

Logging, Scale, and HA

Agenda

1. Cloud Native Apps
2. Elastic Runtime Architecture
3. High Availability

FUNDAMENTAL CHANGES

Distributed System

Distributed systems are hard to build, test, manage, and scale.

Ephemeral Infrastructure

Virtual machines and containers are temporary.

Immutable Infrastructure

Updates to systems and applications are not done in-place but rather new, updated instances are created instead.

CHANGES IN APP DESIGN

The 12 Factor App

Methodology for building web apps suitable for running on cloud platforms.

<http://12factor.net/>

The 12 Factors

Codebase

Dependencies

Config

Backing
Services

Build, release,
run

Processes

Port binding

Concurrency

Disposability

Dev/prod parity

Logs

Admin Processes

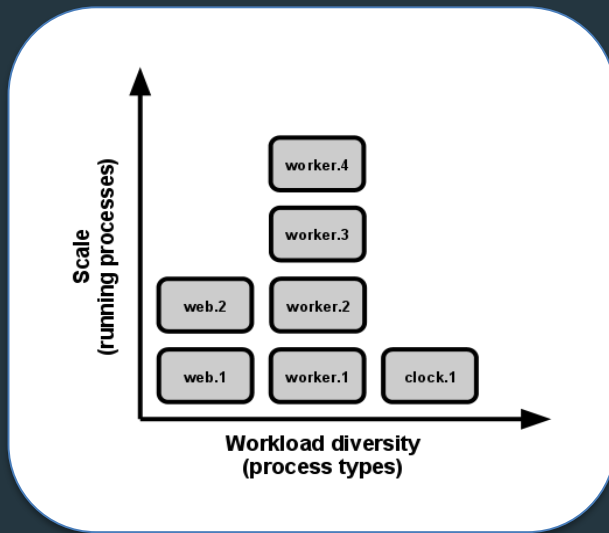
Processes

Execute the app as one or more stateless processes.

<http://12factor.net/processes>

Concurrency

Scale out via the process model.



Disposability

Maximize robustness with fast startup and graceful shutdown.

<http://12factor.net/disposability>

Logs

Treat logs as event streams.

<http://12factor.net/logs>

Agenda

1. Cloud Native Apps
2. Elastic Runtime Architecture
3. High Availability

Elastic Runtime Architecture

- Elastic Runtime Subsystems
 - Diego
 - Loggregator
 - Cloud Controller API
 - Routing
- Key Sequence Flows through the ER

DIEGO

<https://docs.pivotal.io/pivotalcf/concepts/diego/diego-architecture.html>

Diego

Schedules tasks and Long-Running Processes (LRPs).

Diego: Task

Is guaranteed to run at *most once*.

e.g. stage an application

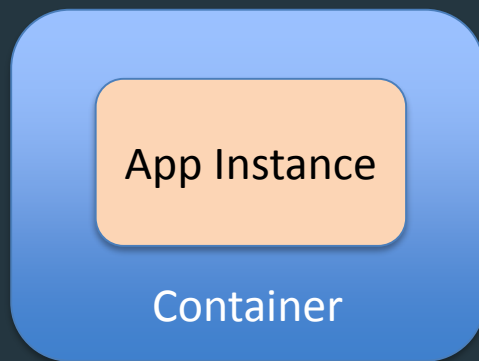
Diego: LRP

Is a Long-Running Process, typically represented
as a web app.

LRPs can have multiple instances.

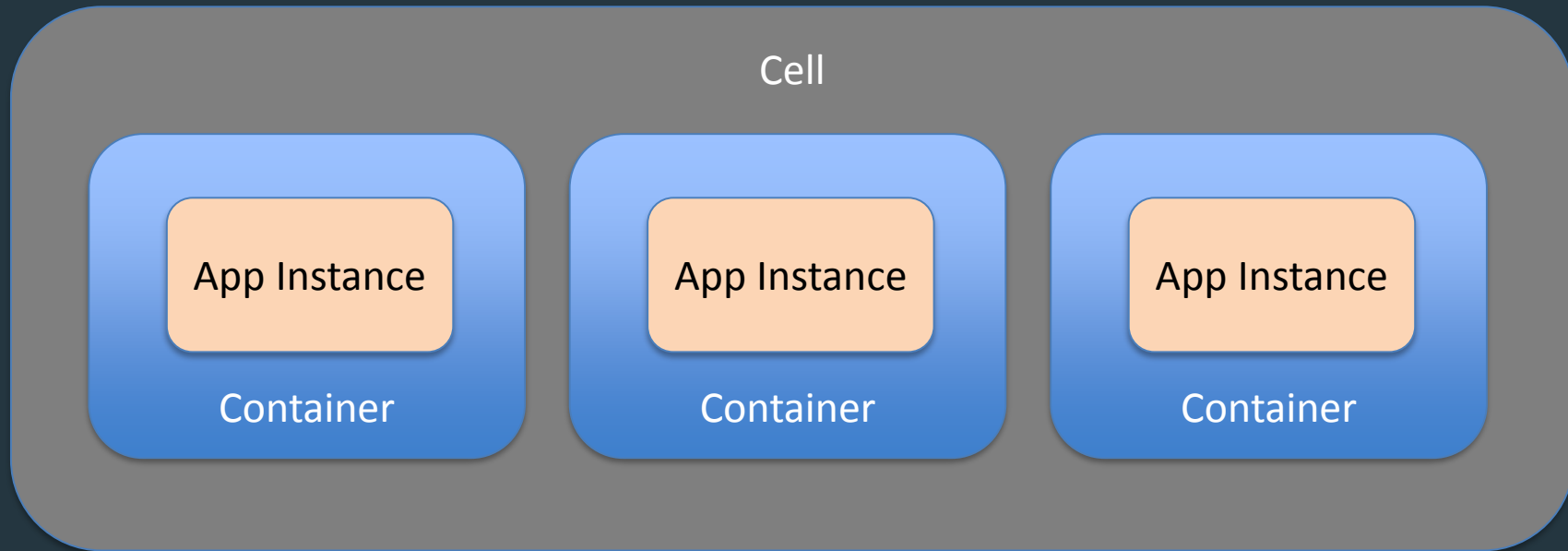
Diego: Container

An application instance is run within an immutable container.



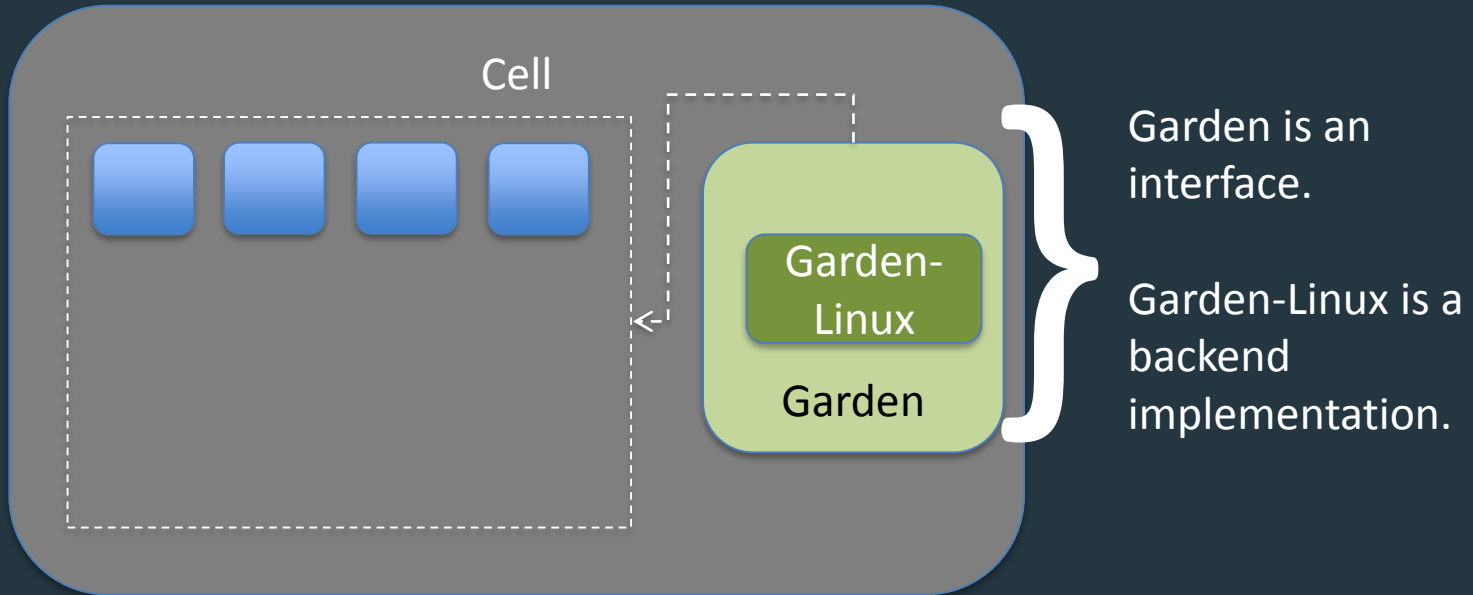
Diego: Cell

Containers are run within a cell.



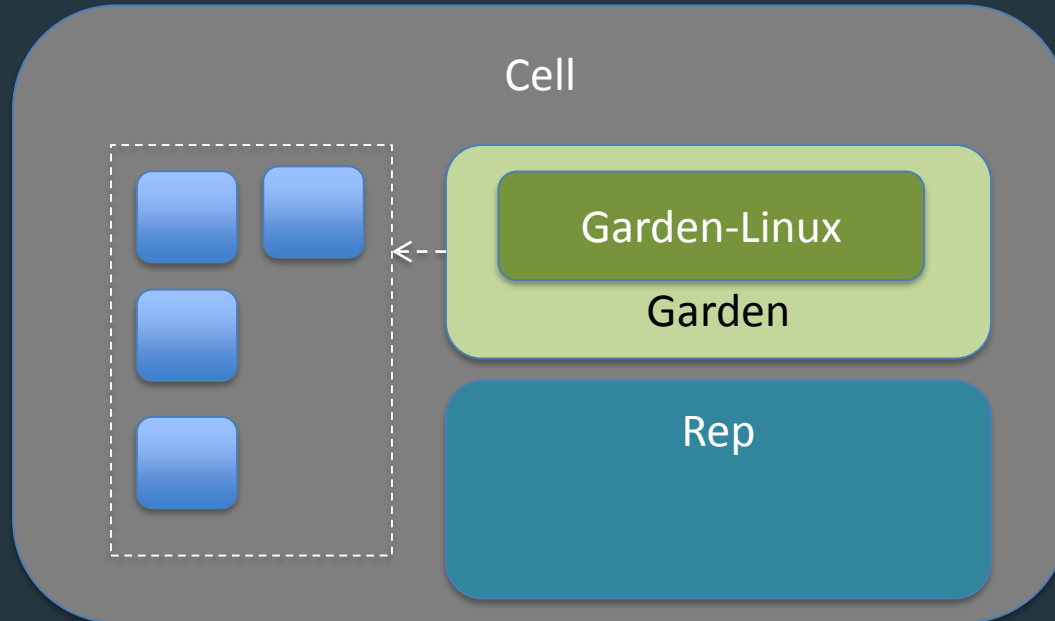
Diego: Garden

Containers are managed by Garden.



Diego: Rep

Represents the Cell in the BBS/auctions.

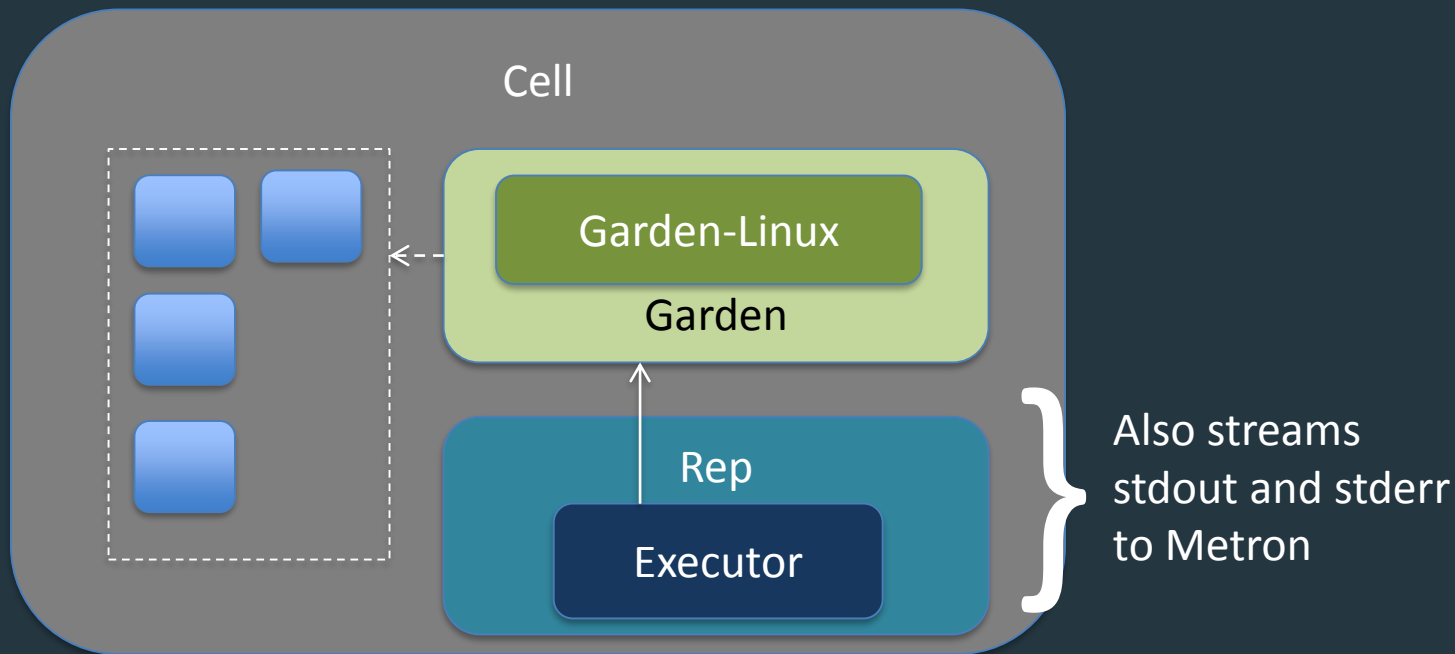


Diego: Auction

An auction is held to bid on executing a task or an LRP.

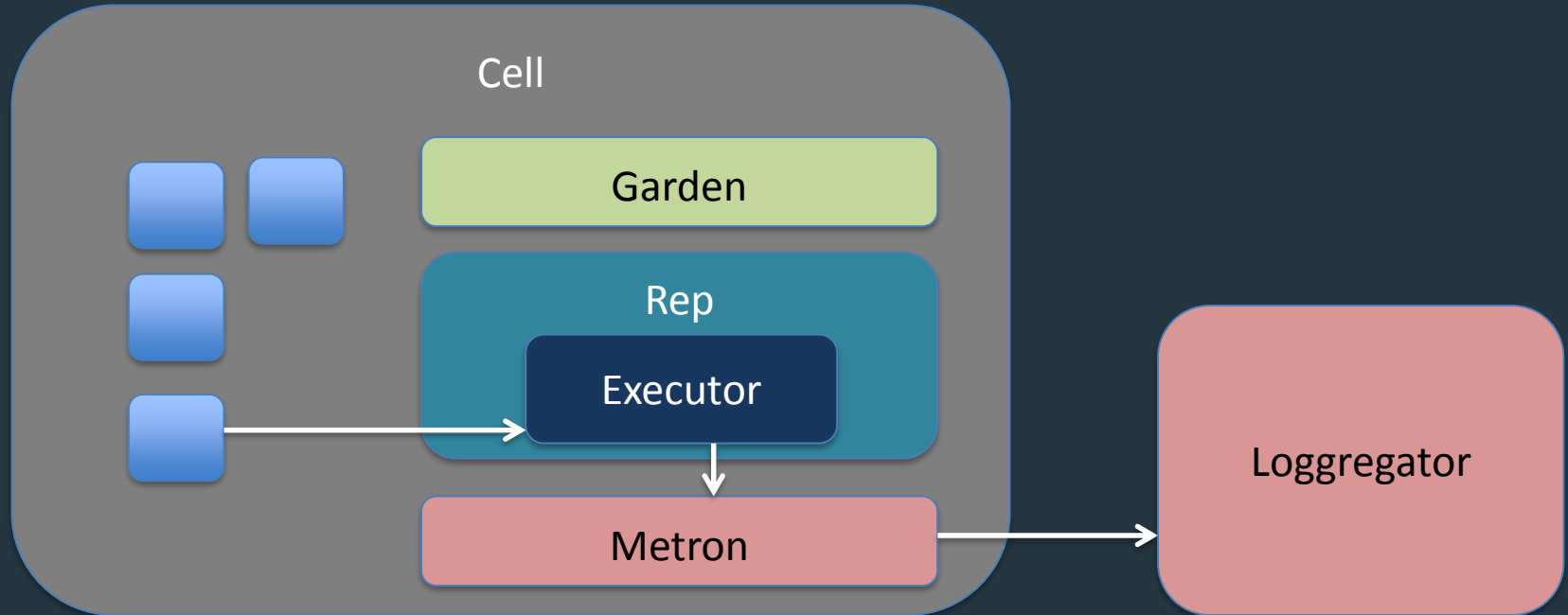
Diego: Executor

Manages container allocations on the cell.



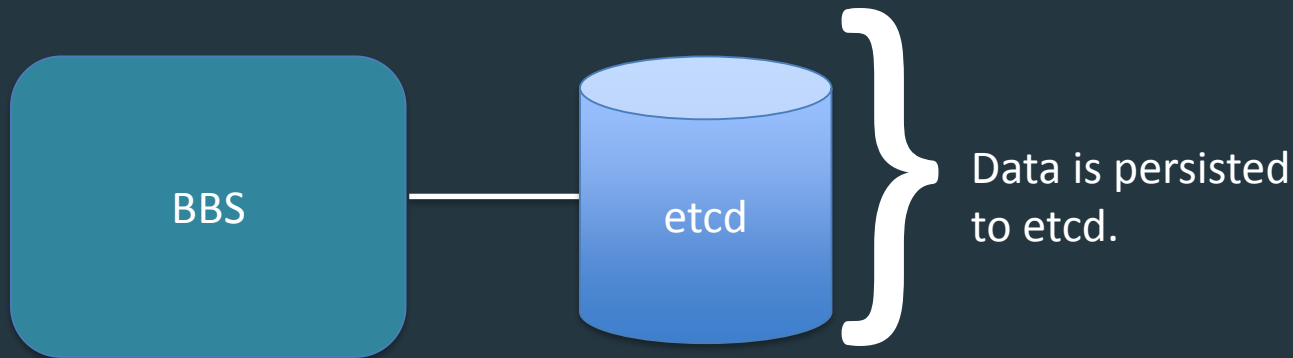
Diego: Metron

Forwards logs to the Loggregator subsystem.



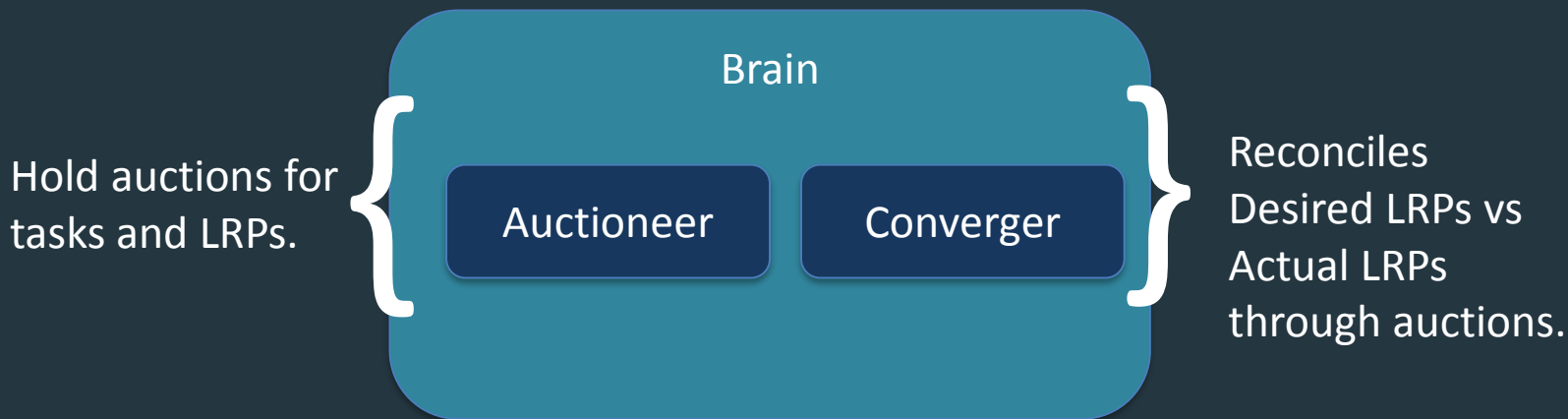
Diego: BBS

BBS (Bulletin Board System) is the API to access the Diego database for tasks and LRPS.



Diego: Brain

The Brain is composed of two components.

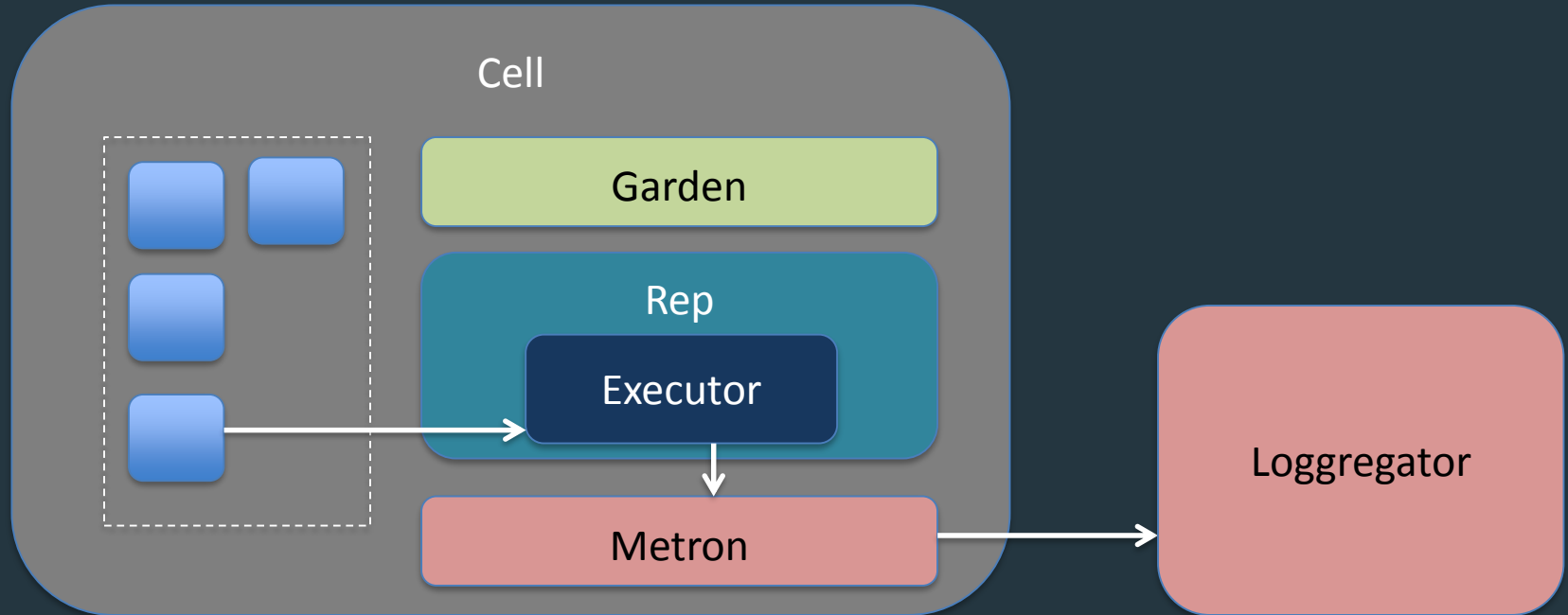


LOGGREGATOR

<https://docs.pivotal.io/pivotalcf/loggregator/architecture.html>

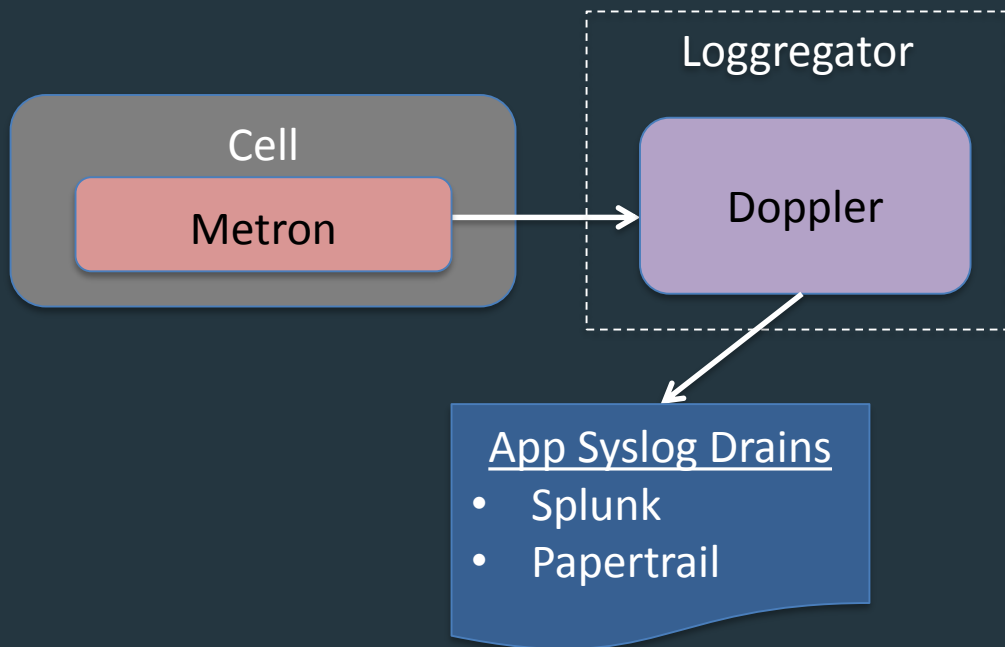
Loggregator: Metron

Forwards logs to the Loggregator subsystem.



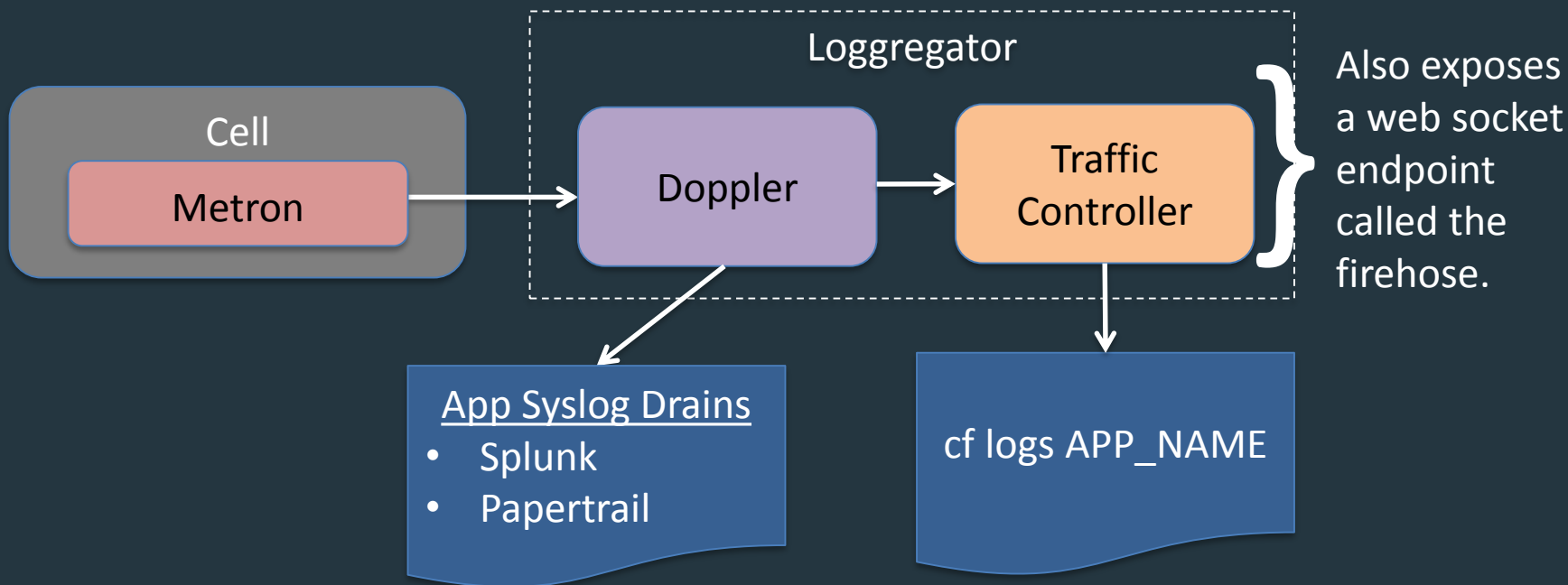
Loggregator: Doppler

Gathers logs from Metron.



Loggregator: Traffic Controller

Handles client requests for logs.



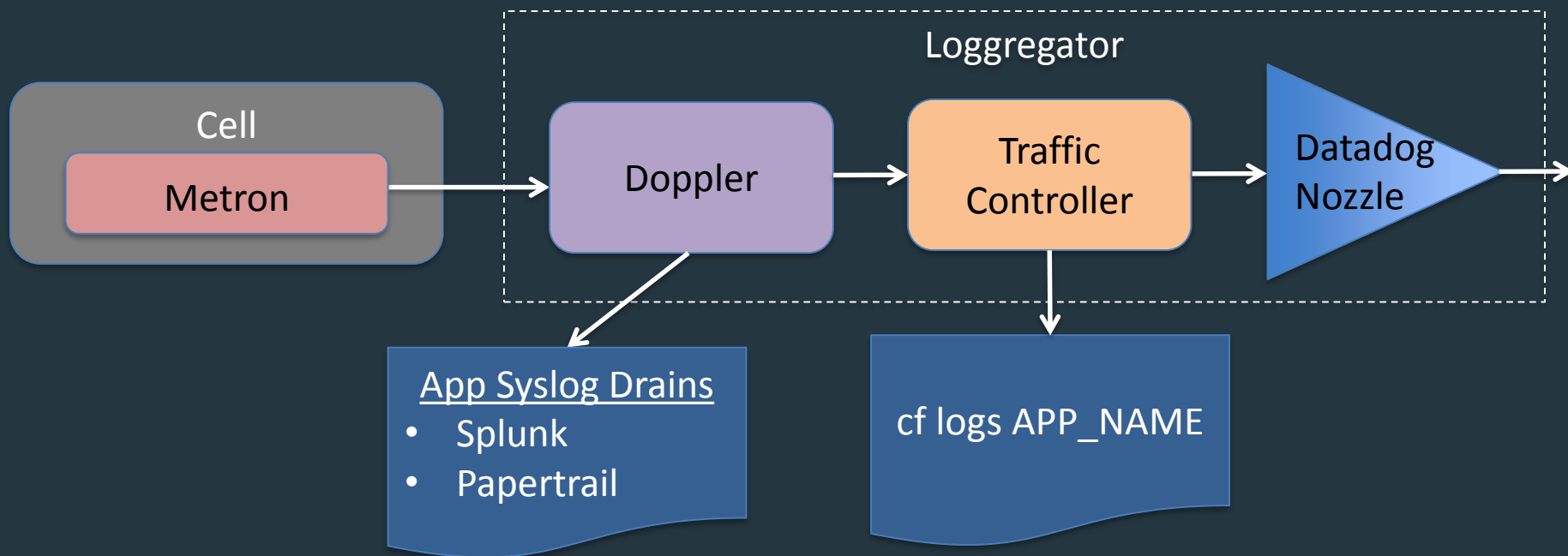
Loggregator: Firehose

A websocket endpoint that exposes app logs, container metrics and ER component metrics.

Does not include ER component logs.

Loggregator: Nozzles

Consume the firehose output.

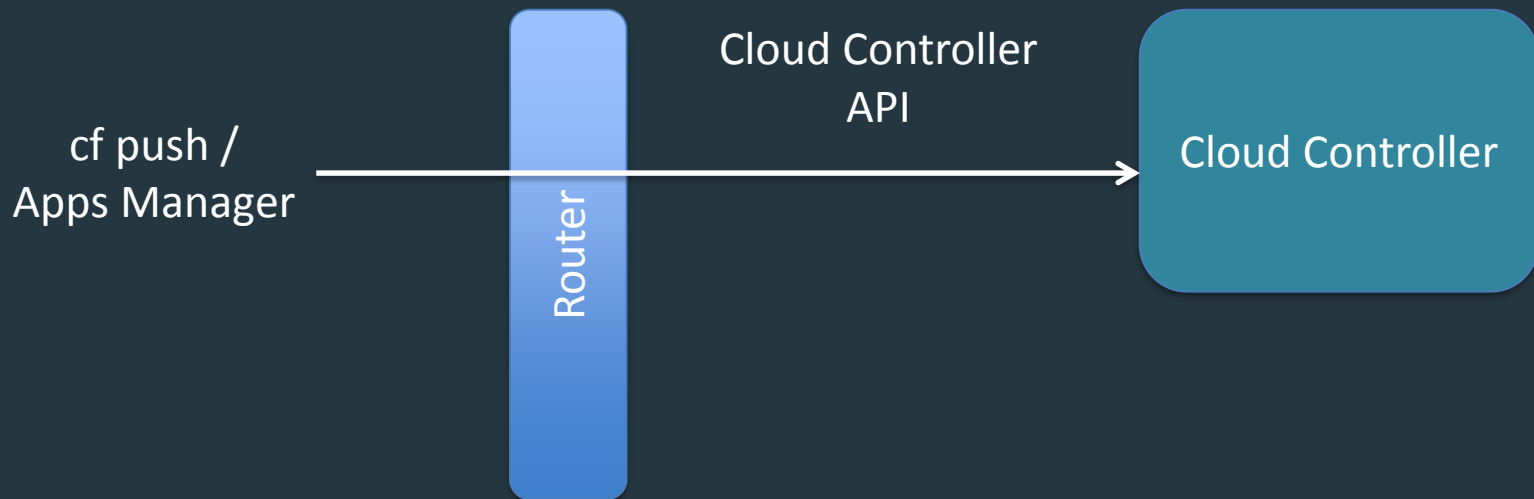


CLOUD CONTROLLER API

<https://docs.pivotal.io/pivotalcf/concepts/architecture/cloud-controller.html>

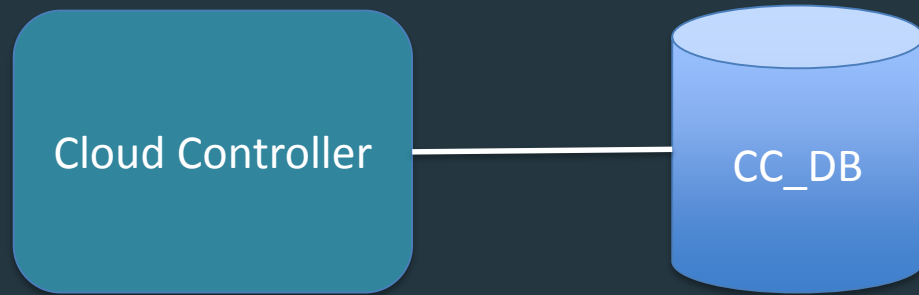
CCAPI: Cloud Controller

The Cloud Controller exposes an API for using and managing the Elastic Runtime.



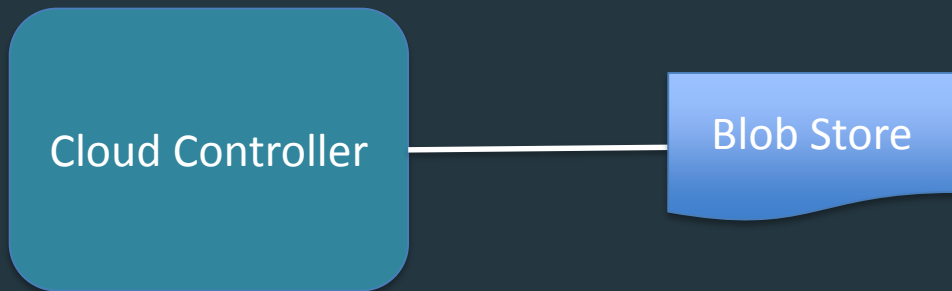
CCAPI: Cloud Controller Database

The Cloud Controller persists Org/Space/App data in the Cloud Controller Database.



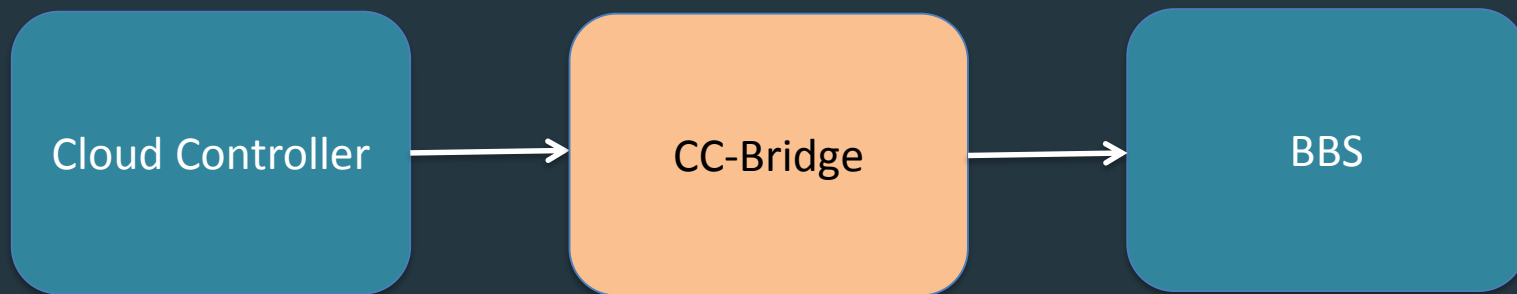
CCAPI: Blob Store

The Cloud Controller persists app packages and droplets to the blob store.



CCAPI: CC-Bridge

The CC-Bridge translates app specific messages into the generic language of tasks and LRPs.

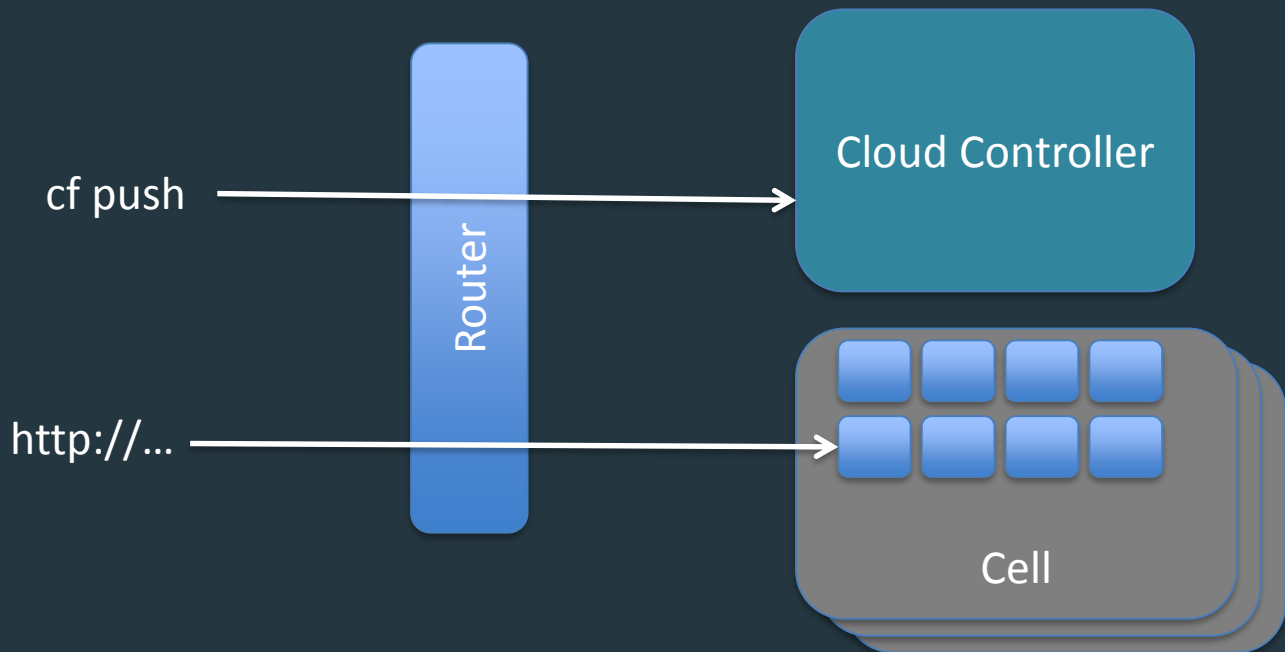


ROUTING

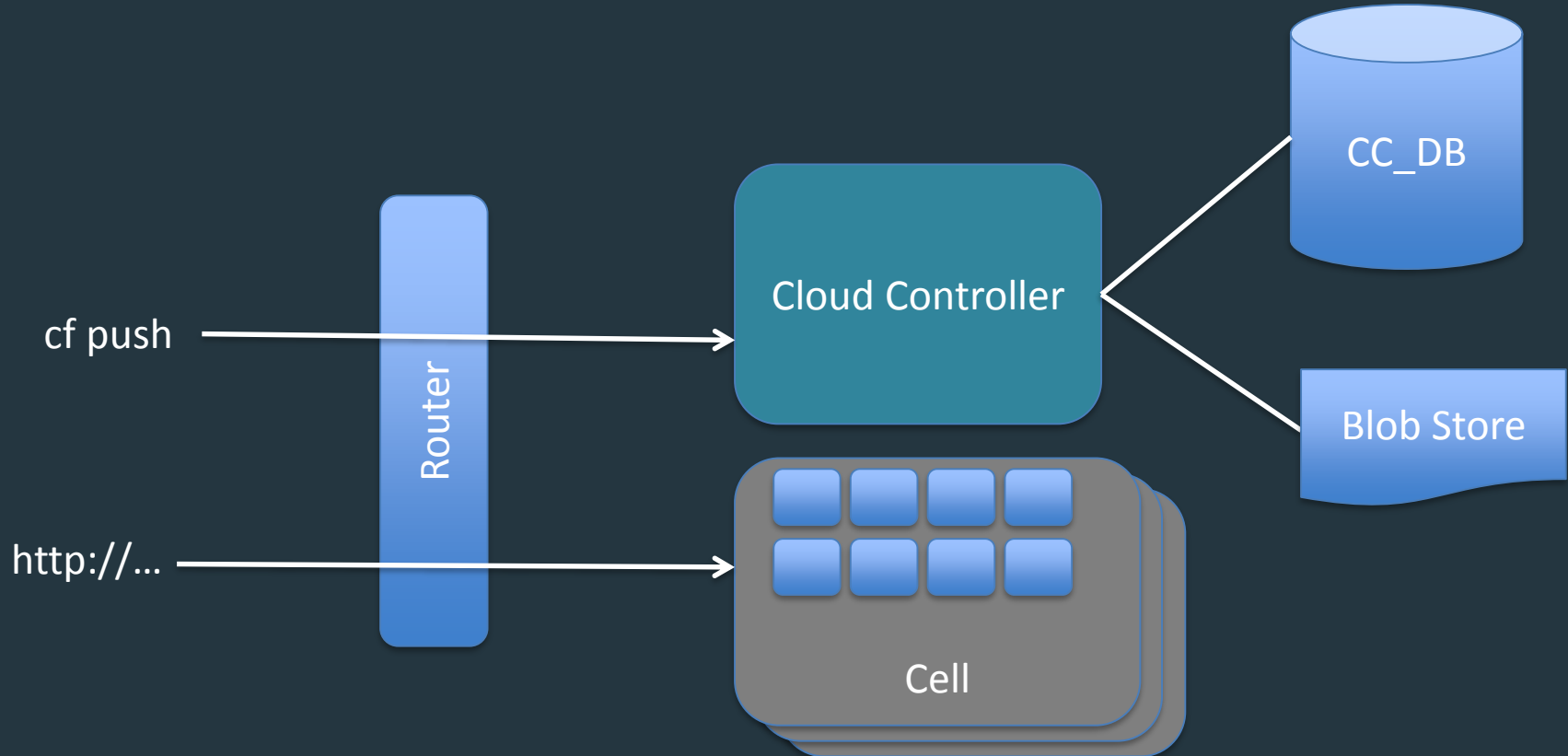
<https://docs.pivotal.io/pivotalcf/concepts/architecture/router.html>

Router

The router routes traffic to appropriate component.



Elastic Runtime Simplified Architecture



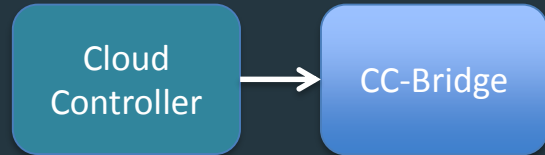
KEY FLOWS

<https://docs.pivotal.io/pivotalcf/concepts/diego/diego-architecture.html>

<https://docs.pivotal.io/pivotalcf/concepts/how-applications-are-staged.html>

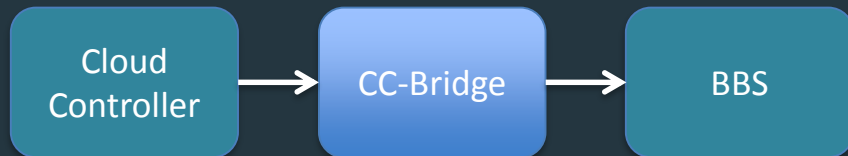
Stage and Run Request Flow

Cloud Controller passes requests to run and stage applications to the CC-Bridge.



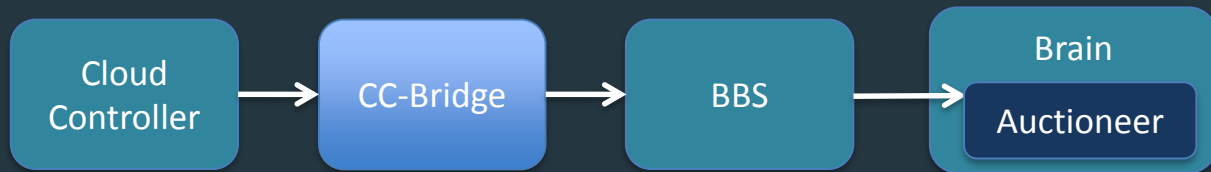
Stage and Run Request Flow

CC-Bridge translates stage and run requests into tasks and LRPs.



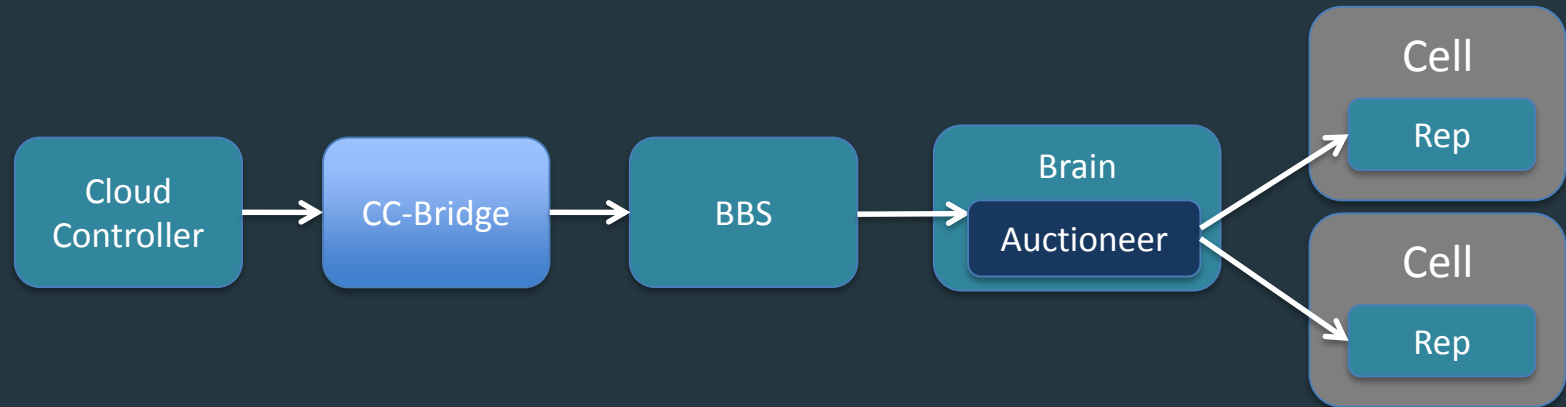
Stage and Run Request Flow

BBS submits tasks and LRPs to the Auctioneer
(Brain)



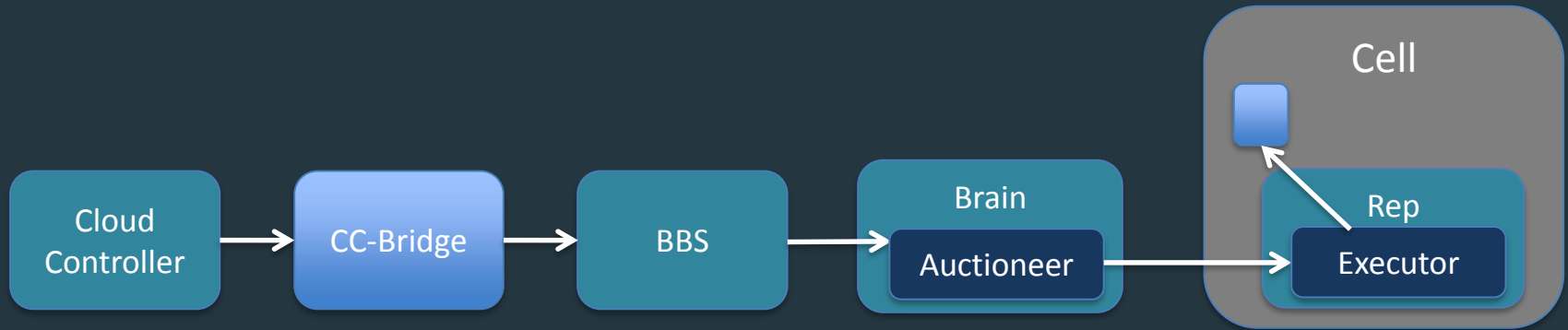
Stage and Run Request Flow

Auctioneer distributes tasks and LRPs through an auction.



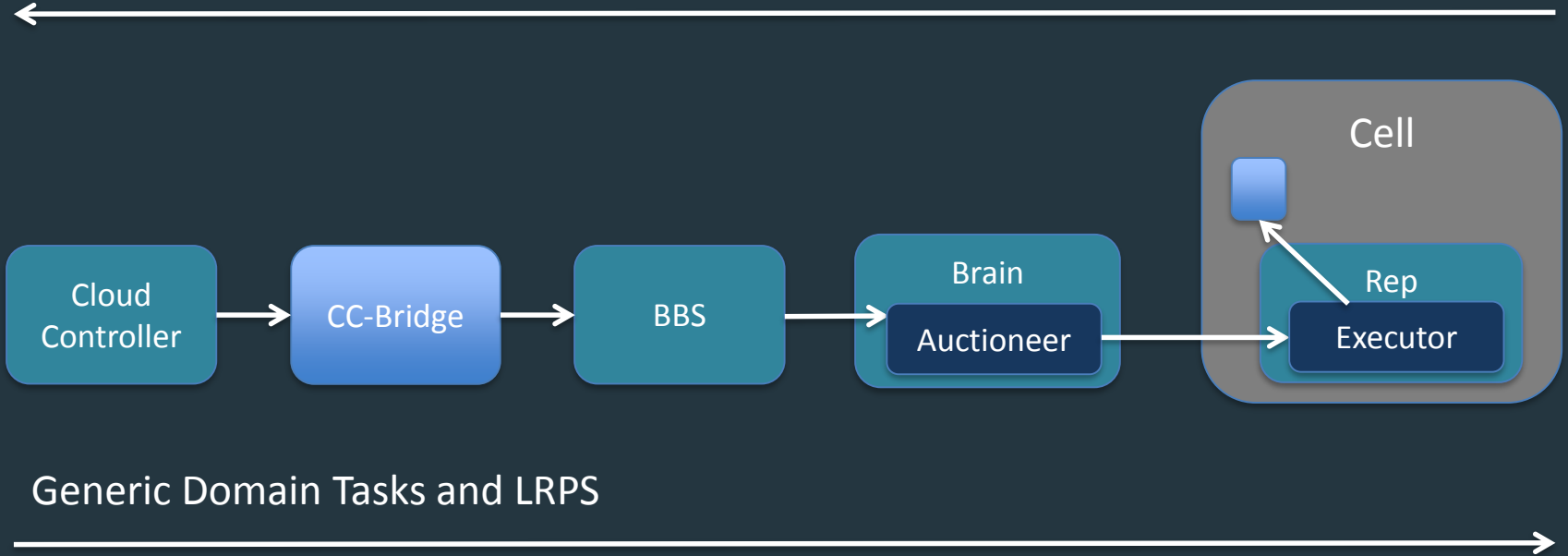
Stage and Run Request Flow

Auctioneer assigns the task or LRP to a cell. The Executor creates a Garden container in the cell. The task or LRP runs in the container.



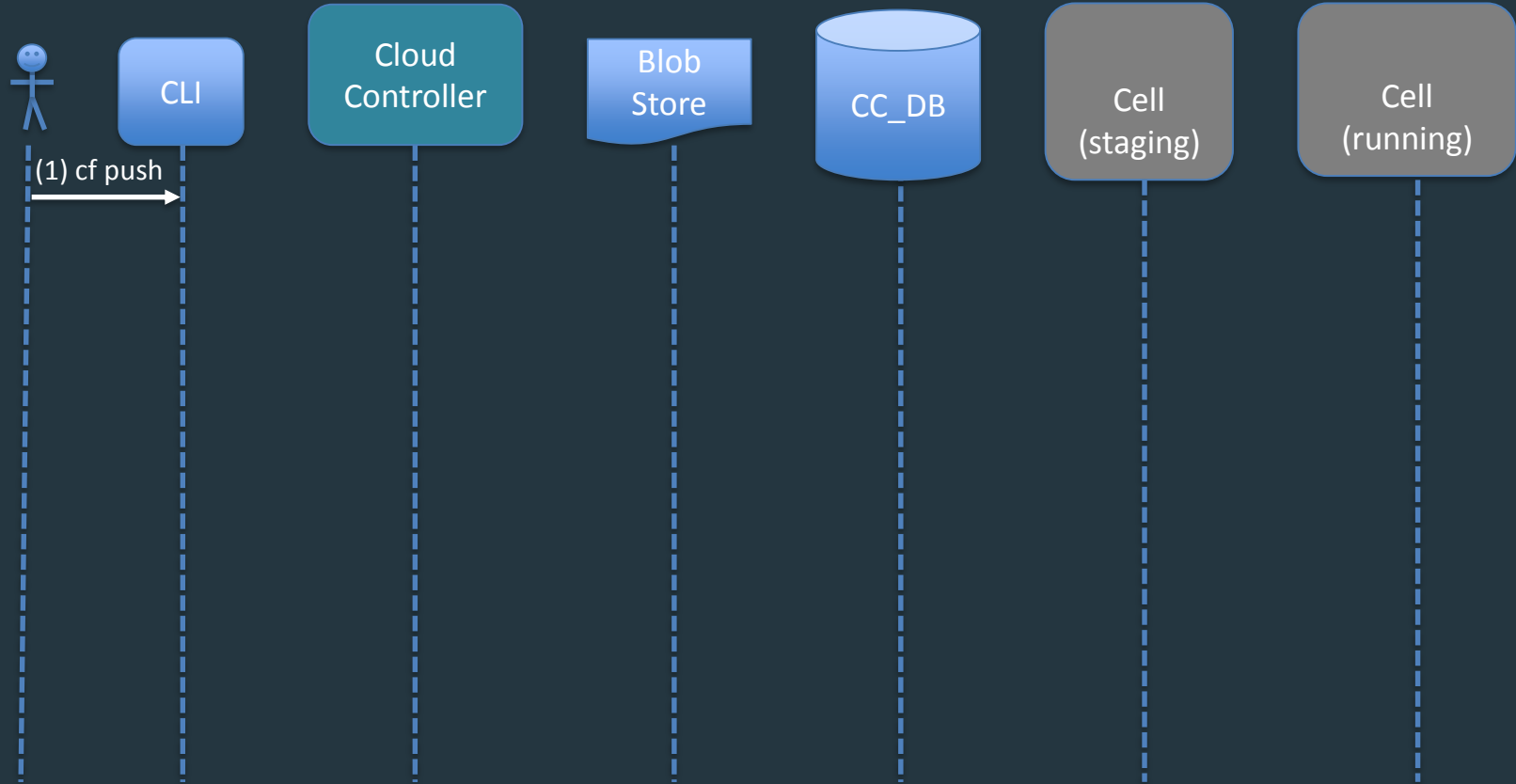
Stage and Run Request Flow

App Specific Domain

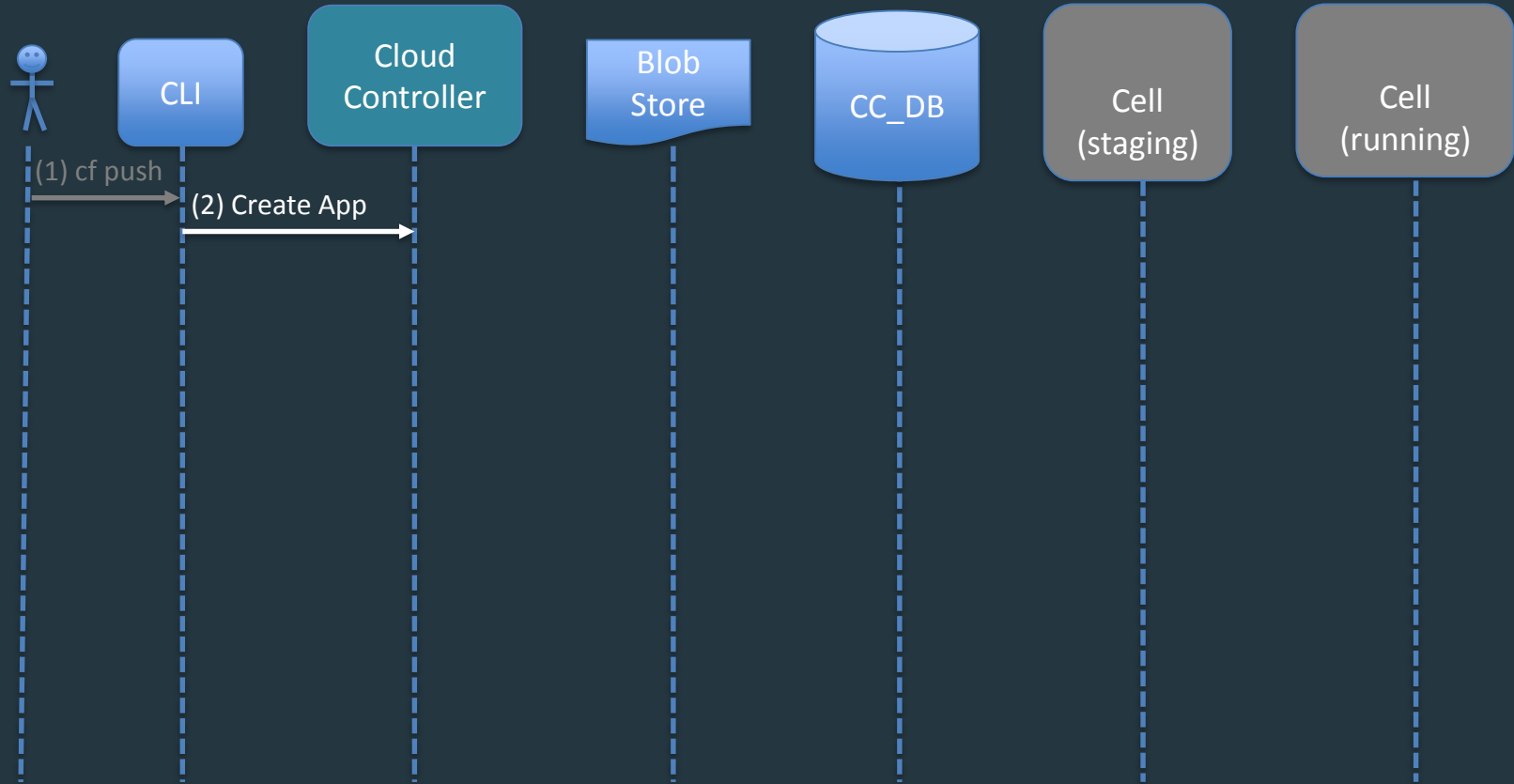


Generic Domain Tasks and LRPS

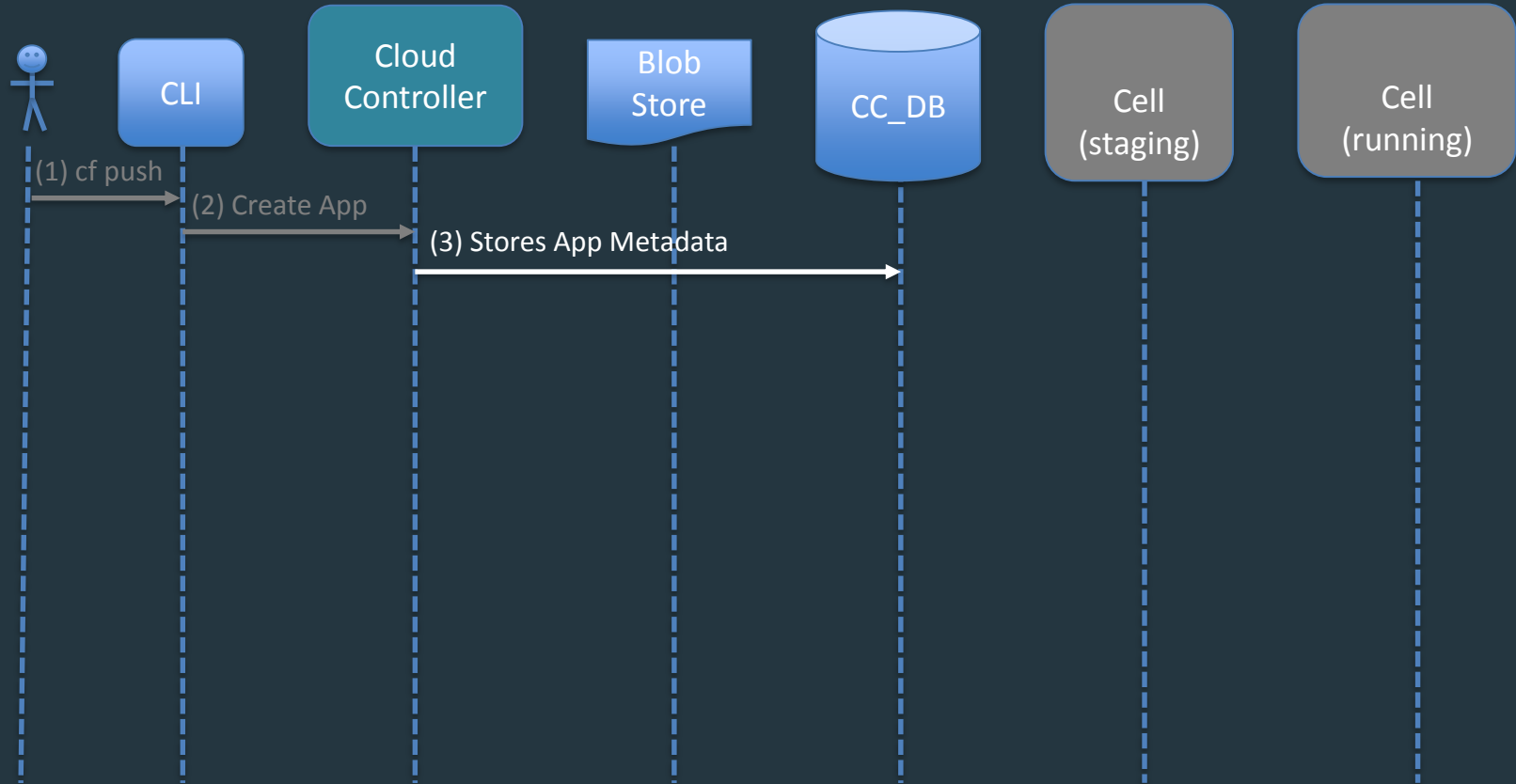
Push Sequence



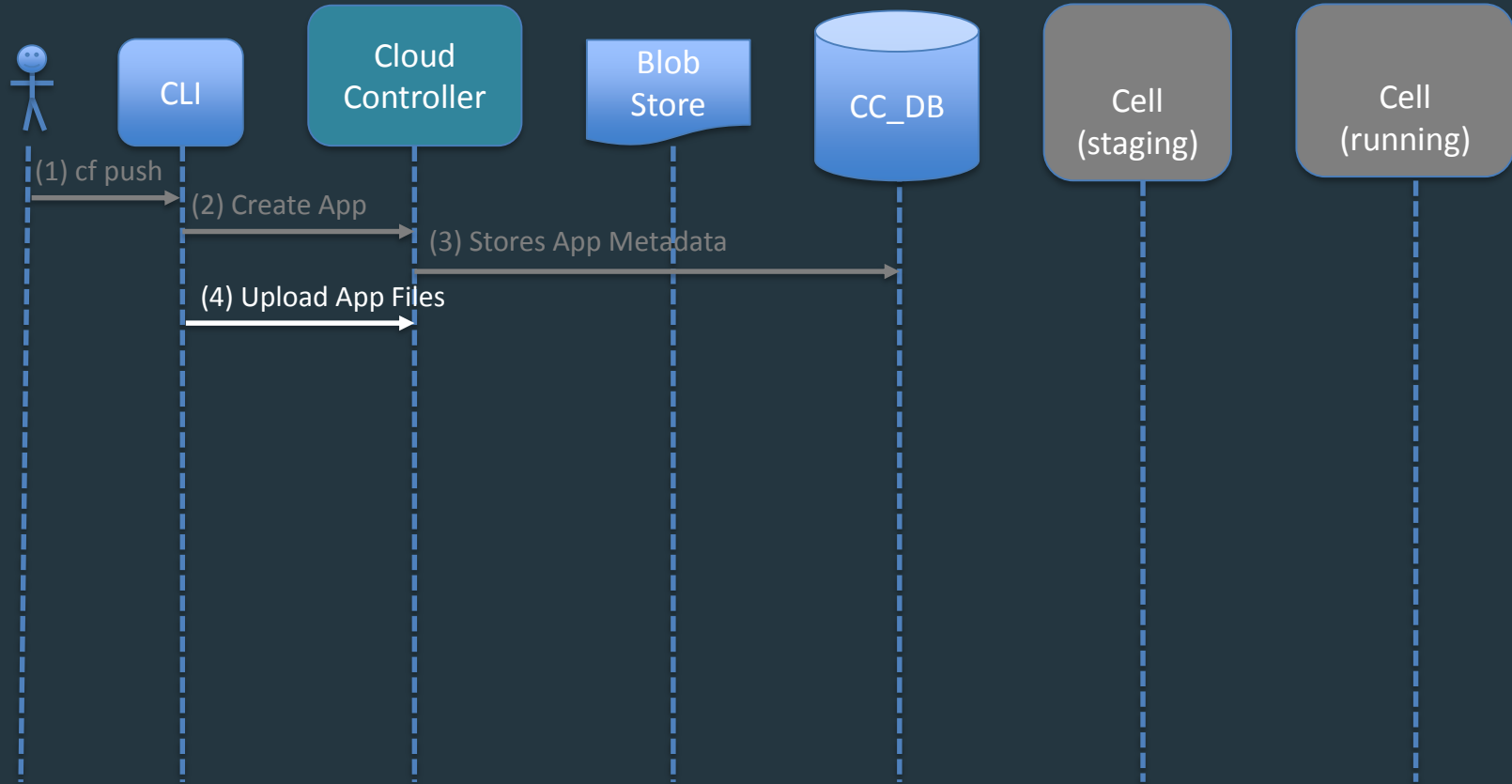
Push Sequence



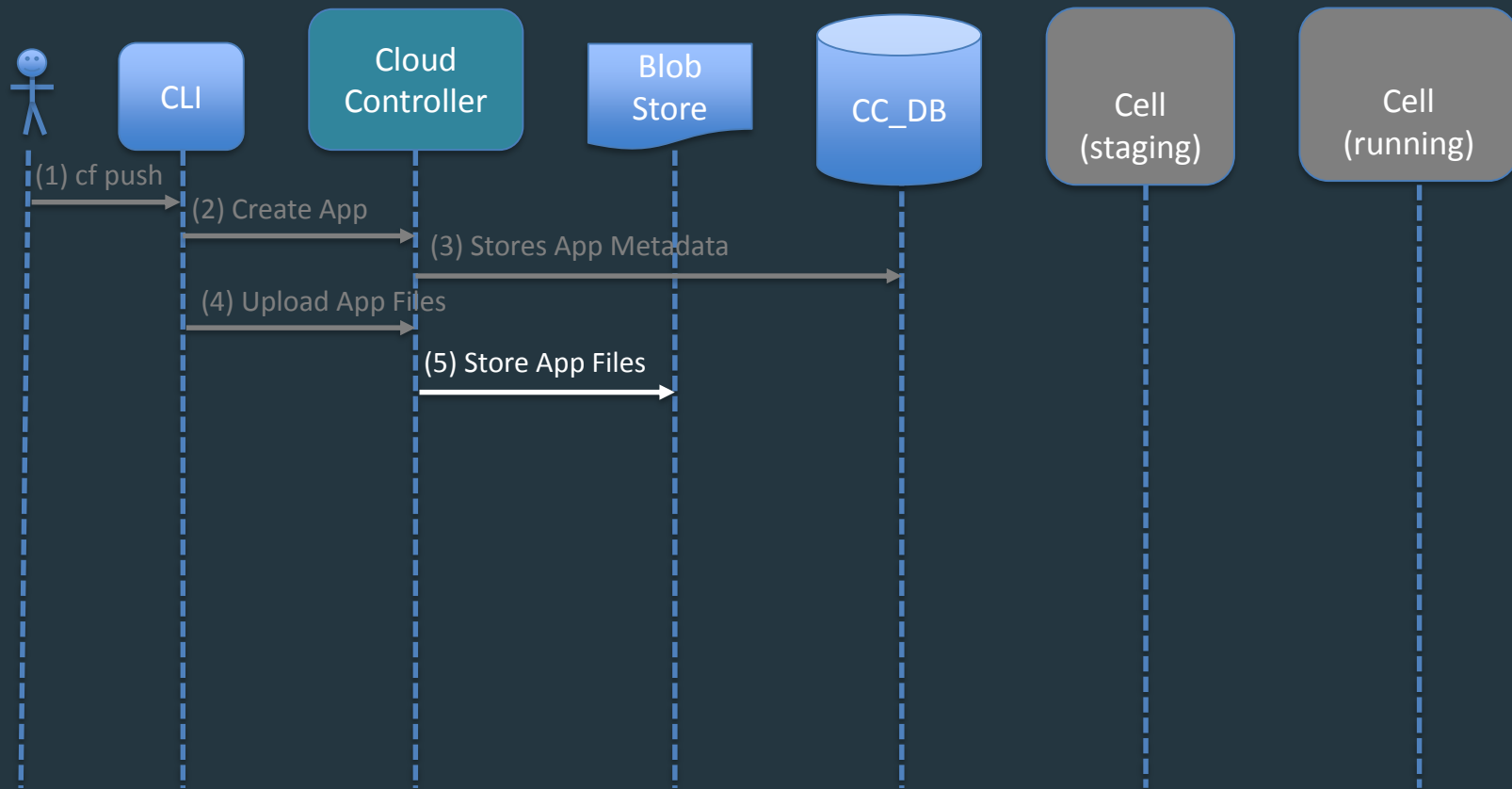
Push Sequence



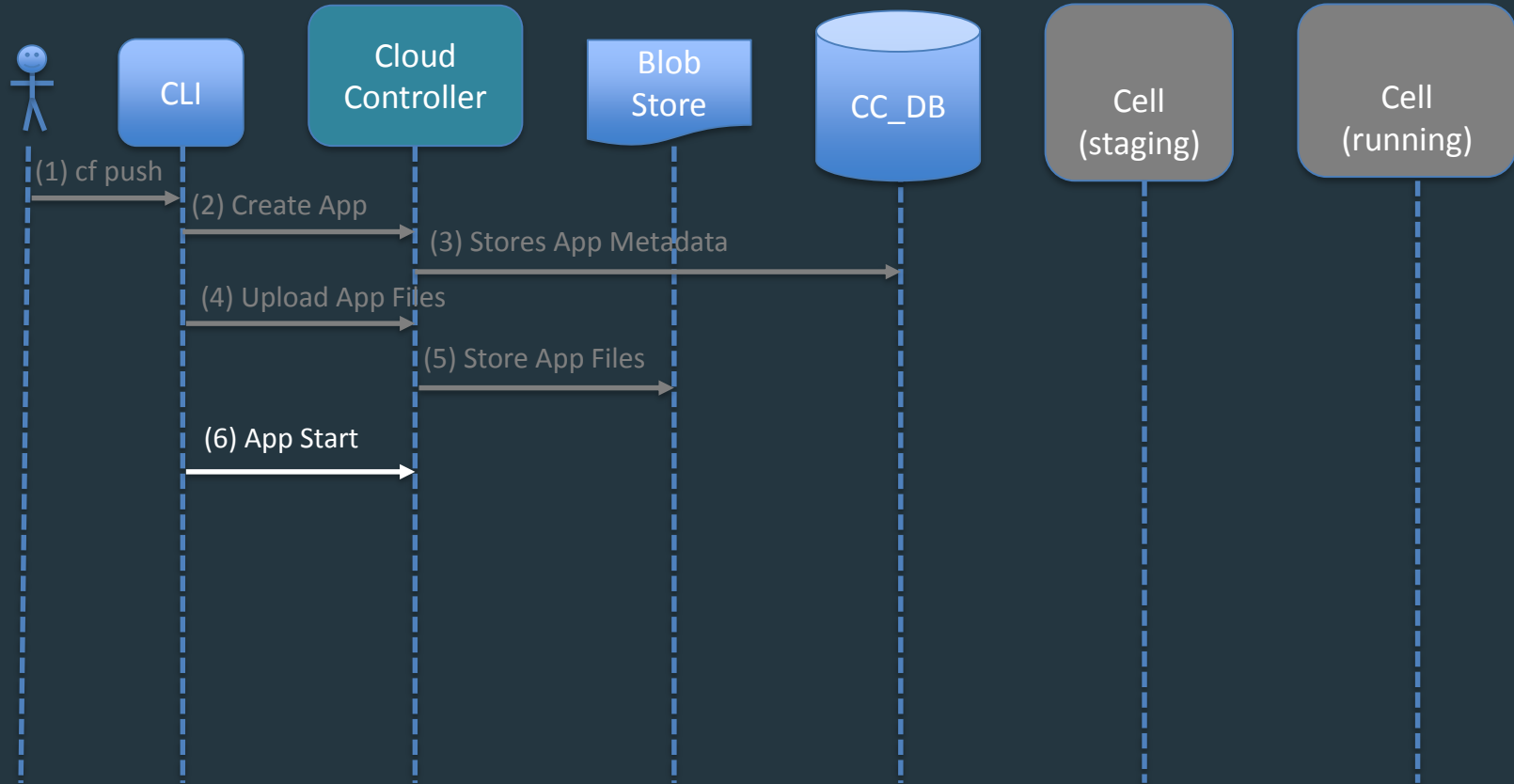
Push Sequence



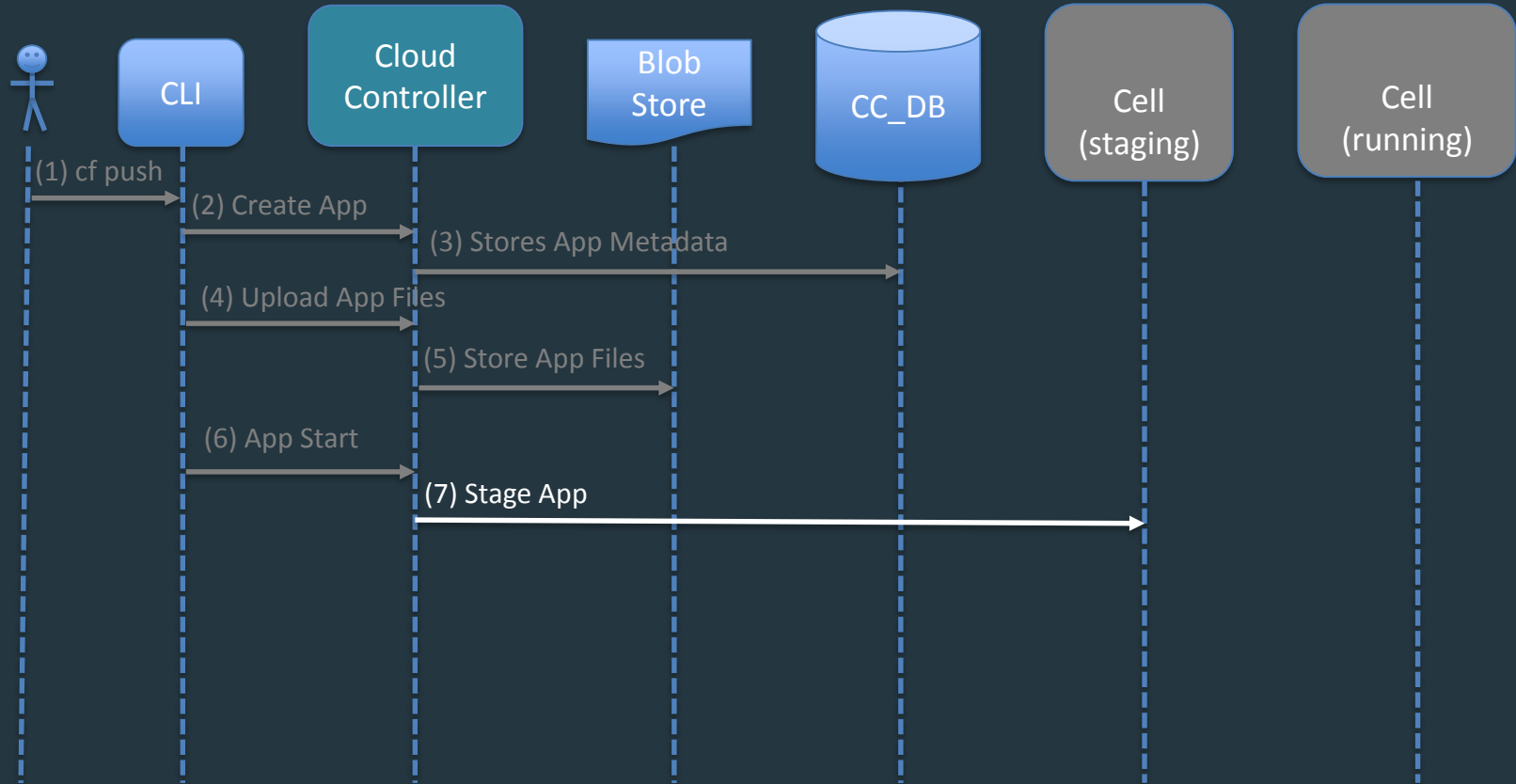
Push Sequence



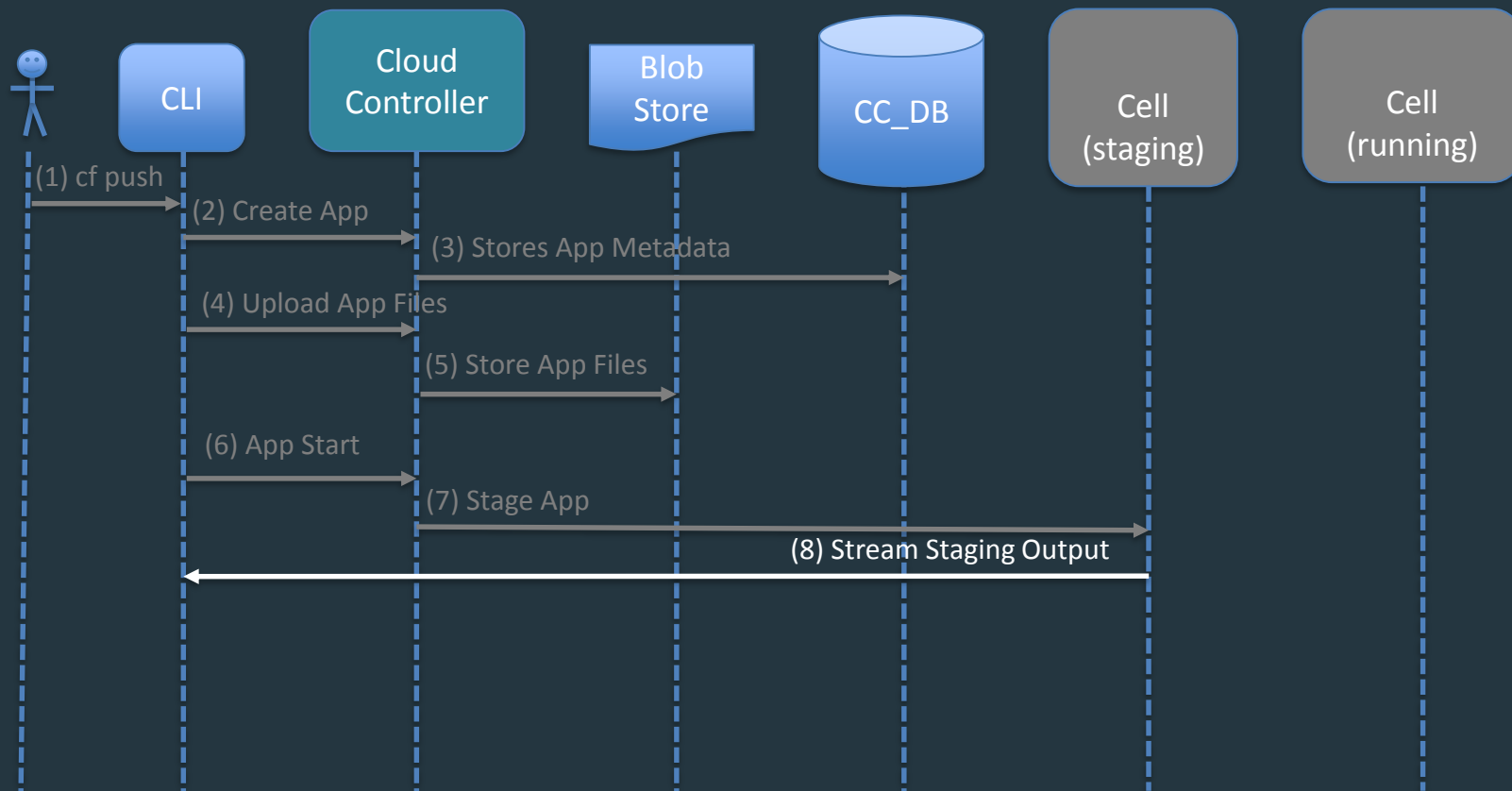
Push Sequence



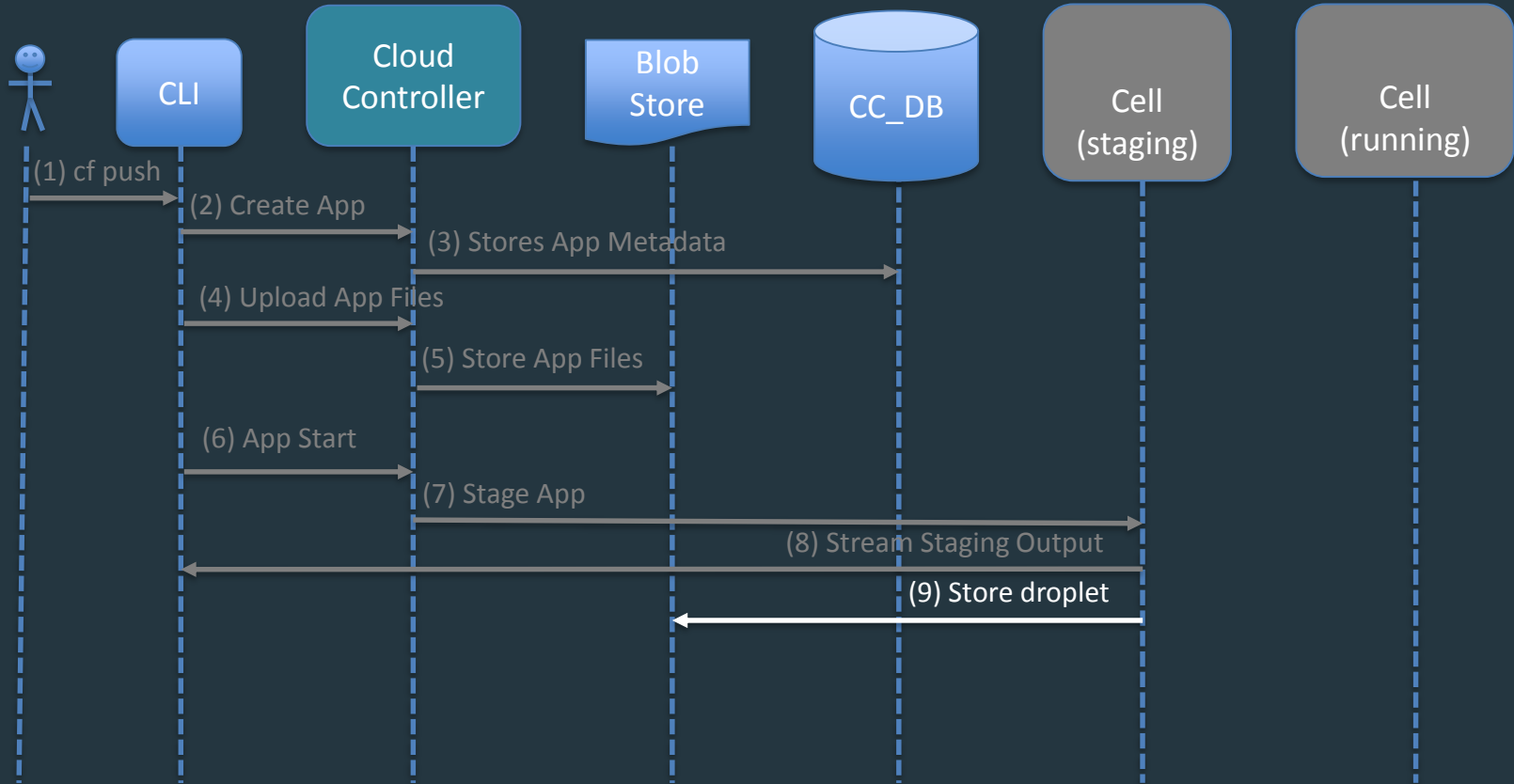
Push Sequence



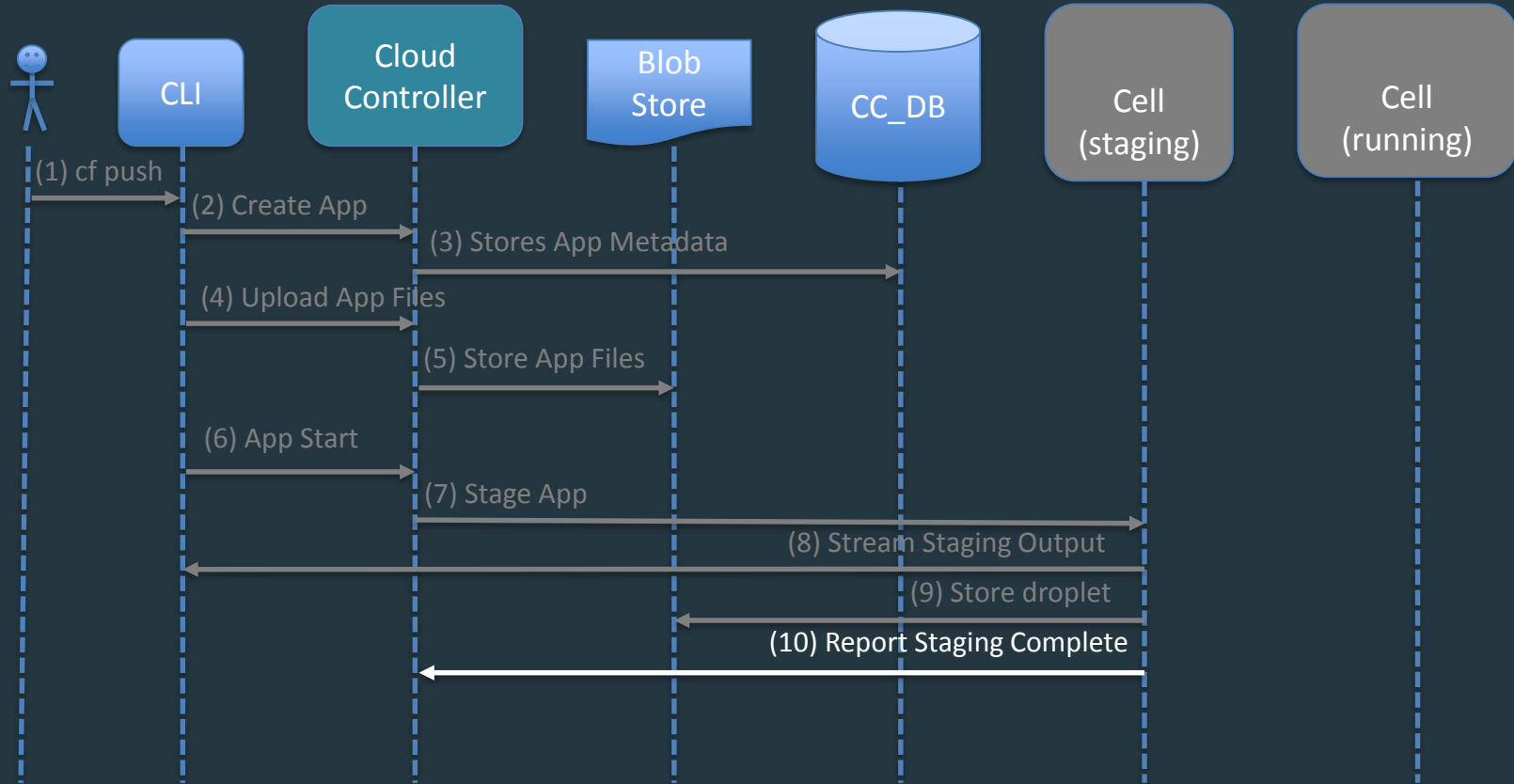
Push Sequence



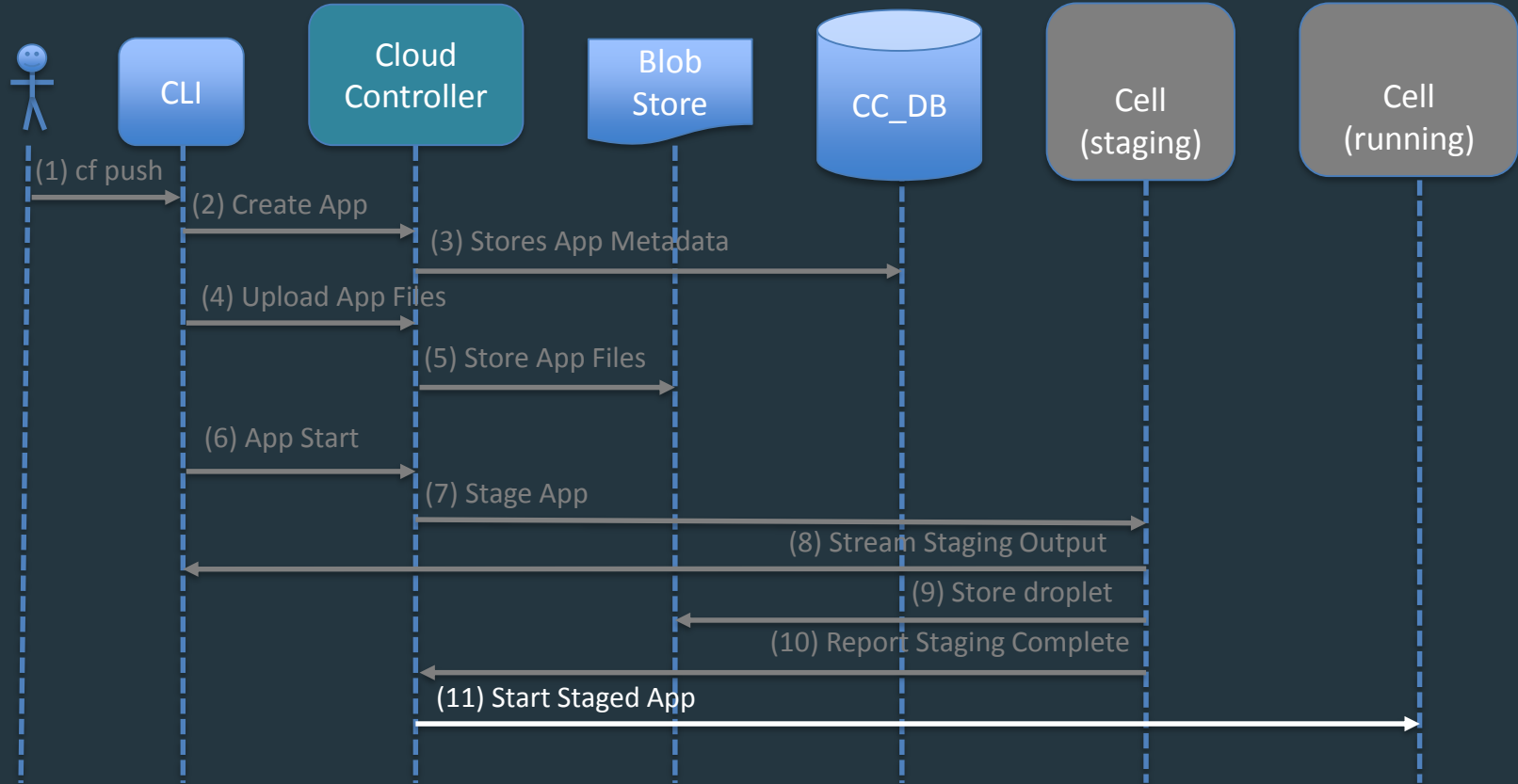
Push Sequence



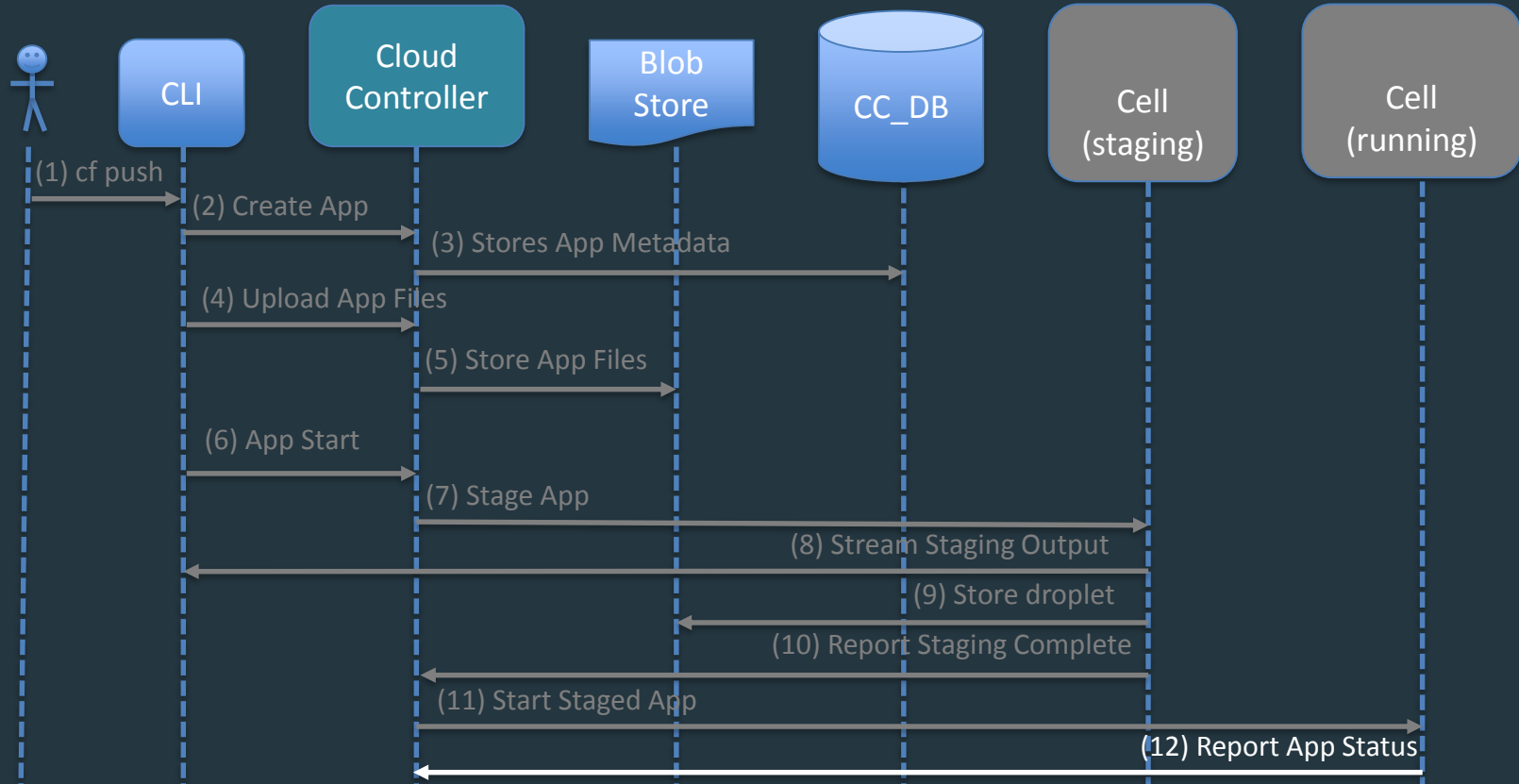
Push Sequence



Push Sequence



Push Sequence



Buildpack

Buildpacks provide framework and runtime support for your applications.

Buildpack

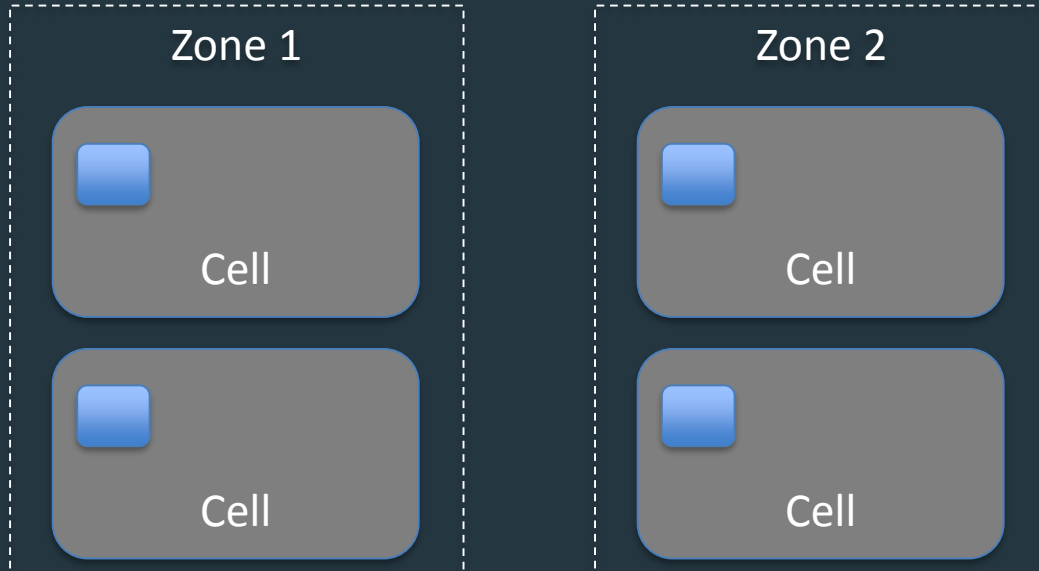
In other words, they build immutable droplets
(stage your application).

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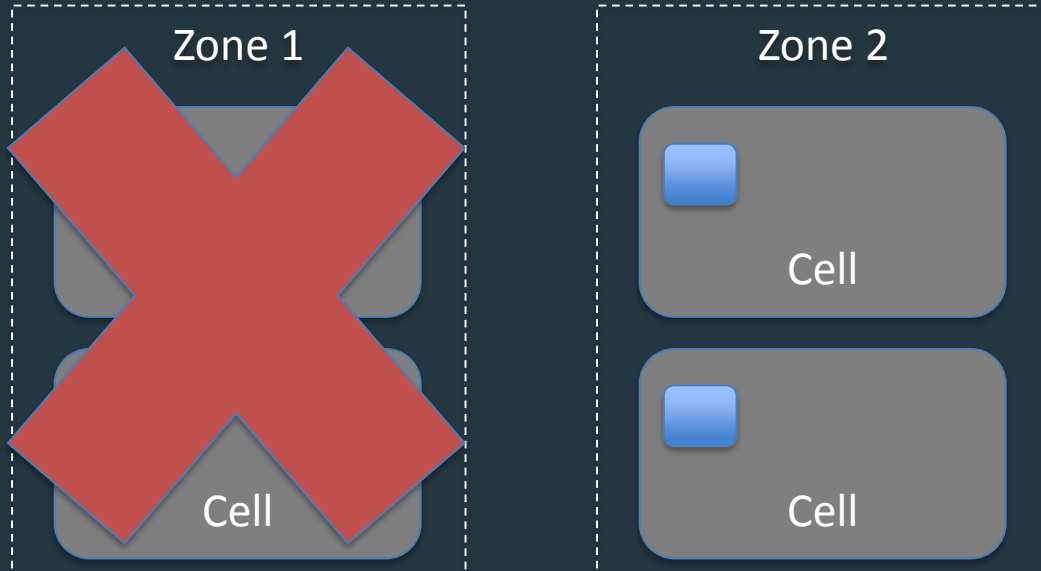
Availability Zones

Application instances are evenly distributed across availability zones.



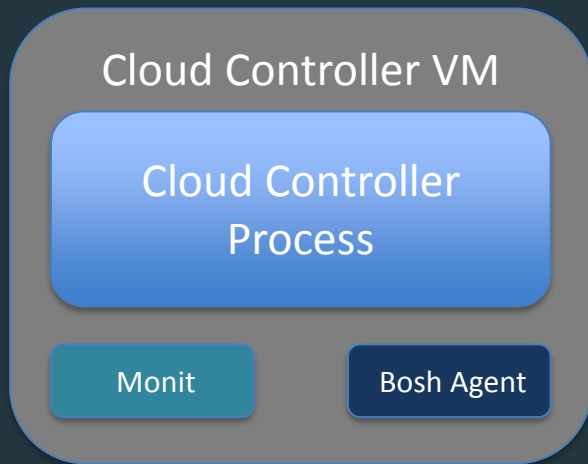
Availability Zones

Application stays up despite losing an AZ.



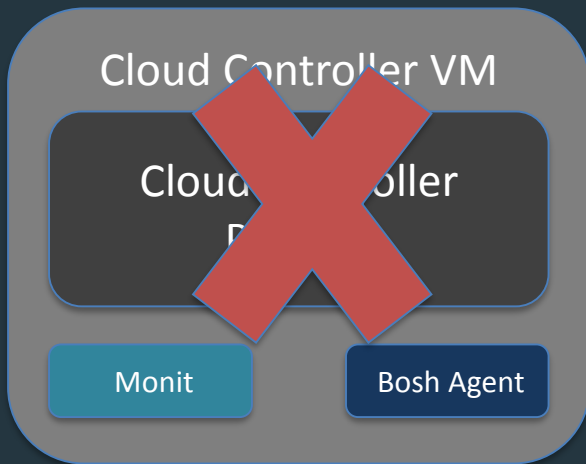
BOSH Managed Processes

Elastic runtime processes are monitored and automatically restarted.



BOSH Managed Processes

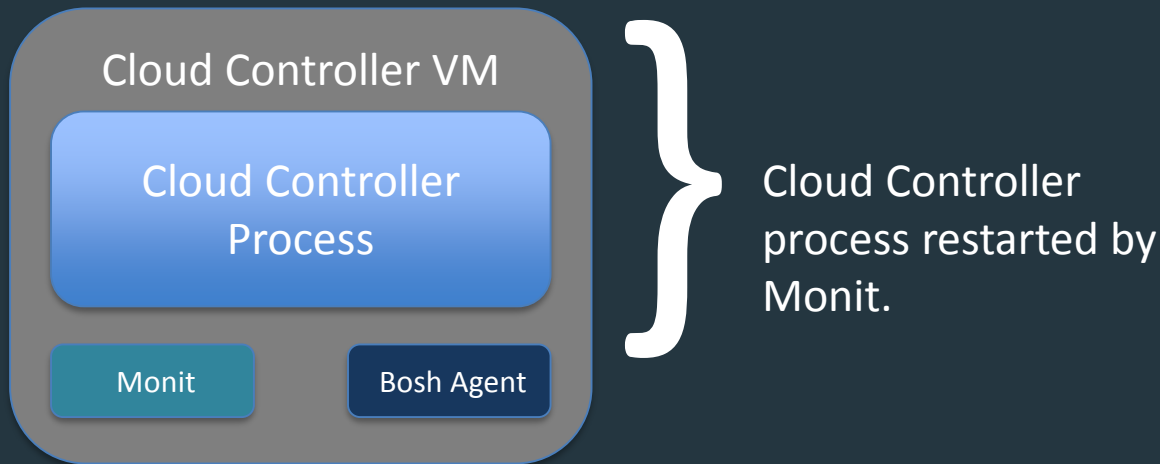
Elastic runtime processes are monitored and automatically restarted.



Cloud Controller
process has failed.

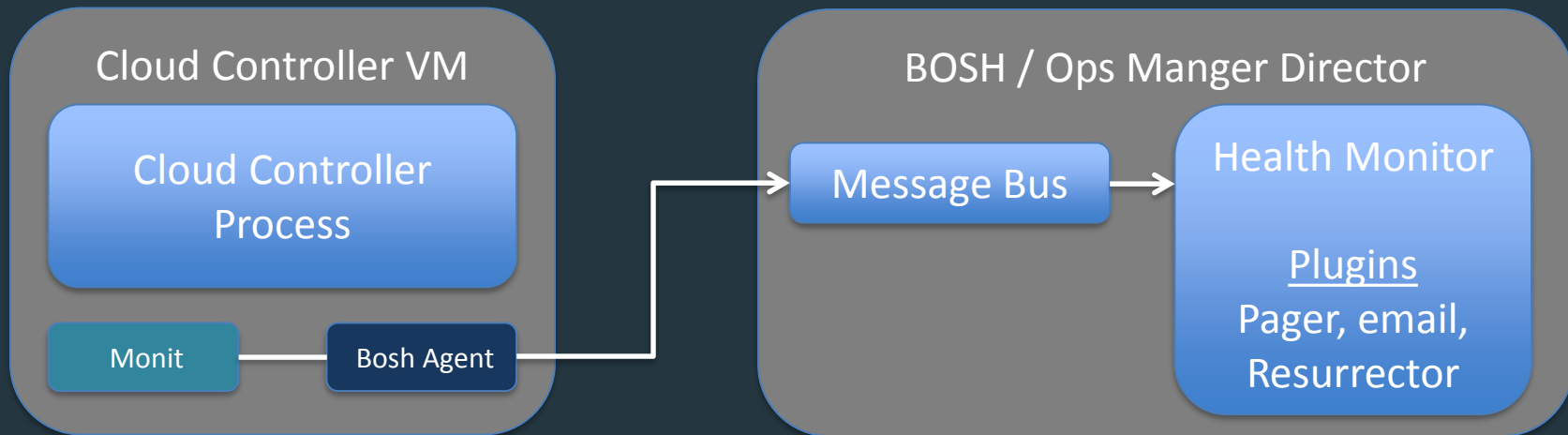
BOSH Managed Processes

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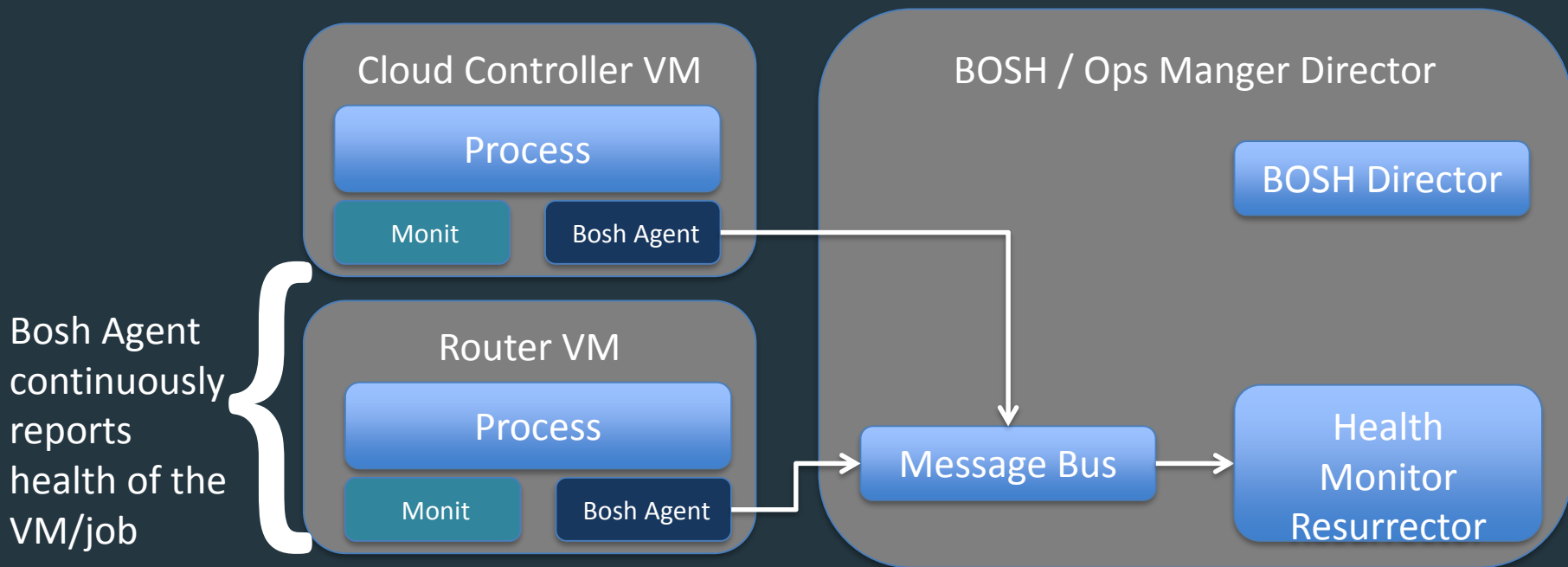
BOSH Managed Processes

Restart event is reported back to the Health Monitor for further investigation.



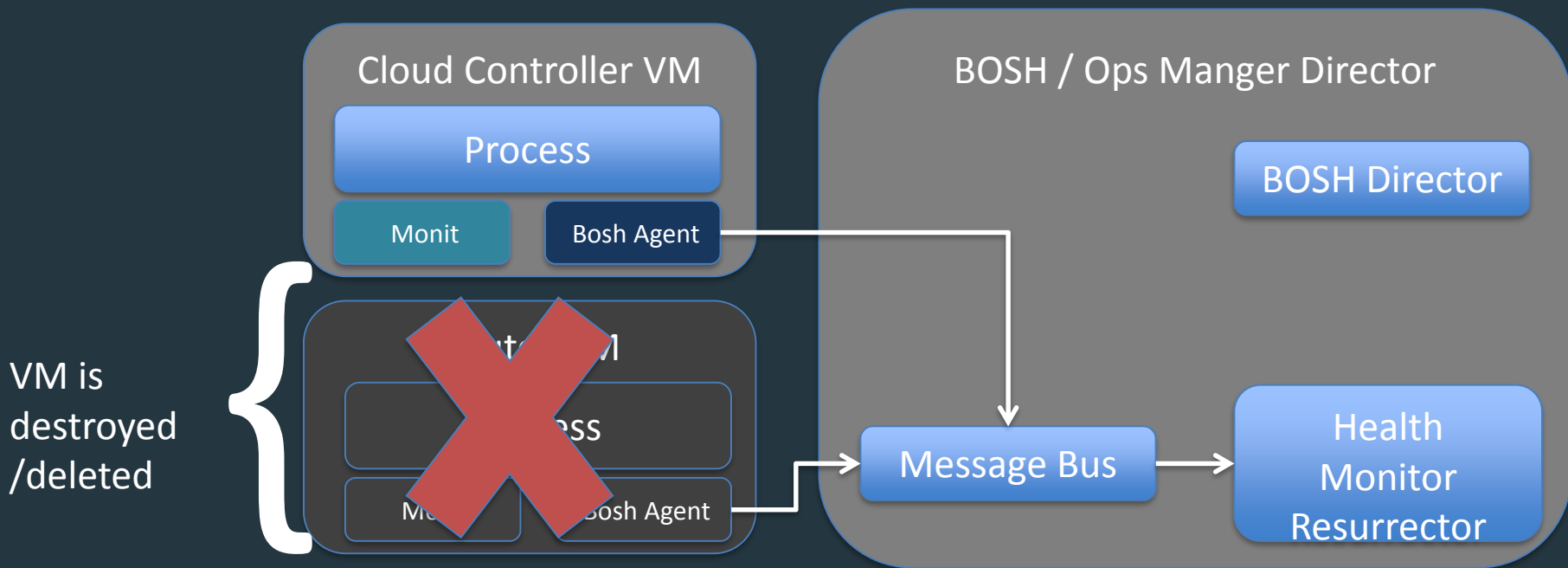
Failed VMs

Failed VMs will be recreated automatically.



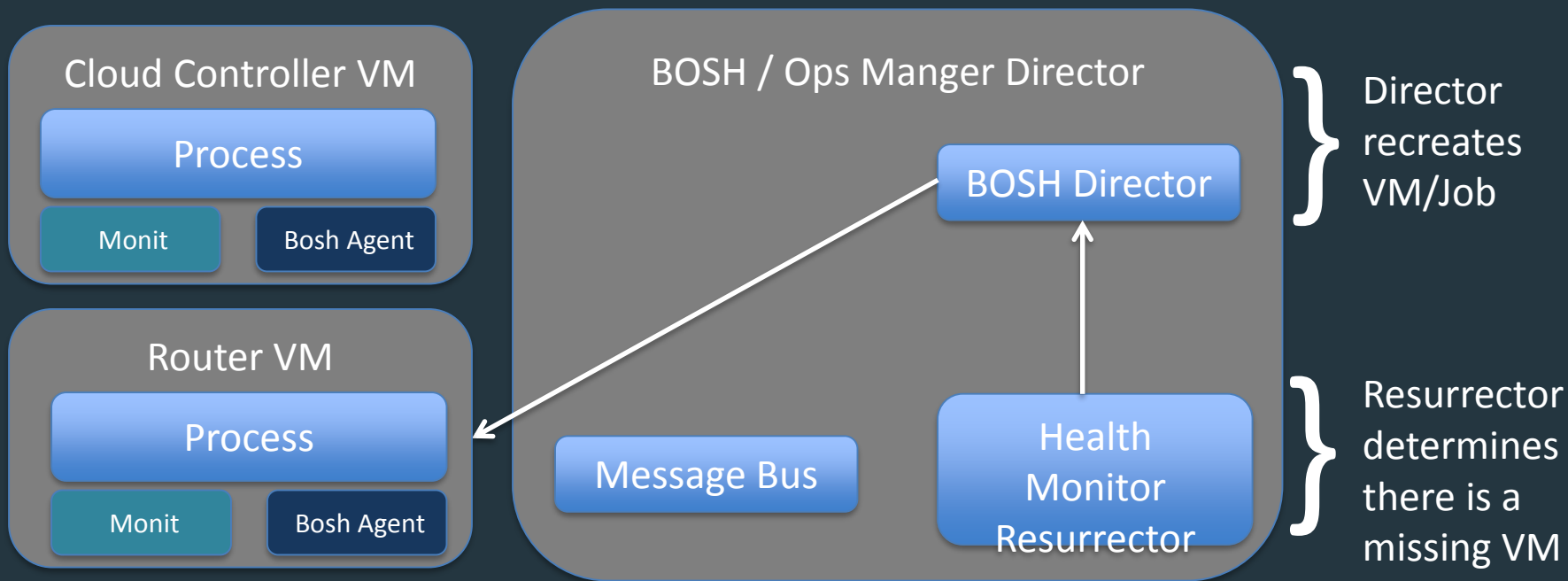
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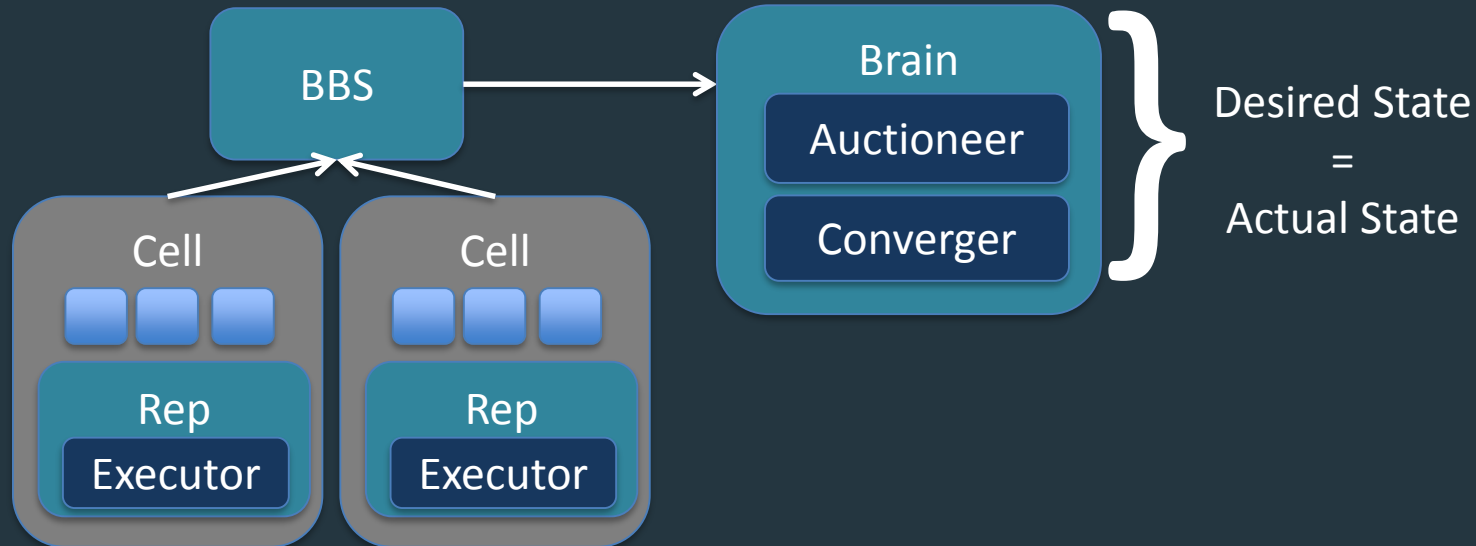
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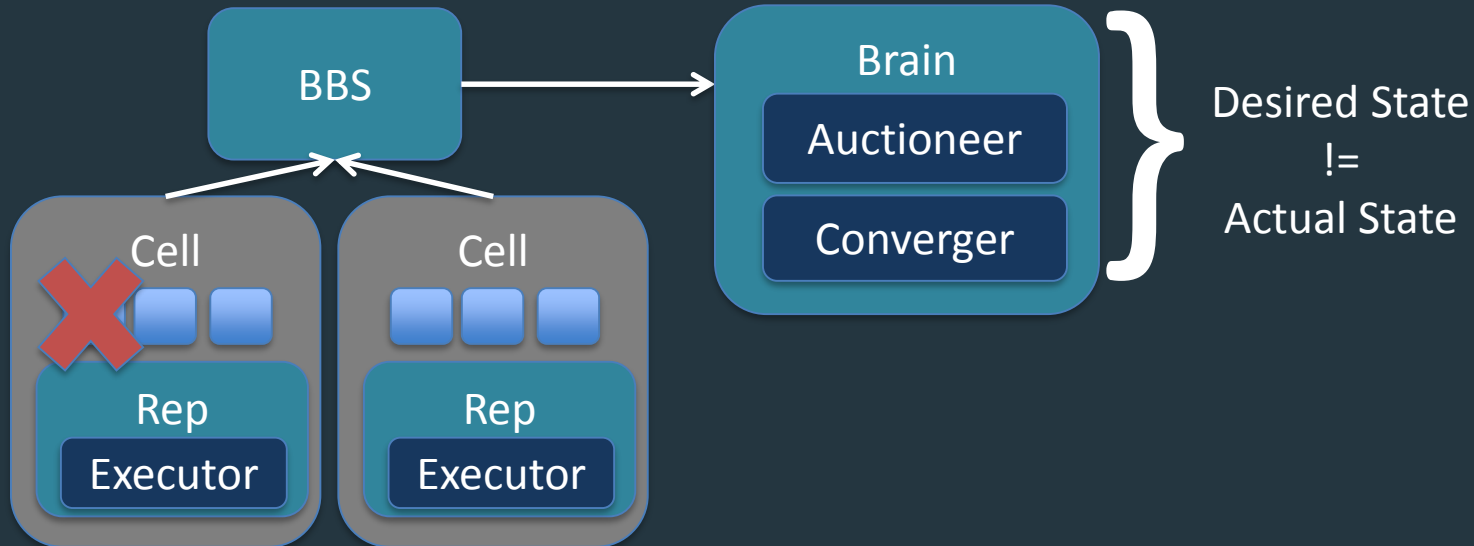
Self Healing Application Instances

Once running, failed application instances will be recreated.



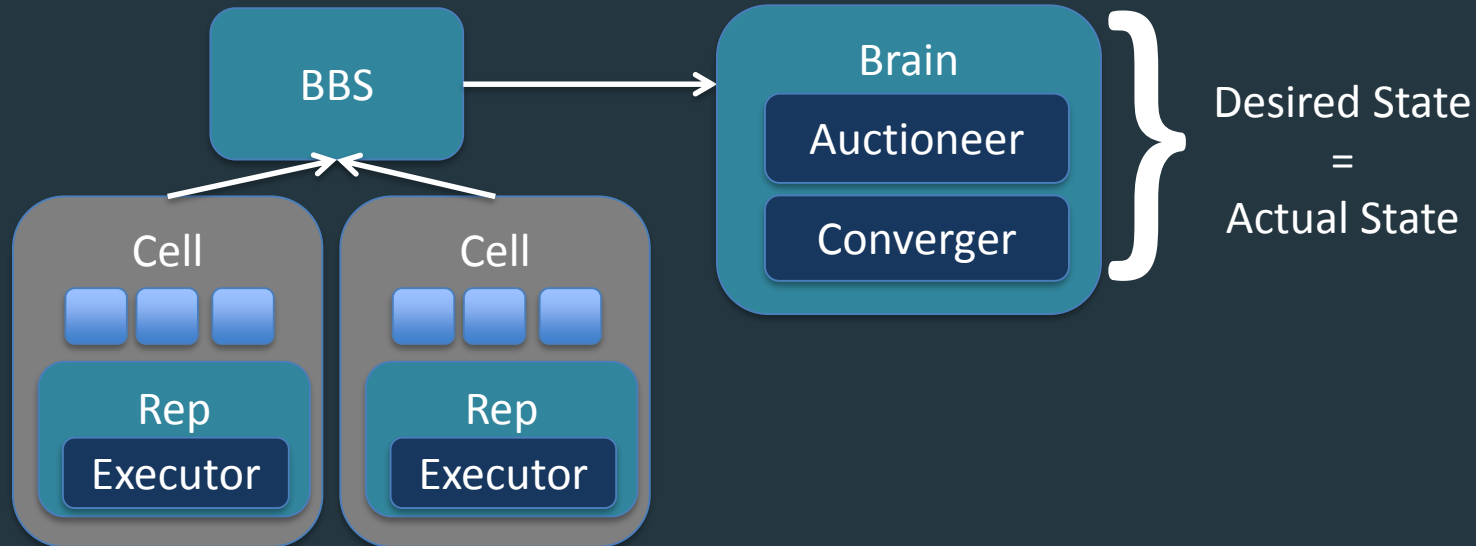
Self Healing Application Instances

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Self Healing Application Instances

Once running, failed application instances will be recreated.



A dark, atmospheric photograph of the Golden Gate Bridge in San Francisco. The bridge's iconic red-orange towers and suspension cables are visible, partially obscured by a thick layer of fog or mist that fills the background and the water below. The foreground shows a dark, rocky cliffside with some sparse vegetation. The overall mood is mysterious and dramatic.

Pivotal®

Transforming How The World Builds Software

Logging, Scale, and HA

Recap