MesosCon
NORTH AMERICA

# OpenWhisk on Mesos

**Tyson Norris/Dragos Dascalita Haut, *Adobe Systems, Inc.***

THE LINUX FOUNDATION


# OPENWHISK ON MESOS

# OPERATIONAL EVOLUTION

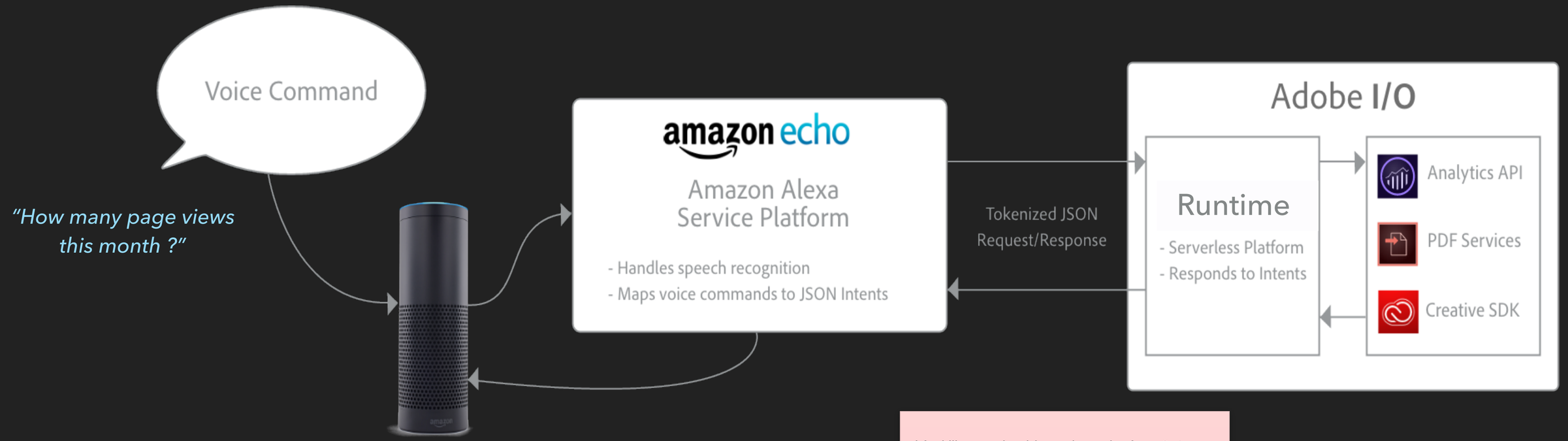
# CUSTOMER FOCUSED DEVELOPMENT

# CUSTOMER FOCUSED EXTENSIONS

# ALEXA SKILLS – A SERVERLESS USE CASE

- Demo
- Associate Alexa skills with serverless functions

# EXTENDING ADOBE ANALYTICS WITH ALEXA




I feel like we should speak maybe for a 3-4 minutes why do we care so much about serverless and end that with this demo, and then get into more details of how.
WDYT ? I could cover the motivation part too.

Tyson: not just why server less is important for us, but also "why running your own platform" ( Serverless infrastructure vs app specific server less )

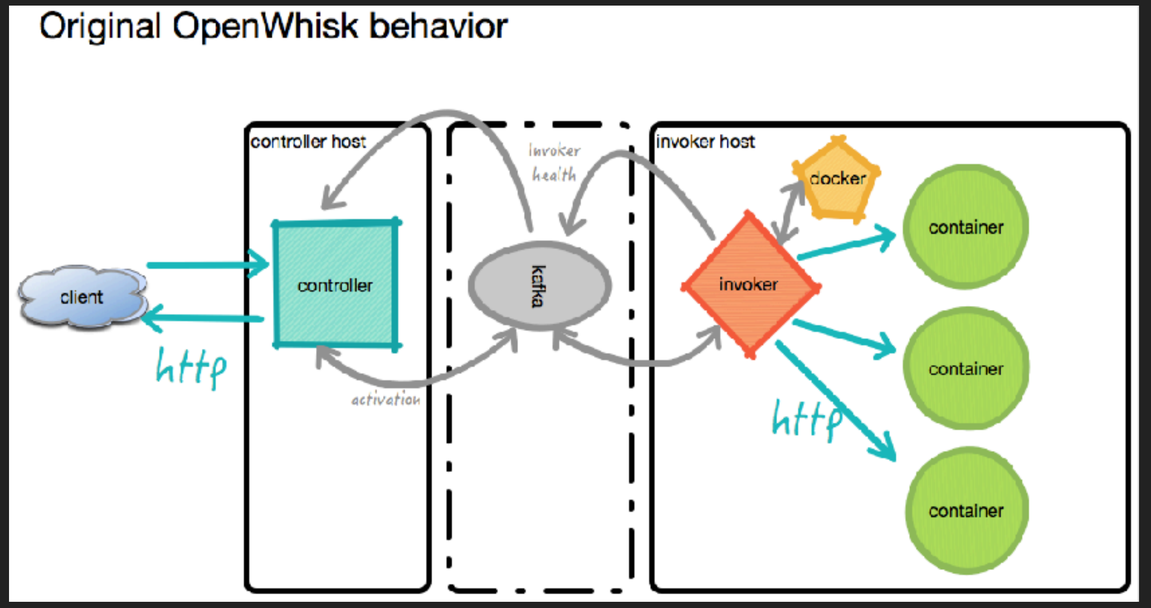
# INSIDE OPENWHISK

# OPENWHISK

- “Apache OpenWhisk is a serverless, open source cloud platform that executes functions in response to events at any scale.”
- Or: functions in docker containers
- And: CLI + API = function management

# OPENWHISK CONCEPTS

- Controller + Invoker
- Execution flow



# OPENWHISK SCALING

- Add an Invoker
- Invoker will advertise itself via Kafka
- Controller will register it and monitor its health

But…

- We're a Mesos shop.
  - We don't want competing cluster (or container) managers
  - Can I use mesos to manage the cluster?
  - Can I use mesos to control my containers that invoke actions?

# YES!

WITH SOME MINOR CHANGES

# HOW TO MESOS IN AKKA

- OpenWhisk is an Akka application (Scala)
- OpenWhisk uses docker to launch containers
- Put a Mesos Actor in there!

But. . .

- What Mesos Actor?

# MESOSIFICATION IN 3 STEPS

- Build a Mesos Actor
- Make OpenWhisk extensible
- Launch Mesos Tasks

# A MESOS ACTOR IN AKKA

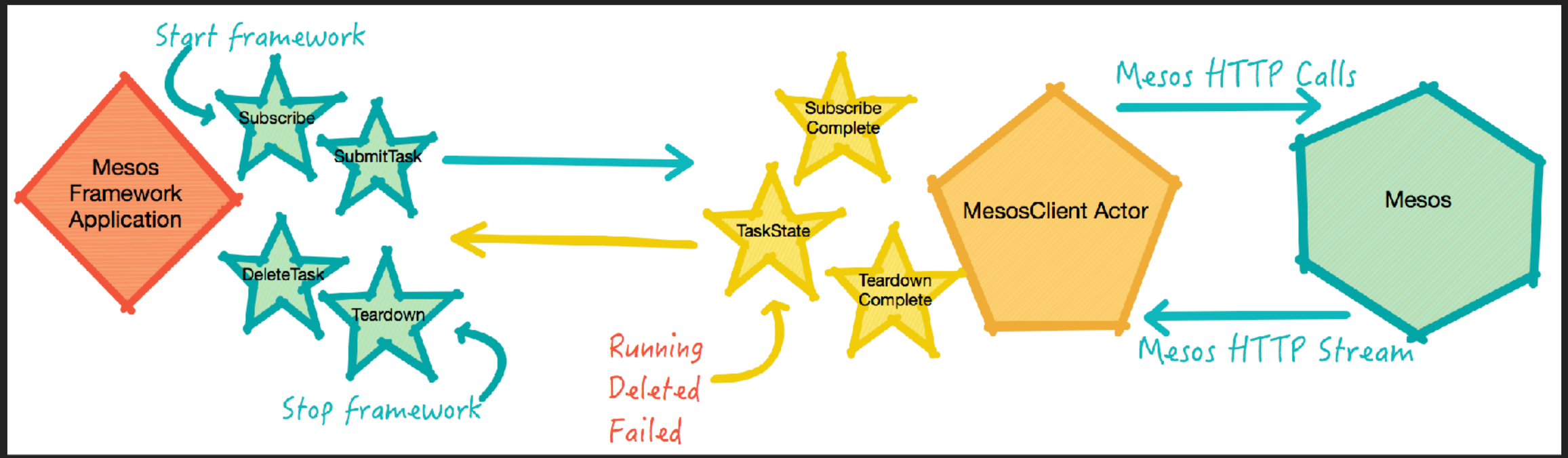
- Existing libraries didn't fit (Scala, HTTP API)

## Let's build a new one!

- Akka HTTP + Akka Streams
- https://github.com/adobe-apiplatform/mesos-actor

# A MESOS ACTOR IN AKKA

- Mesos HTTP + Protobuf messages -> Scala classes + Akka Messages



# A SHORT DEMO

- Mesos cluster using docker-compose
- SampleFramework
  - TaskMatcher - matching pending tasks to offers - default is “first match”
  - TaskBuilder - building TaskInfo protobuf from requirements - default is “verbatim”
- K.I.S.S. - A simplified interface to Mesos task launching
- DEMO

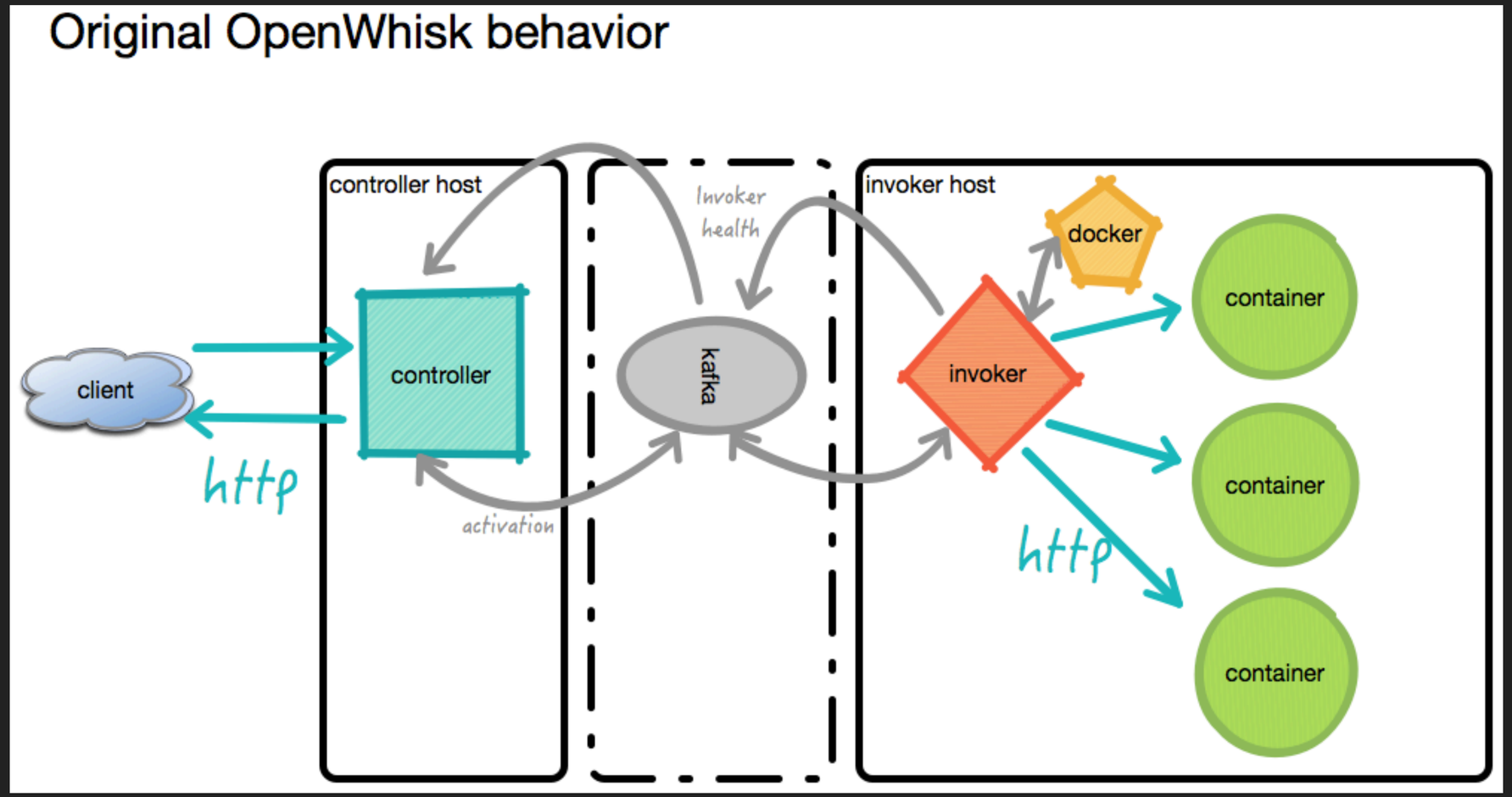
# MESOS-ACTOR TODO

- Framework ID persistence (zookeeper, etc)
- Reconcile on startup (next update received will reset tasks)
- HA (multiple framework instances, leader election, shared task state - based on Akka Clustering)
- Multi-master redirect (redirect to current leader)
- Re-subscribe after disconnect (in master/framework failover)
- Mesos roles

# A SERVERLESS PLATFORM ON MESOS

- YOUR servers
- YOUR Mesos cluster
- Operators expand/contract Mesos cluster
- OpenWhisk Alterations
  - Controller – none
  - Invoker – ContainerFactory

# INVOKER – BEFORE

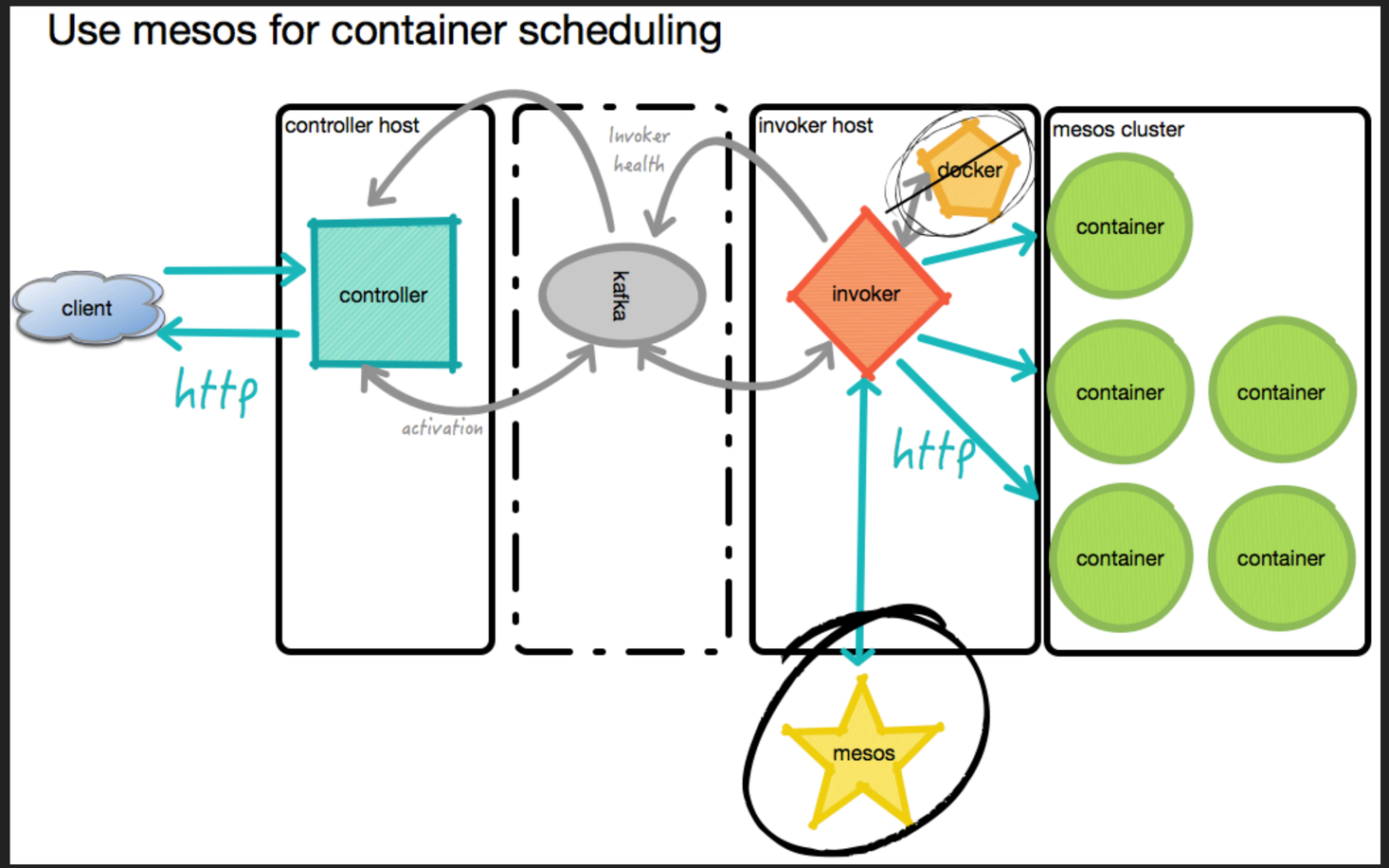


# OPENWHISK INVOKER

- Invoker changes
  - Deploy: 1 per cluster (instead of 1 per host!)*
  - Configure: MesosContainerFactory SPI (instead of DockerContainerFactory)
  - Configure: LogDriverLogStore SPI (instead of DockerLogStore)

* HA? Details later

# INVOKER – AFTER



# HA IN THE AKKA CLUSTER

# 1. AKKA CLUSTER

- Shared container state
  - All cluster nodes have visibility to same container pool
- 1 leader
  - Single leader is responsible for streaming Mesos messages from master

# 2. FRAMEWORK FAILOVER

- Shared container state
  - Containers remain when scheduler stream is interrupted
  - New Containers cannot be created until new scheduler instance resumes
  - ***Mitigate downtime with "prewarm containers"***
- 1 leader
  - New leader is elected by Akka
  - New leader will create new subscription to Mesos master with the same FrameworkID
  - Reconcile existing tasks
  - Resume managing containers

# OPENWHISK DETAILS

# OPENWHISK ALTERATIONS

- SPI - service provider interface: *“Service Provider Interface (SPI) is an API intended to be implemented or extended by a third party. It can be used to enable framework extension and replaceable components.”*

```
trait ContainerFactory {
    def createContainer(tid: TransactionId,
                        name: String,
                        actionImage: ExecManifest.ImageName,
                        userProvidedImage: Boolean,
                        memory: ByteSize)(implicit config: WhiskConfig,
                        logging:Logging): Future[Container]
}

trait LogStore {
    def containerParameters: Map[String, String]
    def logs(activation: WhiskActivation): Future[ActivationLogs]
    def collectLogs(container:Container, action: ExecutableWhiskAction)
                   (implicit transid: TransactionId): Future[Vector[String]]
}
```

# OPENWHISK ALTERATIONS

- ContainerFactory SPI (PR#2659)
  - MesosContainerFactory (coming soon)
- LogStore SPI (PR#2695)
  - SplunkLogStore