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Pivotal Cloud Foundry

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Getting Started with Command Line Interface

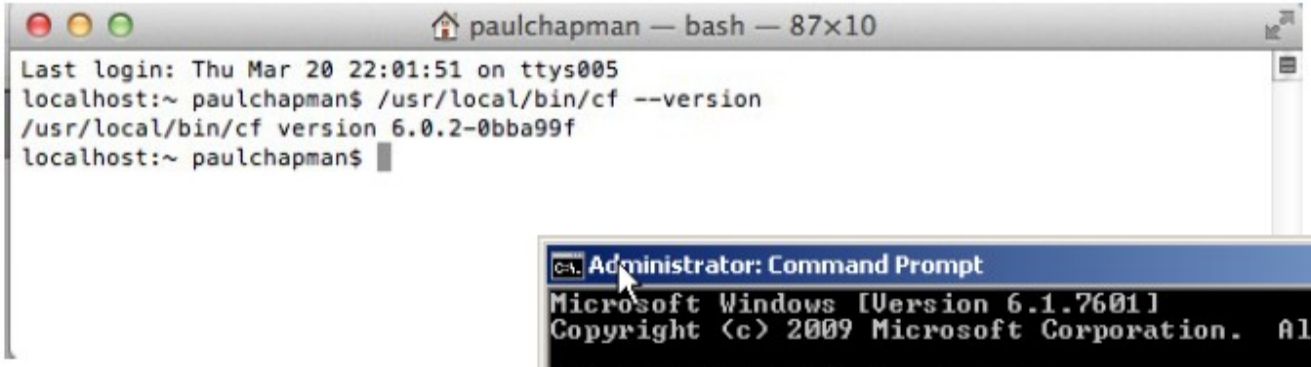
The Command Line Interface

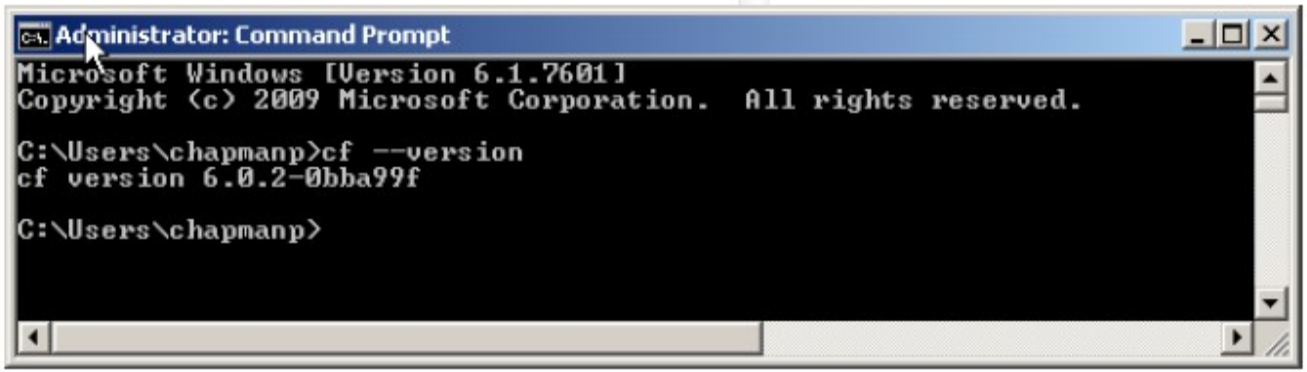
- Several interface options exits for Cloud Foundry
  - Command Line Interface (CLI)
  - Web-based Application Manager Console
  - Eclipse / STS plug-in
- Primary access is done via the CLI
  - Make sure you have it installed
    - Installation was covered in the “welcome” module

Test the CLI Utility

- It is called **cf**
  - Open a command/Shell window
  - At the prompt type : **cf --version**

- Version *must* be **6** or more
- *Must* remove any earlier (Ruby) version





Getting Help

- Get help at any time via **cf help**

- Or **cf help <command>**

DO NOW – Get Help on a Command

- Perform these steps on your computer:
  - Open a command prompt
  - Issue the **cf help** command
  - Get help on the login command: **cf help login**
- Answer these questions:
  - What option do you use to specify username?
  - Is specifying the password option encouraged?

Login

Login to Cloud Foundry

- Need to tell cf
  - What cloud foundry instance you are using
  - What your account details are
  - Use **cf login**

Color highlighting
MacOS, Linux only

```
> cf login -a api.run.pivotal.io -u <username>
API endpoint: api.run.pivotal.io
Authenticating...
OK

Targeted org Cloud Foundry Course

Targeted space development

API endpoint: https://api.run.pivotal.io (API version: 2.0.0)
User:         qzqz2020@yahoo.com.au
Org:          Cloud Foundry Course
Space:        development
```

Will prompt for anything you don't specify
No -p? Prompts for password

Cloud Foundry URLs

- To access CF you need to know 3 URLs
  - API Endpoint
    - Identifies your CF instance
    - Used to deploy applications, manage spaces, routes…
    - The cf utility makes *RESTful* requests to this URL

      Actually to the Cloud Controller
  - Apps Manager
    - Application management dashboard
    - Pivotal CF only
  - Apps Domain
    - Used to access deployed applications
    - May be same as System Domain

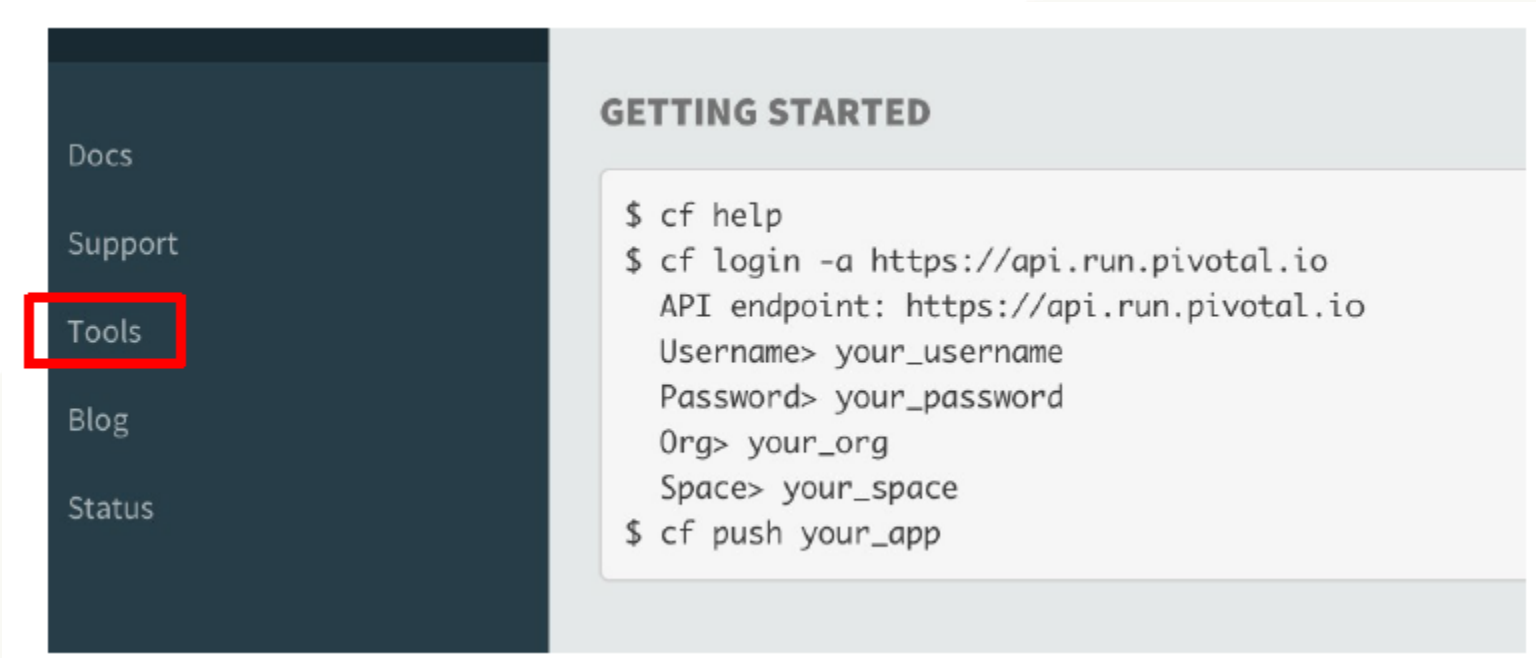
Cloud Foundry URLs

For simplicity, most examples
In this session show PWS URLs

- System & App domains defined when CF was installed
- If using PWS
  - System domain: **run.pivotal.io**
    - API Endpoint: **api.run.pivotal.io**
    - Apps Manager: **console.run.pivotal.io**
  - Apps domain: **cfapps.io**
- Your own CF installation
  - System domain: **<your-cf-system-domain>**
    - API Endpoint: **api. <your-cf-system-domain>**
    - Apps Manager: **console. <your-cf-system-domain>**
  - Apps domain: **<your-cf-system-domain>**

Finding the API Endpoint URL

- URL of Cloud Controller in our Cloud Foundry instance
  - On Apps Manager home-page on first login
  - Or click Tools
  - Shows how to run **cf login**, including the API Endpoint



DO NOW – Login

- Perform these steps on your computer
  - Login with **cf login** command
    - Specify CF instance using **–a <API-URL>**

      For PWS: **-a api.run.pivotal.io**
    - Specify email / password
    - If prompted, select an organization and space

```
$> cf login -a <API-URL> -u <your-email-or-username>
API endpoint: api.run.pivotal.io
...
```

  - Firewall issues?

http://docs.cloudfoundry.org/devguide/installcf/http-proxy.html

The .cf Directory

- **cf** creates a **.cf** directory in your home directory
  - Stores context, logs, crash reports …
  - Remembers your CF API Endpoint
    - Don't need to specify **–a** option at next login

```
localhost:dev$ ls -l ~/.cf
total 48
-rw-------  1 paulchapman  staff   2491 15 Aug 14:06 config.json
-rw-r--r--  1 paulchapman  staff  11737 29 Nov  2013 crash
drwxr-xr-x  3 paulchapman  staff    102 12 Sep  2013 logs
-rw-r--r--  1 paulchapman  staff     26 12 Sep  2013 target
-rw-r--r--  1 paulchapman  staff   2084 29 Nov  2013 tokens.yml
```

DO NOW - .cf folder

- Perform these steps on your computer:
  - Find the **.cf** folder / directory on your computer:
    - You won't (yet) have all the files shown on previous slide
  - Open the **config.json** file, observe the contents

Current Targets

- When your first login you see output like this
  - Notice it shows current organization and space
  - At any time, run **cf target** to get same information

```
API endpoint: https://api.run.pivotal.io (API version: 2.6.0)
User:         pchapman@pivotal.io
Org:          pivotaledu
Space:        development
```

- By default your organization only has one space
  - Development
- **Note:** on PWS you are setup as your own oraganization

Viewing Organization

- Commands
  - **cf orgs** — All orgs for current user
  - **cf org <org-name>** — Shows specified org

```
>$ cf org pivotaledu
Getting info for org myorg as user@somedomain.com
OK

pivotaledu:
    domains:          cfapps.io
    quota:            paid (10240M memory limit, Unlimited instance
                        memory limit, 1000 routes, -1 services,
                        paid services allowed)
    spaces:           development, production, staging
    space quotas:
>$
```

Managing Space

- To see all the spaces in an organization
  - **cf spaces**
- Create a new space (in current organization by default)
  - **cf create-space <space-name>**
  - **cf create-space <space-name> -o <org-name>**
- Use ***target*** command to change space (or organization)
  - **cf target –s <space-name>**
  - **cf target –o <org-name>**

Deploy An Application

Deploy Using the CLI

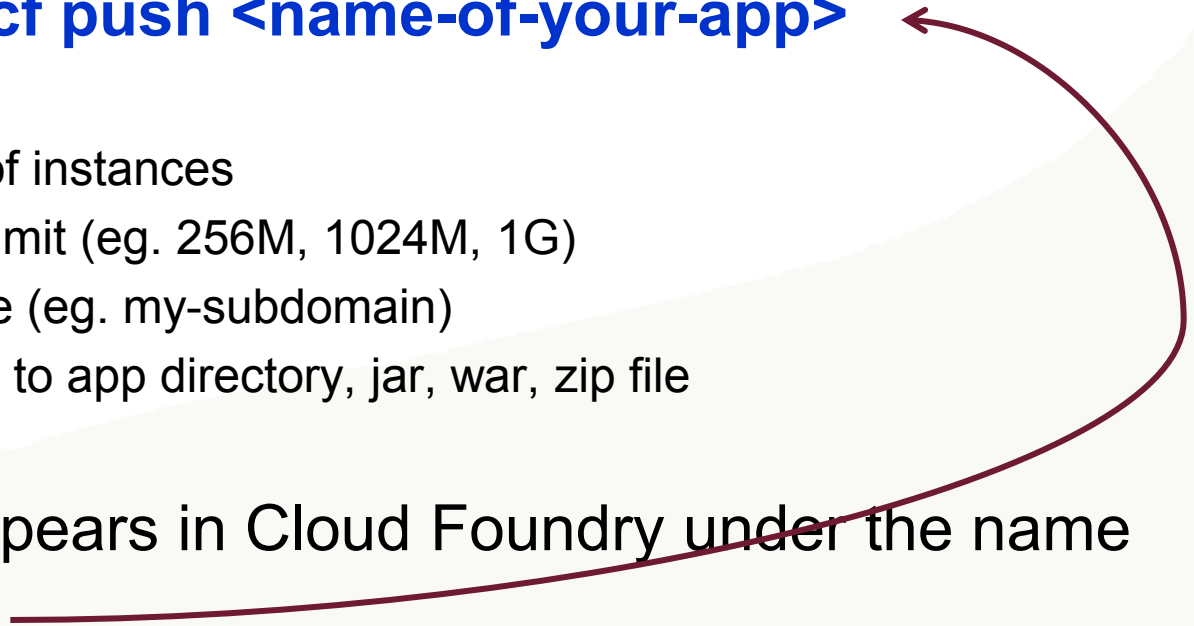
- You need a deployable application
  - For example with Java: a jar or war
    - Ant, maven or Gradle built-tools can make it for us
    - Cloud Foundry doesn't care how you build your application
  - Other languages (Ruby, Node.js, etc …) : the course will do

The cf push Philosophy

- Onsi Fakhouri (Cloud Foundry PM)
  - Here is my source code
  - Run it on the cloud for me
  - I do not care how
- The architecture of CF is fascinating
  - And we will cover it
  - But ultimately irrelevant
- I just want to push an application
  - I no longer need to know: how that happens, how it is packaged or how it is run?

Deploy push to Cloud Foundry

- Deploy by running **cf push <name-of-your-app>**
  - Many options
    - -i Number of instances
    - -m Memory limit (eg. 256M, 1024M, 1G)
    - -n Hostname (eg. my-subdomain)
    - -p local path to app directory, jar, war, zip file
- Your application appears in Cloud Foundry under the name you specify here

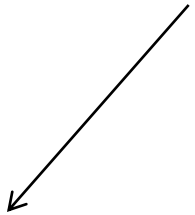


Domains and URLs

- Every CF instance is assigned a domain at installation
  - Known as the *Apps Domain*
  - For PWS this is **cfapps.io**
- When you deploy, your application gets a unique route (URL) to access it: **hostname + app domain name**
  - By default, hostname = application name
  - Make sure hostname is **unique**
    - cf push returns an HTTP 400 error if not
- PWS example:
  - **cf push spring-music …**
  - gets route: **spring-music.cfapps.io**

Example of Using cf push

Specify unique sub-domain by adding numbers, initials …



- Fully specified (recommended)

```
cf push spring-music -i 1
                     -m 512M
                     -n spring-music-678
                     -p build/libs/spring-music.war
```

  - Deploys war file (specify path if needed)
  - 1 instance, 512M memory
  - Name: **spring-music**
    - Appears as **spring-music** in Cloud Foundry
  - Hostname: **spring-music-678**
    - Creates URL (PWS): **spring-music-678.cfapps.io**

What Happens?

- cf connects to Cloud Foundry using your credentials
- It ‘pushes’ your application to CF and tells it to deploy it
  - The whole application is uploaded – takes a while
  - CF “stages” your application
    - Recognizes Java WAR file, prepares a “droplet” with a JRE and Tomcat server
    - “Droplet” is deployed to a container and starts running
    - All requests to the deployed URL route to your application
- Whole processed logged on screen
  - Next 3 slides

What Happens – 1

URL: spring-music-678.cfapps.io

```
cf push spring-music -n spring-music-678 -i 1 -m 512M
                     -p pre-built/spring-music.war
```

```
> cf push spring-music -n spring-music-678 -p build/libs/spring-music.war -i 1 -m 512M

Updating app spring-music in org your-org / space development as your-id@company.io...
OK

Using route spring-music-678.cfapps.io
Uploading spring-music...
Uploading app files from: pre-built/spring-music.war
Uploading 574.8K, 95 files
Done uploading
OK

Starting app spring-music in org your-org / space development as your-id@company.io...
...
```

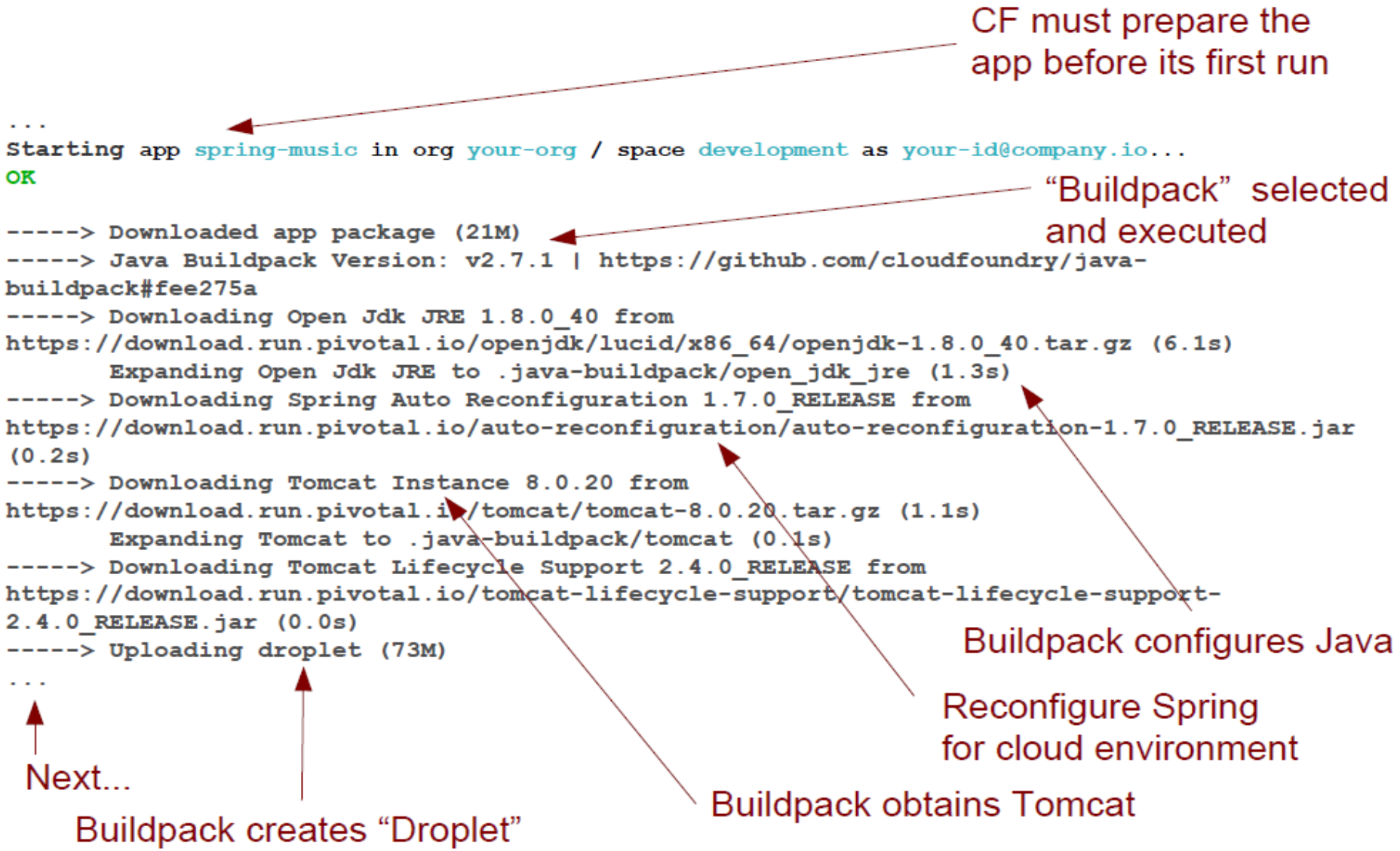
Updates CF metadata (app name, instances, memory)

Establish route

Uploads war

Next...

What Happens – "Staging"



What Happens – start

Cloud Foundry runs the "Droplet" on a "container"

```
...
0 of 1 instances running, 1 starting
0 of 1 instances running, 1 starting
1 of 1 instances running

App started

OK

App spring-music was started using this command `JAVA_HOME=$PWD/.java-buildpack/open_jdk_jre JAVA_OPTS="-
Djava.io.tmpdir=$TMPDIR -XX:OnOutOfMemoryError=$PWD/.java-buildpack/open_jdk_jre/bin/killjava.sh
-Xmx382293K -Xms382293K -XX:MaxMetaspaceSize=64M -XX:MetaspaceSize=64M -Xss995K
-Daccess.logging.enabled=false -Dhttp.port=$PORT" $PWD/.java-buildpack/tomcat/bin/catalina.sh run`

Showing health and status for app spring-music in org your-org as your-id@company.io...
OK

requested state: started
instances: 1/1
usage: 512M x 1 instances
urls: spring-music-678.cfapps.io
last uploaded: Tue Mar 17 17:58:35 UTC 2015

     state     since                    cpu    memory           disk
#0   running   2015-03-17 01:59:35 PM   0.0%   474.4M of 512M   150.3M of 1G
```

Health Check

Done! 1 application instance running on spring-music-678.cfapps.io

Application State and Logs

- Run `cf apps`

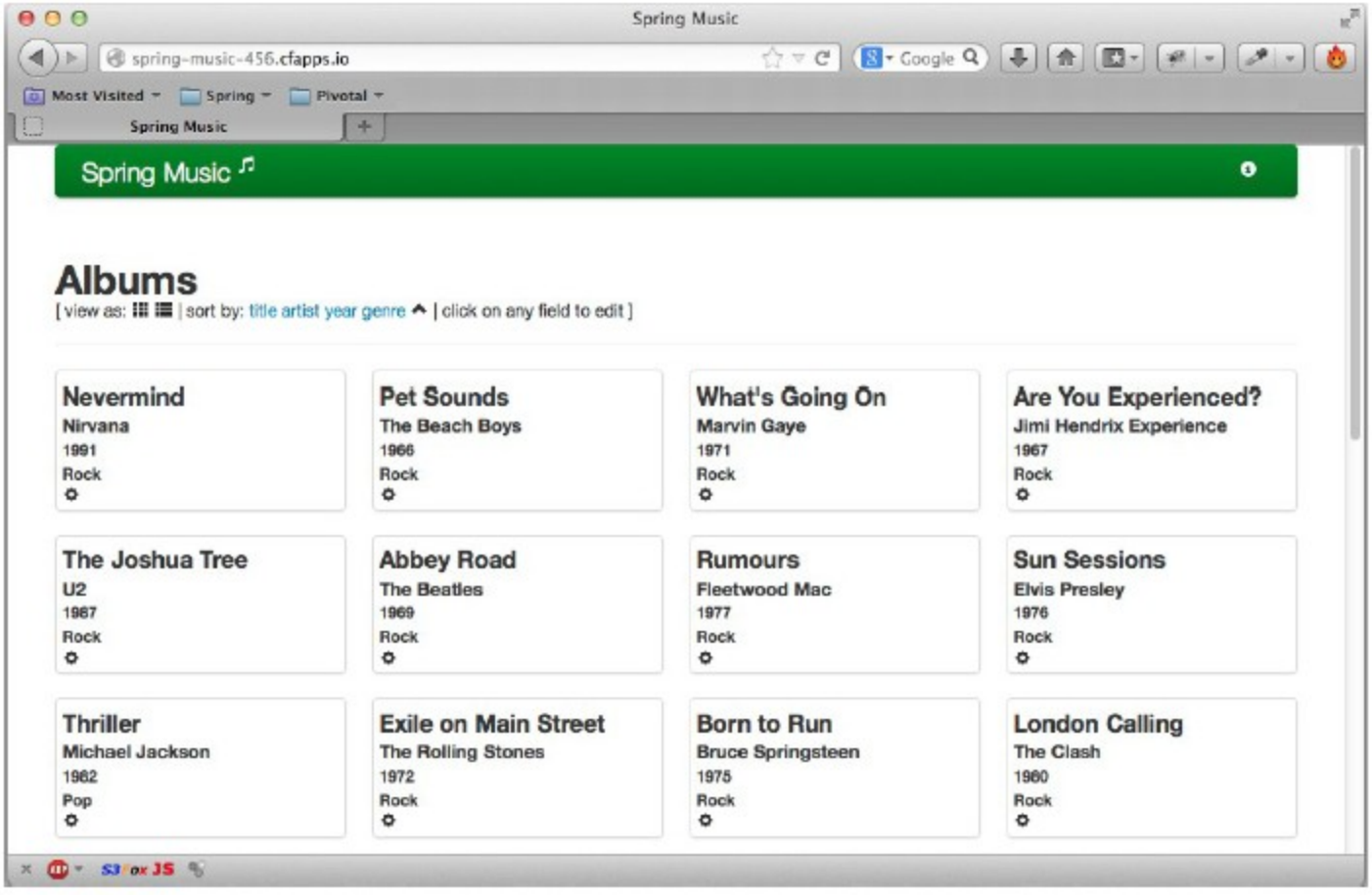
```
> cf apps
Getting apps in org pivotaledu / space development as kkrueger@pivotal.io...
OK

name           requested state   instances   memory   disk   urls
spring-music    started          1/1         512M     1G     spring-music-678.cfapps.io
```

- `cf logs spring-music`

```
> cf logs spring-music
Connected, tailing logs for app spring-music in org pivotaledu / space development as
kkrueger@gopivotal.com...
2014-06-07T23:01:47.68-0400 [RTR]     OUT spring-music-678.cfapps.io -
[08/06/2014:03:01:47 +0000] "GET /assets/js/status.js HTTP/1.1" 200 844 "http://spring-
music-678.cfapps.io/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_7_5)
AppleWebKit/537.73.11 (KHTML, like Gecko) Version/6.1.1 Safari/537.73.11"
10.10.66.34:64401 vcap_request_id:73037523-63ef-498f-6cd8-d3b48fe69e84
response_time:0.003693009 app_id:314f0434-d2c9-446c-ab4a-6c310878ca80
2014-06-07T23:01:48.47-0400 [RTR]     OUT spring-music-678.cfapps.io -
[08/06/2014:03:01:48 +0000] "GET /assets/templates/header.html HTTP/1.1" 200 1060
"http://spring-music-678.cfapps.io/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_7_5)
AppleWebKit/537.73.11 (KHTML, like Gecko) Version/6.1.1 Safari/537.73.11"
10.10.66.34:64324 vcap_request_id:39fbb3f2-46fb-4bd7-78d6-8994fafade9f
response_time:0.004132254 app_id:314f0434-d2c9-446c-ab4a-6c310878ca80
```


See the Application Running

- Open a browser window to **spring-music-678.cfapps.io**



Configuring a Deployed Application

- Change the number of instances
  - **cf scale <app> -i <new-value>**
  - Two instances: **cf scale spring-music –i 2**
  - New instances added, or some existing instances stopped
- Change the memory allocation
  - **cf scale <app> -m <new-value>**
  - 1024M: **cf scale spring-music –m 1024M**
  - Requires a restart to take effect

Stopping and Starting

- cf stop - Sends SIGTERM message to application
  - Sends SIGKILL 10 seconds later if still running
- cf start - Starts existing application
- cf restart - cf stop followed by cf start
- cf restage - Repeats the staging process, and starts the app.
  - Useful when environment variables / bound services change

    * (Covered later)

Adding / Removing Routes

- Add a new domain mapping
  - **cf map-route <app> <domain> -n <hostname>**
  - **cf map-route spring-music cfapps.io –n mymusic**
    - **mymusic.cfapps.io** **also** maps to spring-music
- Remove mapping
  - **cf unmap-route <app> <domain> -n <hostname>**
  - **cf unmap-route spring-music cfapps.io –n spring-music-678**
    - **Spring-music-678.cfapps.io** **no longer** maps to spring-music

Cleaning Up Unused Routes

- Routes tend to accumulate over time
  - Application in other Orgs / Spaces cannot use these routes
- Find all other routes used in a space:
  - **cf routes**
- Remove route:
  - **cf delete-route**
- Very Useful! Remove unused routes:
  - **cf delete-orphaned-routes**

Managing Application Instances

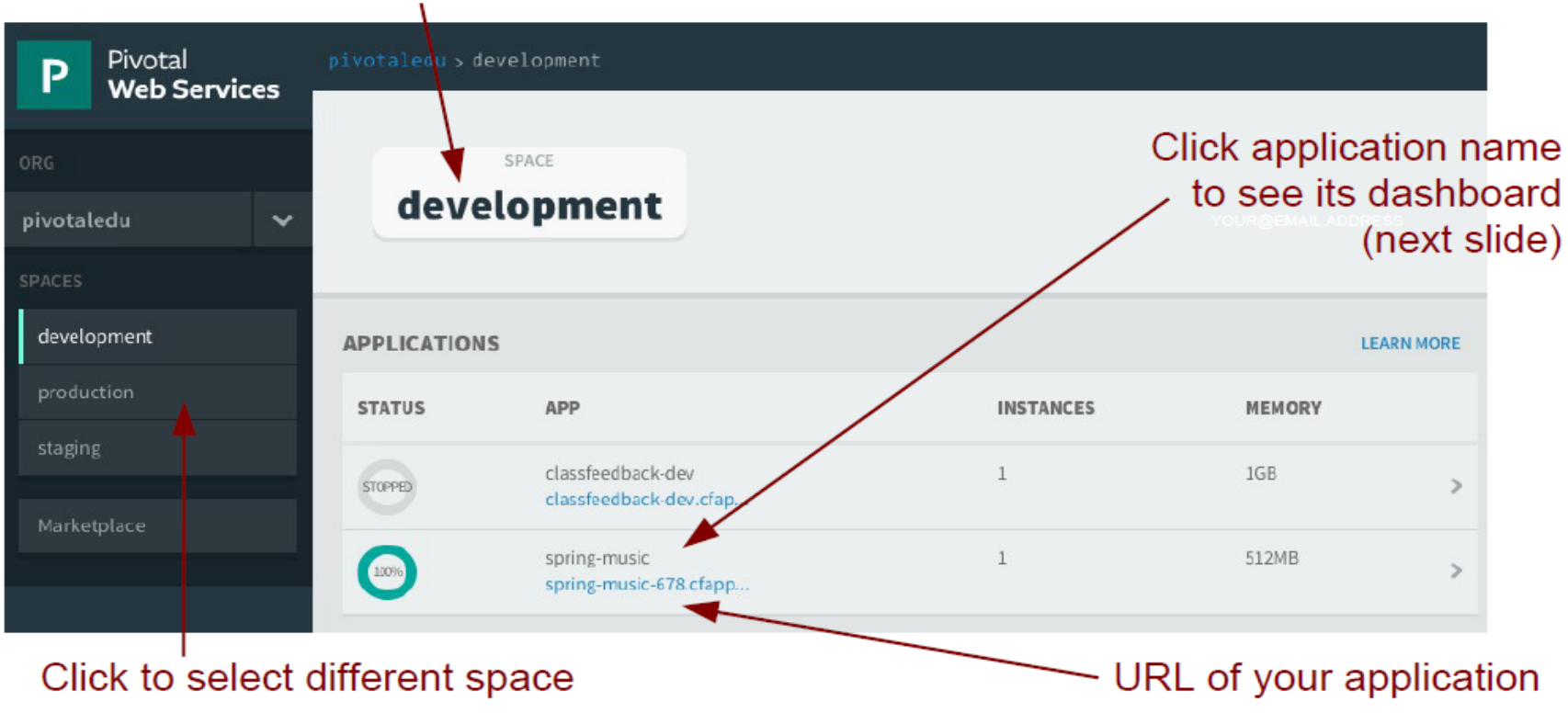
Apps Manager

- Login to Cloud Foundry using your web-browser
  - Pivotal Web Services : http://run.pivotal.io
    - Your Cloud Foundry instance URL will be different
    - console.<your-cf-domain>
  - Use the username and password you registered with
  - Our new application should show green in the Apps Manager
- Next slide

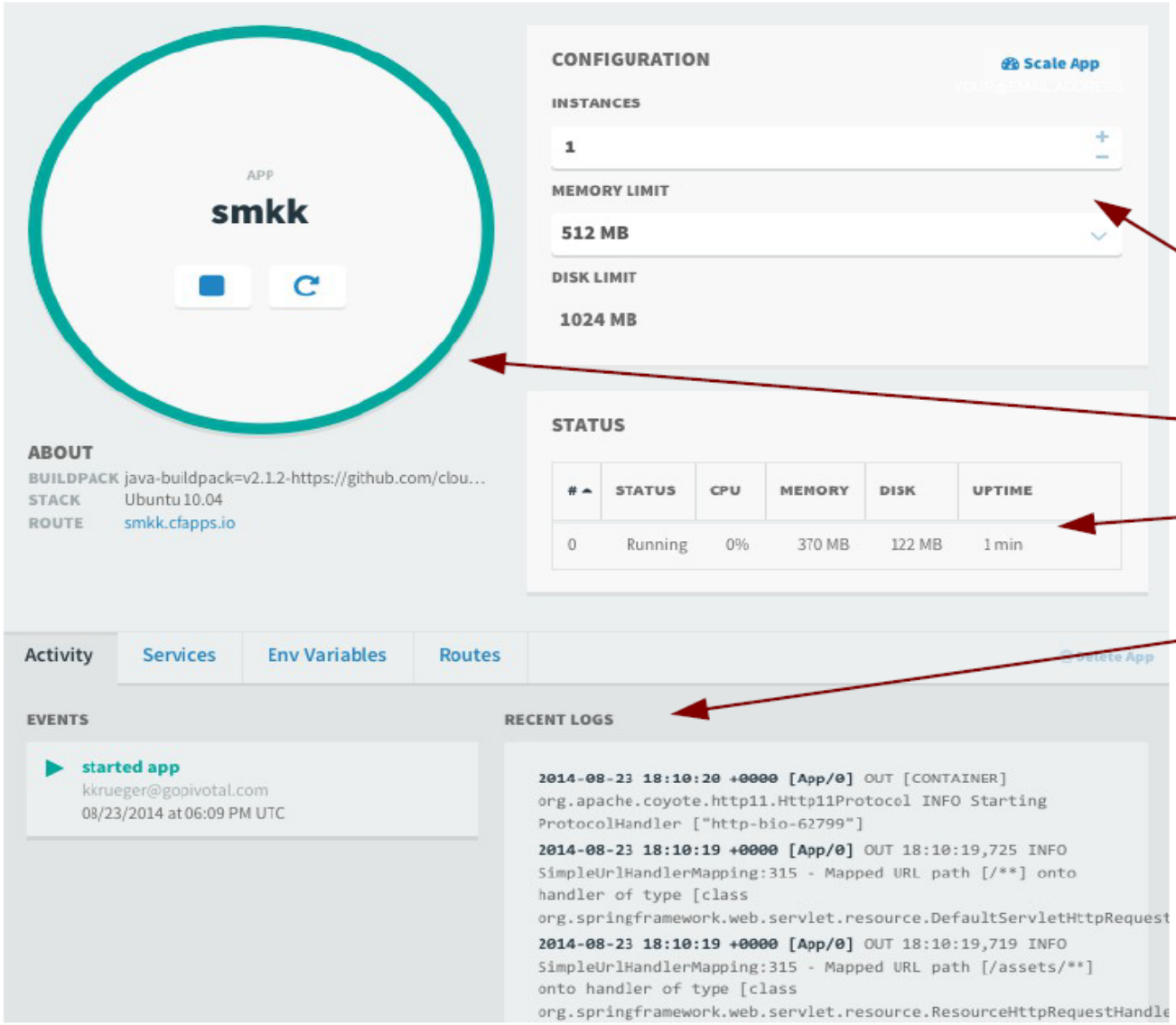
Note: *only pivotal CF comes with the apps manager*
Open Source Cloud Foundry does not

Apps Manager Home Page

- At a glance view of all your applications
  - Shows current space



Application Dashboard



Change instances, memory

Application state

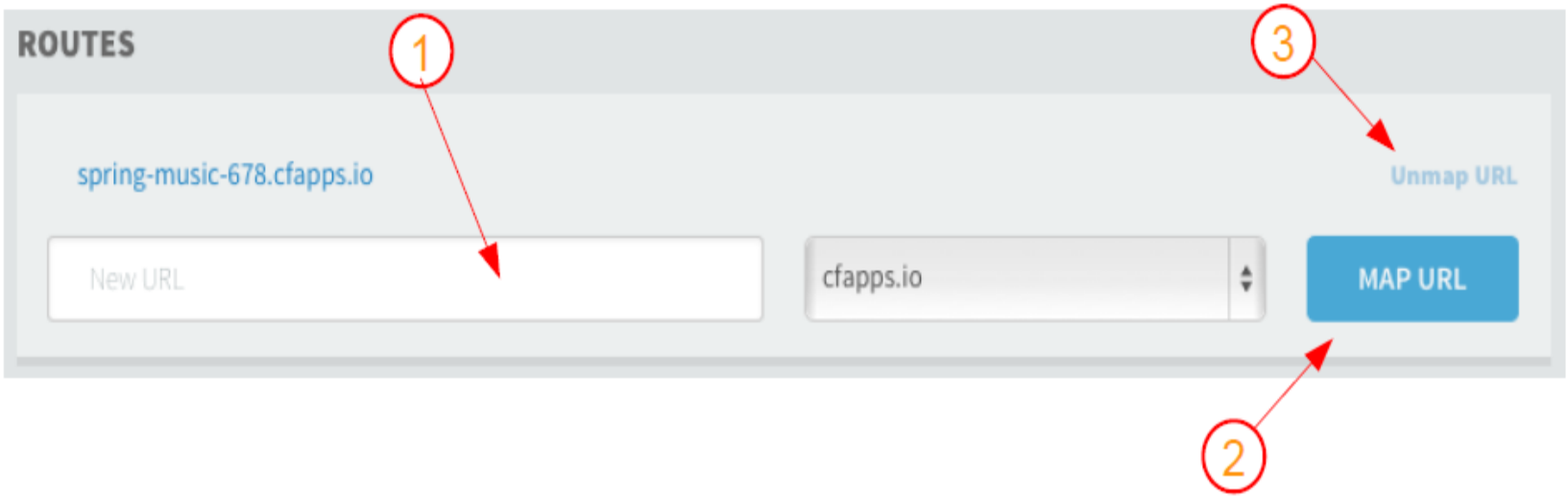
Instance Statistics

Logs and Events

All work described was performed by Capgemini or a Capgemini affiliate

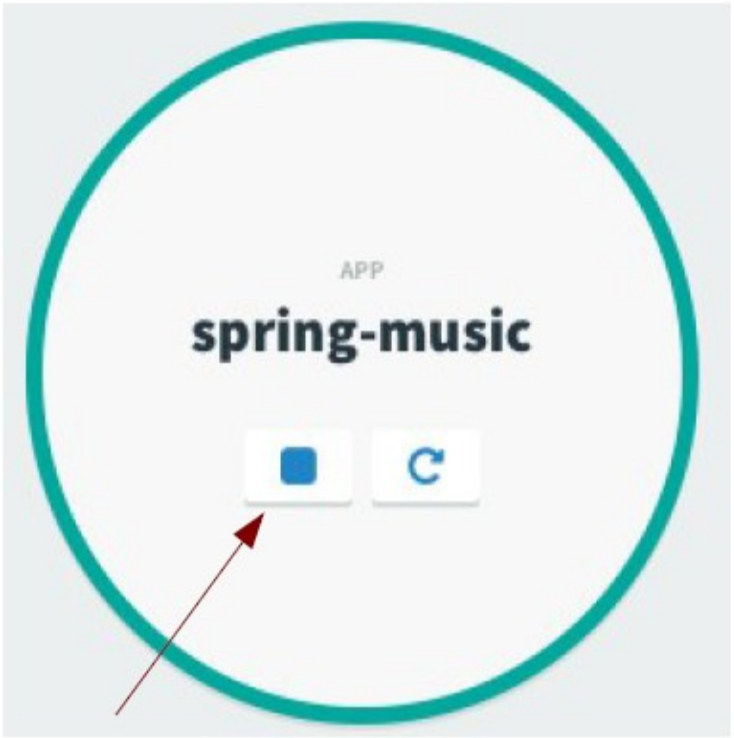
Change Mapped URL

- Enter new domain (1)
  - Remember to make it Unique
- Click MAP URL (2)
- To remove a mapping (3)
  - Click UNMAP URL at far right of same line



Stopping and Starting

- Just click the square to stop
- Click play to start



Click to Stop

Click to Start

Monitoring Instances

- The very bottom panel shows all your instances
  - Provides statistics
  - Updated live (slight time – lag)

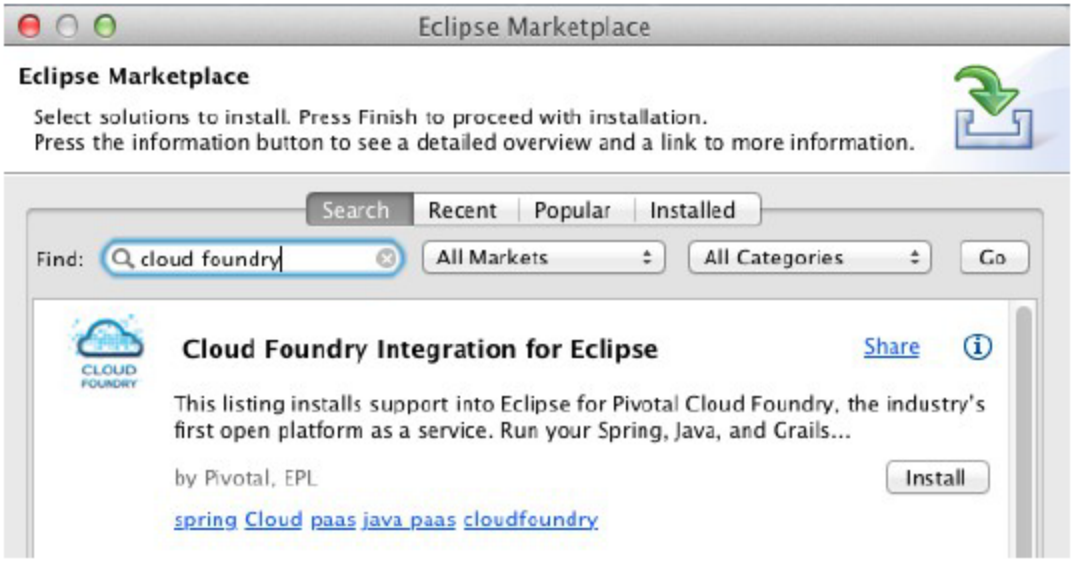
INSTANCES

INSTANCE	CPU	MEMORY	DISK	UPTIME	STATE
1	0%	312MB	121MB		Running
0	0%	314MB	121MB	31min	Running

Deploying via Eclipse or Spring Tool Suite

Setting up Eclipse / Spring Tool Suite

- Select Help → Eclipse Marketplace
- Search for Cloud Foundry plugin and install

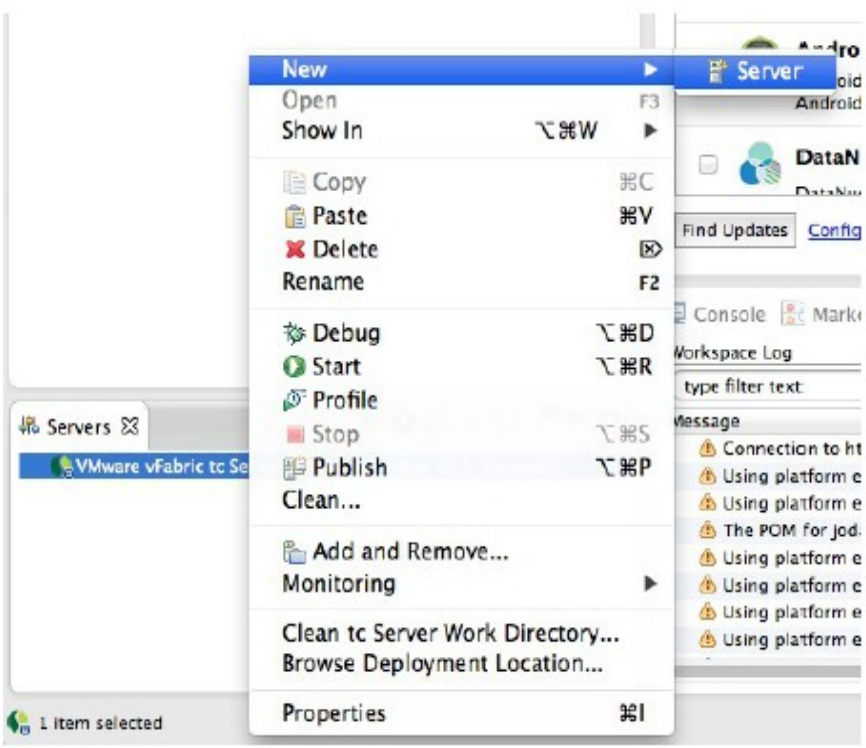


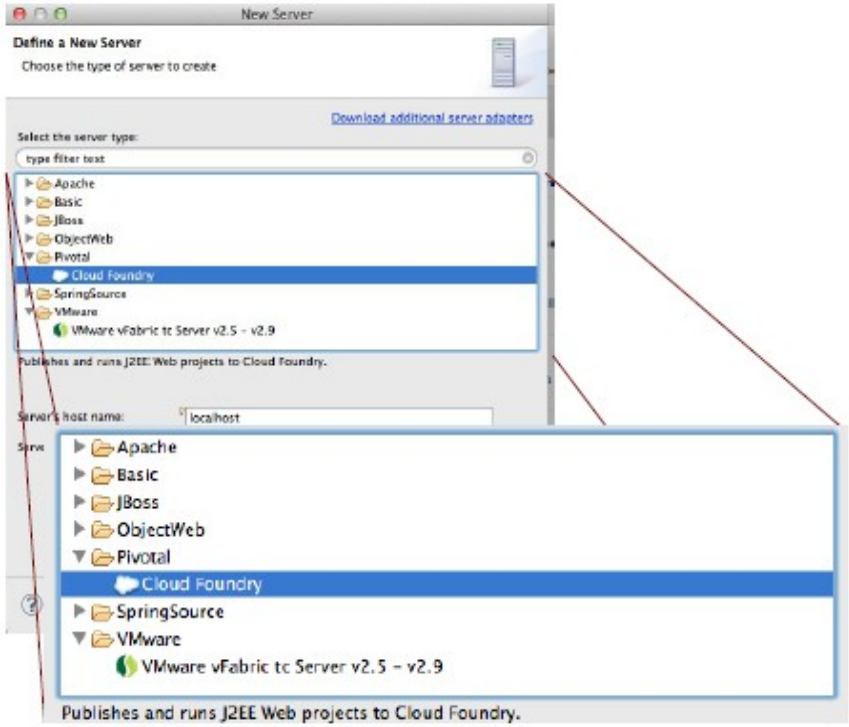
Do this now…

- The install takes time to run.

Setting up a New Server

- In white-area of Servers panel, right click New → Server
- In popup, under Pivotal select Cloud Foundry



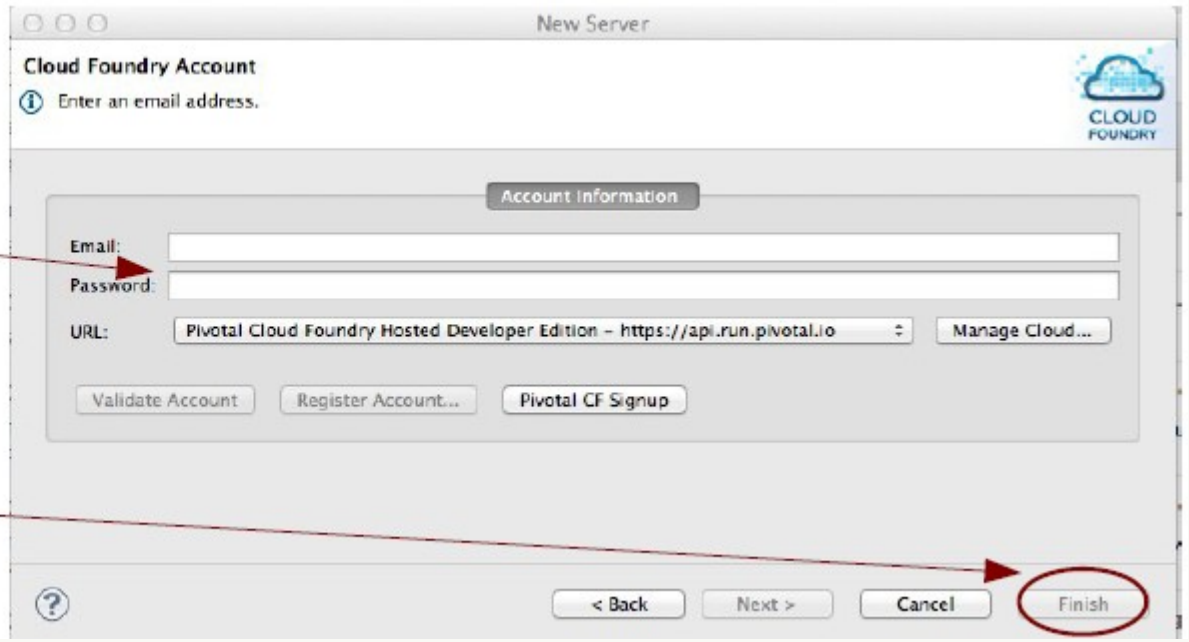


Fill in Details of your CF Account

- Fill in registration dialog
  - Use Manage Cloud to specify a different URL
    - Another public PaaS or for your private cloud
  - Note there is a Signup button here.

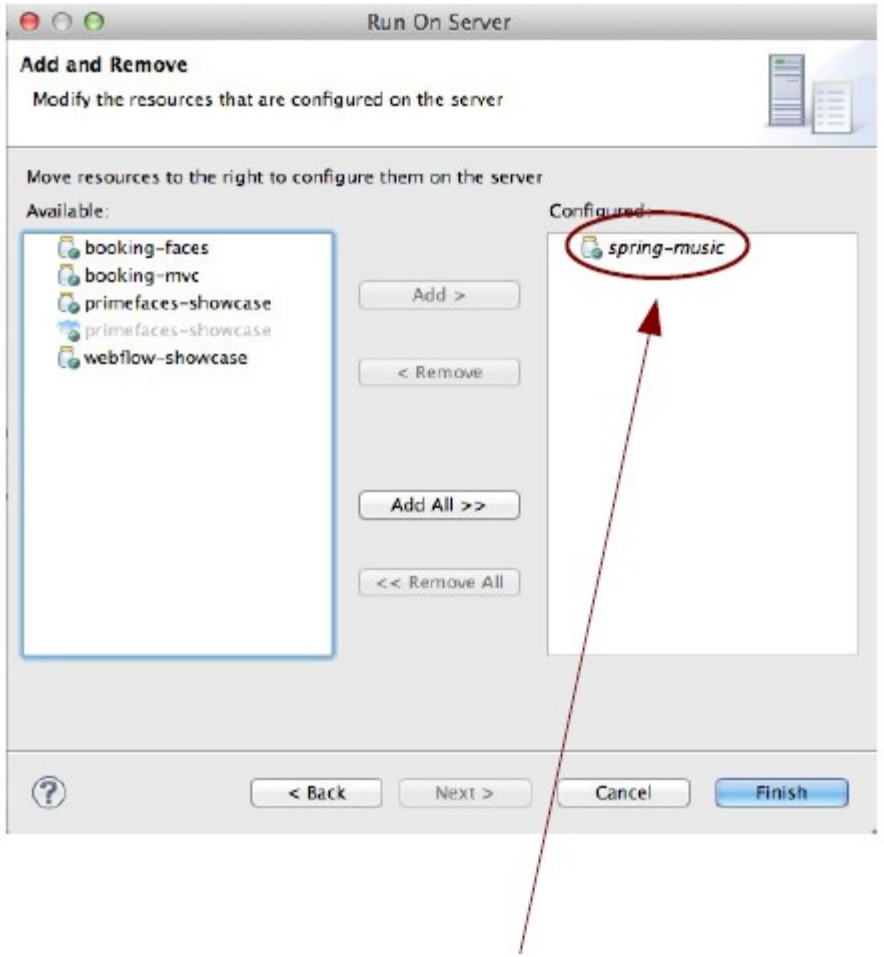
Same email and password
That you signed-up with

Click Finish when done



Deployment

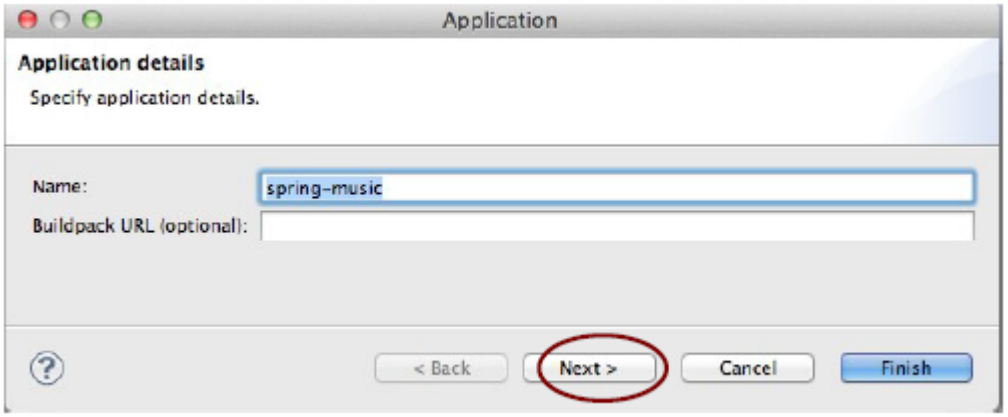
- We are now ready to deploy an application
- Select a project in Eclipse
  - Right click and select
    - Run As … → Run on server
    - *Just like any other server*
  - Select Cloud Foundry server
  - Click Next
  - In next dialog make sure your project is in the RHS list
    - Just as you would normally
  - Click Finish to deploy

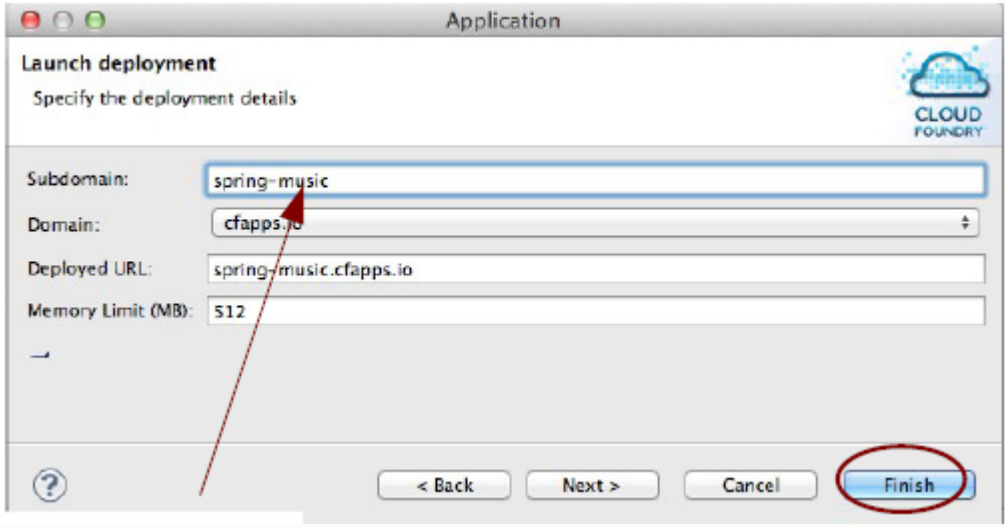


Now things get different …

Application details

- Two dialogs appear
  - Application details … just click next for now
  - Launch deployment… Pick a unique URL
    - All apps deploy to <appname>.cfapps.io
  - For now, just click Finish to deploy





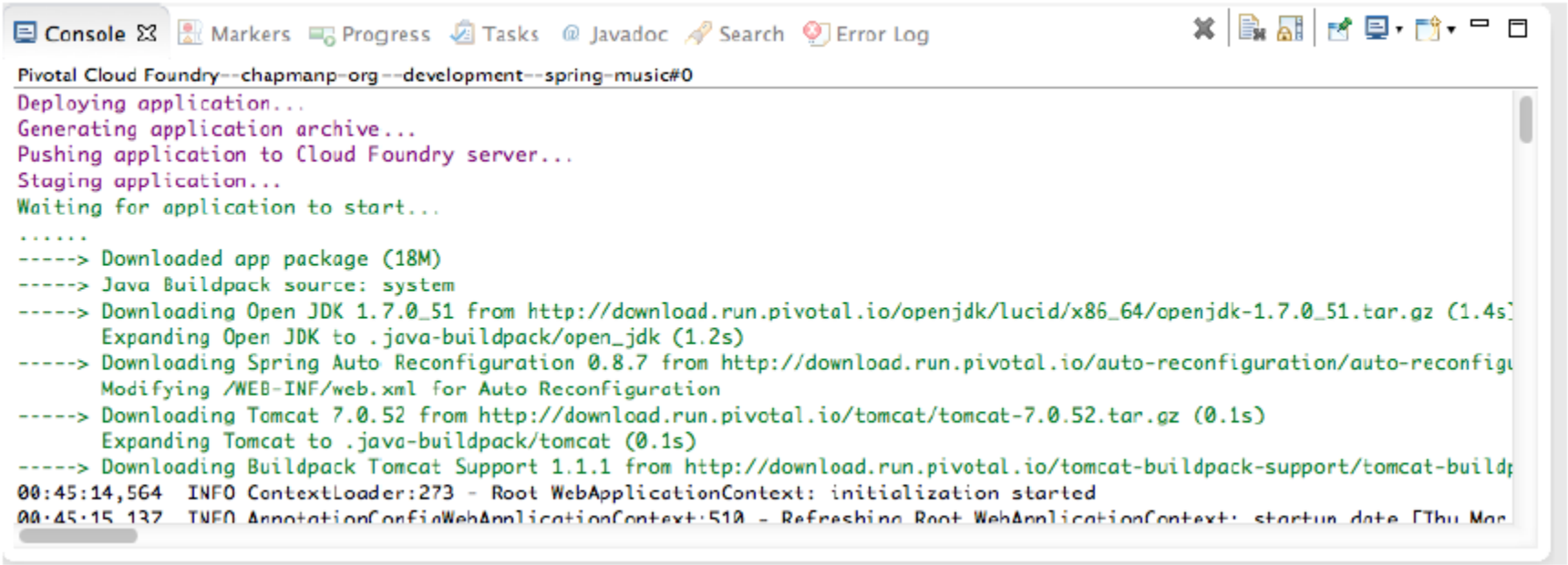
Will this be unique? Change Sub-domain to make sure

What just happened?

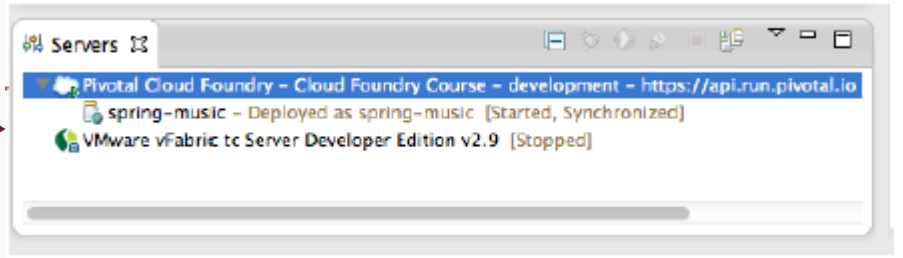
- Eclipse Connected to Cloud Foundry using your credentials
- It 'pushed' your application to CF and told it to deploy it
  - The whole application is uploaded – takes a while
  - CF "staged" your application
    - Recognized Java/ WAR, prepared a "droplet" containing JRE and Tomcat server
  - "Droplet" was deployed to a container and began running
  - All requests to the Deployed URL route to your application
- Same process as when using the CLI

Watching it Run

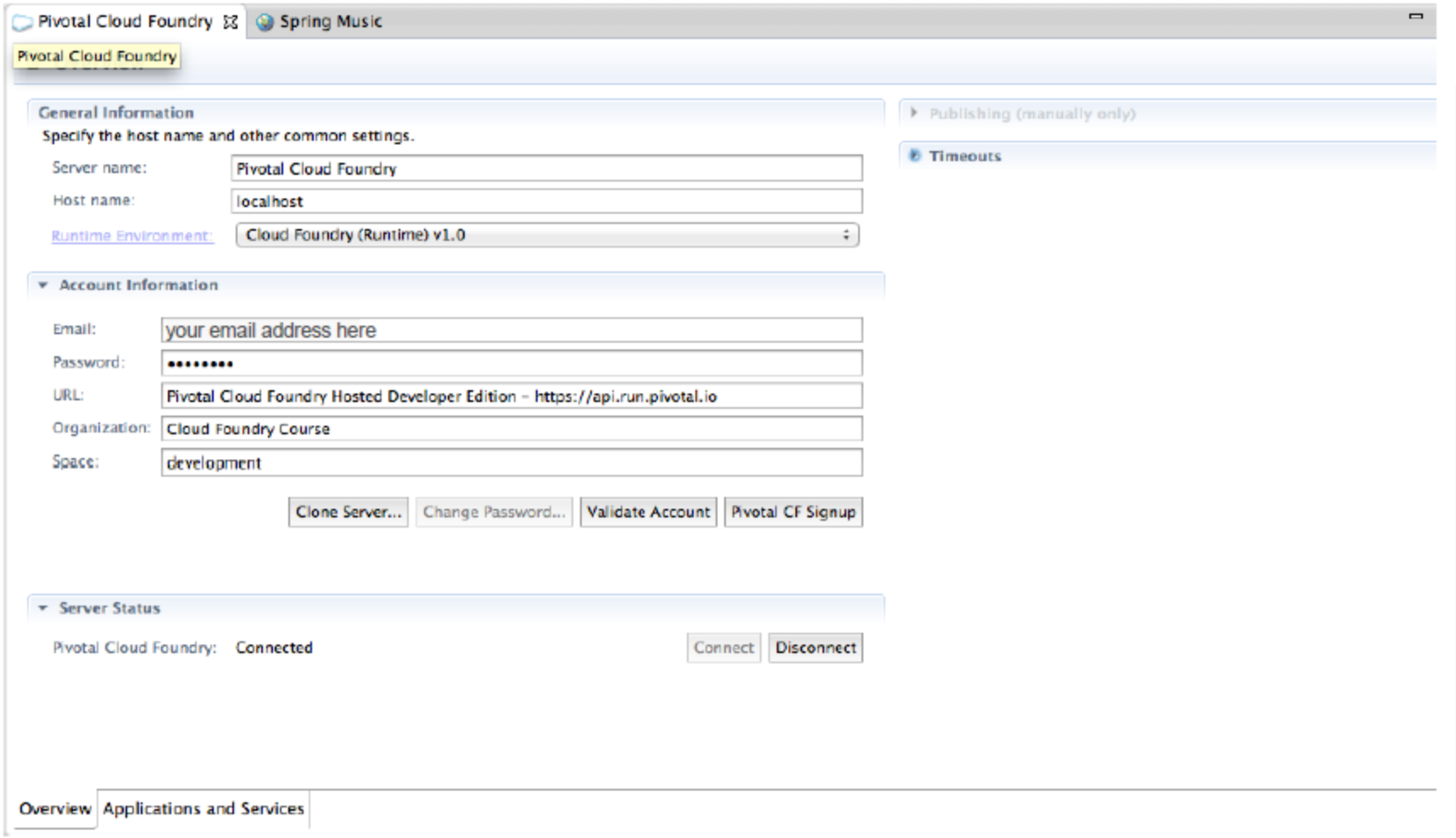
- In the Console View



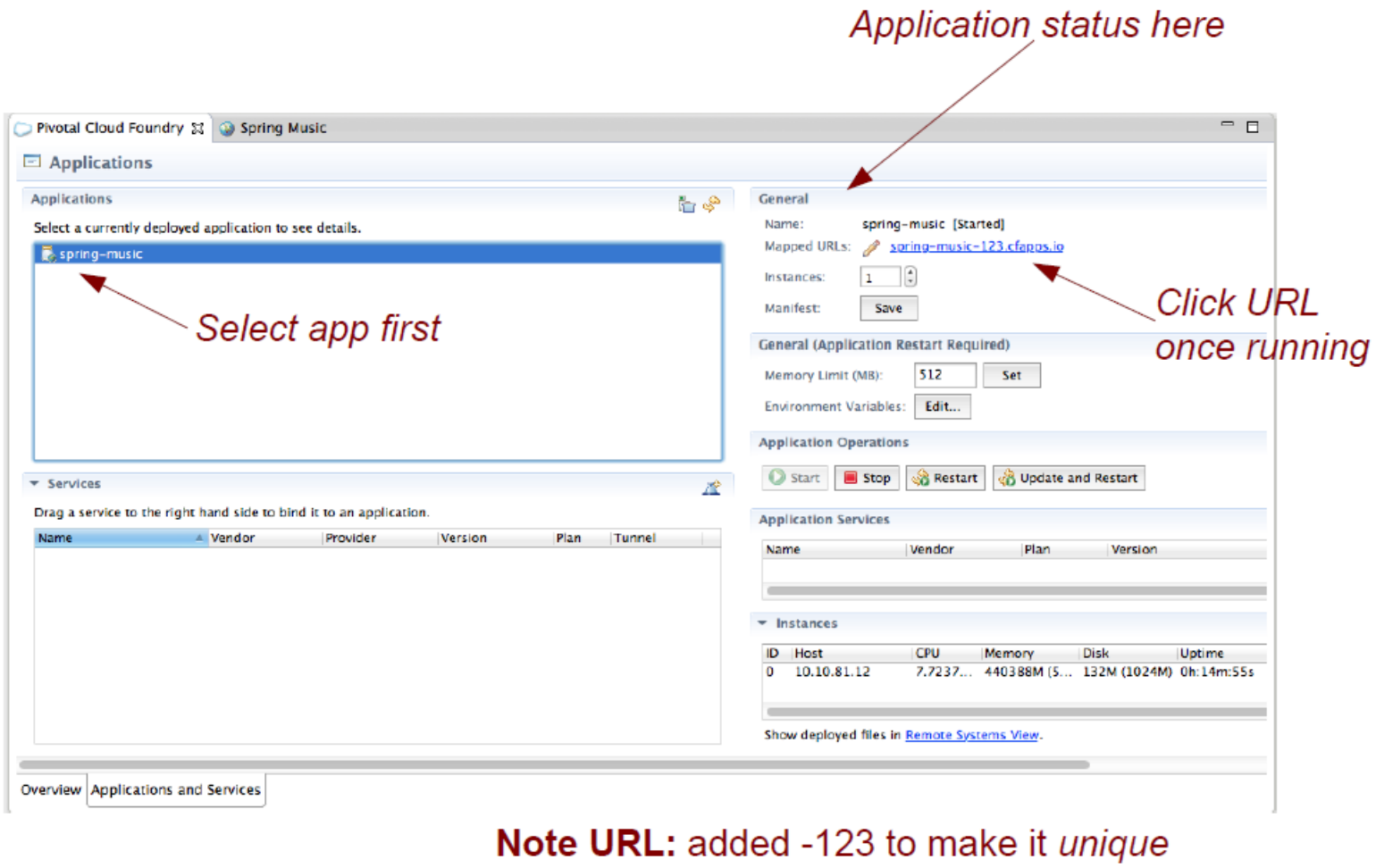
- In the Dashboard
  - Double click



Overview Dashboard Tab

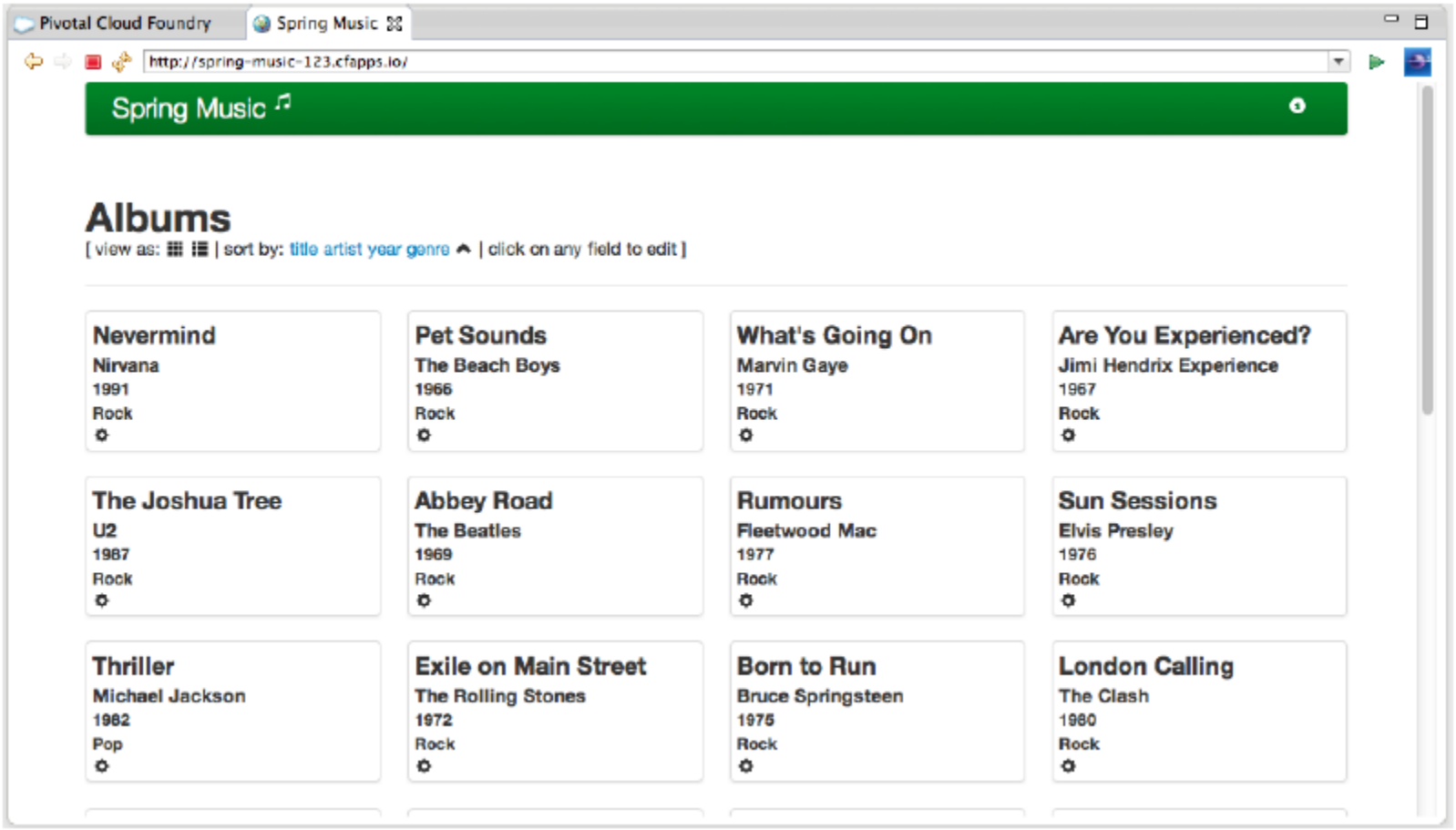


Application Tab



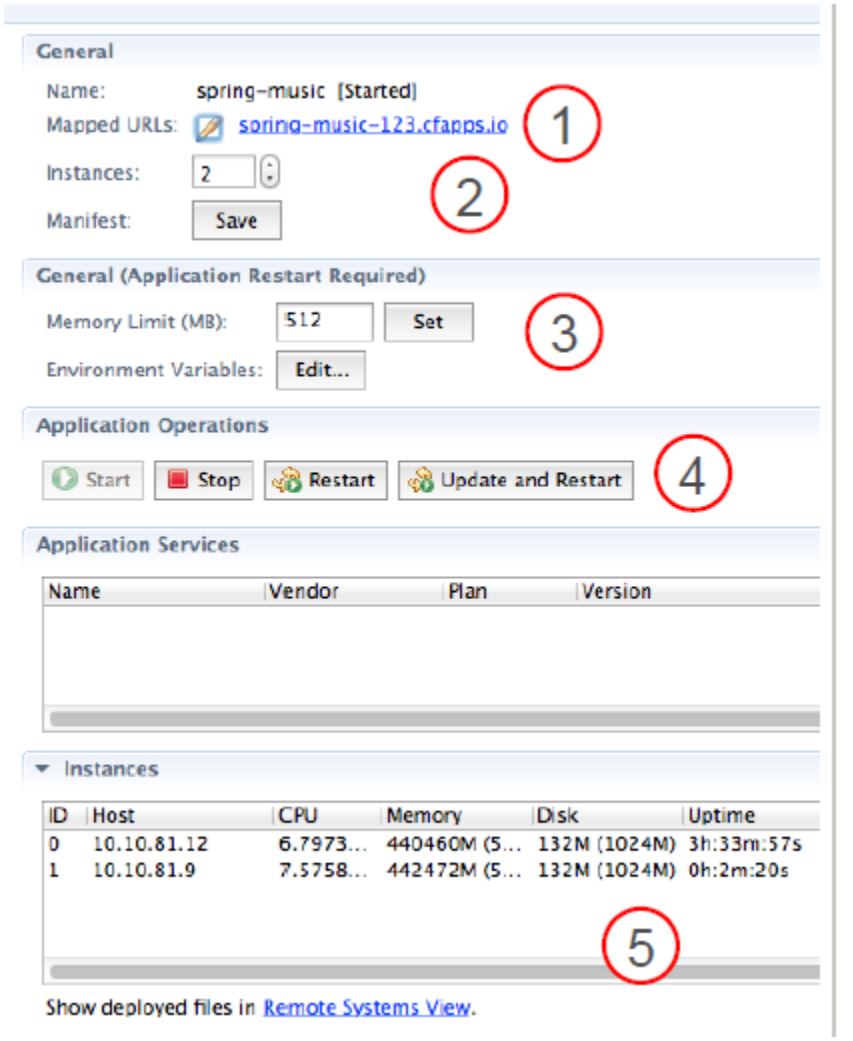
See your Application Running in Eclipse

- Eclipse pops up a browser window open at your URL
  - Or use the browser of your choice



Managing Application Instances

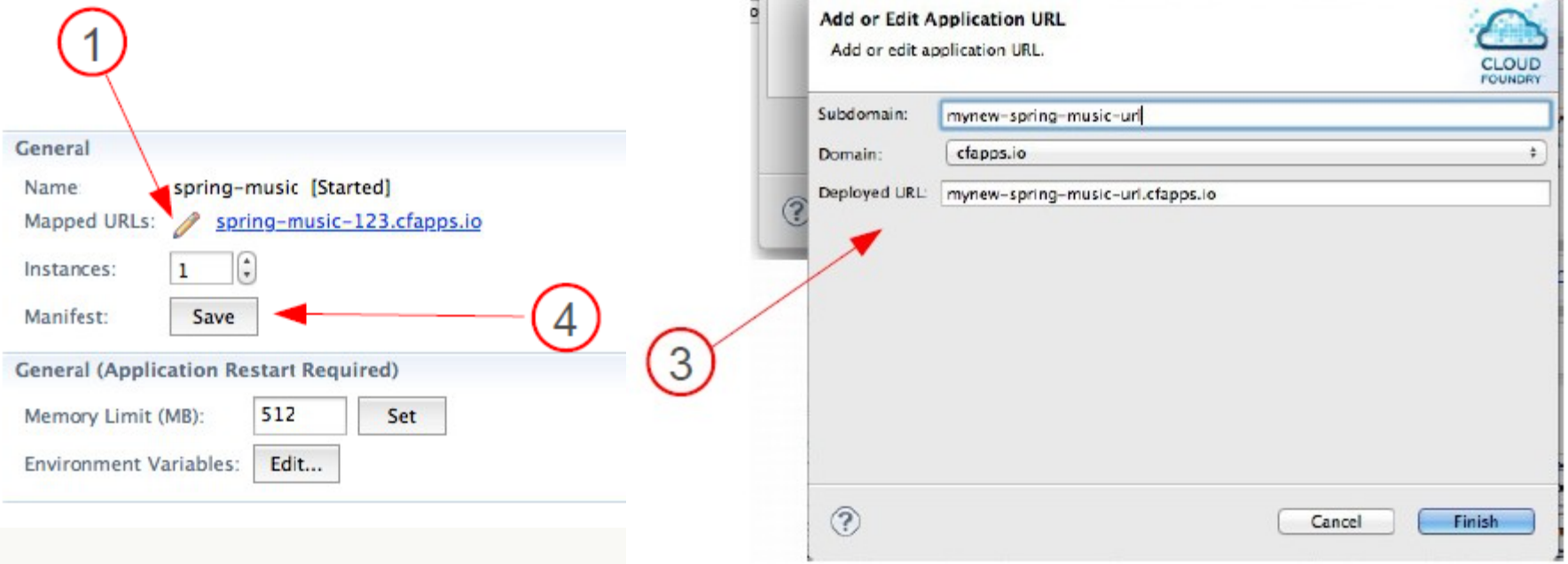
Cloud Foundry Dashboard



- The right-side panel of Applications and Services tab
  - Below General
- Control your application
  1. Change mapped URL
  2. Add/remove instances
  3. Change memory
  4. Stop/start
  5. Monitor instances

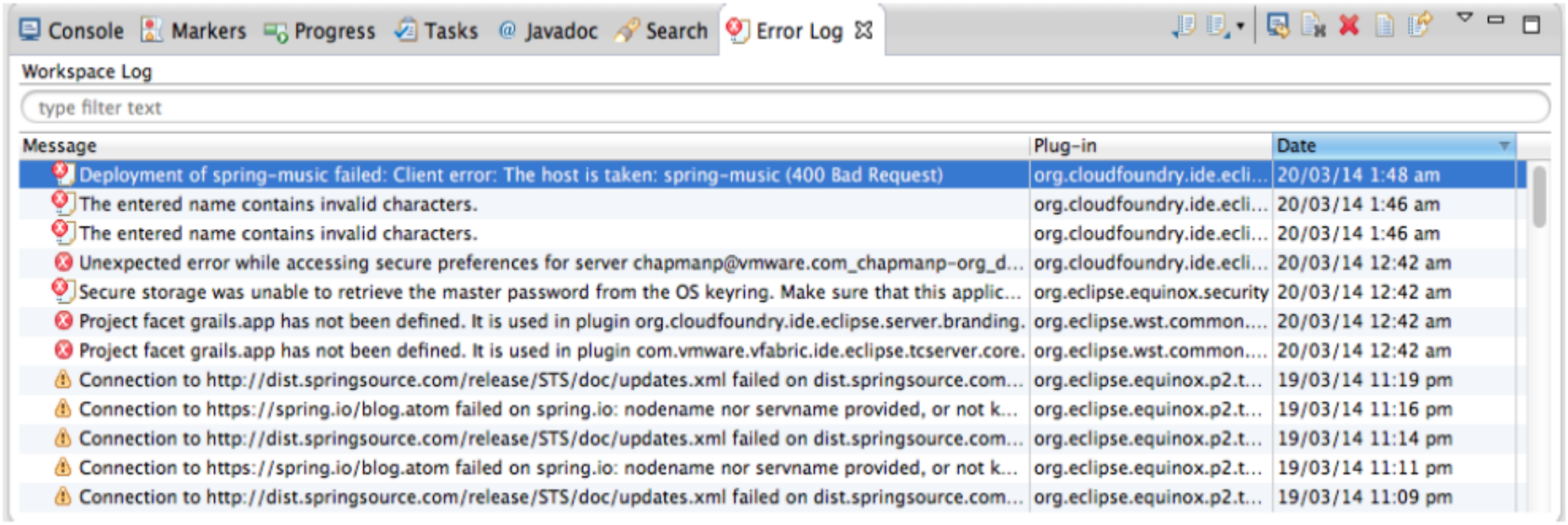
Change Mapped URL

- Click pencil(edit) icon
- Can add, edit or remove URLs
- Save when done



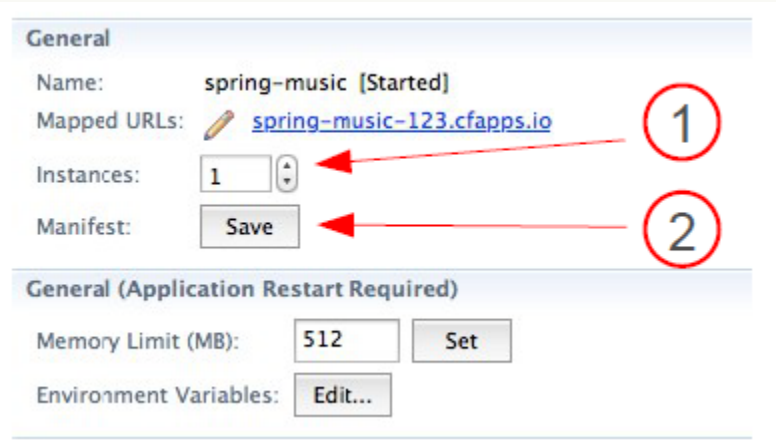
Choosing Your URL

- All applications mapped to cfapps.io domain
- Your URL must be unique
  - Get a Bad Request 400 if you try to use an existing URL



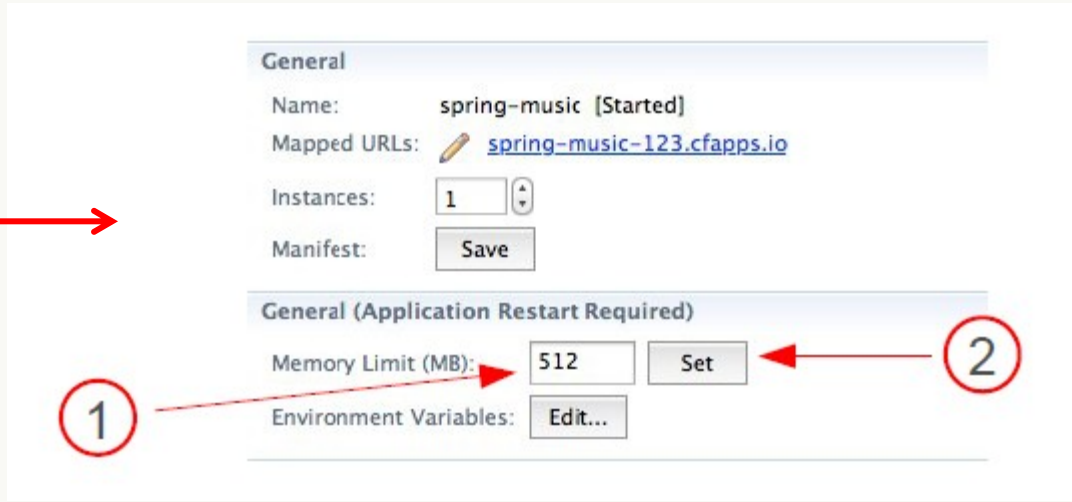
Instances

- By default one instance of your application runs up
  - Typically a Tomcat server
- To handle large loads you need multiple servers
  - Known as instances
  - Run behind load balancer
- How many instances do I need?
  - Design issue – covered later
- Modify as shown



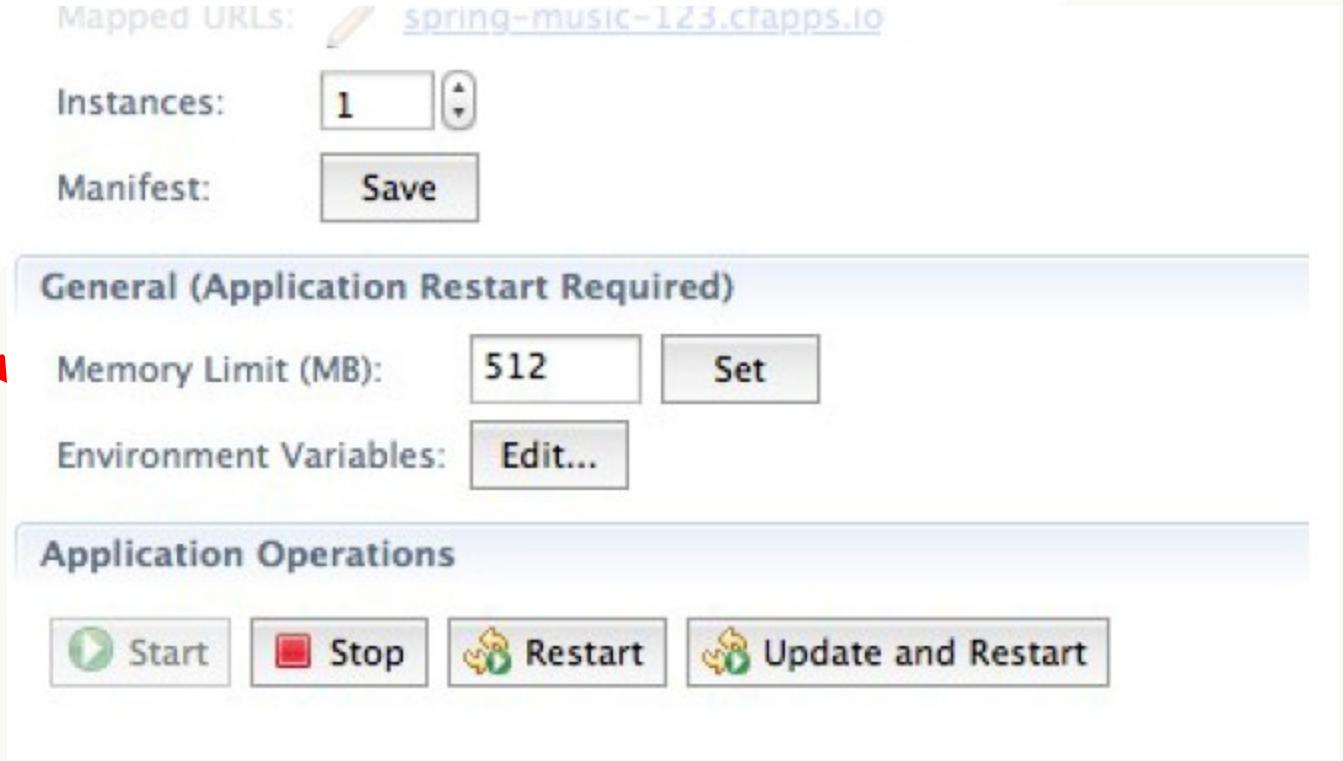
Memory Allocation

- Define how much memory our process gets to run in
  - 512 is the default
    - Good for a typical application under test (1 or 2 users)
  - How much memory do I need in production
    - Another good question for later!
- Easy to configure …
  - But the server has to be started



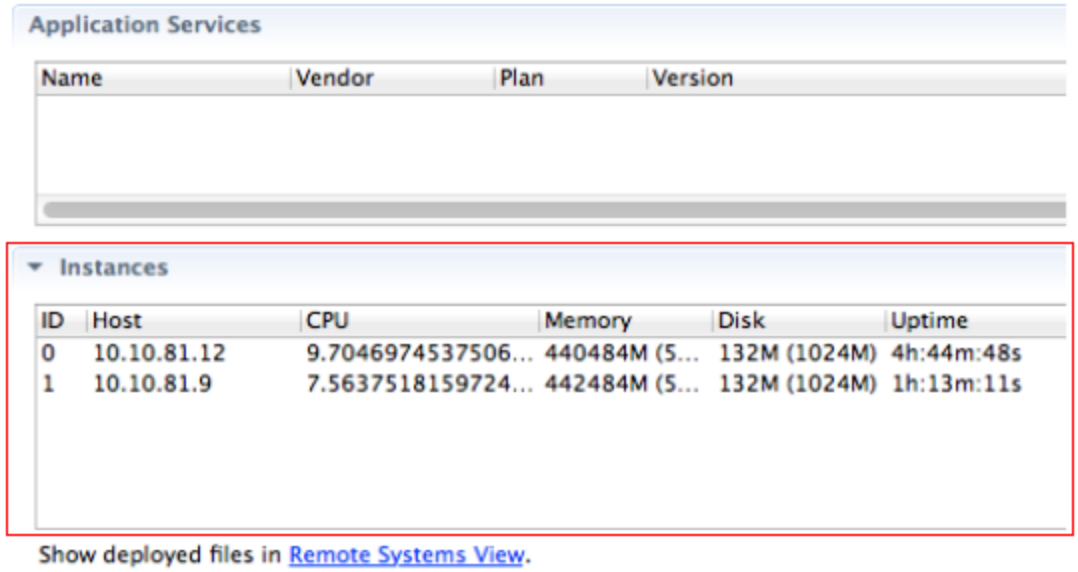
Stopping and Starting

- Normally this happens in the Servers view
  - Those buttons are grayed out
- Instead use the Dashboard



Monitoring Instances

- The very bottom panel shows all your instances
  - Provides statistics
  - Not real-time
- To refresh
  - Click refresh icon on the application list



Summary: Cloud Foundry Dashboard

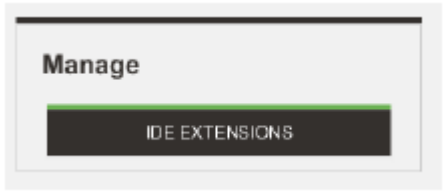
- In the Application and Services tab
  - Configure your application (below general on right-side)
  - Options
    - Modify mapped URL
    - Change number of instances
    - Change the amount of memory allocated
    - Start and stop the application
    - Monitor instances
  - You may have noticed we missed two options (later)
    - Add or remove services
    - Set environment variables

Appendices

- Describe installation of Cloud Foundry plug-in into
  - Appendix A : STS
  - Appendix B : Standard Eclipse
- For full details see:
  - http://docs.cloudfoundry.org/devguide/deploy-apps/sts.html

Appendix A: Installing CF Plug in into STS

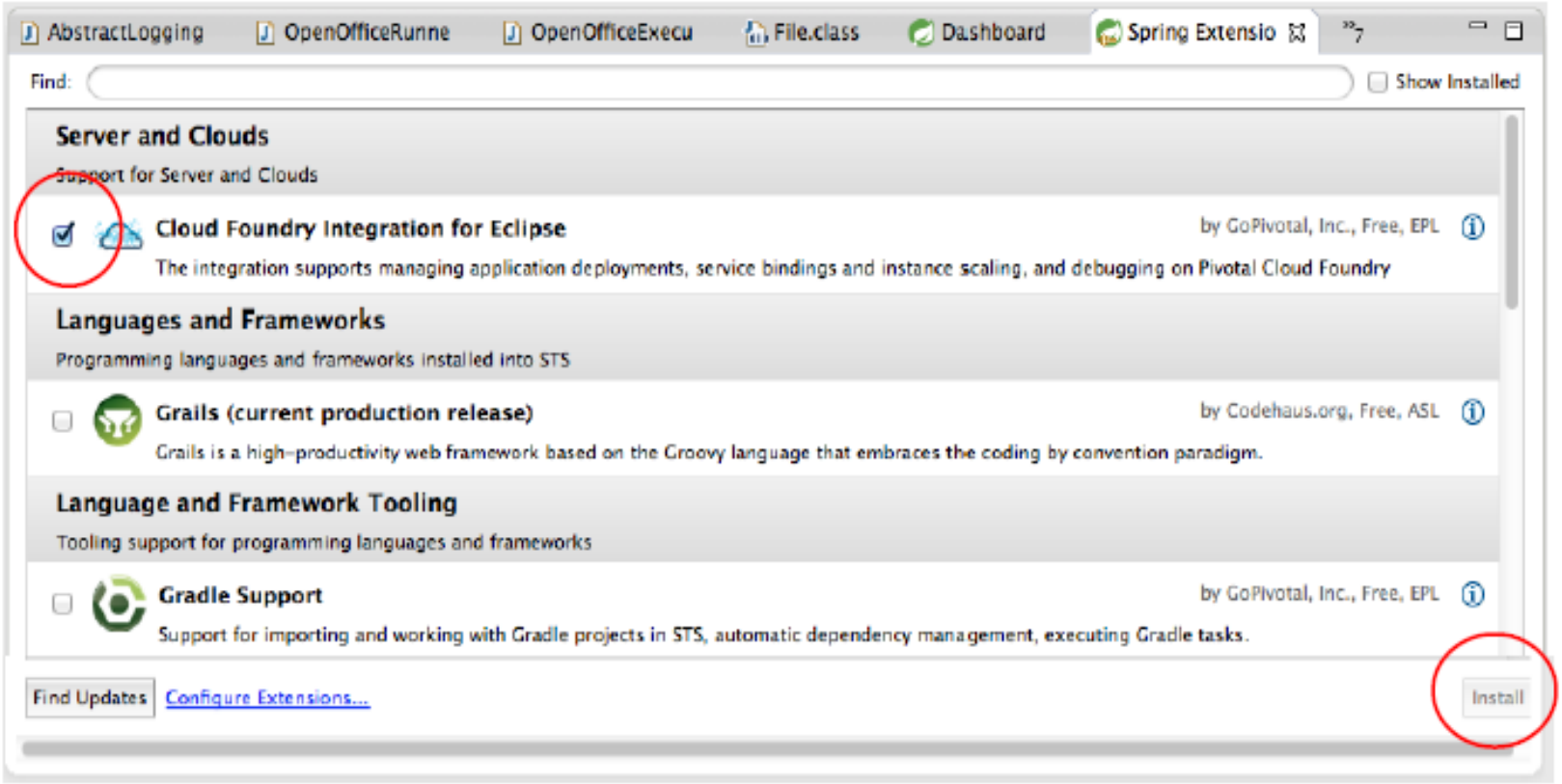
- Click Spring leaf icon in STS
  - Displays dashboard
- At bottom right under Manage
  - Click “IDE Extensions”



See : http://docs.cloudfoundry.org/devguide/deploy-apps/sts.html#install-to-sts

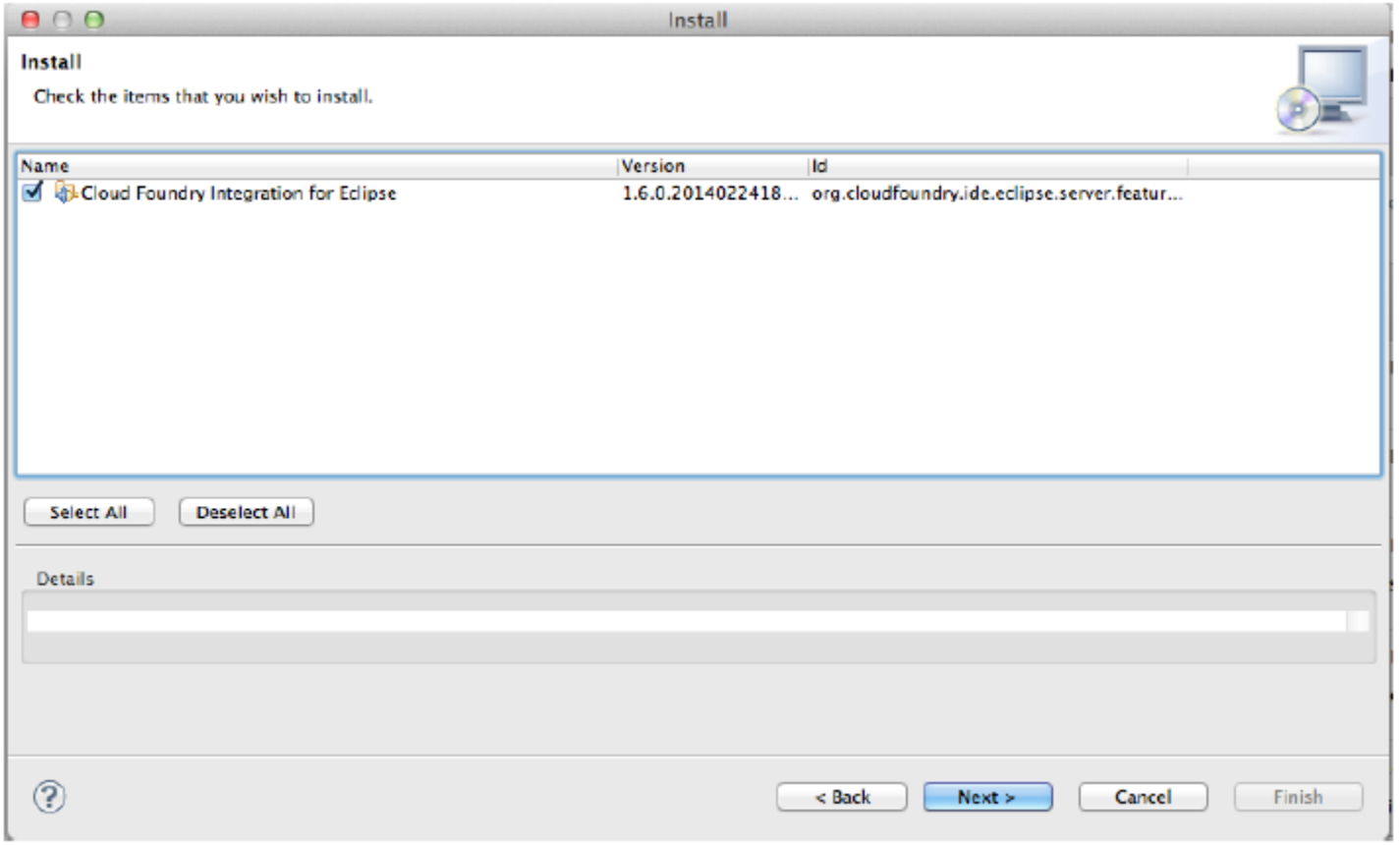
See Cloud Foundry Integration for Eclipse

- Select checkbox and click install button
  - If not listed, enter “cloud foundry” in Find and hit enter



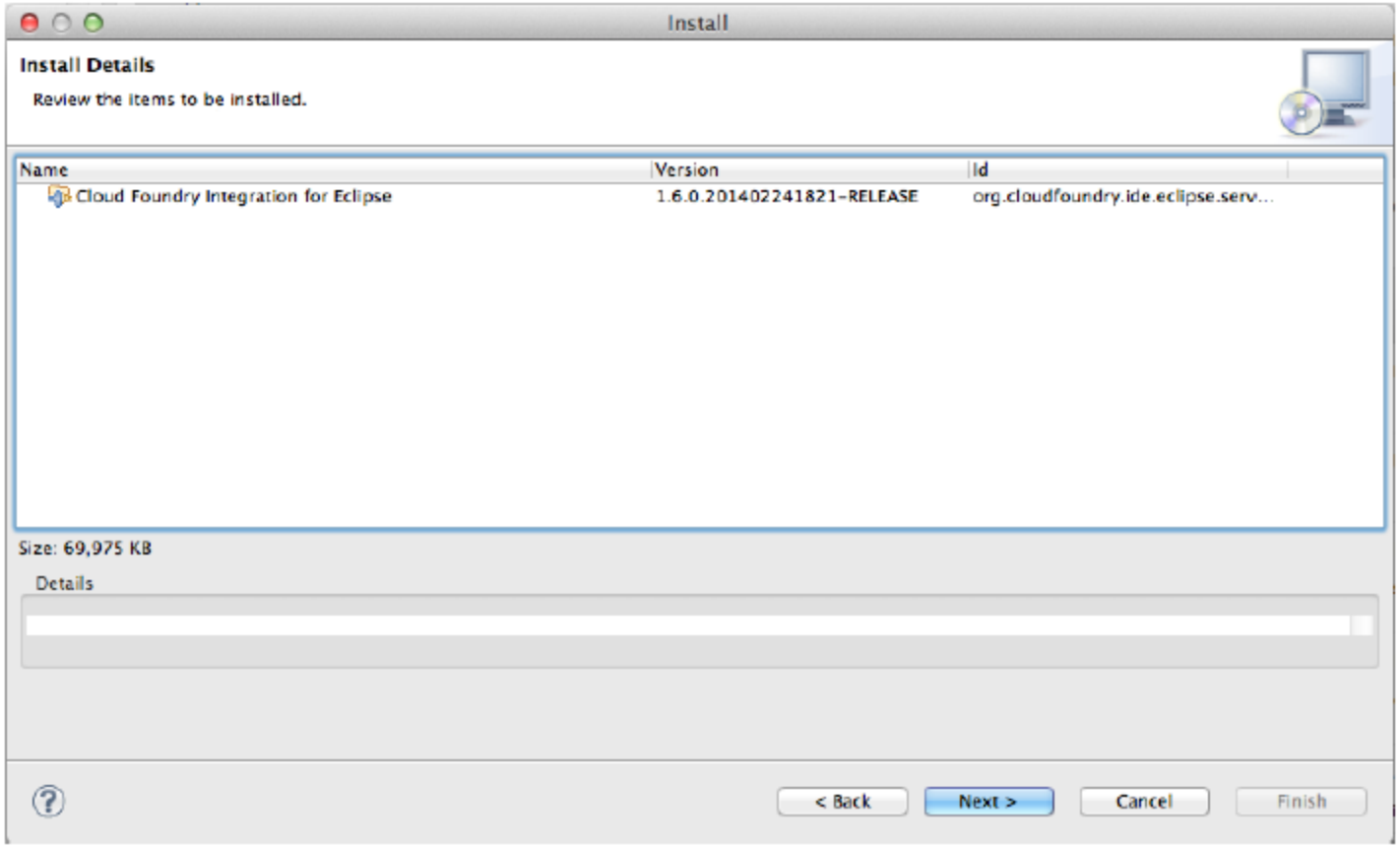
Runs up a wizard

- Click next



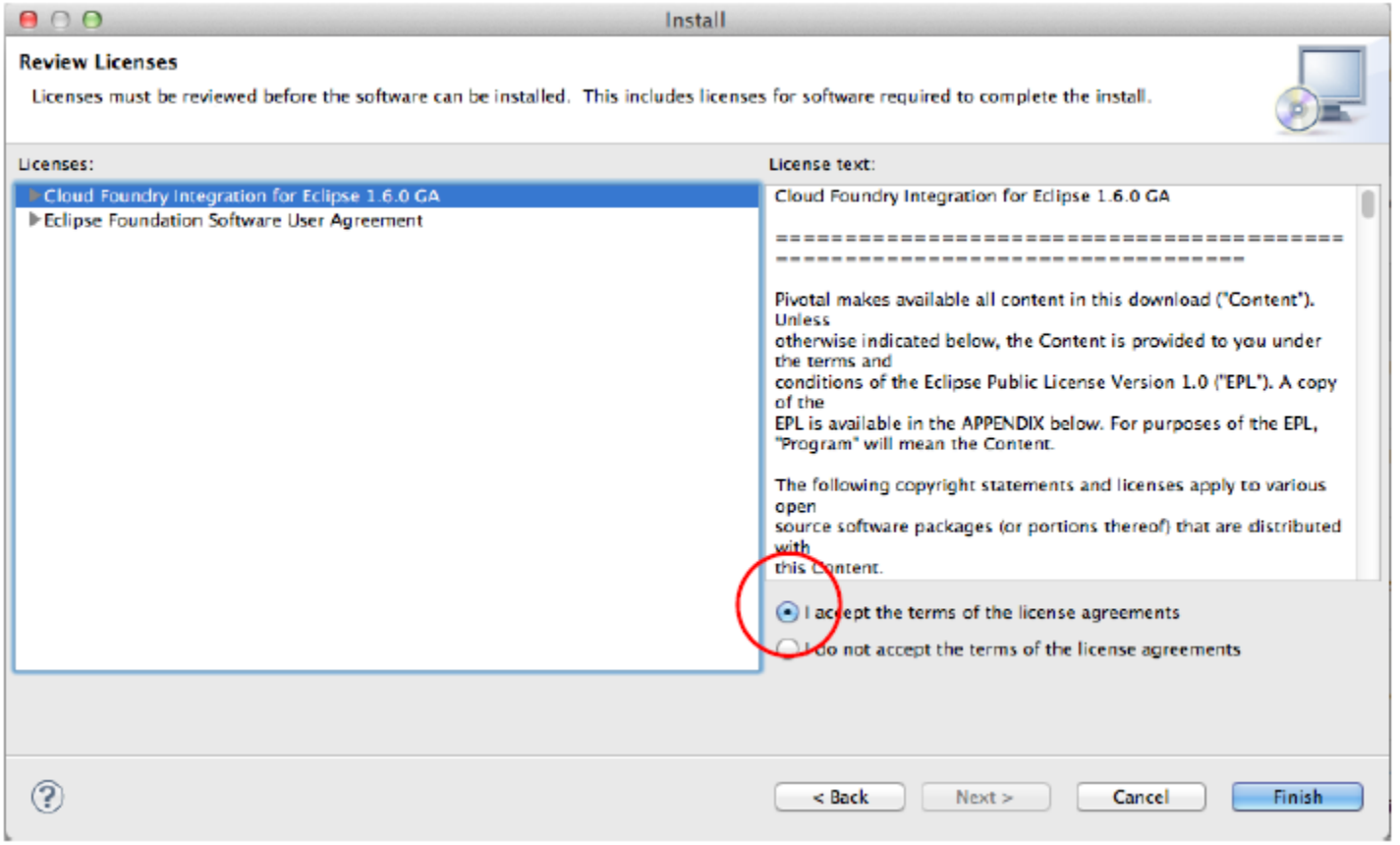
Wizard – Step 2

- Click next again



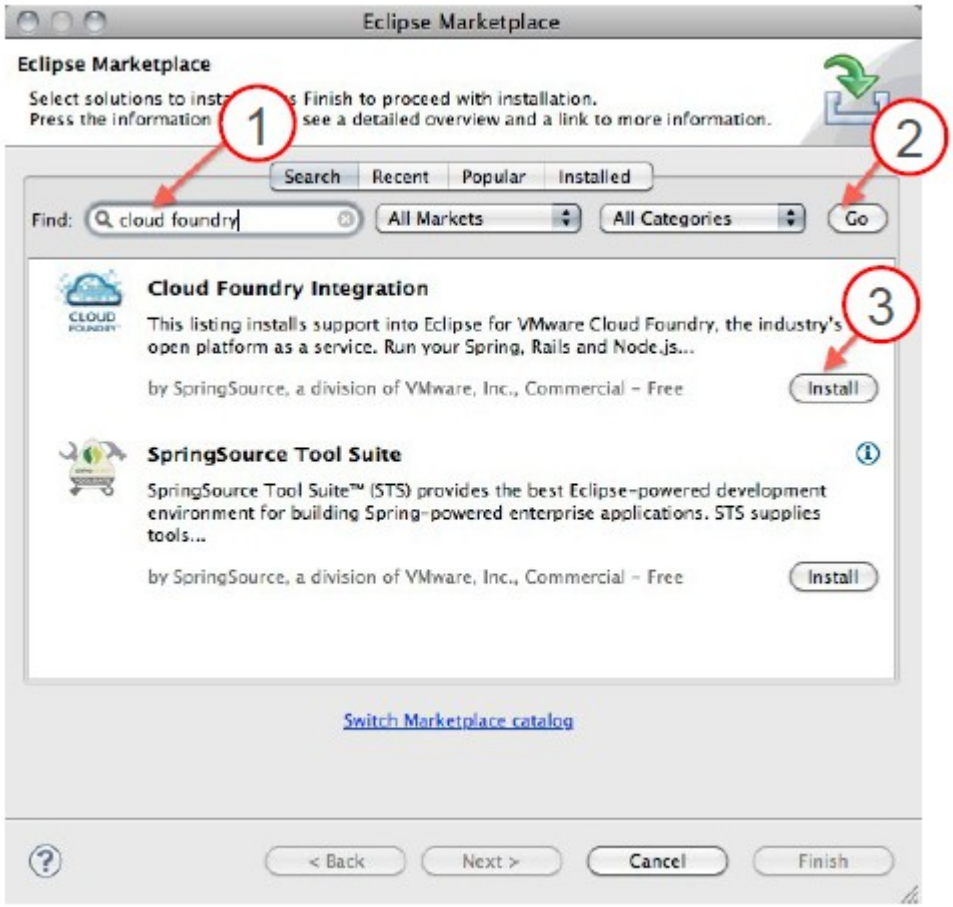
Wizard – Step 3

- Accept license agreement, and the installer will run



Appendix B : Installing into Eclipse

- For Help menu
  - Eclipse Marketplace
- Enter “Cloud Foundry” into find box
- Click “Go”
- Click “Cloud Foundry Integration” *Install* button

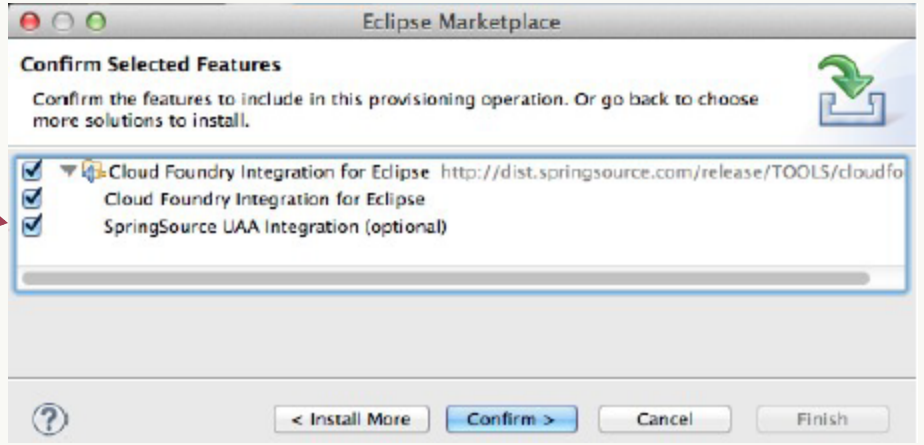


See : http://docs.cloudfoundry.org/devguide/deploy-apps/sts.html#install-to-eclipse

Confirm Selected Features

- Popup window lists what will be installed
  - "Cloud Foundry Integration for Eclipse"
  - "SpringSource UAA Integration" (optional)
    - Reports tool usage data, anonymously
    - Helps us track usage of free software
    - Deselect to stop plug in usage statistics being sent
  - Click Confirm.

Optional, deselect it you wish

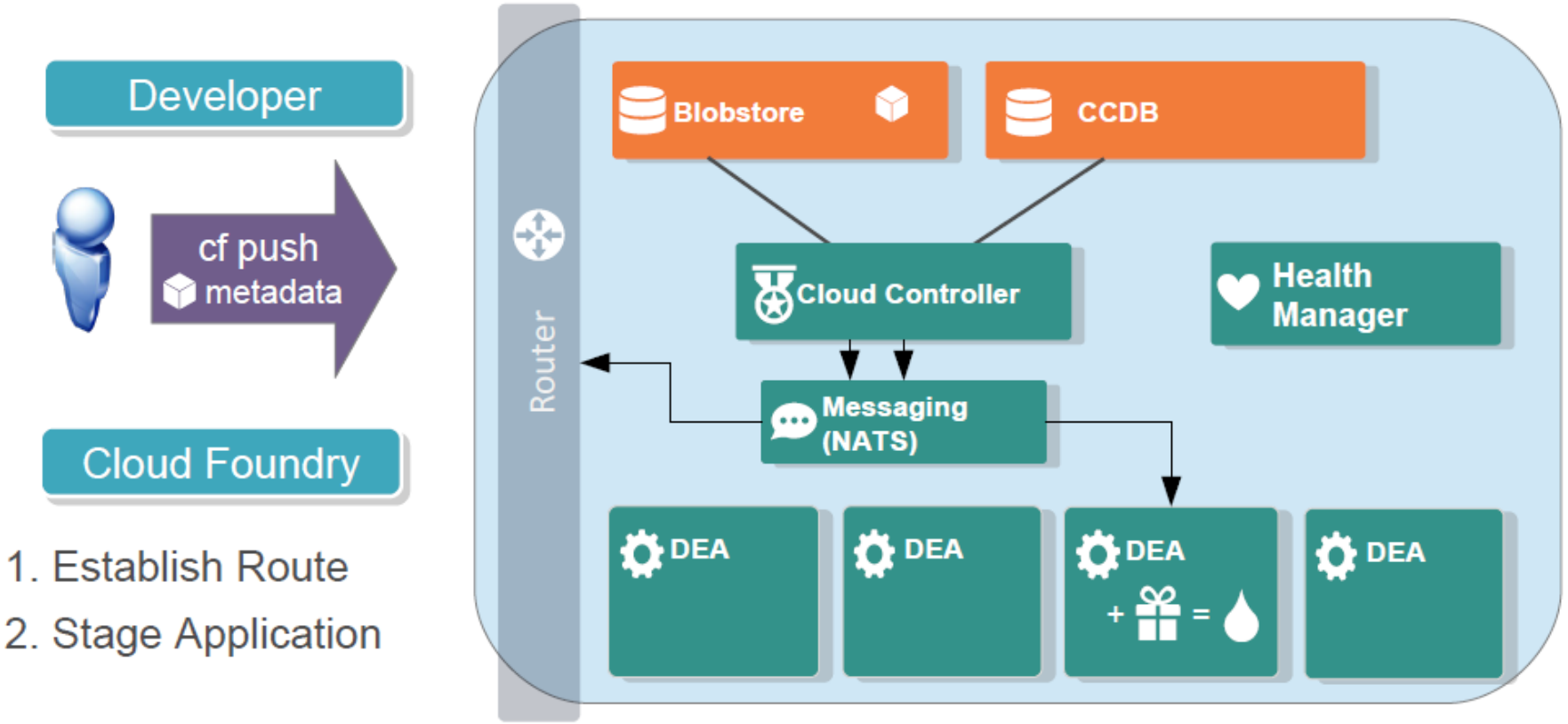


Last Few Steps

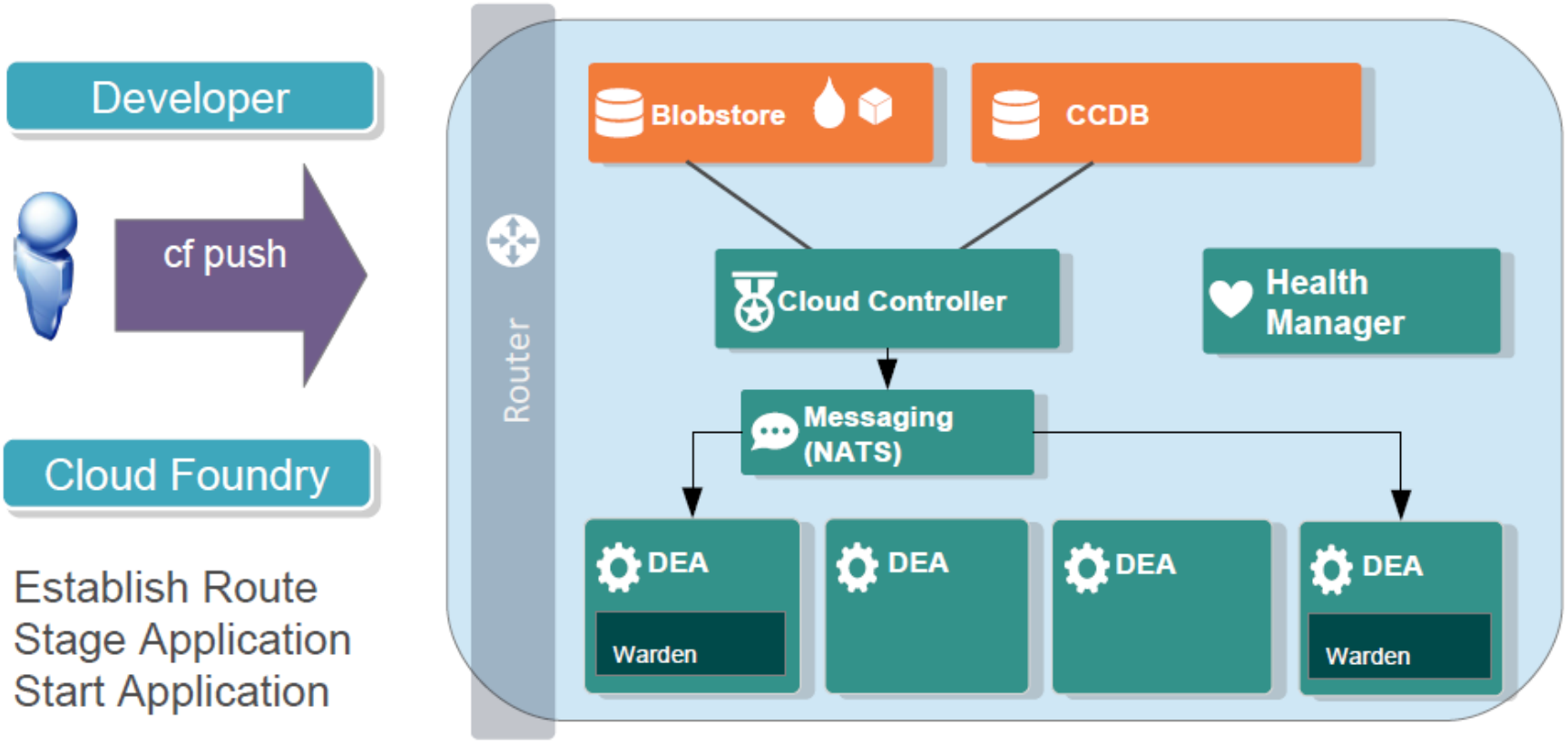
- Accept the license agreement
- Click finish
- Installer runs (takes a while)
- Eventually you are asked to restart Eclipse

How Deployment Happens

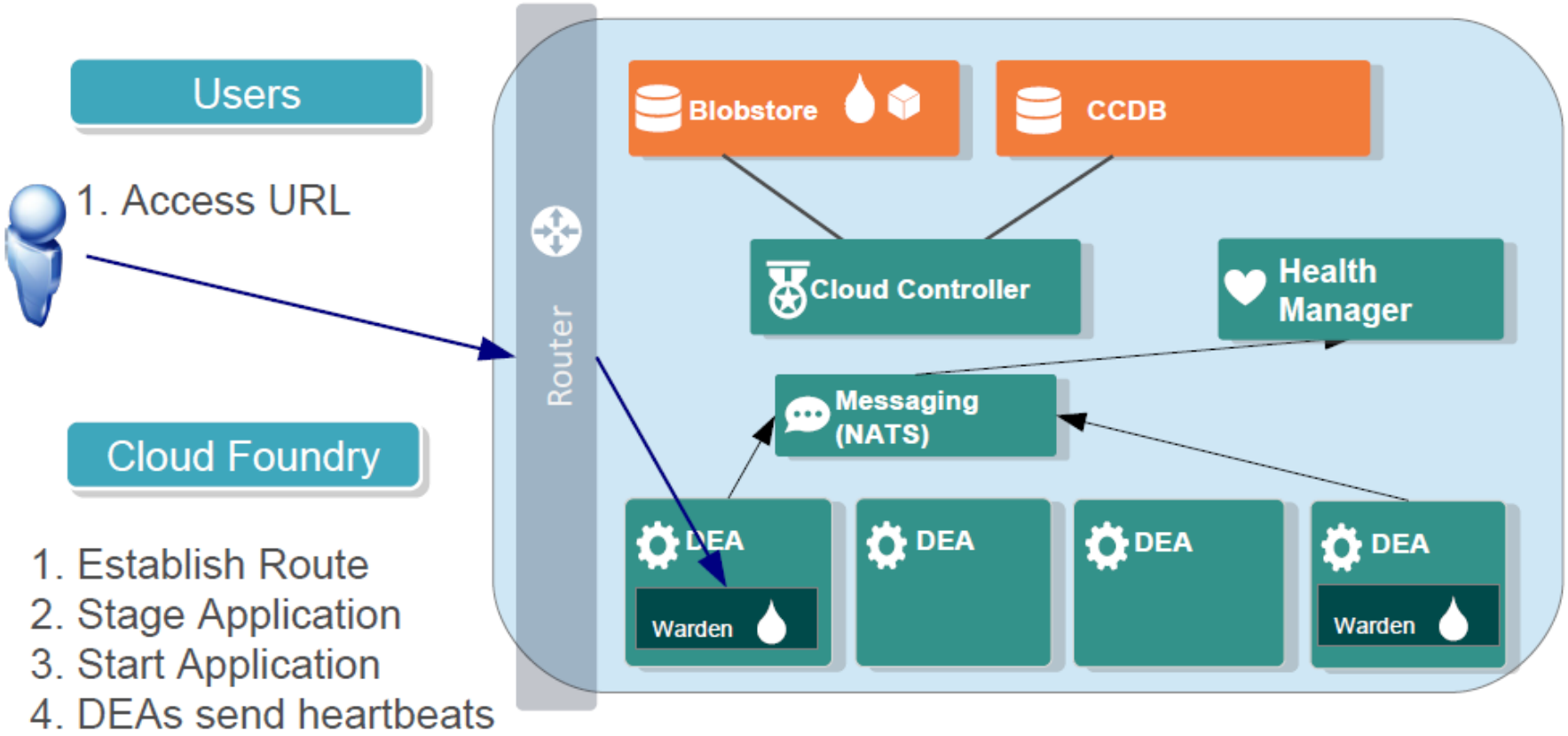
Deploying App to Cloud Foundry *(Push & Staging)*



Deploying App to Cloud Foundry *(Starting)*



Deploying App to Cloud Foundry *(Health Management & Running)*



Recap

manage

Web-based

install

STS

Eclipse

Dashboard

Report

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