



Logging and Troubleshooting in Cloud Foundry

A closer look at practical Cloud Foundry usage

Logging, Troubleshooting, and Understanding Application Deployment

Overview

- After completing this lesson, you should be able to:
 - View Logs from your CF application
 - Troubleshoot your application
 - Understand how deployment works

Roadmap

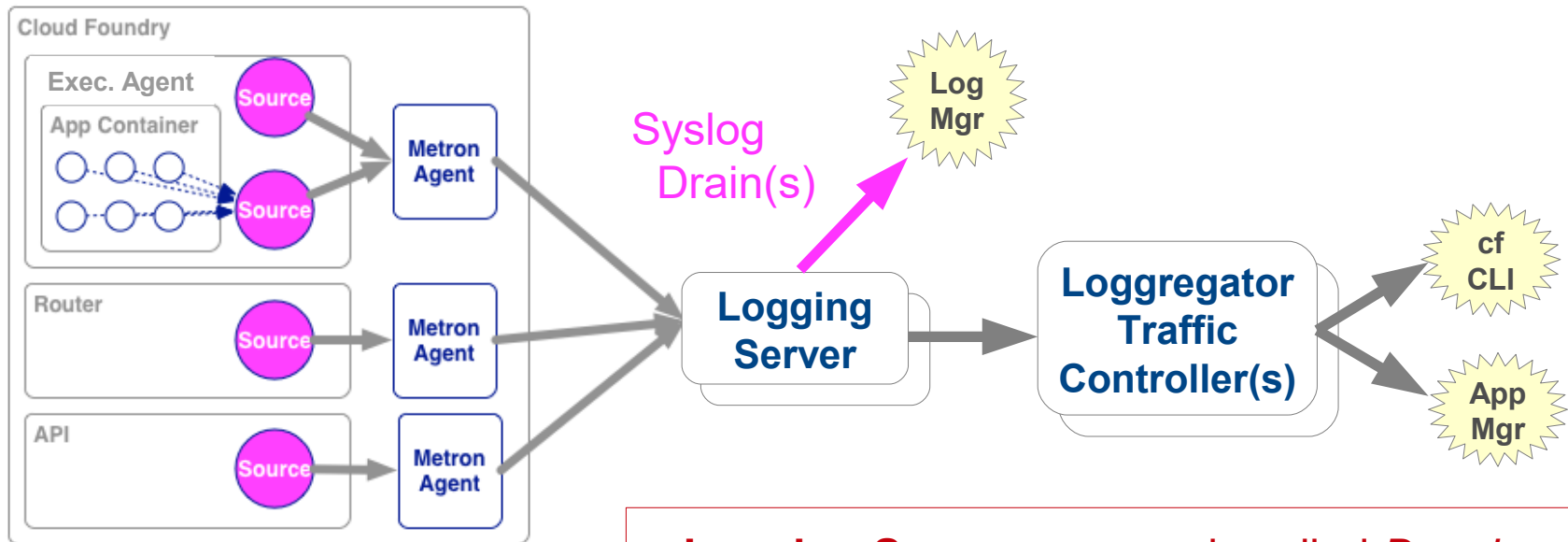
- **Logging**
- Troubleshooting
- How Deployment Happens

Log Aggregation Architecture

Execution Agent VM

- **Cells** in *Diego*
- *Formerly DEAs*

- Collects logging output from:
 - Application Instances, CF Components
- Aggregates into a consolidated log



Logging Server: process is called *Doppler*

Logging Terminology

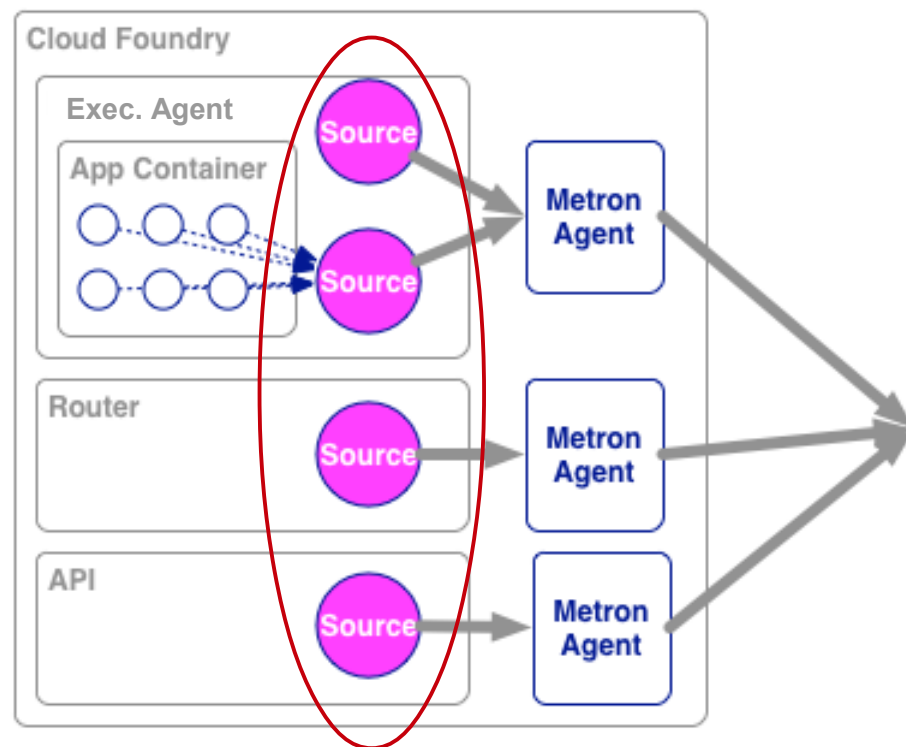
- ***Loggregator***: *entire* Log Aggregation Architecture
 - Metric agents + logging servers + traffic controllers
- Multiple components
 - Metron Agents: receive both logs *and* metrics
 - Doppler Server(s): accumulates data from agents
 - Traffic Controller(s): allow access to metrics and logs

Note: CF 1.3 or earlier

- Everything logged to a *single Loggregator* process
- Make sure you do not refer to older documentation by mistake

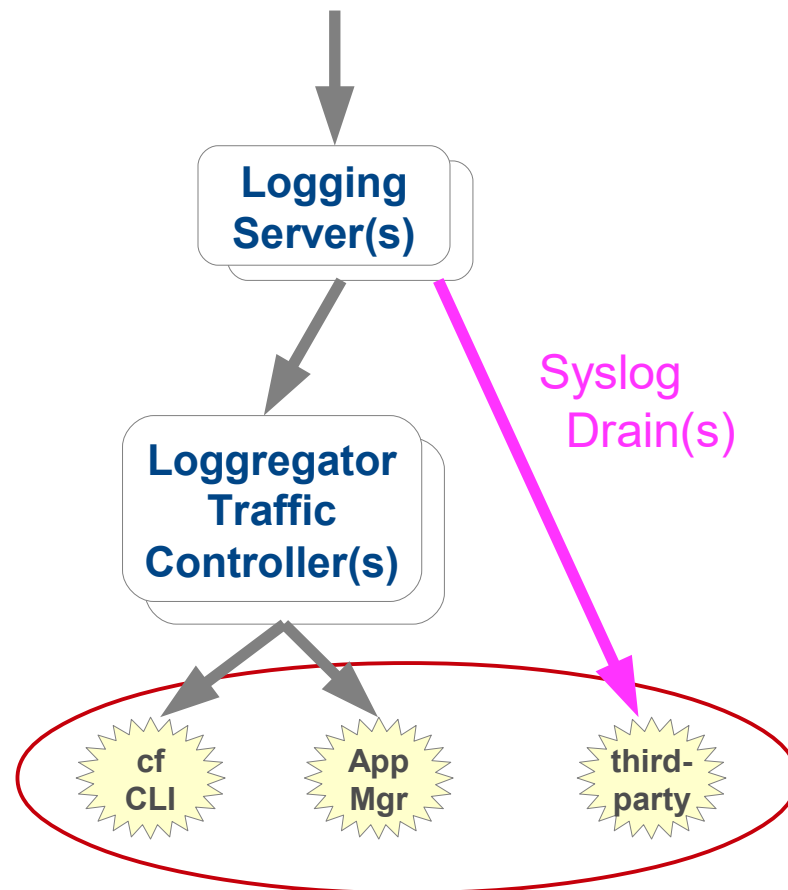
Logging - Sources

- Application Instances
 - Logs collected from all application instances
 - From *sysout* or *syserr*
- Cloud Foundry Components
 - Router, Cloud Controller, Execution Agents ...
 - Useful to understand update / deployment issues



Logging - Sinks

- CLI – Tail
 - Quick, direct way to obtain output
 - **cf logs <appname>**
- Third-party log managers
 - Splunk, Logentries, logstash, Papertrail, etc.



A Tour of Log Output

Timestamp – Added by Loggregator

```
2014-04-11T14:58:41.66 [API] OUT Updated app with guid 018f9a20-f0c9-4b5a-970d-e84f05375859
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2014-04-11T14:58:57.45 [APP/0] ERR INFO: Server startup in 8713 ms
2014-04-11T15:01:09.44 [RTR] OUT spring-music-567.cfapps.io - [19:01:09 +0000] "GET /info HTTP/1.1" 200 48
2014-04-11T15:01:09.46 [RTR] OUT spring-music-567.cfapps.io - [19:01:09 +0000] "GET /albums HTTP/1.1" 200 4669
2014-04-11T15:03:35.16 [CELL] OUT Starting app instance (index 1) with guid 018.70d-e84f05375859
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A Tour of Log Output

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Log Type / Origin

Where this message came from

- API – Cloud Controller
 - A change in application state
- APP/# - Your Application / Instance number
- RTR – Router
- CELL – Execution Agent
- etc.

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Channel

- Whether this output came from “SYSOUT” or “SYSERR”

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Message

- From the application / component

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Instance 0 startup activity
(condensed)

A Tour of Log Output

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User requests for a web page on instance 0

A Tour of Log Output

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Request to scale application

- `cf scale <appname> -i 2`

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2014-04-11T14:58:57.45 [APP/0] ERR Apr 11, 2014 6:58:57 PM org.apache.catalina.start
2014-04-11T14:58:57.45 [APP/0] ERR INFO: Server startup in 8713 ms
2014-04-11T15:01:09.44 [RTR] OUT spring-music-567.cfapps.io - [19:01:09 +0000] "GET /info HTTP/1.1" 200 48
2014-04-11T15:01:09.46 [RTR] OUT spring-music-567.cfapps.io - [19:01:09 +0000] "GET /albums HTTP/1.1" 200 4669
2014-04-11T15:03:35.16 [CELL] OUT Starting app instance (index 1) with guid 018.70d-e84f05375859
2014-04-11T15:03:40.43 [APP/1] ERR INFO: Starting Servlet Engine: Apache Tomcat/7.0.52
2014-04-11T14:58:54.47 [APP/1] OUT ...]
2014-04-11T14:58:56.26 [APP/1] OUT Hibernate: insert into Album (albumId, artist, trackCount, id) values (?, ?, ?, ?, ?, ?, ?)
2014-04-11T14:58:56.26 [APP/1] OUT Hibernate: insert into Album (albumId, artist, trackCount, id) values (?, ?, ?, ?, ?, ?, ?)
2014-04-11T14:58:56.38 [APP/1] ERR INFO: Initializing Spring Environment for Cloud Foundry
2014-04-11T14:58:57.44 [APP/1] ERR Apr 11, 2014 6:58:57 PM org.apache.coyote.AbstractProtocol start
2014-04-11T14:58:57.44 [APP/1] ERR INFO: Starting ProtocolHandler ["http-bio-62773"]
2014-04-11T14:58:57.45 [APP/1] ERR Apr 11, 2014 6:58:57 PM org.apache.catalina.startup.Catalina start
2014-04-11T14:58:57.45 [APP/1] ERR INFO: Server startup in 8713 ms
2014-04-11T15:03:35.15 [API] OUT Updated app with guid 018f9a20-f0c9-4b5a-970d-e84f05375859 ({"instances"=>2})
```

Instance #1 startup activity

More Logging

- Other logging types
 - STG = logging from Staging
 - SSH = ssh logging (discussed soon)

```
2016-03-26T16:52:05.000+00:00 [STG] OUT Downloaded java_buildpack
2016-03-26T16:52:05.000+00:00 [STG] OUT Creating container
2016-03-26T16:52:07.000+00:00 [STG] OUT Downloaded app package (21M)
2016-03-26T16:52:11.000+00:00 [STG] OUT -----> Downloading Tomcat Lifecycle Support 2.5.0_RELEASE from ...
2016-03-26T16:52:11.000+00:00 [STG] OUT -----> Downloading Tomcat Access Logging Support 2.5.0_RELEASE from ...
2016-03-26T16:52:20.000+00:00 [STG] OUT Staging complete
...
2016-03-26T21:19:08.13+0000 [SSH/0]    OUT Successful remote access by 10.10.66.204:37790
2015-04-11T12:58:35.16 [CELL/1]  OUT Starting app instance (index 1) with guid 018.70d-e84f05375859
2015-08-31T12:58:40.43 [APP/1]  ERR INFO: Starting Servlet Engine: Apache Tomcat/7.0.52
2015-08-31T12:58:54.47 [APP/1]  OUT ...]
2015-08-31T12:58:56.26 [APP/1]  OUT Hibernate: insert into Album (albumId, artist, trackCount, id) values (?, ?, ?, ?, ?, ?, ?)
2016-03-26T16:52:35.000+00:00 [CELL] OUT Starting health monitoring of container
2016-03-26T21:22:19.21+0000 [CELL/2]  OUT Starting health monitoring of container
2015-08-31T12:58:56.26 [HEALTH/1] OUT healthcheck passed
```


Accessing Logs

- *Tailing* – provides *real time* echoing (like Unix *tail* command) of output from loggregator
 - `cf logs <app_name>`
 - Live feed
 - Use `<ctrl> c` to exit
- Recent activity
 - `cf logs <app_name> --recent`

Eclipse Remote Systems View

Applications

Applications

Select a currently deployed application to see details.

cf-profile-test
cf-service-broker

Services

General

Name: cf-profile-test [Started]

Mapped URLs: cf-profile-test-dev.cfapps.io

Memory limit: 512M Change is not updated until application restarts

Instances: 1

Stop

Restart

Application Services

Name	Vendor	Plan	Version

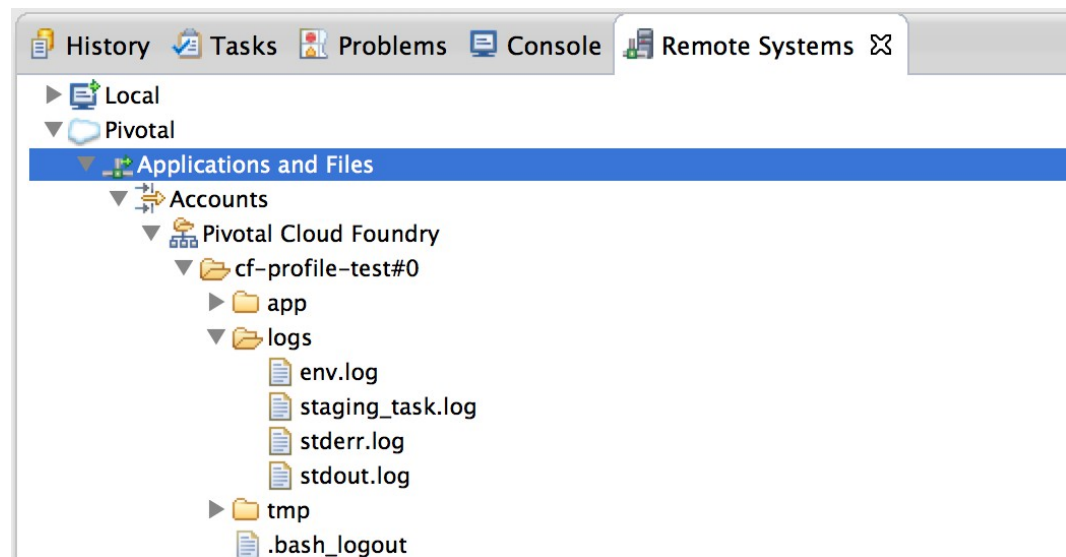
Instances

ID	Host	CPU	Memory	Disk	Uptime
0	10.10.17.11	0.0% (0)	0M (512M)	102M (1024M)	0h:0m:0s

Show deployed files in [Remote Systems View](#).

Eclipse Remote Systems View – cont.

- Eclipse plug-in for Cloud Foundry
 - Remote Systems View
 - Access logs



Roadmap

- Logging
- **Troubleshooting**
- How Deployment Happens

Troubleshooting applications in Cloud Foundry

- Troubleshooting Applications in Cloud Foundry can be hard
 - Deployment / push issues
 - Runtime issues
- Important to be familiar with the tools at your disposal

cf apps command

- **cf apps** - Lists all applications within a space
 - ... and their *status*
- **cf app <app-name>** - Lists all instances of an application within a space
 - ... and their *status*

```
> cf app spring-music
```

```
...
```

	state	since	cpu	memory	disk
#0	running	2014-04-14 03:27:02 PM	0.1%	407.1M of 512M	134.8M of 1G
#1	starting	2014-04-14 09:12:37 PM	0.0%	0 of 0	0 of 0
#2	running	2014-04-14 09:12:55 PM	0.0%	415.9M of 512M	134.8M of 1G
#3	running	2014-04-14 09:12:54 PM	0.0%	415.7M of 512M	134.8M of 1G

Events

- `cf events <app-name>`
 - Event log related to you application

```
> cf events spring-music
```

time	event	description
2014-04-01T16:33:37.00-0400	audit.app.create	instances: 1, state: STOPPED
2014-04-01T16:33:38.00-0400	audit.app.update	
2014-04-01T16:34:17.00-0400	audit.app.update	state: STARTED
2014-04-01T17:03:45.00-0400	audit.app.update	
2014-04-01T19:30:09.00-0400	audit.app.update	instances: 1, state: STOPPED
2014-04-10T17:56:07.00-0400	audit.app.update	
2014-04-10T17:56:11.00-0400	audit.app.update	state: STARTED
2014-04-10T17:58:48.00-0400	audit.app.update	state: STOPPED
2014-04-11T14:58:41.00-0400	audit.app.update	state: STARTED
2014-04-11T15:03:35.00-0400	audit.app.update	instances: 2
2014-04-11T15:16:28.00-0400	audit.app.update	state: STOPPED
2014-04-11T16:55:17.00-0400	audit.app.update	state: STARTED
2014-04-14T21:12:40.00-0400	audit.app.update	instances: 4

Recent Logs

- Obtain most recent subset of logs
 - Very useful when diagnosing a crash
 - `cf logs <app_name> --recent`

Note: Incoming Port 4443

- `cf logs` receives data on incoming port 4443 (secure web-socket)
- This must be open in your firewall
- Otherwise view logs in the Apps Manager console

CF_TRACE

- Set this environment variable
 - On our *own* machine (*not* a Cloud Foundry variable)
 - Detected by the `cf` utility causing it to generate extra debugging output
 - Displays REST messages between `cf` and Cloud Foundry
- Usage

```
export CF_TRACE=true  
cf push ...
```

MacOS
/ Linux

```
export CF_TRACE=/path/to/log/file  
cf push ...
```

MacOS/Linux

```
set CF_TRACE=true
```

MS Windows

```
set CF_TRACE=\path\to\log\file
```

MS Windows

Common CF Deployment Issues - Java

- Memory set too low
 - Warden container fails due to memory, discarded, new container created, fails again, restarted, fails ...
- JAR / WAR too large, upload fails
 - Resolve by:
 - push the JAR / WAR only
 - Decompose application
- Slow start, health check fails
 - Specify Tomcat `BindOnInit = false`
 - Alter timeout settings (explained later...)



Known as
FLAPPING

Best Practices - Ruby

- Precompile assets
 - Recommended to reduce staging time
- Use **rails_serve_static_assets** gem (Rails 4)
 - Sets **config.serve_static_assets = true**
 - Allows populating of CDN, or serving files directly from application
- Don't push unnecessary files
 - List them in **.cfigure**
 - **cf** should ignore **.cfigure!**

```
.cfigure  
.gitignore  
_darcs  
.DS_Store  
.git  
.hg  
.svn  
/manifest.yml  
/tmp  
/logs
```

Best Practices – Node.JS

- `package.json` *mandatory*
 - For configuration
- Again. don't push unnecessary files
 - Use `.cfignore`
- Specify application's web start command
 - Using a Procfile
 - Or `cf push -command "node myapp.js"`
 - Or Cloud Foundry deployment manifest
 - (covered later)

```
{
  "name": "myapp",
  "version": "0.0.1",
  "author": "Your Name",
  "dependencies": {
    "express": "3.4.8",
    "consolidate": "0.10.0",
    "express": "3.4.8",
    "swig": "1.3.2"
  },
  "engines": {
    "node": "0.12.2",
    "npm": "2.7.4"
  }
}
```

Controlling Timeouts



- When a new application is pushed, timeouts may occur
 - **cf push** after 60 secs
 - Application staging after 15 mins
 - Application start-up after 5 minutes
- Can specify push timeout in *seconds* using **-t** option
 - **cf push -t 120**
 - maximum timeout is 180s
- Use environment variables to control staging or startup
 - **CF_STAGING_TIMEOUT** and **CF_STARTUP_TIMEOUT**
 - specify time in *minutes*

What about IDE Debugging?

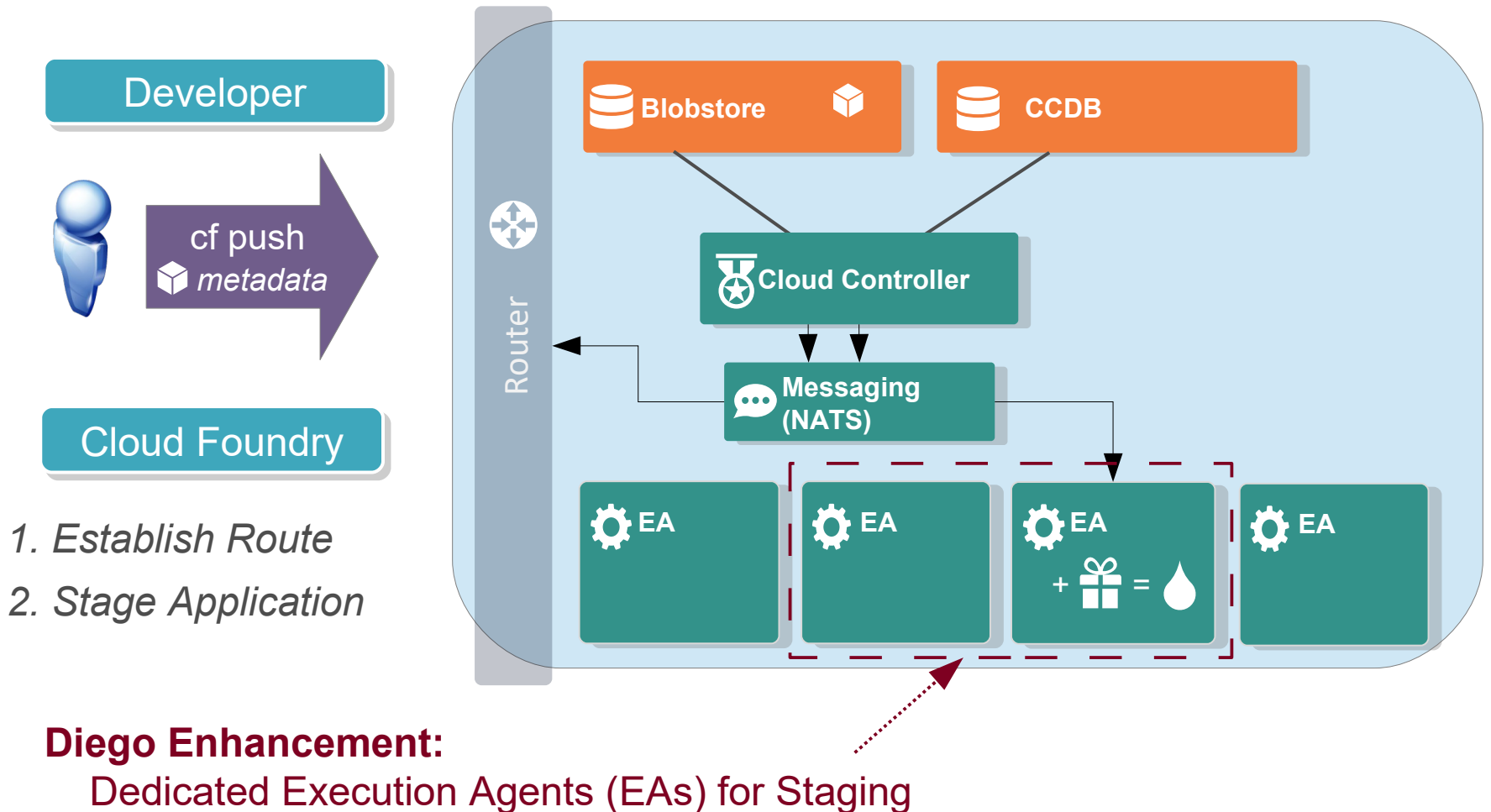
- Connecting an IDE to an application running on Cloud Foundry is basically not possible
- Cloud Foundry restricts incoming traffic
 - Only HTTP on port 80 & 443
- Work-arounds are possible
 - Described in later module
- Recommendation: debug applications locally, rely on techniques just described for troubleshooting.

Roadmap

- Logging
- Troubleshooting
- **How Deployment Happens**

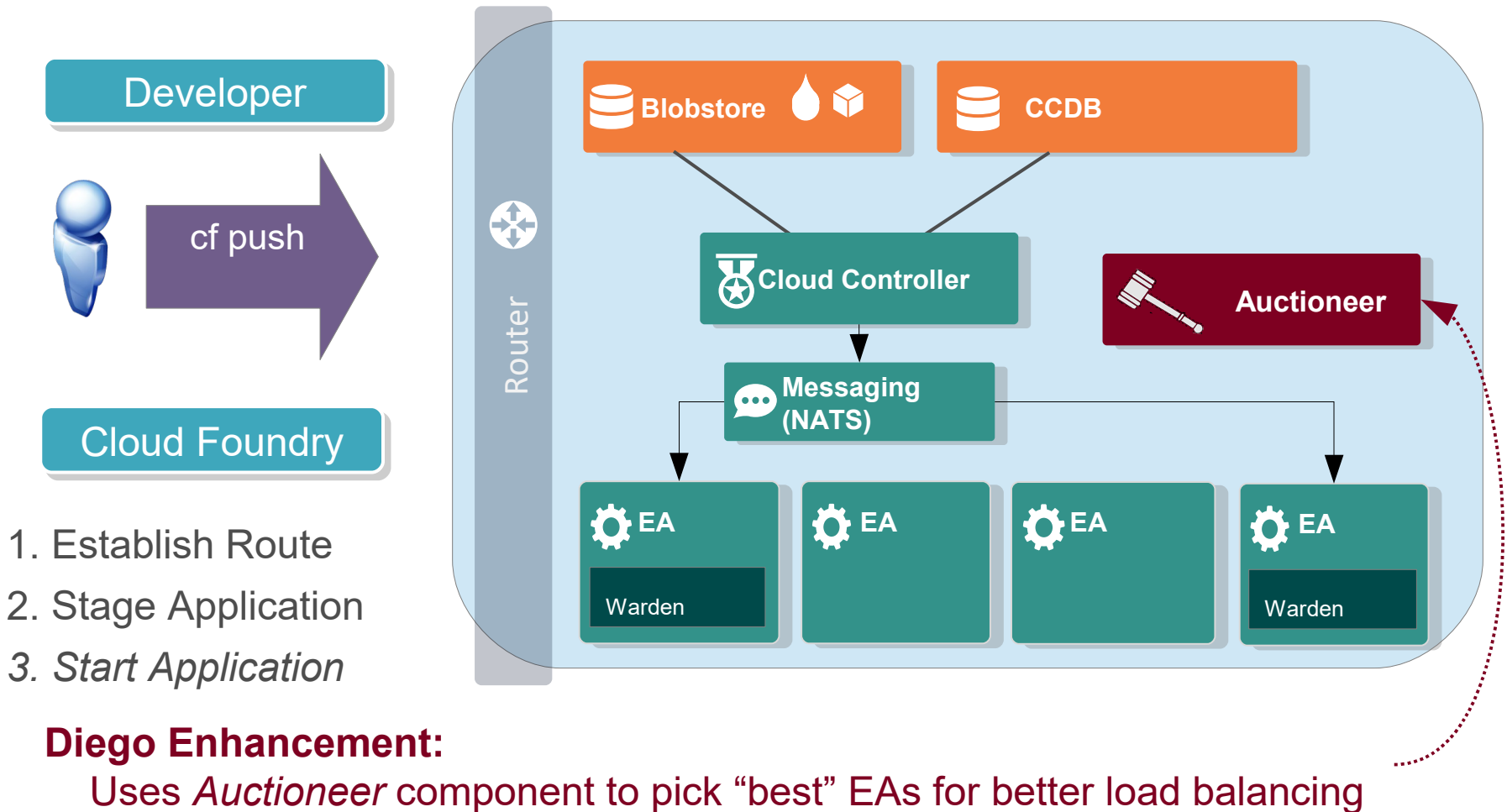
Deploying App to Cloud Foundry

Push & Staging



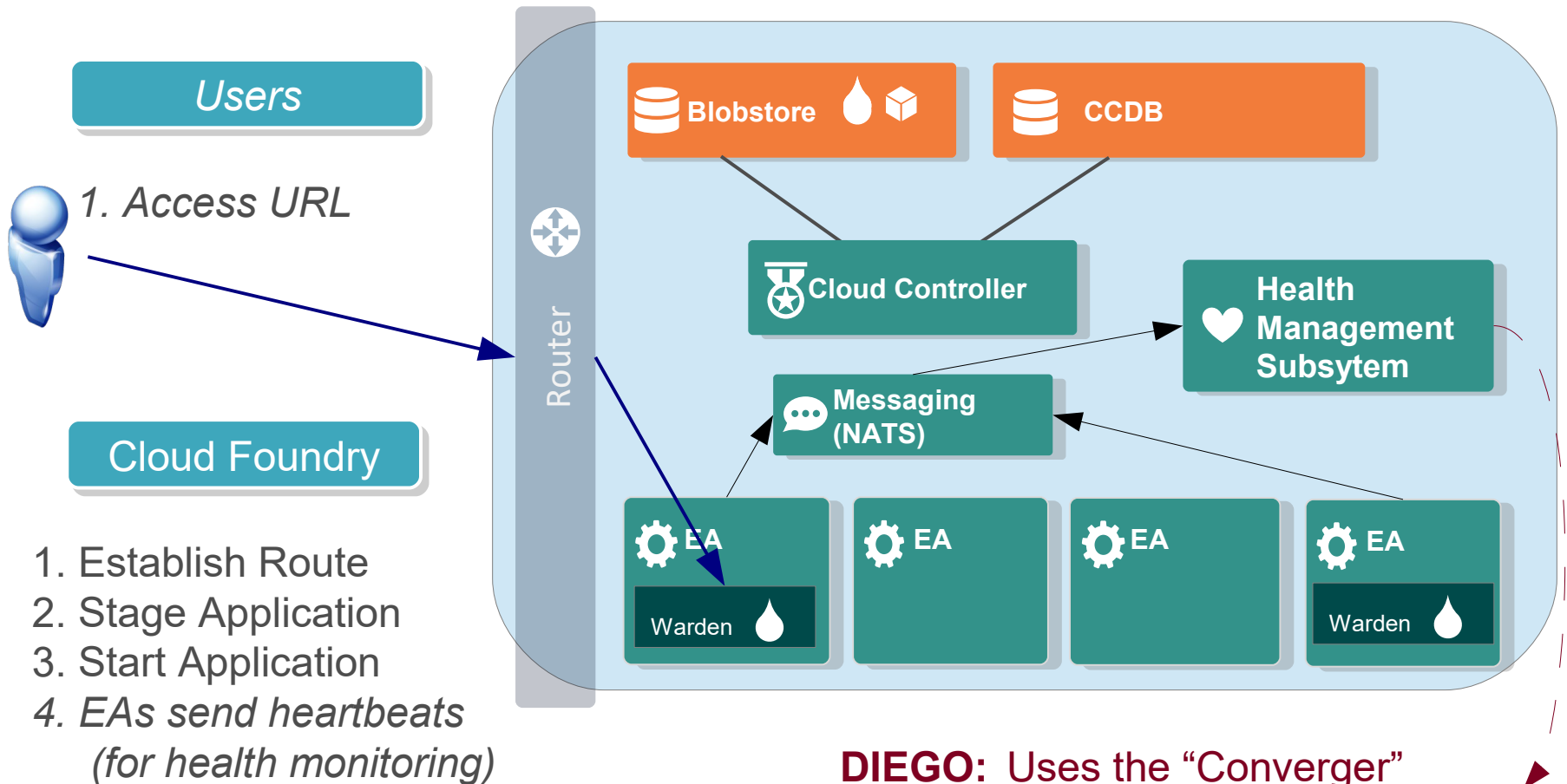
Deploying App to Cloud Foundry

Starting



Deploying App to Cloud Foundry

Health Management and Running



DIEGO: Uses the “Converger”
DEA: Used a “Health Manager”

Summary

- After completing this lesson, you should have learned:
 - How to log and troubleshoot your application
 - How deployment happens

Lab

Troubleshooting application problems
with Cloud Foundry