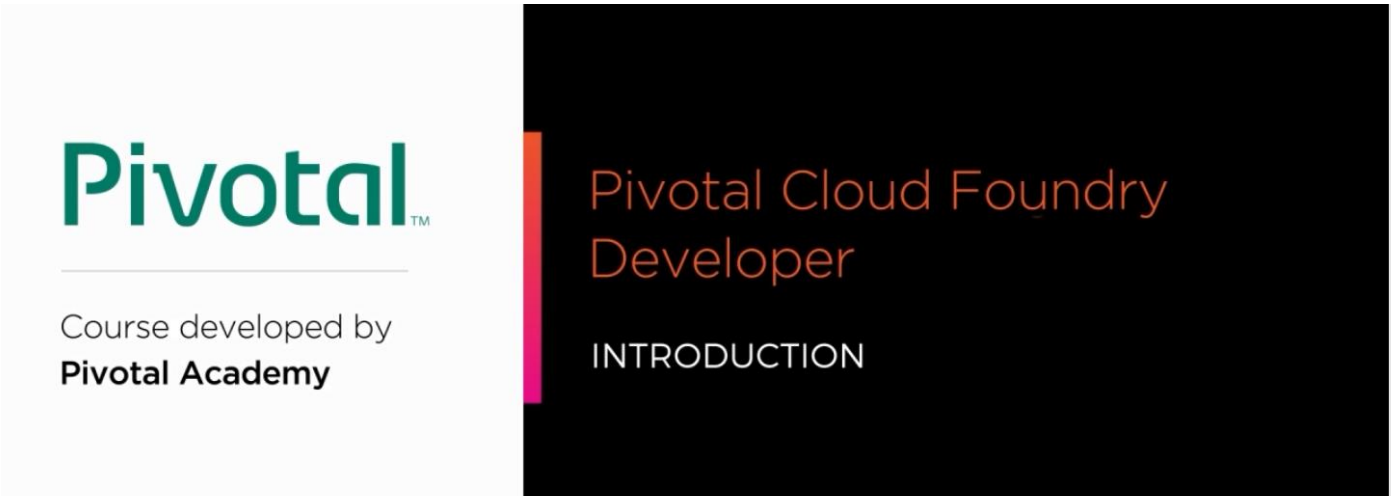


Pivotal™

Course developed by
Pivotal Academy

Pivotal Cloud Foundry
Developer

INTRODUCTION

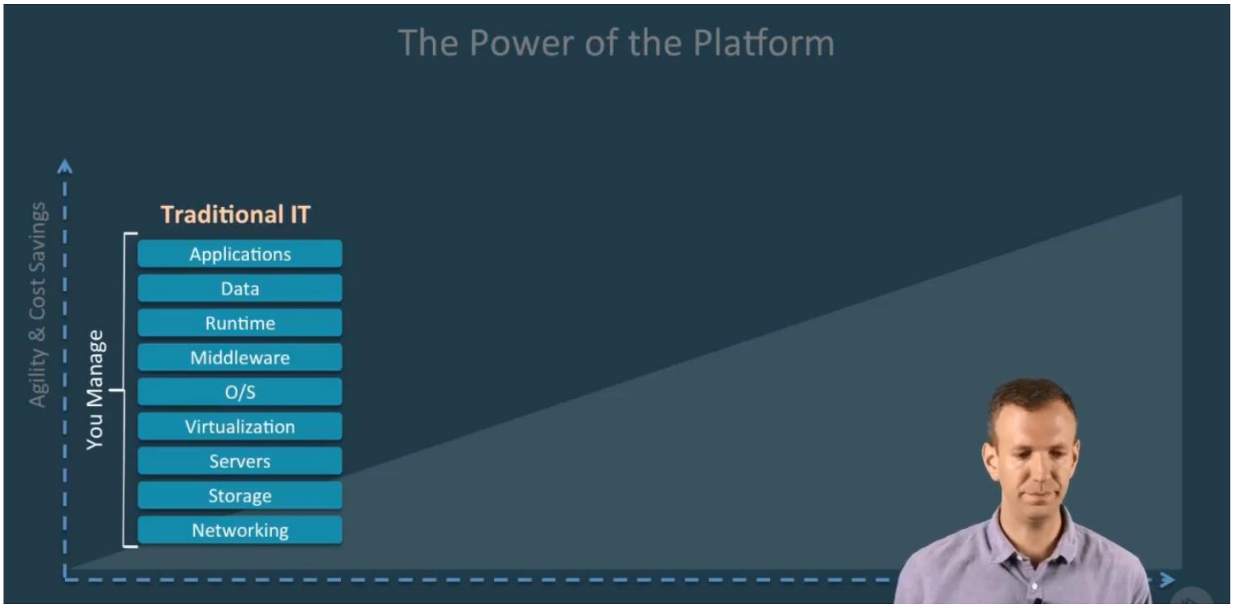
Learn how to push applications to Pivotal Cloud Foundry and many of the concepts and features of the Pivotal Cloud Foundry platform, including **services**, **log draining**, **metrics**, **buildpacks**, **service brokers**, and **route services** and more.

Pivotal Cloud Foundry

An Introduction

Agenda

1. Evolution of Cloud Architectures
2. Industry Trends
3. Cloud Foundry
4. Pivotal Cloud Foundry



The Power of the Platform

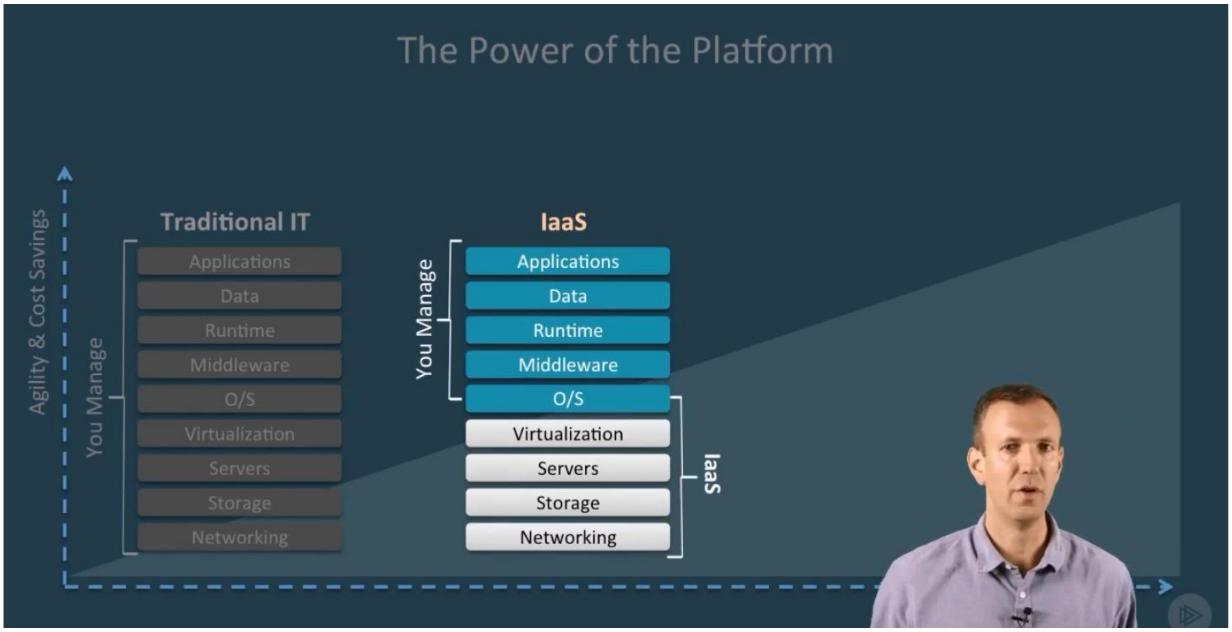
Agility & Cost Savings

Traditional IT

You Manage

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

This is where we were about 17 years ago where we have to provision everything by ourselves, this takes a lot of time to get application releases out to customers.



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Agility & Cost Savings

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IaaS

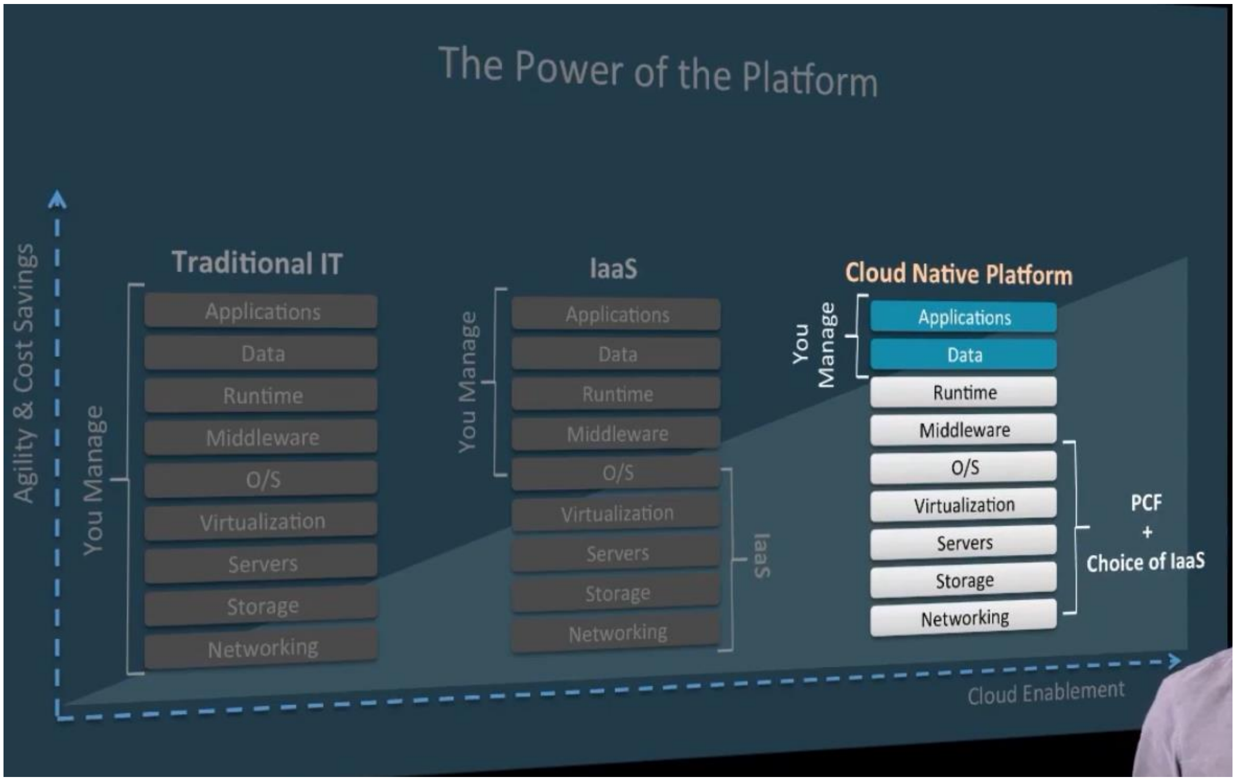
You Manage

- Applications
- Data
- Runtime
- Middleware
- O/S

IaaS

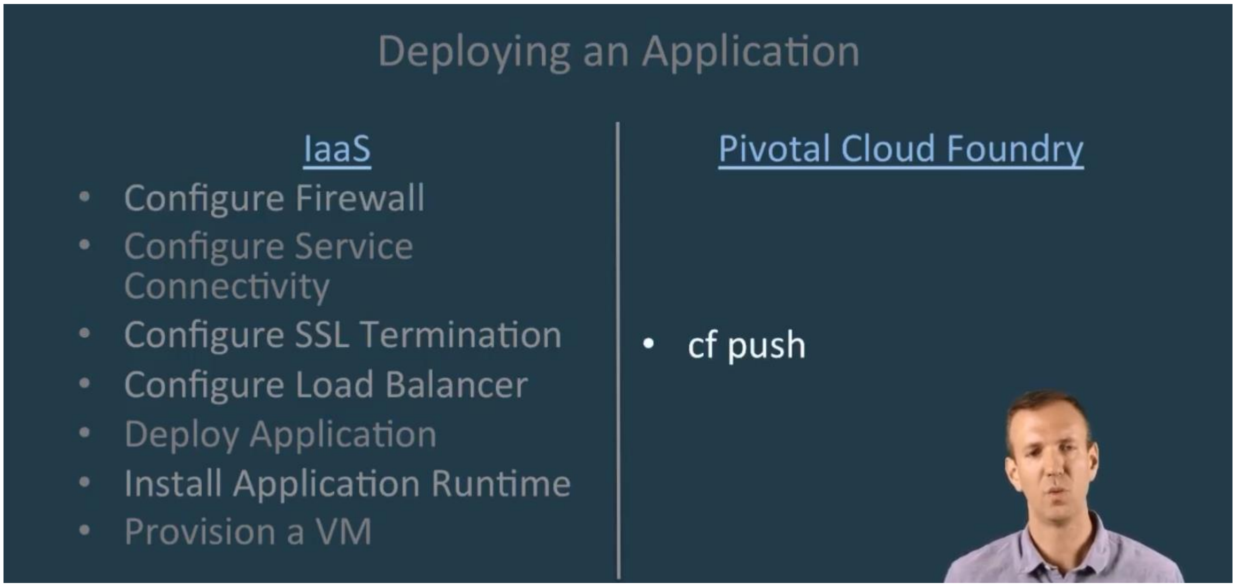
- Virtualization
- Servers
- Storage
- Networking

This makes it easy to get VMs setup and provisioned for you by the IaaS providers. The developer still has to do some plumbing for their applications.



The Power of the Platform

Now the plumbing is being done by the IaaS and PCF, you simply focus on your application and deliver fast.



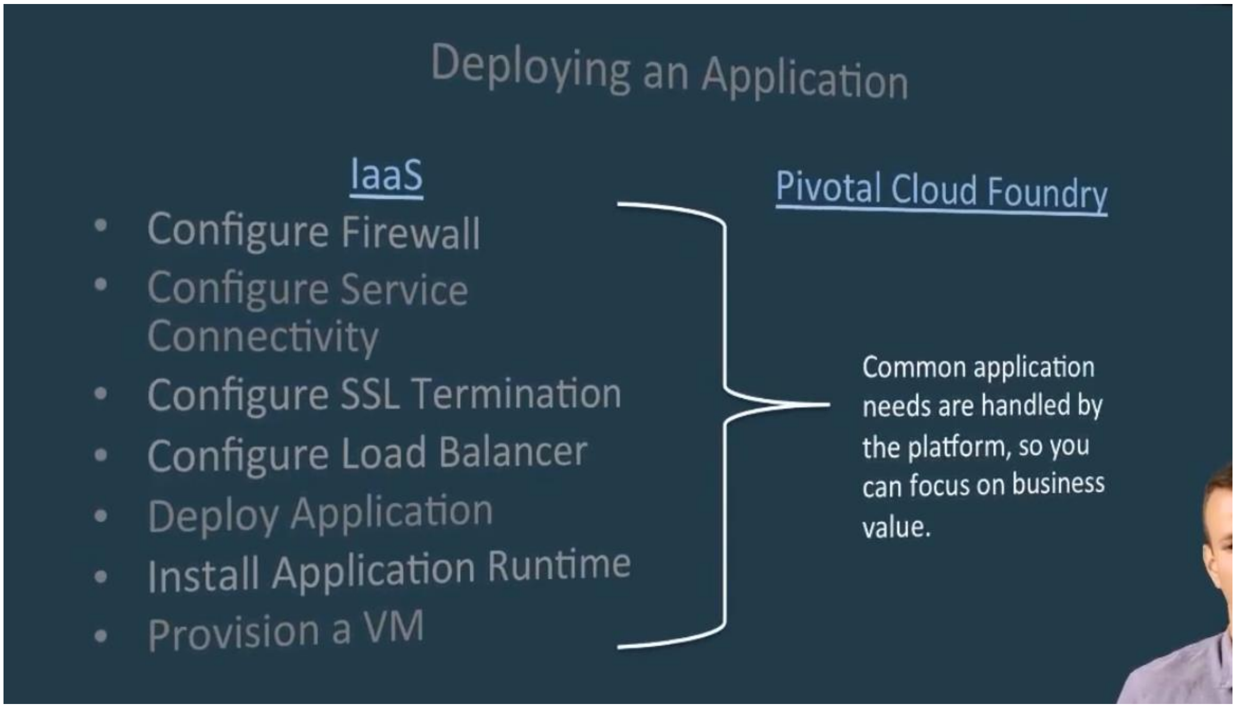
Deploying an Application

IaaS

- Configure Firewall
- Configure Service Connectivity
- Configure SSL Termination
- Configure Load Balancer
- Deploy Application
- Install Application Runtime
- Provision a VM

Pivotal Cloud Foundry

- cf push



Deploying an Application

IaaS

- Configure Firewall
- Configure Service Connectivity
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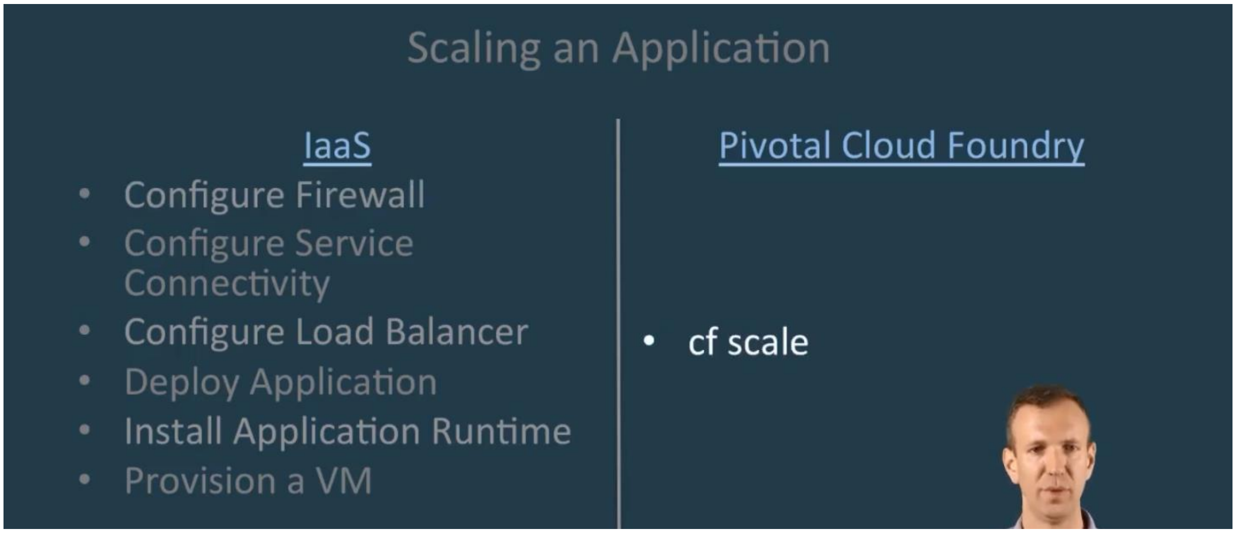
Pivotal Cloud Foundry

Common application needs are handled by the platform, so you can focus on business value.



Scaling an Application

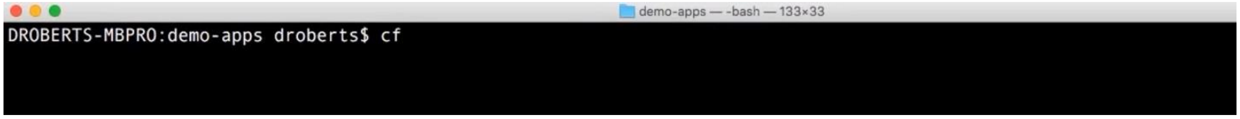
IaaS

- Configure Firewall
- Configure Service Connectivity
- Configure Load Balancer
- Deploy Application
- Install Application Runtime
- Provision a VM

Pivotal Cloud Foundry

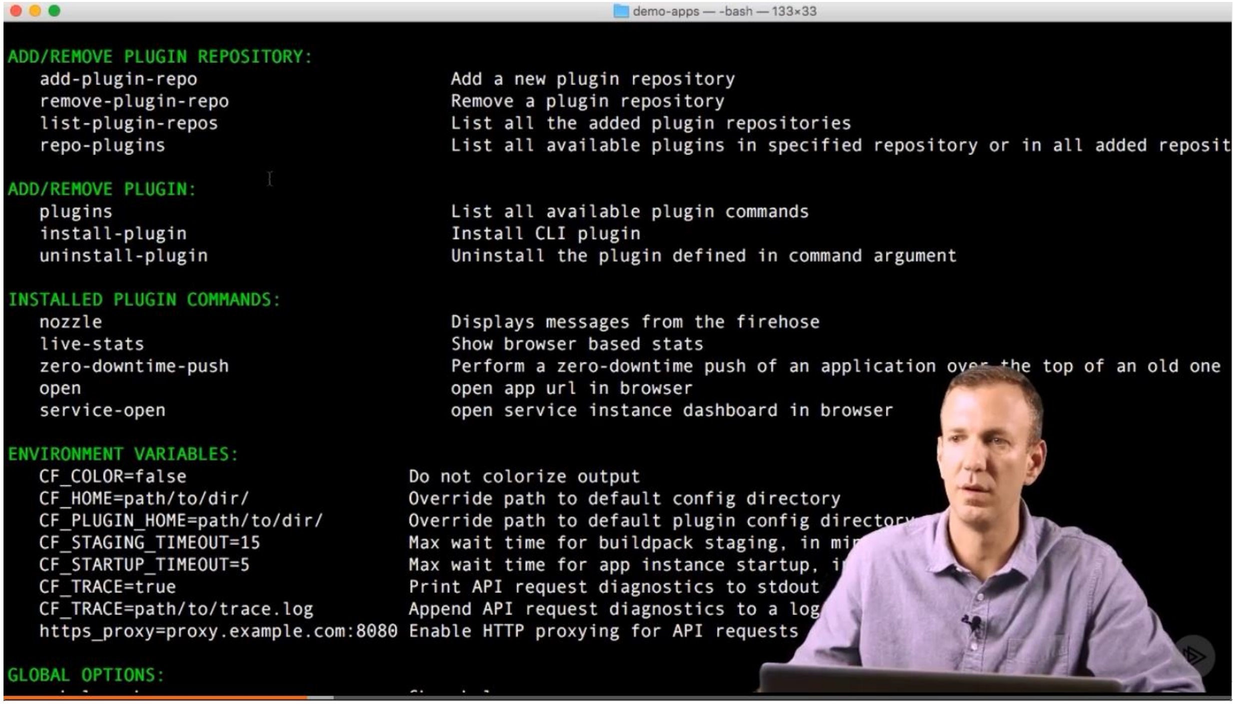
- cf scale

Let us now push an app in PCF

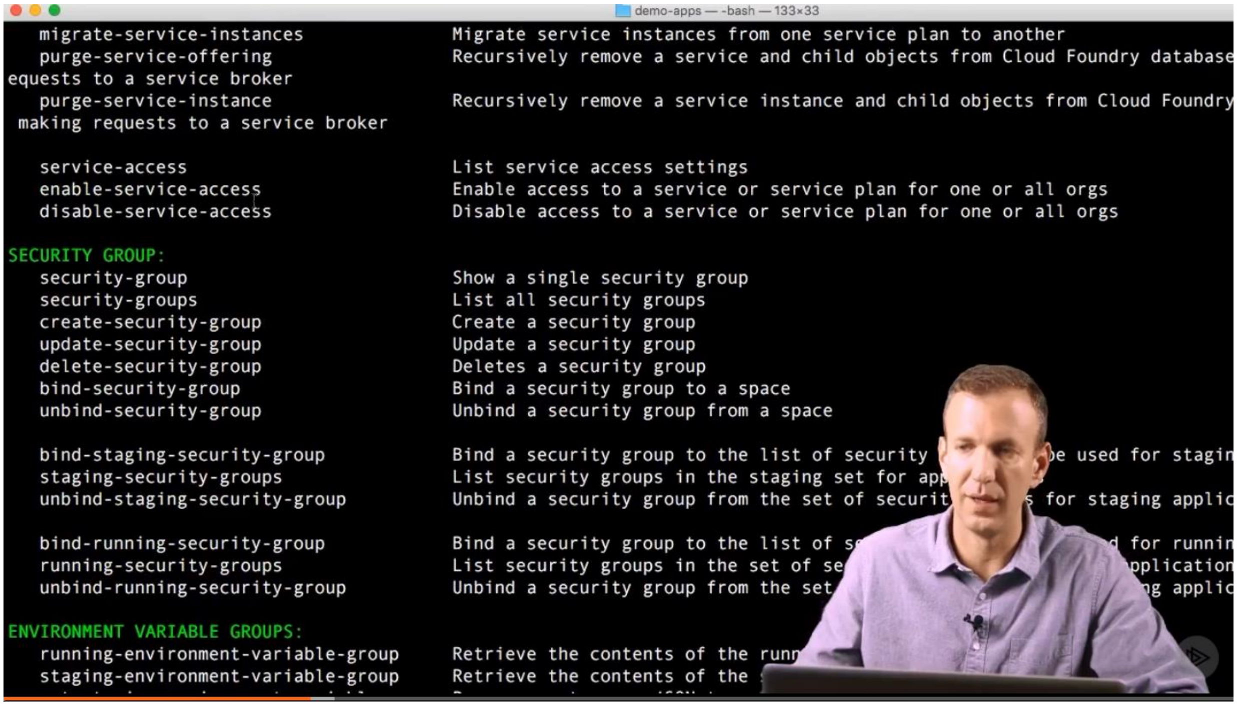


```
DROBERTS-MBPRO:demo-apps droberts$ cf
```

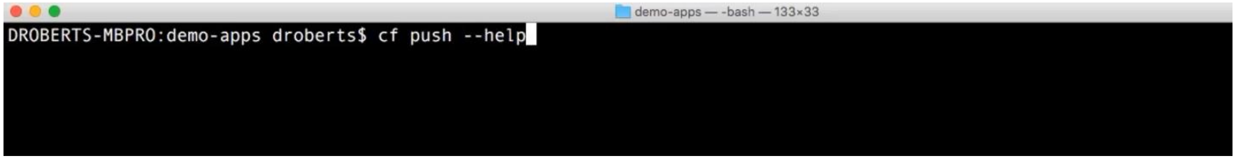
We can use the ***cf*** command to see all the commands that can be performed using the CF CLI.



```
ADD/REMOVE PLUGIN REPOSITORY:
   add-plugin-repo                        Add a new plugin repository
   remove-plugin-repo                     Remove a plugin repository
   list-plugin-repos                      List all the added plugin repositories
   repo-plugins                           List all available plugins in specified repository or in all added reposit

ADD/REMOVE PLUGIN:
   plugins                                List all available plugin commands
   install-plugin                         Install CLI plugin
   uninstall-plugin                       Uninstall the plugin defined in command argument

INSTALLED PLUGIN COMMANDS:
   nozzle                                 Displays messages from the firehose
   live-stats                             Show browser based stats
   zero-downtime-push                     Perform a zero-downtime push of an application over the top of an old one
   open                                   open app url in browser
   service-open                           open service instance dashboard in browser

ENVIRONMENT VARIABLES:
   CF_COLOR=false                     Do not colorize output
   CF_HOME=path/to/dir/               Override path to default config directory
   CF_PLUGIN_HOME=path/to/dir/        Override path to default plugin config directory
   CF_STAGING_TIMEOUT=15              Max wait time for buildpack staging, in mi
   CF_STARTUP_TIMEOUT=5               Max wait time for app instance startup, i
   CF_TRACE=true                      Print API request diagnostics to stdout
   CF_TRACE=path/to/trace.log         Append API request diagnostics to a log
   https_proxy=proxy.example.com:8080 Enable HTTP proxying for API requests

GLOBAL OPTIONS:
```

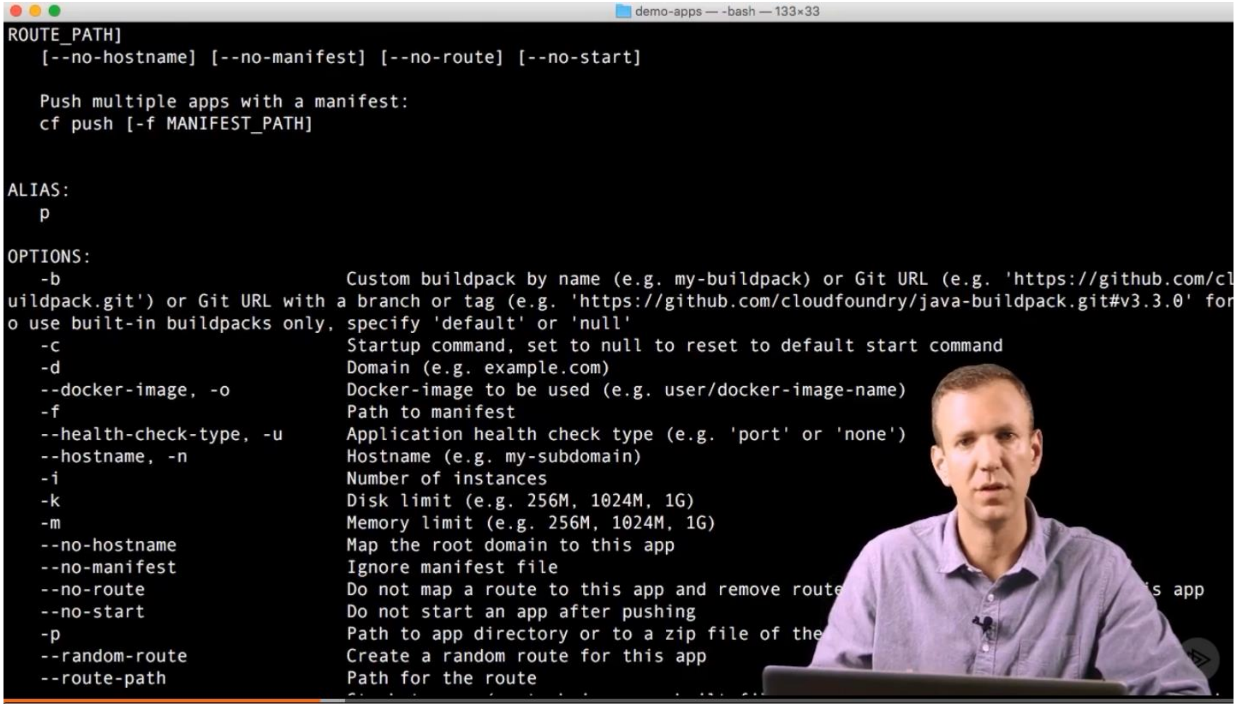


```
   migrate-service-instances              Migrate service instances from one service plan to another
   purge-service-offering                 Recursively remove a service and child objects from Cloud Foundry database
equests to a service broker
   purge-service-instance                 Recursively remove a service instance and child objects from Cloud Foundry
 making requests to a service broker

   service-access                         List service access settings
   enable-service-access                  Enable access to a service or service plan for one or all orgs
   disable-service-access                 Disable access to a service or service plan for one or all orgs

SECURITY GROUP:
   security-group                         Show a single security group
   security-groups                        List all security groups
   create-security-group                  Create a security group
   update-security-group                  Update a security group
   delete-security-group                  Deletes a security group
   bind-security-group                    Bind a security group to a space
   unbind-security-group                  Unbind a security group from a space

   bind-staging-security-group            Bind a security group to the list of security       be used for stagin
   staging-security-groups                List security groups in the staging set for app
   unbind-staging-security-group          Unbind a security group from the set of securit      s for staging applic

   bind-running-security-group            Bind a security group to the list of s               d for runnin
   running-security-groups                List security groups in the set of se                pplication
   unbind-running-security-group          Unbind a security group from the set                 ng applic

ENVIRONMENT VARIABLE GROUPS:
   running-environment-variable-group     Retrieve the contents of the runn
   staging-environment-variable-group     Retrieve the contents of the
```

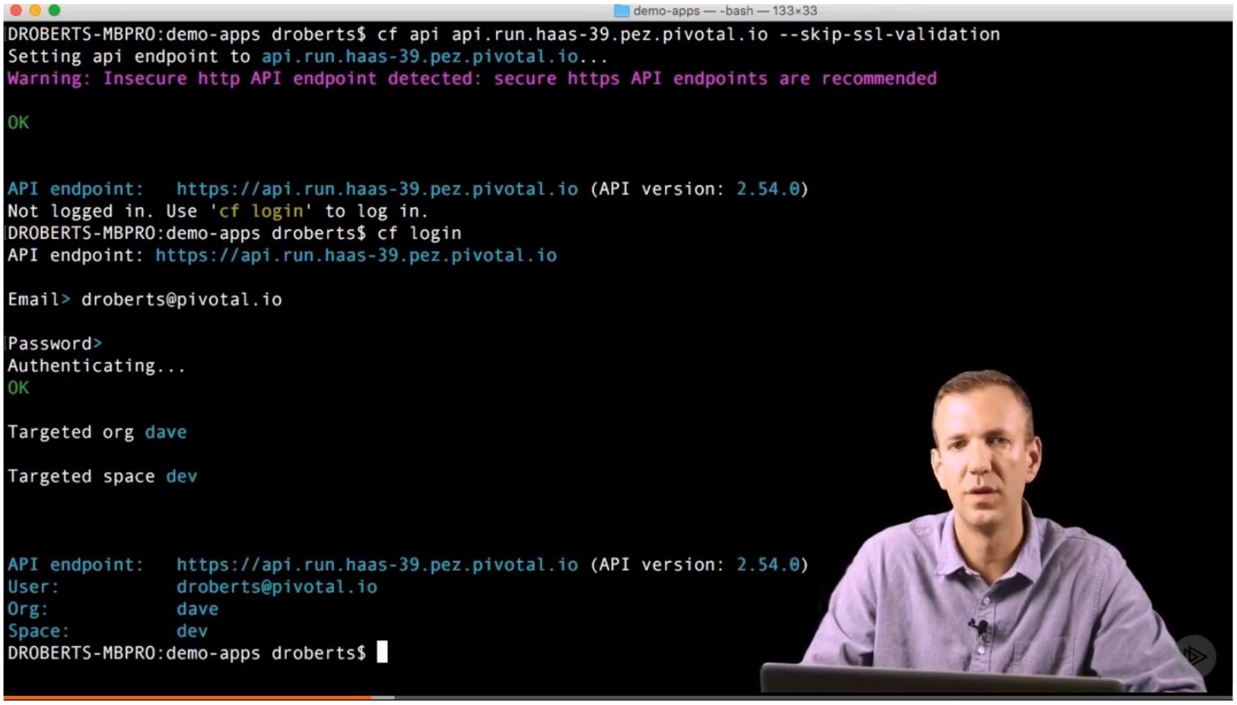


```
DROBERTS-MBPRO:demo-apps droberts$ cf push --help
```

We can get help for any command using the ***–help*** command

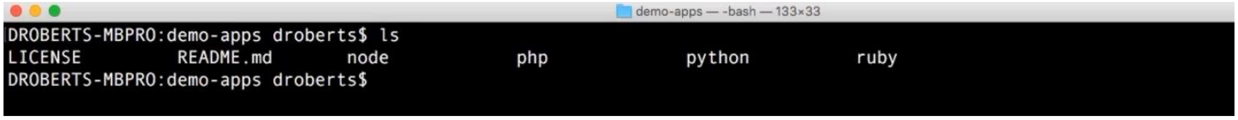


```
ROUTE_PATH]
   [--no-hostname] [--no-manifest] [--no-route] [--no-start]

   Push multiple apps with a manifest:
   cf push [-f MANIFEST_PATH]


ALIAS:
   p

OPTIONS:
   -b                           Custom buildpack by name (e.g. my-buildpack) or Git URL (e.g. 'https://github.com/cl
uildpack.git') or Git URL with a branch or tag (e.g. 'https://github.com/cloudfoundry/java-buildpack.git#v3.3.0' for
o use built-in buildpacks only, specify 'default' or 'null'
   -c                           Startup command, set to null to reset to default start command
   -d                           Domain (e.g. example.com)
   --docker-image, -o           Docker-image to be used (e.g. user/docker-image-name)
   -f                           Path to manifest
   --health-check-type, -u      Application health check type (e.g. 'port' or 'none')
   --hostname, -n               Hostname (e.g. my-subdomain)
   -i                           Number of instances
   -k                           Disk limit (e.g. 256M, 1024M, 1G)
   -m                           Memory limit (e.g. 256M, 1024M, 1G)
   --no-hostname                Map the root domain to this app
   --no-manifest                Ignore manifest file
   --no-route                   Do not map a route to this app and remove route              s app
   --no-start                   Do not start an app after pushing
   -p                           Path to app directory or to a zip file of the
   --random-route               Create a random route for this app
   --route-path                 Path for the route
```



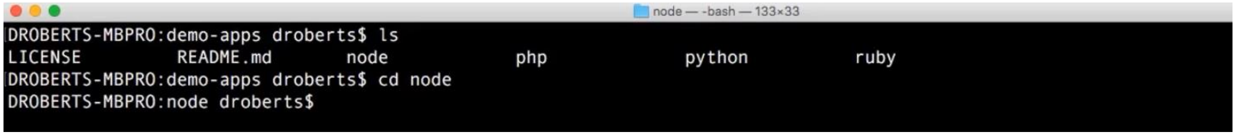
```
DROBERTS-MBPRO:demo-apps droberts$ cf api api.run.haas-39.pez.pivotal.io --skip-ssl-validation
Setting api endpoint to api.run.haas-39.pez.pivotal.io...
Warning: Insecure http API endpoint detected: secure https API endpoints are recommended

OK


API endpoint:   https://api.run.haas-39.pez.pivotal.io (API version: 2.54.0)
Not logged in. Use 'cf login' to log in.
DROBERTS-MBPRO:demo-apps droberts$ cf login
API endpoint: https://api.run.haas-39.pez.pivotal.io

Email> droberts@pivotal.io

Password>
Authenticating...
OK

Targeted org dave

Targeted space dev



API endpoint:   https://api.run.haas-39.pez.pivotal.io (API version: 2.54.0)
User:           droberts@pivotal.io
Org:            dave
Space:          dev
DROBERTS-MBPRO:demo-apps droberts$
```

We can target our PCF environment by passing the API endpoint to our PCF environment using the ***$ cf api api.run.haas-39.pez.pivotal.io –skip-ssl-validation*** command, then we use the ***$ cf login*** command to log in as above. We are now in the <u>dave</u> ***org*** and the <u>dev</u> ***space*** within that <u>dave</u> ***org***, this is where our deployed apps will run in.

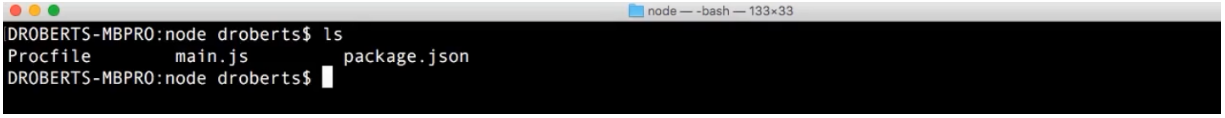


```
DROBERTS-MBPRO:demo-apps droberts$ ls
LICENSE         README.md       node            php             python          ruby
DROBERTS-MBPRO:demo-apps droberts$
```

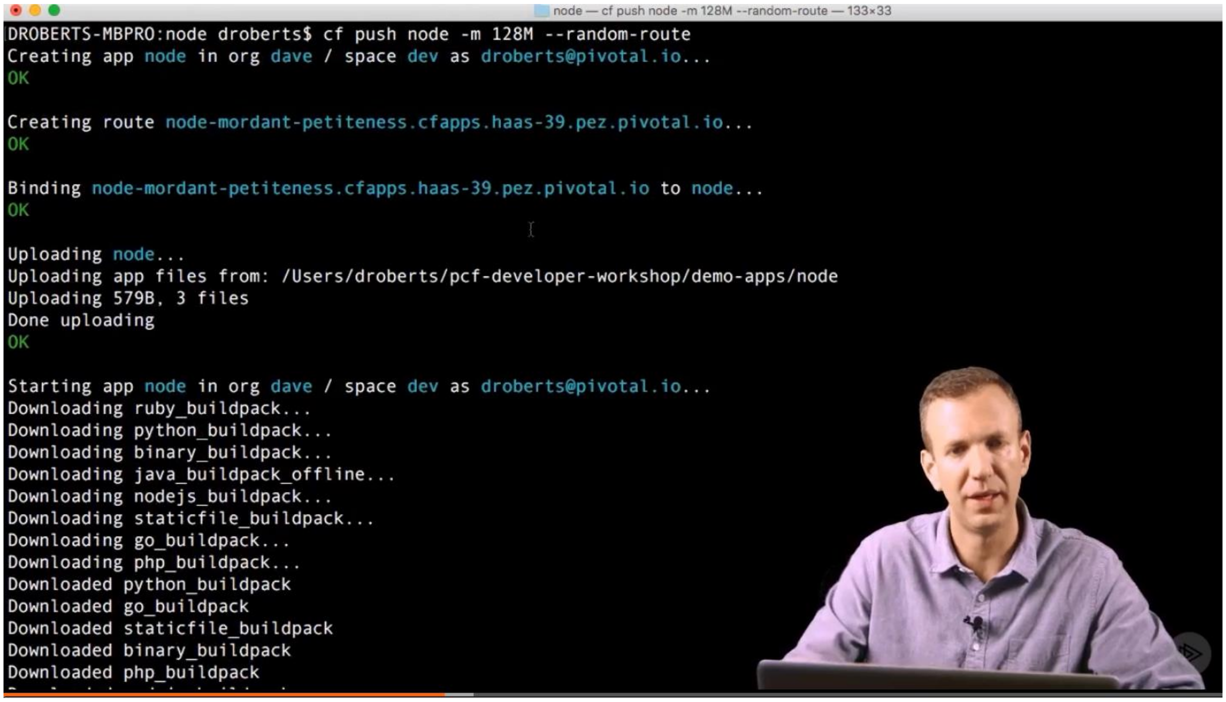
We currently have 4 apps on our filesystem that can be deployed to our org at the moment.



```
DROBERTS-MBPRO:demo-apps droberts$ ls
LICENSE         README.md       node            php             python          ruby
DROBERTS-MBPRO:demo-apps droberts$ cd node
DROBERTS-MBPRO:node droberts$
```

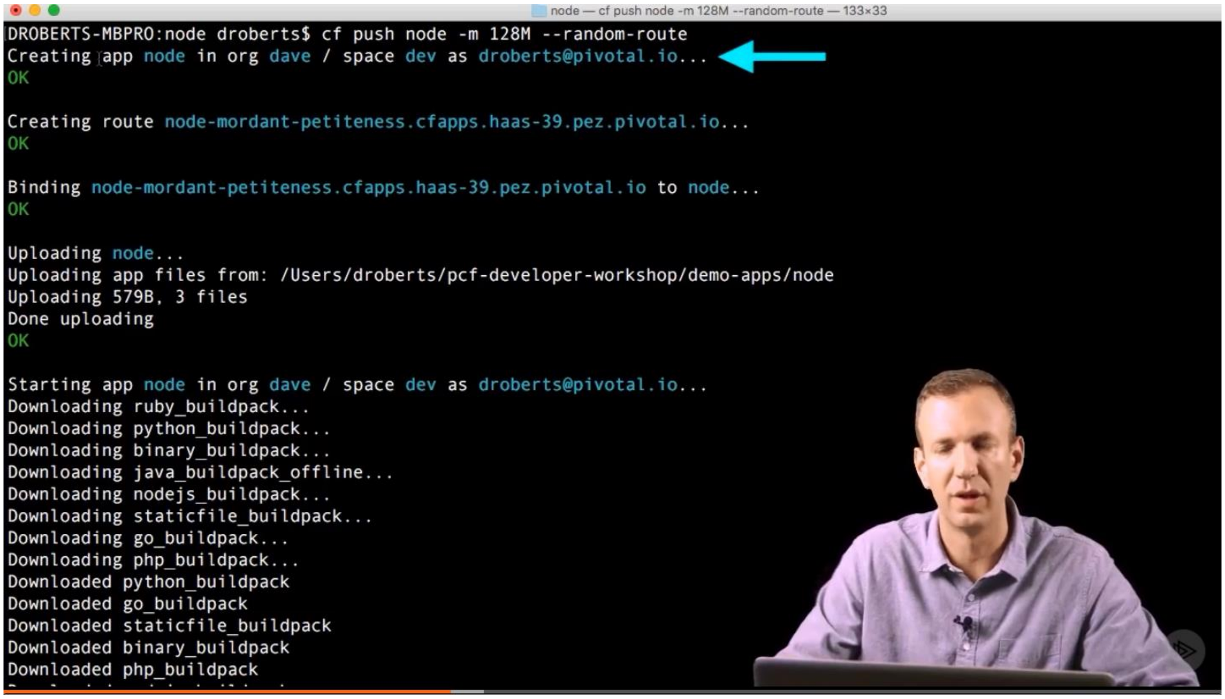


```
DROBERTS-MBPRO:node droberts$ ls
Procfile        main.js         package.json
DROBERTS-MBPRO:node droberts$ 
```



```
DROBERTS-MBPRO:node droberts$ cf push node -m 128M --random-route
Creating app node in org dave / space dev as droberts@pivotal.io...
OK

Creating route node-mordant-petiteness.cfapps.haas-39.pez.pivotal.io...
OK

Binding node-mordant-petiteness.cfapps.haas-39.pez.pivotal.io to node...
OK

Uploading node...
Uploading app files from: /Users/droberts/pcf-developer-workshop/demo-apps/node
Uploading 579B, 3 files
Done uploading
OK

Starting app node in org dave / space dev as droberts@pivotal.io...
Downloading ruby_buildpack...
Downloading python_buildpack...
Downloading binary_buildpack...
Downloading java_buildpack_offline...
Downloading nodejs_buildpack...
Downloading staticfile_buildpack...
Downloading go_buildpack...
Downloading php_buildpack...
Downloaded python_buildpack
Downloaded go_buildpack
Downloaded staticfile_buildpack
Downloaded binary_buildpack
Downloaded php_buildpack
```

We can use the ***$ cf push <app-name> <memory-size-needed> --random-route*** for a randomly generated URI for our deployed application.



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DROBERTS-MBPRO:node droberts$ cf push node -m 128M --random-route
Creating app node in org dave / space dev as droberts@pivotal.io...
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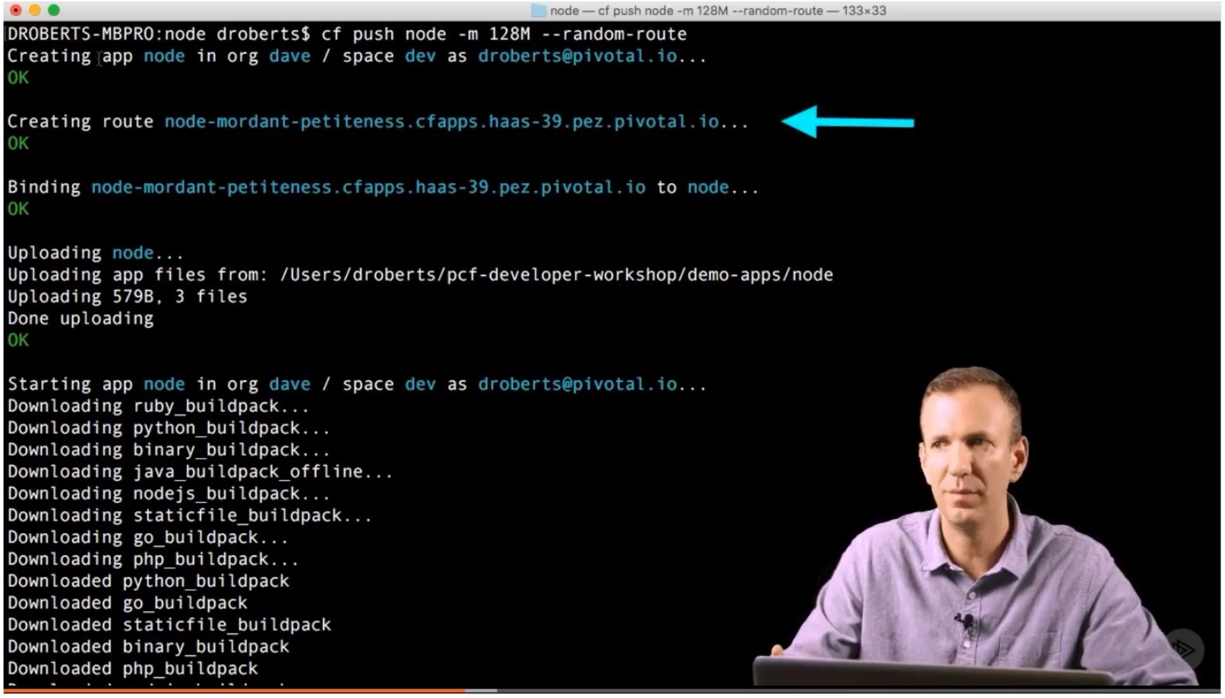
Downloading go_buildpack...
Downloading php_buildpack...
Downloaded python_buildpack
Downloaded go_buildpack
Downloaded staticfile_buildpack
Downloaded binary_buildpack
Downloaded php_buildpack
```

An app is created in PCF called node



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DROBERTS-MBPRO:node droberts$ cf push node -m 128M --random-route
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Downloaded python_buildpack
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```
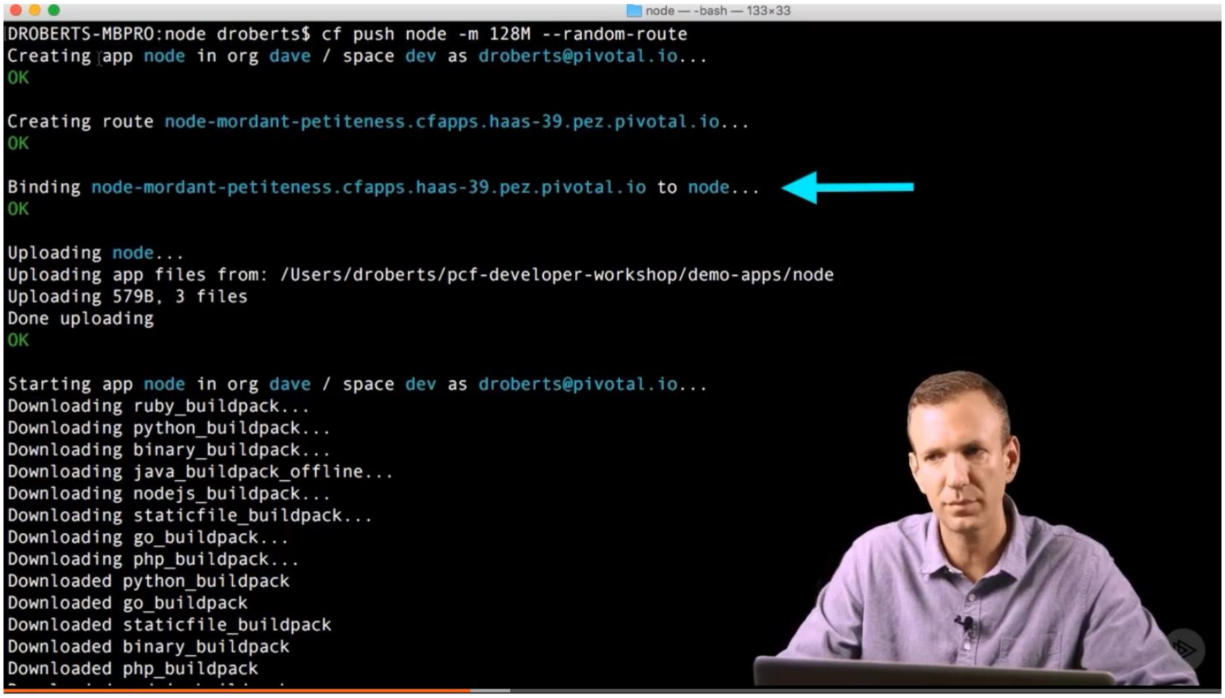

A random route is then created



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Downloading go_buildpack...
Downloading php_buildpack...
Downloaded python_buildpack
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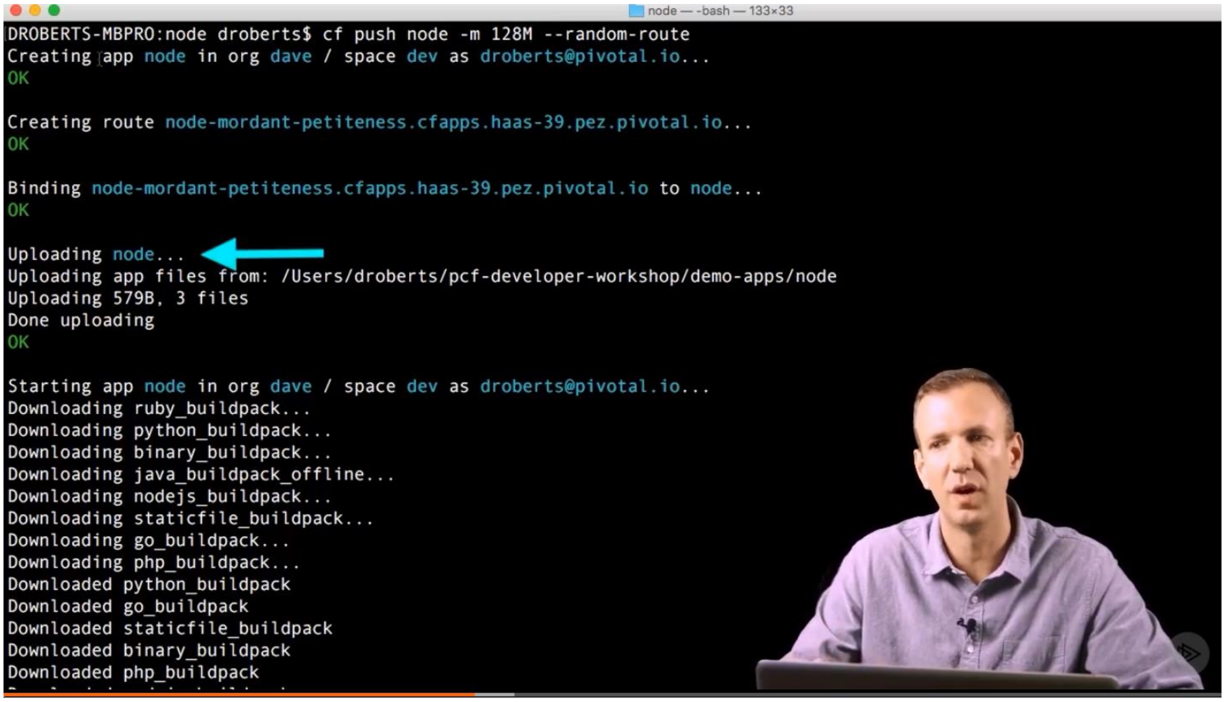
```

Then our app is bounded to the route created



```
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Downloaded python_buildpack
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Downloaded binary_buildpack
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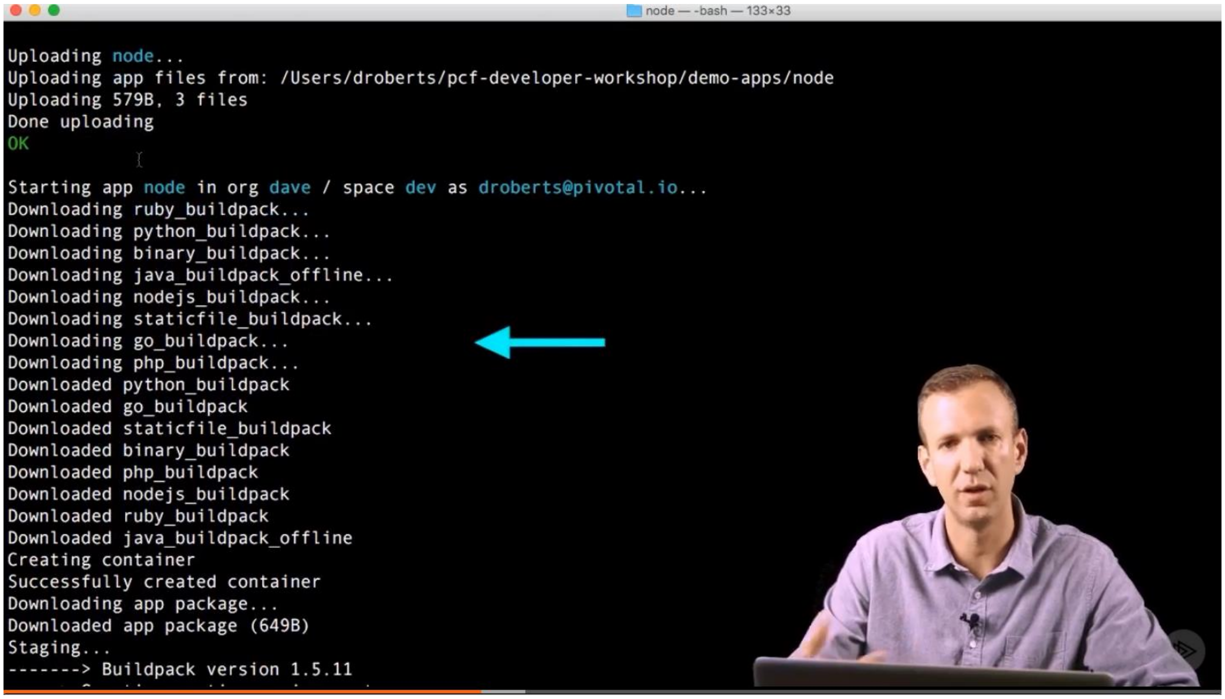
```

Our application is then uploaded to PCF



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Downloading php_buildpack...
Downloaded python_buildpack
Downloaded go_buildpack
Downloaded staticfile_buildpack
Downloaded binary_buildpack
Downloaded php_buildpack
Downloaded nodejs_buildpack
Downloaded ruby_buildpack
Downloaded java_buildpack_offline
Creating container
Successfully created container
Downloading app package...
Downloaded app package (649B)
Staging...
-------> Buildpack version 1.5.11
```
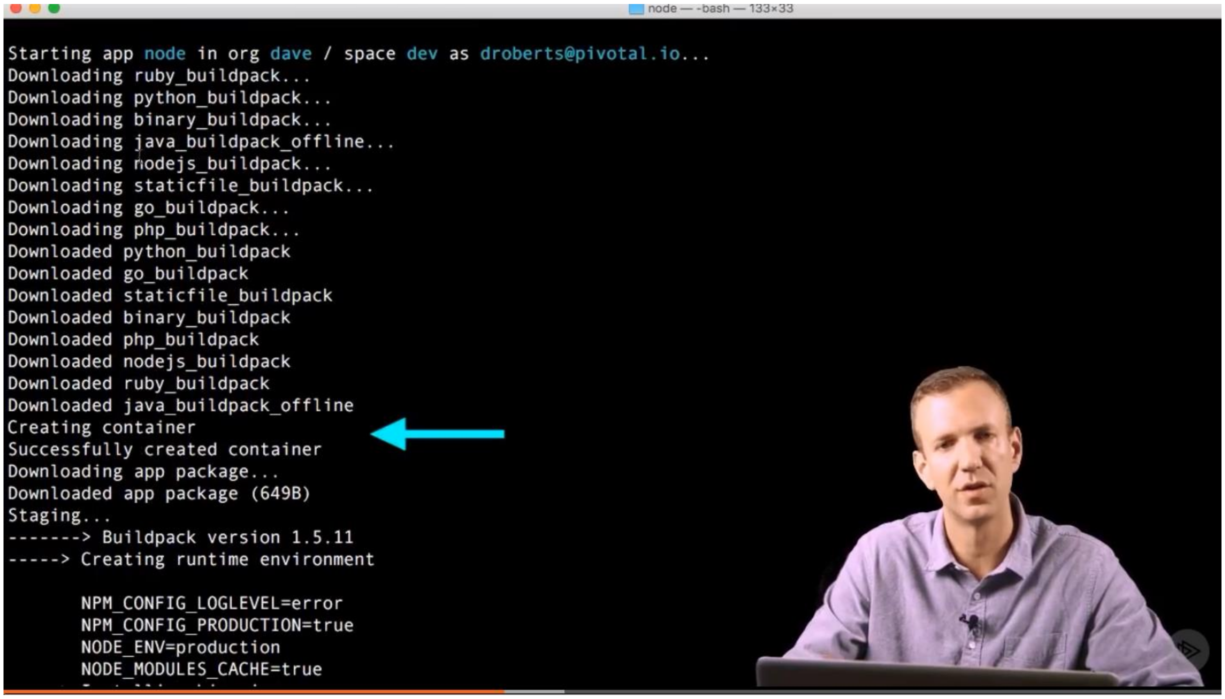

Then needed buildpacks are downloaded. PCF is going to determine the needed buildpacks for running your application



```
Starting app node in org dave / space dev as droberts@pivotal.io...
Downloading ruby_buildpack...
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Downloaded nodejs_buildpack
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Downloaded java_buildpack_offline
Creating container
Successfully created container
Downloading app package...
Downloaded app package (649B)
Staging...
-------> Buildpack version 1.5.11
-----> Creating runtime environment

       NPM_CONFIG_LOGLEVEL=error
       NPM_CONFIG_PRODUCTION=true
       NODE_ENV=production
       NODE_MODULES_CACHE=true
```
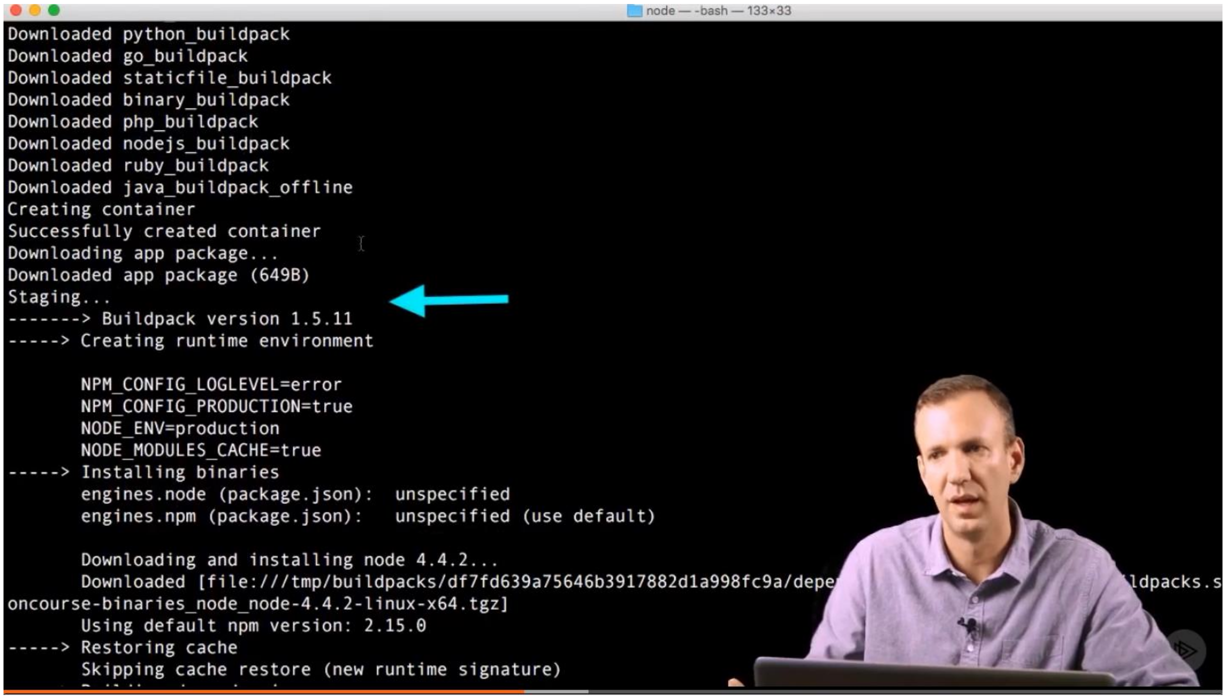
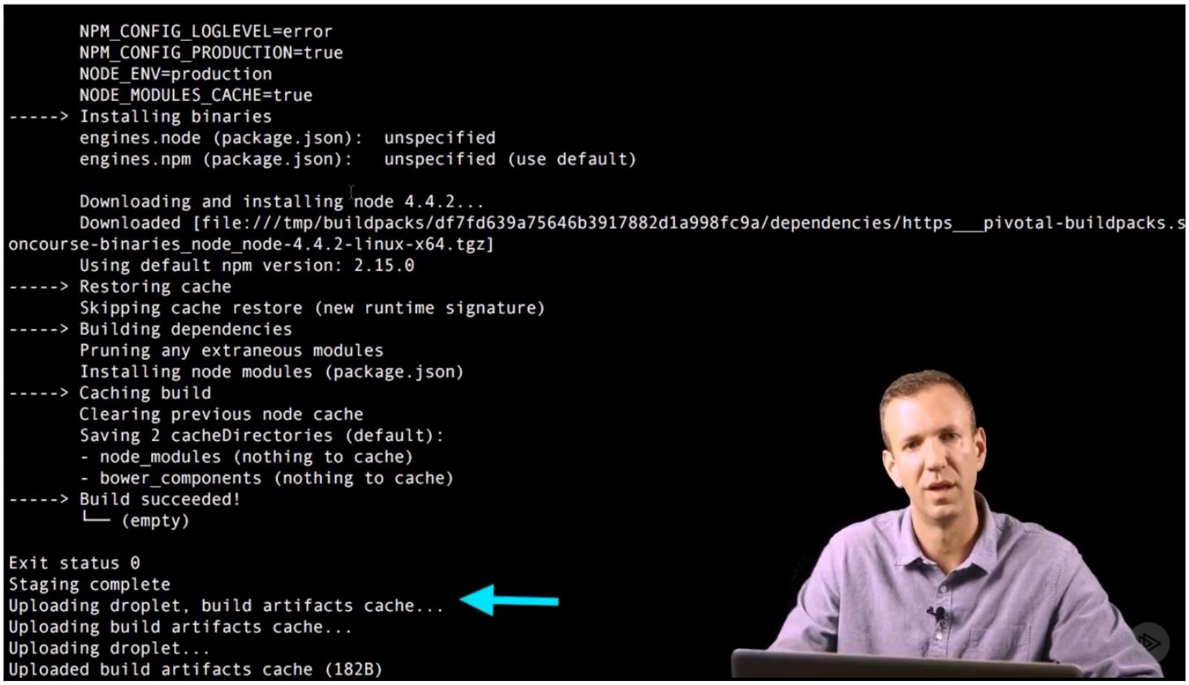

A container is then created to run our application inside in an isolate manner



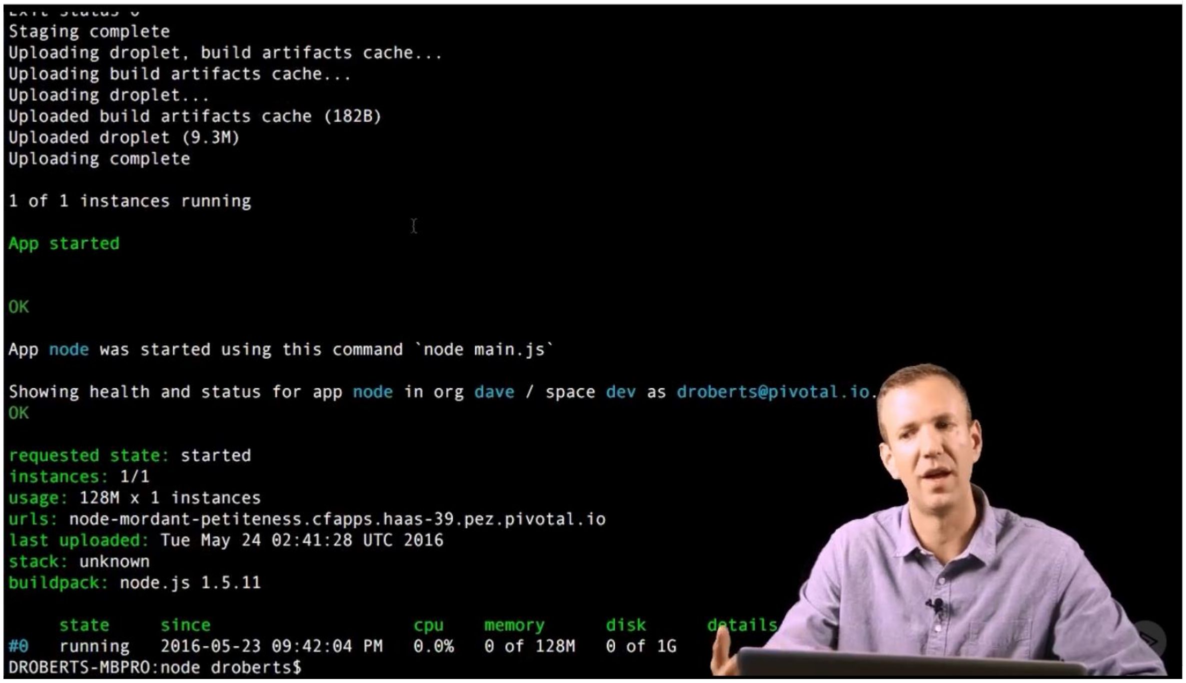
```
Downloaded python_buildpack
Downloaded go_buildpack
Downloaded staticfile_buildpack
Downloaded binary_buildpack
Downloaded php_buildpack
Downloaded nodejs_buildpack
Downloaded ruby_buildpack
Downloaded java_buildpack_offline
Creating container
Successfully created container
Downloading app package...
Downloaded app package (649B)
Staging...
-------> Buildpack version 1.5.11
-----> Creating runtime environment

       NPM_CONFIG_LOGLEVEL=error
       NPM_CONFIG_PRODUCTION=true
       NODE_ENV=production
       NODE_MODULES_CACHE=true
-----> Installing binaries
       engines.node (package.json):  unspecified
       engines.npm (package.json):   unspecified (use default)

       Downloading and installing node 4.4.2...
       Downloaded [file:///tmp/buildpacks/df7fd639a75646b3917882d1a998fc9a/depe                    ldpacks.s
oncourse-binaries_node_node-4.4.2-linux-x64.tgz]
       Using default npm version: 2.15.0
-----> Restoring cache
       Skipping cache restore (new runtime signature)
```

This is the staging step that determines all the runtime support our app needs to run successfully. A web app might need an app server and this is all rolled up into something called a droplet.



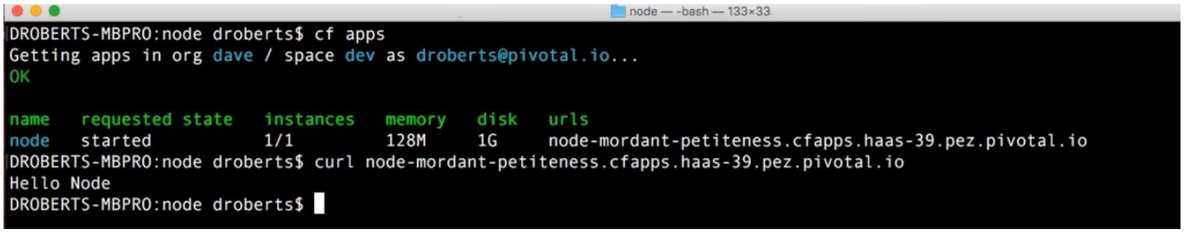
```
       NPM_CONFIG_LOGLEVEL=error
       NPM_CONFIG_PRODUCTION=true
       NODE_ENV=production
       NODE_MODULES_CACHE=true
-----> Installing binaries
       engines.node (package.json):  unspecified
       engines.npm (package.json):   unspecified (use default)

       Downloading and installing node 4.4.2...
       Downloaded [file:///tmp/buildpacks/df7fd639a75646b3917882d1a998fc9a/dependencies/https___pivotal-buildpacks.s
oncourse-binaries_node_node-4.4.2-linux-x64.tgz]
       Using default npm version: 2.15.0
-----> Restoring cache
       Skipping cache restore (new runtime signature)
-----> Building dependencies
       Pruning any extraneous modules
       Installing node modules (package.json)
-----> Caching build
       Clearing previous node cache
       Saving 2 cacheDirectories (default):
       - node_modules (nothing to cache)
       - bower_components (nothing to cache)
-----> Build succeeded!
       └── (empty)

Exit status 0
Staging complete
Uploading droplet, build artifacts cache...
Uploading build artifacts cache...
Uploading droplet...
Uploaded build artifacts cache (182B)
```

The droplet containing all the needed dependencies is created



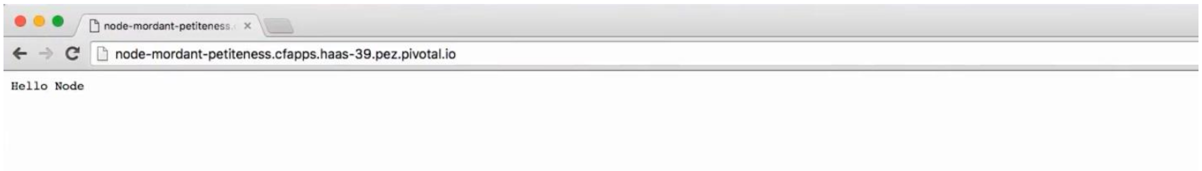
```
Staging complete
Uploading droplet, build artifacts cache...
Uploading build artifacts cache...
Uploading droplet...
Uploaded build artifacts cache (182B)
Uploaded droplet (9.3M)
Uploading complete

1 of 1 instances running

App started


OK

App node was started using this command `node main.js`

Showing health and status for app node in org dave / space dev as droberts@pivotal.io.
OK

requested state: started
instances: 1/1
usage: 128M x 1 instances
urls: node-mordant-petiteness.cfapps.haas-39.pez.pivotal.io
last uploaded: Tue May 24 02:41:28 UTC 2016
stack: unknown
buildpack: node.js 1.5.11

     state     since                    cpu    memory      disk      details
#0   running   2016-05-23 09:42:04 PM   0.0%   0 of 128M   0 of 1G
DROBERTS-MBPRO:node droberts$
```

The droplet is created and then ran within the container, the route gets mapped to that specific application instance and we have our running application. We currently have instance #0 of our application running.



```
DROBERTS-MBPRO:node droberts$ cf apps
Getting apps in org dave / space dev as droberts@pivotal.io...
OK

name   requested state   instances   memory   disk   urls
node   started           1/1         128M     1G     node-mordant-petiteness.cfapps.haas-39.pez.pivotal.io
DROBERTS-MBPRO:node droberts$ curl node-mordant-petiteness.cfapps.haas-39.pez.pivotal.io
Hello Node
DROBERTS-MBPRO:node droberts$ █
```

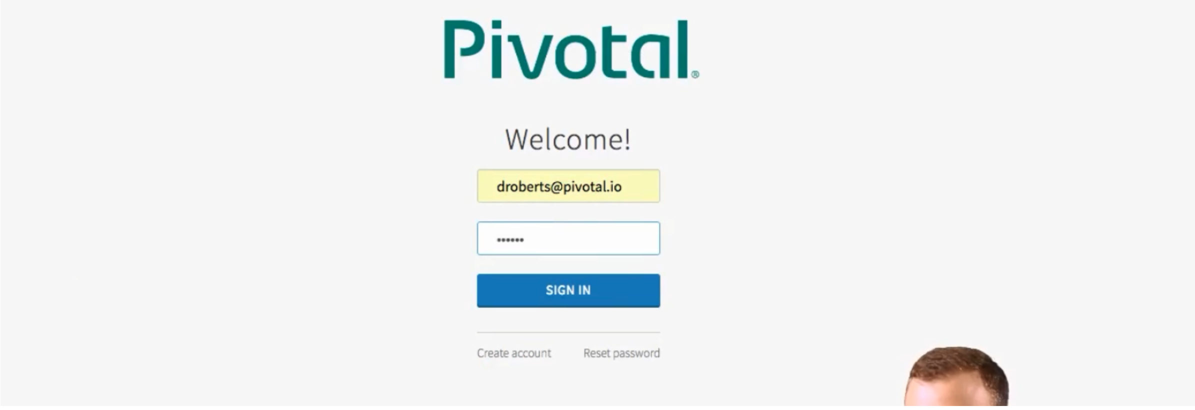
We can use the ***$ cf apps*** command to see all the apps running within a particular organization or **org** and ***space***, we can use ***$ curl <app-URL>*** to get a response and see that our Hello World application is running.



node-mordant-petiteness.cfapps.haas-39.pez.pivotal.io

```
Hello Node
```

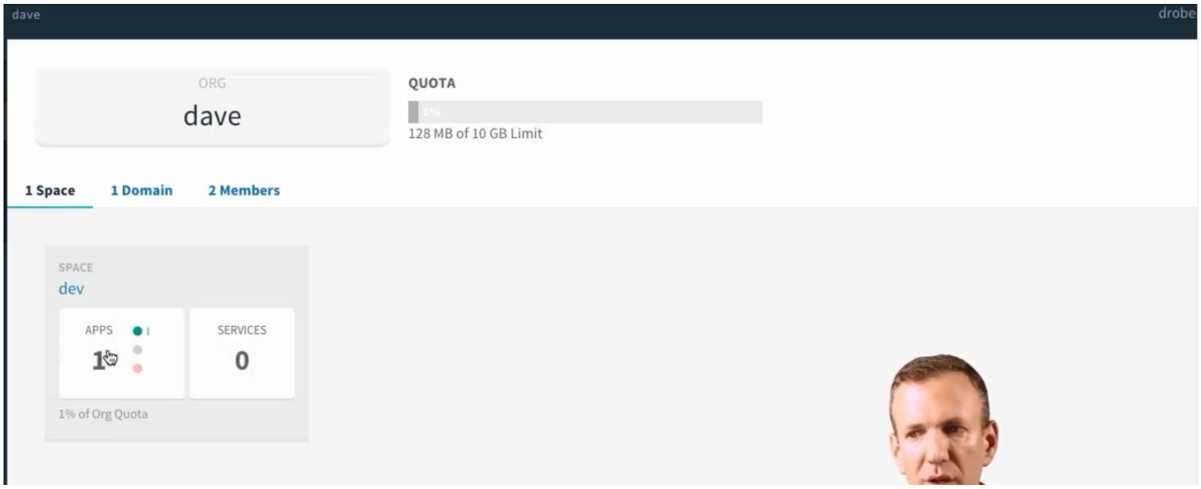
We can also use the browser to see our application running.


Pivotal

Welcome!

droberts@pivotal.io

••••••



ORG
dave

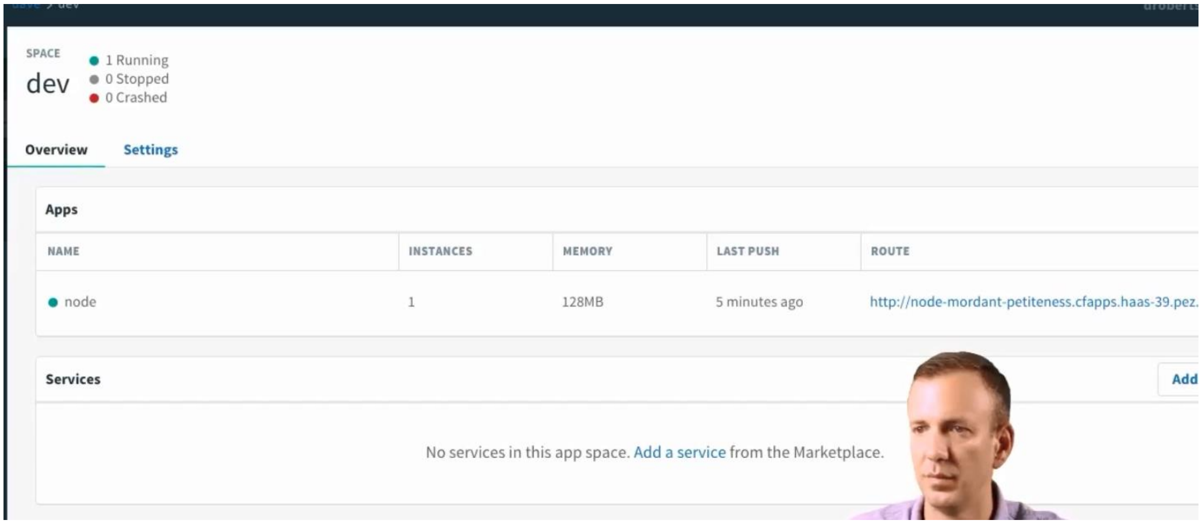
QUOTA
128 MB of 10 GB Limit

SPACE
dev

APPS 1
SERVICES 0

1% of Org Quota

The PCF Apps Manager gives us a UI for managing our apps.

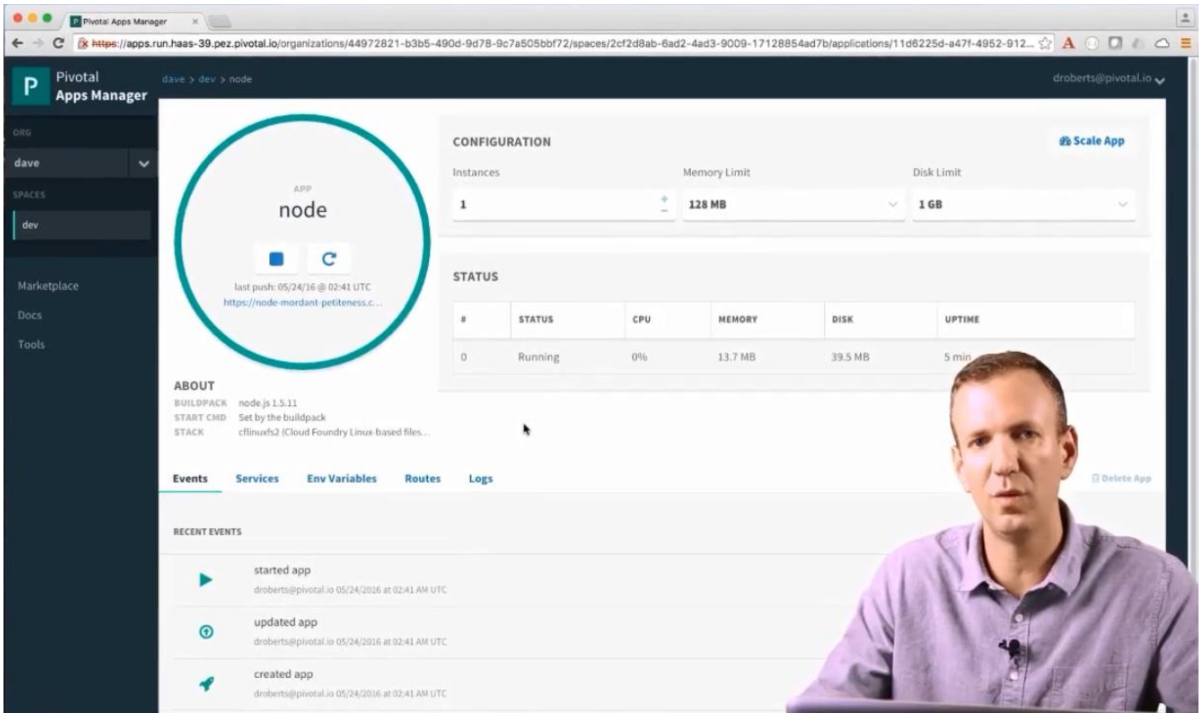

SPACE
dev
● 1 Running
● 0 Stopped
● 0 Crashed

Apps

NAME	INSTANCES	MEMORY	LAST PUSH	ROUTE
● node	1	128MB	5 minutes ago	http://node-mordant-petiteness.cfapps.haas-39.pez.

Services

No services in this app space. Add a service from the Marketplace.



https://apps.run.haas-39.pez.pivotal.io/organizations/44972821-b3b5-490d-9d78-9c7a505bbf72/spaces/2cf2d8ab-6ad2-4ad3-9009-17128854ad7b/applications/11d6225d-a47f-4952-912...

ORG: dave

SPACES: dev

APP
node

last push: 05/24/16 @ 02:41 UTC
https://node-mordant-petiteness.c...

CONFIGURATION

Instances	Memory Limit	Disk Limit
1	128 MB	1 GB

STATUS

#	STATUS	CPU	MEMORY	DISK	UPTIME
0	Running	0%	13.7 MB	39.5 MB	5 min

ABOUT

BUILDPACK	node.js 1.5.11
START CMD	Set by the buildpack
STACK	cflinuxfs2 (Cloud Foundry Linux-based files...

RECENT EVENTS

started app
droberts@pivotal.io 05/24/2016 at 02:41 AM UTC

updated app
droberts@pivotal.io 05/24/2016 at 02:41 AM UTC

created app
droberts@pivotal.io 05/24/2016 at 02:41 AM UTC

We see a lot of the information we specified via the CLI when creating our app.

Agenda

1. Evolution of Cloud Architectures
2. Industry Trends
3. Cloud Foundry
4. Pivotal Cloud Foundry

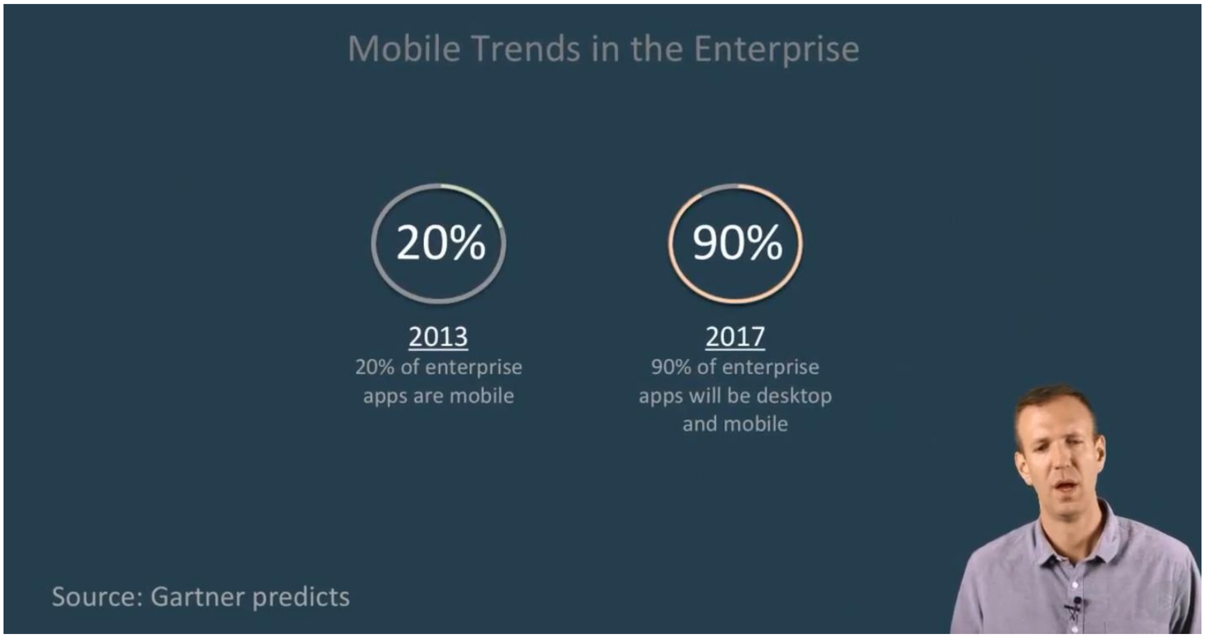
Software is Disrupting Every Industry

Silicon Valley is coming.

Jamie Dimon
CEO, JPMorgan Chase

Source: JPMorgan Chase Annual Shareholder Letter 2015

Software is Changing Industries

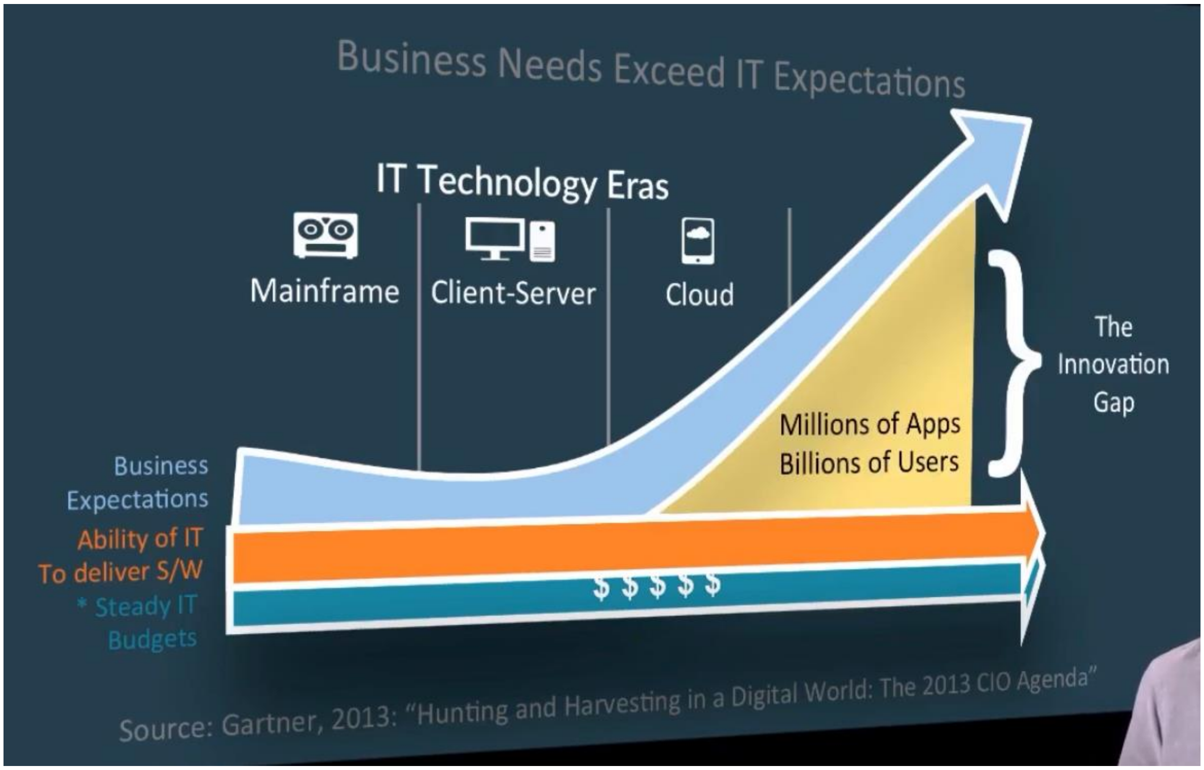


Mobile Trends in the Enterprise

2013
20% of enterprise apps are mobile

2017
90% of enterprise apps will be desktop and mobile

Source: Gartner predicts



Business Needs Exceed IT Expectations

IT Technology Eras

Mainframe

Client-Server

Cloud

Business Expectations

Ability of IT To deliver S/W

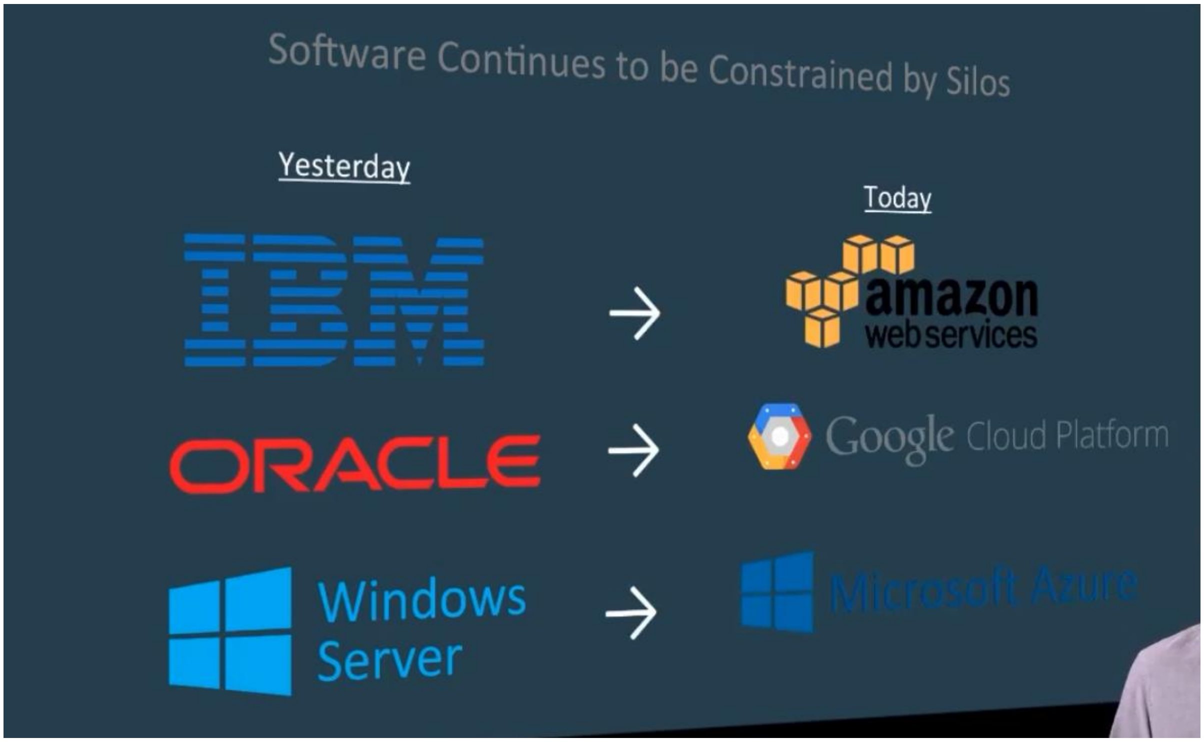
* Steady IT Budgets

$ $ $ $ $

Millions of Apps
Billions of Users

The Innovation Gap

Source: Gartner, 2013: "Hunting and Harvesting in a Digital World: The 2013 CIO Agenda"



Software Continues to be Constrained by Silos

Yesterday		Today
IBM	→	amazon web services
ORACLE	→	Google Cloud Platform
Windows Server	→	Microsoft Azure

Agenda

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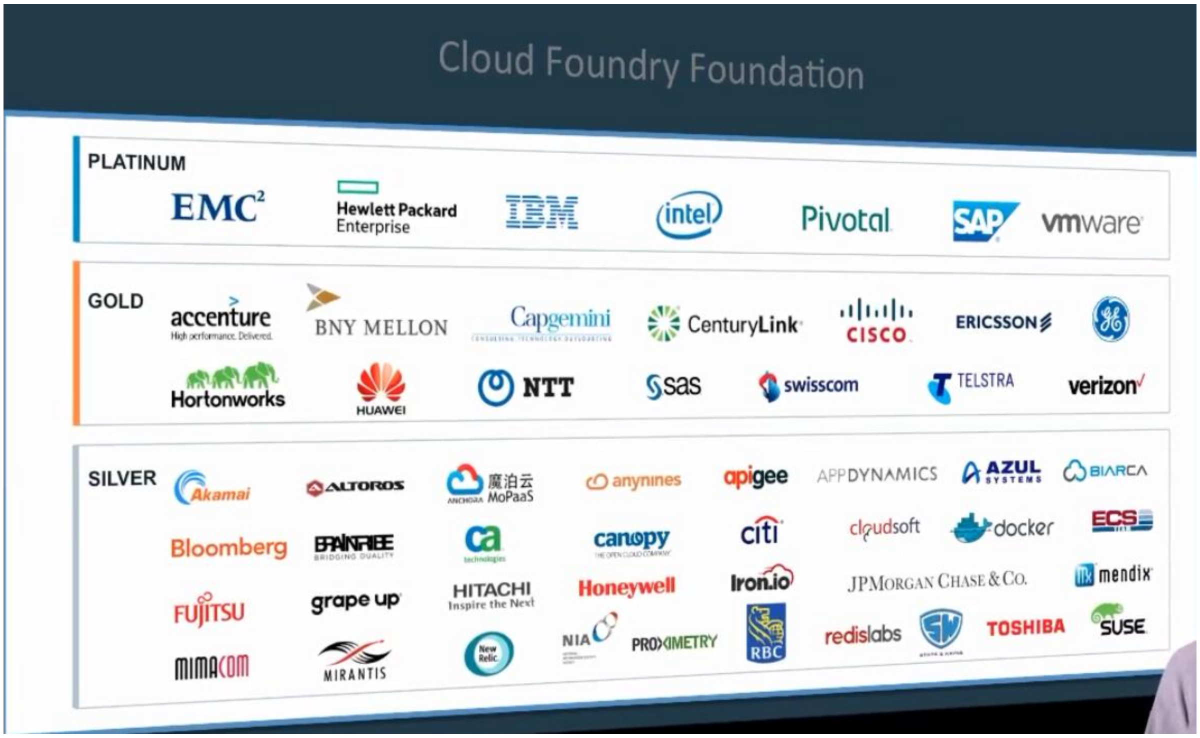
4. Pivotal Cloud Foundry

Cloud Foundry



Cloud Foundry Foundation

PLATINUM

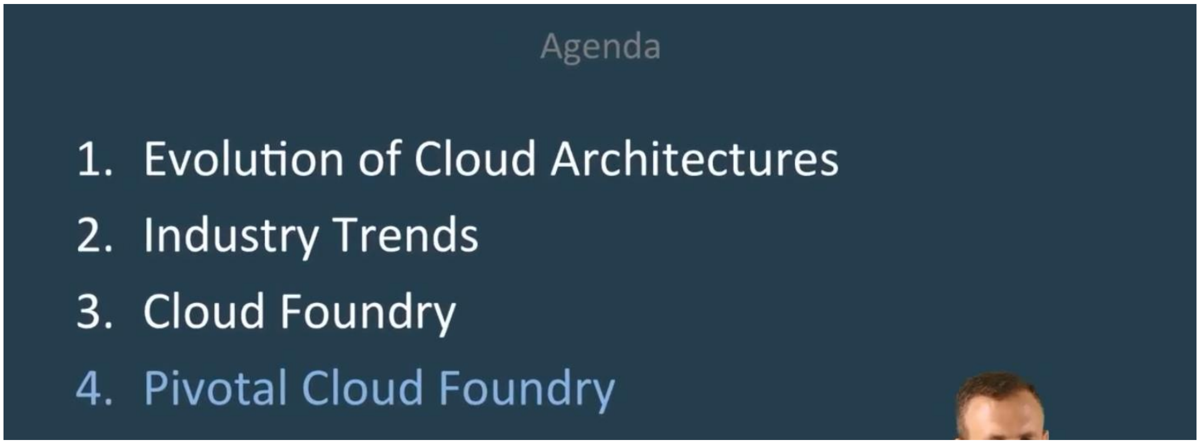
EMC² · Hewlett Packard Enterprise · IBM · intel · Pivotal · SAP · vmware

GOLD

accenture High performance. Delivered. · BNY MELLON · Capgemini · CenturyLink · cisco · ERICSSON · GE · Hortonworks · HUAWEI · NTT · sas · swisscom · TELSTRA · verizon

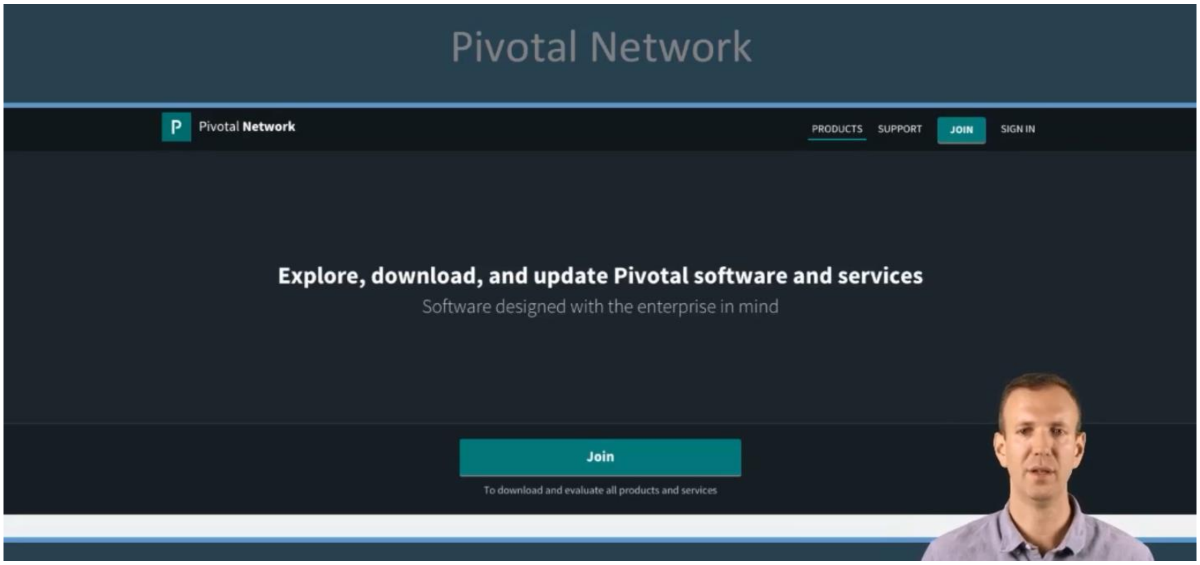
SILVER

Akamai · ALTOROS · 魔泊云 MoPaaS · anynines · apigee · APPDYNAMICS · AZUL SYSTEMS · BIARCA · Bloomberg · BRAINFREE · ca technologies · canopy · citi · cloudsoft · docker · ECS · FUJITSU · grape up · HITACHI Inspire the Next · Honeywell · Iron.io · JPMorgan Chase & Co. · mendix · MIMACOM · MIRANTIS · New Relic · NIA · PROXIMETRY · RBC · redislabs · Stark & Wayne · TOSHIBA · SUSE



Agenda

1. Evolution of Cloud Architectures
2. Industry Trends
3. Cloud Foundry
4. Pivotal Cloud Foundry

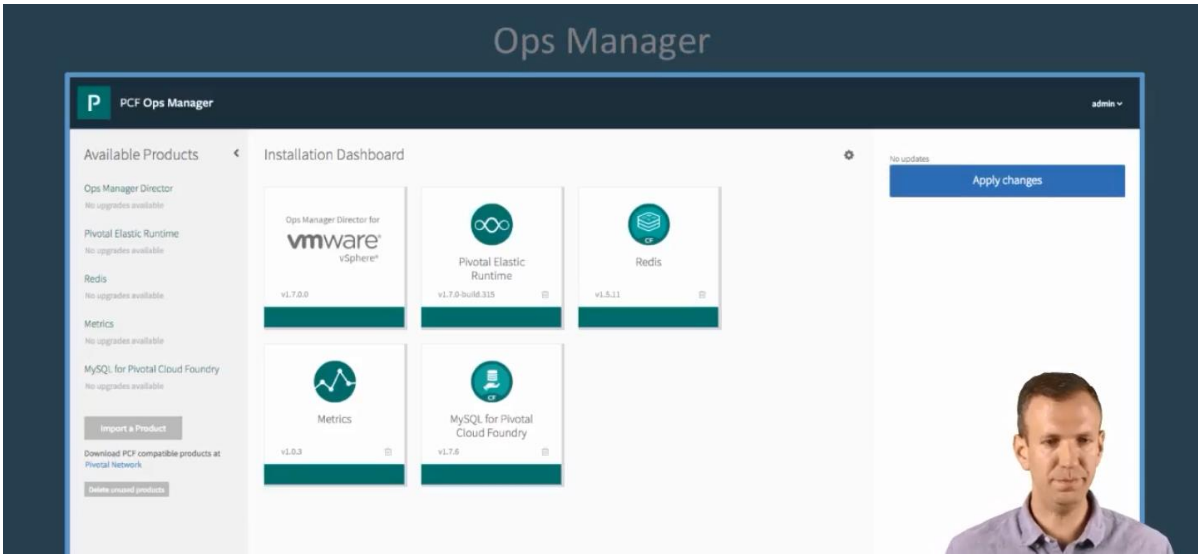


Pivotal Network

Explore, download, and update Pivotal software and services

Software designed with the enterprise in mind

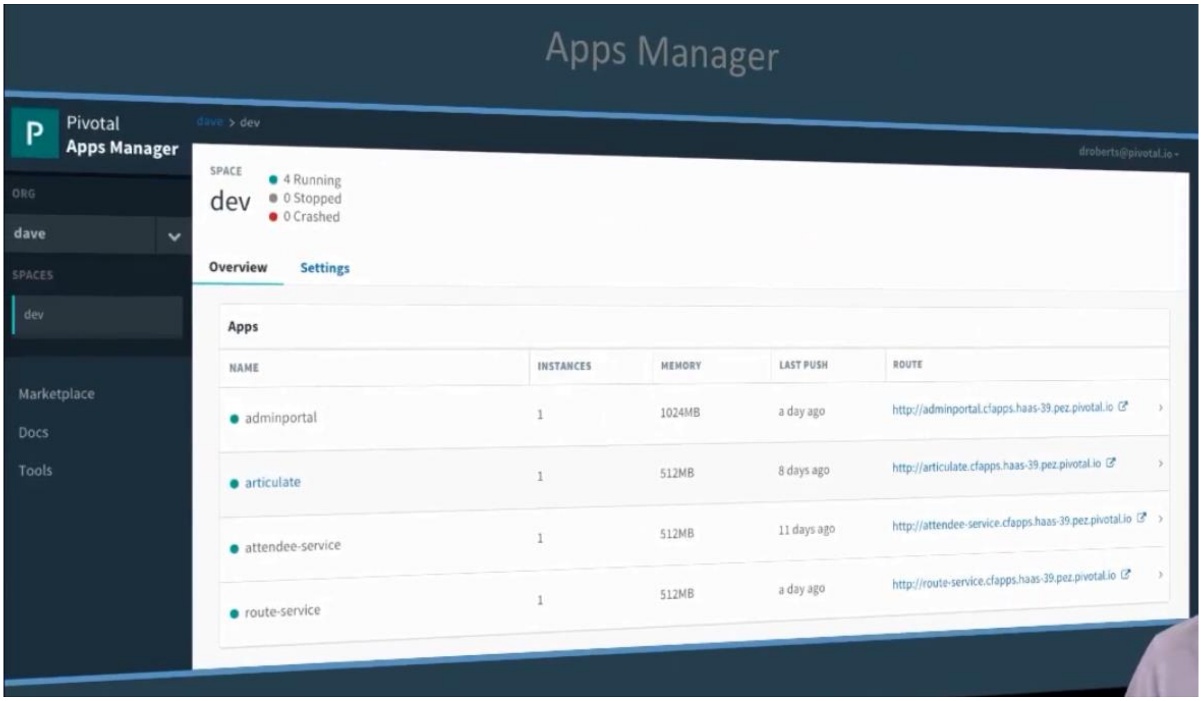
To download and evaluate all products and services



Ops Manager

Download PCF compatible products at Pivotal Network

We have also simplified the install experience, and manage your PCF deployments and services used with your apps.



Apps Manager

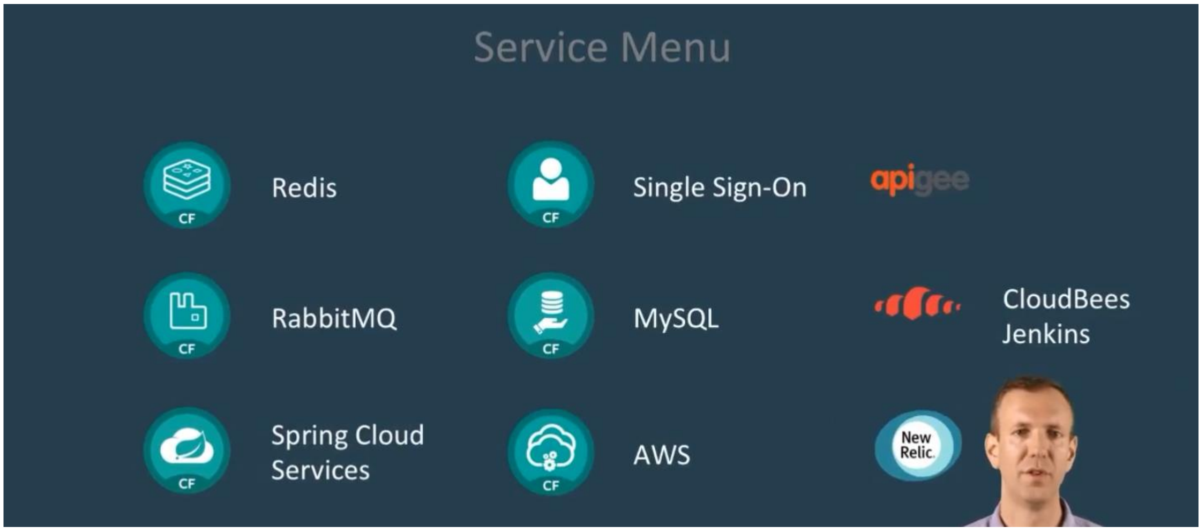
SPACE

dev

- ● 4 Running
- ● 0 Stopped
- ● 0 Crashed

Apps

NAME	INSTANCES	MEMORY	LAST PUSH	ROUTE
● adminportal	1	1024MB	a day ago	http://adminportal.cfapps.haas-39.pez.pivotal.io
● articulate	1	512MB	8 days ago	http://articulate.cfapps.haas-39.pez.pivotal.io
● attendee-service	1	512MB	11 days ago	http://attendee-service.cfapps.haas-39.pez.pivotal.io
● route-service	1	512MB	a day ago	http://route-service.cfapps.haas-39.pez.pivotal.io



Service Menu

- Redis
- RabbitMQ
- Spring Cloud Services
- Single Sign-On
- MySQL
- AWS
- apigee
- CloudBees Jenkins
- New Relic

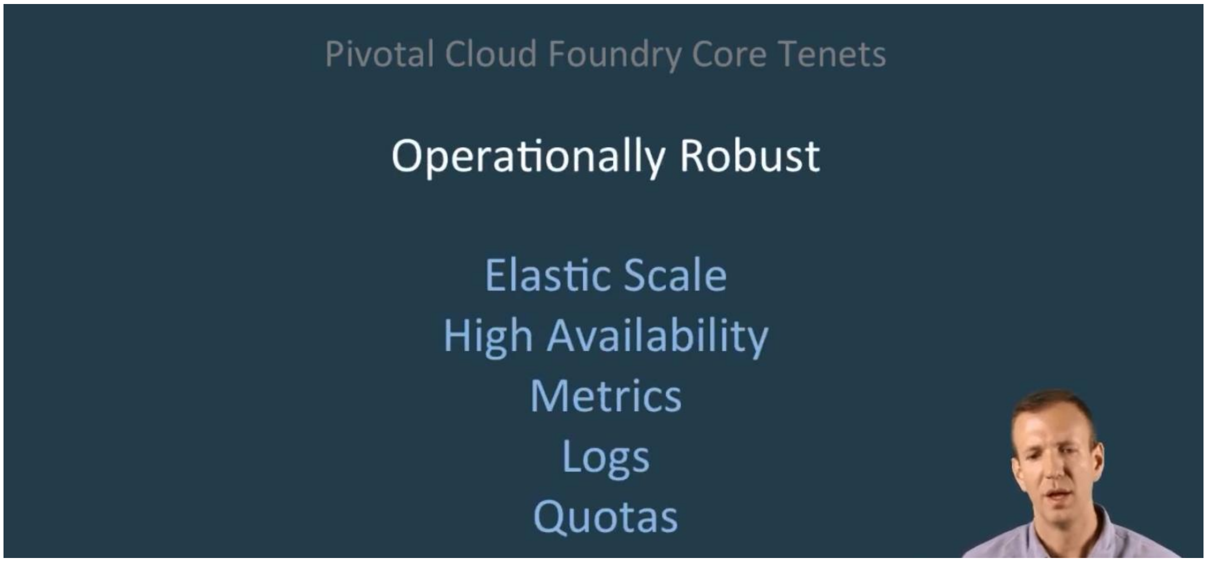
Pivotal Cloud Foundry Core Tenets

Self Serve Platform for Developers

cf push

Service Marketplace

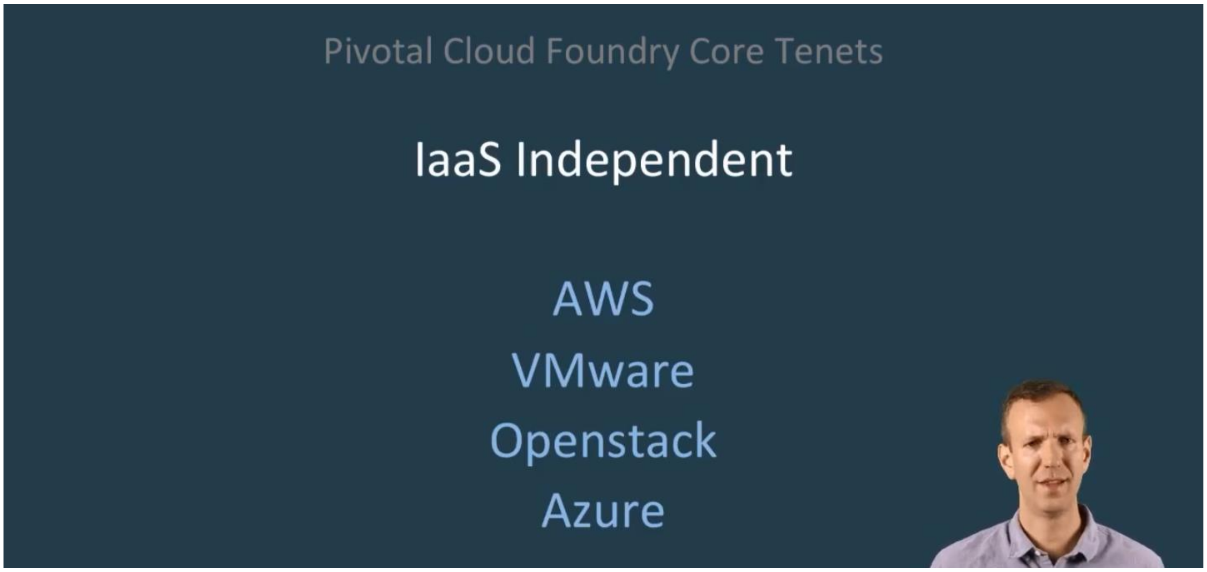
Microservice Ready



Pivotal Cloud Foundry Core Tenets

Operationally Robust

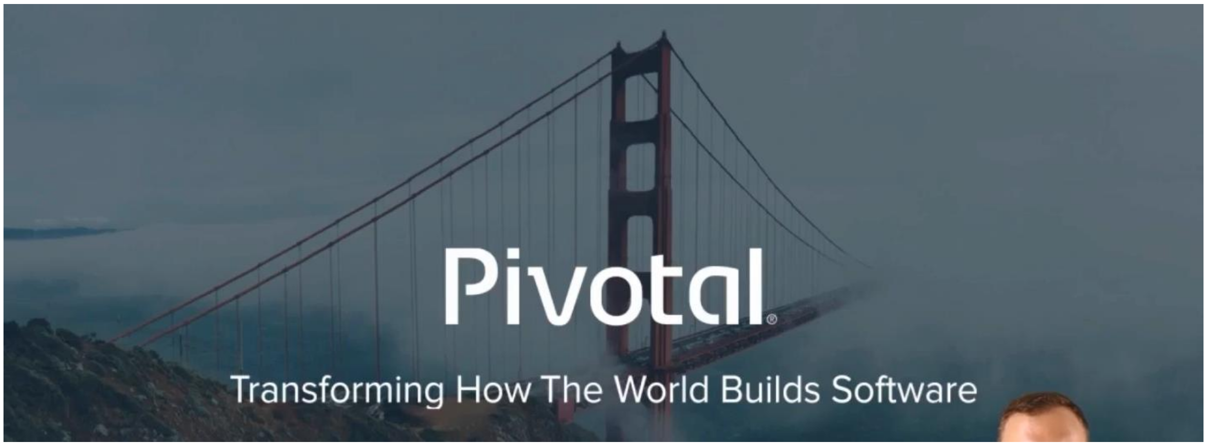
Elastic Scale
High Availability
Metrics
Logs
Quotas



Pivotal Cloud Foundry Core Tenets

IaaS Independent

AWS
VMware
Openstack
Azure



Pivotal

Transforming How The World Builds Software

Pivotal Cloud Foundry

Introduction Recap