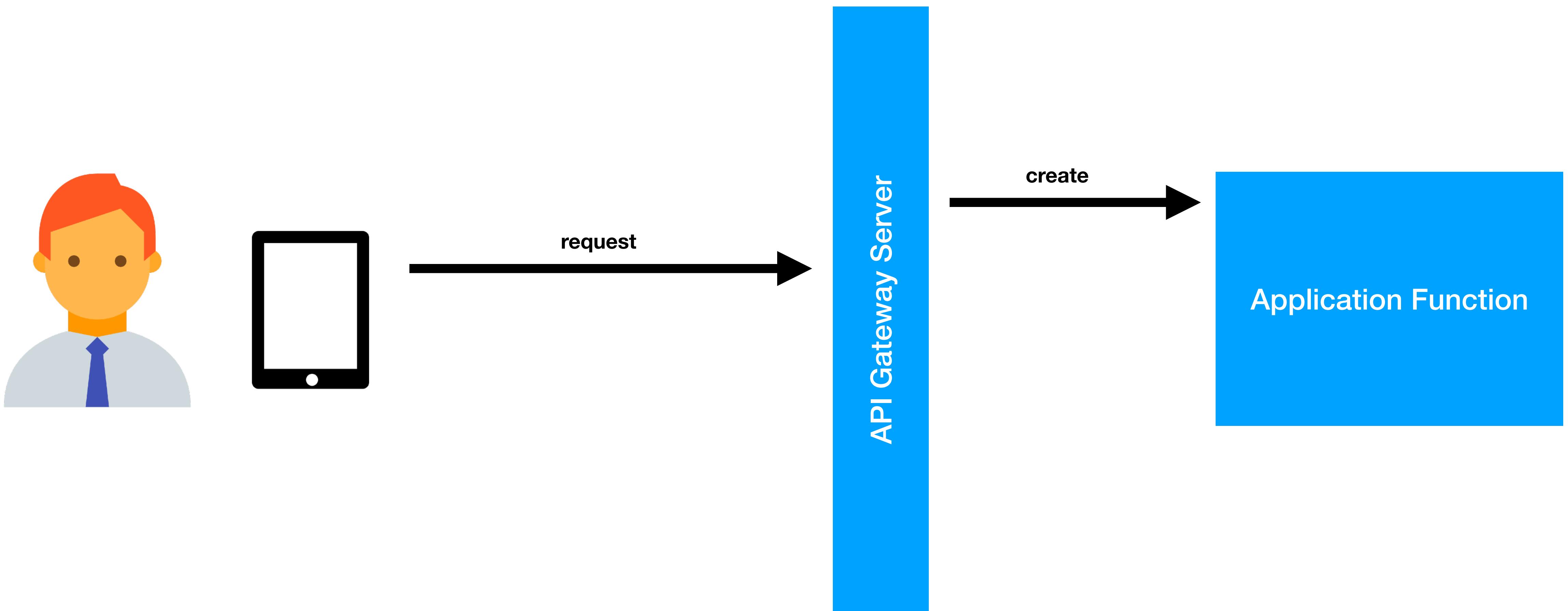
Serverless Web Request



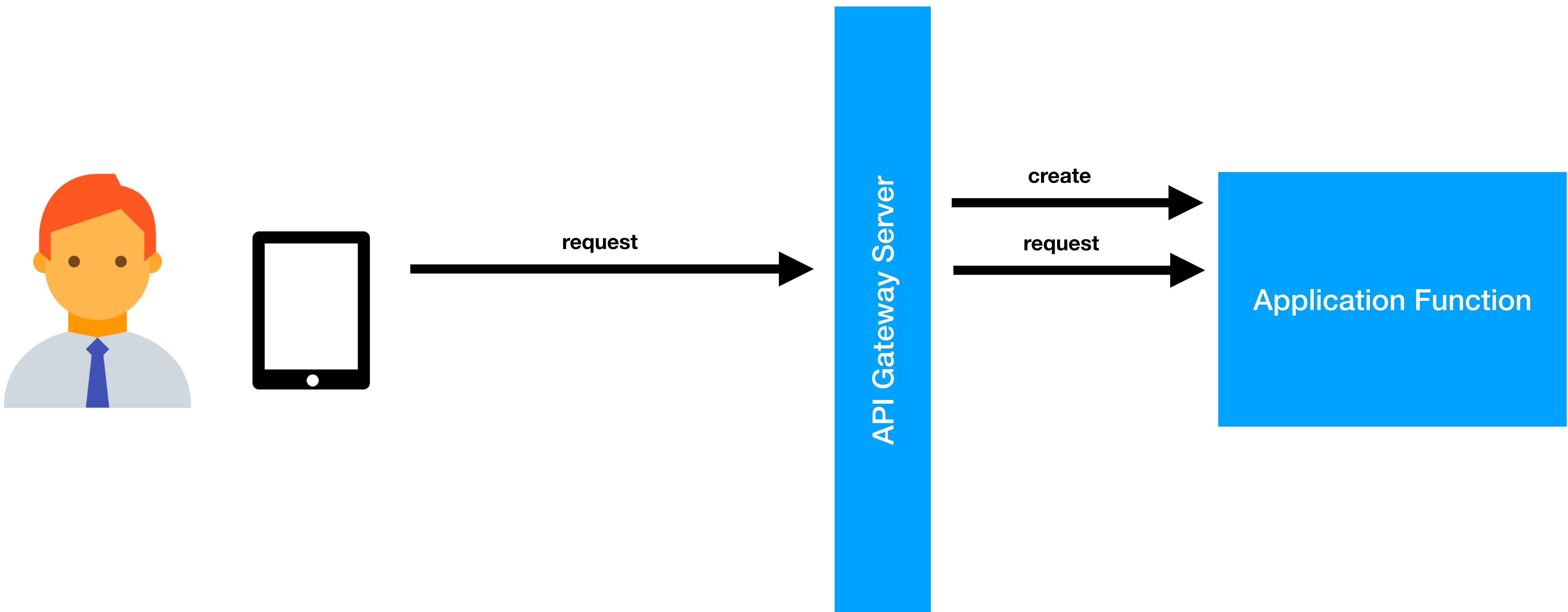
Serverless Web Request



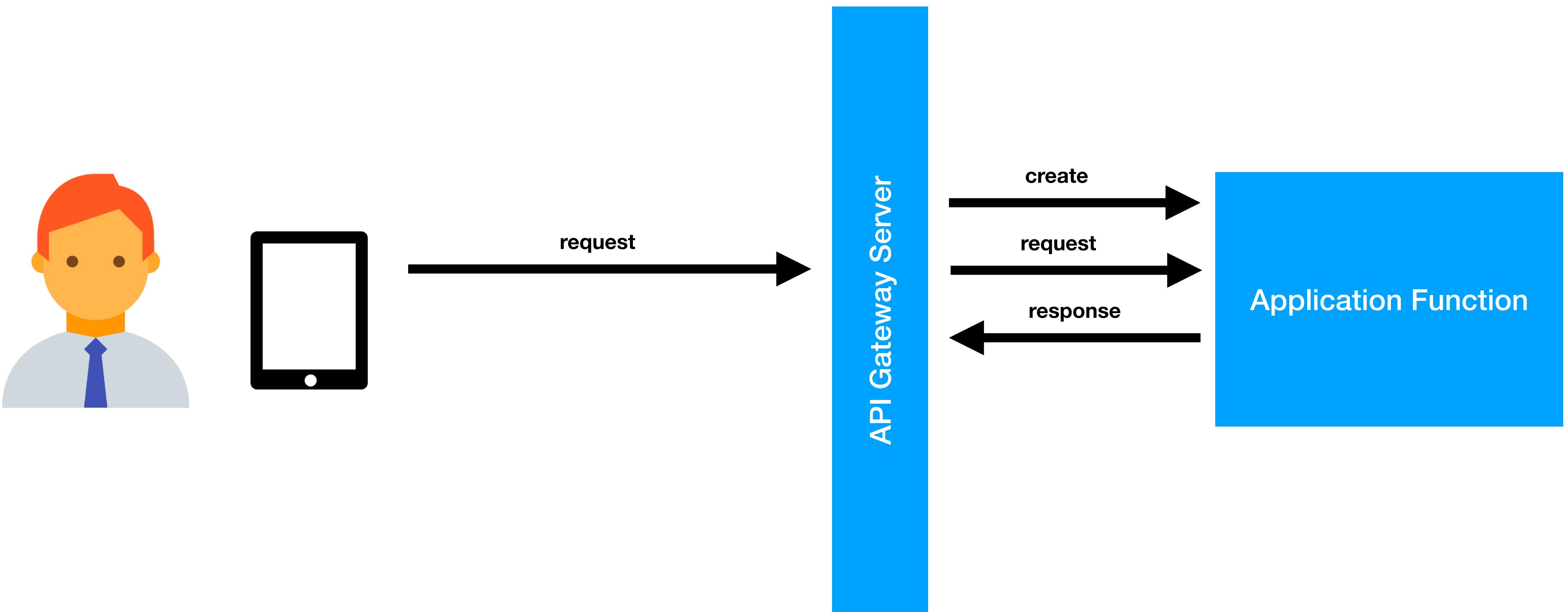
Serverless Web Request



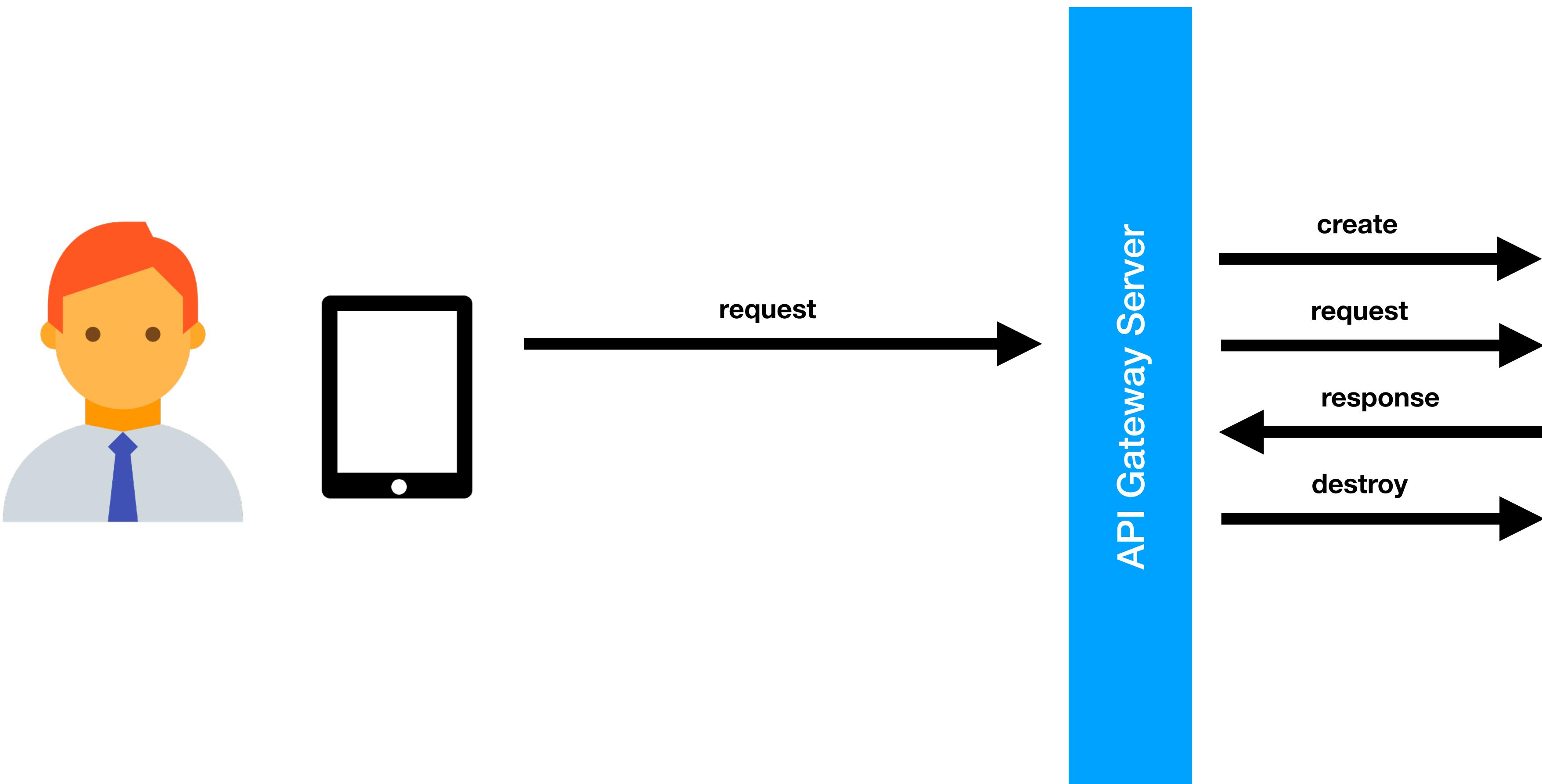
Serverless Web Request



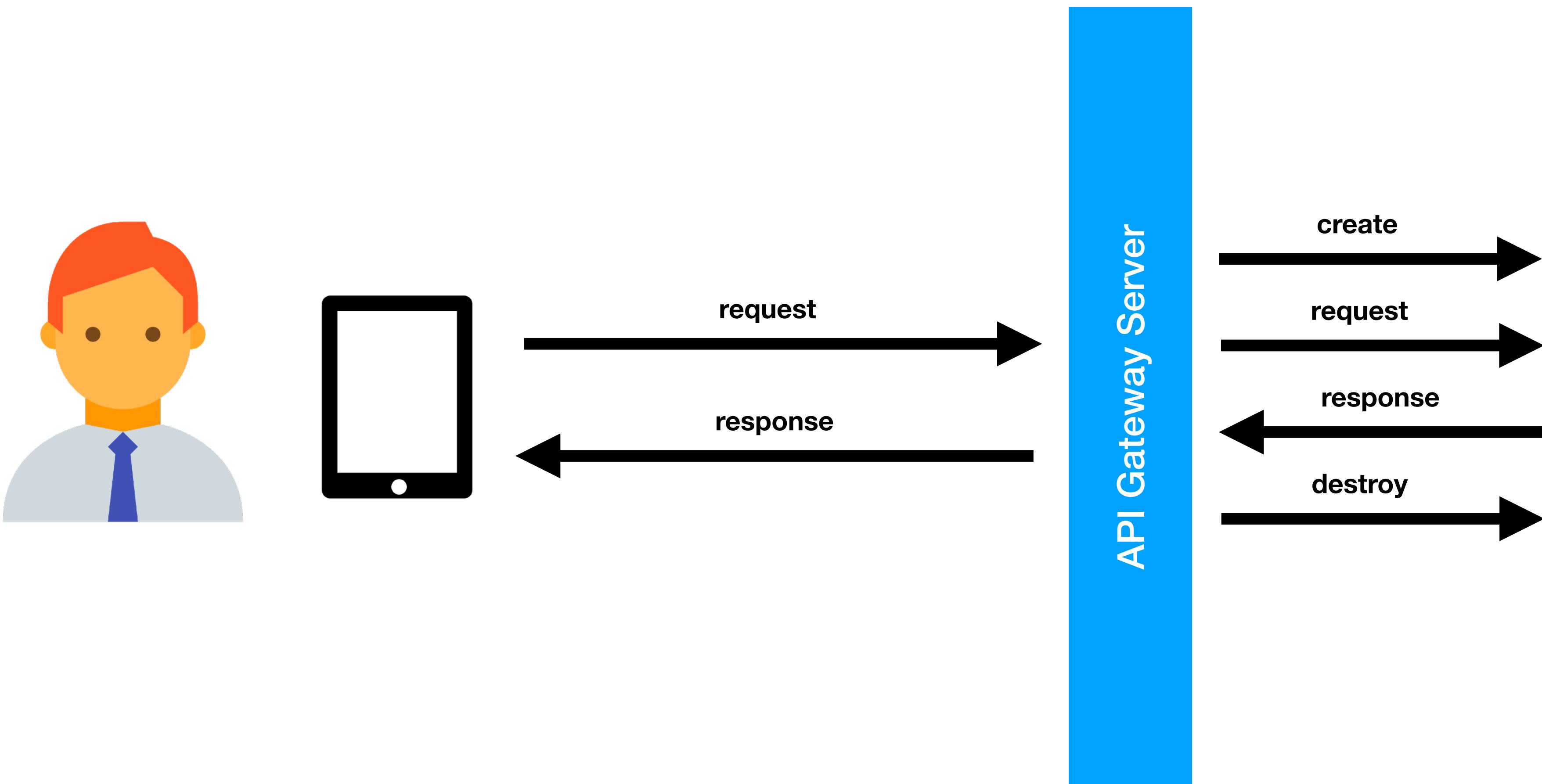
Serverless Web Request



Serverless Web Request



Serverless Web Request



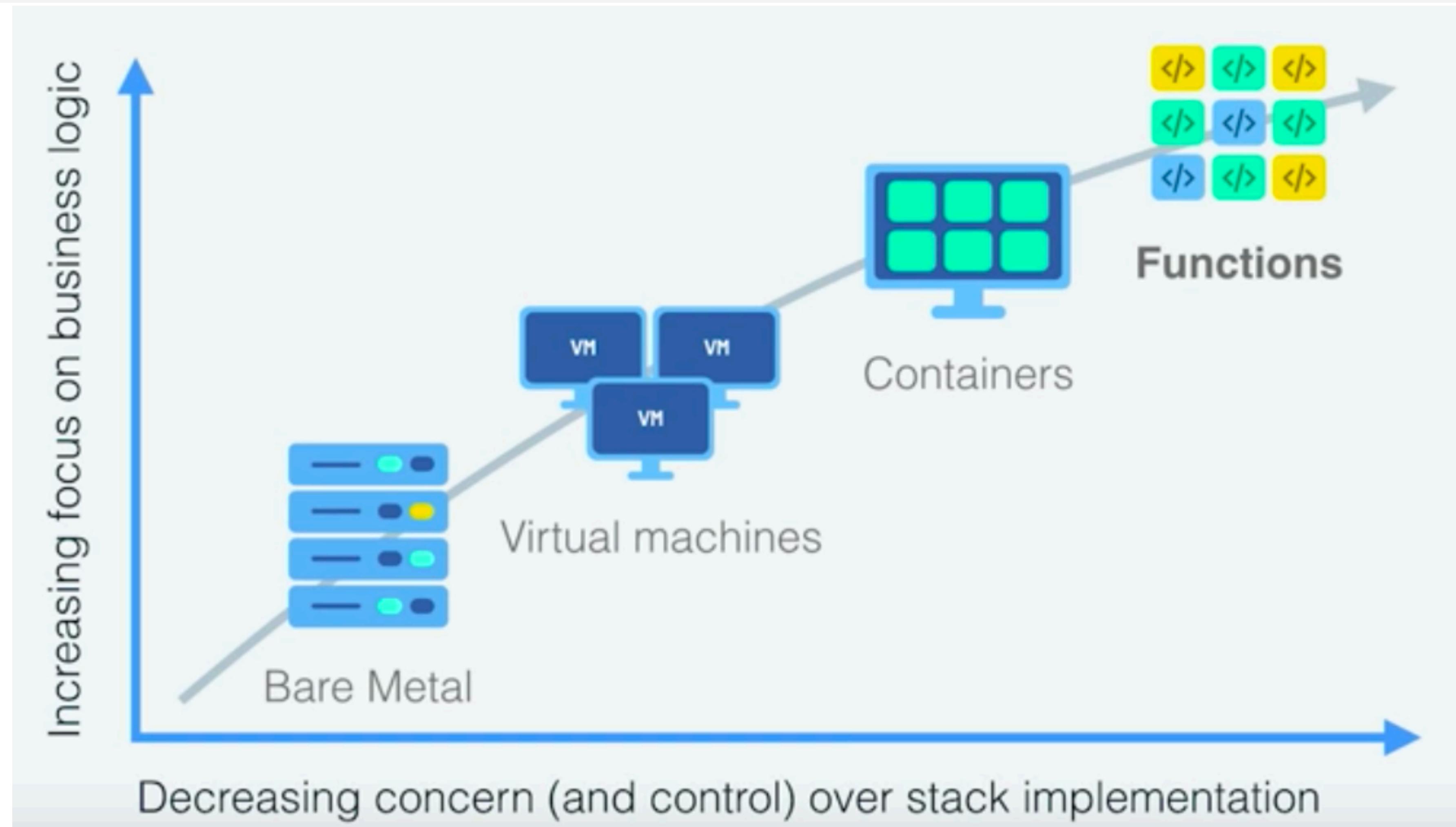
Cloud Functions with OpenWhisk



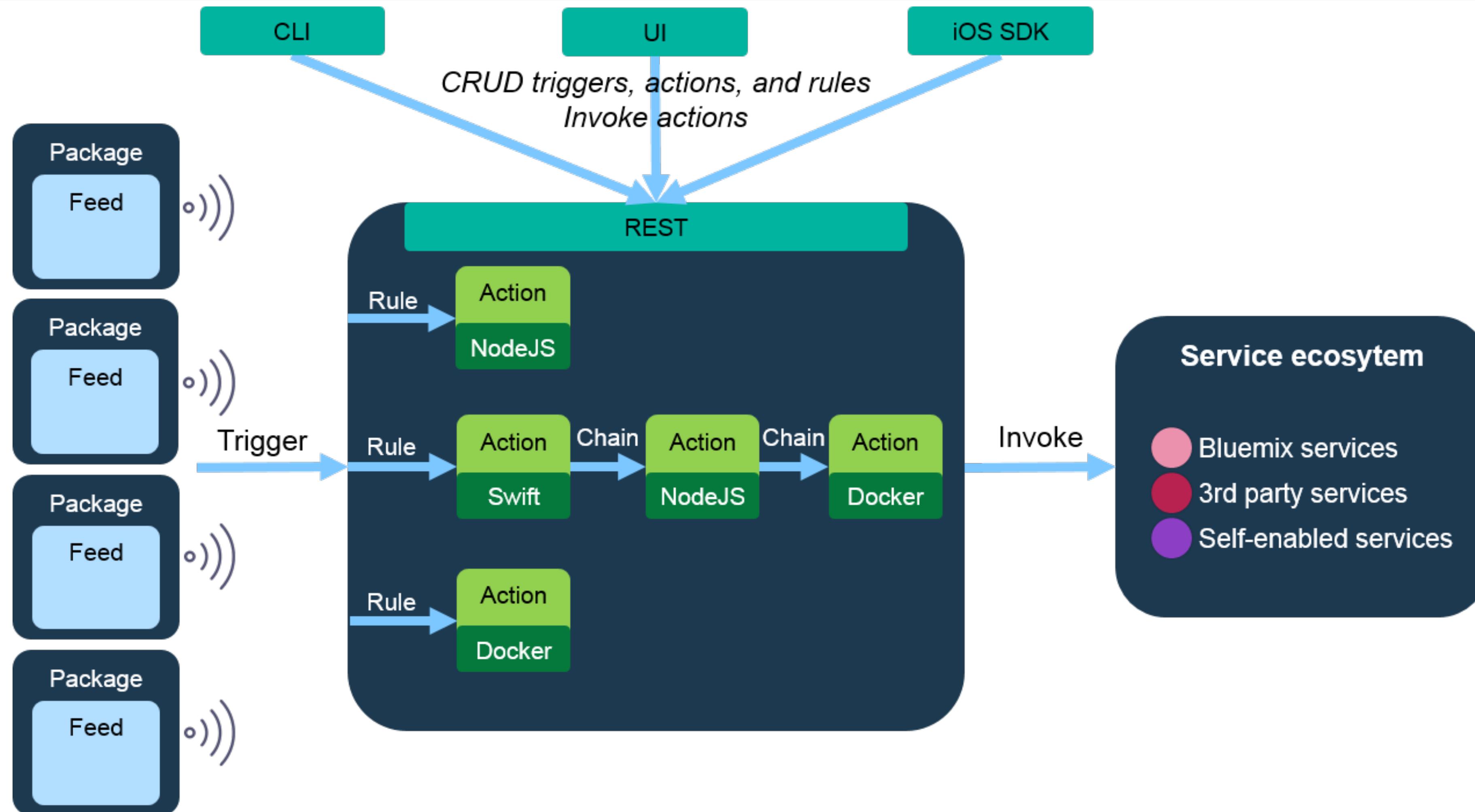
- OpenWhisk is a *cloud-first* distributed event-based programming service
- It represents an *event-action* platform that allows you to execute code in response to an event
- Provides a *serverless* deployment and operations model hiding infrastructural complexity
 - Simply provide the code you want to execute



Technology Progression

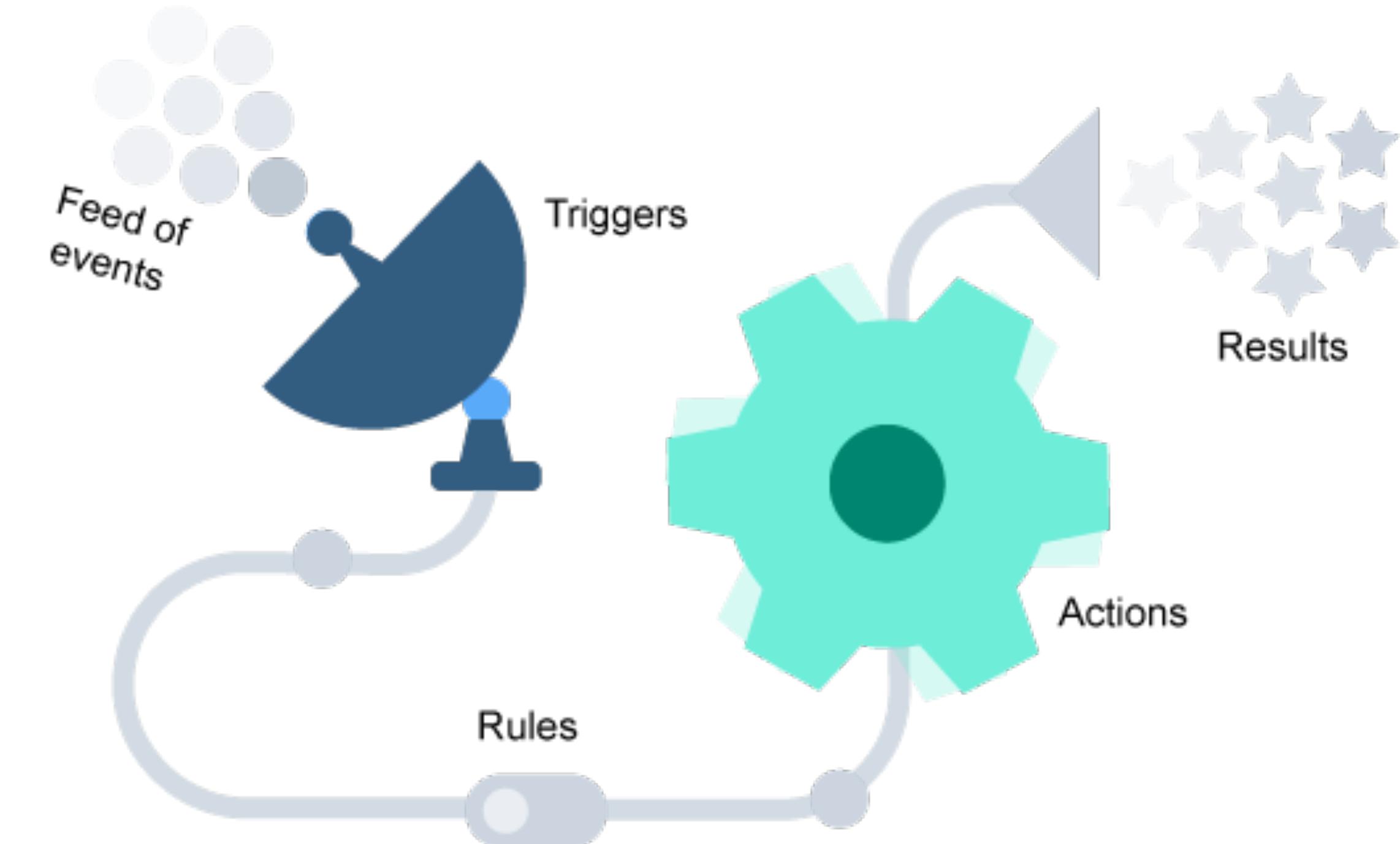


Cloud Functions High Level Architecture



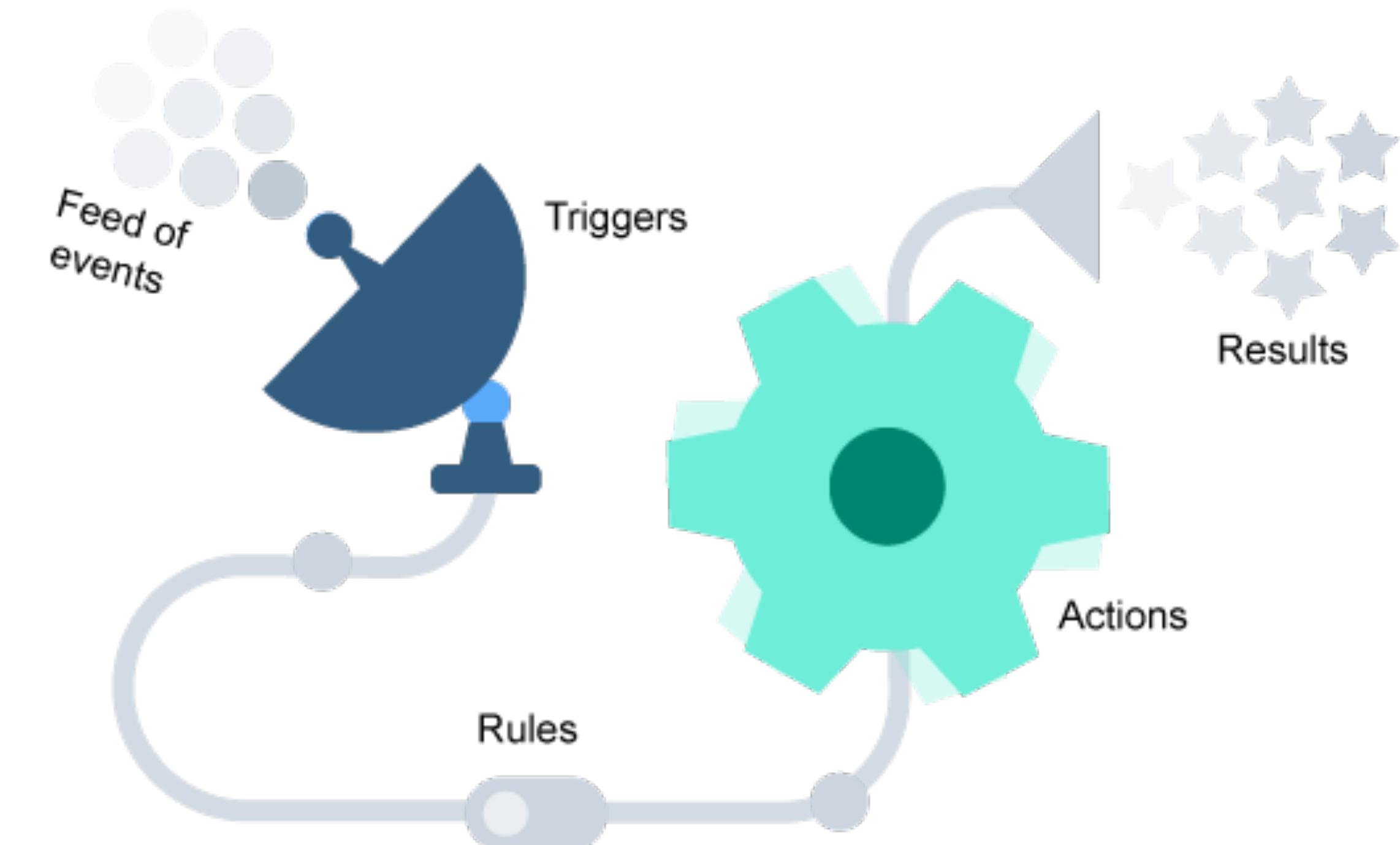
OpenWhisk Languages

- Supported Languages
 - NodeJS
 - Java
 - Swift
 - Python
 - Docker



OpenWhisk Events

- Supported Events
 - Periodic
 - IBM Cloudant
 - Message Hub (Kafka)
 - Mobile Push
 - GitHub
 - IBM API Connect



Kubeless - A Kubernetes Native Serverless Framework

- Build advanced applications with FaaS on top of Kubernetes
- Kubeless is a Kubernetes-native serverless framework that lets you deploy small bits of code without having to worry about the underlying infrastructure plumbing
- It leverages Kubernetes resources to provide auto-scaling, API routing, monitoring, troubleshooting and more
- Kubeless is purely open-source and non-affiliated to any commercial organization



Plain Ole VM's

- Sometimes you need a VM because of some unique requirement
- Deploying to Virtual Machines means that you now have to manage VM's
 - Patching, upgrading, health check, etc.
 - Not desirable
- Use as a *last resort!*



Advantages of PaaS

- Minimal set-up time to get coding
 - Developers can concentrate on the application and not the infrastructure
- Large number of services to take advantage of (Database, Messaging, Analytics, Mobile, etc...)
- Very easy to scale with demand
- Delete it if it doesn't work out and pay nothing (or very little)



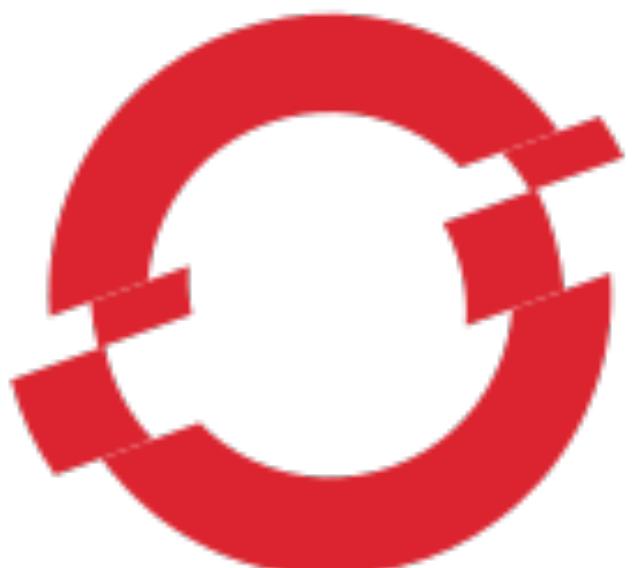
CLOUD FOUNDRY



Cloud Functions
(Serverless)



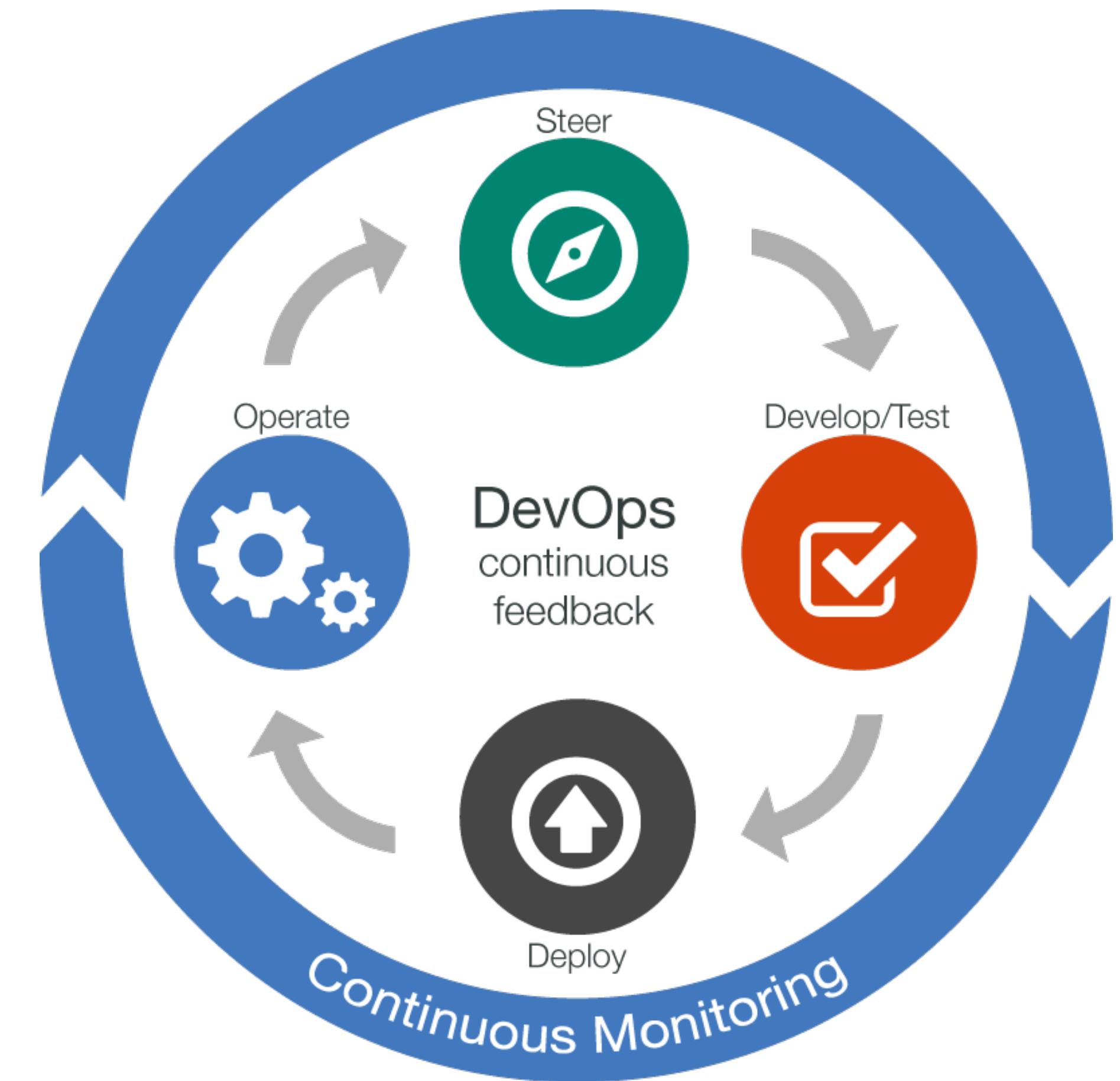
Kubernetes



OPENSHIFT

DevOps Continuous Deployment

- In order to facilitate **Continuous Deployment**, you want to deploy into an environment with the least friction
- Setting up IaaS VM's is a lot of work and leaves a large '**attack surface**' for predators
- Platform as a Service makes deployment **frictionless** and more secure



Why is PaaS important for Developers?

Summit of Innovation

Sea of Technical Debt



Platform as a Service is Frictionless

- Let's deploy an application we have on GitHub and see what the steps are
- This is a Python Flask application with a CouchDB/Cloudant database
- Instead of provisioning VM's and installing middleware and FTPing our code over, we will use a Cloud Foundry runtime from IBM Cloud.

Hands-On

“live session”

Some Assembly Required

- Tools you will need to complete this lab:
 - IBM Cloud Account (cloud.ibm.com)
 - GitHub Account (github.com)
 - Git Client
 - Text Editor (e.g., Visual Studio Code)
 - Vagrant and VirtualBox

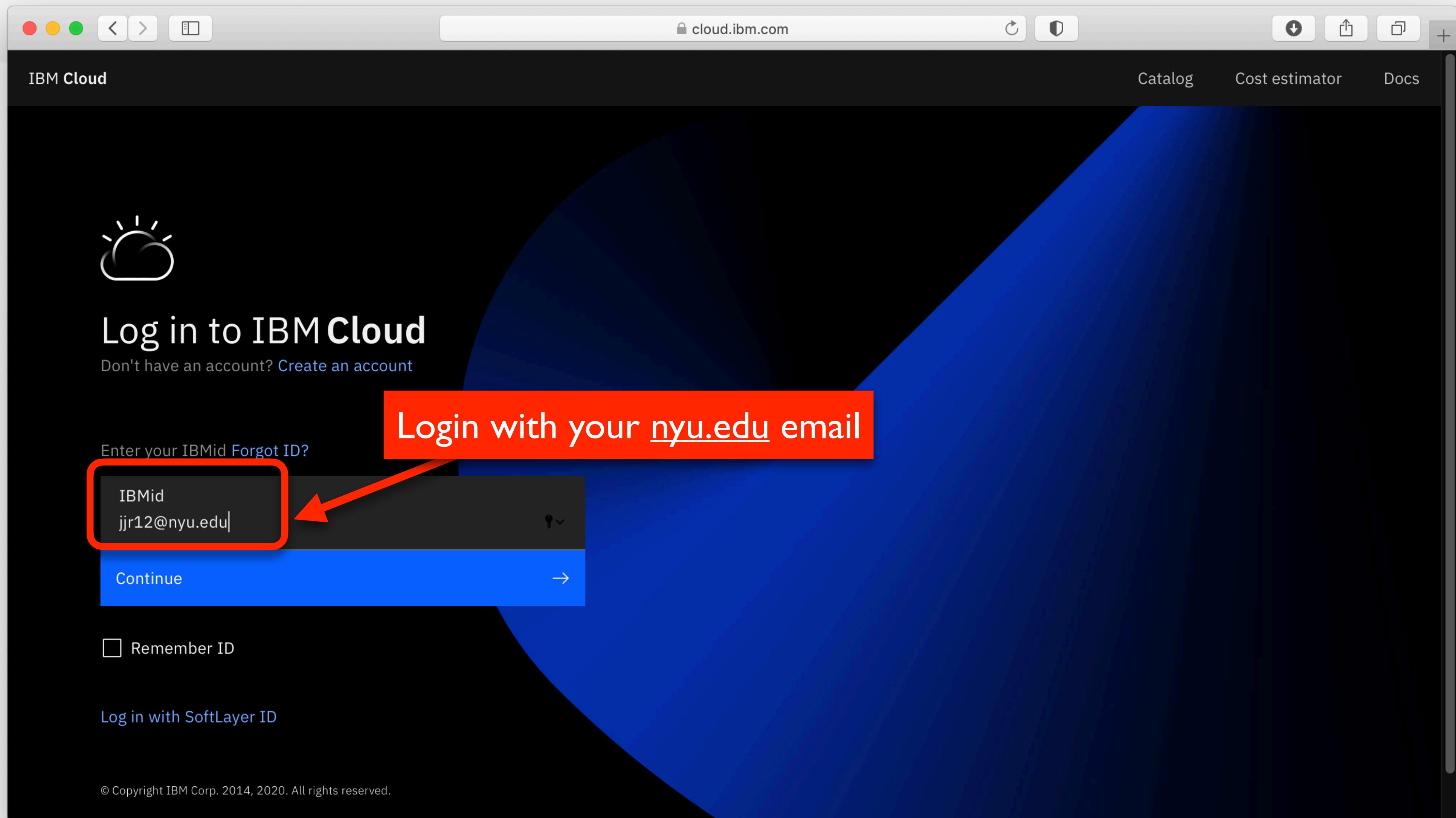


Focus of Today's Lab

- Learn IBM Cloud using Cloud Foundry
- Creating your first application
- Creating other Service instances
- Connecting them together
- Deploying a simple DevOps Pipeline



Go to <http://cloud.ibm.com>



IBM Cloud Services Catalog

The screenshot shows the IBM Cloud Services Catalog dashboard. At the top, there's a navigation bar with links for Catalog, Docs, Support, Manage, NYU, and a user profile. Below the navigation is a search bar and a blue button labeled "Create resource".

The main area is divided into several sections:

- Resource summary**: Shows counts for Cloud Foundry apps (1), Cloud Foundry services (4), Services (3), and Developer tools (1). There's also a link to "View resources".
- Planned maintenance**: Lists a "Next event: Tue, Mar 24, 2020 1:00 PM" for "Discovery service database migration" and other upcoming events.
- Location status**: Shows the status for Asia Pacific, Europe, and North America.
- For you**: A recommendation for Watson Studio, which is described as providing tools and a collaborative environment for data scientists, developers, and domain experts. It includes a "Use Watson Studio" button.
- Starter kits**: A section encouraging users to accelerate their cloud use with starter kits, featuring a "View available starter kits" button.

IBM Cloud Services Catalog

The screenshot shows the IBM Cloud Services Catalog dashboard. At the top, there's a navigation bar with icons for search, catalog, docs, support, manage, and user profile. A red arrow points from the text "All of the IBM Cloud Services are Here" down to the "Catalog" button in the navigation bar. Below the navigation bar, the dashboard features several sections: "Resource summary" (Cloud Foundry apps, services, developer tools), "Planned maintenance" (Discovery service database migration, upcoming events like the Container Registry move and Internet Services maintenance), "Location status" (Asia Pacific, Europe, North America), and "For you" (Watson Studio description and a "View available starter kits" button). A large orange banner in the center of the dashboard says "All of the IBM Cloud Services are Here".

cloud.ibm.com

IBM Cloud

Catalog

Docs Support Manage NYU

Dashboard

Upgrade Customize Create resource

Resource summary

Cloud Foundry apps

Cloud Foundry services

Services

Developer tools

View resources

Planned maintenance

Discovery service database migration

Upcoming

The IBM Cloud Container Registry in AP-South is mov...

Maintenance for Internet Services from Mar 26 2020,...

Update the Hyper Protect Crypto Services user interf...

Add more resources +

Location status

View status

Asia Pacific

Europe

North America

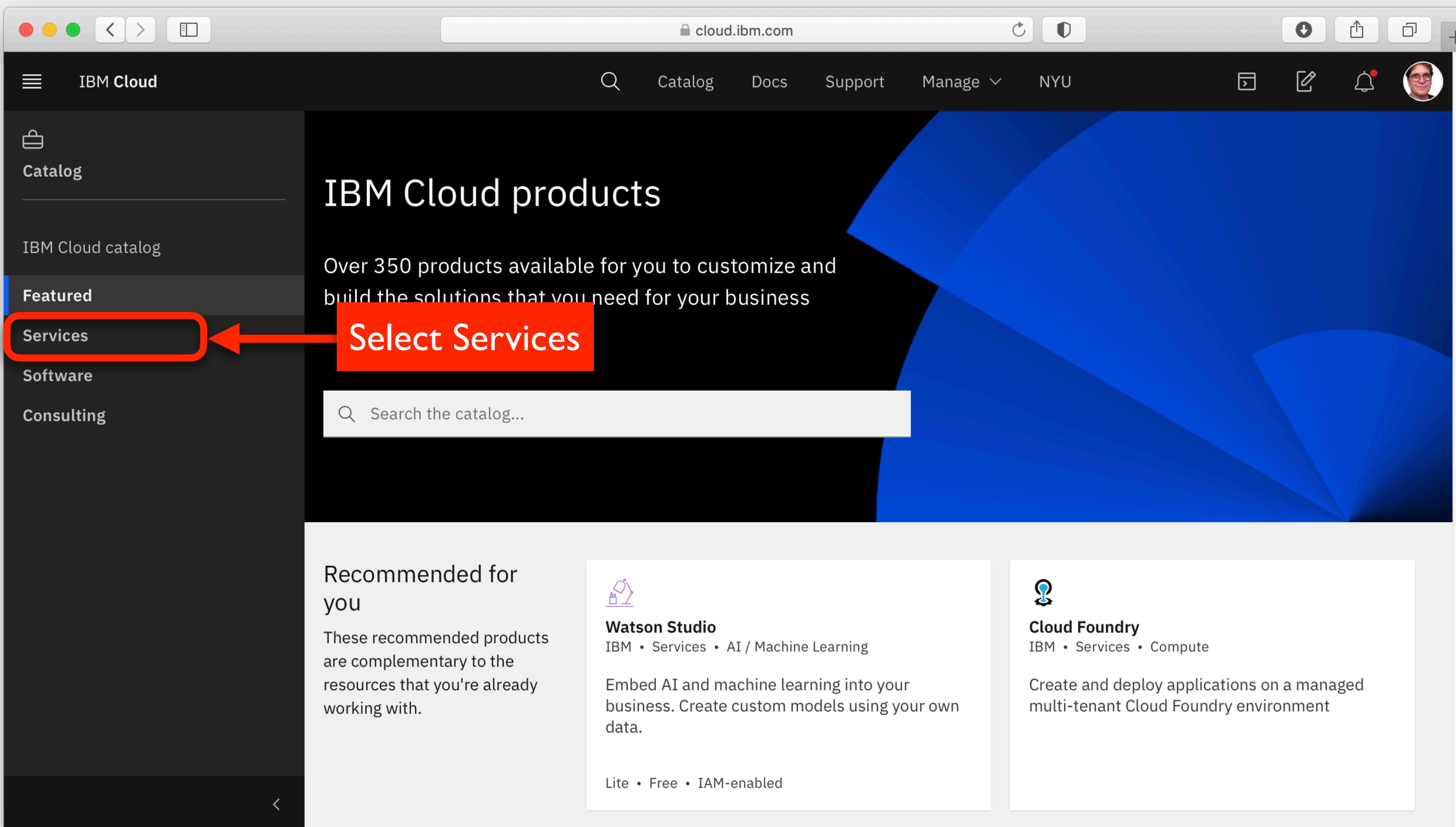
For you

Watson Studio provides a suite of tools and a collaborative environment for data scientists, developers and domain experts.

Use Watson Studio

View available starter kits

Go to Services



The Catalog

The screenshot shows the IBM Cloud Catalog interface. A red arrow points from the 'Category' section in the sidebar to the 'Quick Access to Services' banner at the top. The sidebar also has a red border around its category list.

Quick Access to Services

Services
Explore our broad portfolio of managed services for infrastructure, developer tools, and more to build your apps on the public cloud.

All Categories 173 items

- Accern-API**
Third party • Developer Tools
Get the most advanced breaking news technology for your investment strategies.
Free
- AccountScore**
Third party • Analytics
AccountScore Open Banking & transaction analytics
Free
- Actifio GO**
Third party • Storage • Developer Tools • Integration
SaaS platform for backup/DR/cloning/migration of Enterprise workloads in IBM Cloud
IAM-enabled
- Alloy**
Third party • Developer Tools
- Analytics Engine**
IBM • Analytics
- Annotator for Clinical Data**
IBM • AI / Machine Learning

Virtual Private Cloud (VPC)

The screenshot shows the IBM Cloud Catalog interface. On the left, there's a sidebar with a navigation menu. The main area is titled "Catalog" and contains a search bar. Below the search bar, there are two tabs: "Services" (which is selected) and "Software". A red box highlights the "VPC Infrastructure" category, which is listed under "All Categories". To the right of the catalog, there are four service cards:

- Block Storage for VPC**
IBM • VPC Infrastructure • Storage
Persistent storage for use as boot and data storage for Virtual Servers in a VPC network.
IAM-enabled
- Load Balancer for VPC**
IBM • VPC Infrastructure • Networking
Elastic Load Balancer as a service with core load balancing features and flexible usage-based pricing.
Free • IAM-enabled
- Virtual Private Cloud**
IBM • VPC Infrastructure • Networking
Fully customizable, software-defined virtual network with superior isolation.
IAM-enabled
- Virtual Server for VPC**
IBM • VPC Infrastructure
Virtual Server instances for VPC deliver flexible compute capacity for your Virtual Private Cloud. Fully integrated into IBM Cloud platform and capable of provisioning faster than...

Compute - Bare Metal and Hypervisors

The screenshot shows the IBM Cloud Catalog interface. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. The main area is titled "Catalog" with a search bar. A sidebar on the left lists categories: All Categories, VPC Infrastructure, Compute (selected), Containers, Networking, Storage, AI, Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Web and Mobile, and Web and Application. The "Compute" category is highlighted with a red border. The main content area displays three service cards:

- Bare Metal Server** (IBM • Compute): Bare metal servers provide the raw horsepower you demand for your processor-intensive and disk I/O-intensive workloads. These servers come with the most complete package of...
Free • IAM-enabled
- HPCaaS from Rescale** (Third party • Compute): HPCaaS from Rescale enables you to rapidly deploy your HPC jobs on the IBM Cloud with your chosen execution environment.
IAM-enabled
- Power Systems Virtual Server** (IBM • Compute): Power Systems Virtual Server projects deliver flexible compute capacity built upon the advanced RAS features and leading performance of the Power Systems platform
IAM-enabled

Compute - Containers and VMs

The screenshot shows the IBM Cloud Catalog interface. On the left, a sidebar lists various service categories: All Categories, VPC Infrastructure, Compute (selected), Containers, Networking, Storage, AI, Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Web and Mobile, and Web and Application. The 'Compute' category is highlighted with a red border. In the main content area, there are four service cards. The first card, 'Containers and VMs', is also highlighted with a red border. It contains the 'Kubernetes Service' card, which is described as 'Deploy secure, highly available apps in a native Kubernetes experience.' The second card is 'Red Hat OpenShift on IBM Cloud', described as 'Deploy and secure enterprise workloads on native OpenShift with developer focused tools to run highly available apps.' The third card is 'Container Registry', described as 'Securely store container images and monitor their vulnerabilities in a private registry.' The fourth card is 'IBM Cloud Backup', described as 'A fast and flexible backup solution that is managed by IBM Cloud and provides capacity options to scale perfectly with your needs.' Each service card includes its provider (IBM), category (Compute), and specific service type (Containers or Storage).

IBM Cloud

Catalog Docs Support Manage NYU

Catalog

Search the catalog...

Services Software

All Categories

VPC Infrastructure

Compute >

Containers

Networking

Storage

AI

Analytics

Databases

Developer Tools

Integration

Internet of Things

Security and Identity

Web and Mobile

Web and Application

Kubernetes Service
IBM • Compute • Containers
Deploy secure, highly available apps in a native Kubernetes experience.
Free • IAM-enabled • Service Endpoint Supported

Red Hat OpenShift on IBM Cloud
IBM • Compute • Containers
Deploy and secure enterprise workloads on native OpenShift with developer focused tools to run highly available apps.
IAM-enabled • Service Endpoint Supported

Container Registry
IBM • Compute • Containers
Securely store container images and monitor their vulnerabilities in a private registry.

IBM Cloud Backup
IBM • Compute • Storage
A fast and flexible backup solution that is managed by IBM Cloud and provides capacity options to scale perfectly with your needs.

Compute - Serverless

The screenshot shows the IBM Cloud Catalog interface. On the left, there's a sidebar with various service categories: All Categories, VPC Infrastructure, Compute (which is selected and highlighted with a black border), Containers, Networking, Storage, AI, Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Web and Mobile, and Web and Application. Above the sidebar, there are tabs for Services (which is selected) and Software. The main area is titled "Catalog" and contains a search bar with the placeholder "Search the catalog...". Below the search bar, there's a section titled "Serverless Compute" which is also highlighted with a red box. This section includes a logo of a green 'f' inside a circle, the title "Functions", the subtitle "IBM • Compute", a description of what IBM Cloud Functions is (a Function-as-a-Service platform that executes functions in response to incoming events), and a note that it's IAM-enabled. To the right of this, there are other service cards: "Cloud Images" (OSNEXUS Software Defined Storage for Bare Metal, IBM • Compute • Storage, description: Dedicated scale-out file, block and object storage designed for IBM Cloud and hybrid cloud deployments), and "Plesk Onyx Linux Unlimited for Virtual Server" (IBM • Compute, description: Build and manage multiple sites from a single dashboard. You can also run updates, monitor performance and onboard new prospects all from the same place).

Compute - Cloud Foundry

The screenshot shows the IBM Cloud Catalog interface. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. The left sidebar lists categories: All Categories, VPC Infrastructure, Compute (selected), Containers, Networking, Storage, AI, Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Web and Mobile, and Web and Application. The main content area displays two service cards: "Red Hat Enterprise Linux OS for Virtual Server" by IBM (Compute) and "Veeam Availability Suite for Virtual Server" by Veeam (Compute). Below these, a section titled "Cloud Foundry" is highlighted with a red box. It shows the "Cloud Foundry" service by IBM (Compute) with the description: "Run your Cloud Foundry application in either a multi-tenant, or an isolated environment (Cloud Foundry Enterprise)."

Compute - Cloud Foundry Runtimes

The screenshot shows the IBM Cloud web interface with the 'Cloud Foundry' section selected. The left sidebar has 'Overview' selected under 'Cloud Foundry'. The main area shows two options: 'Public Applications' and 'Enterprise Environment', each with a 'Create' button. Below these is a section titled 'Application Runtimes' with a red border around it, listing Java Liberty, .js, .swift, .py, .rb, .net, .php, .go, and tomcat.

Public Applications **Create**

Create and deploy apps on IBM Cloud's multi-tenant Cloud Foundry environment available in 5 IBM Cloud Regions. Get started in minutes by deploying your applications, and let IBM Cloud manage them for you.

[Learn more about IBM Cloud Foundry Public.](#)

Enterprise Environment **Create**

Create an isolated, single-tenant, IBM Cloud Foundry Enterprise Environment, on-demand, with one click and rapidly delivered to your IBM Cloud account.

[Learn more about IBM Cloud Foundry Enterprise Environment.](#)

Application Runtimes

A range of popular language runtimes that make working with your chosen language easy and automatic.

java liberty .js .swift .py .rb .net .php .go tomcat

Why Cloud Foundry?

Compute - Cloud Foundry Runtimes

The screenshot shows the IBM Cloud Foundry Public Overview page. The left sidebar includes links for Cloud Foundry, Overview (which is selected), Public, Enterprise, Getting Started, Environments, Applications, and Services. The main content area has a large orange callout box containing the following text:

Note what is not here.
Compiled languages that are machine specific like:
- C
- C++
Because they would need to be recompiled for each architecture

A red arrow points from this callout down to the "Application Runtimes" section below.

Application Runtimes

A range of popular language runtimes that make working with your chosen language easy and automatic.

Icons for various runtimes are shown in circles: java liberty, .js, .swift, .py, .rb, .net, .php, .go, and tomcat.

At the bottom, the text "Why Cloud Foundry?" is visible.

Networking

The screenshot shows the IBM Cloud Catalog interface. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. The main area is titled "Catalog" with a search bar. A tab menu at the top left shows "Services" (selected) and "Software". On the left, a sidebar lists various service categories: All Categories, VPC Infrastructure, Compute, Containers, Networking (which is selected and highlighted with a black border), Storage, AI, Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Web and Mobile, and Web and Application.

The central content area is titled "Networking" and displays four service cards:

- Load Balancers** (IBM • Networking): Use a load balancer service to distribute traffic among your application servers residing locally within data center. Choose from flexible pricing and deployment options summarized...
- Content Delivery Network** (IBM • Networking): Distribute your content in geographically diverse nodes and shorten the distance it has to travel to get to your end user.
- Direct Link Connect on Classic** (IBM • Networking): IBM Cloud Direct Link Connect offers private access to your IBM Cloud infrastructure and to any other clouds linked to your Network Service Provider, through your local IBM Cloud...
- Direct Link Dedicated** (IBM • Networking): Direct Link "2.0" : Connect directly to IBM Cloud through a single-tenant connection, using a dedicated circuit or cross-connect, for unparalleled network performance to and from...

At the bottom right of the networking section, there is a note: "Free • IAM-enabled".

Storage

The screenshot shows the IBM Cloud Catalog interface. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. The main area is titled "Catalog" with a search bar. A sidebar on the left lists various service categories. The "Storage" category is selected and highlighted with a blue border.

All Categories

- VPC Infrastructure
- Compute
- Containers
- Networking
- Storage** >
- AI
- Analytics
- Databases
- Developer Tools
- Integration
- Internet of Things
- Security and Identity
- Web and Mobile
- Web and Application

Storage

Actifio GO
Third party • Storage • Developer Tools • Integration
SaaS platform for backup/DR/cloning/migration of Enterprise workloads in IBM Cloud
IAM-enabled

Block Storage
IBM • Storage
Persistent iSCSI based storage with high-powered performance and capacity up to 12TB.

Block Storage for VPC
IBM • VPC Infrastructure • Storage
Persistent storage for use as boot and data storage for Virtual Servers in a VPC network.
IAM-enabled

box
box
Third party • Storage
Powering Content and data for your application. Whether you are building a line of business app, content management software or need to display content beautifully on web and...
Free

Artificial Intelligence

The screenshot shows the IBM Cloud Catalog interface. At the top, there's a navigation bar with links for Catalog, Docs, Support, Manage, NYU, and a user profile icon. Below the navigation bar, the main area is titled "Catalog" with a search bar that says "Search the catalog...". There are two tabs: "Services" (which is selected) and "Software". On the left, a sidebar lists various service categories: All Categories, VPC Infrastructure, Compute, Containers, Networking, Storage, AI (which is selected and highlighted with a blue border), Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Web and Mobile, and Web and Application.

The main content area displays four AI-related services:

- Watson Assistant** (IBM • AI): Watson Assistant lets you build conversational interfaces into any application, device, or channel. It is listed as Lite • Free • IAM-enabled.
- Watson Studio** (IBM • AI): Embed AI and machine learning into your business. Create custom models using your own data. It is listed as Lite • Free • IAM-enabled.
- Compare and Comply** (IBM • AI): Process governing documents to convert, identify, classify, and compare important elements. It is listed as Lite • Free • IAM-enabled.
- Discovery** (IBM • AI): Add a cognitive search and content analytics engine to applications. It is listed as Lite • Free • IAM-enabled.

 **Watson Assistant**
IBM • AI

Watson Assistant lets you build conversational interfaces into any application, device, or channel.

Lite • Free • IAM-enabled

 **Watson Studio**
IBM • AI

Embed AI and machine learning into your business. Create custom models using your own data.

Lite • Free • IAM-enabled

 **Annotator for Clinical Data**
IBM • AI

Analyze text to extract medical codes and concepts such as diseases, lab values, medications, procedures and more.

Lite • Free • IAM-enabled

 **Compare and Comply**
IBM • AI

Process governing documents to convert, identify, classify, and compare important elements

Lite • Free • IAM-enabled

 **Discovery**
IBM • AI

Add a cognitive search and content analytics engine to applications.

Lite • Free • IAM-enabled

 **Insights for Medical Literature**
IBM • AI

Search a medical literature corpus and discover insights.

Lite • Free • IAM-enabled

 **Knowledge Catalog**
IBM • AI

Discover, catalog, and securely share enterprise data.

Lite • Free • IAM-enabled

 **Knowledge Studio**
IBM • AI

Teach Watson the language of your domain.

Lite • Free • IAM-enabled

 **Language Translator**
IBM • AI

Translate text, documents, and websites from one language to another. Create industry or region-specific translations via the service's...

Lite • Free • IAM-enabled

 **Machine Learning**
IBM • AI

IBM Watson Machine Learning - make smarter decisions, solve tough problems, and improve user outcomes.

Lite • Free • IAM-enabled

 **Natural Language Classifier**
IBM • AI

Natural Language Classifier uses advanced natural language processing and machine learning techniques to create custom...

Free • IAM-enabled

 **Natural Language Understanding**
IBM • AI

Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and more.

Lite • Free • IAM-enabled

 **Personality Insights**
IBM • AI

The Watson Personality Insights derives insights from transactional and social media data to identify psychological traits.

Lite • Free • IAM-enabled

 **Speech to Text**
IBM • AI

Low-latency, streaming transcription

Lite • Free • IAM-enabled

 **Text to Speech**
IBM • AI

Synthesizes natural-sounding speech from text.

Lite • Free • IAM-enabled

 **Tone Analyzer**
IBM • AI

Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, social, and...

Lite • Free • IAM-enabled

 **Visual Recognition**
IBM • AI

Find meaning in visual content! Analyze images for scenes, objects, and other content. Choose a default model off the shelf, or...

Lite • Free • IAM-enabled

 **Watson OpenScale**
IBM • AI

IBM Watson OpenScale is an enterprise-grade environment for AI infused applications that provides enterprises with visibility into...

Lite • Free • IAM-enabled



**AccountScore**

Third party • Analytics

AccountScore Open Banking & transaction analytics

Free

**Analytics Engine**

IBM • Analytics

Flexible framework to deploy Hadoop and Spark analytics applications.

Lite • Free • IAM-enabled • Service Endpoint Supported

**BigInsights for Apache Hadoop (Subscription)**

IBM • Analytics

Provision managed bare metal Apache Hadoop clusters for production use or POCs at scale.

Free • Deprecated

**Db2 Warehouse**

IBM • Analytics • Databases

Db2 Warehouse on Cloud is a flexible and powerful data warehouse for enterprise-level analytics.

Free • Dedicated

**IBM Cognos Dashboard Embedded**

IBM • Analytics

Bring data to life directly from your application with this powerful and easy-to-use visualization service.

Lite • Free • IAM-enabled

**Master Data Management**

IBM • Analytics

IBM® Master Data Management (MDM) on Cloud helps businesses gain a trusted view of data in a hybrid computing environment.

**SQL Query**

IBM • Analytics • Databases

Read, analyze, and store data in Cloud Object Storage with ANSI SQL.

Lite • Free • IAM-enabled

**Streaming Analytics**

IBM • Analytics

Leverage IBM Streams to ingest, analyze, monitor, and correlate data as it arrives from real-time data sources. View information and events as they...

Lite • Free • IAM-enabled

 Blockchain Platform IBM • Databases Welcome to the fast, flexible way to build, operate, and grow blockchain solutions. IAM-enabled	 Cloudant IBM • Databases A scalable JSON document database for web, mobile, IoT, and serverless applications. Lite • Free • IAM-enabled	 Databases for PostgreSQL IBM • Databases PostgreSQL is a powerful, open source object-relational database that is highly customizable. IAM-enabled	 Databases for Redis IBM • Databases Redis is a blazingly fast, in-memory data structure store. IAM-enabled	 Databases for Elasticsearch IBM • Databases Elasticsearch combines the power of a full text search engine with the indexing strengths of a JSON document... IAM-enabled	 Databases for MongoDB IBM • Databases MongoDB is a JSON document store with a rich query and aggregation framework. IAM-enabled
 Messages for RabbitMQ IBM • Databases RabbitMQ is an open source multi-protocol messaging broker. IAM-enabled	 Databases for etcd IBM • Databases etcd is a distributed reliable key-value store for the most critical data of a distributed system IAM-enabled	 Blockchain IBM • Databases First version Starter and Enterprise Plans, soon to be deprecated. Search for the "Blockchain Platform" tile in the... Deprecated	 Compose Enterprise IBM • Databases IBM Compose Enterprise is a service which provides a private isolated cluster for IBM Cloud users to optionally... Beta	 Compose for JanusGraph IBM • Databases JanusGraph is a scalable graph database optimized for storing and querying highly-interconnected data Beta	 Compose for MySQL IBM • Databases MySQL is a fast, easy-to-use, and flexible RDBMS. Beta
 Compose for RethinkDB IBM • Databases RethinkDB is a JSON document based, distributed database with an integrated administration and exploration console. Beta	 Compose for ScyllaDB IBM • Databases ScyllaDB is a highly performant, in-place replacement for the Cassandra wide-column distributed database. Beta	 Db2 IBM • Databases A next generation SQL database. Formerly dashDB For Transactions. Lite • Free • IAM-enabled	 Db2 Hosted IBM • Databases Db2 Hosted: Offers customers the rich features of an on-premise Db2 deployment without the cost,... Free	 Db2 Warehouse IBM • Analytics • Databases Db2 Warehouse on Cloud is a flexible and powerful data warehouse for enterprise-level analytics. Free • Dedicated	 GEO Web Services Third party • Databases Adding geo-intelligence to your business. Free
 Hyper Protect DBaaS for MongoDB IBM • Databases Hyper Protect DBaaS for MongoDB is a highly secured enterprise service. It provides capabilities to manage... Free • IAM-enabled	 Hyper Protect DBaaS for PostgreSQL IBM • Databases Hyper Protect DBaaS for PostgreSQL is a highly secured enterprise service. It provides capabilities to manage... Free • IAM-enabled	 InfluxCloud Third party • Databases A modern time series data platform for metrics & events Free	 Informix IBM • Databases IBM Informix on Cloud helps businesses gain a trusted view of data in a hybrid computing environment. IAM-enabled	 Portworx Enterprise Third party • Storage • Databases • Developer Tools • Internet of Things Cloud-native persistent storage and data management solution for Kubernetes and OpenShift clusters. IAM-enabled	 SQL Query IBM • Analytics • Databases Read, analyze, and store data in Cloud Object Storage with ANSI SQL. Lite • Free • IAM-enabled

 **Actifio GO**
Third party • Storage • Developer Tools • Integration

SaaS platform for backup/DR/cloning/migration of Enterprise workloads in IBM Cloud

IAM-enabled

 **Availability Monitoring**
IBM • Developer Tools

Around the world, around the clock availability and performance monitoring.

Lite • Free

 **Continuous Delivery**
IBM • Developer Tools

Support DevOps best practices by using Git, issue tracking, CI/CD pipelines, and the Eclipse Orion Web IDE in the Cloud.

Lite • Free • IAM-enabled

 **Event Management**
IBM • Developer Tools

Consolidated operational event and incident management.

Free

 **Globalization Pipeline**
IBM • Developer Tools

Manage the translation of your cloud and mobile applications using IBM Globalization Pipeline.

IAM-enabled

 **IBM Cloud Activity Tracker with LogDNA**
IBM • Developer Tools

LogDNA provides collection and search of events that occur on IBM Cloud Activity Tracker. Save searches, design alerts, and build graphs to...

Lite • Free • IAM-enabled

 **IBM Cloud Monitoring with Sysdig**
Third party • Developer Tools

Offers visibility into the performance and health of your infrastructure and apps, with in-depth troubleshooting, and alerting.

Lite • Free • IAM-enabled

 **IBM Log Analysis with LogDNA**
IBM • Developer Tools

LogDNA provides log collection and log search for IBM Log Analysis. Define alerts and design custom views to monitor application and system logs.

Lite • Free • IAM-enabled

 **PagerDuty**
Third party • Developer Tools

Incident Management and Resolution Platform

Free

 **Portworx Enterprise**
Third party • Storage • Databases • Developer Tools • Internet of Things

Cloud-native persistent storage and data management solution for Kubernetes and OpenShift clusters.

IAM-enabled

 **Schematics**
IBM • Developer Tools

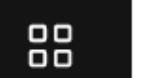
Enable Infrastructure as Code and automate the management of IBM Cloud service and Terraform.

Lite • Free • IAM-enabled

 **Toolchain**
IBM • Developer Tools

Integrate tools to build, test, and deploy applications by using DevOps best practices.

Lite • Free • IAM-enabled

**Actifio GO**

Third party • Storage • Developer Tools • Integration

SaaS platform for backup/DR/cloning/migration of Enterprise workloads in IBM Cloud

IAM-enabled

**API Connect**

IBM • Integration

Create, manage, enforce, and run APIs.

Lite • Free • IAM-enabled

**API Gateway**

IBM • Integration • Web and Mobile

A developer-focused solution for creating, securing, and sharing API proxies and custom APIs backed by IBM Cloud resources.

Lite • Free • IAM-enabled

**App Connect**

IBM • Integration

Connect your applications, automate tasks, and improve productivity

Lite • Free

**Event Streams**

IBM • Integration

IBM Event Streams is a high-throughput message bus built with Apache Kafka. It is optimized for event ingestion into IBM Cloud and event stream...

Lite • Free • IAM-enabled • Service Endpoint Supported

**Lift CLI**

IBM • Integration

Migrate your data quickly, easily and securely from your on-premises data source to an IBM Cloud data property.

Free • IAM-enabled

**MQ**

IBM • Integration

Enterprise-grade messaging hosted in the cloud

Lite • Free • IAM-enabled

**Rocket Mainframe Data**

Third party • Integration

Rocket Mainframe Data Service on IBM Cloud provides an easy way to leverage your mainframe data for new cloud services and mobile apps. Bu...

Free

**Secure Gateway**

IBM • Integration

IBM Secure Gateway for IBM Cloud enables users to integrate cloud services with enterprise systems on premises.

Free

**SPLICE Pre-CAT Insurance Notifications**

Third party • Integration • Web and Mobile

Pre-CAT Notifications for Insurance Companies

Free



Internet of Things



Internet of Things Platform

IBM • Internet of Things

This service is the hub of all things IBM IoT, it is where you can set up and manage your connected devices so that your apps can access their live a...

Lite • Free • IAM-enabled



AT&T Flow Designer

Third party • Internet of Things

Design, Build and Deploy IoT Solutions in Minutes

Free



AT&T IoT Data Plans

Third party • Internet of Things

Launch your IoT product fast with IoT data plans

Free



Bosch IoT Rollouts

Third party • Internet of Things

Rollout software and firmware updates to devices

Free



Car Diagnostic API

Third party • Internet of Things

Translation service for OBD error codes.

Free



Portworx Enterprise

Third party • Storage • Databases • Developer Tools • Internet of Things

Cloud-native persistent storage and data management solution for Kubernetes and OpenShift clusters.

IAM-enabled



Precision Location

Third party • Internet of Things

Skyhook Precision Location

Free



UnificationEngine

Third party • Internet of Things

Intelligent IoT messaging for all H2M communications.

Free



 <p>App ID IBM • Security and Identity • Web and Mobile</p> <p>User Authentication and User Profiles for your apps.</p> <p>Lite • Free • IAM-enabled</p>	 <p>Certificate Manager IBM • Security and Identity</p> <p>Use Certificate Manager to order and manage SSL/TLS certificates for your apps and services</p> <p>Free • IAM-enabled</p>	 <p>Cloud HSM IBM • Security and Identity</p> <p>Protect your keys and secrets in a dedicated hardware security module.</p>	 <p>Container Security Services IBM • Security and Identity</p> <p>IBM Security Consulting Services to assess, design and implement Container Security solutions that will help secure your entire...</p>	 <p>Contrast Security Third party • Security and Identity</p> <p>Detect vulnerabilities and block attacks</p> <p>Free</p>
 <p>FortiGate Security Appliance IBM • Networking • Security and Identity</p> <p>Enterprise-class hardware firewall gives you enhanced, granular control over your network.</p> <p>Free</p>	 <p>FusionAuth Third party • Security and Identity</p> <p>Modern Identity and User Management</p> <p>Free</p>	 <p>Hardware Firewall IBM • Security and Identity</p> <p>Secure your IBM IaaS environment (and all the information stored there) as well as preventing malicious activity from ever...</p>	 <p>Hardware Firewall (Dedicated) IBM • Security and Identity</p> <p>Secure your IBM IaaS environment (and all the information stored there) as well as preventing malicious activity from ever...</p>	 <p>Hyper Protect Crypto Services IBM • Security and Identity</p> <p>Data protection with a dedicated key management service and hardware security module (HSM) - using FIPS 140-2 Level 4...</p> <p>Free • IAM-enabled</p>
 <p>IBM Cloud Data Shield IBM • Security and Identity</p> <p>IBM Cloud™ Data Shield enables users to run containerized applications in a secure enclave on an IBM Cloud Kubernetes host, providing...</p> <p>IAM-enabled</p>	 <p>Internet Services IBM • Networking • Security and Identity</p> <p>Using Cloudflare, Cloud Internet Services (CIS) provides Domain Name Service (DNS), Global Load Balancer (GLB), DDoS protectio...</p> <p>Free • IAM-enabled</p>	 <p>Key Protect IBM • Security and Identity</p> <p>An app-independent service for protecting, managing, and generating keys.</p> <p>Free • IAM-enabled</p>	 <p>MNSS IBM • Security and Identity</p> <p>IBM Managed Network Security Services that provides management, monitoring, and alerting of security devices in the cloud or o...</p>	 <p>Raxak Protect Third party • Security and Identity</p> <p>Automated Comprehensive Security Configuration Management for Servers</p> <p>Lite • Free • IAM-enabled</p>
 <p>Security Advisor IBM • Security and Identity</p> <p>A unified security dashboard and console to enable centralized management for the security team</p> <p>Lite • Free • IAM-enabled</p>	 <p>SSL Certificates IBM • Security and Identity</p> <p>Secure Socket Layer (SSL) certificates provide a secure, encrypted connection between your site or application and your end user.</p> <p>Free</p>	 <p>Twilio Authy Third party • Security and Identity</p> <p>Secure your users with 2FA for mobile and web.</p>	 <p>Twilio Verify Third party • Security and Identity</p> <p>Check phone numbers, reduce fraud, increase trust.</p> <p>Free</p>	



 **API Gateway**
IBM • Integration • Web and Mobile

A developer-focused solution for creating, securing, and sharing API proxies and custom APIs backed by IBM Cloud resources.

Lite • Free • IAM-enabled

 **App ID**
IBM • Security and Identity • Web and Mobile

User Authentication and User Profiles for your apps.

Lite • Free • IAM-enabled

 **Bitbar Testing Cloud**
Third party • Web and Mobile

Mobile device cloud with real devices only

Free

 **Email Delivery, powered by Sendgrid**
IBM • Web and Mobile

Integrate and Deliver via SMTP or API in 5 Minutes or Less Our SMTP relay setup and flexible Web and SMTP APIs provide a...

Free

 **esri**
Esri ArcGIS for Developers
Third party • Web and Mobile

Bring the power of location to your apps with ArcGIS.

Free

 **Mobile Foundation**
IBM • Web and Mobile

Build secure, cognitive, engaging and personalized mobile apps faster at scale

Free • IAM-enabled

 **Nexmo**
Third party • Web and Mobile

Build great communication experiences.

Free

 **Phunware Location Based Services**
Third party • Web and Mobile

Phunware Location Based Services

Free

 **Phunware Mobile Marketing Automation**
Third party • Web and Mobile

Phunware Mobile Marketing Automation

Free

 **Push Notifications**
IBM • Web and Mobile

Scalable and reliable Push Notifications service for mobile and web applications

Lite • Free • IAM-enabled

 **SPLICE Pre-CAT Insurance Notifications**
Third party • Integration • Web and Mobile

Pre-CAT Notifications for Insurance Companies

Free

 **Telstra Messaging API**
Third party • Web and Mobile

Send and receive SMS/MMS messages globally.

Free

 **Twilio Programmable SMS**
Third party • Web and Mobile

Not just an API to exchange SMS text messages.

Free

 **Twilio Programmable Video**
Third party • Web and Mobile

Embed WebRTC video calling into web & mobile apps.

Free

 **Twilio Programmable Voice**
Third party • Web and Mobile

Build calling experiences with Twilio's Voice API.

Free

 Accern-API Third party • Web and Application Get the most advanced breaking news technology for your investment strategies. Free	 Alloy Third party • Web and Application API for identity (KYC, AML & fraud) Free	 Bondevalue-API Third party • Web and Application Real time bonds data to manage one's bond investments. Free	 CloudAMQP Third party • Web and Application RabbitMQ as a Service Lite • Free • IAM-enabled	 Consult with IBM Garage IBM • Web and Application Work with IBM Garage on your next project! IAM-enabled	 Difitek Third party • Web and Application API-first platform for fintech applications Free
 Dwolla Third party • Web and Application Dwolla is a powerful payments platform. Free	 ElephantSQL Third party • Web and Application PostgreSQL as a Service Lite • Free • IAM-enabled	 Envestnet Yodlee Third party • Web and Application APIs for Financial Data Aggregation Free	 FundingShield - Wire Account Verification Service (WAVS) Third party • Web and Application Wire fraud prevention and compliance confirmation Free	 HazardHub Property Risk Data API Third party • Web and Application Property Level hazard risk data Free	 Health Score Third party • Web and Application The dacadoo Health Score measures health Free
 Hydrogen Third party • Web and Application Build fintech apps with ease with Hydrogen's APIs. Free	 Information Server IBM • Web and Application IBM® Information Server on Cloud allows you to rapidly expand data integration and governance capabilitie... Lite • Free • IAM-enabled	 Managed Financial Data API IBM • Web and Application Trust our team of in-house experts to manage, cleanse, update, and provide simulation support so you can focus on... Lite • Free • IAM-enabled	 Managed Solutions IBM • Web and Application IBM Services for Managed Applications Free • IAM-enabled • Beta	 Morningstar Third party • Web and Application Managed investments portfolio statistics Free	 ARRIA Natural Language Generation APIs Third party • Web and Application Generate expertly written narratives in seconds Free



Payeezy
Third party • Web and Application

Simple, powerful payments

Free



Plaid
Third party • Web and Application

Innovate in financial services.

Free



Powerlytics
Behavior/Propensity Model API
Third party • Web and Application

Improve customer behavior/propensity models

Free



Powerlytics Consumer Income API
Third party • Web and Application

The income profile of consumers at the ZIP+4 level

Free



Powerlytics Investable Assets & Wealth API
Third party • Web and Application

Investable assets & wealth income at Zip+4 level.

Free



Quovo
Third party • Web and Application

Connecting You to Your Users' Financial Accounts

Free



Rainbow
Third party • Web and Application

Connect people and transform the way they work

Free



RelSci
Third party • Web and Application

Integrate people and relationship intelligence.

Free



Risk Engine
Third party • Web and Application

Calculate health risks with dacadoo Risk Engine

Free



Simulated Instruments
Analytics API

IBM • Web and Application

Leverage sophisticated IBM Algorithmics financial models to price and compute analytics on financial...

Lite • Free • IAM-enabled



SizeUp Small Business
Intelligence

Third party • Web and Application

SizeUp Provides Big Data for Small Businesses

Free



Strands Business Financial Management
Third party • Web and Application

Business Financial Management

Free



Totum Risk
Third party • Web and Application

Risk tolerance tool for financial advisors

Free



TradeIt
Third party • Web and Application

TradeIt enables developers to link to brokers.

Free



uCloud Multitenant Core
Platform for VMware

Third party • Web and Application

Management of public, private and hybrid cloud

Free



Voice Agent with Watson
IBM • Web and Application

Create a cognitive voice agent that uses Watson services to speak directly with customers using natural language over...

Lite • Free • IAM-enabled



WealthEngine API
Third party • Web and Application

Look up anyone's net worth in real-time.

Free



Xignite Market Data APIs
Third party • Web and Application

Real-time and reference market data

Free



Ylabs
Third party • Web and Application

Full banking stack with enhanced KYC and real time risk monitoring.

Free

Web and Application (continued)

Hands-On

“live follow-along session”

The Hamburger Button



A screenshot of the IBM Cloud dashboard. The top navigation bar includes the IBM Cloud logo, a search bar, and links for Resources, Catalog, Docs, Support, and Manage. The main area shows a 'Dashboard' section with a 'Customize' link. Below this is a 'Resource summary' section with a table:

Category	Count
Cloud Foundry Apps	3
Cloud Foundry Services	2
Services	2
Apps	1

On the right side, there is a 'View resources' section with a vertical scroll bar. At the bottom of the dashboard, there is a footer bar with icons for DevOps Tools, Watson Tools, and Watson Studio.

The Hamburger Button



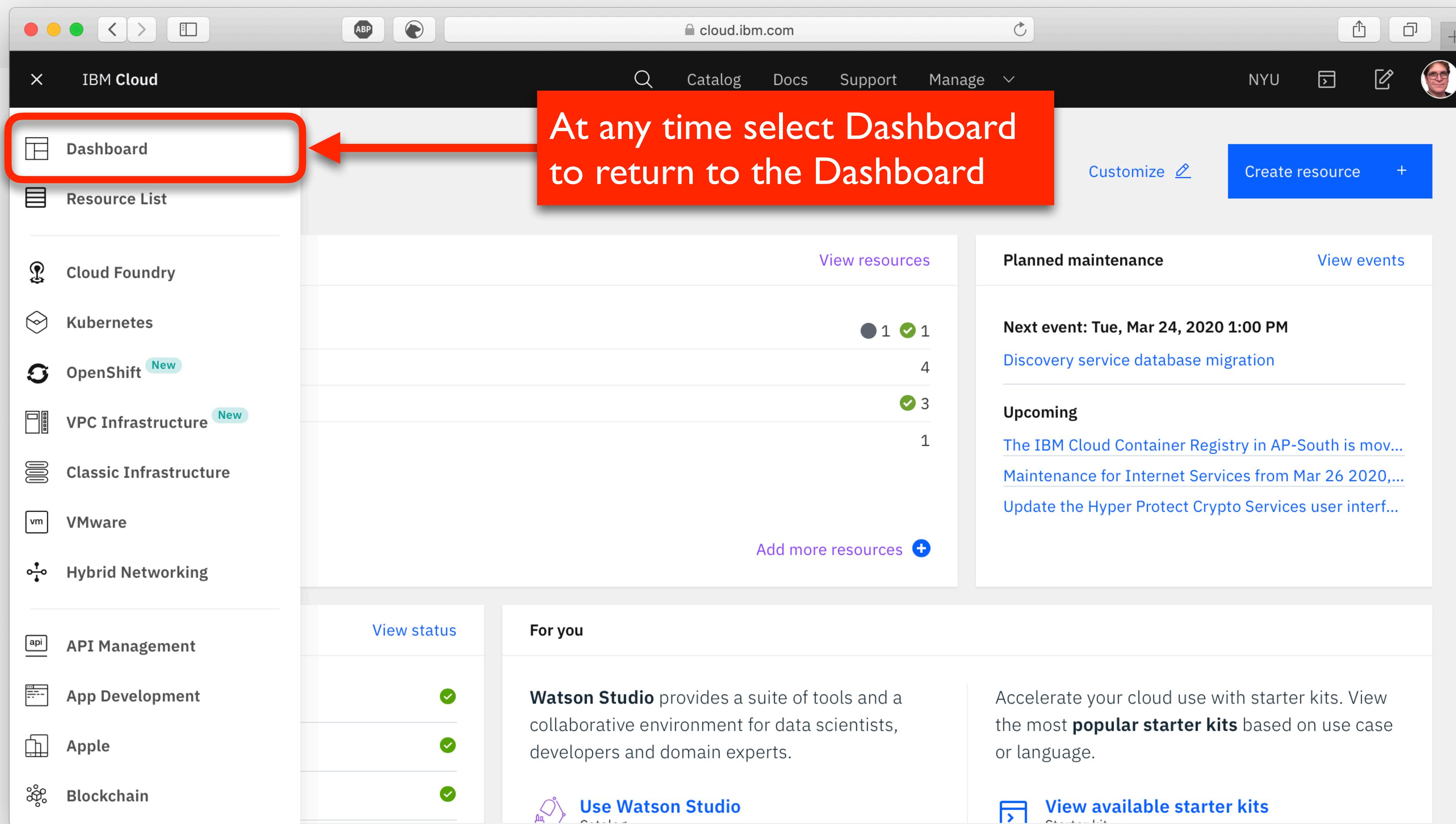
A screenshot of the IBM Cloud dashboard. At the top left, there is a hamburger menu icon (three horizontal lines) enclosed in a red box. A red arrow points from this box to a red callout bubble containing the text "Brings up the Navigation Menu". The dashboard features a dark header bar with the IBM Cloud logo, a search bar, and links for "Dashboard", "Docs", "Support", and "Manage". Below the header is a "Resource summary" section with a "Cloud Foundry Apps" card showing 3 items, a "Cloud Foundry Services" card showing 2 items, a "Services" card showing 2 items, and an "Apps" card showing 1 item. The "Cloud Foundry Apps" card includes a green checkmark icon.

Category	Count
Cloud Foundry Apps	3
Cloud Foundry Services	2
Services	2
Apps	1

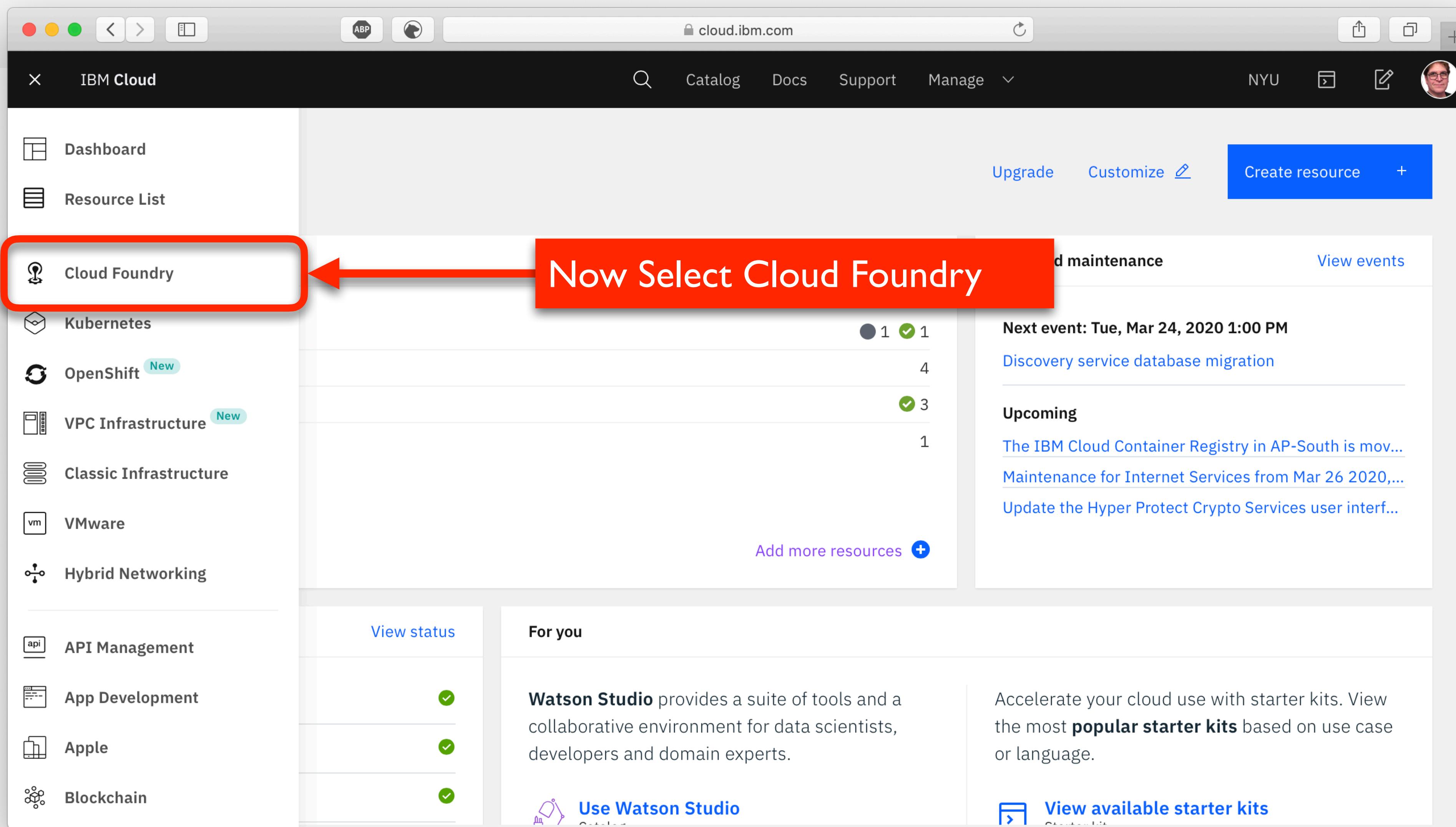
Navigation Menu -> Cloud Foundry

The screenshot shows the IBM Cloud dashboard interface. On the left, a vertical navigation menu is expanded, listing various cloud services. The 'Cloud Foundry' option is highlighted with a blue icon and text. The main dashboard area displays a summary of resources, including a 'View resources' section with counts for '1' (black dot), '1' (green checkmark), '4', '3', and '1'. To the right, there's a 'Planned maintenance' section listing an event for 'Tue, Mar 24, 2020 1:00 PM' related to 'Discovery service database migration'. Below that is an 'Upcoming' section with links to 'The IBM Cloud Container Registry in AP-South is mov...', 'Maintenance for Internet Services from Mar 26 2020,...', and 'Update the Hyper Protect Crypto Services user interf...'. At the bottom, there are sections for 'View status' (with icons for API Management, App Development, Apple, and Blockchain) and 'For you' (highlighting Watson Studio). A prominent blue button at the top right says 'Create resource'.

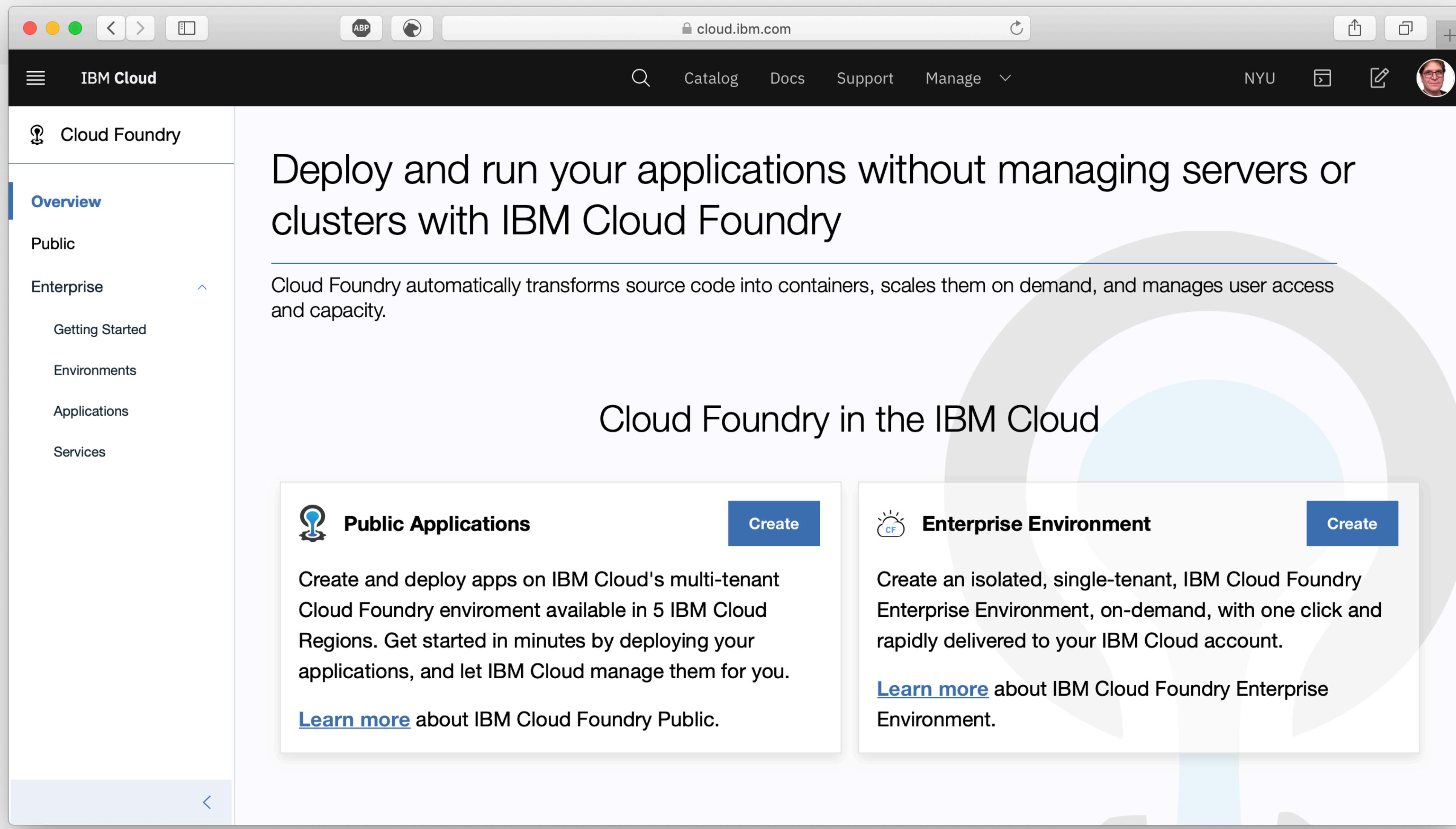
Navigation Menu -> Cloud Foundry



Navigation Menu -> Cloud Foundry



Create a Cloud Foundry App



The screenshot shows the IBM Cloud Foundry Overview page. The left sidebar has a 'Cloud Foundry' icon and a 'Overview' section with links for Public, Enterprise (which is expanded to show Getting Started, Environments, Applications, and Services), and a 'Create' button. The main content area features a large heading 'Deploy and run your applications without managing servers or clusters with IBM Cloud Foundry'. Below it, a sub-section explains that Cloud Foundry automatically transforms source code into containers, scales them on demand, and manages user access and capacity. A large circular graphic overlaps the text. Two callout boxes are present: one for 'Public Applications' and one for 'Enterprise Environment', each with a 'Create' button.

Deploy and run your applications without managing servers or clusters with IBM Cloud Foundry

Cloud Foundry automatically transforms source code into containers, scales them on demand, and manages user access and capacity.

Cloud Foundry in the IBM Cloud

Public Applications

Create and deploy apps on IBM Cloud's multi-tenant Cloud Foundry environment available in 5 IBM Cloud Regions. Get started in minutes by deploying your applications, and let IBM Cloud manage them for you.

[Learn more](#) about IBM Cloud Foundry Public.

Enterprise Environment

Create an isolated, single-tenant, IBM Cloud Foundry Enterprise Environment, on-demand, with one click and rapidly delivered to your IBM Cloud account.

[Learn more](#) about IBM Cloud Foundry Enterprise Environment.

Create a Cloud Foundry App

The screenshot shows the IBM Cloud Foundry Overview page. On the left, a sidebar lists categories: Cloud Foundry (selected), Overview (highlighted in blue), Public, Enterprise (with a dropdown menu for Getting Started, Environments, Applications, and Services). The main content area has a heading "Deploy and run your applications without managing servers or clusters with IBM Cloud Foundry". Below it, a sub-section for "Cloud Foundry automatically transforms source code into containers, scales them on demand, and manages user access and capacity." Two options are presented: "Cloud Foundry in the IBM Cloud" (Public Applications) and "Enterprise Environment". A red box highlights the "Create" button in the Public Applications section, with a red arrow pointing to it from the text "Select Create".

Select Create

Public Applications

Create and deploy apps on IBM Cloud's multi-tenant Cloud Foundry environment available in 5 IBM Cloud Regions. Get started in minutes by deploying your applications, and let IBM Cloud manage them for you.

[Learn more](#) about IBM Cloud Foundry Public.

Enterprise Environment

Create an isolated, single-tenant, IBM Cloud Foundry Environment, on-demand, with one click and rapidly delivered to your IBM Cloud account.

[Learn more](#) about IBM Cloud Foundry Enterprise Environment.

Select Dallas Region

The screenshot shows the IBM Cloud Java Liberty sample app creation interface. The top navigation bar includes links for Catalog, Docs, Support, Manage, and a user profile for NYU. The main content area has tabs for Docs, Create (which is selected), and About. A sub-section titled "Select a region" shows "Dallas" as the chosen option. Another section titled "Select a pricing plan" displays the "Default" plan, which is described as "Build, Deploy and Scale Cloud-Native Applications. Create multiple instances of the application for High Availability." The price is listed as \$0.07 USD/GB-Hour. A note at the bottom of this section states: "This plan is for running Liberty for Java apps on IBM Cloud Foundry Public and is priced based on the amount of Cloud Foundry memory utilized measured on a hourly basis. Cloud Foundry applications have built in support for Auto-Scaling, Logging and Monitoring." To the right, a "Summary" panel lists the app details: Region: Dallas, Plan: Default, Runtime: Liberty for Java™, Domain: us-south.cf.appdomain.cloud, Org: CSCI-GA.2820-001, and Space: dev. Buttons for "Create", "Add to estimate", and "View terms" are also visible.

java liberty Create a Cloud Foundry Sample App

Docs Create About

Select a region

Select a region

Dallas

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: [United States](#)

Plan	Features	Pricing
Default	Build, Deploy and Scale Cloud-Native Applications. Create multiple instances of the application for High Availability.	\$0.07 USD/GB-Hour

This plan is for running Liberty for Java apps on IBM Cloud Foundry Public and is priced based on the amount of Cloud Foundry memory utilized measured on a hourly basis. Cloud Foundry applications have built in support for Auto-Scaling, Logging and Monitoring.

Summary

Cloud Foundry App [Estimate costs](#)

Region: Dallas
Plan: Default
Runtime: Liberty for Java™
Domain: us-south.cf.appdomain.cloud
Org: CSCI-GA.2820-001
Space: dev

Create

Add to estimate

View terms

Select Dallas Region

Select the Dallas Region

Cloud Foundry App Estimate costs

Region: Dallas
Plan: Default
Runtime: Liberty for Java™
Domain: us-south.cf.appdomain.cloud
Org: CSCI-GA.2820-001
Space: dev

Select a region

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: [United States](#)

Plan	Features	Pricing
Default	Build, Deploy and Scale Cloud-Native Applications. Create multiple instances of the application for High Availability.	\$0.07 USD/GB-Hour

This plan is for running Liberty for Java apps on IBM Cloud Foundry Public and is priced based on the amount of Cloud Foundry memory utilized measured on a hourly basis. Cloud Foundry applications have built in support for Auto-Scaling, Logging and Monitoring.

Create

Add to estimate

View terms

Select Dallas Region

The screenshot shows the IBM Cloud interface for creating a Cloud Foundry sample app. The top navigation bar includes links for Catalog, Docs, Support, Manage, and a user profile for NYU. The main content area has a heading 'Create a Cloud Foundry Sample App' with a Java Liberty icon. Below this, there are tabs for 'Docs' (selected), 'Create' (highlighted in blue), and 'About'. A section titled 'Select a region' contains a dropdown menu set to 'Dallas'. Another 'Select a region' section below it also has 'Dallas' selected. A pricing plan table shows a 'Default' plan with the description: 'Build, Deploy and Scale Cloud-Native Applications. Create multiple instances of the application for High Availability.' The price is listed as '\$0.07 USD/GB-Hour'. A note at the bottom states: 'This plan is for running Liberty for Java apps on IBM Cloud Foundry Public and is priced based on the amount of Cloud Foundry memory utilized measured on a hourly basis. Cloud Foundry applications have built in support for Auto-Scaling, Logging and Monitoring.' To the right, a summary panel lists the app details: Region: Dallas, Plan: Default, Runtime: Liberty for Java™, Domain: us-south.cf.appdomain.cloud, Org: CSCI-GA.2820-001, and Space: dev. A large red arrow points downwards from the summary section towards the 'Create' button.

Summary

Cloud Foundry App [Estimate costs](#)

Region: Dallas
Plan: Default
Runtime: Liberty for Java™
Domain: us-south.cf.appdomain.cloud
Org: CSCI-GA.2820-001
Space: dev

Scroll Down

Create

Add to estimate

View terms

Fill out the details and Create App

The screenshot shows the IBM Cloud application creation interface. On the left, a grid of runtime options is displayed:

Runtime	Description
.java Liberty for Java™	
.js SDK for Node.js™	
.net ASP.NET Core	
.go Go Community	
.php PHP Community	
.py Python Community	Selected (indicated by a checked checkbox)
.rb Ruby Community	
.swift Runtime for Swift	
tomcat Tomcat	

Below the runtime selection, the following fields are filled out:

- App name:** lab-bluemix-cf-jr
- Host name:** lab-bluemix-cf-jr
- Domain:** us-south.cf.appdomain.cloud
- Choose an organization:** nyu.edu
- Choose a space:** dev
- Tags**: (empty input field)

On the right side, the **Summary** section displays the configuration details:

Cloud Foundry App	Estimate costs
Region: Dallas	
Plan: Default	
Runtime: Python	
App name: lab-bluemix-cf-jr	
Host name: lab-bluemix-cf-jr	
Domain: us-south.cf.appdomain.cloud	
Org: nyu.edu	
Space: dev	

At the bottom right, there are two buttons: **Create** (blue background) and **Add to estimate**.

Fill out the details and Create App

The screenshot shows the IBM Cloud application creation interface. On the left, there's a grid of runtime options: Java (Liberty for Java™), Node.js (SDK for Node.js™), .NET (ASP.NET Core), Go (Community), PHP (Community), Ruby (Community), Swift (Runtime for Swift), and Python (Community). The Python row is highlighted with a red box and a callout bubble pointing to it with the text "Select Python". The Python runtime is selected, indicated by a checked checkbox icon. To the right of the runtime selection is a "Summary" section displaying various deployment details:

Region:	Dallas
Plan:	Default
Runtime:	Python
App name:	lab-bluemix-cf-jr
Host name:	lab-bluemix-cf-jr
Domain:	us-south.cf.appdomain.cloud
Org:	nyu.edu
Space:	dev

Below the summary, there are three main buttons: "Create" (in a large blue box), "Add to estimate" (in a white box with a blue border), and "View terms" (in a small white box).

Fill out the details and Create App

The screenshot shows the IBM Cloud application creation interface. On the left, a grid of runtime options is displayed:

java liberty	.js	.net
Liberty for Java™	SDK for Node.js™	ASP.NET Core
go	.php	.py Python
Ruby	Runtime for Swift	tomcat

The Python runtime is selected, indicated by a checked checkbox icon. Below the runtime selection, there are several configuration fields:

- App name:** lab-bluemix-cf-jr (highlighted with a red box and a callout "Give it a name")
- Host name:** lab-bluemix-cf-jr
- Domain:** us-south.cf.appdomain.cloud
- Choose an organization:** nyu.edu
- Choose a space:** dev
- Tags** (i)

On the right side of the interface, there is a summary panel and a control panel:

Summary

Cloud Foundry App Estimate costs

Region: Dallas
Plan: Default
Runtime: Python
App name: lab-bluemix-cf-jr
Host name: lab-bluemix-cf-jr
Domain: us-south.cf.appdomain.cloud
Org: nyu.edu
Space: dev

Create

Add to estimate

View terms

Fill out the details and Create App

The screenshot shows the IBM Cloud application creation interface. On the left, a grid of runtime options is displayed:

java liberty	.js	.net
Liberty for Java™	SDK for Node.js™	ASP.NET Core
Go Community	.php Community	.py Python Community
Ruby Community	.swift Runtime for Swift	Tomcat Community

The Python runtime is selected, indicated by a checked checkbox icon.

The main configuration area contains the following fields:

- App name:** lab-bluemix-cf-jr
- Host name:** lab-bluemix-cf-jr (This field is highlighted with a red box and has a red arrow pointing to it from the text "This is the hostname").
- Domain:** us-south.cf.appdomain.cloud
- Choose an organization:** nyu.edu
- Choose a space:** dev
- Tags:** (i) [empty input field]

On the right side, the **Summary** section provides details about the Cloud Foundry App:

- Region: Dallas
- Plan: Default
- Runtime: Python
- App name: lab-bluemix-cf-jr
- Host name: lab-bluemix-cf-jr
- Domain: us-south.cf.appdomain.cloud
- Org: nyu.edu
- Space: dev

Buttons on the right include **Create**, **Add to estimate**, and **View terms**.

This is the hostname

Fill out the details and Create App

The screenshot shows the IBM Cloud interface for creating a new application. On the left, there's a grid of runtime options: Java (Liberty for Java™), Node.js (SDK for Node.js™), .NET (ASP.NET Core), Go (Community), PHP (Community), Python (Community, selected), Ruby (Community), Swift (Runtime for Swift), and Tomcat. Below the grid, fields for 'App name' (lab-bluemix-cf-jr), 'Host name' (lab-bluemix-cf-jr), 'Choose an organization' (nyu.edu), and 'Tags' are visible. To the right, a 'Summary' panel displays app details: Cloud Foundry App, Region: Dallas, Plan: Default, Runtime: Python, App name: lab-bluemix-cf-jr, Host name: lab-bluemix-cf-jr, Domain: us-south.cf.appdomain.cloud, Org: nyu.edu, and Space: dev. A red box highlights the 'Domain:' dropdown set to 'us-south.cf.appdomain.cloud'. A red arrow points from a callout 'Select this domain' to the dropdown. A blue 'Create' button is at the bottom right.

Configure your resource

Select a runtime

java Liberty for Java™	.js SDK for Node.js™	.net ASP.NET Core
go Go Community	.php PHP Community	.py Python Community
.rb Ruby Community	.swift Runtime for Swift	tomcat Tomcat Community

App name:
lab-bluemix-cf-jr

Host name:
lab-bluemix-cf-jr

Choose an organization:
nyu.edu

Tags ⓘ

Domain:
us-south.cf.appdomain.cloud

Choose a space:
dev

Create

Add to estimate

View terms

Cloud Foundry App [Estimate costs](#)

Region: Dallas
Plan: Default
Runtime: Python
App name: lab-bluemix-cf-jr
Host name: lab-bluemix-cf-jr
Domain: us-south.cf.appdomain.cloud
Org: nyu.edu
Space: dev

Summary

Fill out the details and Create App

The screenshot shows the IBM Cloud interface for creating a new application. The left side contains configuration fields, while the right side displays a summary of the selected options.

Summary:

- Cloud Foundry App**
- Region: Dallas
- Plan: Default
- Runtime: Python
- App name: lab-bluemix-cf-jr
- Host name: lab-bluemix-cf-jr
- Domain: us-south.cf.appdomain.cloud
- Org: nyu.edu
- Space: dev

Configure your resource:

Select a runtime:

- .java** Liberty for Java™
- .js** SDK for Node.js™
- .net** ASP.NET Core
- .go** Go Community
- .php** PHP Community
- .py** Python Community
- .rb** Ruby Community
- .swift** Runtime for Swift
- tomcat** Tomcat Community

App name: lab-bluemix-cf-jr

Choose an organization: nyu.edu

Choose a space: dev

Create

Add to estimate

View terms

Select your organization (highlighted with a red box and arrow)

Fill out the details and Create App

The screenshot shows the IBM Cloud interface for creating a new application. On the left, a grid of runtime options is displayed:

- .java** Liberty for Java™
- .js** SDK for Node.js™
- .net** ASP.NET Core

- .go** Go Community
- .php** PHP Community
- .py** Python Community (selected)

- .rb** Ruby Community
- .swift** Runtime for Swift
- tomcat** Tomcat Community

Configure your resource

Select a runtime

Cloud Foundry App [Estimate costs](#)

Region: Dallas
Plan: Default
Runtime: Python
App name: lab-bluemix-cf-jr
Host name: lab-bluemix-cf-jr
Domain: us-south.cf.appdomain.cloud
Org: nyu.edu
Space: dev

Summary

App name: lab-bluemix-cf-jr

Host name: lab-bluemix-cf-jr

Domain: us-south.cf.appdomain.cloud

Choose an organization: nyu.edu

Choose a space: dev

Create [Add to env](#)

Select dev environment

Tags [View terms](#)

Fill out the details and Create App

The screenshot shows the IBM Cloud application creation interface. On the left, a grid of runtime options is displayed:

- .java** Liberty for Java™
- .js** SDK for Node.js™
- .net** ASP.NET Core

- .go** Go Community
- .php** PHP Community
- .py** Python Community (selected)

- .rb** Ruby Community
- .swift** Runtime for Swift
- tomcat** Tomcat Community

Below the runtime selection, the following fields are filled out:

- App name:** lab-bluemix-cf-jr
- Host name:** lab-bluemix-cf-jr
- Domain:** us-south.cf.appdomain.cloud
- Choose an organization:** nyu.edu
- Choose a space:** dev
- Tags**: (empty)

On the right, a summary section displays the selected configuration:

- Cloud Foundry App**
- Region: Dallas
- Plan: Default
- Runtime: Python
- App name: lab-bluemix-cf-jr
- Host name: lab-bluemix-cf-jr
- Domain: us-south.cf.appdomain.cloud
- Org: nyu.edu
- Space: dev

A large red box highlights the **Create** button at the bottom right of the summary section. A red arrow points from the text "Select Create" above the button to the button itself.

Application Creation

The screenshot shows the IBM Cloud application creation interface. On the left, a sidebar titled "Getting started" lists various options: Overview, Runtime, Connections, Logs, API Management, Autoscaling, and Monitoring. The main area displays a resource list with one item: ".py lab-bluemix-cf-jr". A red box highlights the status "Starting" next to the application name. Below the application details, there's a large orange banner with the text "Your App is Starting...". Further down, it says "Last Updated: 2019-11-07" and provides a guide for deploying a Hello World sample application. A tip box is present, stating: "Tip: Throughout these docs, references to the Cloud Foundry CLI are now updated to the IBM Cloud CLI! The IBM Cloud CLI has the same familiar Cloud Foundry commands, but with better integration with IBM Cloud accounts and other services. Learn more about getting started with the IBM Cloud CLI in this tutorial." At the bottom, there's a section titled "Before you begin" with a note about required items: "You'll need the following: • [IBM Cloud account](#)".

Application Creation

The screenshot shows the IBM Cloud application creation interface. On the left, a sidebar titled "Getting started" lists options: Overview, Runtime, Connections, Logs, API Management, Autoscaling, and Monitoring. The main area displays a resource list with one item: ".py lab-bluemix-cf-jr". A red box highlights the status "Running" next to the app name. Below the app details, it shows "Org: nyu.edu", "Location: Dallas", "Space: dev", and a "Add tags" button. A large orange banner at the bottom of the page says "Your App is Running". The page footer includes a "Before you begin" section with a link to "IBM Cloud account".

Resource list /

.py lab-bluemix-cf-jr • Running Visit App URL

Org: nyu.edu Location: Dallas Space: dev Add tags

Your App is Running

Last Updated: 2019-11-07

Congratulations, you deployed a Hello World sample application on IBM Cloud™! To get started, follow this step-by-step guide. Or, [download the sample code](#) and explore on your own.

By following the Python getting started tutorial, you'll set up a development environment, deploy an app locally on IBM Cloud™, and integrate a database service in your app.

Tip: Throughout these docs, references to the Cloud Foundry CLI are now updated to the IBM Cloud CLI!

The IBM Cloud CLI has the same familiar Cloud Foundry commands, but with better integration with IBM Cloud accounts and other services. Learn more about getting started with the IBM Cloud CLI in this tutorial.

Before you begin ↗

You'll need the following:

- [IBM Cloud account](#)

Application Creation

The screenshot shows the IBM Cloud web interface. On the left, a sidebar titled 'Getting started' includes links for Overview, Runtime, Connections, Logs, API Management, Autoscaling, and Monitoring. The main area displays a resource list with one item: 'lab-bluemix-cf-jr' (Running). To the right of the app name are status indicators: Org: nyu.edu, Location: Dallas, Space: dev, and an 'Add tags' button. A red box highlights the 'Visit App URL' button. A large orange callout bubble with the text 'Let's Visit the URL' points to this button. The URL 'cloud.ibm.com' is visible in the browser's address bar.

Resource list /

lab-bluemix-cf-jr • Running

Org: nyu.edu Location: Dallas Space: dev Add tags

Visit App URL

Let's Visit the URL

Getting started with Python

Last Updated: 2019-11-07

Congratulations, you deployed a Hello World sample application on IBM Cloud™! To get started, follow this step-by-step guide. Or, [download the sample code](#) and explore on your own.

By following the Python getting started tutorial, you'll set up a development environment, deploy an app locally on IBM Cloud™, and integrate a database service in your app.

Tip: Throughout these docs, references to the Cloud Foundry CLI are now updated to the IBM Cloud CLI!

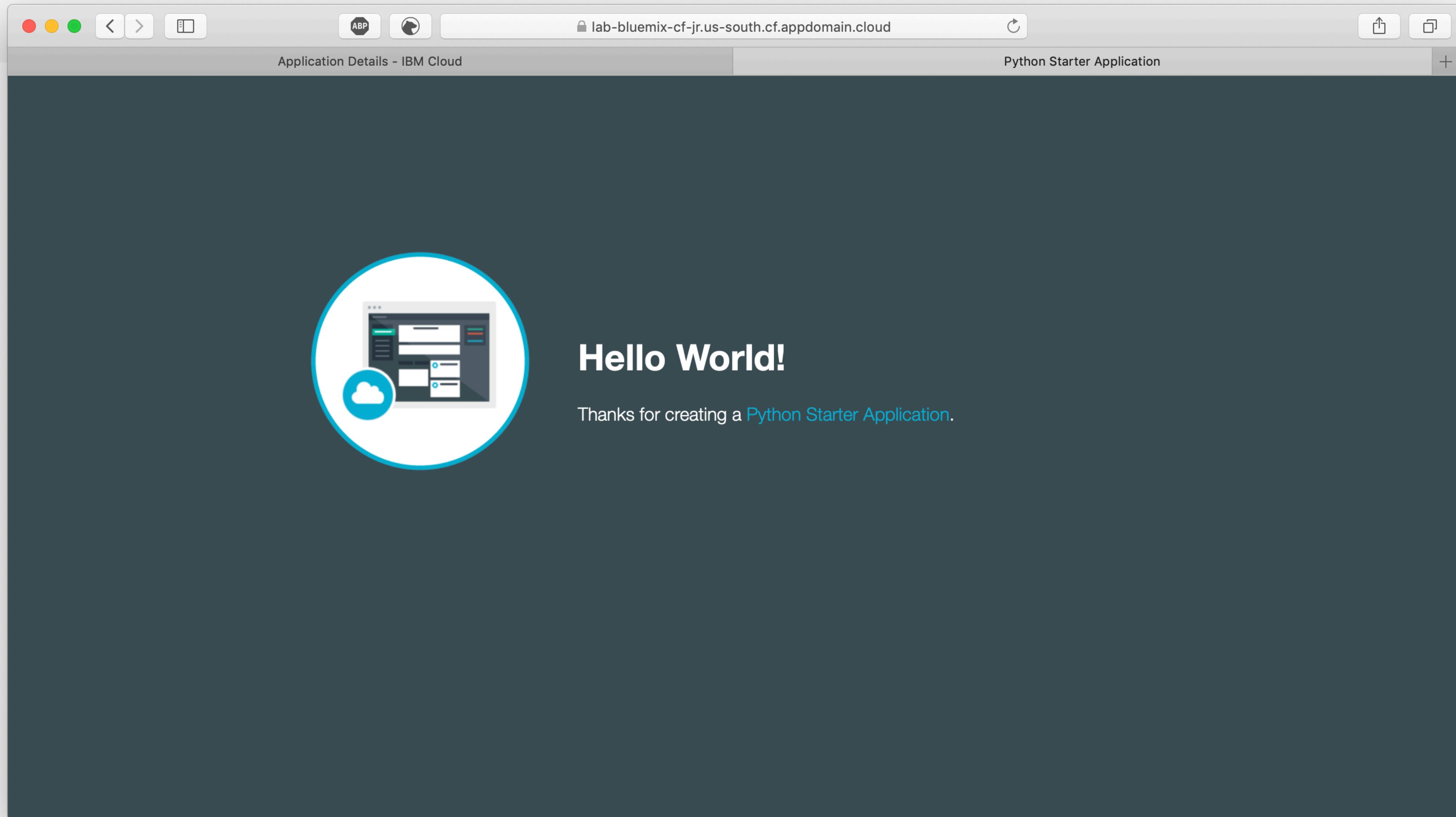
The IBM Cloud CLI has the same familiar Cloud Foundry commands, but with better integration with IBM Cloud accounts and other services. Learn more about getting started with the IBM Cloud CLI in this tutorial.

Before you begin

You'll need the following:

- [IBM Cloud account](#)

Congratulations!!! You just deployed a Cloud App!



Application Overview

Overview will show info about your App

IBM Cloud

Getting started

Overview

.py lab-bluemix-cf-jr • Running Visit App URL

Runtime Org: nyu.edu Location: Dallas Space: dev Add tags ↗

Connections

Logs

API Management

Autoscaling

Monitoring

Resource list /

NYU

Routes :

Getting started with Python

Last Updated: 2019-11-07

Congratulations, you deployed a Hello World sample application on IBM Cloud™! To get started, follow this step-by-step guide. Or, [download the sample code](#) and explore on your own.

By following the Python getting started tutorial, you'll set up a development environment, deploy an app locally on IBM Cloud™, and integrate a database service in your app.

Tip: Throughout these docs, references to the Cloud Foundry CLI are now updated to the IBM Cloud CLI!

The IBM Cloud CLI has the same familiar Cloud Foundry commands, but with better integration with IBM Cloud accounts and other services. Learn more about getting started with the IBM Cloud CLI in this tutorial.

Before you begin ↗

You'll need the following:

Change Memory

You can change the memory used

lab-bluemix-cf-jr • Running Visit App URL

Org: nyu.edu Location: Dallas Space: dev Add tags

Runtime

BUILDPACK: Python

INSTANCES: 1

All instances are running
Health is 100%

MB MEMORY PER INSTANCE: 128

TOTAL MB ALLOCATION: 7.75GB still available

Connections Runtime cost

Change Instances

The screenshot shows the IBM Cloud Application Details interface for a Python Starter Application named 'lab-bluemix-cf-jr'. The application is running and accessible via its URL. The left sidebar lists various management options like Getting started, Overview, Runtime, Connections, Logs, API Management, Autoscaling, and Monitoring. The main content area displays runtime details: Buildpack (.py, Python), 1 instance (highlighted with a red box and arrow), 128 MB memory per instance, and a total allocation of 128 MB. A red callout box with the text 'Or increase the number of instances' points to the 'INSTANCES' section.

Resource list / .py lab-bluemix-cf-jr • Running Visit App URL

Getting started

Overview

Runtime

Connections

Logs

API Management

Autoscaling

Monitoring

IBM Cloud

Catalog Docs Support Manage

NYU

Routes :

Org: ny

Or increase the number of instances

Runtime

.py

BUILDPACK

Python

INSTANCES

All instances are running
Health is 100%

- 1 +

MB MEMORY PER INSTANCE

128

TOTAL MB ALLOCATION

128

7.75GB still available ?

Connections

Runtime cost

Runtime Page

The screenshot shows the IBM Cloud Application Details page for a Python Starter Application named "lab-bluemix-cf-ir". The page is titled "Python Starter Application" and includes a navigation bar with links for Catalog, Docs, Support, Manage, NYU, and a user profile.

The main content area displays the application's runtime information:

- Runtime**: Circled in red with a callout "Runtime information".
- Buildpack**: Python
- Instances**: 1
- MB Memory per Instance**: 128
- Total MB Allocation**: 128

Below the runtime section, there are tabs for Connections and Runtime cost.

Environment Variables

The screenshot shows the IBM Cloud Application Details interface for a Python Starter Application named "lab-bluemix-cf-jr". The application is running in the nyu.edu organization, located in Dallas, Space: dev. The "Runtime" tab is selected in the sidebar. A red box highlights the "Environment variables (12-factor)" section at the top right. A red arrow points to the "Environment variables" tab in the navigation bar below it, which is also highlighted with a red border. The "VCAP_SERVICES" section shows that the value is empty. The "User defined" section shows no items.

Application Details - IBM Cloud

IBM Cloud

Resource list /

.py lab-bluemix-cf-jr • Running

Org: nyu.edu Location: Dallas Space: dev Add tags

Memory and instance Environment variables SSH

VCAP_SERVICES

The value for VCAP_SERVICES is empty. Either there are no services associated with this app or you are not authorized to view them.

User defined

Name	Value	Action
No items to display.		

Export

Connections

The screenshot shows the IBM Cloud Application Details interface for a Python Starter Application named "lab-bluemix-cf-jr". The application is running in the nyu.edu organization, located in Dallas, Space: dev. A red box highlights the "Connections" tab in the left sidebar, which is currently selected. The main content area displays a table with one item, showing the connection name and type. A search bar and a "Create connection" button are also visible.

Application Details - IBM Cloud

IBM Cloud

Getting started

Overview

Runtime

Connections

Logs

API Management

Autoscaling

Monitoring

Resource list /

.py lab-bluemix-cf-jr • Running Visit App URL

Org: nyu.edu Location: Dallas Space: dev Add tags ↗

Filter items

Create connection +

Connection name	Type
1	No items to display

Logs

The screenshot shows the IBM Cloud Application Details interface for a Python Starter Application named "lab-bluemix-cf-jr". The application is running in the "nyu.edu" organization, located in Dallas, Space: dev. A red box highlights the "Logs" tab in the left sidebar. A blue banner at the top right informs users about LogDNA support for Cloud Foundry apps.

Logs

IBM Log Analysis with LogDNA now supports logging for Cloud Foundry apps. Monitor logs from Cloud Foundry apps through the Log Analysis with LogDNA instance that is configured to receive platform services logs in the location where the app is running.

Type	Instance	Logs	Time
API	11	Created app with guid 870a22c7-543c-419f-bdfc-a74bbb3fb037	Mar 12:30
API	21	Updated app with guid 870a22c7-543c-419f-bdfc-a74bbb3fb037 {"route":>"f6f8eefc-d68f-4944-83bd-916ea88852de", :verb=>"add", :relation=>"routes", :related_guid=>"f6f8eefc-d68f-4944-83bd-916ea88852de"})	Mar 12:30
API	14	Uploading bits for app with guid 870a22c7-543c-419f-bdfc-a74bbb3fb037	Mar 12:30
API	5	Creating build for app with guid 870a22c7-543c-419f-bdfc-a74bbb3fb037	Mar 12:30

API Management Services

The screenshot shows the IBM Cloud Application Details interface for a Python Starter Application named "lab-bluemix-cf-jr". The application is running in the nyu.edu organization, located in Dallas, Space: dev. A red box highlights the "API Management" link in the left sidebar.

Left Sidebar:

- Getting started
- Overview
- Runtime
- Connections
- Logs
- API Management** (highlighted with a red box)
- Autoscaling
- Monitoring

Application Overview:

- .py lab-bluemix-cf-jr** • Running [Visit App URL](#)
- Org: nyu.edu Location: Dallas Space: dev Add tags [🔗](#)
-
- [Get started](#)

API Management Options:

- Secure**: Apply security and rate limiting policies to your API. [Learn more](#)
- Manage**: View API usage statistics and response logs. [Learn more](#)
- Share**: Share your API with other developers within and outside of IBM Cloud. [Learn more](#)

Autoscaling Policies

The screenshot shows the IBM Cloud Application Details interface for a Python Starter Application named "lab-bluemix-cf-jr". The application is running in the nyu.edu organization, located in Dallas, Space: dev. A warning message indicates "No policy is defined for this application." The "Autoscaling" tab is highlighted with a red box.

Getting started

Overview

Runtime

Connections

Logs

API Management

Autoscaling

History

Credential

Getting started

No policy is defined for this application.

Create Auto-Scaling Policy

Import From JSON

Monitoring

Application Details - IBM Cloud

Python Starter Application

IBM Cloud

Getting started

Overview

Runtime

Connections

Logs

API Management

Autoscaling

Monitoring

.py lab-bluemix-cf-jr • Running Visit App URL

Org: nyu.edu Location: Dallas Space: dev Add tags ↗

Routes :

Availability Monitoring

Detect, isolate, and diagnose application issues quickly with monitoring that fits into your team's DevOps process.

100% Availability

AVERAGE TEST AVAILABILITY In the last 24 hrs

LATEST TEST STATUS Normal (1)

0% Used

1 Tests

Service Usage ⓘ Currently on [Free Plan](#)

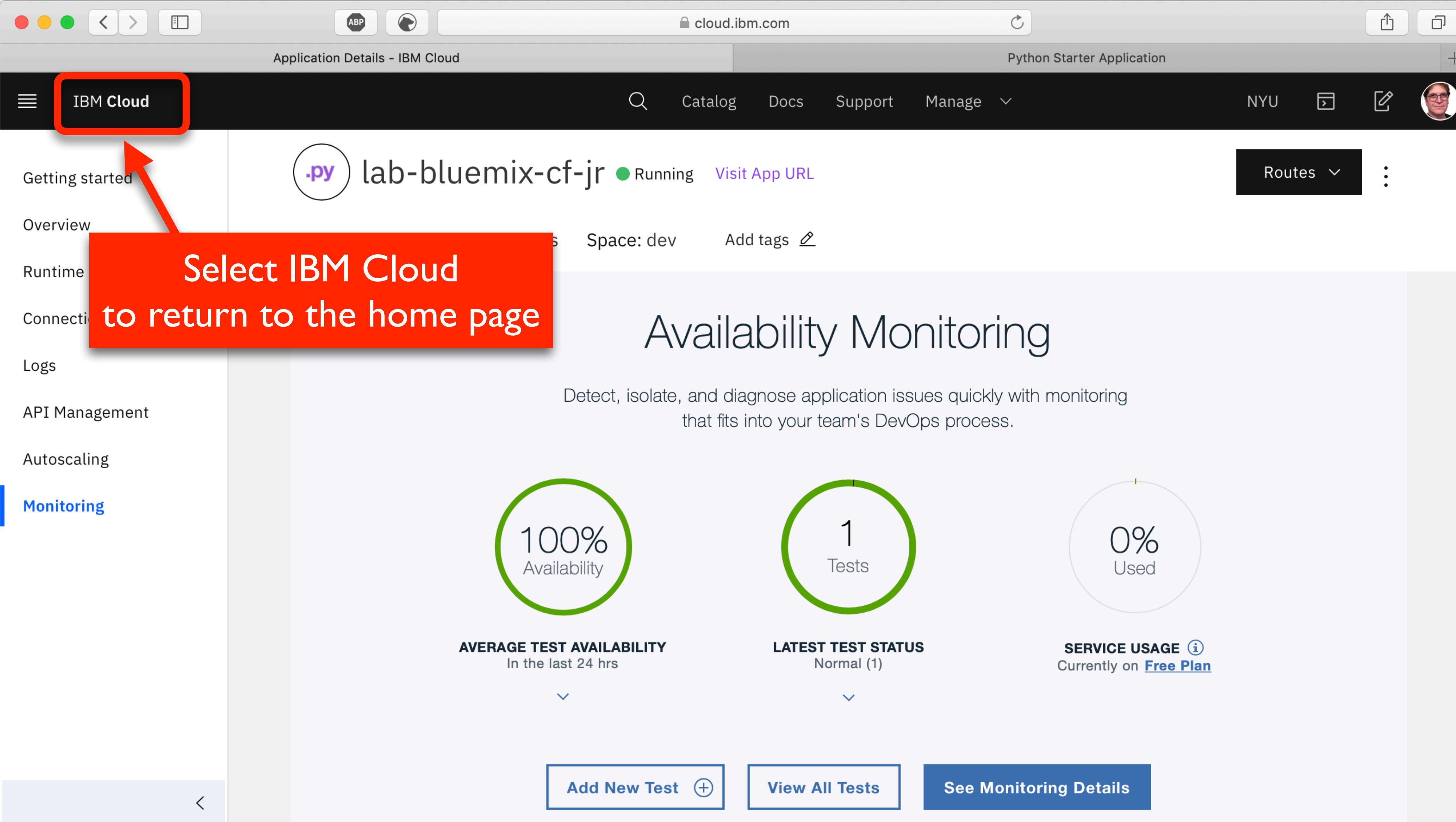
Add New Test +

View All Tests

See Monitoring Details

Let's Create a Database Service

Back to the Dashboard



Application Details - IBM Cloud

Python Starter Application

IBM Cloud

Getting started

.py lab-bluemix-cf-jr • Running Visit App URL

Overview

Runtime

Connections

Logs

API Management

Autoscaling

Monitoring

Select IBM Cloud to return to the home page

Availability Monitoring

Space: dev Add tags ↗

Routes :

Availability Monitoring

Detect, isolate, and diagnose application issues quickly with monitoring that fits into your team's DevOps process.

100% Availability

AVERAGE TEST AVAILABILITY In the last 24 hrs

1 Tests

LATEST TEST STATUS Normal (1)

0% Used

SERVICE USAGE ⓘ Currently on Free Plan

Add New Test +

View All Tests

See Monitoring Details

From the Dashboard, Create a Resource

The screenshot shows the IBM Cloud dashboard interface. At the top, there's a navigation bar with links for Catalog, Docs, Support, Manage, NYU, and a user profile. Below the navigation bar, the word "Dashboard" is displayed. In the center, there's a prominent orange button with the text "Select Create resource" and a blue button next to it labeled "Create resource +". A red arrow points from the text "Select Create resource" to the blue "Create resource +" button. The dashboard also features sections for "Resource summary", "Planned maintenance", "Location status", and "For you".

Select Create resource → **Create resource +**

Resource summary

- Cloud Foundry apps
- Cloud Foundry services
- Services
- Developer tools

View resources

● 1 ✓ 2
4
✓ 3
1

Add more resources +

Planned maintenance

Next event: Tue, Mar 24, 2020 1:00 PM
Discovery service database migration

Upcoming

The IBM Cloud Container Registry in AP-South is mov...
Maintenance for Internet Services from Mar 26 2020,...
Update the Hyper Protect Crypto Services user interf...

Location status

View status

- Asia Pacific
- Europe
- North America

✓ ✓ ✓

For you

Watson Studio provides a suite of tools and a collaborative environment for data scientists, developers and domain experts.

Accelerate your cloud use with starter kits. View the most **popular starter kits** based on use case or language.

Use Watson Studio

View available starter kits

Databases

The screenshot shows the IBM Cloud Catalog interface. A red box highlights the 'Databases' category in the sidebar, and a red arrow points from the text 'Select Databases' to this highlighted area. The 'Services' tab is selected in the top navigation bar.

Select Databases

Featured

- Kubernetes Service**
IBM • Compute • Containers
Deploy secure, highly available apps in a native Kubernetes experience.
Free • IAM-enabled • Service Endpoint Supported
- Red Hat OpenShift on IBM Cloud**
IBM • Compute • Containers
Deploy and secure enterprise workloads on native OpenShift with developer focused tools to run highly available apps.
IAM-enabled • Service Endpoint Supported

All Categories

Select Cloudant

The screenshot shows the IBM Cloud Catalog interface. A red callout box labeled "Select Cloudant" points to the Cloudant service card. The Cloudant card is highlighted with a red border. The service card includes the Cloudant logo, the name "Cloudant", the text "IBM • Databases", and the description "A scalable JSON document database for web, mobile, IoT, and serverless applications.".

Catalog

Services Software

All Categories

- VPC Infrastructure
- Compute
- Containers
- Networking
- Storage
- AI
- Analytics
- Databases** >
- Developer Tools
- Integration
- Internet of Things
- Security and Identity
- Web and Mobile
- Web and Application

Services

Explore our broad portfolio of managed services for infrastructure, developer tools, and more to build your apps on the public cloud.

Select Cloudant

Cloudant
IBM • Databases

A scalable JSON document database for web, mobile, IoT, and serverless applications.

Lite • Free • IAM-enabled

Databases for PostgreSQL
IBM • Databases

Databases for Redis
IBM • Databases

Deploy in Dallas

The screenshot shows the IBM Cloud service catalog interface. The URL in the address bar is `cloud.ibm.com`. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile icon.

The main content area displays the **Cloudant** service details. The service is created by IBM and last updated on 02/14/2020. The **Create** button is highlighted in blue, while the **About** button is greyed out.

Summary section:

- Cloudant** (Region: Dallas, Plan: Lite, Service name: Cloudant-ud, Resource group: default)
- Free**

Select a region dropdown menu shows **Dallas** selected.

Select a pricing plan section indicates no tax is included, and monthly prices are shown for the United States.

Pricing table:

Plan	Features	Pricing
Lite	Limited throughput & storage Capped at 1GB of data storage Provisioned throughput capacity fixed at 20 reads/sec, 10 writes/sec, 5 global queries/sec Max JSON document size of 1MB	Free

A note below the table states: "The Lite plan provides access to the full functionality of Cloudant for development and evaluation. The plan has a set amount of provisioned throughput capacity as shown and includes a max of 1GB of encrypted data storage. Users"

Buttons on the right side include **Create**, **Add to estimate** (which is highlighted with a blue border), and **View terms**.

Deploy in Dallas

The screenshot shows the IBM Cloud service catalog interface. On the left, the 'Cloudant' service page is displayed. A red box highlights the 'Dallas' option in the 'Select a region' dropdown. A red arrow points from a red button labeled 'Deploy it in Dallas' to the 'Dallas' entry in the dropdown. The 'Summary' panel on the right provides deployment details: Region: Dallas, Plan: Lite, Service name: Cloudant-ud, and Resource group: default. The service is listed as 'Free'. At the bottom, there are 'Create' and 'Add to estimate' buttons.

Cloudant

Author: IBM • Date of last update: 02/14/2020 • [Docs](#)

[Create](#) [About](#)

Select a region

Select a region

Dallas

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: [United States](#)

Plan	Features	Pricing
Lite	Limited throughput & storage Capped at 1GB of data storage Provisioned throughput capacity fixed at 20 reads/sec, 10 writes/sec, 5 global queries/sec Max JSON document size of 1MB	Free

The Lite plan provides access to the full functionality of Cloudant for development and evaluation. The plan has a set amount of provisioned throughput capacity as shown and includes a max of 1GB of encrypted data storage. Users

Summary

Cloudant **Free**

Region: Dallas

Plan: Lite

Service name: Cloudant-ud

Resource group: default

[Create](#)

[Add to estimate](#)

[View terms](#)

Deploy in Dallas

The screenshot shows the IBM Cloud service catalog interface. On the left, the Cloudant service card is displayed. A red box highlights the 'Dallas' region under 'Select a region'. A large red arrow points from this box to a red button labeled 'Deploy it in Dallas'. Another red box highlights the 'Lite' plan under 'Select a pricing plan'. A second large red arrow points down to a red button labeled 'Add to estimate'.

Cloudant

Author: IBM • Date of last update: 02/14/2020 • Docs

Create About

Select a region

Select a region

Dallas

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: [United States](#)

Plan	Features	Pricing
Lite	Limited throughput & storage Capped at 1GB of data storage Provisioned throughput capacity fixed at 20 reads/sec, 10 writes/sec, 5 global queries/sec Max JSON document size of 1MB	Free

The Lite plan provides access to the full functionality of Cloudant for development and evaluation. The plan has a set amount of provisioned throughput capacity as shown and includes a max of 1GB of encrypted data storage. Users

Deploy it in Dallas

Cloudant **Free**

Region: Dallas
Plan: Lite
Service name: Cloudant-ud
Resource group: default

Scroll Down

Create

Add to estimate

View terms

Create Cloudant Database Service

The screenshot shows the IBM Cloud Catalog interface for creating a Cloudant service. The top navigation bar includes links for Catalog, Docs, Support, Manage, and a user profile for NYU.

Summary

Cloudant **Free**

Region: Dallas
Plan: Lite
Service name: Cloudant
Resource group: default

Configure your resource

Service name: Cloudant

Select a resource group: default

Tags Examples: env:dev, version-1

Available authentication methods:

Legacy credentials enable login to Cloudant using HTTP Basic authentication

Use both legacy credentials and IAM

Create

Add to estimate

View terms

Create Cloudant Database Service

The screenshot shows the IBM Cloud service catalog interface. On the left, there's a sidebar with service categories like Dedicated, Hardware, and Software. The main area displays a service card for Cloudant.

Service Card Details:

- Hardware:** Available in any IBM Cloud location, HIPAA readiness option for US locations, IP whitelisting, Customer-managed encryption keys with Key Protect, Internal endpoints (Provisioned in 2019 or later).
- Cloudant:** Region: Dallas, Plan: Lite, Service name: Cloudant, Resource group: default.

Configuration Steps:

- Name it Cloudant:** A red callout box highlights the "Service name:" field, which contains "Cloudant".
- Select a resource group:** An arrow points from this text to the "Select a resource group:" dropdown, which shows "default".

Available authentication methods: Legacy credentials enable login to Cloudant using HTTP Basic authentication. A dropdown menu is open, showing "Use both legacy credentials and IAM".

Action Buttons:

- Create:** A large blue button.
- Add to estimate:** A smaller button below the Create button.
- View terms:** A link at the bottom right.

Create Cloudant Database Service

The screenshot shows the IBM Cloud service catalog interface. A red box highlights the 'Service name:' field, which contains 'Cloudant'. A red arrow points from this field to a callout box labeled 'Name it Cloudant'. Another red box highlights the 'Select a resource group:' dropdown, which is set to 'default'. A red arrow points from this dropdown to a callout box labeled 'Use both Legacy Credentials and IAM'. The right side of the screen displays a 'Summary' section for the selected service, showing details like Region: Dallas, Plan: Lite, Service name: Cloudant, and Resource group: default. A large blue 'Create' button is visible at the bottom right.

Configure your resource

Name it Cloudant

Service name:

Cloudant

Select a resource group: ⓘ

default

Tags ⓘ

Examples: env:dev, version-1

Use both Legacy Credentials and IAM

Available authentication methods:

Legacy credentials enable login to Cloudant using

HTTP Basic authentication

Use both legacy credentials and IAM

Cloudant

Region: Dallas

Plan: Lite

Service name: Cloudant

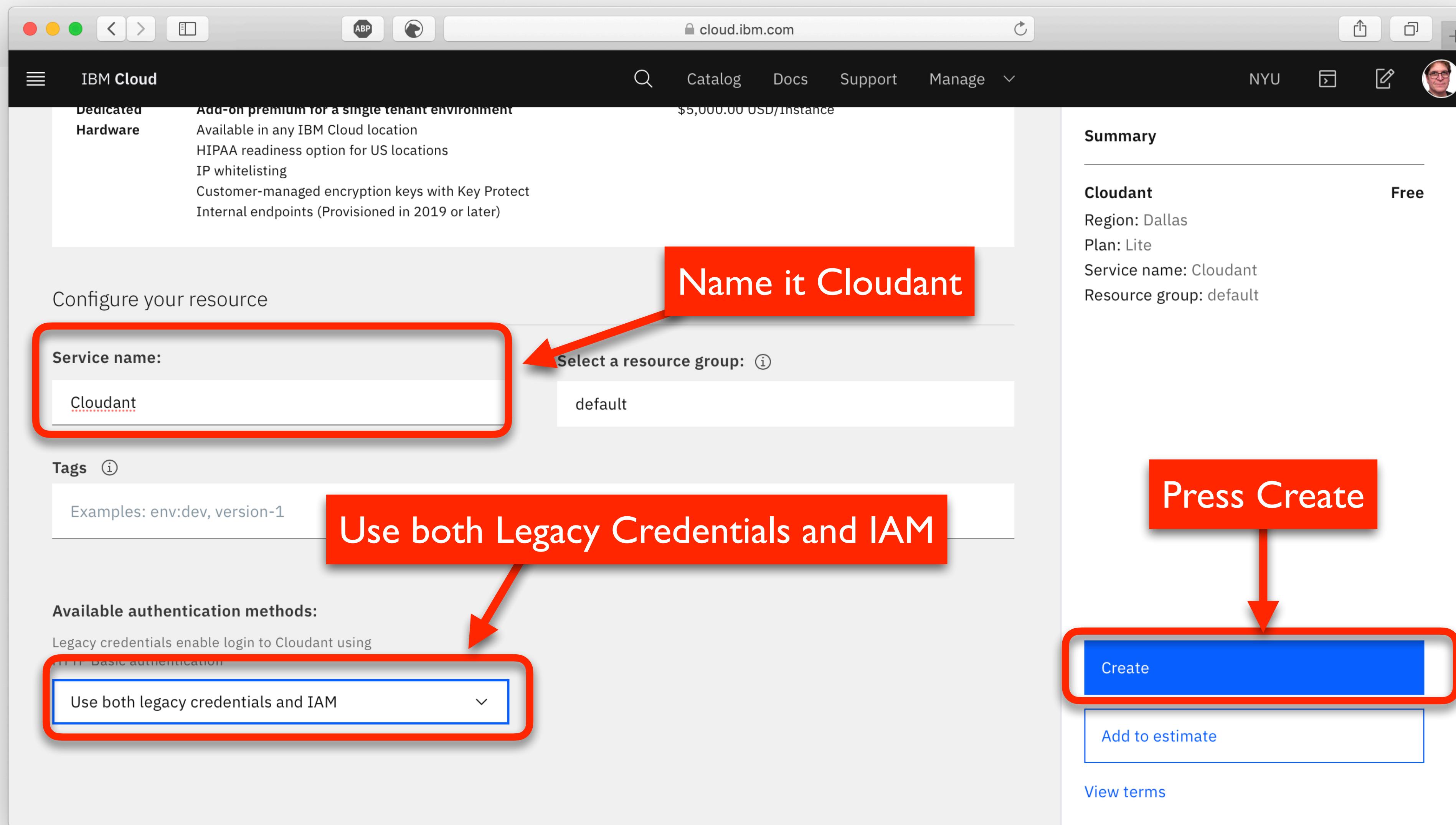
Resource group: default

Create

Add to estimate

View terms

Create Cloudant Database Service



Cloudant Creation Complete

The screenshot shows the IBM Cloud Resource list interface. On the left, a sidebar menu under the 'Manage' section includes 'Service credentials', 'Plan', and 'Connections'. The main content area displays a 'Resource list / Cloudant' page for a service named 'Cloudant'. The service is associated with a 'Resource group: default' and located in 'Dallas'. A 'Launch Cloudant Dashboard' button is highlighted with a blue border. The 'Overview' tab is selected, showing deployment details such as CRN, location, external endpoints, authentication methods, and activity tracker event types. The CRN listed is `crn:v1:bluemix:public:cloudantnosqldb:us-south:a/21caa03e2981e94f56ea98f347b995a5:366ed0ff-bb95-409f-b194-dcf19c4580b6::`. The location is Dallas. The external endpoint is <https://bcd5bf9b-2fcfa-4cbf-ad9d-06d887d60bf0-bluemix.cloudant.com>. The preferred external endpoint is <https://bcd5bf9b-2fcfa-4cbf-ad9d-06d887d60bf0-bluemix.cloudantnosqldb.appdomain.cloud>. Authentication methods include IBM Cloud IAM and Cloudant credentials.

Resource list /

Cloudant

Resource group: default Location: Dallas Add tags ↗

Manage Catalog Docs Support Manage

NYU

Service credentials Plan Connections

Overview Dashboard Capacity Docs Launch Cloudant Dashboard

Deployment details

CRN: `crn:v1:bluemix:public:cloudantnosqldb:us-south:a/21caa03e2981e94f56ea98f347b995a5:366ed0ff-bb95-409f-b194-dcf19c4580b6::`

Location: Dallas

External Endpoint: <https://bcd5bf9b-2fcfa-4cbf-ad9d-06d887d60bf0-bluemix.cloudant.com>

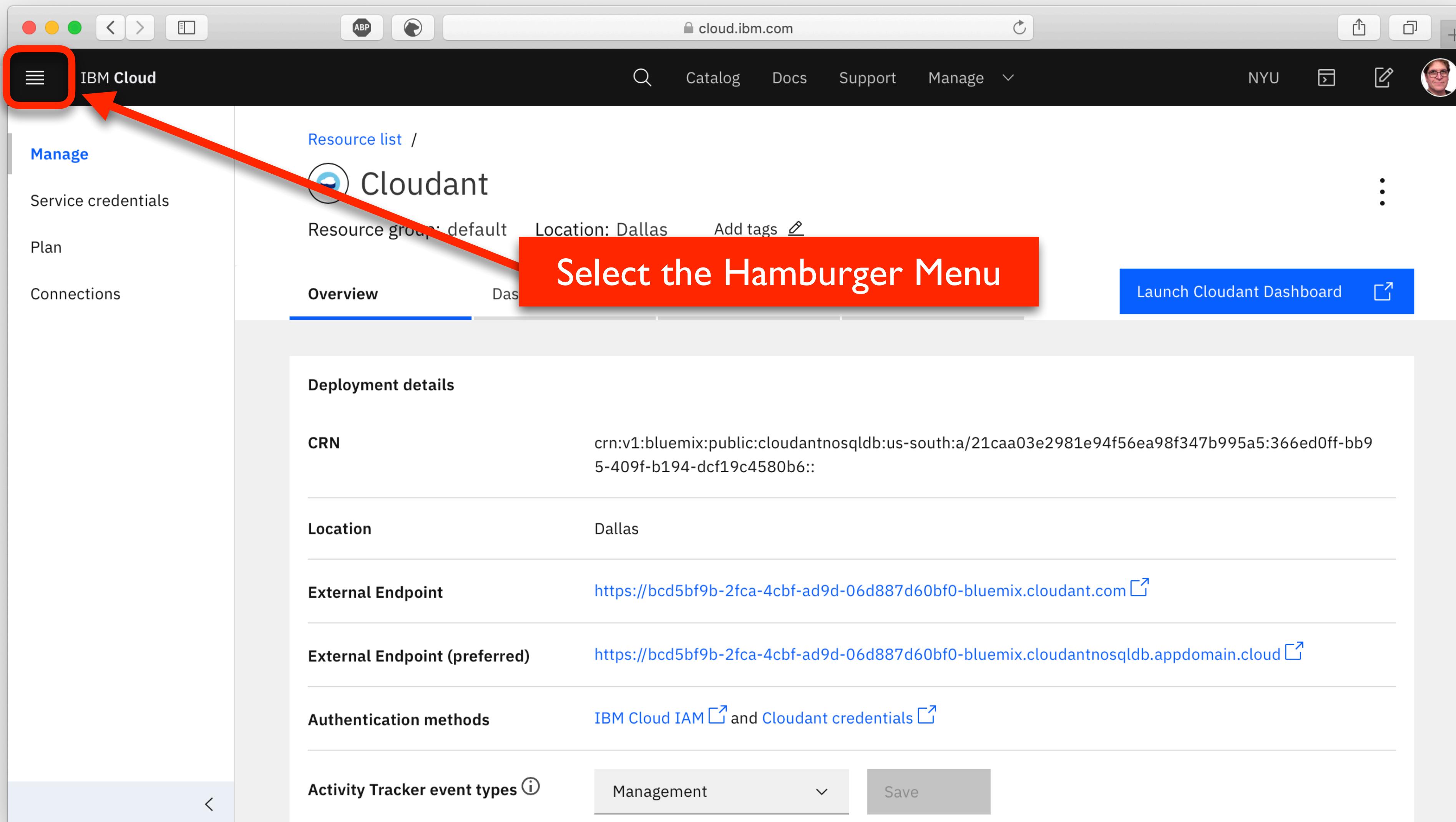
External Endpoint (preferred): <https://bcd5bf9b-2fcfa-4cbf-ad9d-06d887d60bf0-bluemix.cloudantnosqldb.appdomain.cloud>

Authentication methods: IBM Cloud IAM and Cloudant credentials

Activity Tracker event types: Management Save

Let's Connect the Database to our App

Hamburger Menu



Hamburger Menu

The screenshot shows the IBM Cloud web interface with the Hamburger Menu open on the left. The 'Resource List' item is highlighted with a red box and a red arrow points to it from a large orange callout box labeled 'Select Resource List'. The main content area displays deployment details for a Cloudant resource, including CRN, Location, External Endpoint, Authentication methods, and Activity Tracker event types.

Select Resource List

Deployment details
CRN crn:v1:bluemix:public:cloudantnosqldb:us-south:a/21caa03e2981e94f56ea98f347b995a5:366ed0ff-bb95-409f-b194-dcf19c4580b6::
Location Dallas
External Endpoint https://bcd5bf9b-2fcfa-4cbf-ad9d-06d887d60bf0-bluemix.cloudant.com
External Endpoint (preferred) https://bcd5bf9b-2fcfa-4cbf-ad9d-06d887d60bf0-bluemix.cloudantnosqldb.appdomain.cloud
Authentication methods IBM Cloud IAM and Cloudant credentials
Activity Tracker event types ?

Open Cloud Foundry Apps

The screenshot shows the IBM Cloud Resource list interface. At the top, there's a navigation bar with links for Catalog, Docs, Support, Manage, NYU, and a user profile. Below the navigation bar is a search bar and a blue 'Create resource' button. The main area is titled 'Resource list' and contains a table with columns: Name, Group, Location, Status, and Tags. There are also filter bars for each column. A large orange callout box with the text 'Open Cloud Foundry Apps' is positioned over the 'Cloud Foundry apps' section in the table. A red arrow points from the bottom left towards this callout box. The 'Cloud Foundry apps' row is highlighted with a red border.

Name	Group	Location	Status	Tags
Filter by name or IP address...	Filter by group or org...	Filter...	Filter...	Filter...
Devices (0)				
VPC infrastructure (0)				
Clusters (0)				
Cloud Foundry apps (3)				
Cloud Foundry services (4)				
Services (3)				
Storage (0)				
Network (0)				
Cloud Foundry enterprise environments (0)				
Functions namespaces (0)				
Apps (0)				
Developer tools (1)				

Open Cloud Foundry Apps

The screenshot shows the IBM Cloud Resource list interface. On the left, there's a sidebar with categories like Devices, VPC infrastructure, Clusters, and Cloud Foundry apps. The Cloud Foundry apps category is expanded, showing three entries: lab-bluemix-cf-jr, lab-flask-bdd, and lab-flask-bdd-dev. A red box highlights the first entry, lab-bluemix-cf-jr. A red arrow points from a callout bubble containing the text "Select the app you just created" to this highlighted row. The main table has columns for Name, Group, Location, Status, and Tags. The Status column includes icons for Start..., Stop..., and more options.

Name	Group	Location	Status	Tags
.py lab-bluemix-cf-jr	nyu.edu / dev	Dallas	Start...	-
.py lab-flask-bdd	nyu.edu / prod	Dallas	Stop...	-
.py lab-flask-bdd-dev	nyu.edu / dev	Dallas	Start...	-

Resource list

Create resource

Collapse all | Expand all

Name ▲

Group

Location

Status

Tags

Filter by name or IP address...

Filter by group or org...

Filter...

Filter...

Filter...

Filter...

Devices (0)

VPC infrastructure (0)

Clusters (0)

Cloud Foundry apps (3)

lab-bluemix-cf-jr

nyu.edu / dev

Dallas

Start...

...

lab-flask-bdd

nyu.edu / prod

Dallas

Stop...

...

lab-flask-bdd-dev

nyu.edu / dev

Dallas

Start...

...

Cloud Foundry services (4)

Services (3)

Storage (0)

Network (0)

Cloud Foundry enterprise environments (0)

Select the app you just created

Select Connections Menu

The screenshot shows the IBM Cloud interface for an application named "lab-bluemix-cf-jr". The application is listed as ".py" type, running, located in Dallas, Space: dev, Org: nyu.edu. The sidebar on the left has several options: Getting started, Overview (which is selected and highlighted with a blue bar), Runtime, Connections (highlighted with a red box and a red arrow pointing to the "Select Connections" callout), Logs, API Management, Autoscaling, and Monitoring.

Runtime

BUILDPACK	INSTANCES	MB MEMORY PER INSTANCE	TOTAL MB ALLOCATION
Python	1	128	7.75GB still available

Connections (1)

Runtime cost

Create Connection

The screenshot shows the IBM Cloud web interface. On the left, a sidebar menu includes 'Getting started', 'Overview', 'Runtime', 'Connections' (which is selected and highlighted in blue), 'Logs', 'API Management', 'Autoscaling', and 'Monitoring'. The main content area displays a resource named 'lab-bluemix-cf-jr' (Running) with a '.py' icon. It shows details like Org: nyu.edu, Location: Dallas, Space: dev, and an 'Add tags' button. A large orange callout box with the text 'Select Create Connection' points to a blue button labeled 'Create connection' with a plus sign. The table below lists one connection entry: 'availability-monitoring-auto' (Type: Availability Monitoring). The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile.

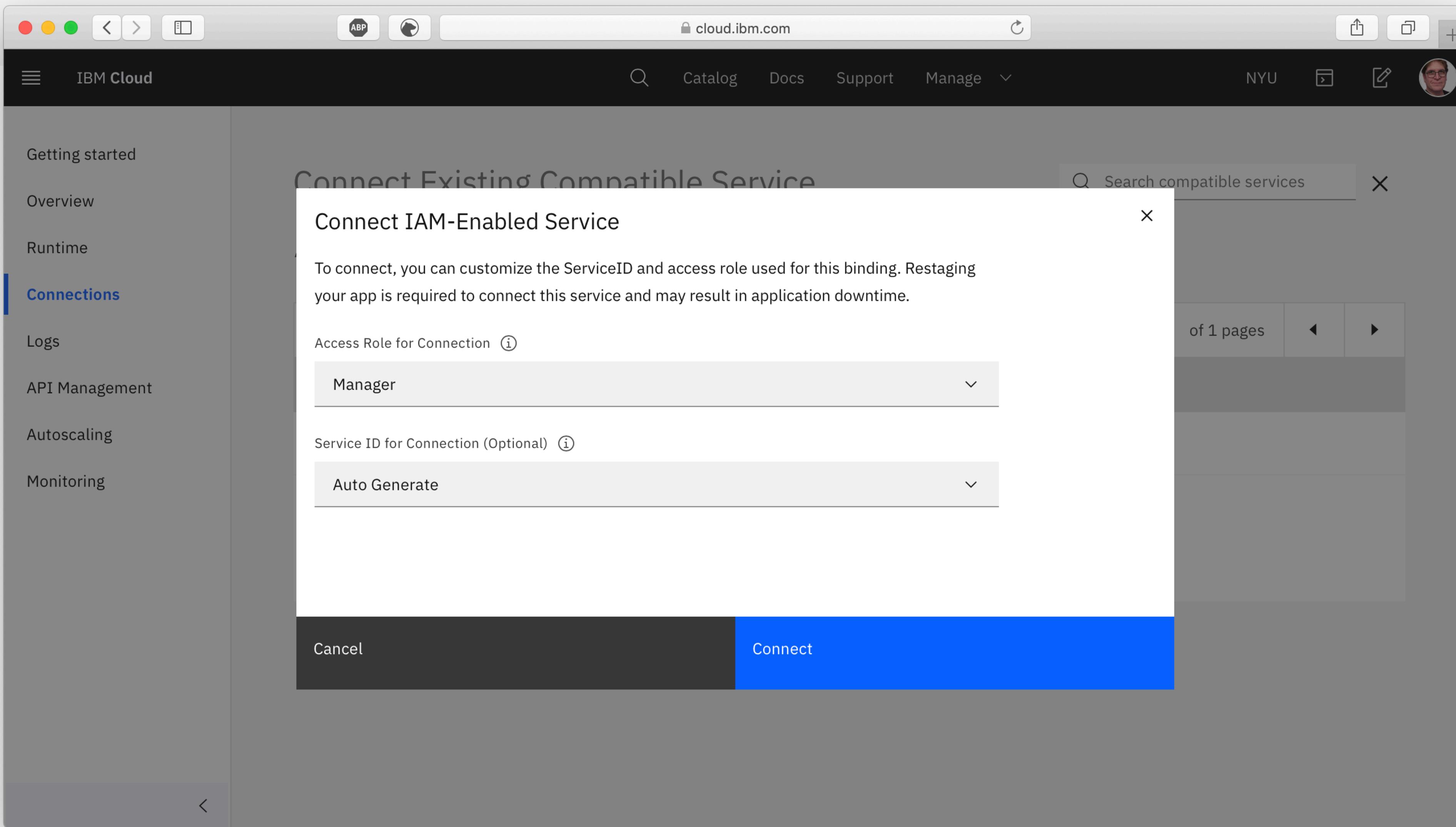
Connection name	Type
availability-monitoring-auto	Availability Monitoring

Create a Connection to Cloudant

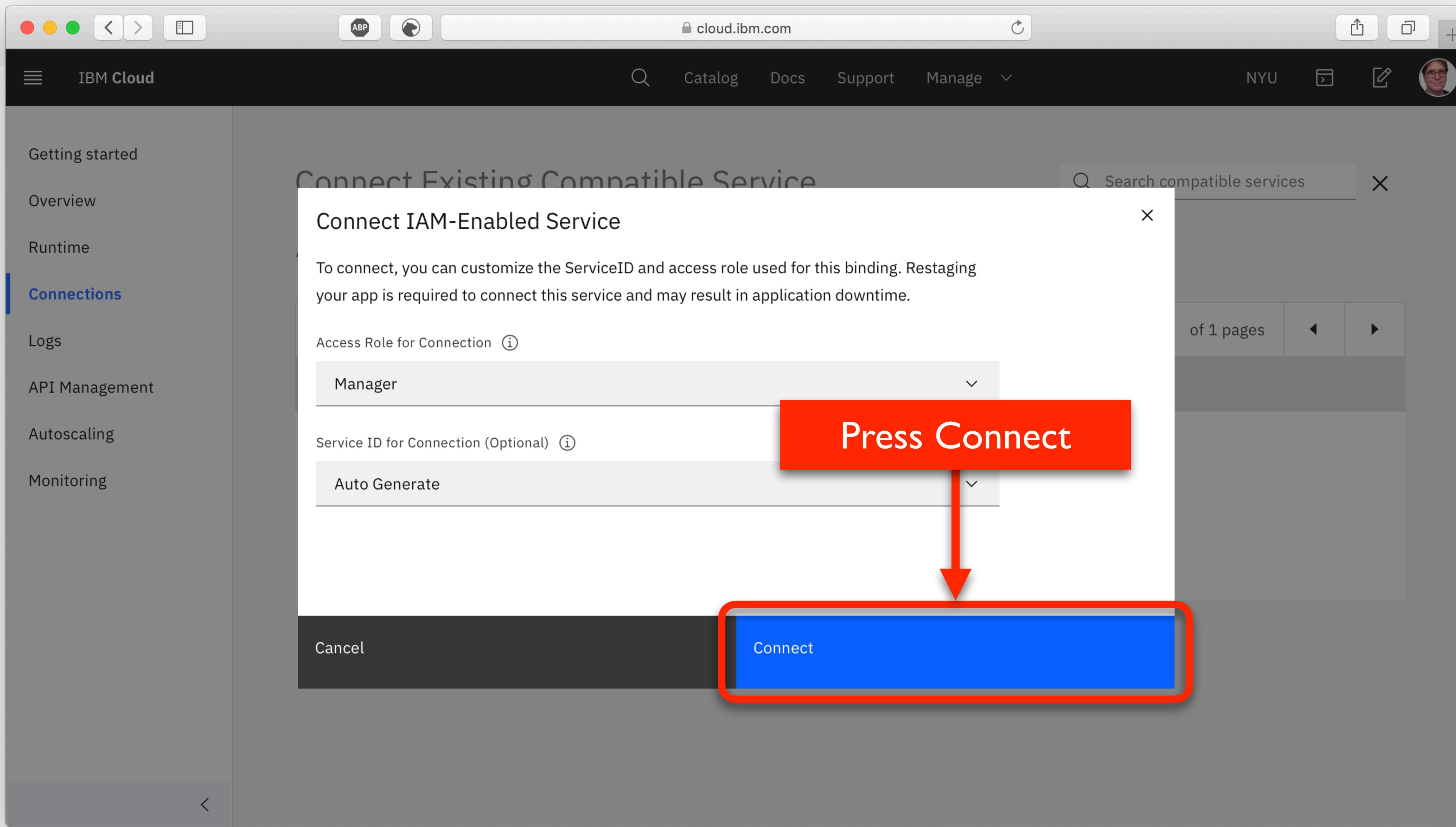
Hover over the Cloudant Service you just created and press the Connect button

SERVICES	RESOURCE GROUP	PLAN	SERVICE OFFERING	
Cloudant	default	Lite	Cloudant	Connect
DB2	default	Lite	Db2	
ElephantSQL	--	n/a	user-provided	

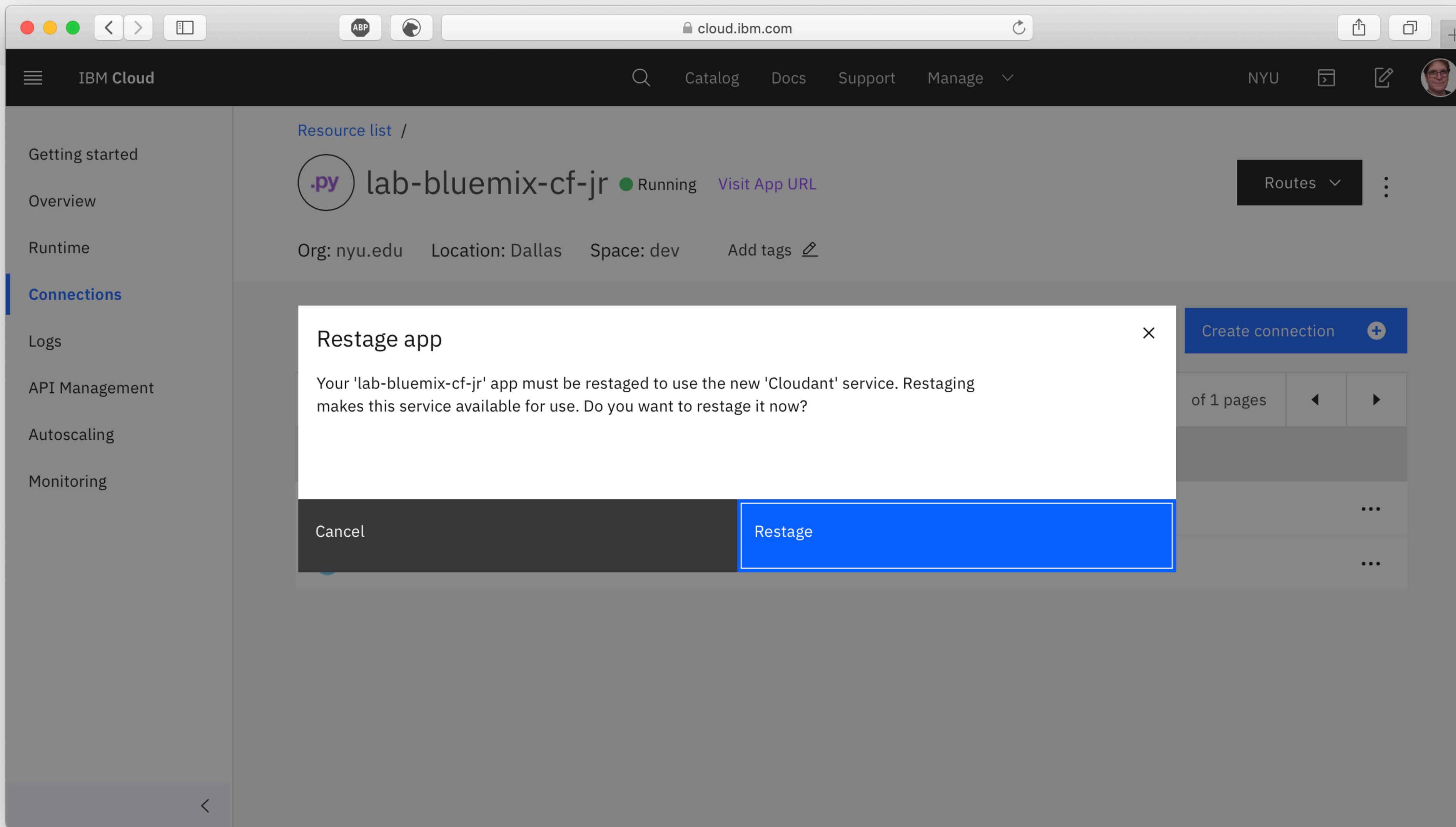
Connect



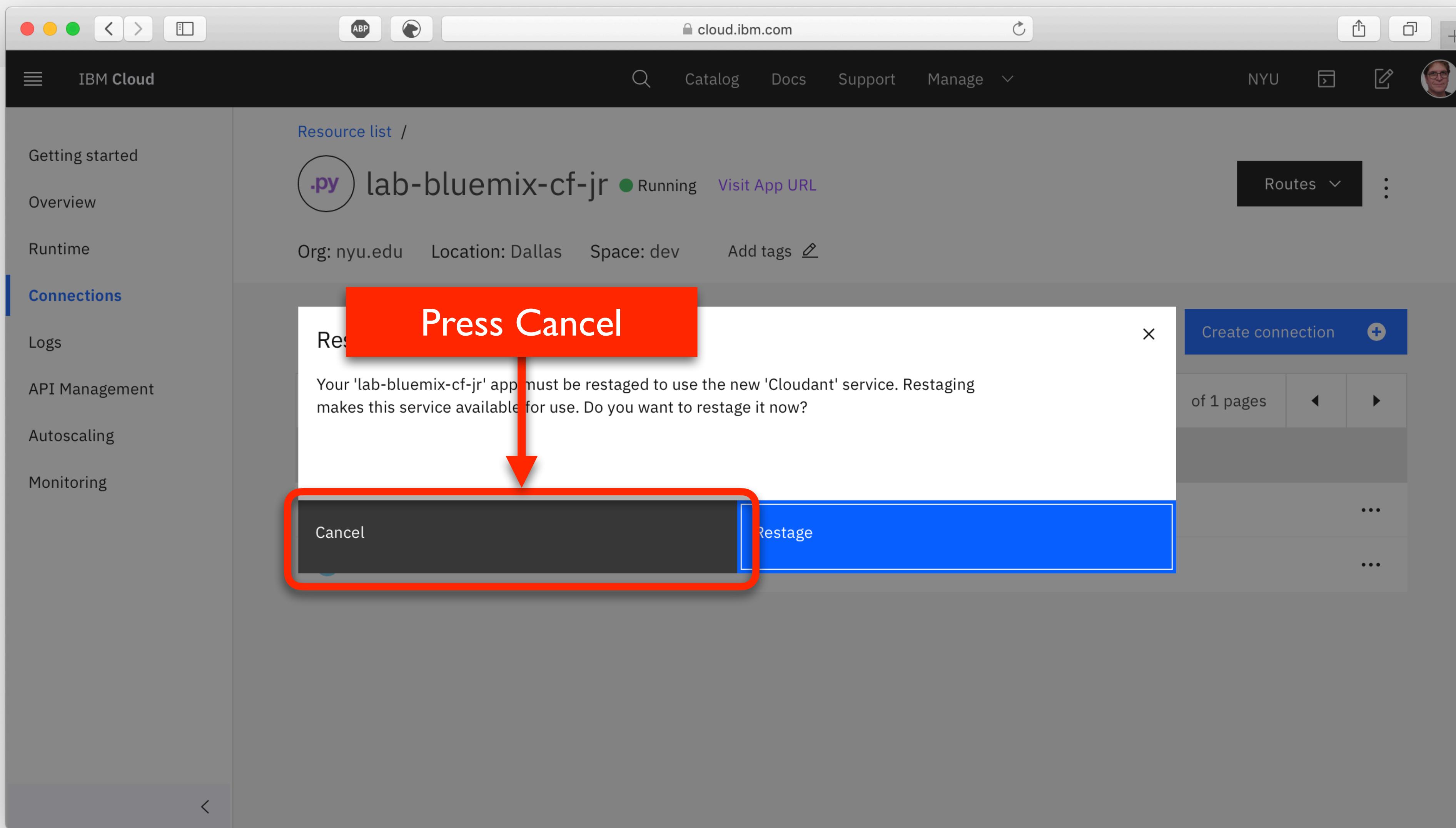
Connect



Cancel Restaging



Cancel Restaging



Connection Complete

The screenshot shows the IBM Cloud interface with the URL `cloud.ibm.com` in the address bar. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. On the left, a sidebar menu lists options like Getting started, Overview, Runtime, Connections (which is selected and highlighted in blue), Logs, API Management, Autoscaling, and Monitoring.

The main content area displays a resource list for an application named `lab-bluemix-cf-jr`, which is running. Below the application details, it shows the organization (`nyu.edu`), location (`Dallas`), space (`dev`), and a link to add tags.

The **Connections** section contains a table listing two connections:

Connection name	Type	Actions
availability-monitoring-auto	Availability Monitoring	...
Cloudant	--	...

Below the table, there are filters for items per page (set to 10) and a search bar labeled "Filter items". A "Create connection" button with a plus sign is also present.

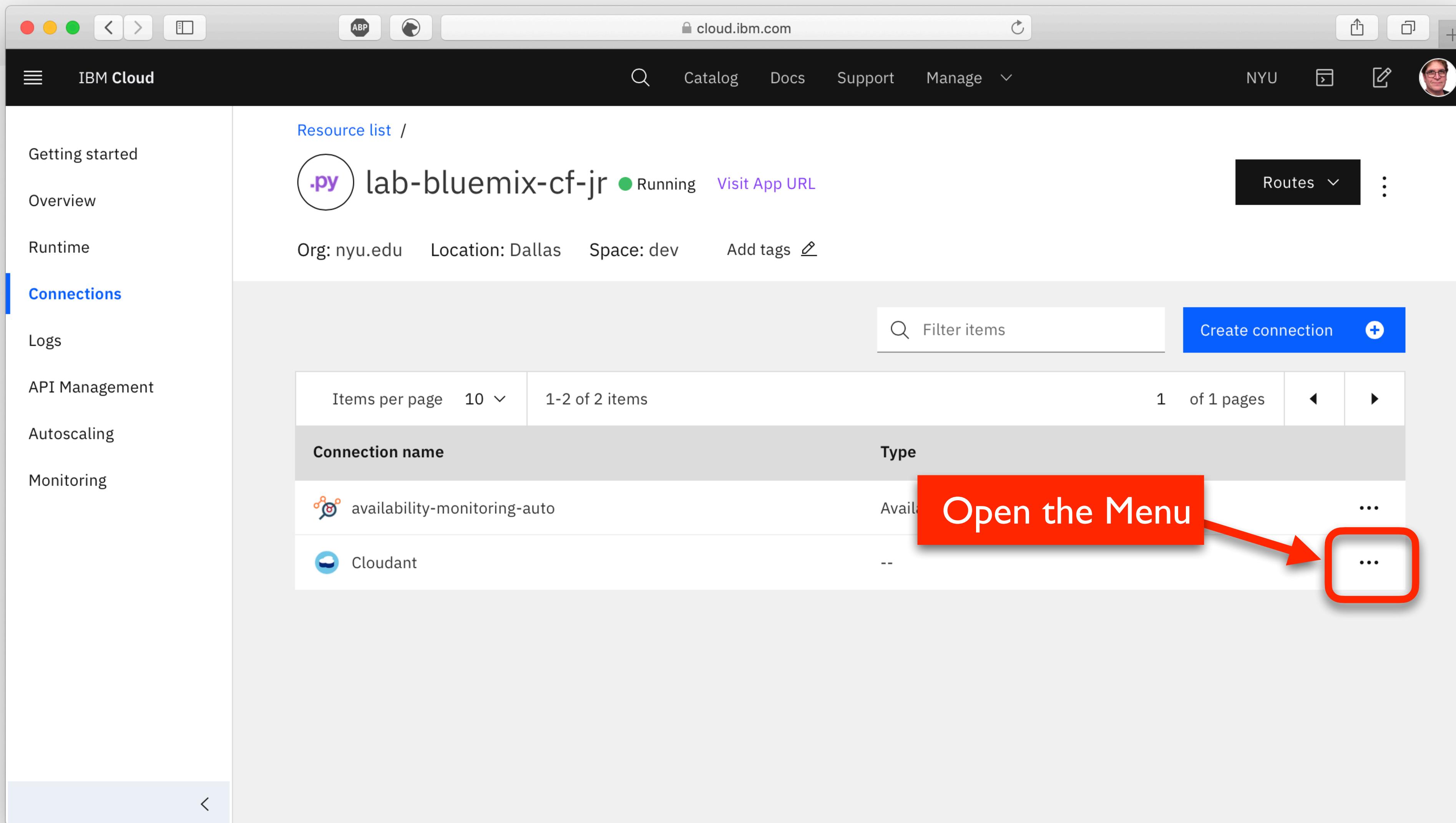
Connection Complete

The screenshot shows the IBM Cloud app dashboard for the application `lab-bluemix-cf-jr`. The application is listed as `.py`, running, with a [Visit App URL](#) link. The sidebar on the left is open to the **Connections** tab. A prominent red banner at the top of the main content area displays the message **The Cloudant database service is now connected to your app**. Below this banner, a table lists two connections:

Connection name	Type
availability-monitoring-auto	Availability Monitoring
Cloudant	--

A red arrow points from the text in the banner down to the `Cloudant` connection entry in the table.

Open the Cloudant Connection Menu



The screenshot shows the IBM Cloud web interface with the URL `cloud.ibm.com` in the address bar. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. On the left, a sidebar menu lists options like Getting started, Overview, Runtime, Connections (which is selected and highlighted in blue), Logs, API Management, Autoscaling, and Monitoring.

The main content area displays an application named `lab-bluemix-cf-jr` which is `Running`. It shows details such as Org: nyu.edu, Location: Dallas, Space: dev, and a link to Add tags. Below this, there's a table titled "Connections" listing two items:

Connection name	Type
availability-monitoring-auto	Available
Cloudant	--

A red callout box with the text "Open the Menu" and a red arrow points to the three-dot menu icon next to the "Cloudant" entry in the table.

Select View Credentials

The screenshot shows the IBM Cloud interface with the URL `cloud.ibm.com` in the address bar. The top navigation bar includes links for Catalog, Docs, Support, Manage, NYU, and a user profile. On the left, a sidebar lists options like Getting started, Overview, Runtime, Connections (which is selected and highlighted in blue), Logs, API Management, Autoscaling, and Monitoring. The main content area displays a resource list for an app named `lab-bluemix-cf-jr`, which is running and located in Org: nyu.edu, Location: Dallas, Space: dev. There is a link to Visit App URL and a 'Routes' button. Below this, the 'Connections' section shows two items: 'availability-monitoring-auto' (Type: Availability Monitoring) and 'Cloudant' (Type: --). A context menu is open for the 'Cloudant' connection, with options including 'View docs', 'View credentials' (which is highlighted with a red box), 'Unbind service', 'Rename service', and 'Delete Service'. A large red callout box with the text 'Select View Credentials' has an arrow pointing to the 'View credentials' option in the menu.

Connection name	Type
availability-monitoring-auto	Availability Monitoring
Cloudant	--

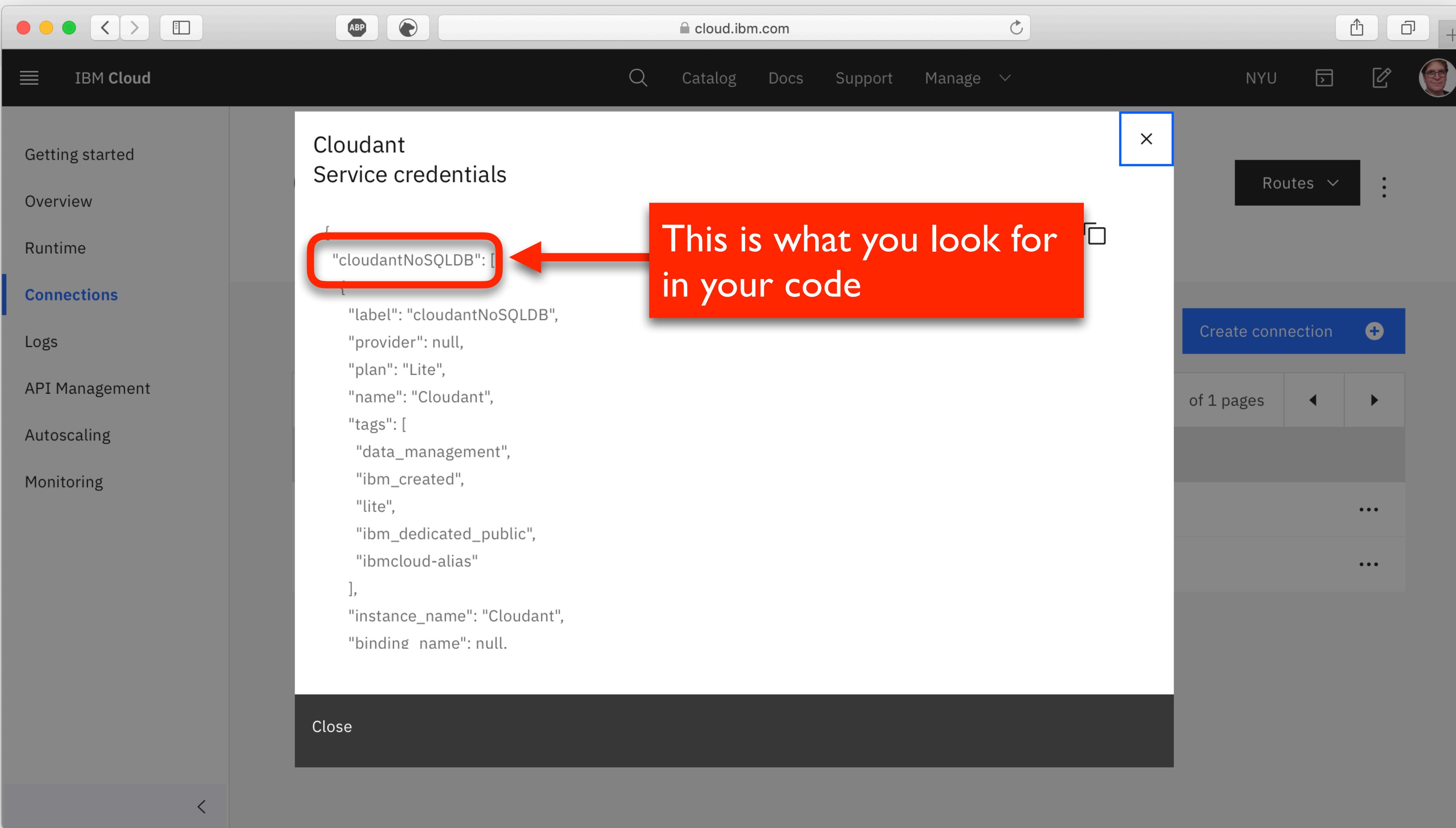
View Credentials

The screenshot shows the IBM Cloud web interface. The left sidebar has a dark theme with white text. The 'Connections' option is highlighted in blue. The main content area is a modal window titled 'Cloudant Service credentials'. Inside the modal, there is a JSON representation of the service credentials:

```
{  
  "cloudantNoSQLDB": [  
    {  
      "label": "cloudantNoSQLDB",  
      "provider": null,  
      "plan": "Lite",  
      "name": "Cloudant",  
      "tags": [  
        "data_management",  
        "ibm_created",  
        "lite",  
        "ibm_dedicated_public",  
        "ibmcloud-alias"  
      ],  
      "instance_name": "Cloudant",  
      "binding_name": null  
    }  
  ]  
}
```

At the bottom of the modal is a dark footer bar with the word 'Close'.

View Credentials



The screenshot shows the IBM Cloud interface with the 'Connections' tab selected. A modal window titled 'Cloudant Service credentials' displays a JSON object. A red box highlights the 'cloudantNoSQLDB' entry, and a red callout bubble points to it with the text: 'This is what you look for in your code'. The JSON content is as follows:

```
{  
  "cloudantNoSQLDB": [  
    {  
      "label": "cloudantNoSQLDB",  
      "provider": null,  
      "plan": "Lite",  
      "name": "Cloudant",  
      "tags": [  
        "data_management",  
        "ibm_created",  
        "lite",  
        "ibm_dedicated_public",  
        "ibmcloud-alias"  
      ],  
      "instance_name": "Cloudant",  
      "binding_name": null  
    }  
  ]  
}
```

View Credentials

The screenshot shows the IBM Cloud interface with a modal window open. The modal is titled "Cloudant Service credentials" and displays a JSON object representing the service instance's configuration. A blue box highlights the close button in the top right corner of the modal. The background shows the sidebar menu with "Connections" selected.

```
{  
  "instance_name": "Cloudant",  
  "binding_name": null,  
  "credentials": {  
    "apikey": "oP25LgVtad0G_8eG2IcKm",  
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06",  
    "iam_apikey_description": "Auto-generated",  
    "iam_apikey_name": "Cloudant",  
    "iam_role_crn": "crn:v1:bluemix:publi",  
    "iam_serviceid_crn": "crn:v1:bluemix:",  
    "password": "22f9e94536c77ab6967",  
    "port": 443,  
    "url": "https://bcd5bf9b-2fca-4cbf-ad",  
    "username": "bcd5bf9b-2fca-4cbf-ad",  
  },  
  "syslog_drain_url": null,  
  "volume_mounts": []  
}
```

View Credentials

The screenshot shows the IBM Cloud interface with the URL `cloud.ibm.com` in the address bar. The left sidebar has a 'Connections' section selected. The main content area displays the 'Cloudant Service credentials' page. A red box highlights the 'credentials' object in the JSON response. An orange callout box with the text 'This is where you get the credentials' and a pointing arrow is overlaid on the highlighted area. The JSON content includes fields like 'apikey', 'host', 'iam_apikey_description', 'iam_apikey_name', 'iam_role_crn', 'iam_serviceid_crn', 'password', 'port', 'url', and 'username'.

```
{
  "instance_name": "Cloudant",
  "binding_name": null,
  "credentials": {
    "apikey": "oP25LgVta0G_8eG2IcKm",
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06",
    "iam_apikey_description": "Auto-generated API key for Cloudant instance Cloudant",
    "iam_apikey_name": "Cloudant",
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:CloudantFullAccess",
    "iam_serviceid_crn": "crn:v1:bluemix:public:cloudant:cloudant:6c77ab69",
    "password": "22f9e94536c77ab6967",
    "port": 443,
    "url": "https://bcd5bf9b-2fca-4cbf-ad9d-06",
    "username": "bcd5bf9b-2fca-4cbf-ad9d-06"
  },
  "syslog_drain_url": null,
  "volume_mounts": []
}
```

Service Credentials in the Environment

- Credentials will be available during runtime in an environment variable called: **VCAP_SERVICES**

example in Python:

```
import os
import json

vcap = json.loads(os.environ['VCAP_SERVICES'])
creds = vcap['cloudantNoSQLDB'][0]['credentials']
hostname = creds['host']
password = creds['password']
port = int(creds['port'])
```

Cloudant
Service credentials

```
,  
  "instance_name": "Cloudant",  
  "binding_name": null,  
  "credentials": {  
    "apikey": "oP25LgVtad0G_8eG2IcKm08TyZZkOFXs1UscF",  
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix.  
    "iam_apikey_description": "Auto-generated for binding 8080",  
    "iam_apikey_name": "Cloudant",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identit  
    "password": "22f9e94536c77ab69679110510b84572f",  
    "port": 443,  
    "url": "https://bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-  
    "username": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0",  
  },  
  "syslog_drain_url": null,  
  "volume_mounts": []
```

Service Credentials in the Environment

- Credentials will be available during runtime in an environment variable called: **VCAP_SERVICES**

example in Python:

```
import os
import json

vcap = json.loads(os.environ['VCAP_SERVICES'])
creds = vcap['cloudantNoSQLDB'][0]['credentials']
hostname = creds['host']
password = creds['password']
port = int(creds['port'])
```

Cloudant
Service credentials

```
,  
"instance_name": "Cloudant",  
"binding_name": null,  
"credentials": {  
    "apikey": "oP25LgVtad0G_8eG2IcKm08TyZZkOFXs1UscF",  
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
    "iam_apikey_description": "Auto-generated for binding 8",  
    "iam_apikey_name": "Cloudant",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Cloudant",  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity:serviceId:Cloudant",  
    "password": "22f9e94536c77ab69679110510b84572",  
    "port": 443,  
    "url": "https://bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix:443",  
    "username": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
},  
"syslog_drain_url": null,  
"volume_mounts": []
```

Service Credentials in the Environment

- Credentials will be available during runtime in an environment variable called: **VCAP_SERVICES**

example in Python:

```
import os
import json

vcap = json.loads(os.environ['VCAP_SERVICES'])
creds = vcap['cloudantNoSQLDB'][0]['credentials']
hostname = creds['host']
password = creds['password']
port = int(creds['port'])
```

Cloudant
Service credentials

```
,  
"instance_name": "Cloudant",  
"binding_name": null,  
"credentials": {  
    "apikey": "oP25LgVtad0G_8eG2IcKm08TyZZkOFXs1UscF",  
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
    "iam_apikey_description": "Auto-generated for binding 8",  
    "iam_apikey_name": "Cloudant",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Cloudant",  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity:serviceId:Cloudant",  
    "password": "22f9e94536c77ab69679110510b84572",  
    "port": 443,  
    "url": "https://bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix:  
    "username": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
},  
"syslog_drain_url": null,  
"volume_mounts": []
```

Service Credentials in the Environment

- Credentials will be available during runtime in an environment variable called: **VCAP_SERVICES**

example in Python:

```
import os
import json

vcap = json.loads(os.environ['VCAP_SERVICES'])
creds = vcap['cloudantNoSQLDB'][0]['credentials']
hostname = creds['host']
password = creds['password']  
port = int(creds['port'])
```

Cloudant
Service credentials

```
,  
"instance_name": "Cloudant",  
"binding_name": null,  
"credentials": {  
    "apikey": "oP25LgVtad0G_8eG2IcKm08TyZZkOFXs1UscF",  
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
    "iam_apikey_description": "Auto-generated for binding 8",  
    "iam_apikey_name": "Cloudant",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Cloudant",  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity:serviceId:Cloudant",  
    "password": "22f9e94536c77ab69679110510b84572",  
    "port": 443,  
    "url": "https://bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix:  
    "username": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
},  
"syslog_drain_url": null,  
"volume_mounts": []
```

Service Credentials in the Environment

- Credentials will be available during runtime in an environment variable called: **VCAP_SERVICES**

example in Python:

```
import os
import json

vcap = json.loads(os.environ['VCAP_SERVICES'])
creds = vcap['cloudantNoSQLDB'][0]['credentials']
hostname = creds['host']
password = creds['password']
port = int(creds['port'])
```

Cloudant
Service credentials

```
,  
"instance_name": "Cloudant",  
"binding_name": null,  
"credentials": {  
    "apikey": "oP25LgVtad0G_8eG2IcKm08TyZZkOFXs1UscF",  
    "host": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
    "iam_apikey_description": "Auto-generated for binding 8",  
    "iam_apikey_name": "Cloudant",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Cloudant",  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity:serviceId:Cloudant",  
    "password": "22f9e94536c77ab69679110510b84572",  
    "port": 443,  
    "url": "https://bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix:  
    "username": "bcd5bf9b-2fca-4cbf-ad9d-06d887d60bf0-bluemix",  
},  
"syslog_drain_url": null,  
"volume_mounts": []
```

Creating a User Provide Service

- Sometimes there is a service outside of the cloud that you want to use
- You can provision these on another cloud and define a User Provided Service (UPS) to bind that service via VCAP_SERVICES
- Command to deliver Service Credentials to an App

```
ic cf cups SERVICE_INSTANCE -p '{"username": "admin", "password": "pa55woRD"}'
```

ElephantSQL Example

<http://elephantsql.com>

Details

Server stampy.db.elephantsql.com (stampy-01)

User & Default database qwwejmnp Reset

Password 3F Reset

URL postgres://qwwejmnp:3F@stampy.db.elephantsql.com:5432/qwwejmnp Reset

Current database size 152 KB

Max database size 20 MB

Active Plan



Tiny Turtle

Upgrade Instance

Creating a User Provide Service

- Deliver Service Credentials to an App

```
cf cups SERVICE_INSTANCE -p '{"username": "admin", "password": "pa55woRD"}'
```

- Example for ElephantSQL:

```
cf cups ElephantSQL -p '{"url": "postgres://admin:passw0rd@db.elephantsql.com:5432/testdb"}'
```

Example config.py

- This is a sample config.py for relational databases using SQLAlchemy that checks for VCAP_SERVICES

```
"""
Global Configuration for Application
"""

import os
import json

# Get configuration from environment
DATABASE_URI = os.getenv(
    "DATABASE_URI",
    "postgres://postgres:postgres@localhost:5432/postgres"
)

# override if we are running in Cloud Foundry
if 'VCAP_SERVICES' in os.environ:
    vcap = json.loads(os.environ['VCAP_SERVICES'])
    DATABASE_URI = vcap['user-provided'][0]['credentials']['url']

# Configure SQLAlchemy
SQLALCHEMY_DATABASE_URI = DATABASE_URI
SQLALCHEMY_TRACK_MODIFICATIONS = False
```

Example config.py

- This is a sample config.py for relational databases using SQLAlchemy that checks for VCAP_SERVICES

```
"""
Global Configuration for Application
"""

import os
import json

# Get configuration from environment
DATABASE_URI = os.getenv(
    "DATABASE_URI",
    "postgres://postgres:postgres@localhost:5432/postgres"
)

# override if we are running in Cloud Foundry
if 'VCAP_SERVICES' in os.environ:
    vcap = json.loads(os.environ['VCAP_SERVICES'])
    DATABASE_URI = vcap['user-provided'][0]['credentials']['url']

# Configure SQLAlchemy
SQLALCHEMY_DATABASE_URI = DATABASE_URI
SQLALCHEMY_TRACK_MODIFICATIONS = False
```

Get the DATABASE_URI
from the environment

Example config.py

- This is a sample config.py for relational databases using SQLAlchemy that checks for VCAP_SERVICES

```
"""
Global Configuration for Application
"""

import os
import json

# Get configuration from environment
DATABASE_URI = os.getenv(
    "DATABASE_URI",
    "postgres://postgres:postgres@localhost:5432/postgres"
)

# override if we are running in Cloud Foundry
if 'VCAP_SERVICES' in os.environ:
    vcap = json.loads(os.environ['VCAP_SERVICES'])
    DATABASE_URI = vcap['user-provided'][0]['credentials']['url']

# Configure SQLAlchemy
SQLALCHEMY_DATABASE_URI = DATABASE_URI
SQLALCHEMY_TRACK_MODIFICATIONS = False
```

Override the value if
VCAP_SERVICES exists

Example config.py

- This is a sample config.py for relational databases using SQLAlchemy that checks for VCAP_SERVICES

```
"""
Global Configuration for Application
"""

import os
import json

# Get configuration from environment
DATABASE_URI = os.getenv(
    "DATABASE_URI",
    "postgres://postgres:postgres@localhost:5432/postgres"
)

# override if we are running in Cloud Foundry
if 'VCAP_SERVICES' in os.environ:
    vcap = json.loads(os.environ['VCAP_SERVICES'])
    DATABASE_URI = vcap['user-provided'][0]['credentials']['url']

# Configure SQLAlchemy
SQLALCHEMY_DATABASE_URI = DATABASE_URI
SQLALCHEMY_TRACK_MODIFICATIONS = False
```

Use the value to
configure the database

Deploy Our App to IBM Cloud Manually

Vagrant SSH Time

- It's time to SSH into your virtual machine

```
$ vagrant ssh
```

Login to Cloud Foundry

- We can now Login to IBM Cloud Cloud Foundry:

```
vagrant@ibmcloud:~$ ibmcloud login -a https://cloud.ibm.com --apikey @~/.bluemix/apiKey.json -r us-south -o nyu.edu -s dev
```

Login to Cloud Foundry

- We can now Login to IBM Cloud Cloud Foundry:

```
vagrant@ibmcloud:~$ ibmcloud login -a https://cloud.ibm.com --apikey @~/bluemix/apiKey.json -r us-south -o nyu.edu -s dev
```

IBM Cloud api endpoint

Login to Cloud Foundry

- We can now Login to IBM Cloud Cloud Foundry:

```
vagrant@ibmcloud:~$ ibmcloud login -a https://cloud.ibm.com --apikey @~/bluemix/apiKey.json -r us-south -o nyu.edu -s dev
```

IBM Cloud api endpoint

Your IBM Cloud Token

Login to Cloud Foundry

- We can now Login to IBM Cloud Cloud Foundry:

```
vagrant@ibmcloud:~$ ibmcloud login -a https://cloud.ibm.com --apikey @~/.bluemix/apiKey.json -r us-south -o nyu.edu -s dev
```

IBM Cloud api endpoint

Your IBM Cloud Token

Cloud Region

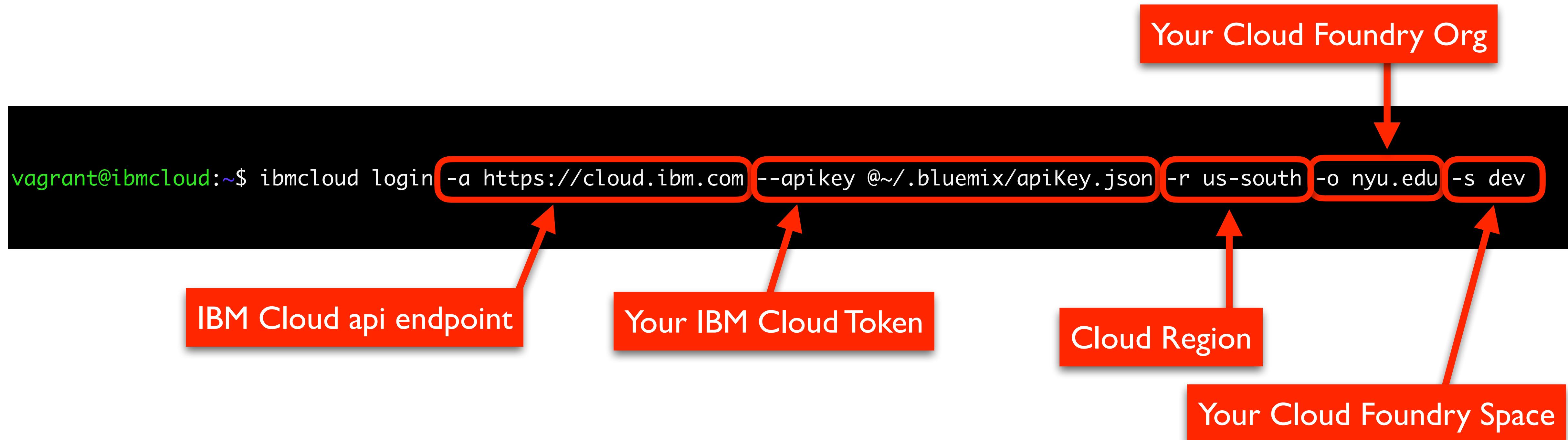
Login to Cloud Foundry

- We can now Login to IBM Cloud Cloud Foundry:



Login to Cloud Foundry

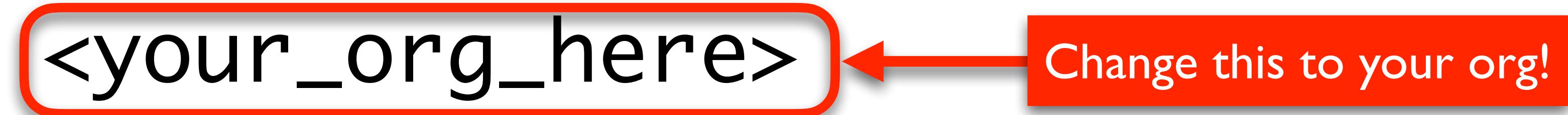
- We can now Login to IBM Cloud Cloud Foundry:



Login Parameters

All on one line:

```
ibmcloud login  
  -a https://cloud.ibm.com  
  --apikey @~/.bluemix/apiKey.json  
  -r us-south  
  -o <your_org_here>  
  -s dev
```



Change this to your org!

Login to Cloud Foundry

- Now we can issue Cloud Foundry commands

```
vagrant@ibmcloud:~$ ibmcloud login -a https://cloud.ibm.com --apikey @~/.bluemix/apiKey.json -r us-south -o nyu.edu -s dev  
Warning: option -o or -s is deprecated. Use command ibmcloud target -o ORG -s SPACE instead.
```

```
API endpoint: https://cloud.ibm.com
```

```
Authenticating...
```

```
OK
```

```
Targeted account NYU (21caa03e2981e94f56ea98f347b995a5)
```

```
Targeted region us-south
```

```
Targeted Cloud Foundry (https://api.ng.bluemix.net)
```

```
Targeted org nyu.edu
```

```
Targeted space dev
```

```
API endpoint: https://cloud.ibm.com
```

```
Region: us-south
```

```
User: jjr12@nyu.edu
```

```
Account: NYU (21caa03e2981e94f56ea98f347b995a5)
```

```
Resource group: No resource group targeted, use 'ibmcloud target -g RESOURCE_GROUP'
```

```
CF API endpoint: https://api.ng.bluemix.net (API version: 2.141.0)
```

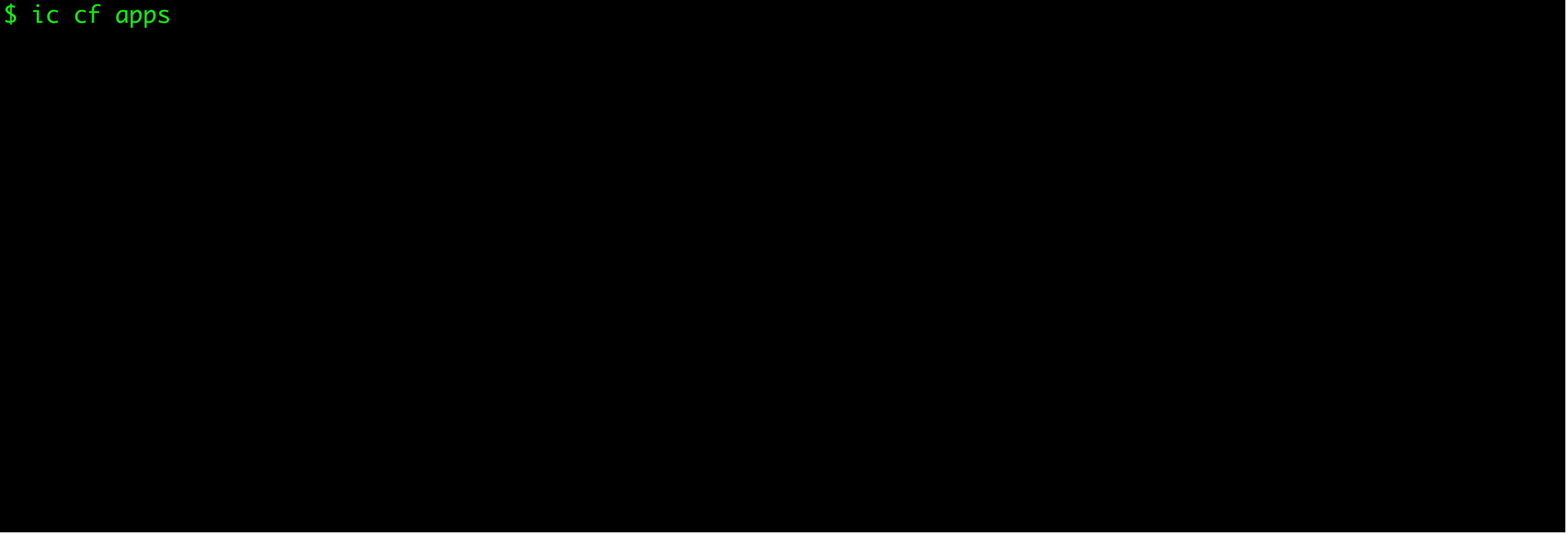
```
Org: nyu.edu
```

```
Space: dev
```

List Apps

- You can use the Cloud Foundry CLI to list app and services:

```
$ ic cf apps
```



List of Apps

- You can use the Cloud Foundry CLI to list app and services:

```
$ ic cf apps
Invoking 'cf apps'...
Getting apps in org nyu.edu / space dev as jjr12@nyu.edu...
OK

name          requested state    instances   memory   disk    urls
lab-bluemix-cf-jr  started      1/1        128M     1G      lab-bluemix-cf-jr.us-south.cf.appdomain.cloud
```

List Services

- You can use the Cloud Foundry CLI to list app and services:

```
$ ic cf apps
Invoking 'cf apps'...
Getting apps in org nyu.edu / space dev as jjr12@nyu.edu...
OK

name          requested state    instances   memory   disk    urls
lab-bluemix-cf-jr  started      1/1        128M     1G      lab-bluemix-cf-jr.us-south.cf.appdomain.cloud

$ ic cf services
```

List of Services

- You can use the Cloud Foundry CLI to list app and services:

```
$ ic cf apps
Invoking 'cf apps'...

Getting apps in org nyu.edu / space dev as jjr12@nyu.edu...
OK

name          requested state    instances   memory    disk    urls
lab-bluemix-cf-jr  started      1/1        128M     1G      lab-bluemix-cf-jr.us-south.cf.appdomain.cloud

$ ic cf services
Invoking 'cf services'...

Getting services in org nyu.edu / space dev as jjr12@nyu.edu...
name          service       plan    bound apps    last operation    broker
Cloudant      cloudantNoSQLDB Lite    lab-bluemix-cf-jr  create succeeded  cloudant
```

List of Services

- You can use the Cloud Foundry CLI to list app and services:

```
$ ic cf apps
Invoking 'cf apps'...
Getting apps in org nyu.edu / space dev as jjr12@nyu.edu...
OK

name          requested state    instances   memory   disk      urls
lab-bluemix-cf-jr  started        1/1       128M     1G       lab-bluemix-cf-jr.us-south.cf.appdomain.cloud
```

Lab-bluemix-cf-jr is bound to Cloudant

```
$ ic cf services
Invoking 'cf services'...
Getting services in org nyu.edu / space dev as jjr12@nyu.edu...
name          service           plan      bound apps      last operation   broker
Cloudant      cloudantNoSQLDB  Lite      lab-bluemix-cf-jr  create succeeded  cloudant
```

Let's PUSH to Cloud Foundry

Cloud Foundry Manifest

```
---
```

```
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk_quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
  services:
    - Cloudant
  env:
    FLASK_APP : service:app
    FLASK_DEBUG : false
```

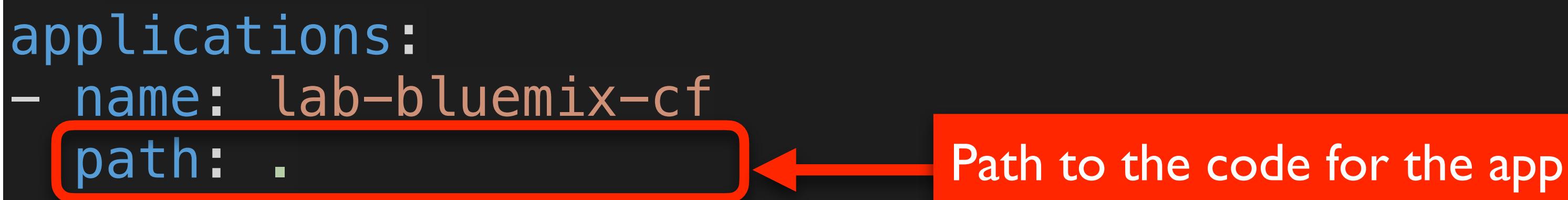
Cloud Foundry Manifest

```
---  
applications:  
- name: lab-bluemix-cf  
  path: .  
  instances: 2  
  memory: 64M  
  routes:  
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud  
  disk_quota: 1024M  
  buildpacks:  
    - python_buildpack  
  timeout: 180  
services:  
- Cloudant  
env:  
  FLASK_APP : service:app  
  FLASK_DEBUG : false
```

Name of the app in IBM Cloud

Cloud Foundry Manifest

```
---
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk_quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
services:
- Cloudant
env:
  FLASK_APP : service:app
  FLASK_DEBUG : false
```



Path to the code for the app

Cloud Foundry Manifest

```
---
```

```
applications:
```

```
- name: lab-bluemix-cf
```

```
  path: .
```

```
  instances: 2
```

```
  memory: 64M
```

```
  routes:
```

```
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
```

```
  disk_quota: 1024M
```

```
  buildpacks:
```

```
    - python_buildpack
```

```
  timeout: 180
```

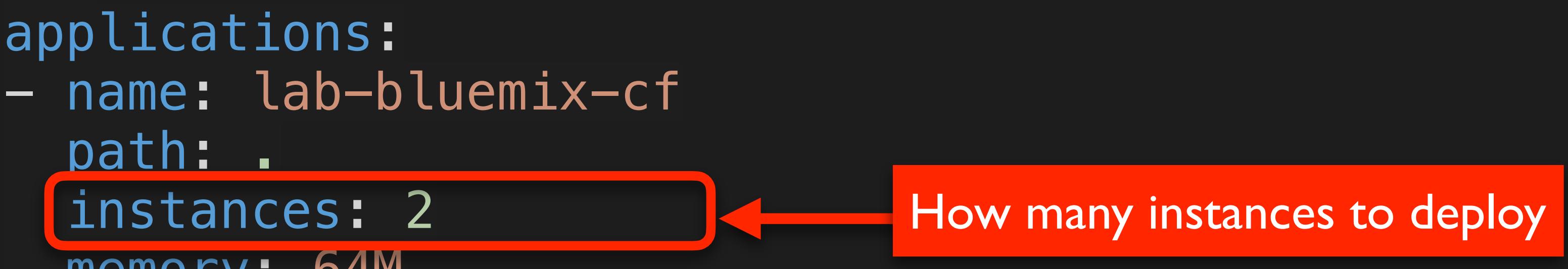
```
services:
```

```
- Cloudant
```

```
env:
```

```
  FLASK_APP : service:app
```

```
  FLASK_DEBUG : false
```



Cloud Foundry Manifest

```
---
```

```
applications:
```

```
- name: lab-bluemix-cf
```

```
  path: .
```

```
  instances: 2
```

```
  memory: 64M
```

```
  routes:
```

```
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
```

```
  disk_quota: 1024M
```

```
  buildpacks:
```

```
    - python_buildpack
```

```
  timeout: 180
```

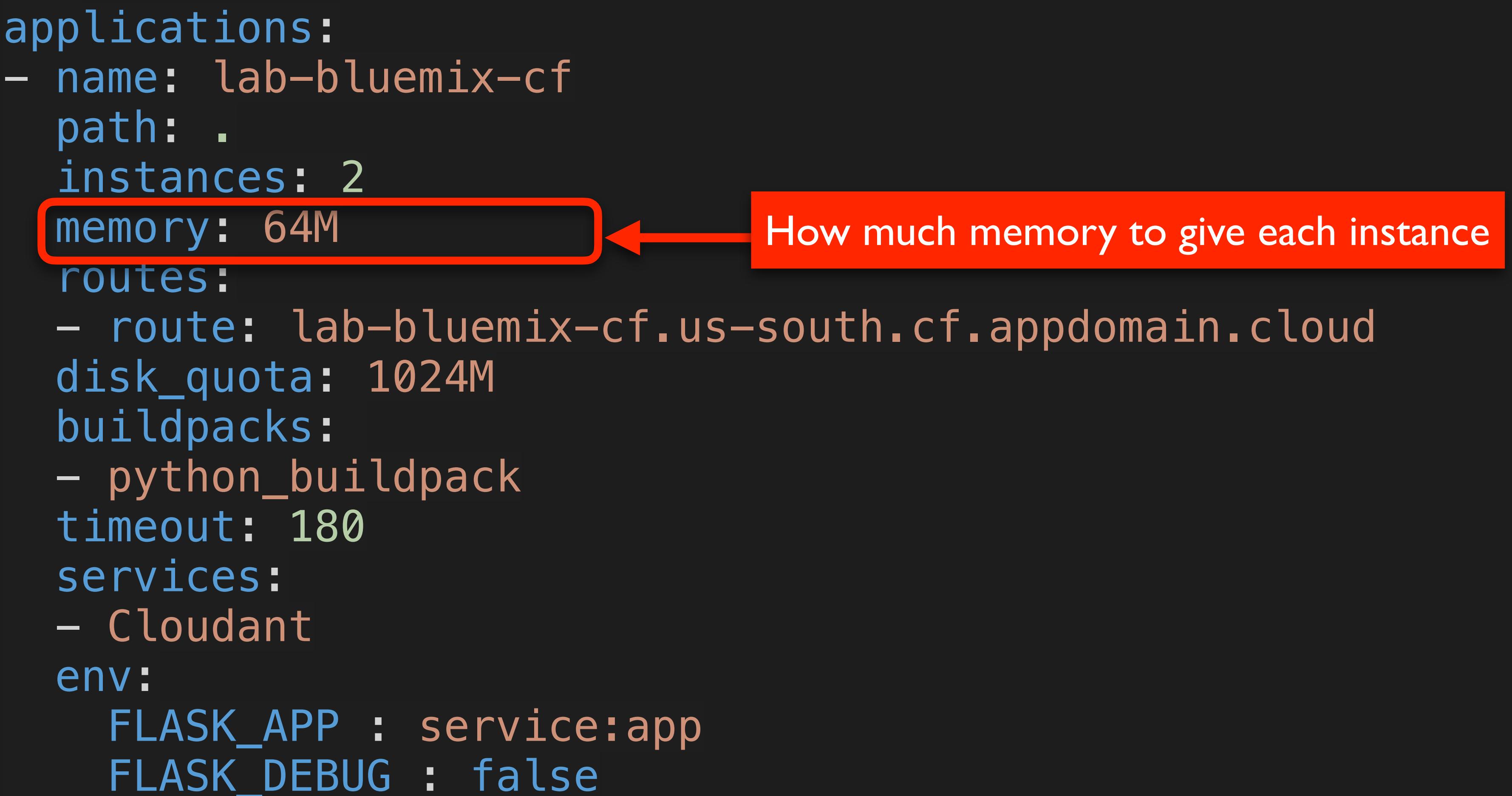
```
  services:
```

```
    - Cloudant
```

```
  env:
```

```
    FLASK_APP : service:app
```

```
    FLASK_DEBUG : false
```



How much memory to give each instance

Cloud Foundry Manifest

```
---
```

```
applications:
```

```
- name: lab-bluemix-cf
```

```
  path: .
```

```
  instances: 2
```

```
  memory: 64M
```

```
routes:
```

```
- route: lab-bluemix-cf.us-south.cf.appdomain.cloud
```

```
disk_quota: 1024M
```

```
buildpacks:
```

```
- python_buildpack
```

```
timeout: 180
```

```
services:
```

```
- Cloudant
```

```
env:
```

```
  FLASK_APP : service:app
```

```
  FLASK_DEBUG : false
```

The URL of the app

Cloud Foundry Manifest

```
---
```

```
applications:
```

```
- name: lab-bluemix-cf
```

```
  path: .
```

```
  instances: 2
```

```
  memory: 64M
```

```
  routes:
```

```
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
```

```
      disk_quota: 1024M
```

```
buildpacks:
```

```
- python_buildpack
```

```
timeout: 180
```

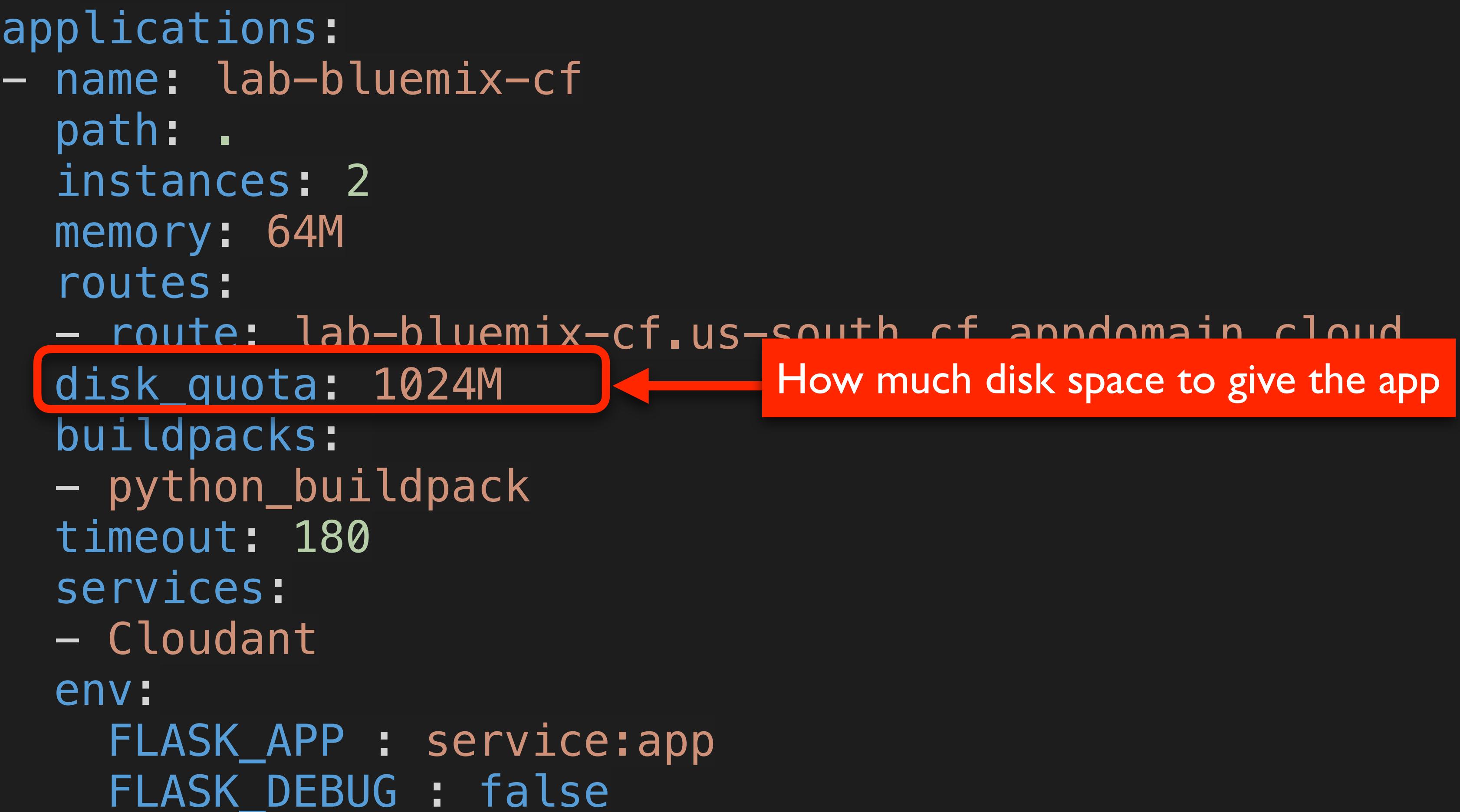
```
services:
```

```
- Cloudant
```

```
env:
```

```
  FLASK_APP : service:app
```

```
  FLASK_DEBUG : false
```



How much disk space to give the app

Cloud Foundry Manifest

```
---
```

```
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
services:
- Cloudant
env:
  FLASK_APP : service:app
  FLASK_DEBUG : false
```

What buildpack to deploy it into

Cloud Foundry Manifest

```
---
```

```
applications:
```

```
- name: lab-bluemix-cf
```

```
  path: .
```

```
  instances: 2
```

```
  memory: 64M
```

```
  routes:
```

```
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
```

```
  disk_quota: 1024M
```

```
  buildpacks:
```

```
    - python buildpack
```

```
  timeout: 180
```

```
services:
```

```
- Cloudant
```

```
env:
```

```
  FLASK_APP : service:app
```

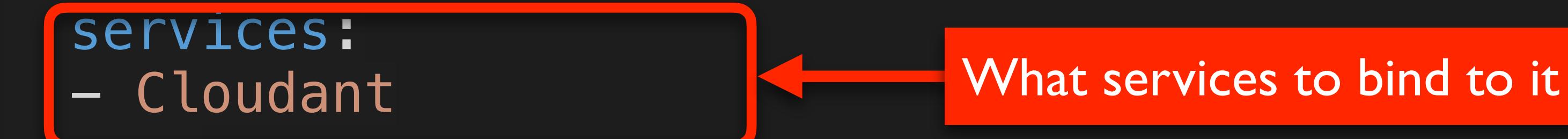
```
  FLASK_DEBUG : false
```

How long to wait for it to start

Cloud Foundry Manifest

```
---
```

```
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk_quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
  services:
    - Cloudant
env:
  FLASK_APP : service:app
  FLASK_DEBUG : false
```



What services to bind to it

Cloud Foundry Manifest

```
---
```

```
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk_quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
  services:
    - Cloudant
  env:
    FLASK_APP : service:app
    FLASK_DEBUG : false
```

What environment variables does it need

Edit the Manifest

- Edit manifest.yml to change the app name to your app

```
---
# This manifest deploys a Python Flask application with a Cloudant database
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk_quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
  services:
    - Cloudant
  env:
    FLASK_APP : service:app
    FLASK_DEBUG : false
```

Edit the Manifest

- Edit manifest.yml to change the app name to your app

```
---
# This manifest deploys a Python Flask application with a Cloudant database
applications:
- name: lab-bluemix-cf
  path: .
  instances: 2
  memory: 64M
  routes:
    - route: lab-bluemix-cf.us-south.cf.appdomain.cloud
  disk_quota: 1024M
  buildpacks:
    - python_buildpack
  timeout: 180
  services:
    - Cloudant
  env:
    FLASK_APP : service:app
    FLASK_DEBUG : false
```

Change the name and host to your name and hostname

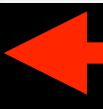
Push to Cloud Foundry

```
vagrant@ibmcloud:/vagrant$ ic cf push
```

Push to Cloud Foundry

```
vagrant@ibmcloud:/vagrants$ ic cf push
```

```
ic cf push
```



Push to Cloud Foundry

```
vagrant@ibmcloud:/vagrant$ ic cf push
Invoking 'cf push lab-bluemix-cf-jr'...

Using manifest file /vagrant/manifest.yml

Updating app lab-bluemix-cf-jr in org nyu.edu / space dev as jjr12@nyu.edu...
OK

Using route lab-bluemix-cf-jr.us-south.cf.appdomain.cloud
Uploading lab-bluemix-cf-jr...
Uploading app files from: /vagrant
Uploading 45.9K, 22 files
Done uploading
OK
Binding service Cloudant to app lab-bluemix-cf-jr in org nyu.edu / space dev as jjr12@nyu.edu...
OK

Stopping app lab-bluemix-cf-jr in org nyu.edu / space dev as jjr12@nyu.edu...
OK

Starting app lab-bluemix-cf-jr in org nyu.edu / space dev as jjr12@nyu.edu...
Downloading python_buildpack...
```

Check for Success

OK

Waiting for app to start...

```
name:          lab-bluemix-cf-jr
requested state: started
routes:        lab-bluemix-cf-jr.us-south.cf.appdomain.cloud
last uploaded: Sun 22 Mar 20:26:54 UTC 2020
stack:         cflinuxfs3
buildpacks:    python

type:          web
instances:     1/2
memory usage: 64M
start command: gunicorn --log-file=- --workers=1 --bind=0.0.0.0:$PORT service:app

          state   since      cpu   memory      disk      details
#0  running   2020-03-22T20:27:00Z  0.2%  16.6M of 64M  124.8M of 1G
#1  starting  2020-03-22T20:26:49Z  0.0%  0 of 64M    0 of 1G
```

Not Secure — lab-bluemix-cf-jr.us-south.cf.appdomain.cloud

Pet Demo REST API Service

GET [/pets](#) to see all the pets.

GET [/pets?category=dog](#) to see all of the pets in the 'dog' category.

GET [/pets/{id}](#) retrieves a pet from the DB using an ID.

PUT [/pets/{id}](#) updates a pet using an ID.

DELETE [/pets/{id}](#) removes a pet from the DB using an ID.

POST [/pets](#) creates an new pet.

Example Data:

```
{  
    "name": "bowser",  
    "category": "dog"  
}
```

Try it now:

What is the name of the pet?

What category is the pet?

[Create Pet](#)

Summary

- You should have a good understand of what PaaS is why you would want to use it
- You just deployed your first IBM Cloud Foundry Application
- You added a services and modified the code to use this server
- You pushed your application changes back to to IBM Cloud

