



DIEGO

ElasticRuntime 2.0

What?

Why?

Show me...

The future

DIEGO

ElasticRuntime 2.0

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What is being rewritten?

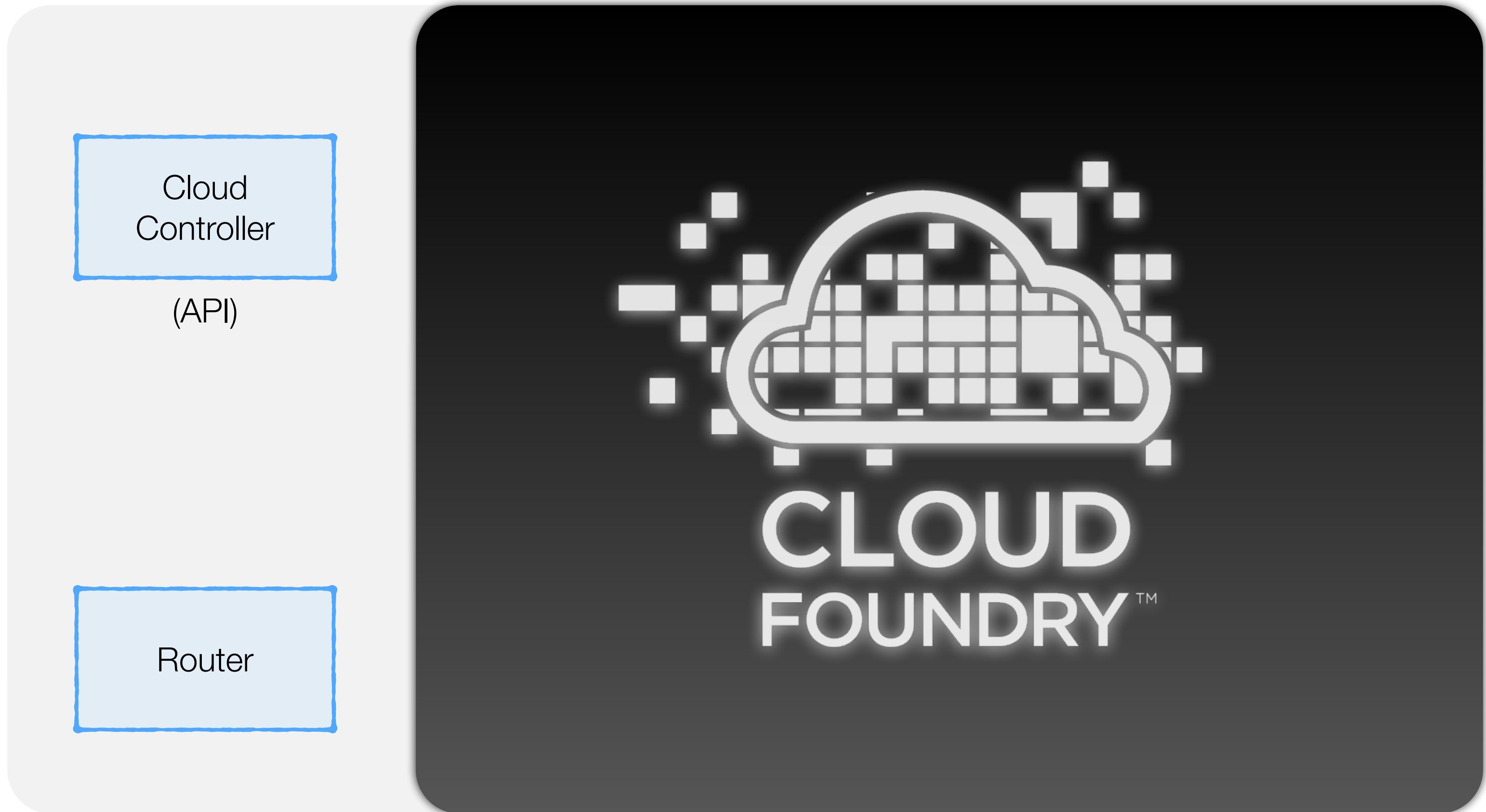
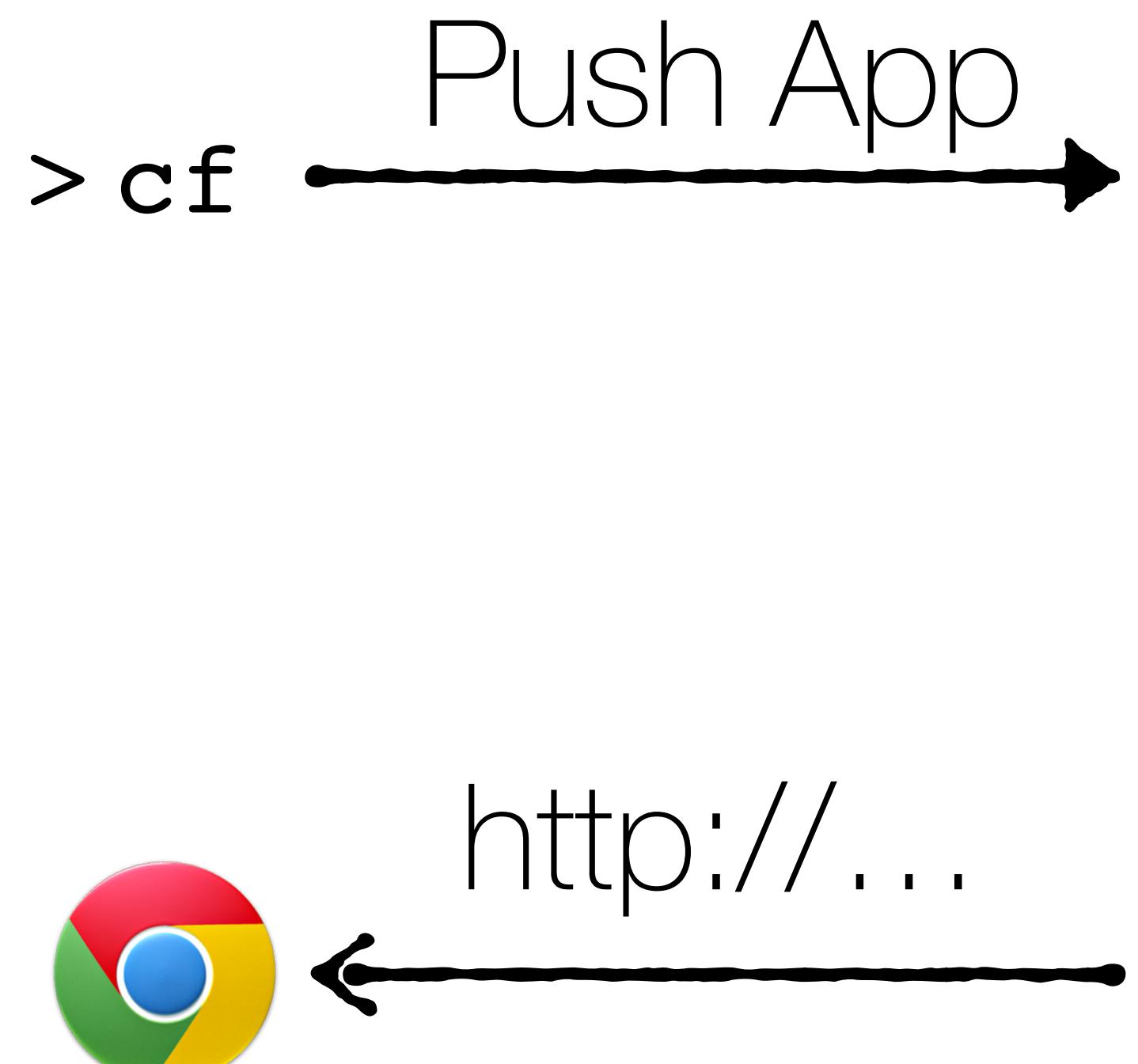
> cf Push App



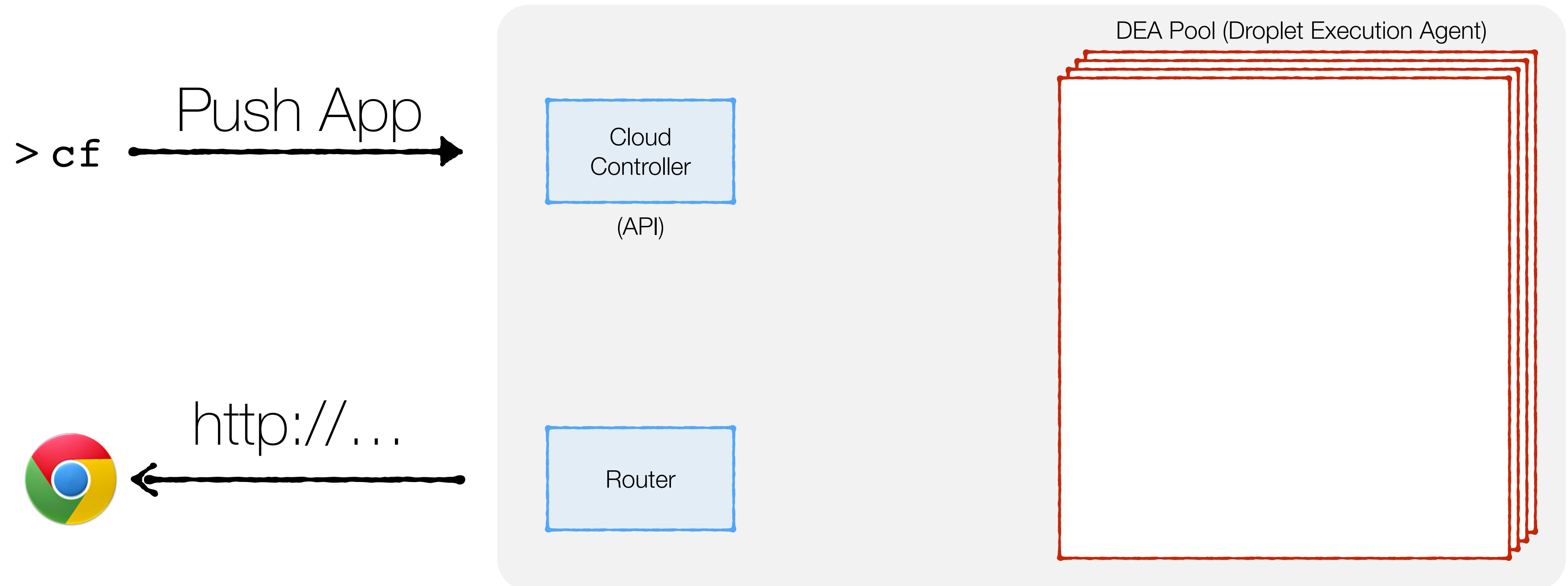
http://...



What is being rewritten?

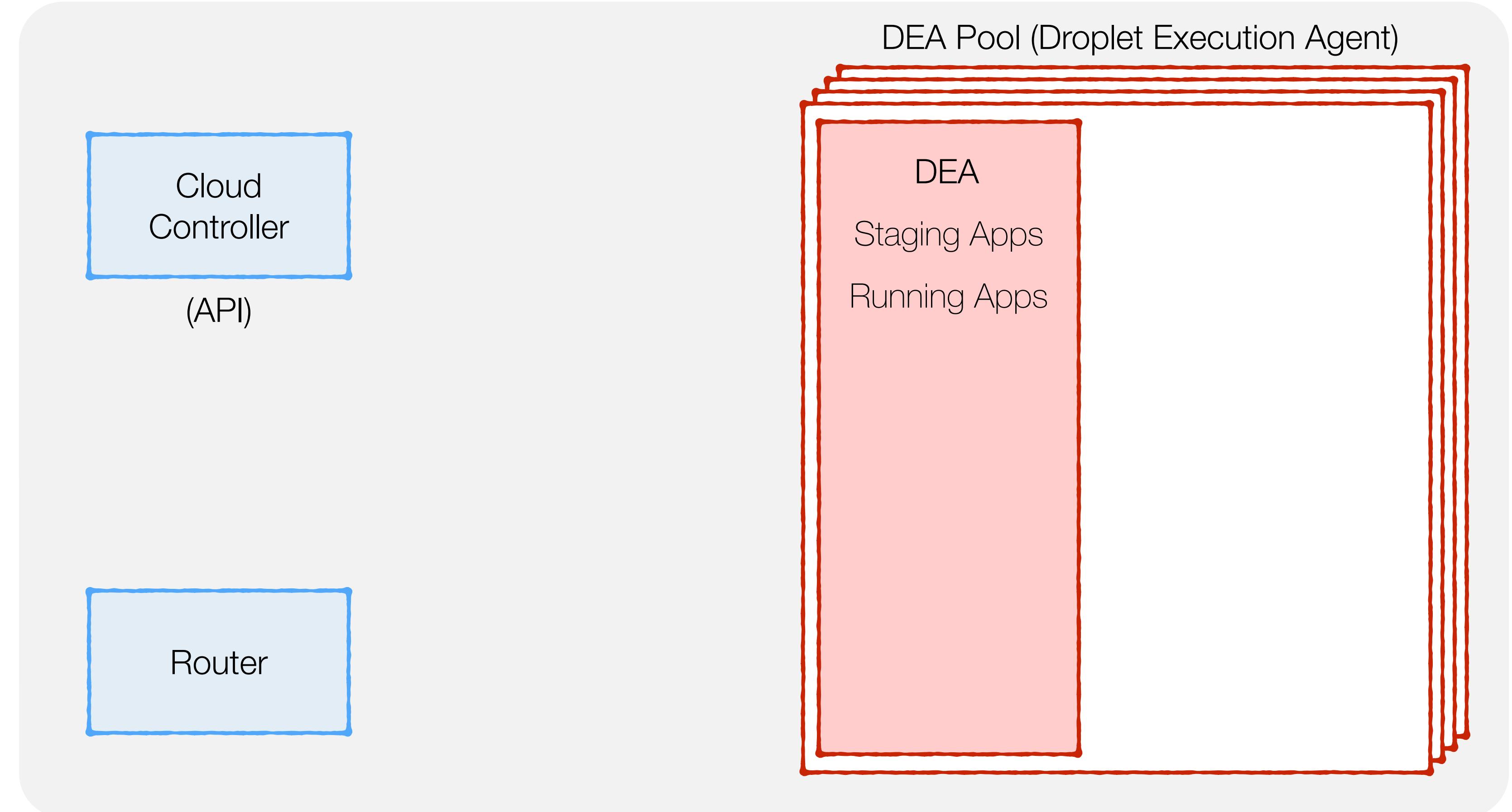


What is being rewritten?

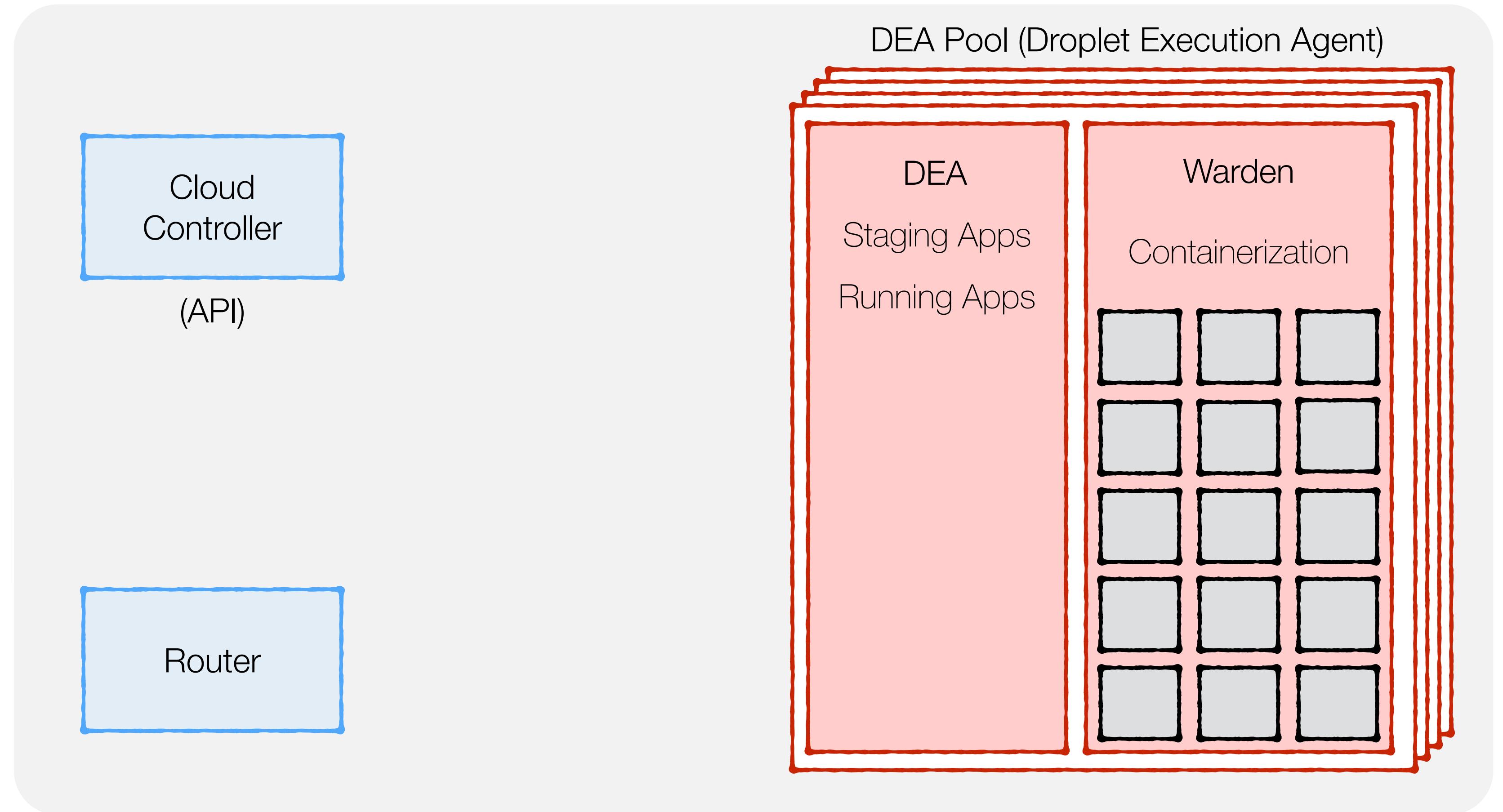
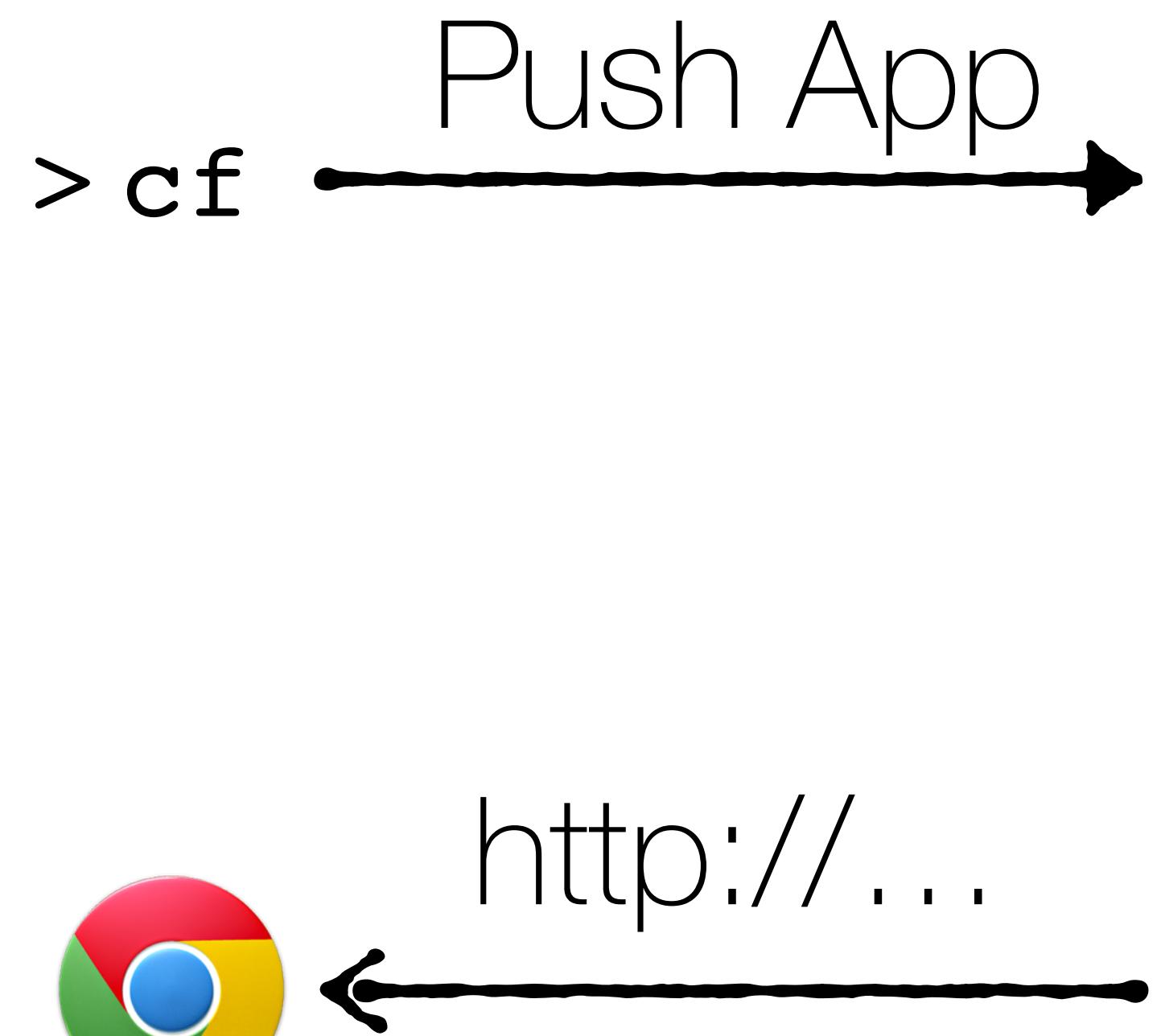


What is being rewritten?

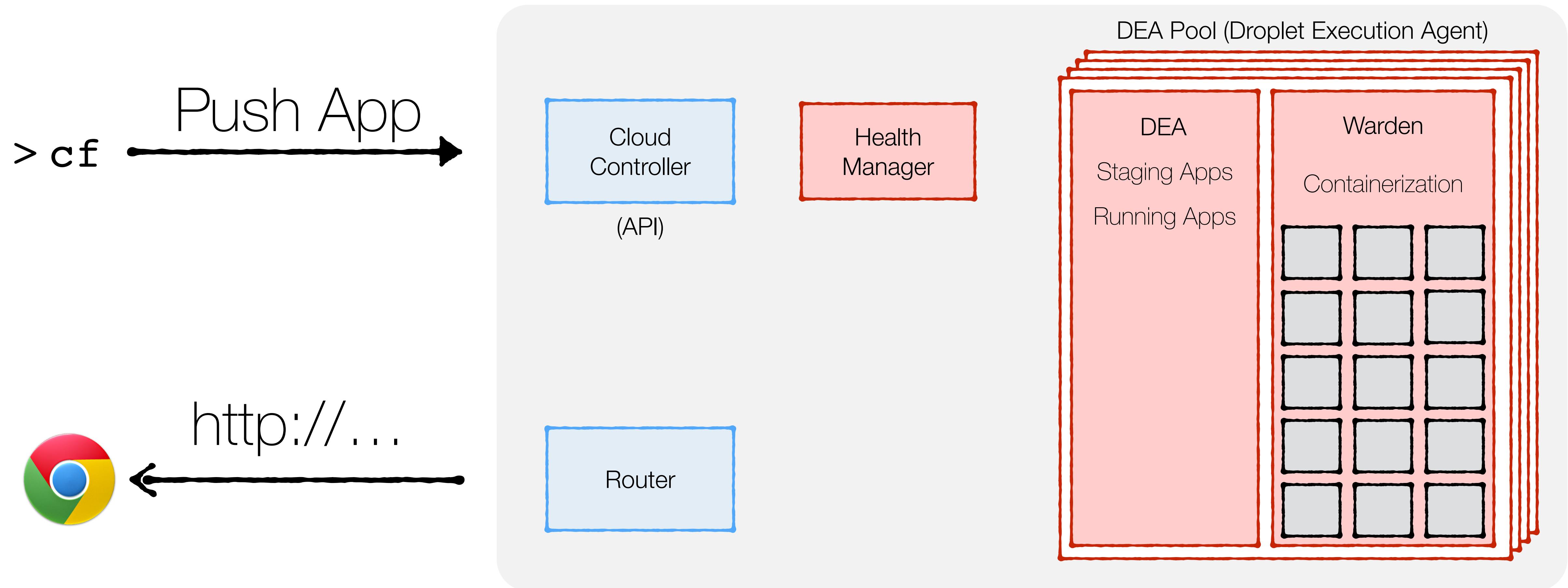
> cf **Push App** →
http://... ←



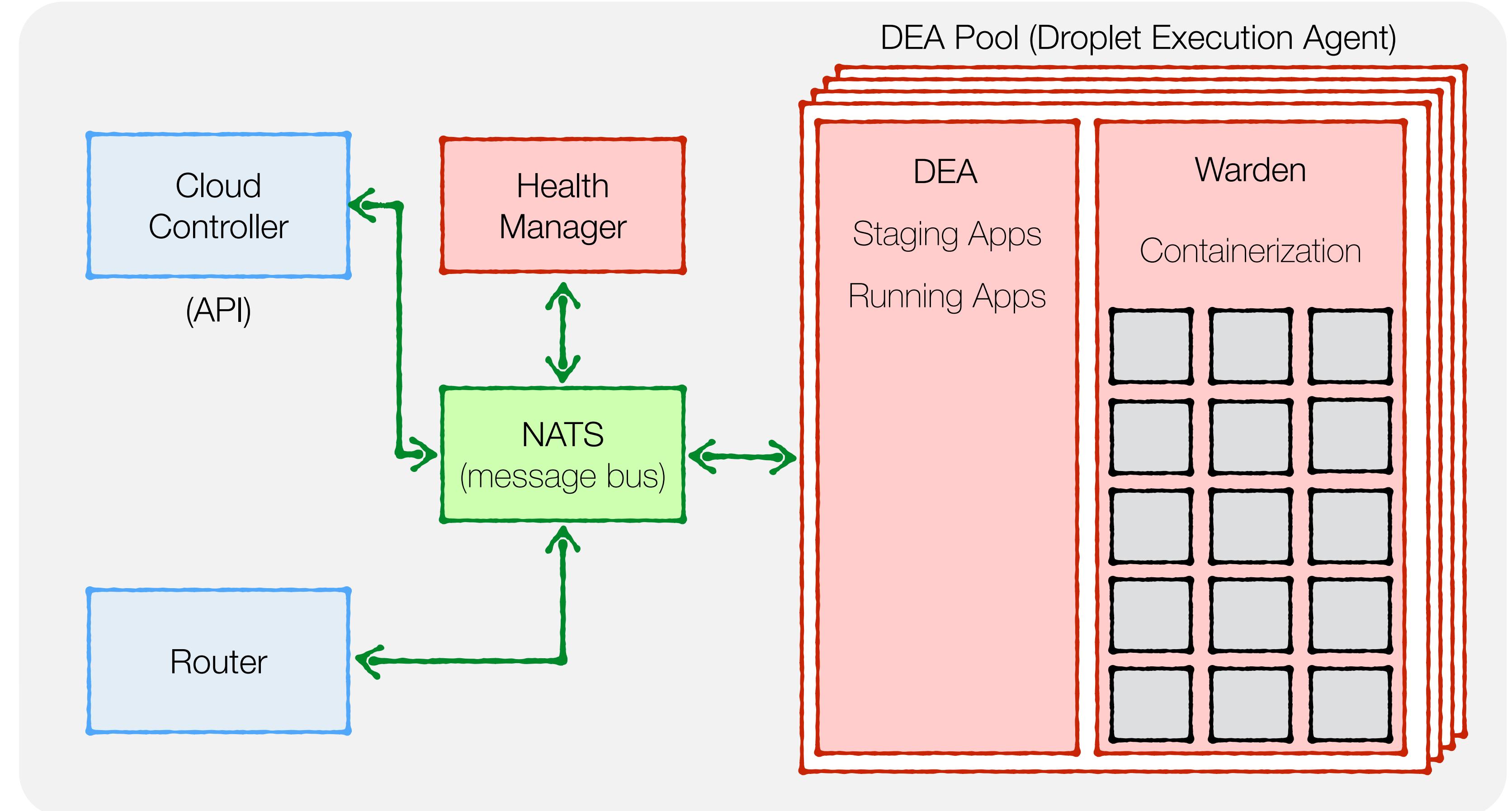
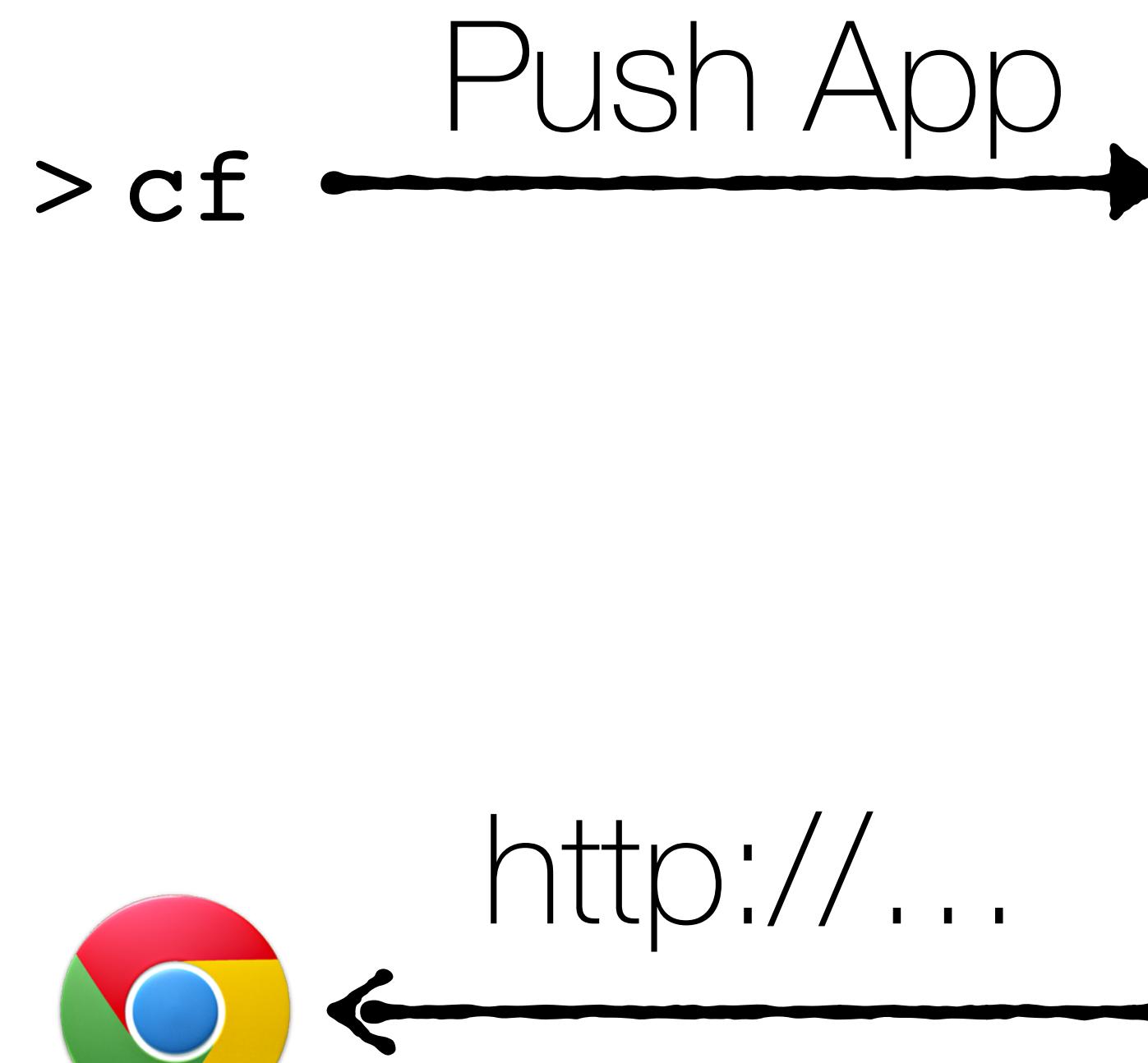
What is being rewritten?



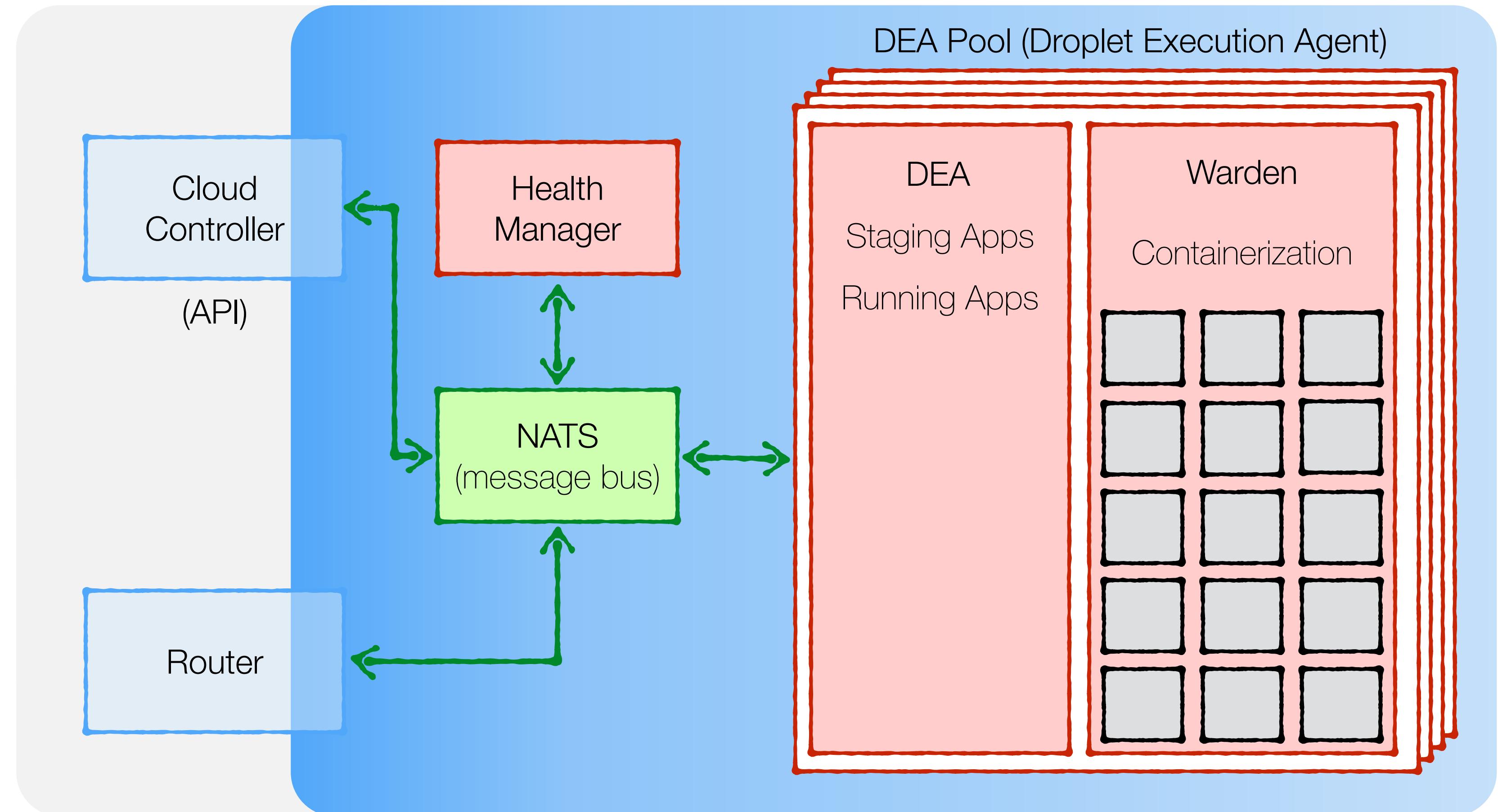
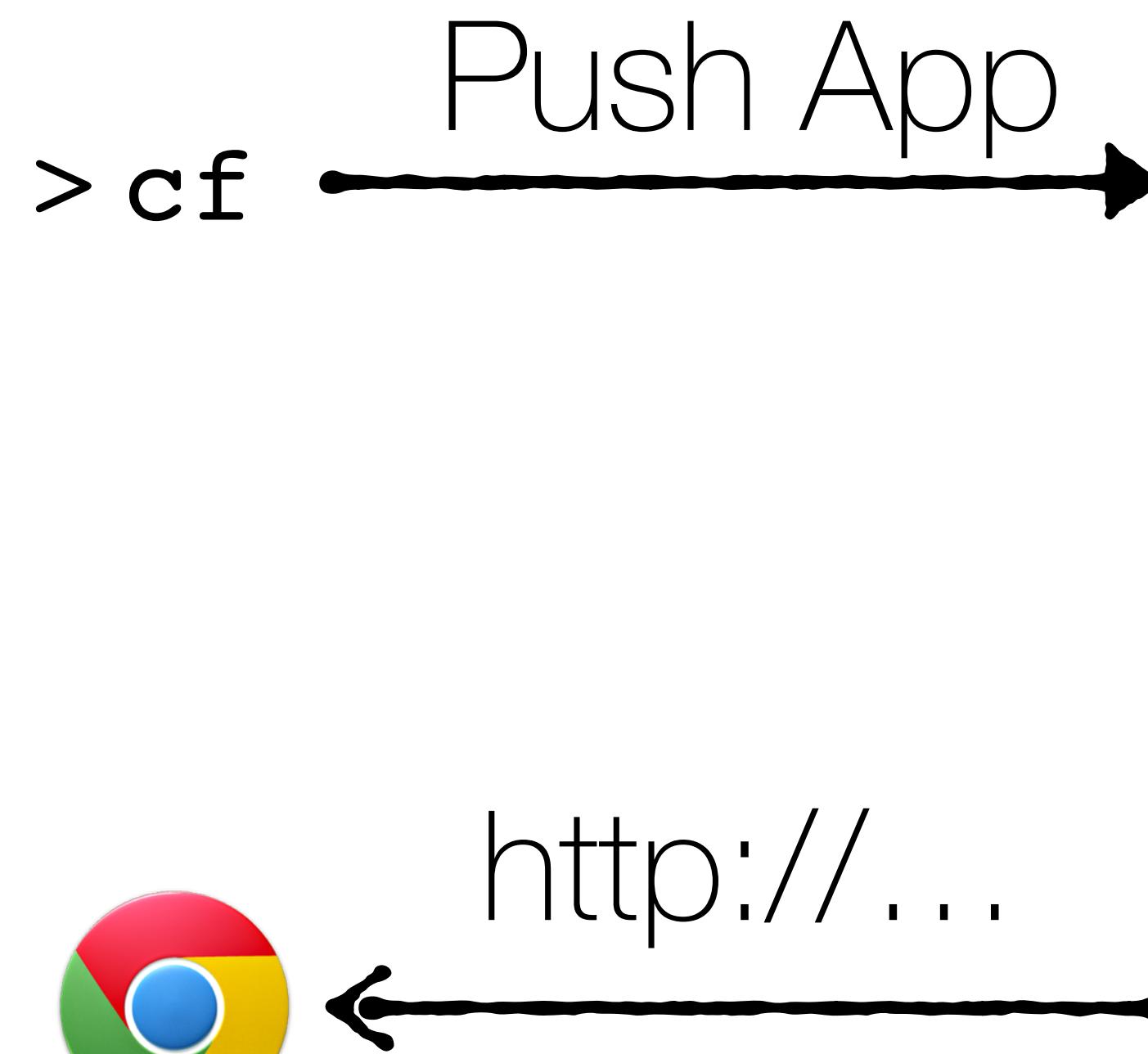
What is being rewritten?



What is being rewritten?



What is being rewritten?



DIEGO

ElasticRuntime 2.0

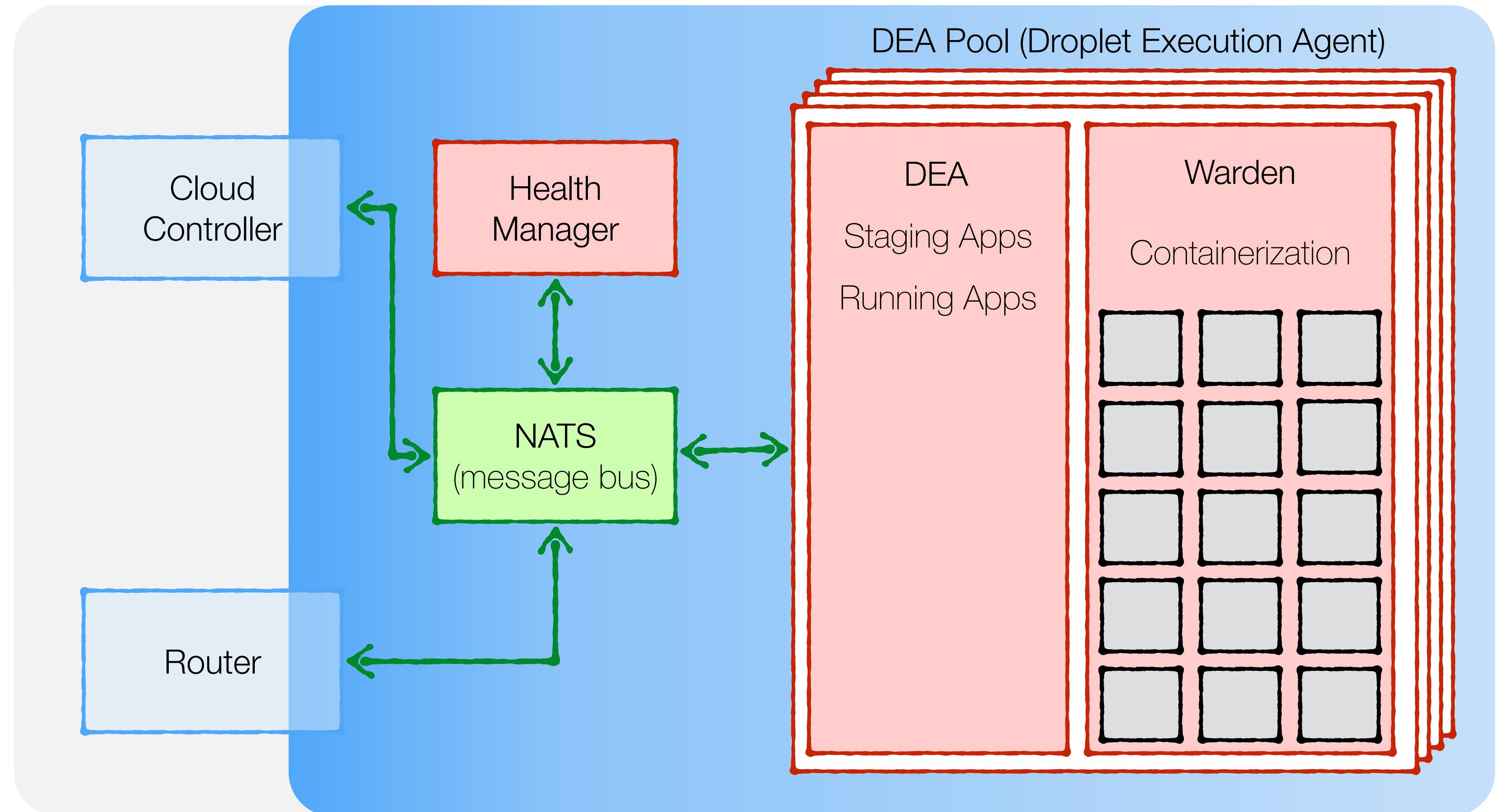
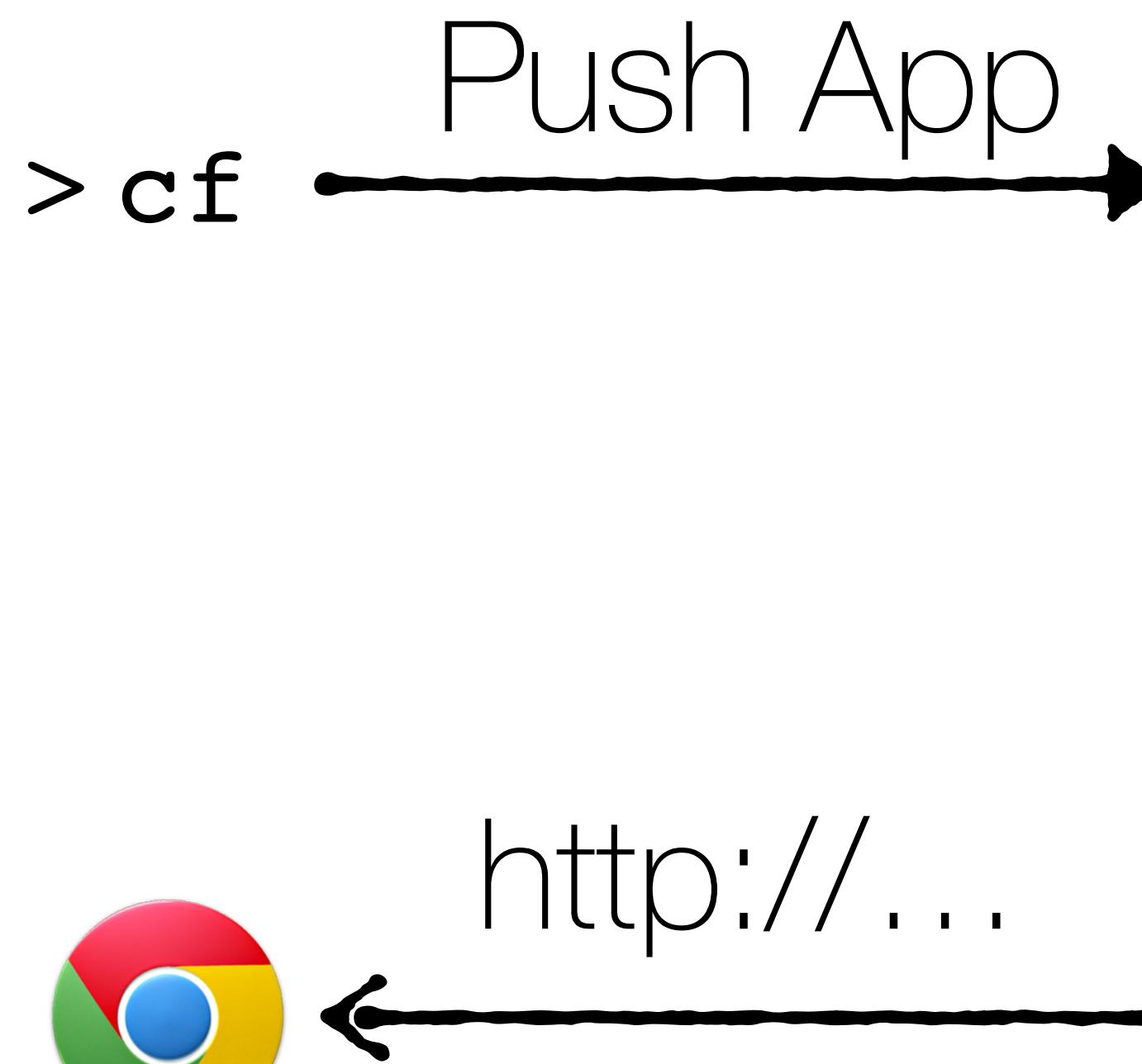
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Why rewrite?



Why rewrite?

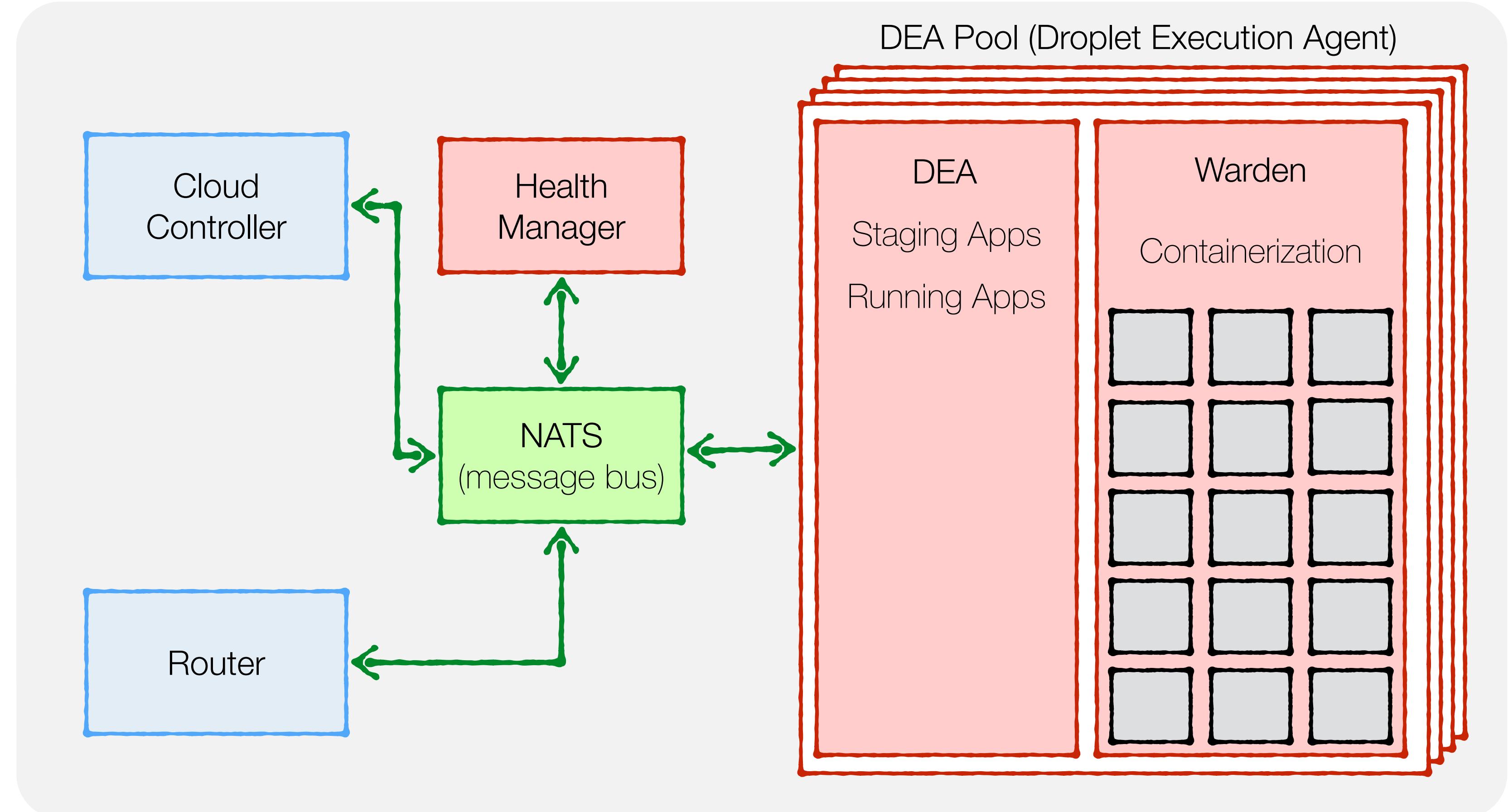
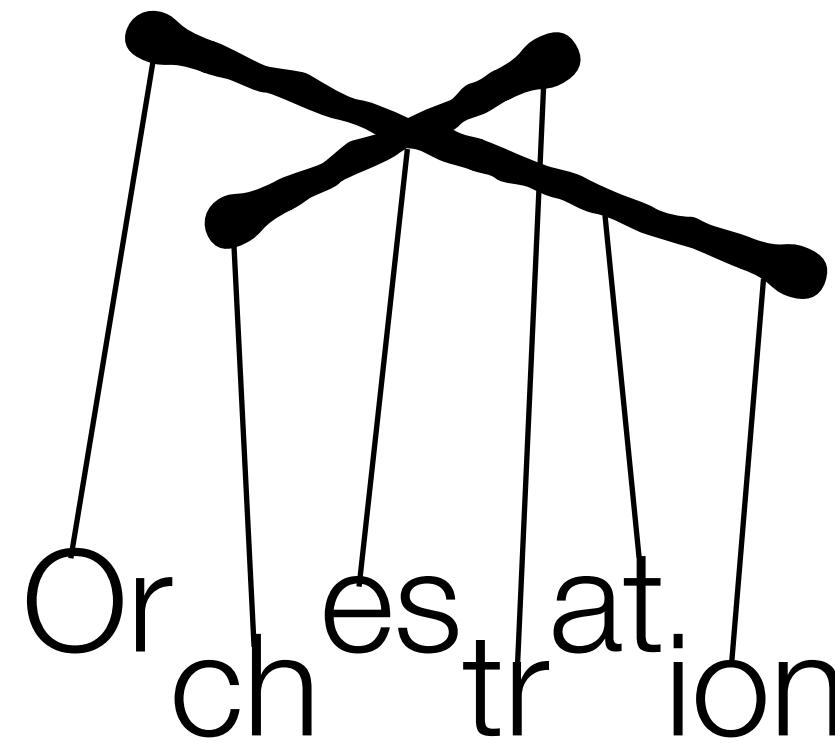
Hard to add new features

Hard to maintain existing features

Why?

Why rewrite?

Tight Coupling
Poor separation
of concerns

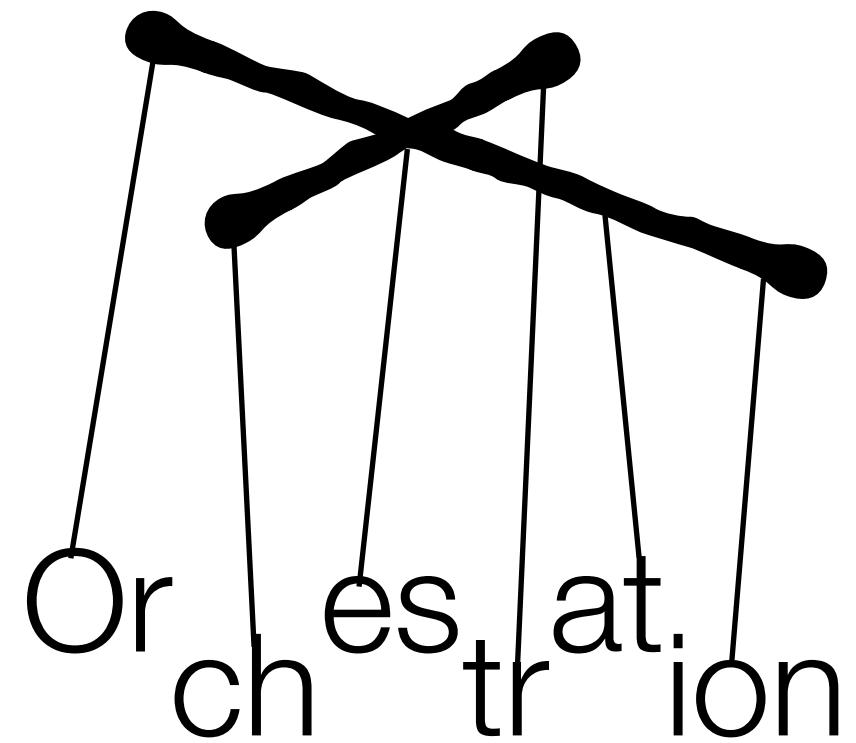


Why rewrite?

> cf scale

Tight Coupling

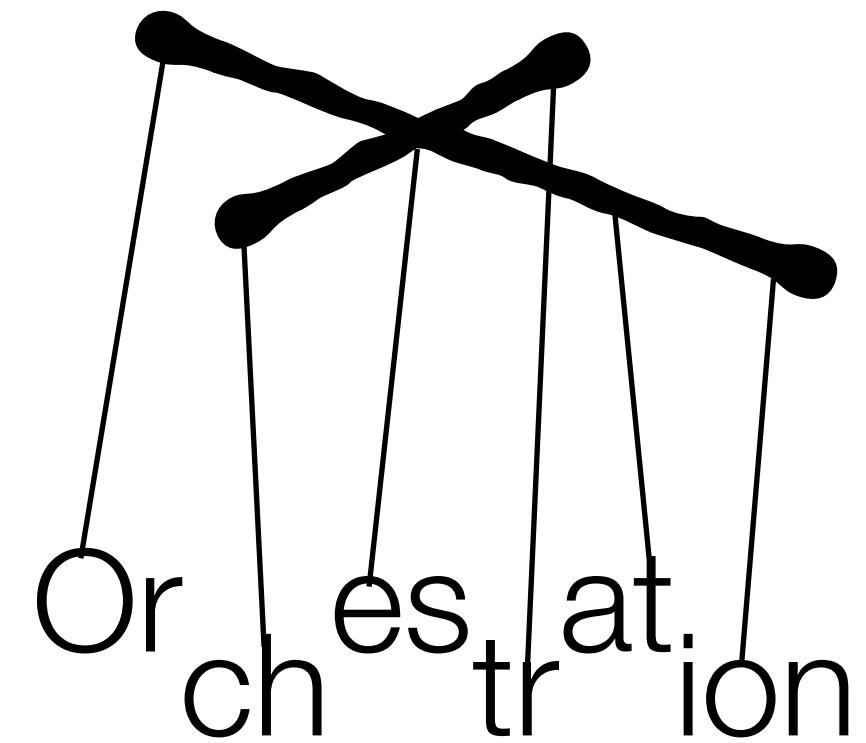
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> cf scale

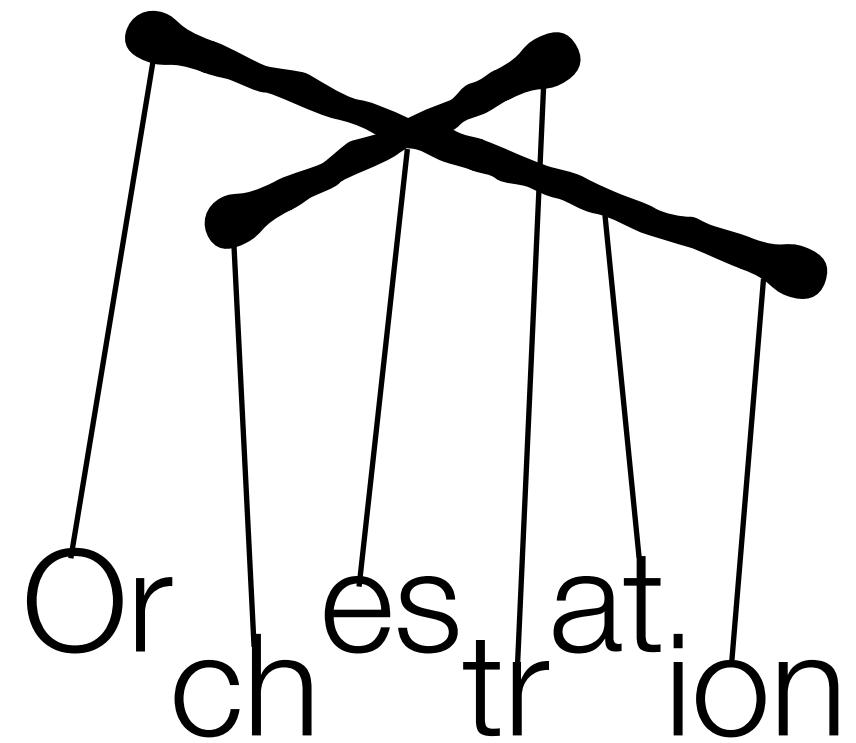


Cloud
Controller

Why rewrite?

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Poor separation
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> cf scale

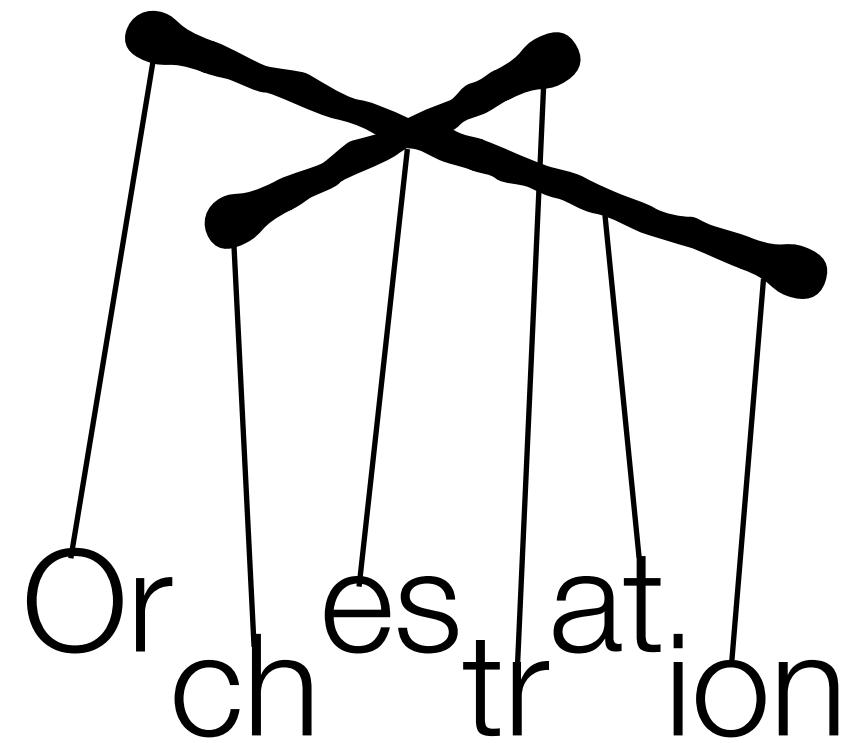


"Make it so"

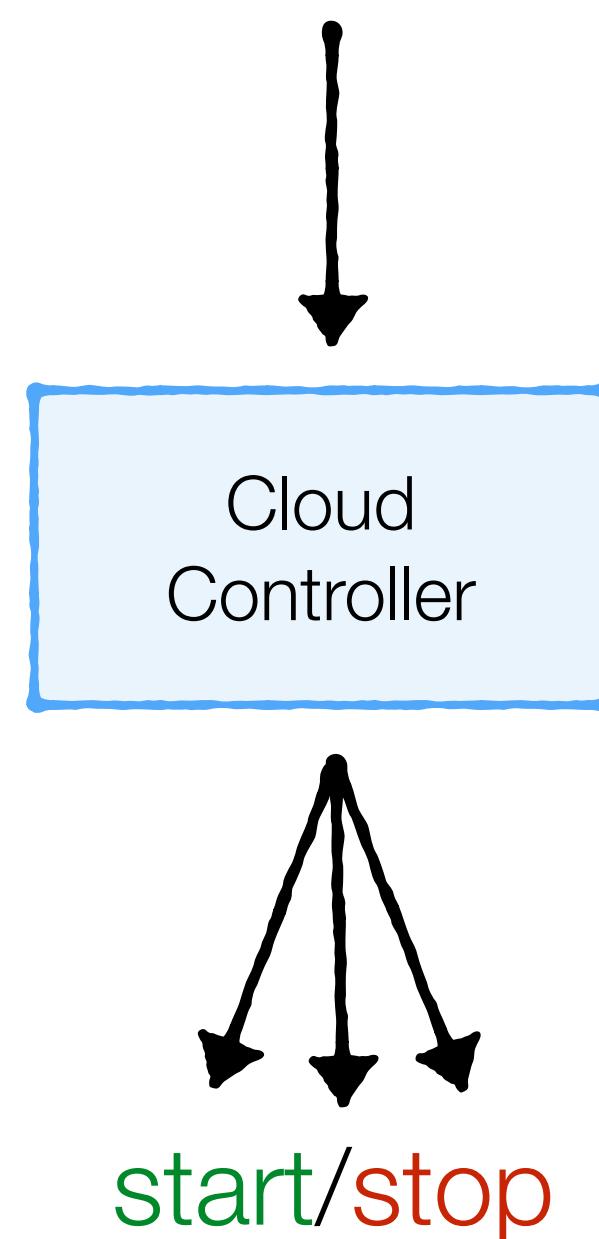
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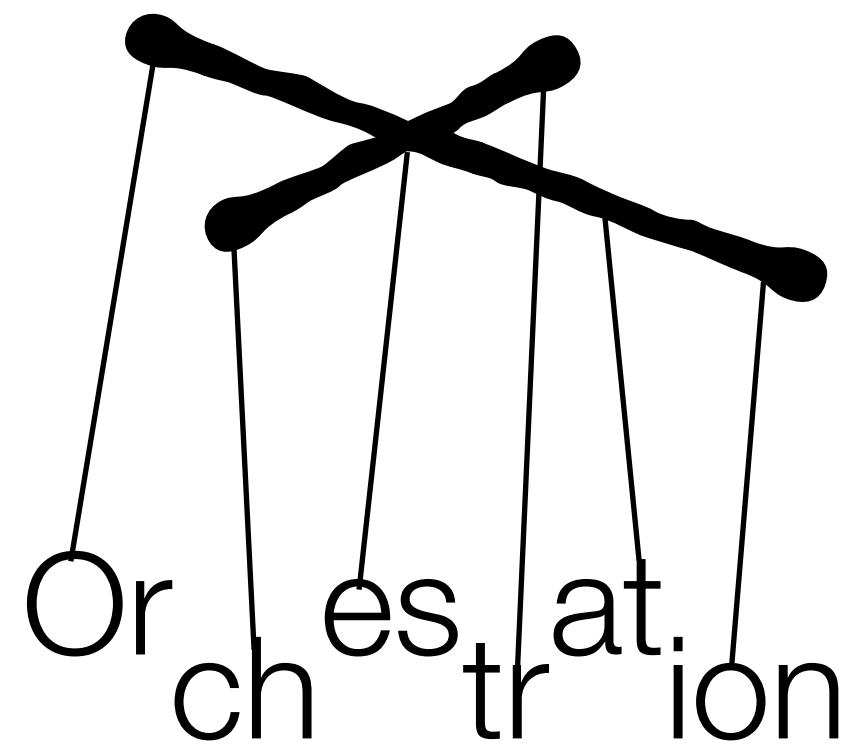
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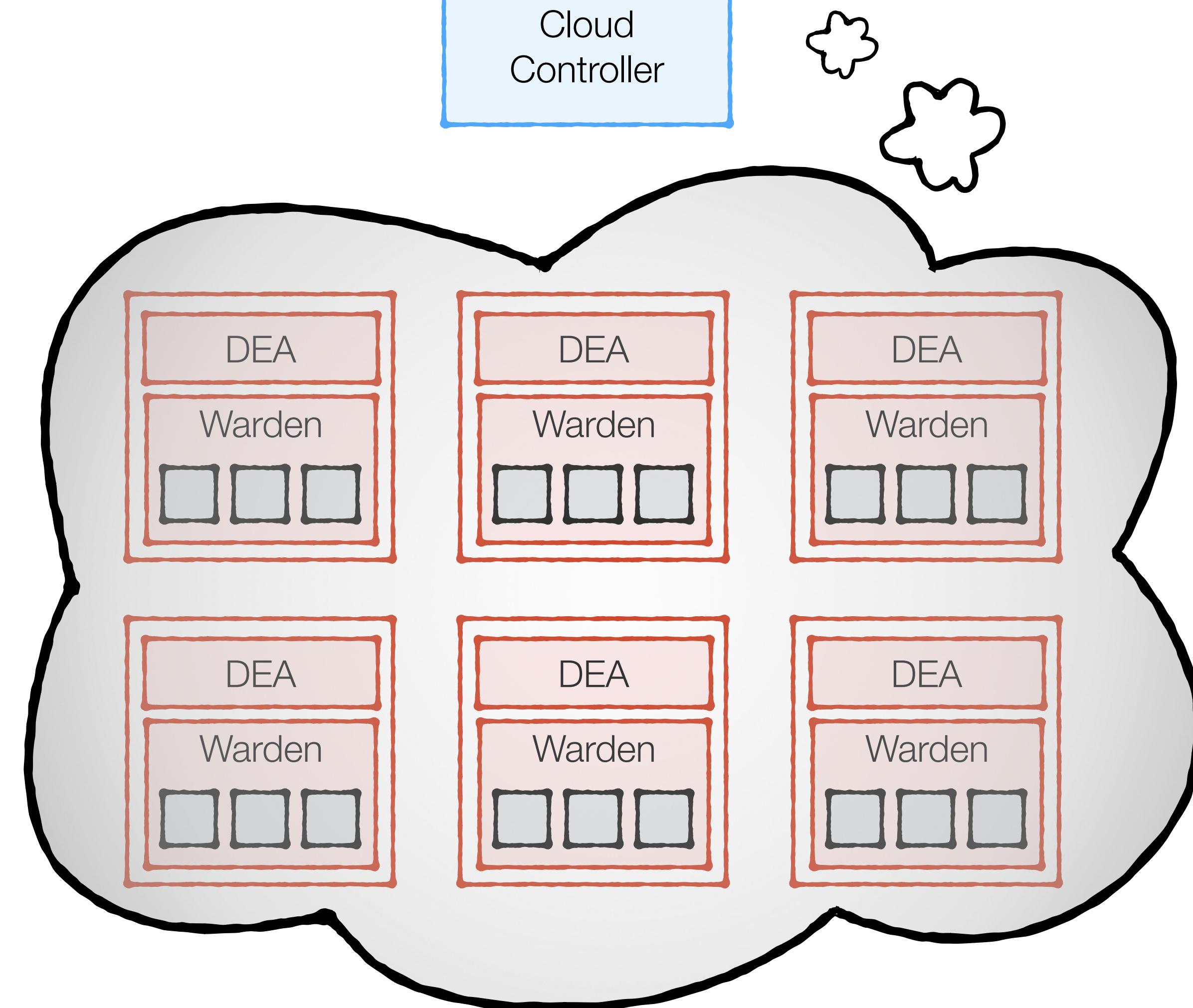
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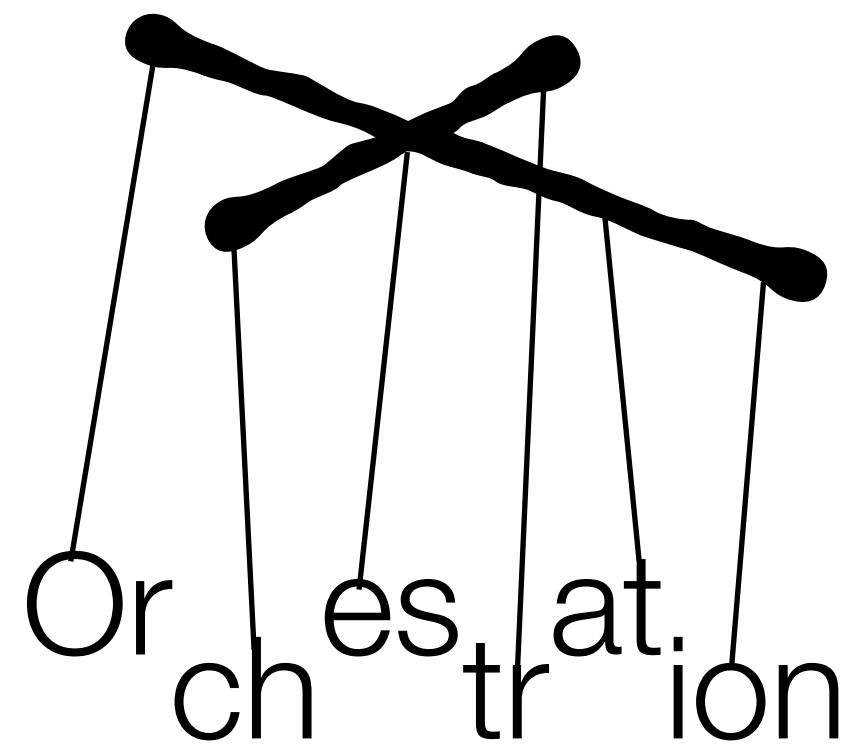
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Why rewrite?

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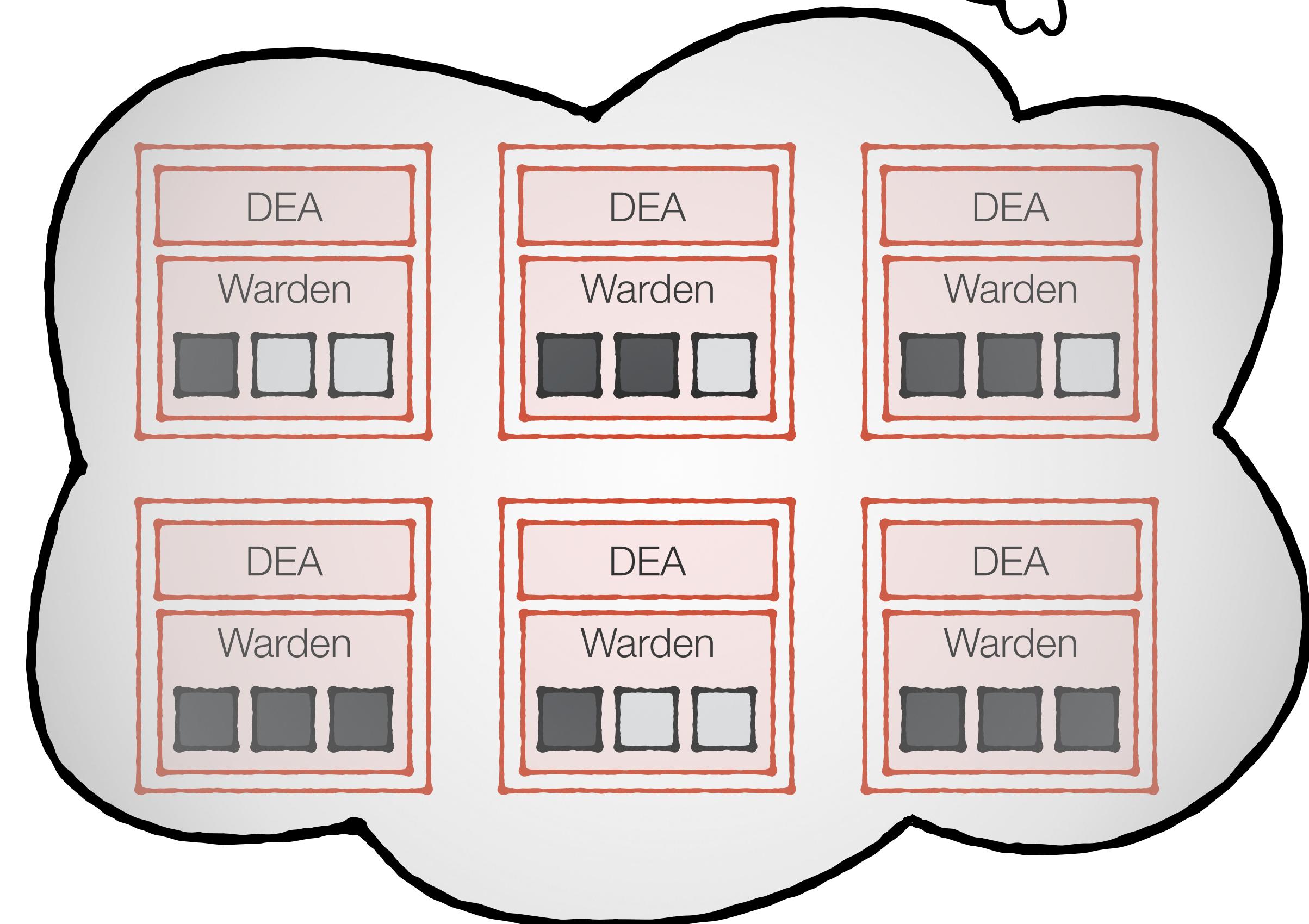
Poor separation
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> cf scale



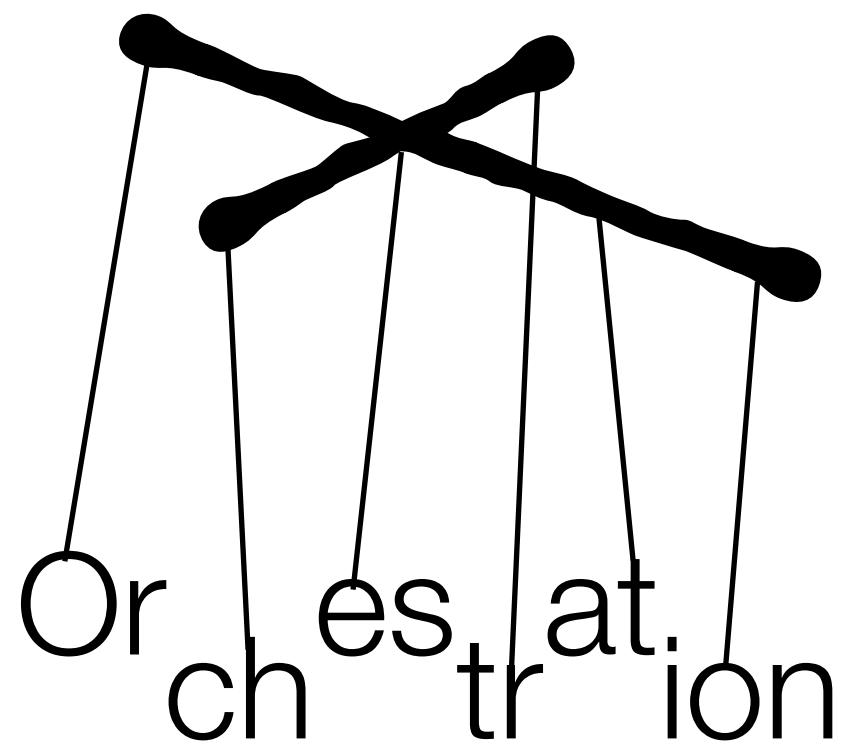
Cloud
Controller



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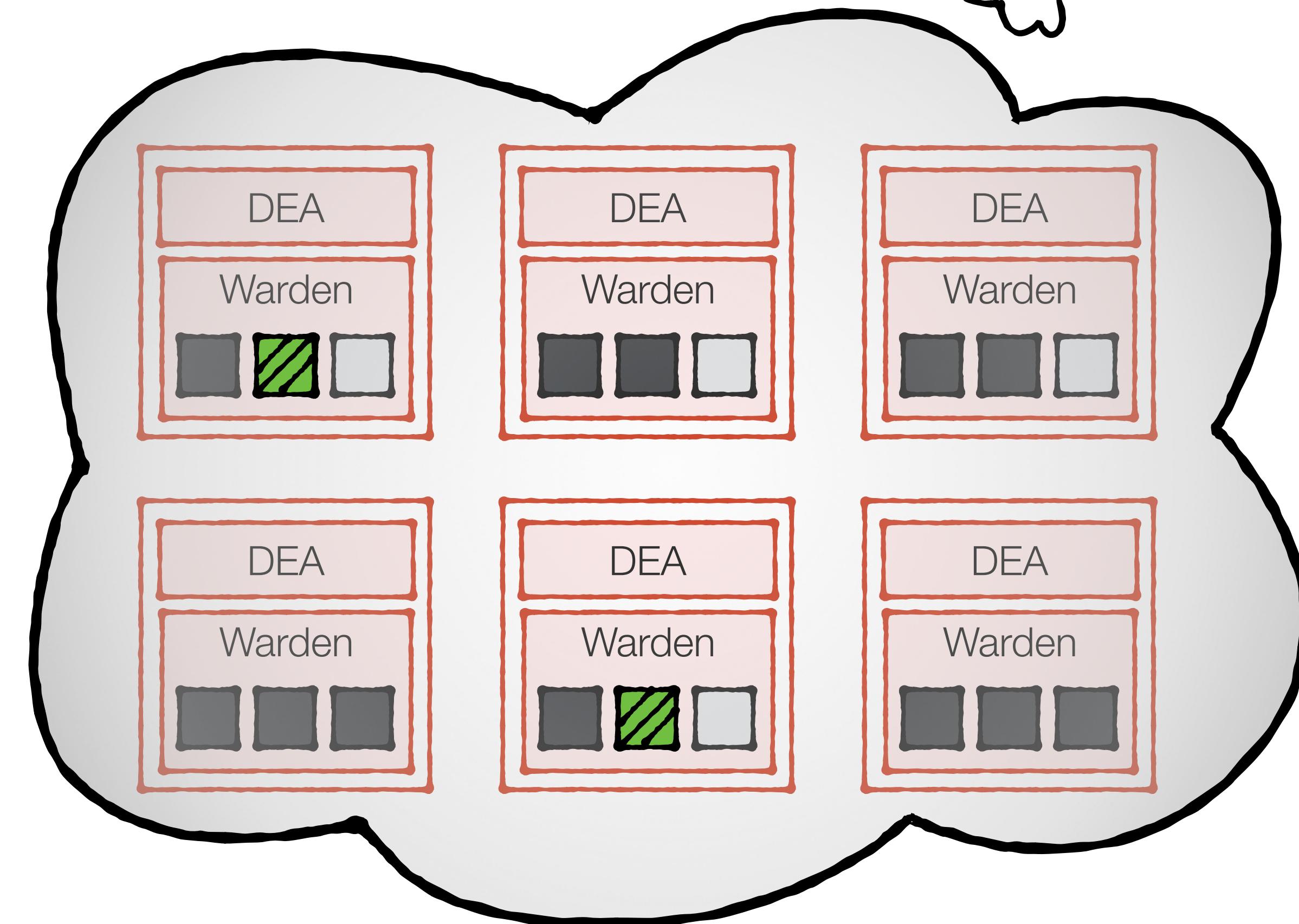
Poor separation
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> cf scale



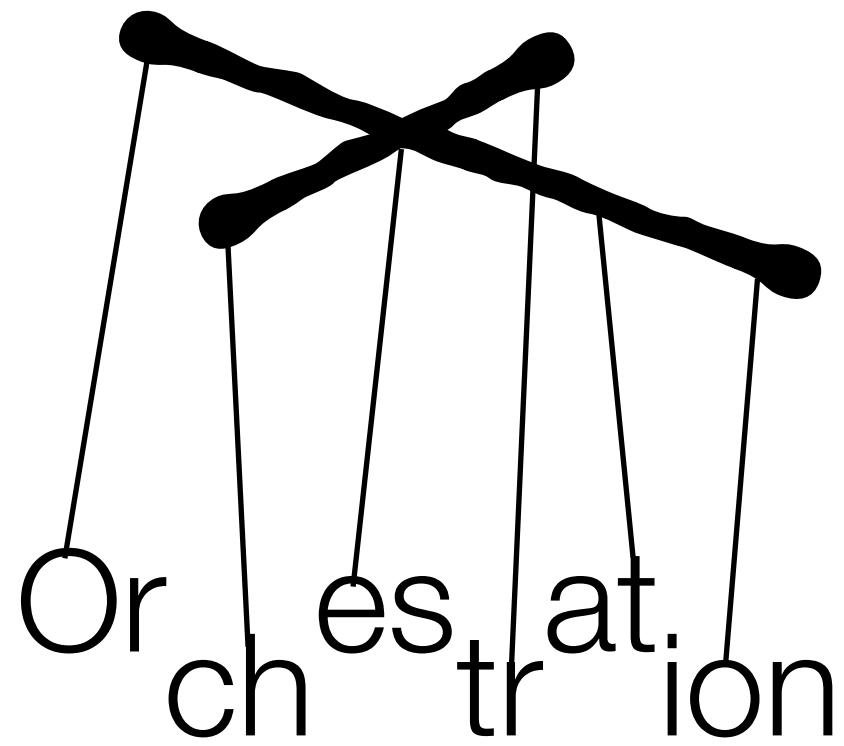
Cloud
Controller



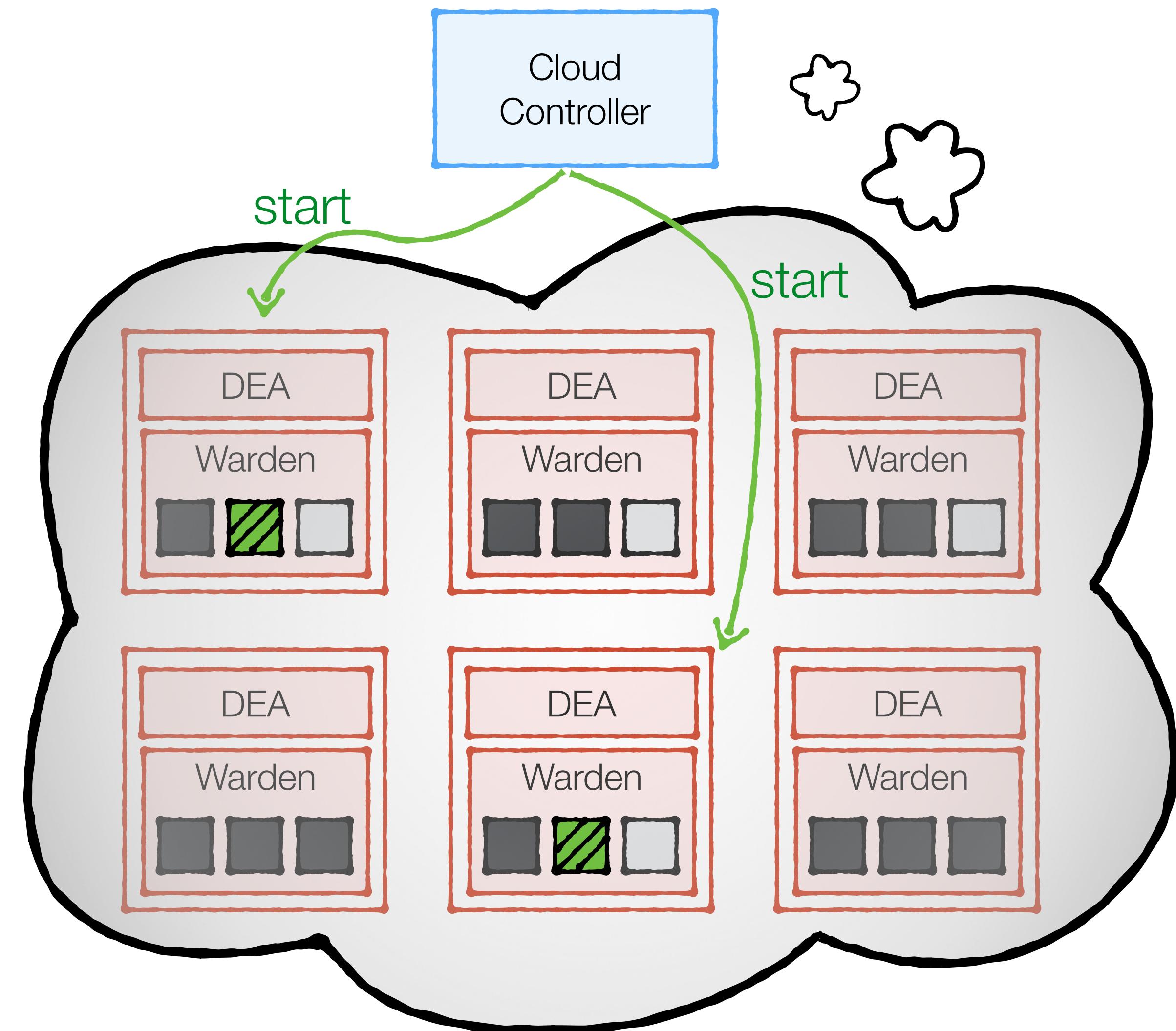
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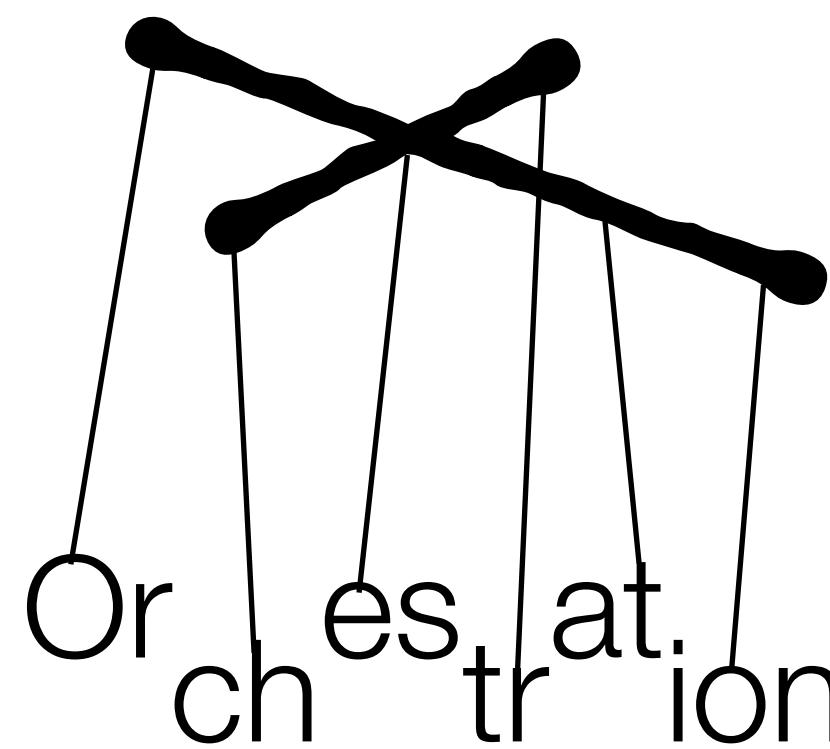
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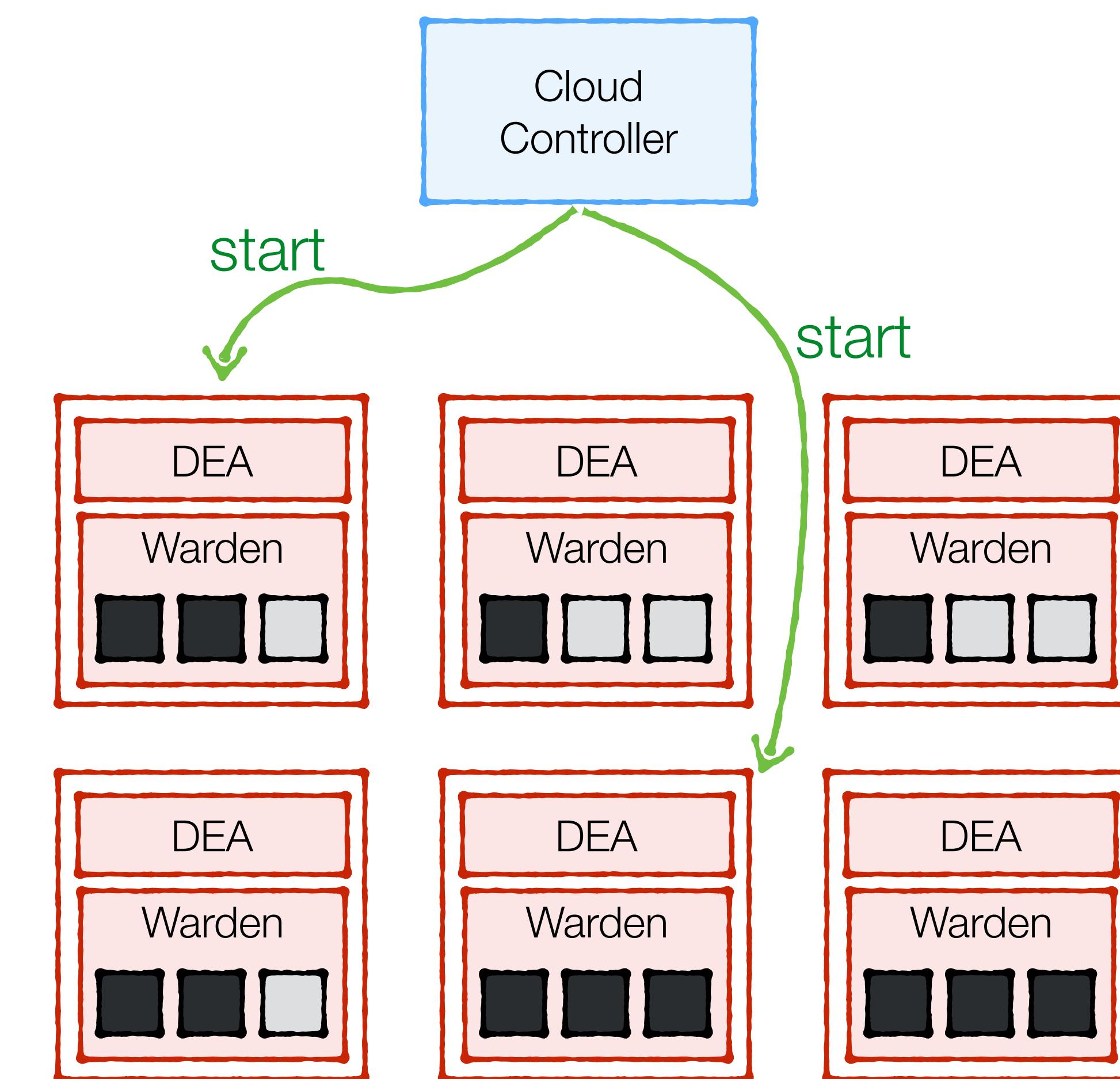
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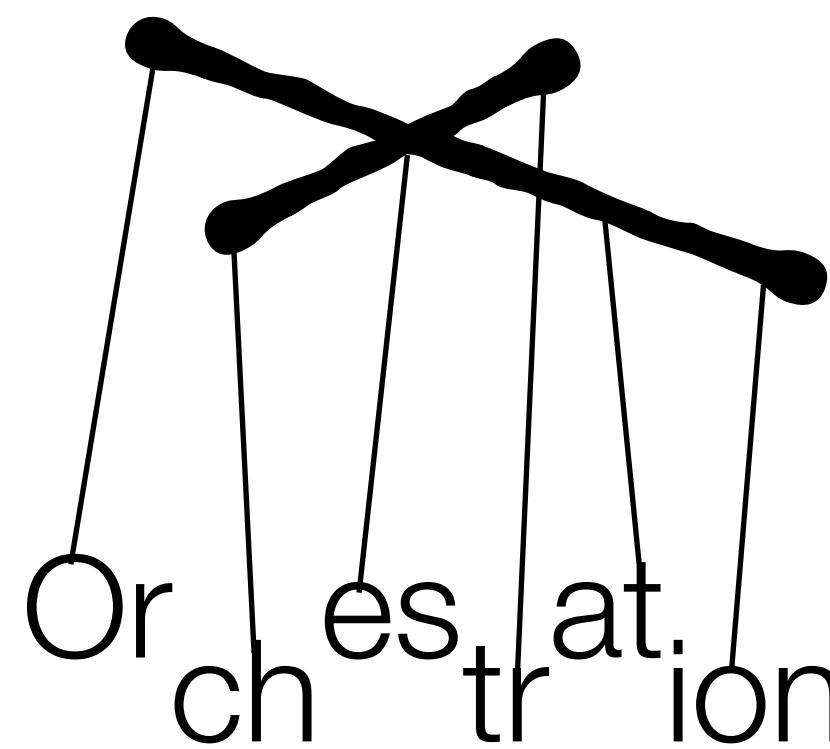
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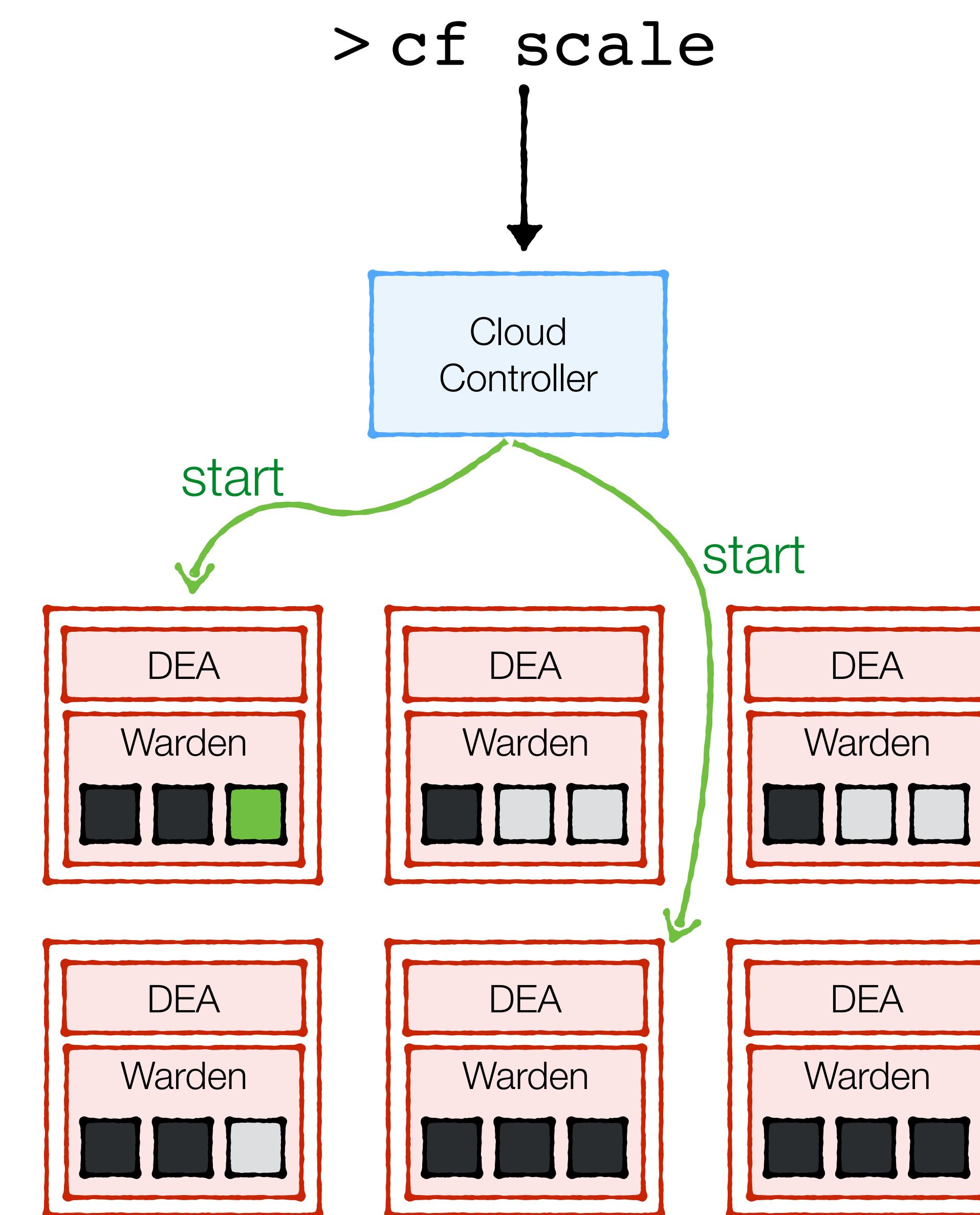
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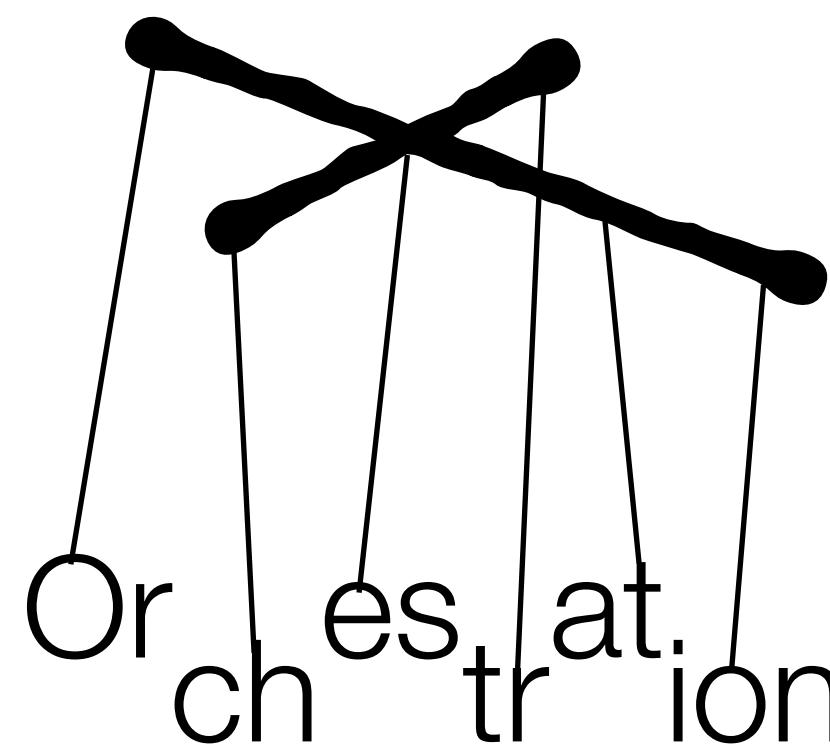
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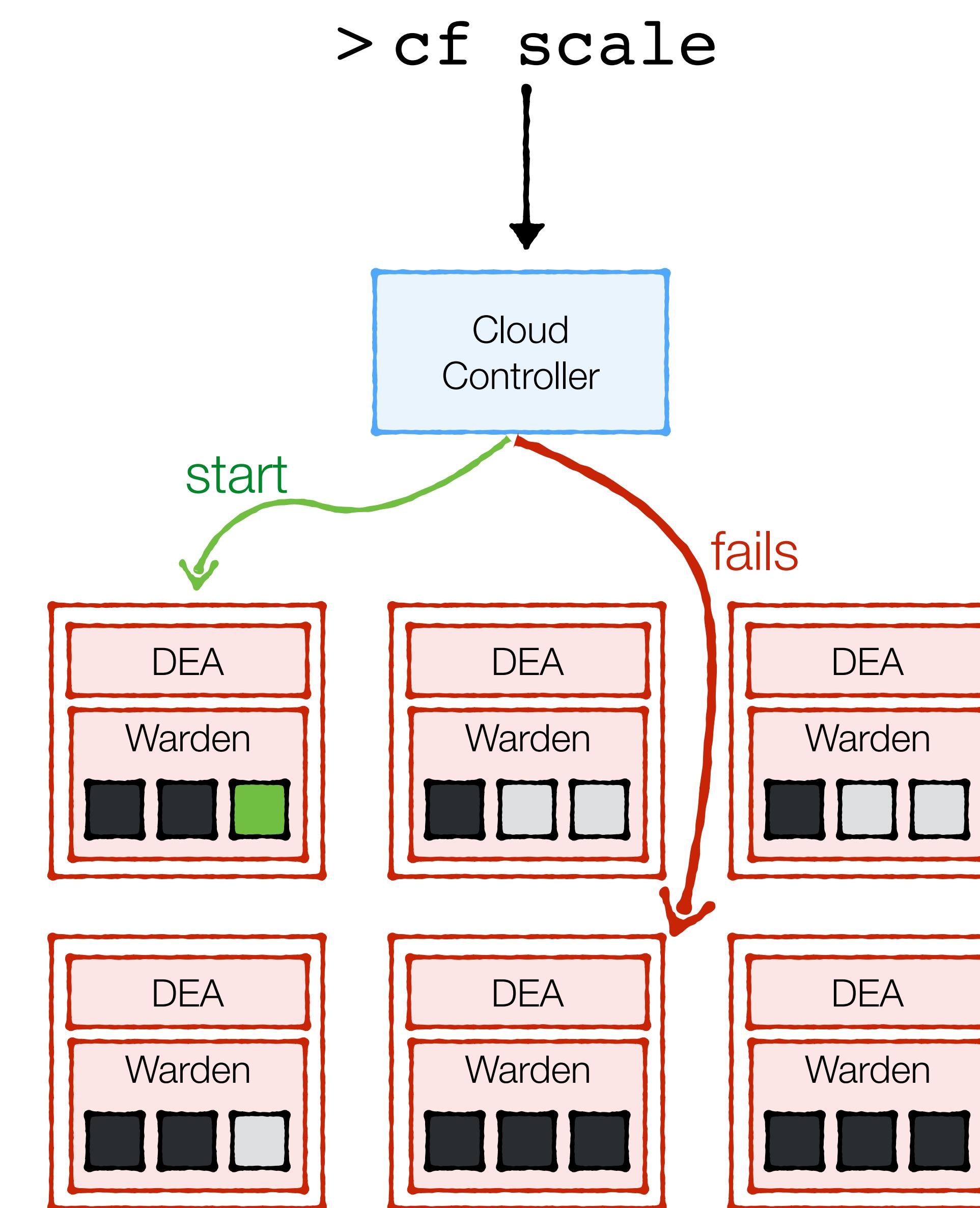
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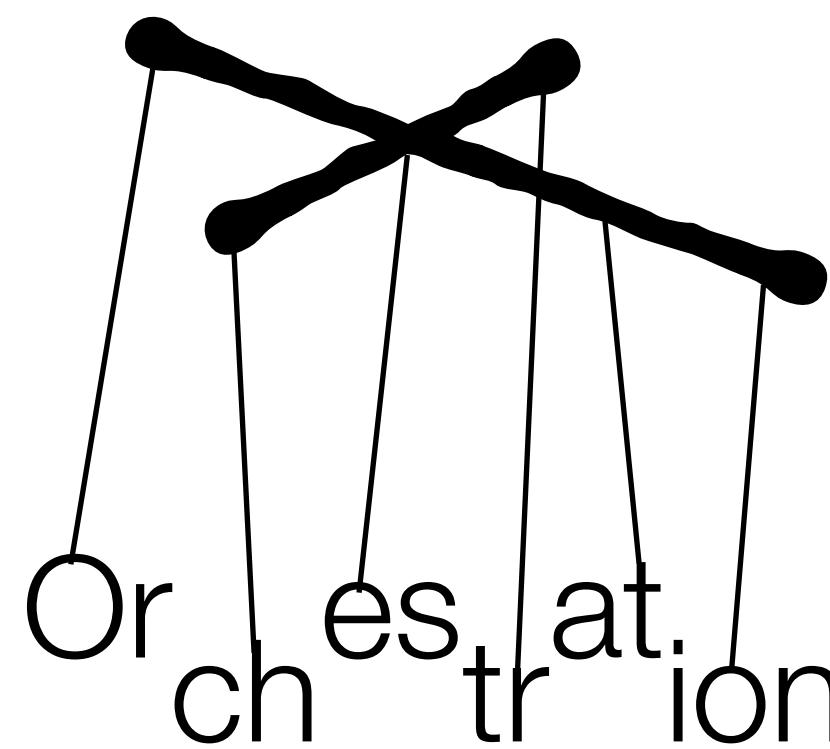
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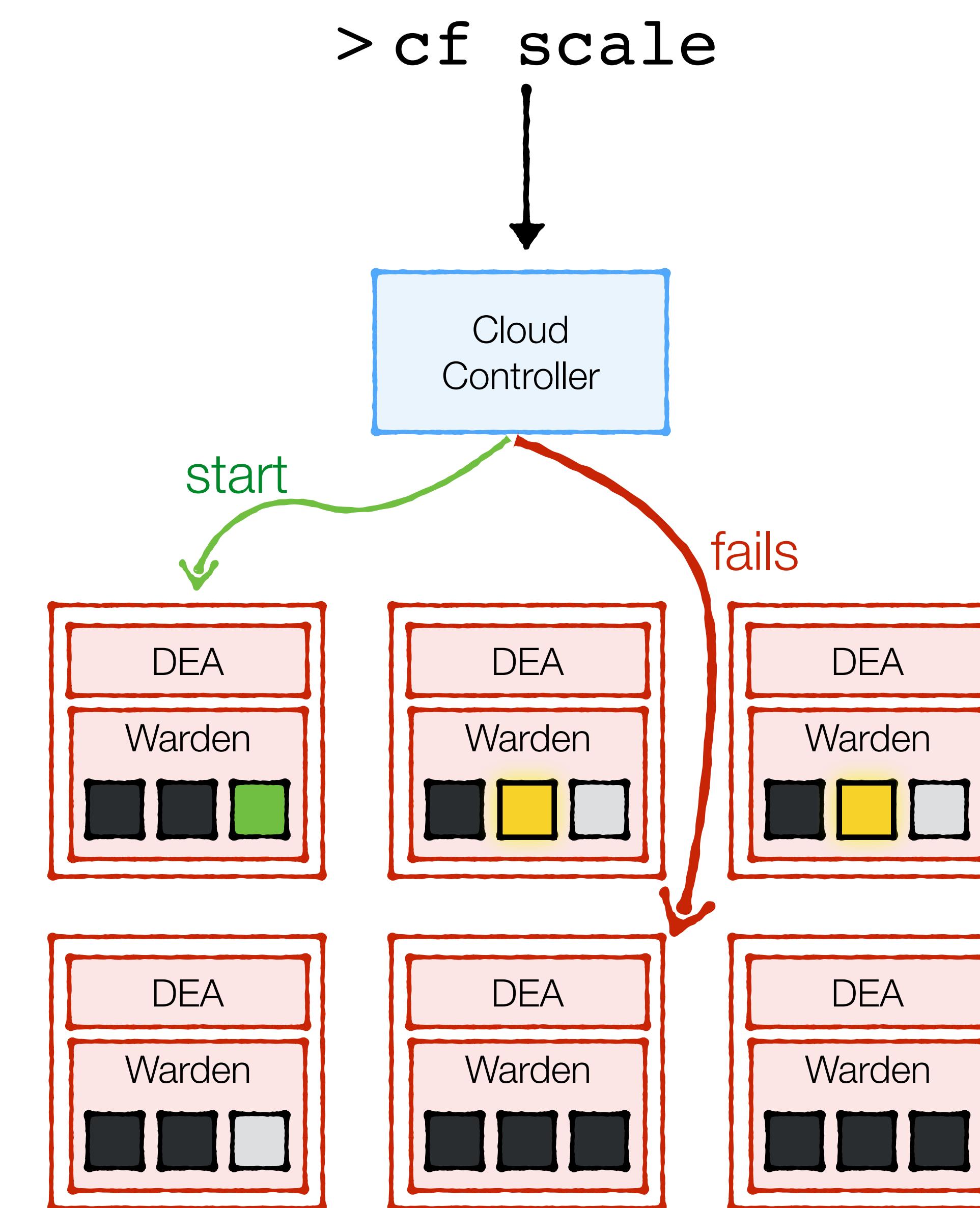
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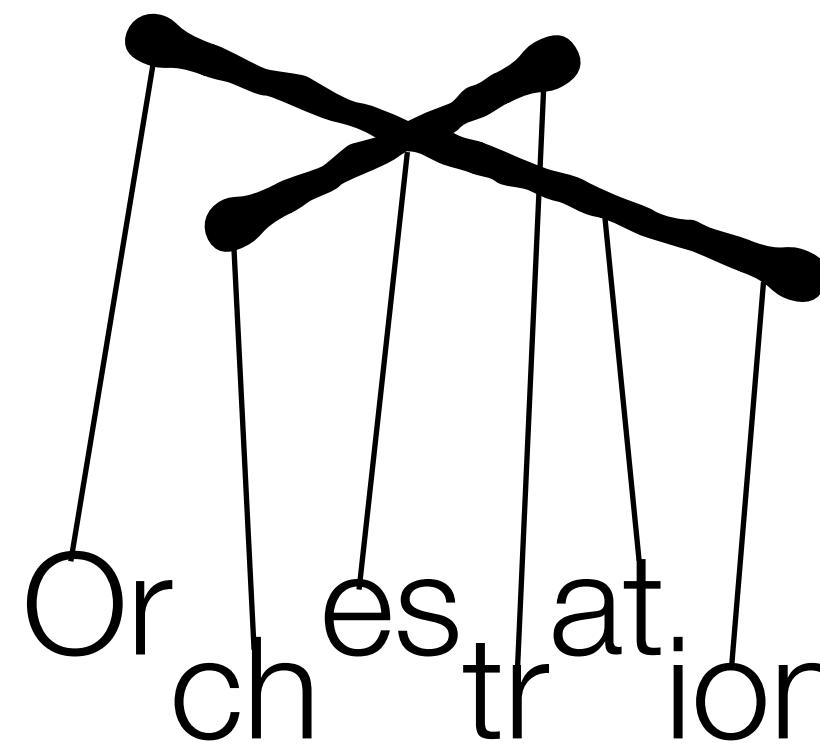
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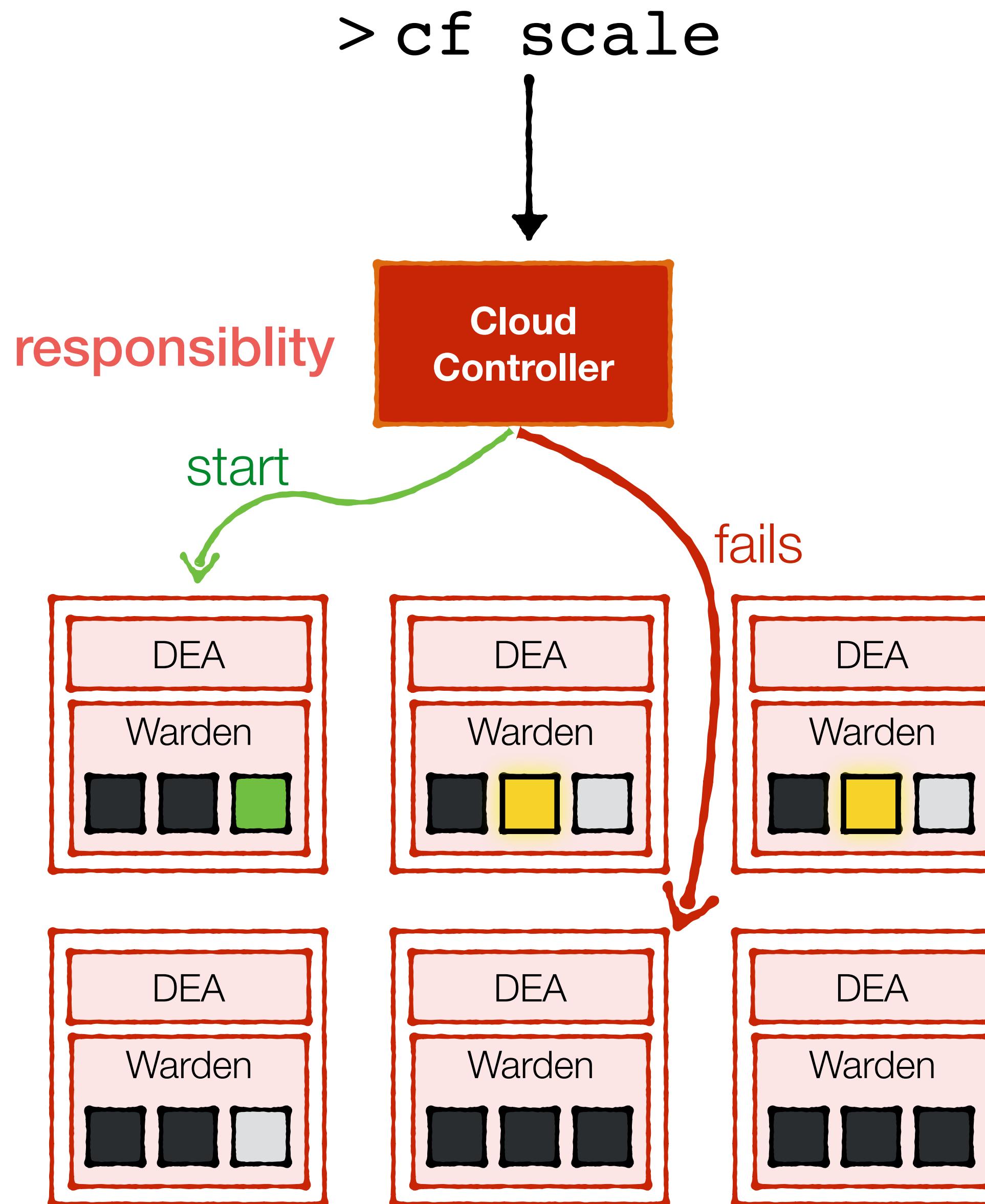
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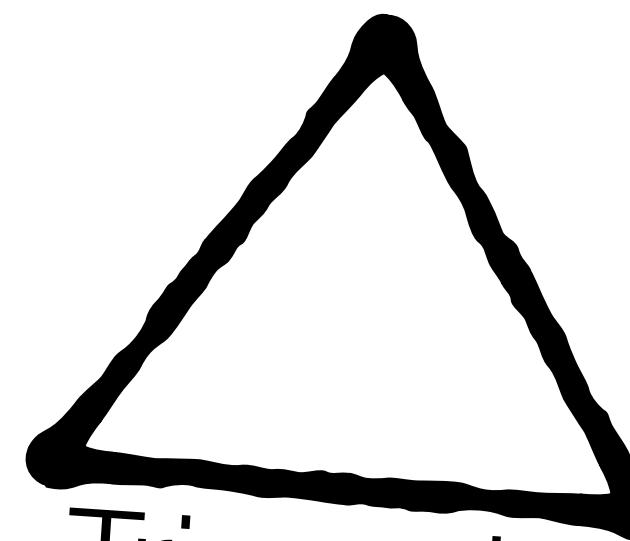
Too much responsibility



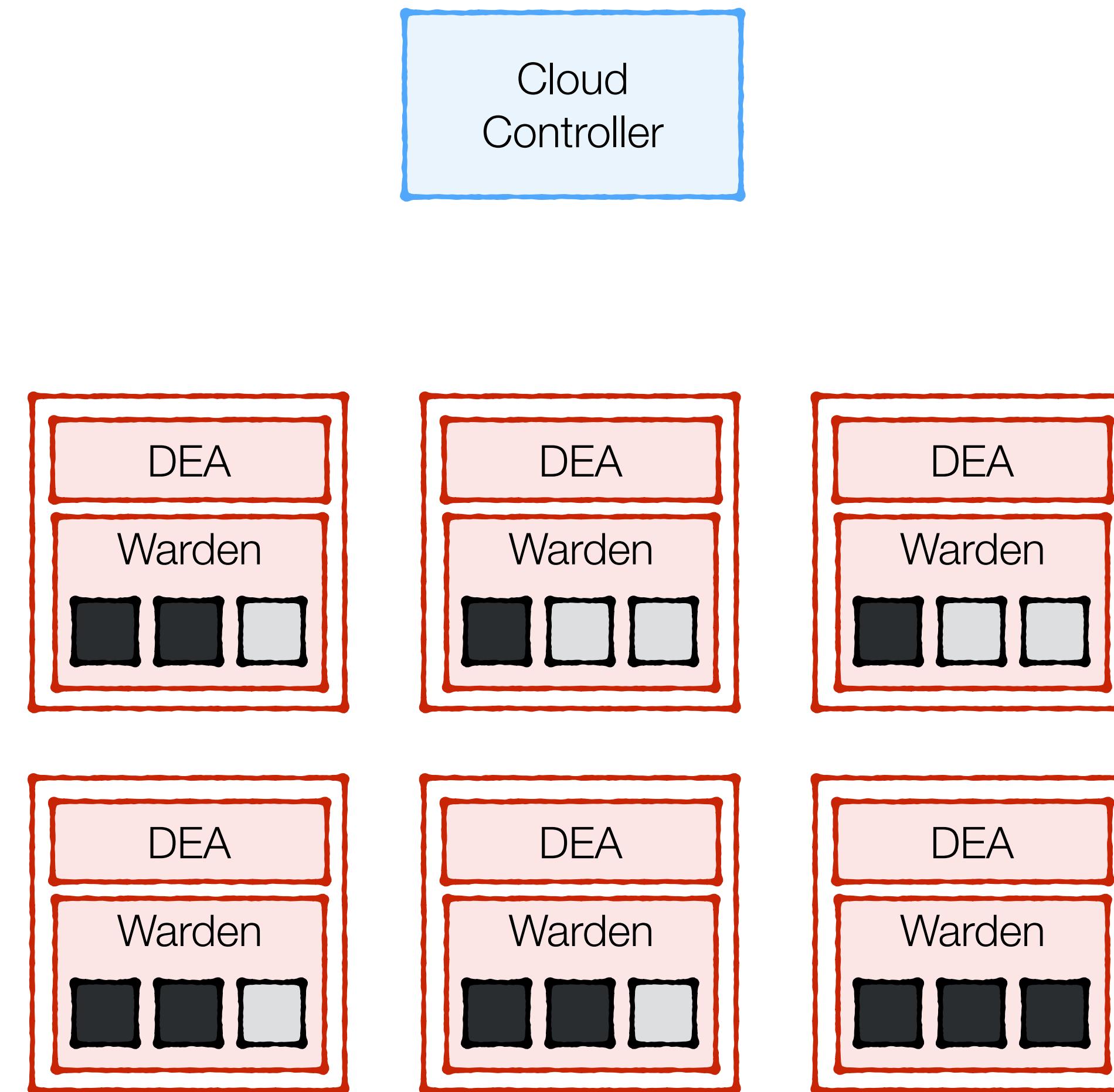
Why rewrite?

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Triangular
Dependencies

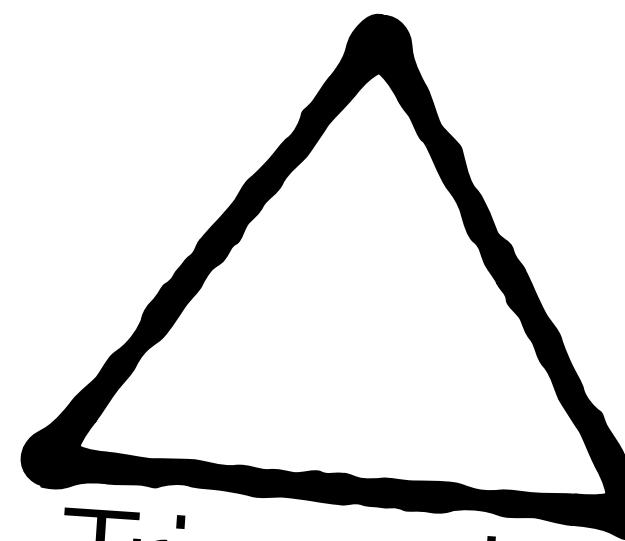


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Poor separation
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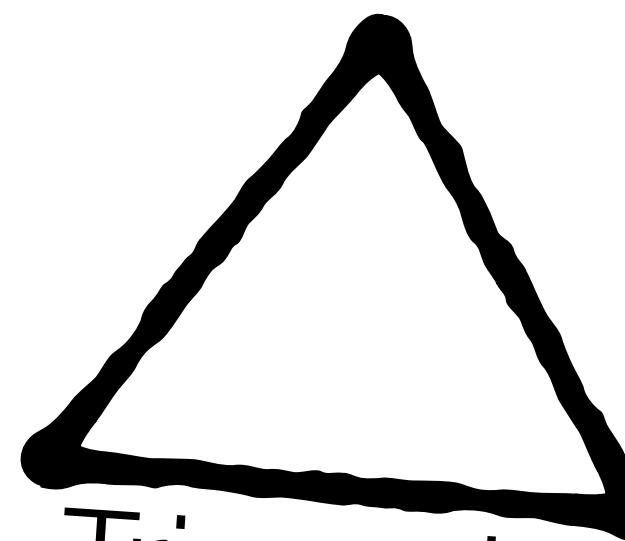
Triangular
Dependencies



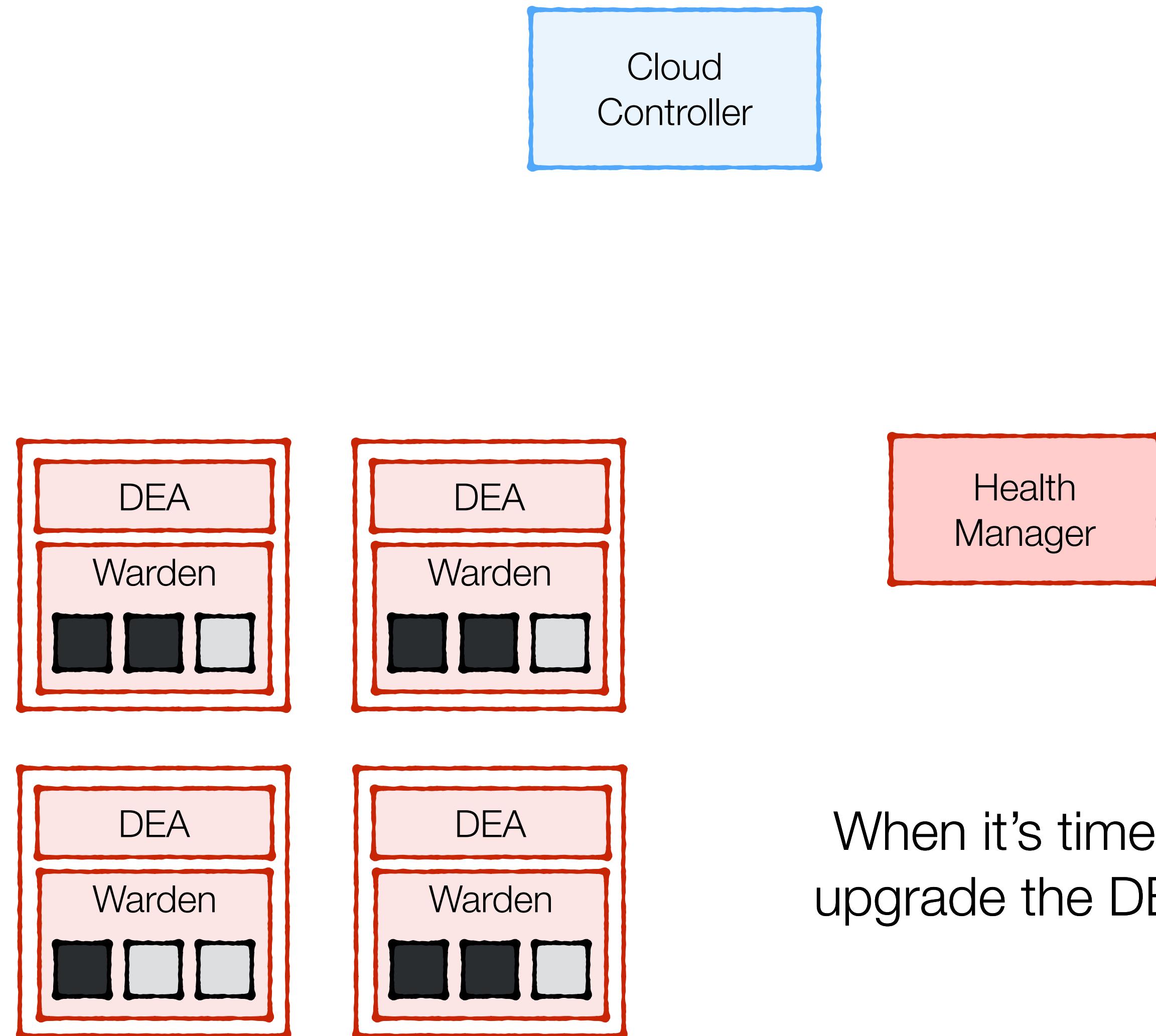
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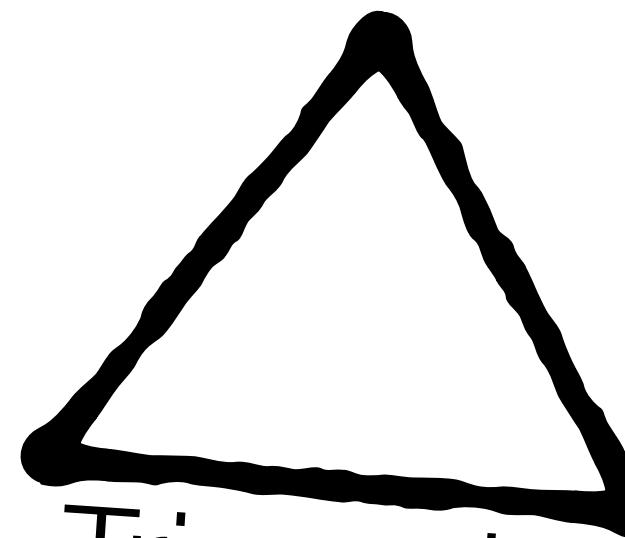
Triangular
Dependencies



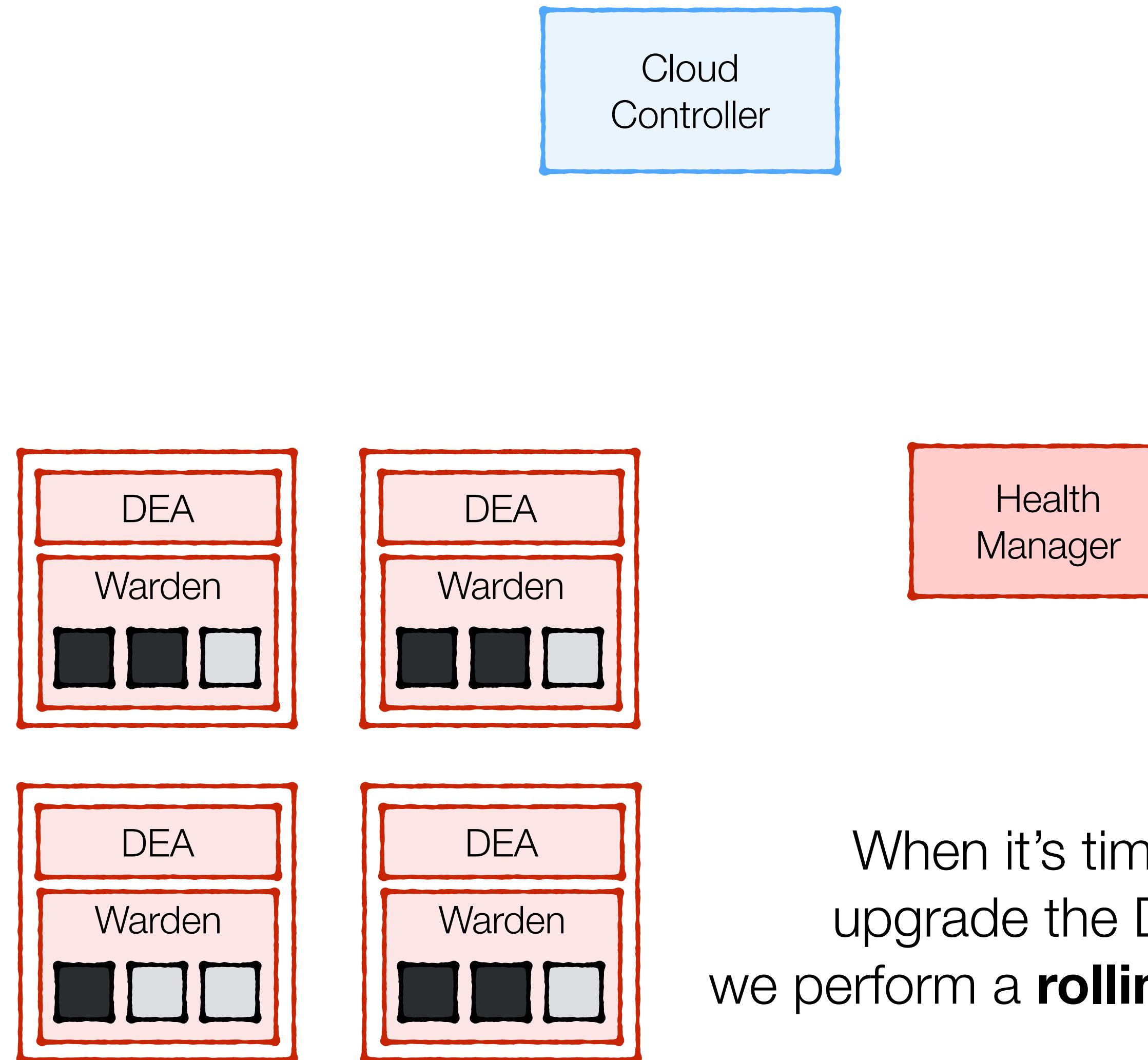
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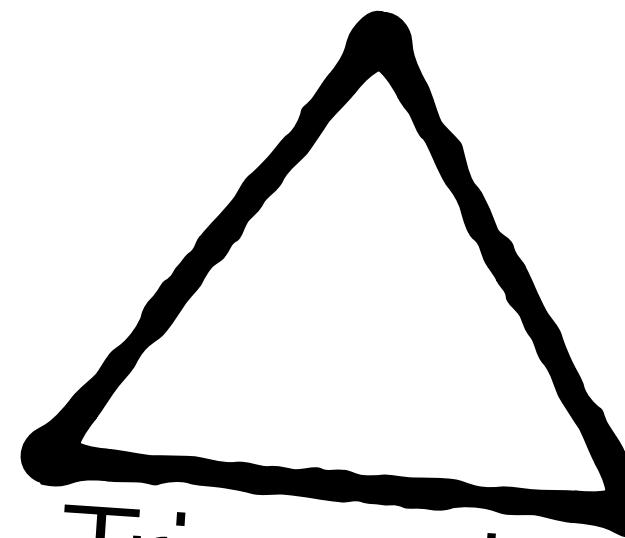
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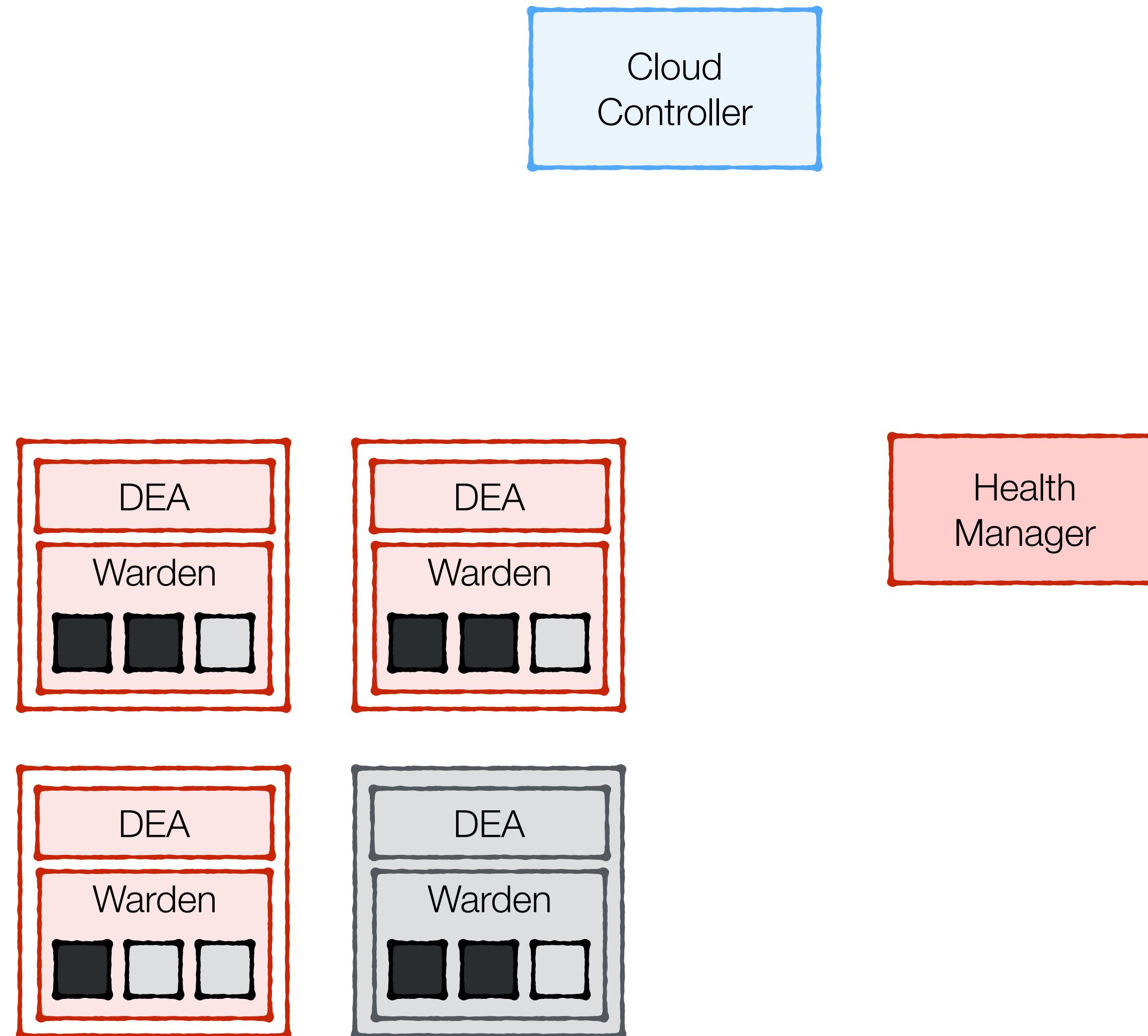
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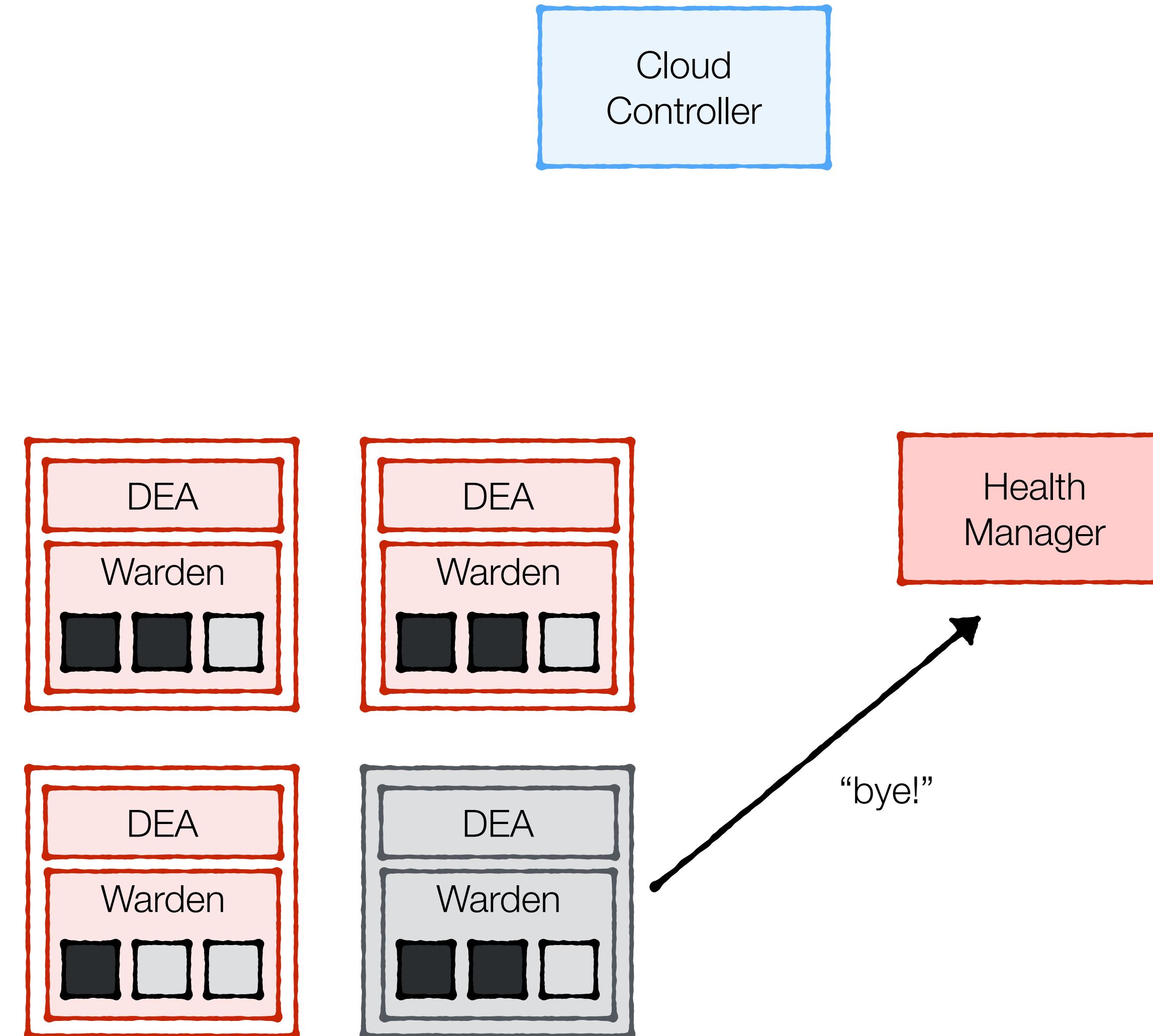
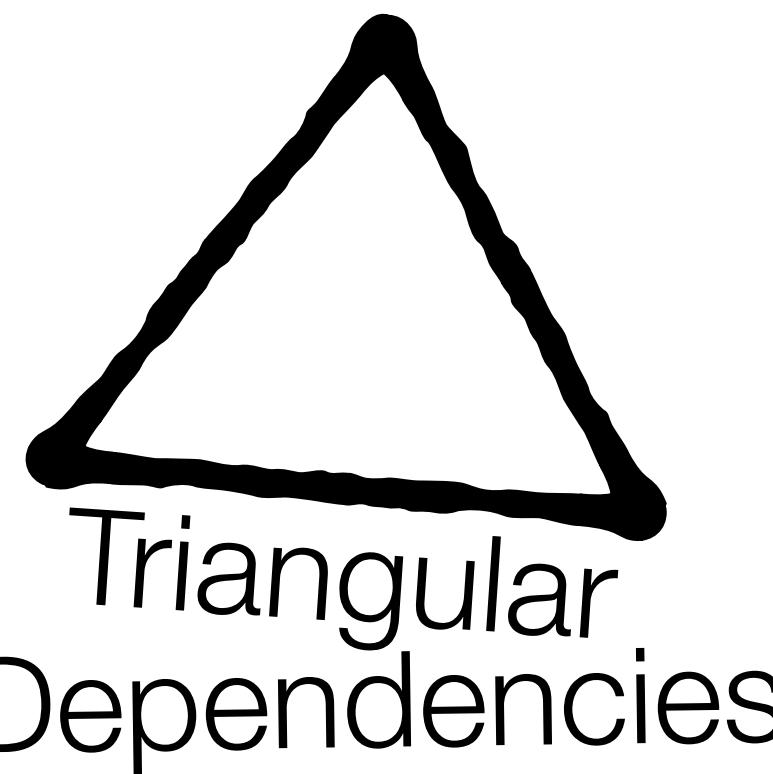
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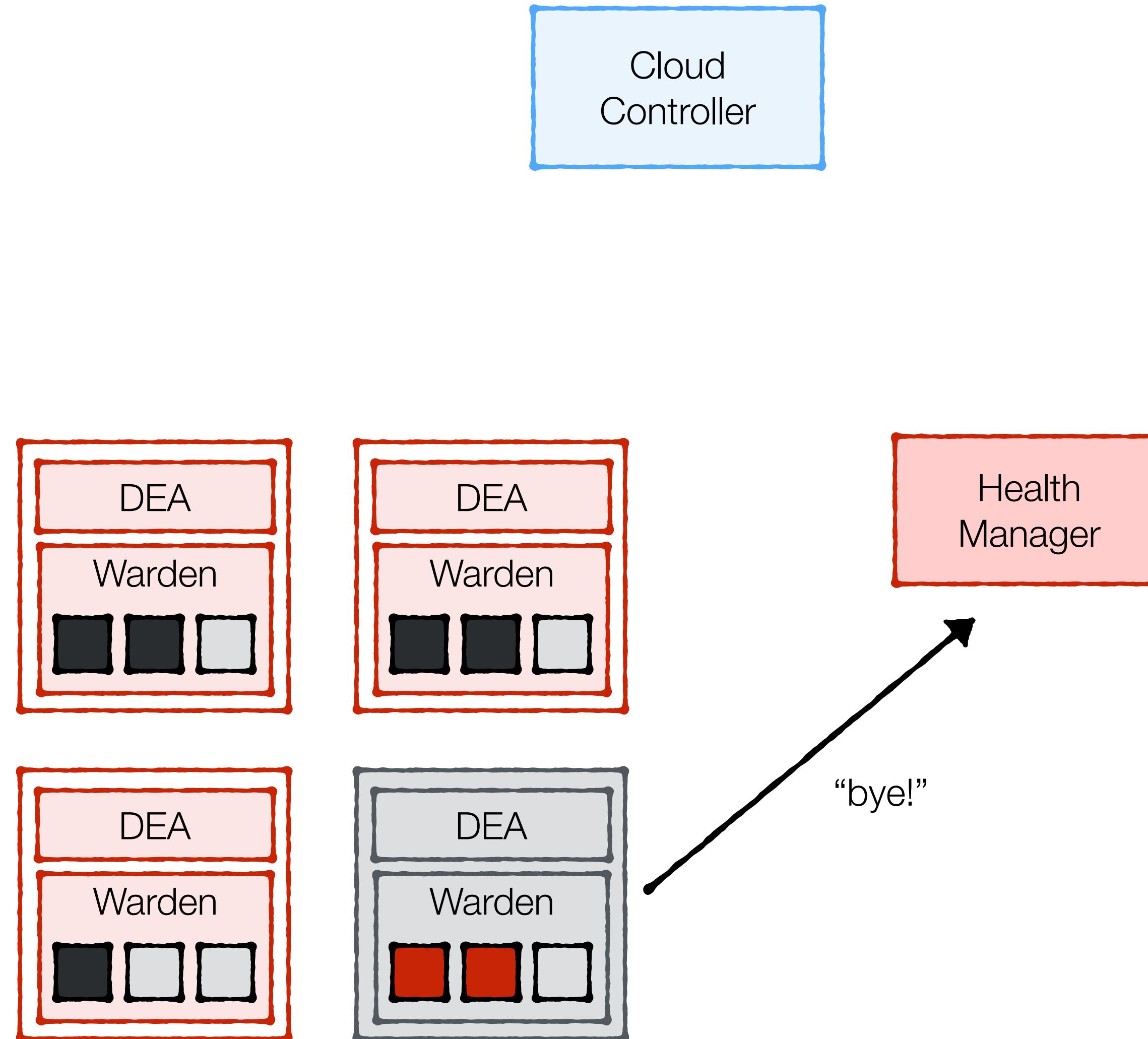
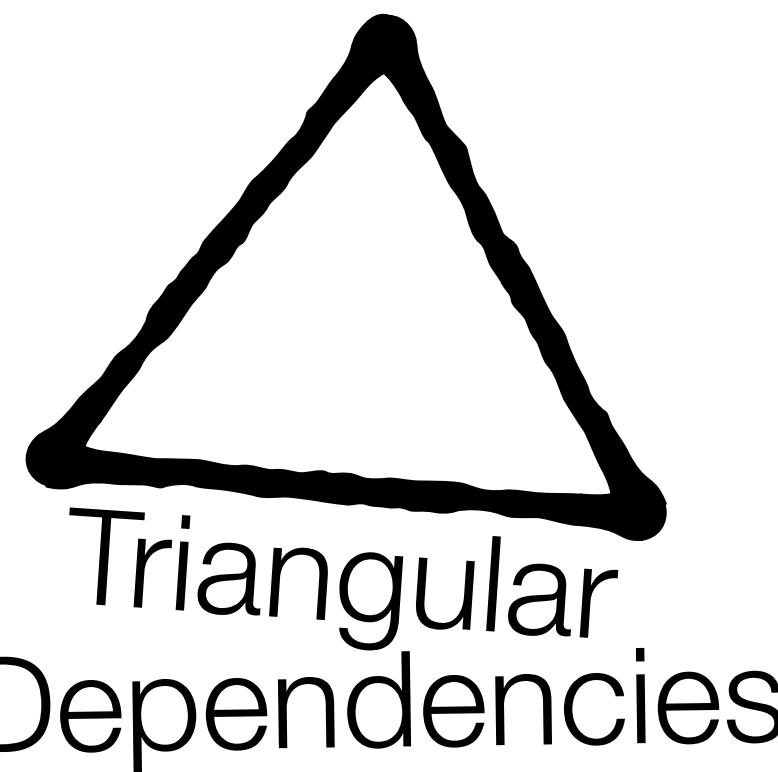
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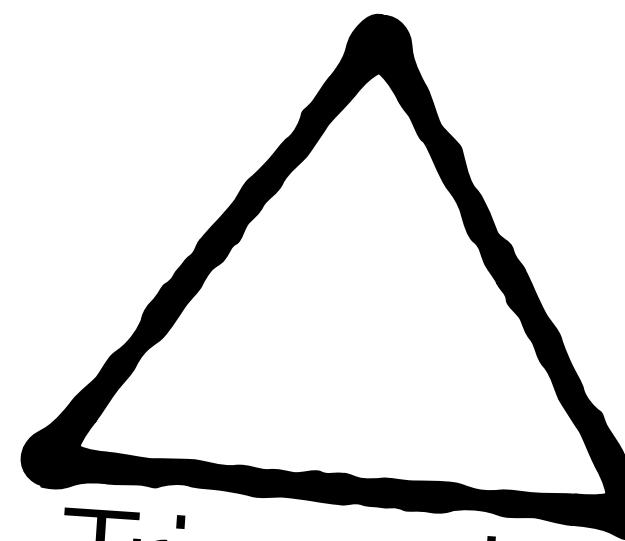
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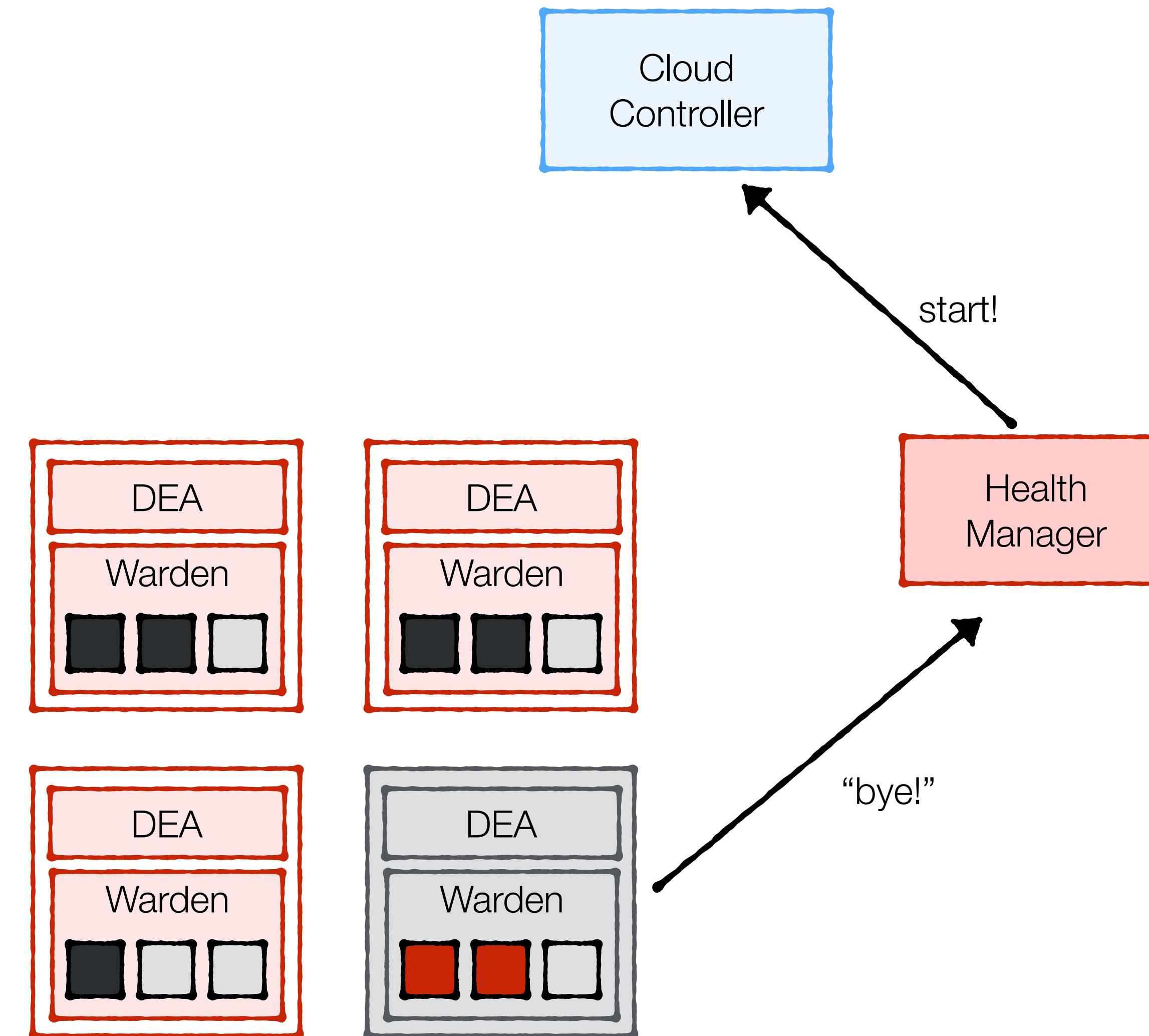
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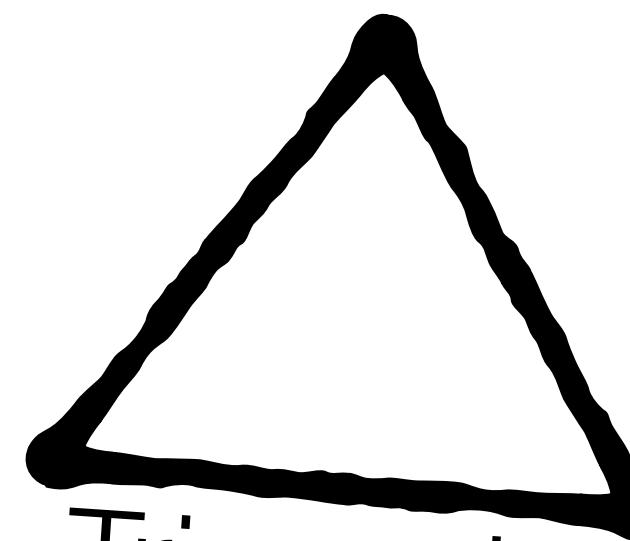
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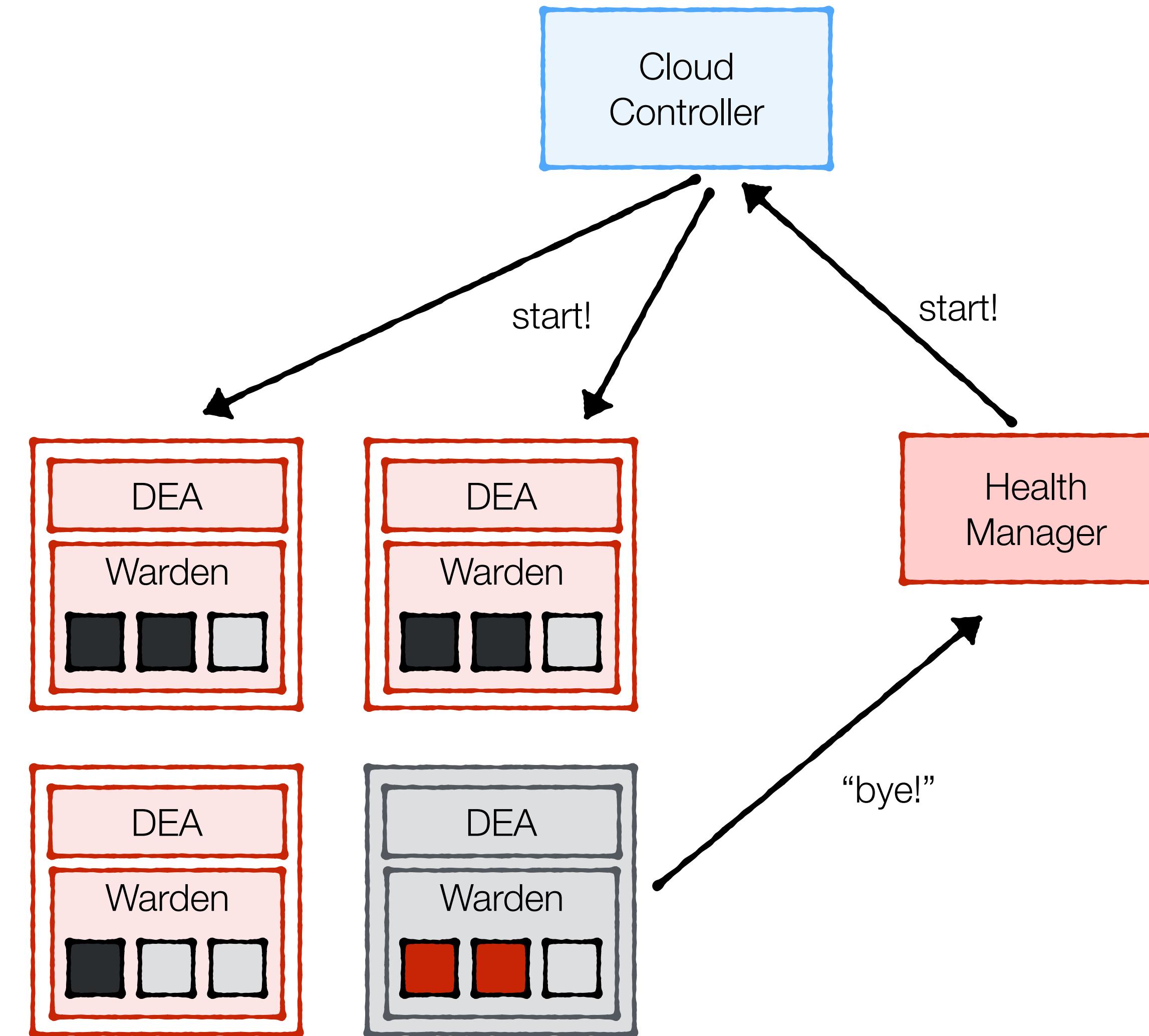
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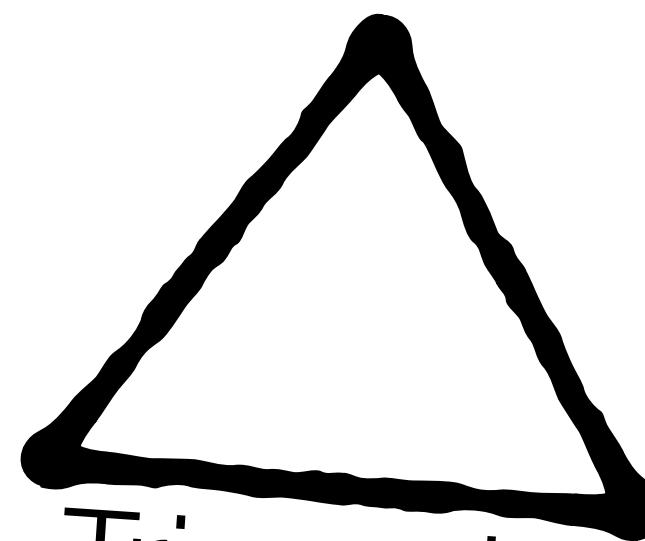
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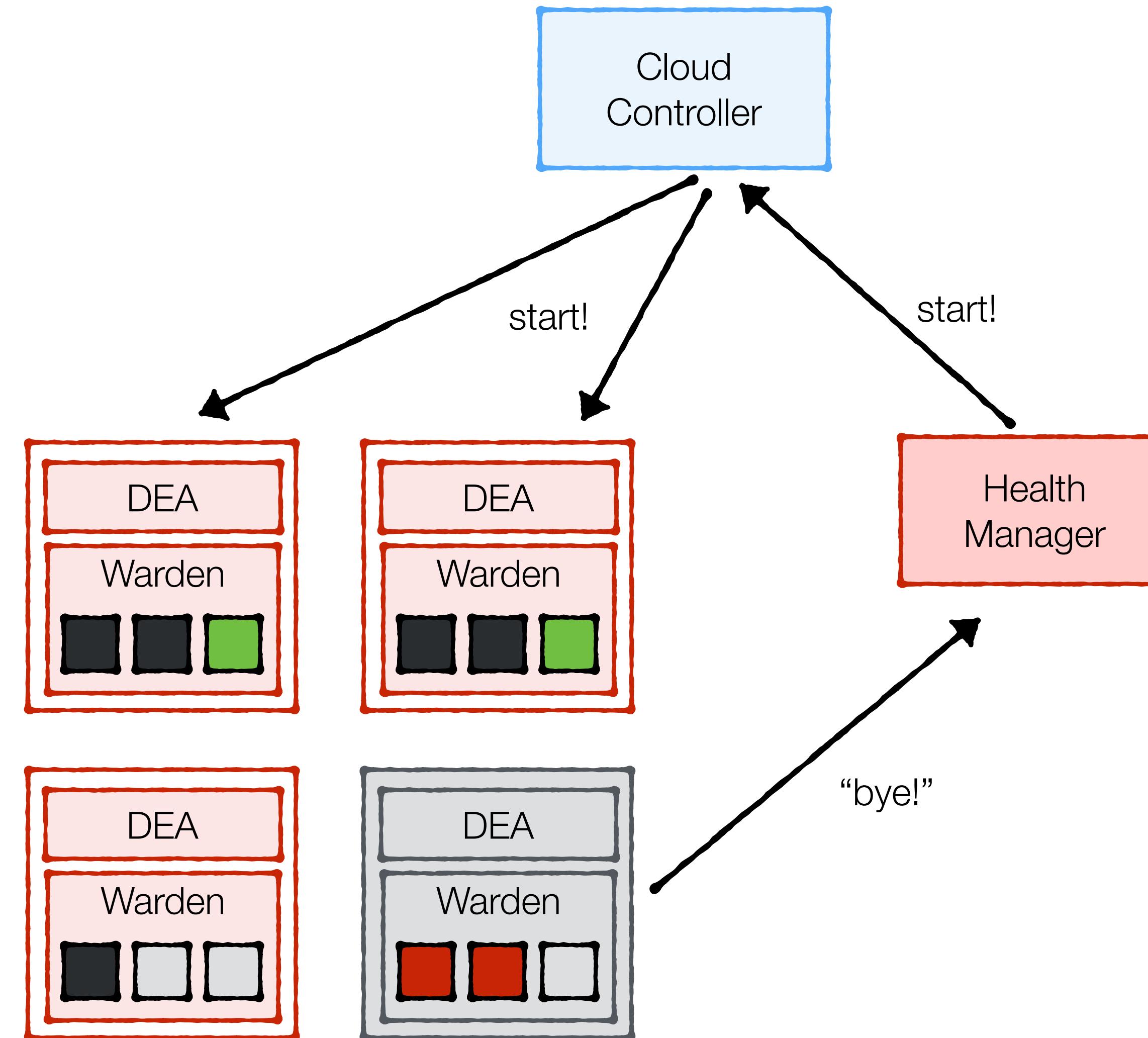
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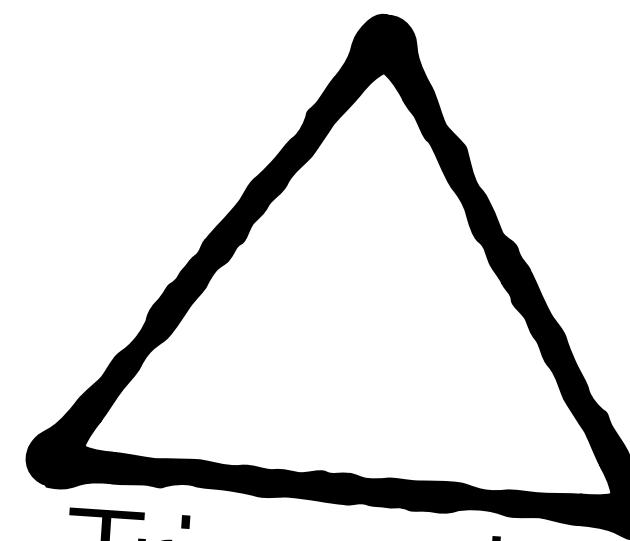
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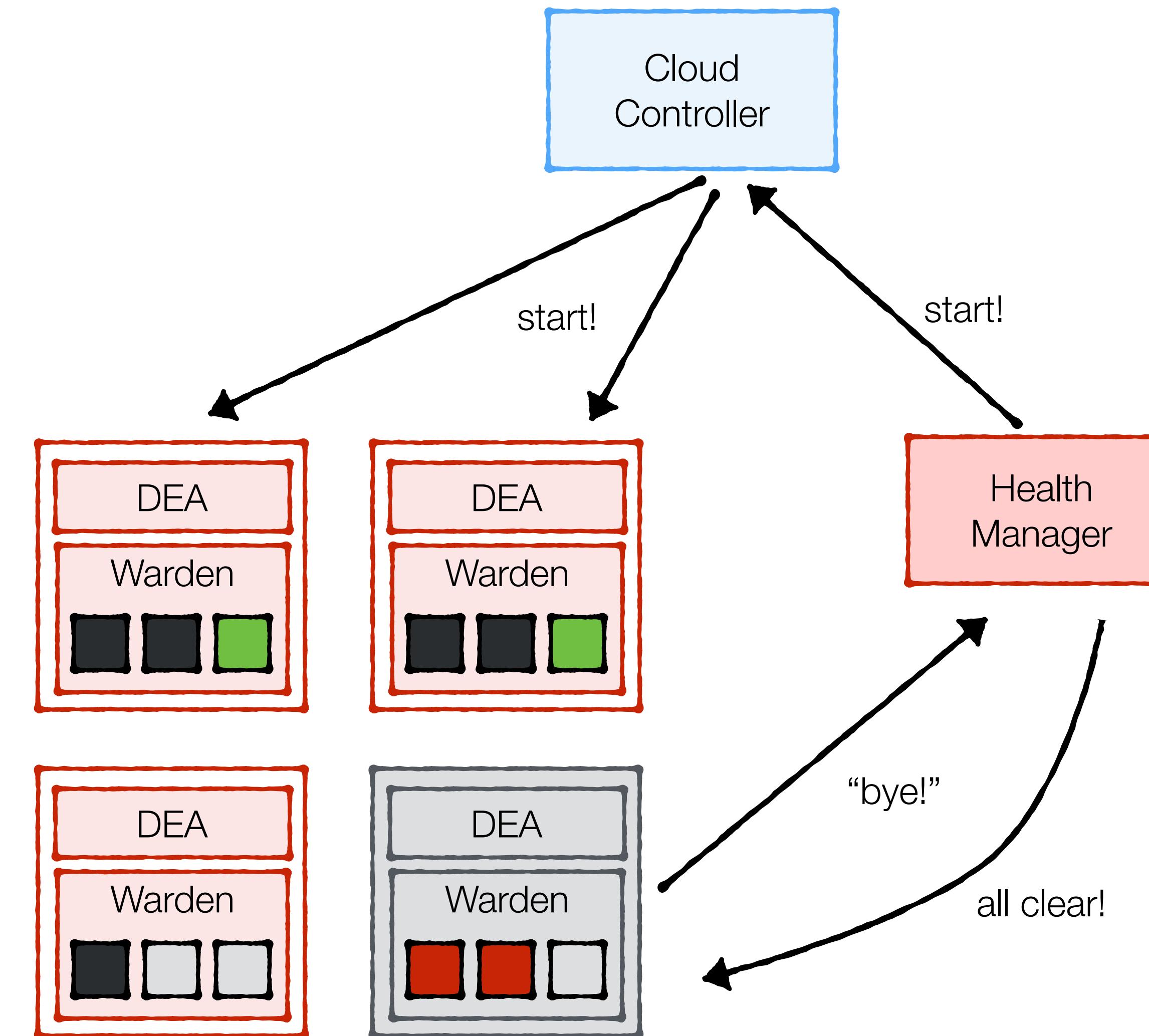
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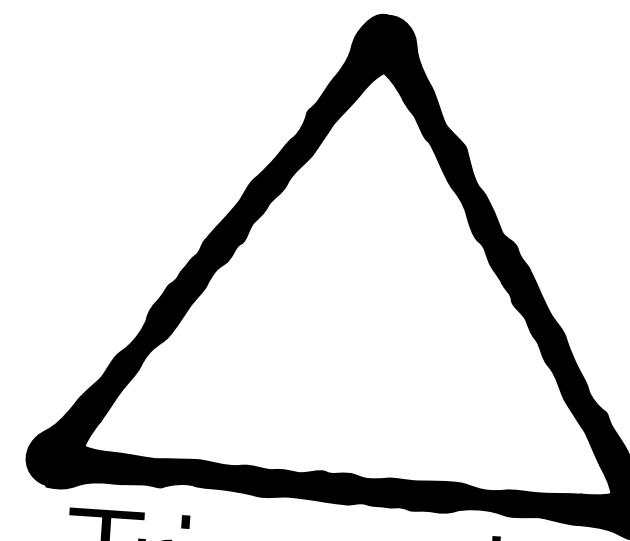
Triangular
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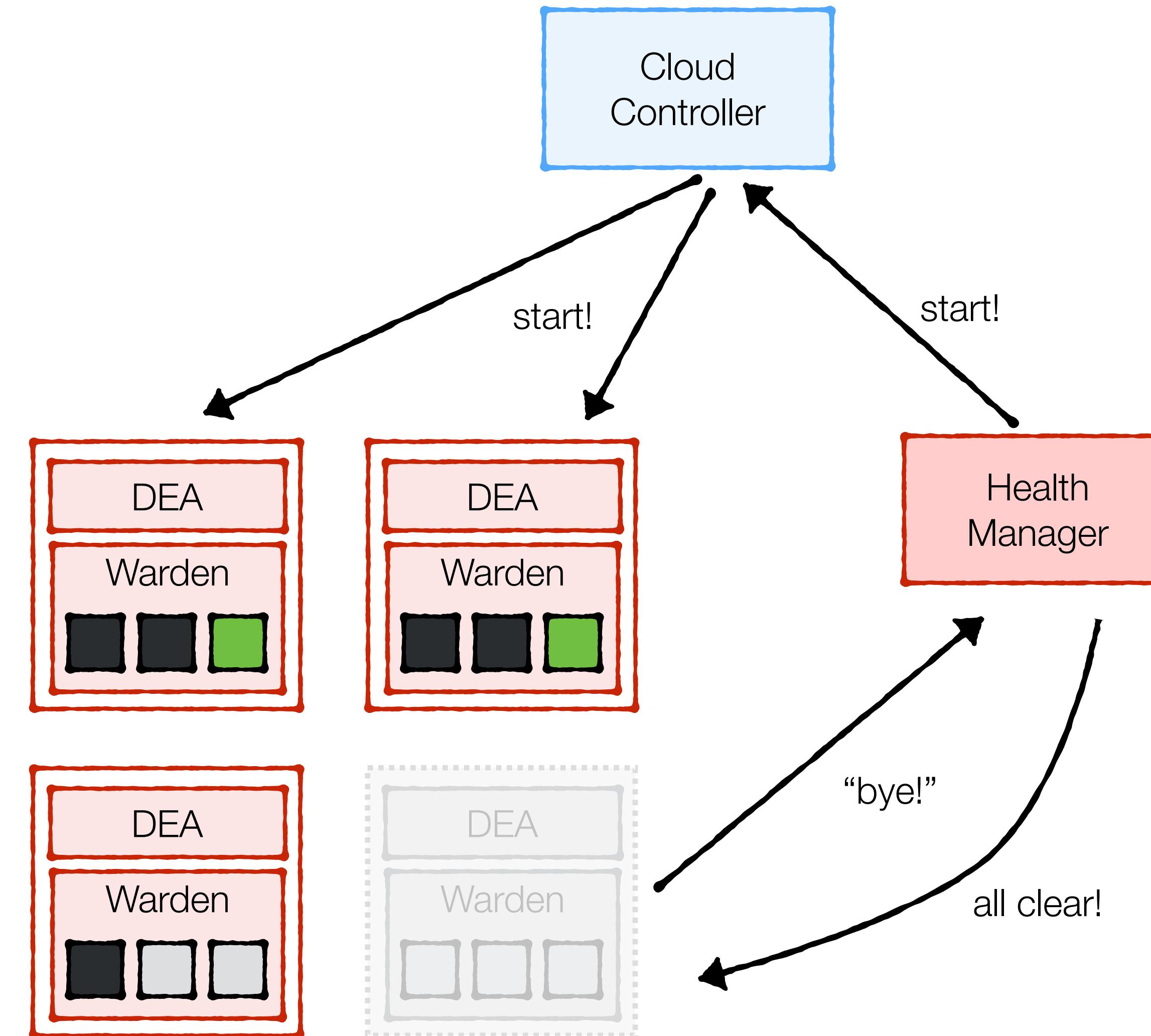
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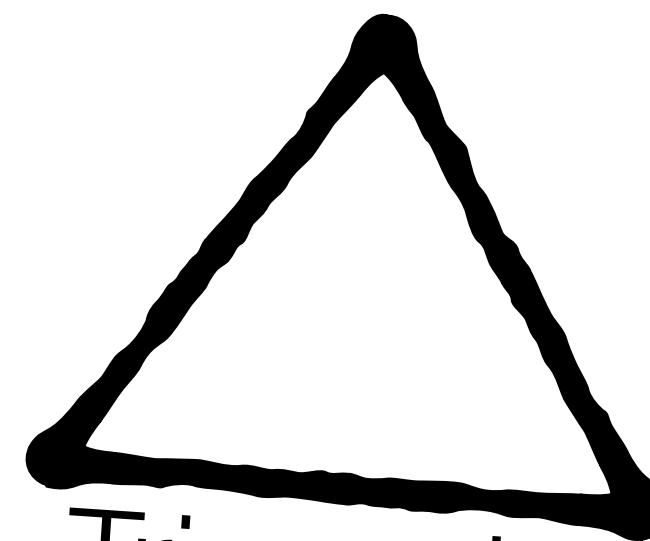
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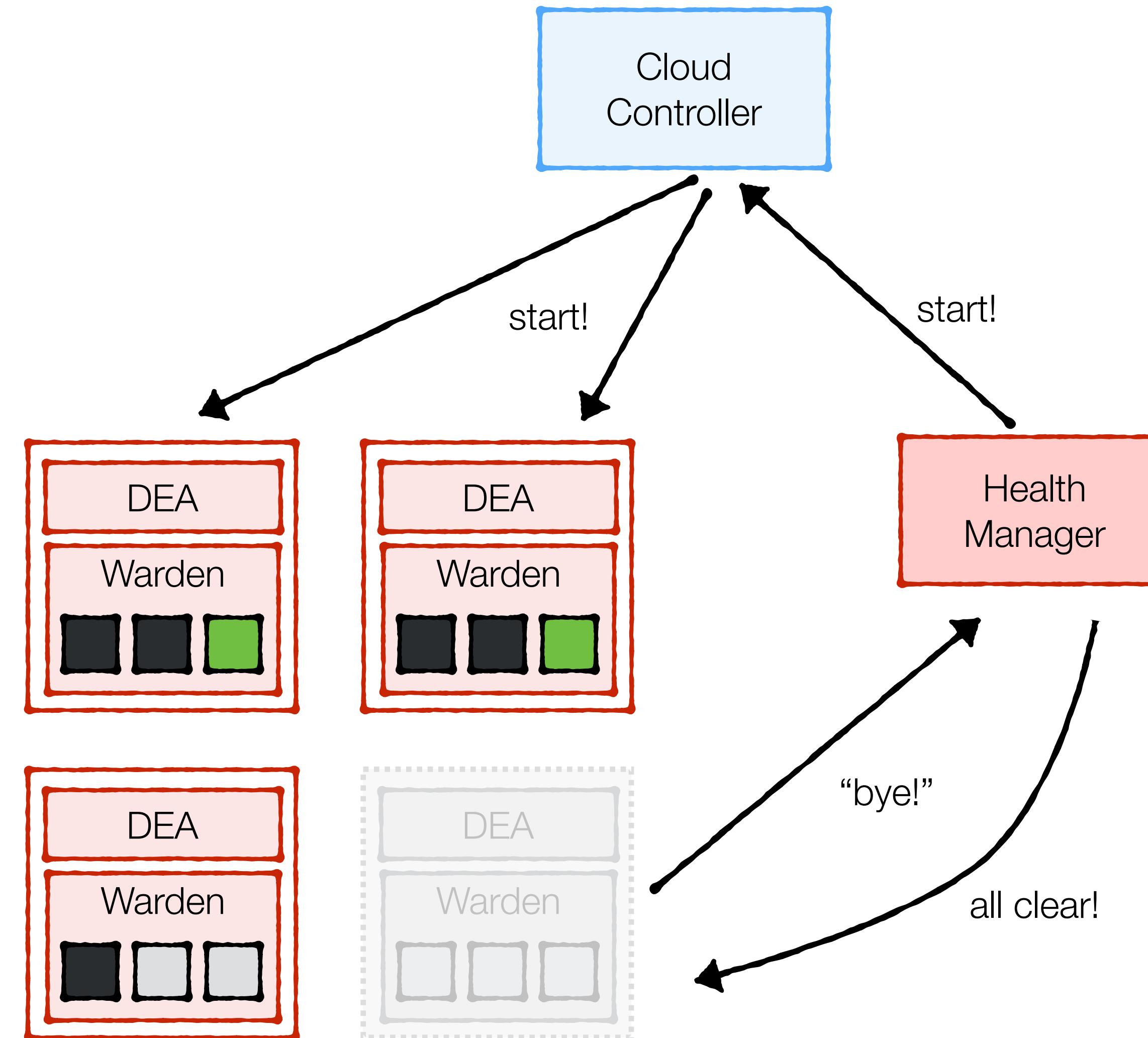
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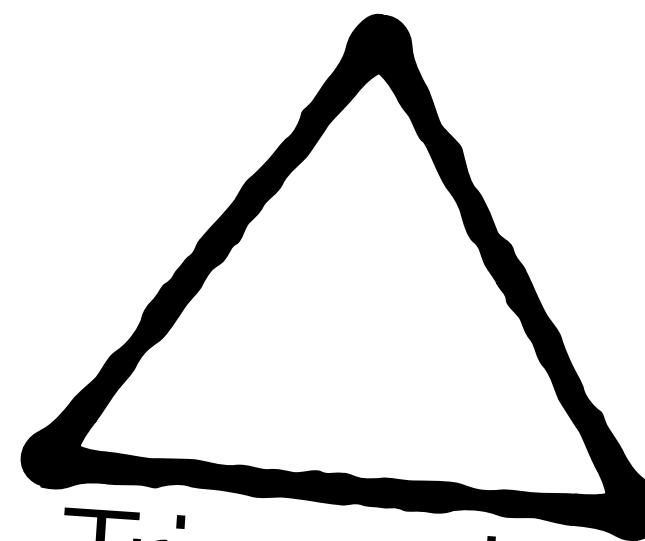
Problematic



Why rewrite?

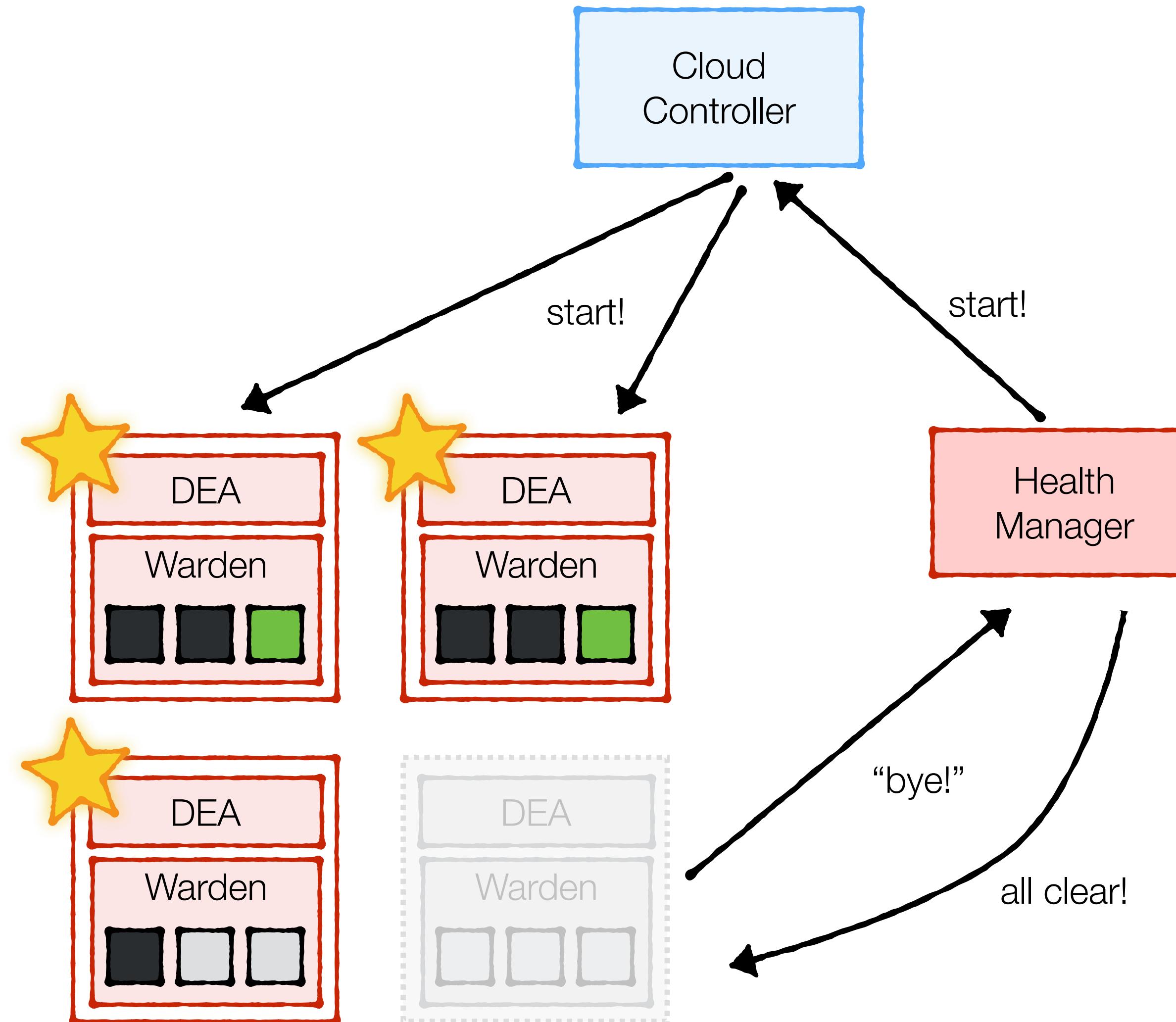
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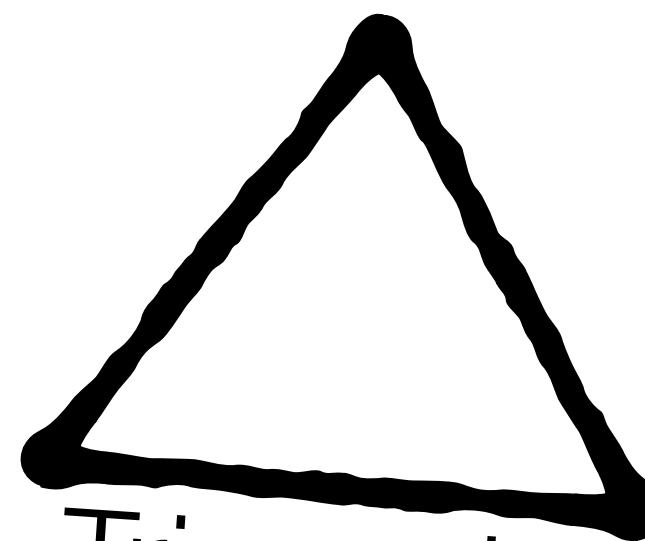
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Why rewrite?

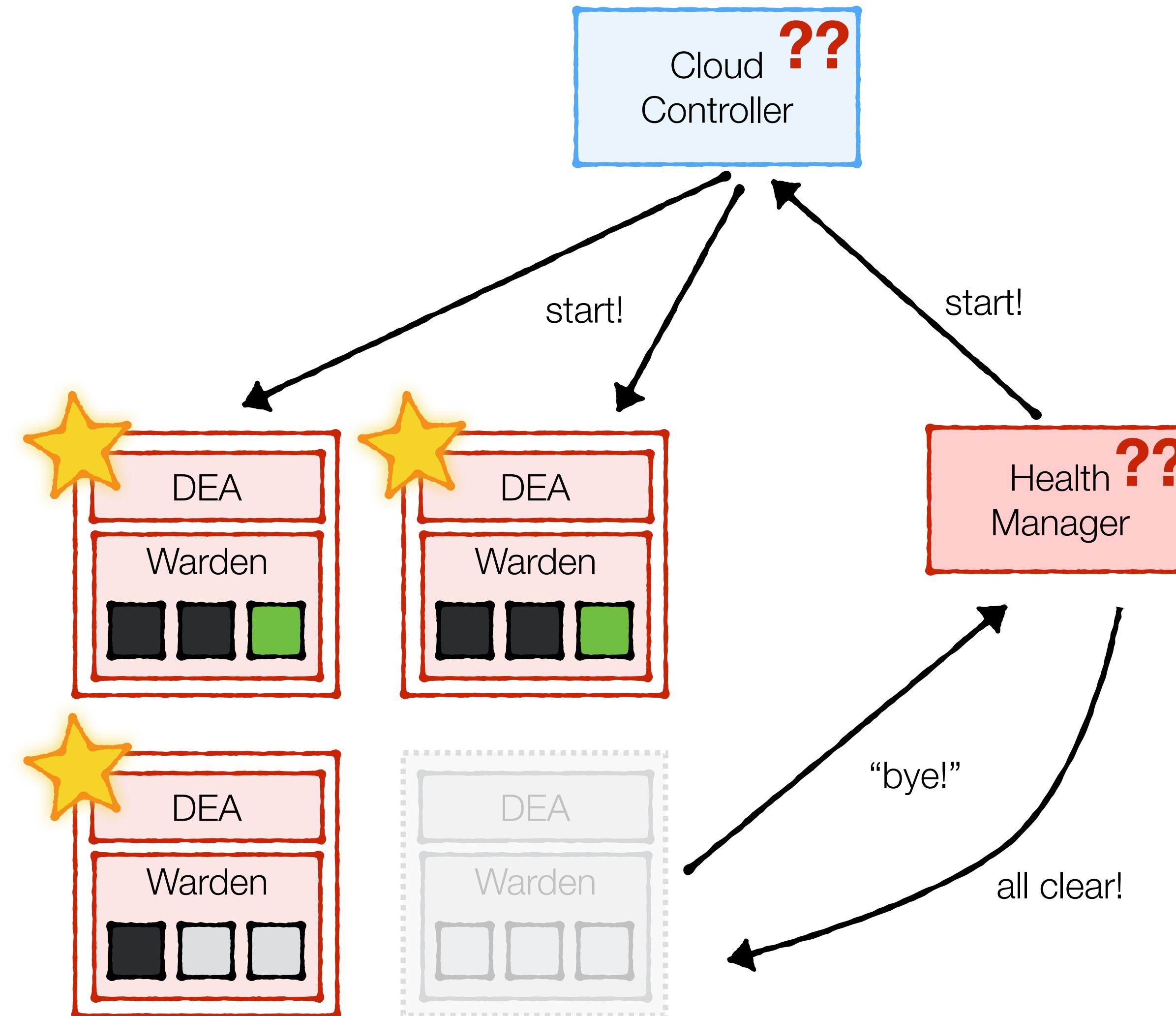
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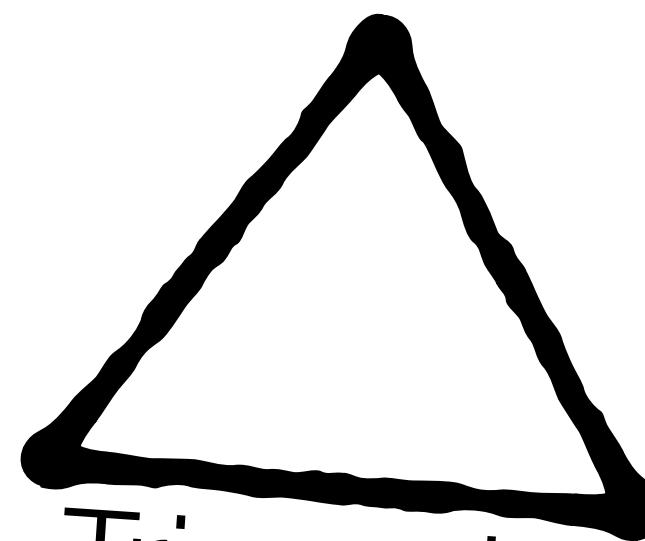
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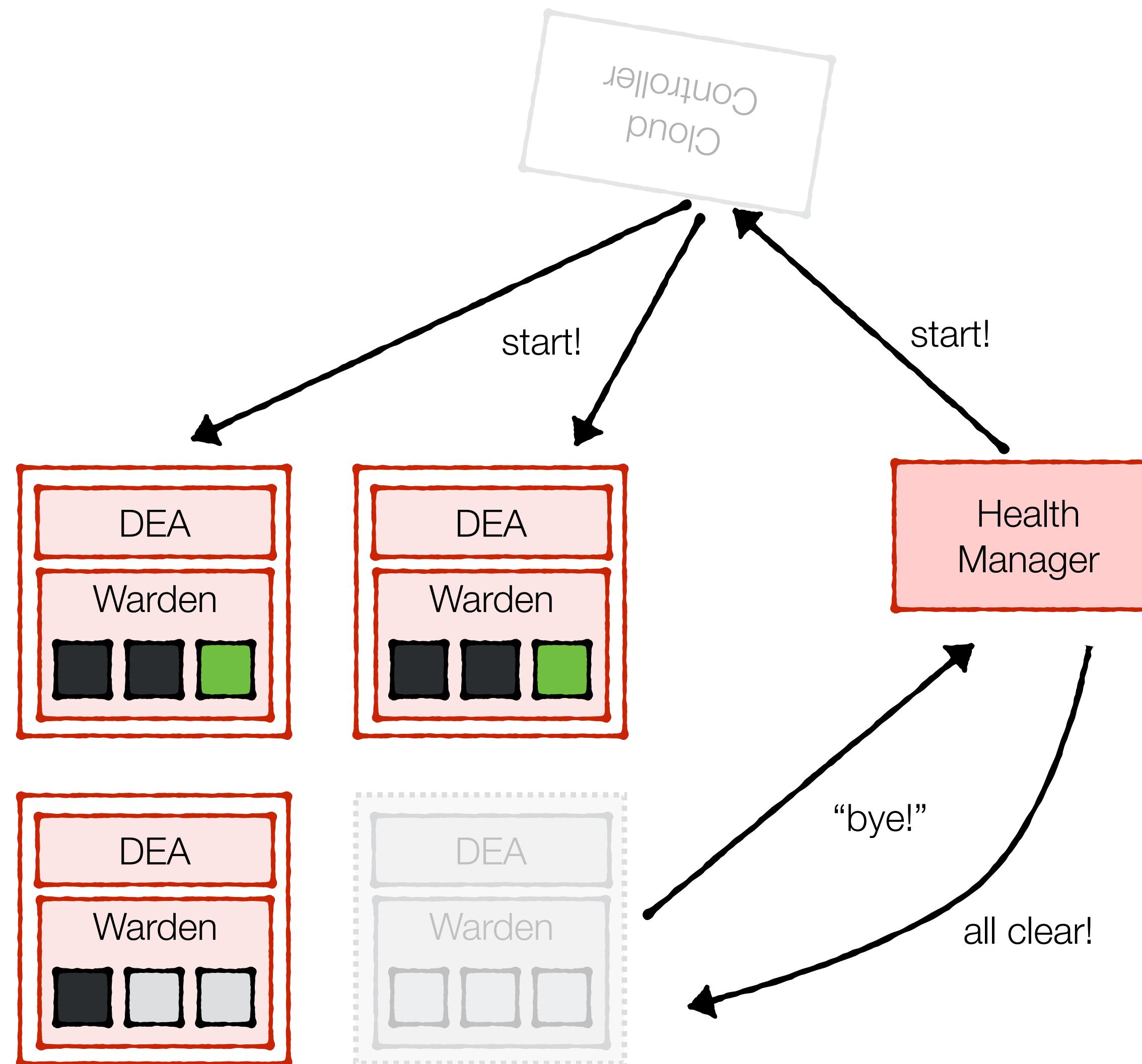
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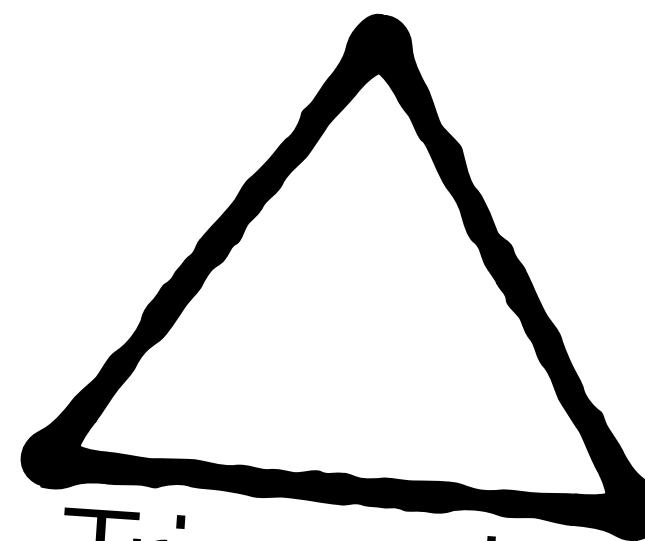
Problematic



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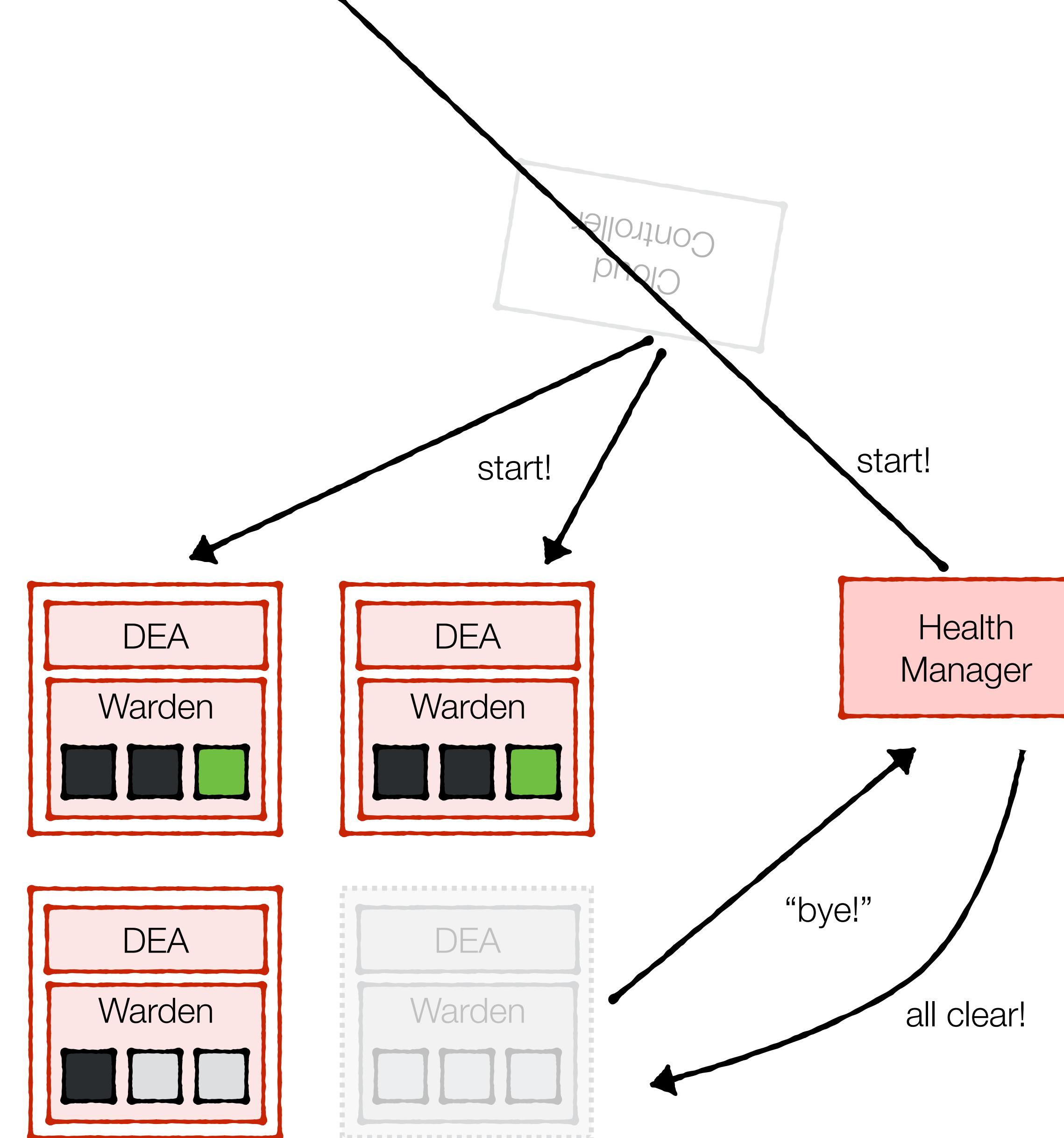
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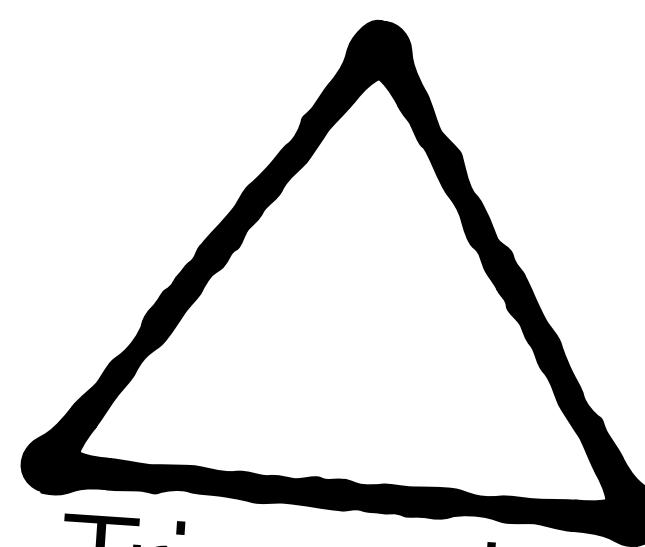
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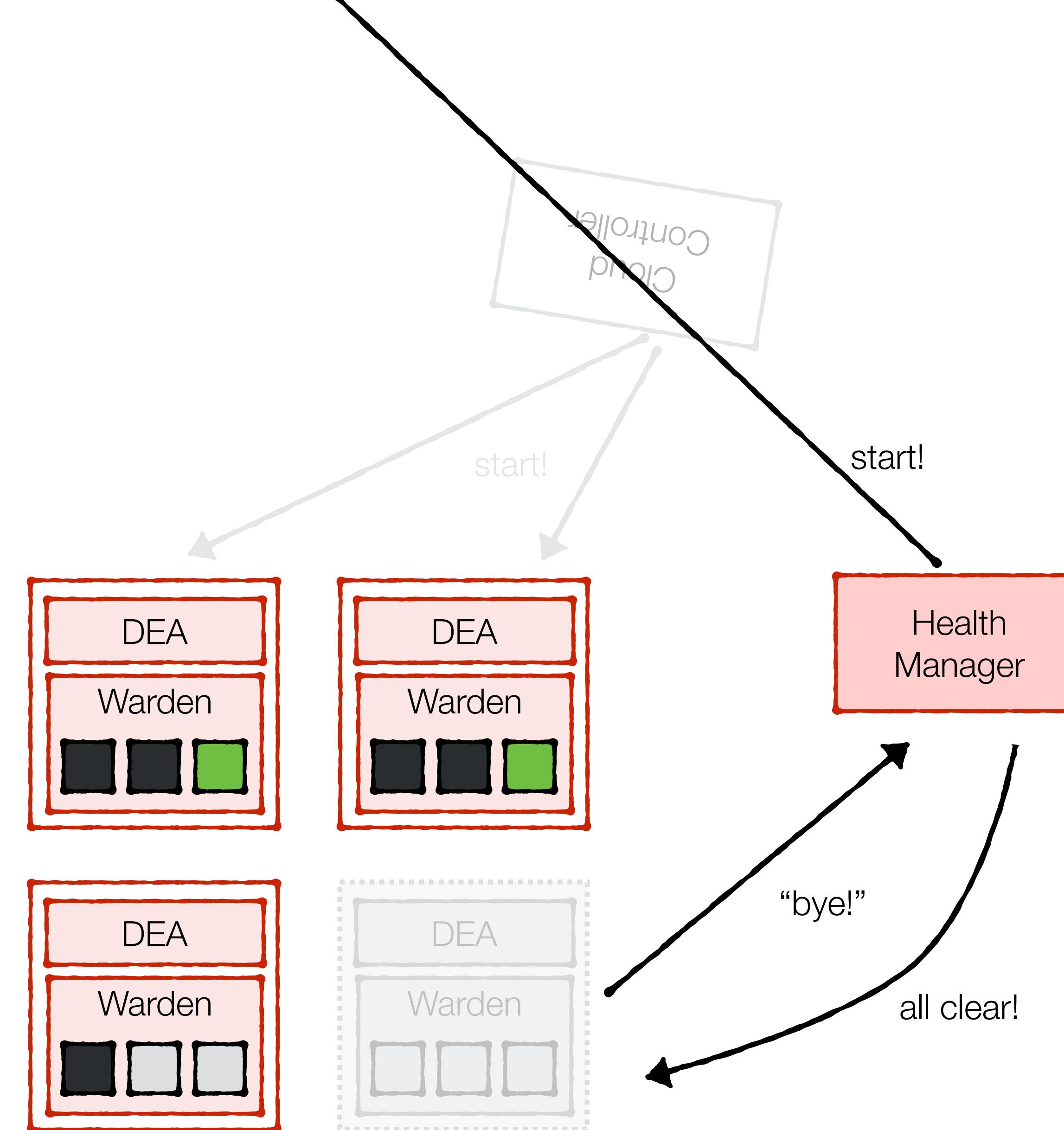
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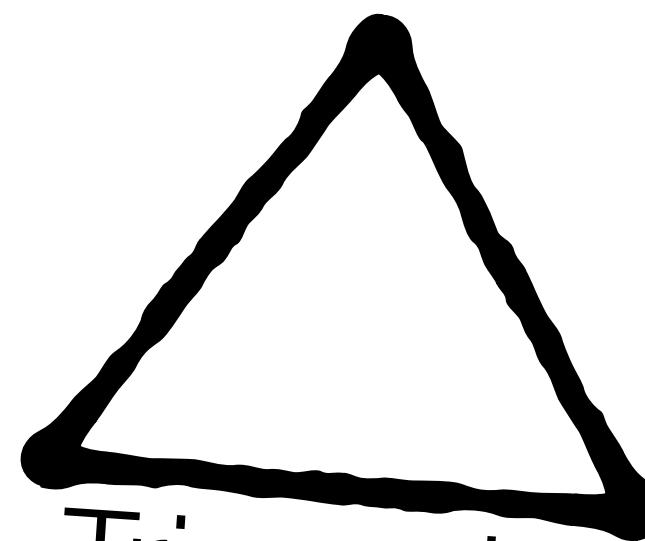
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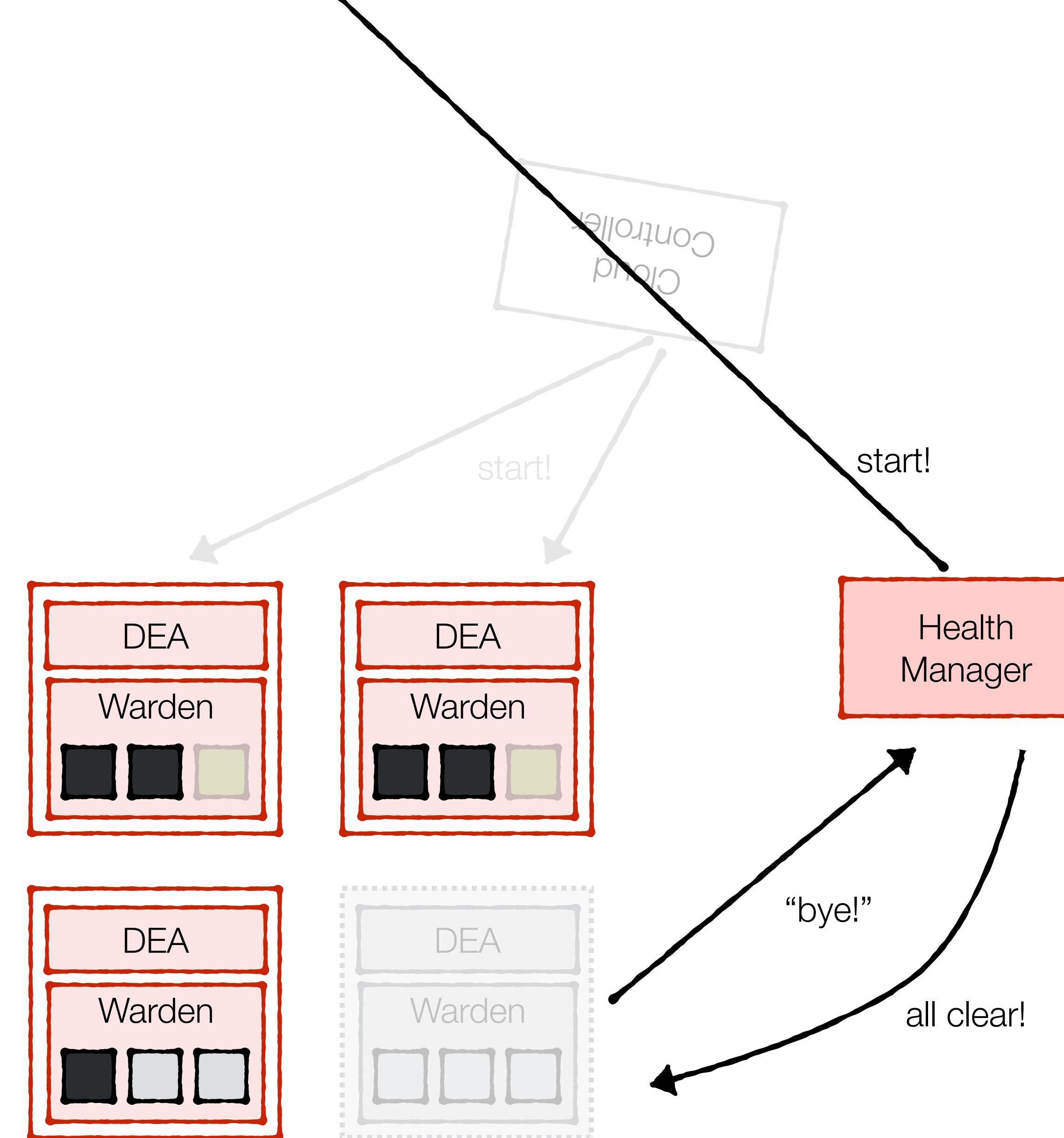
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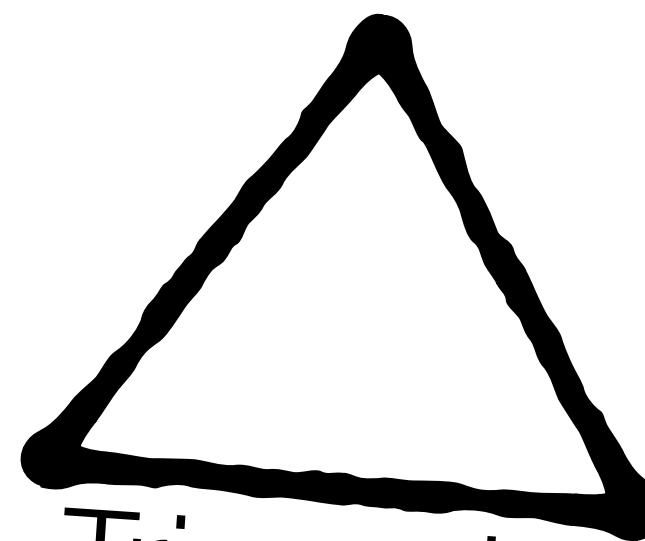
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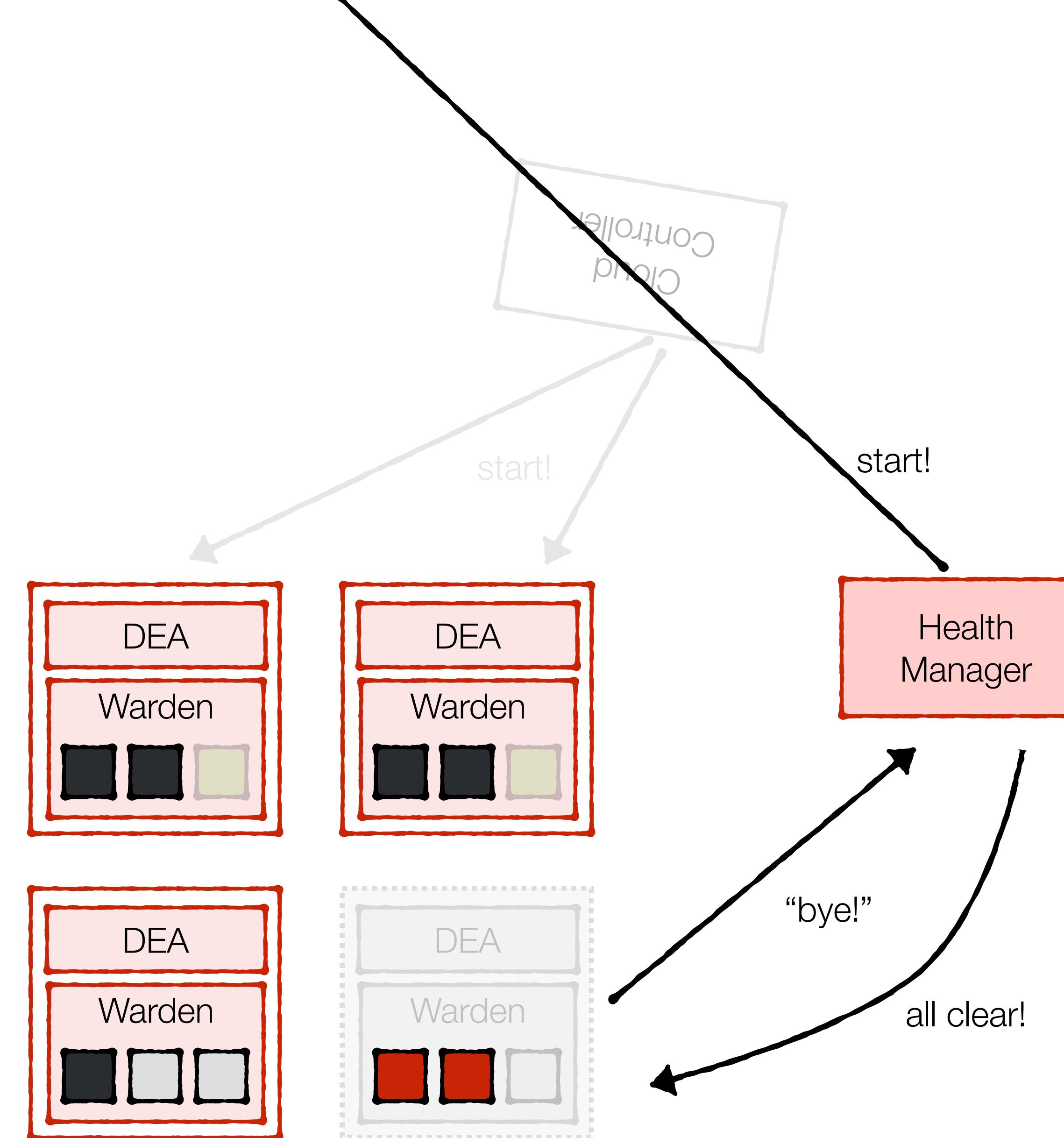
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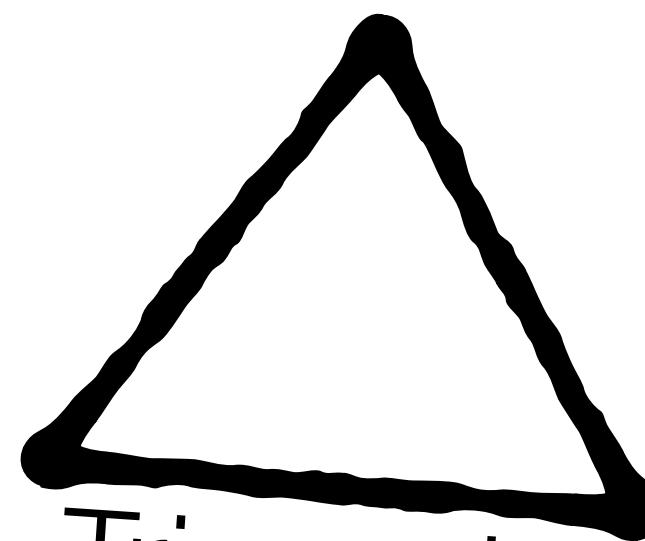
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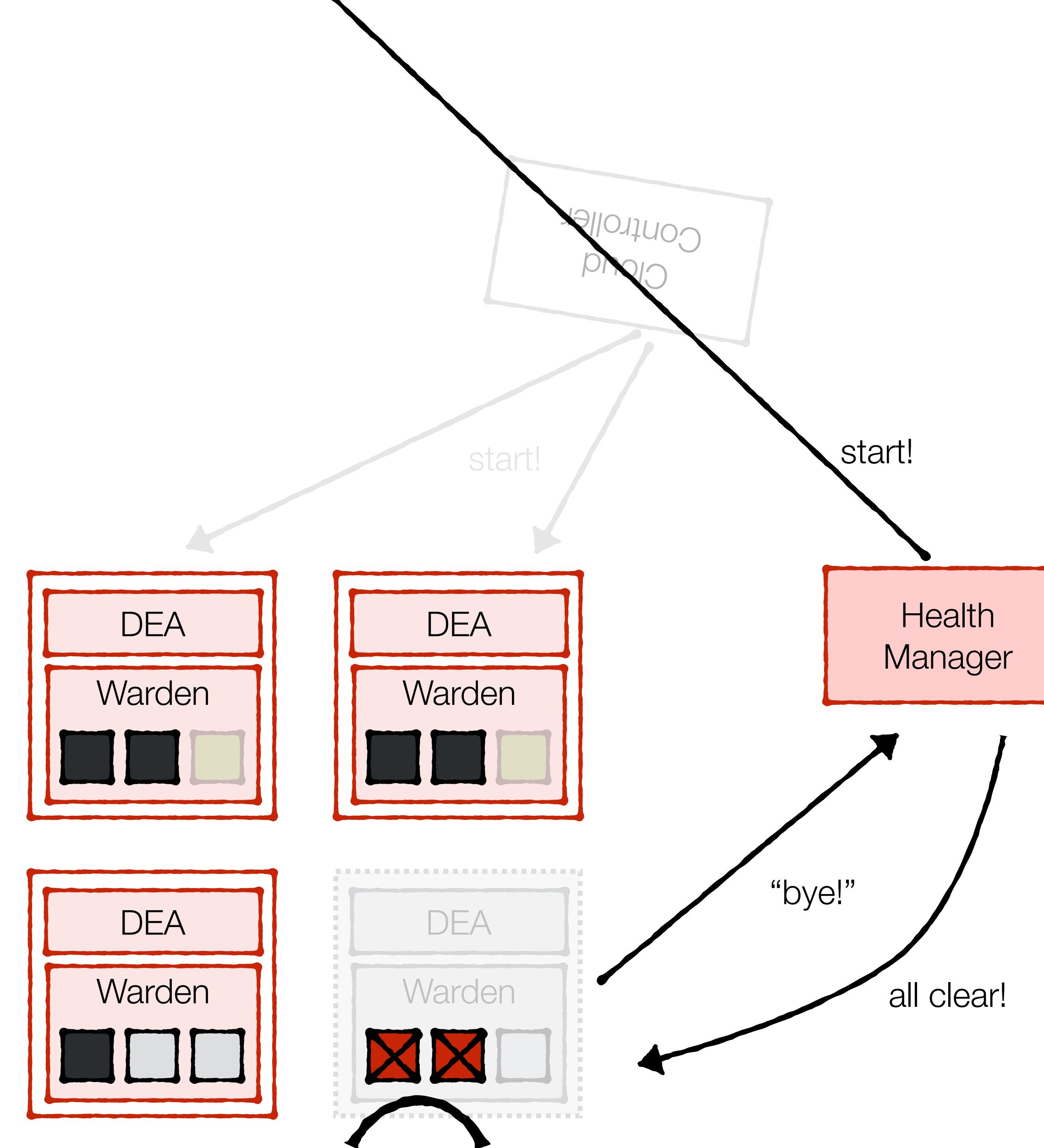
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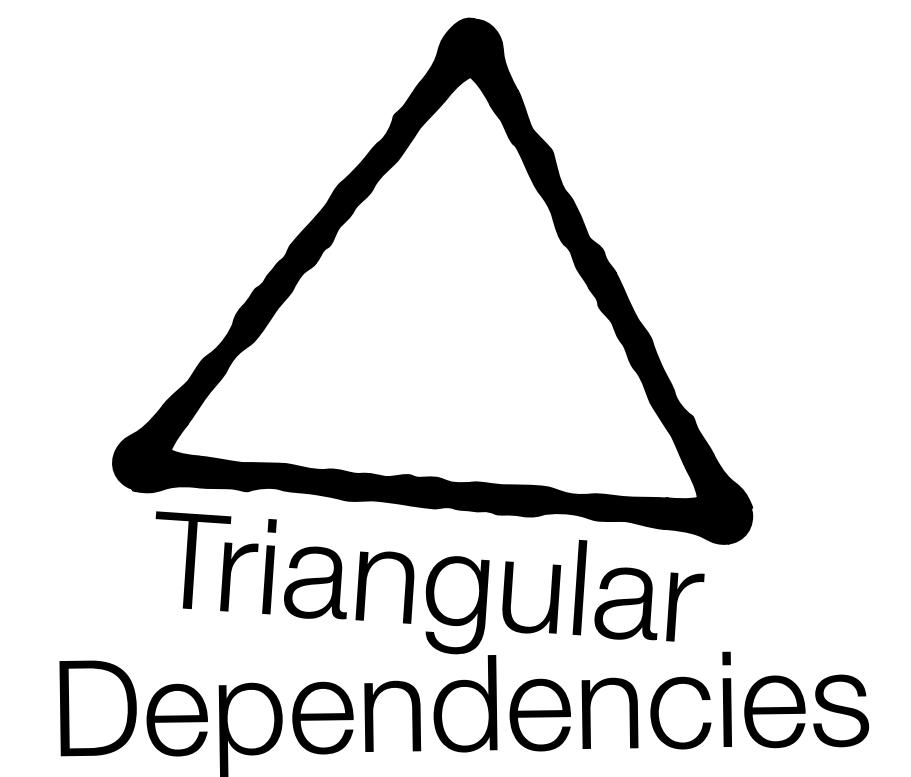
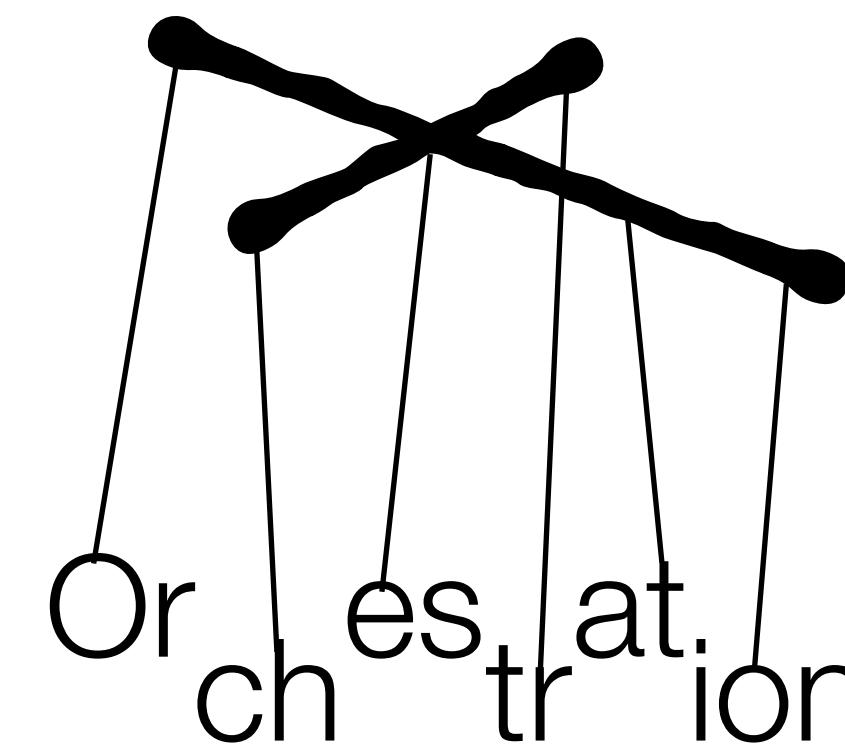
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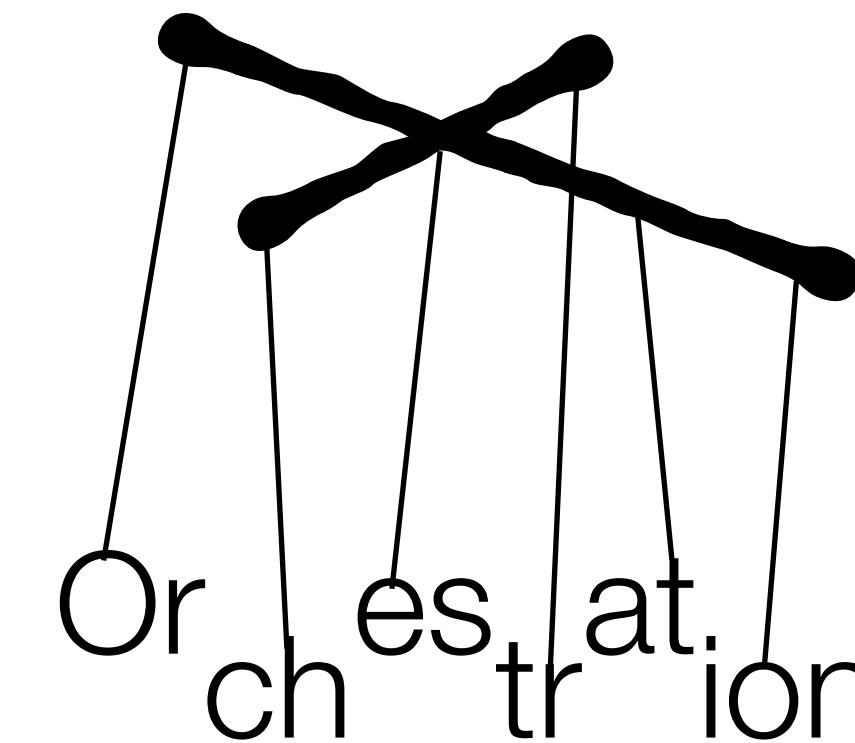
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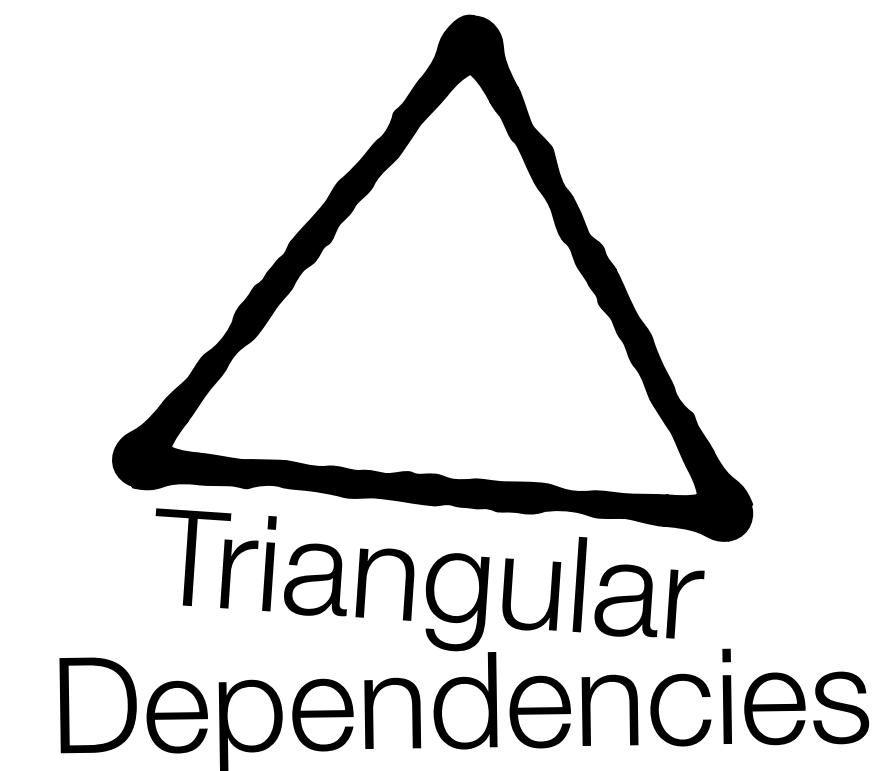
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Why rewrite?

Tight Coupling



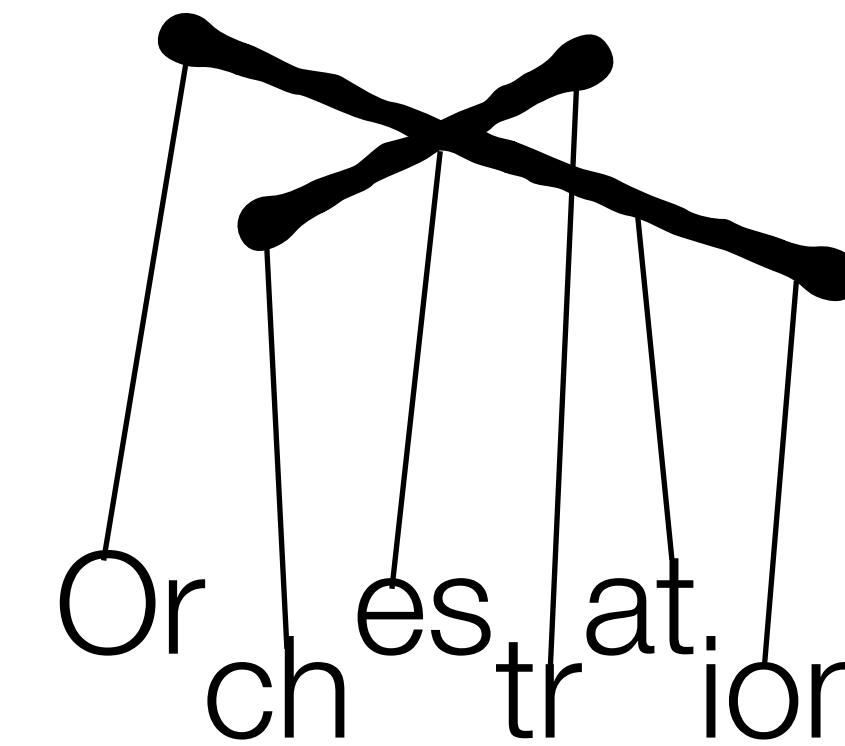
Poor separation
of concerns



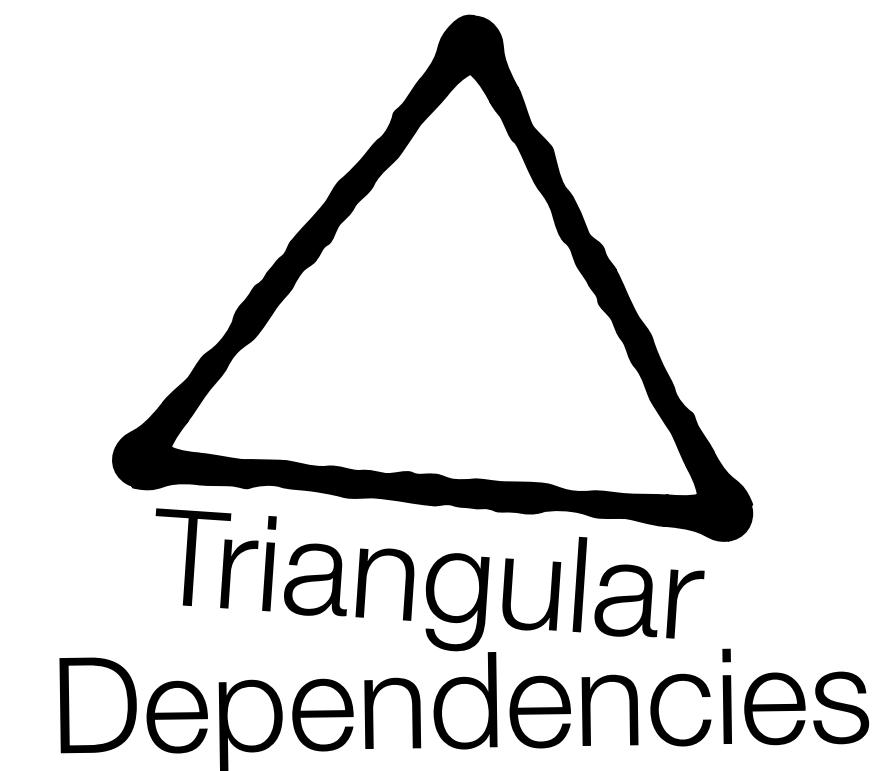
complex interactions

Why rewrite?

Tight Coupling



Poor separation
of concerns

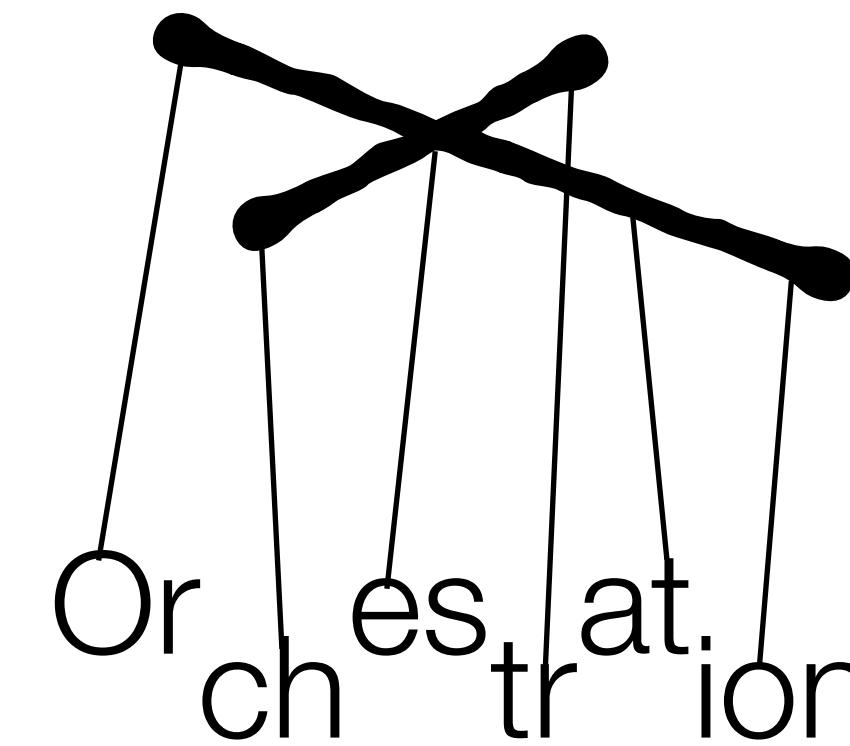


complex interactions

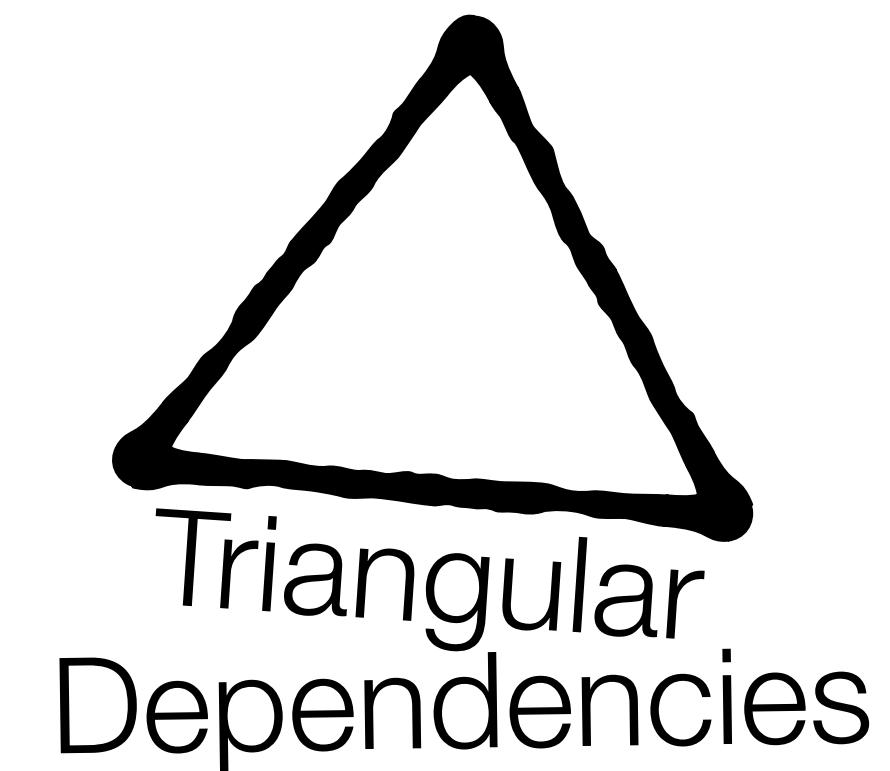
hard to test

Why rewrite?

Tight Coupling



Poor separation
of concerns



complex interactions

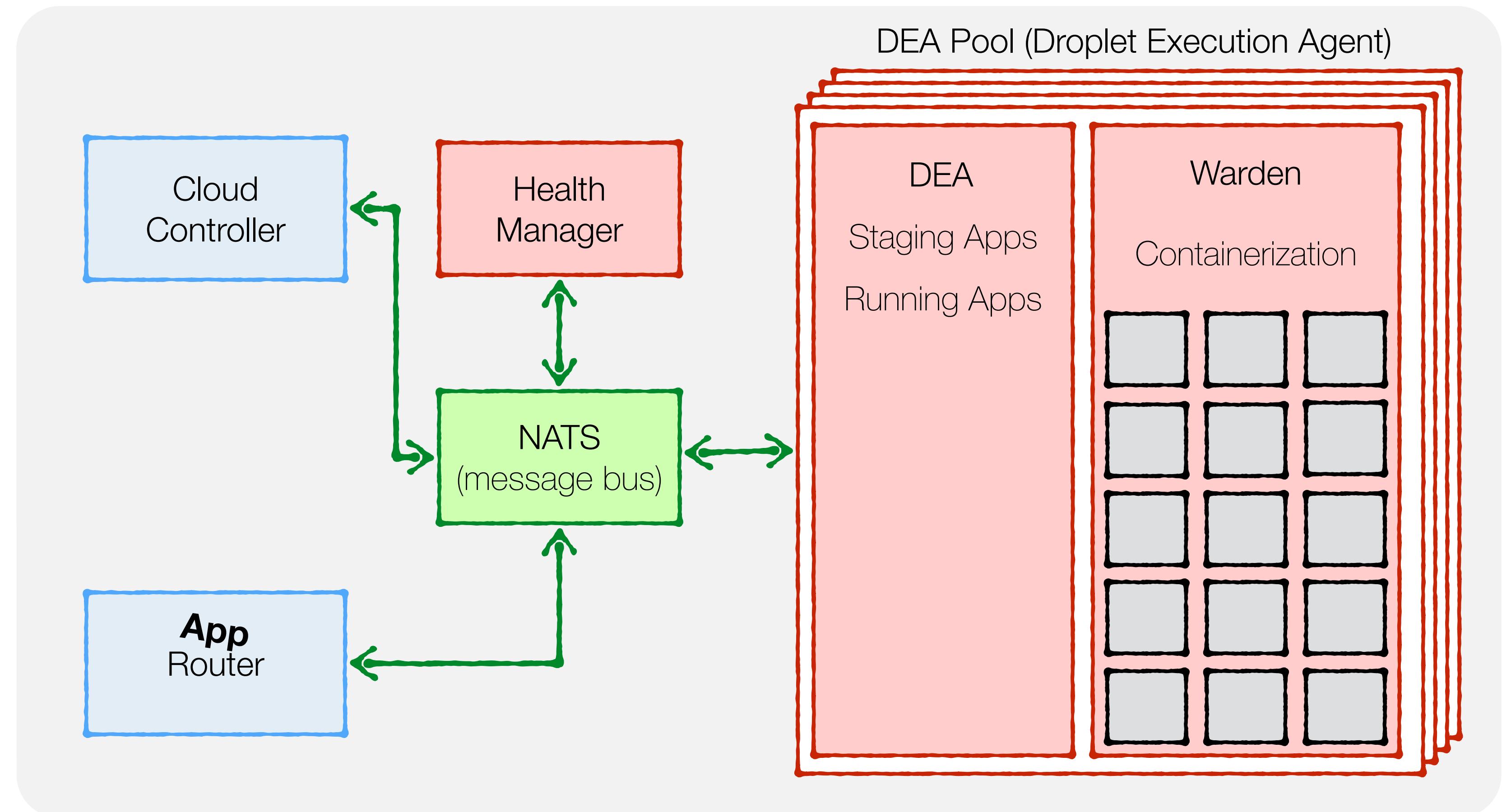
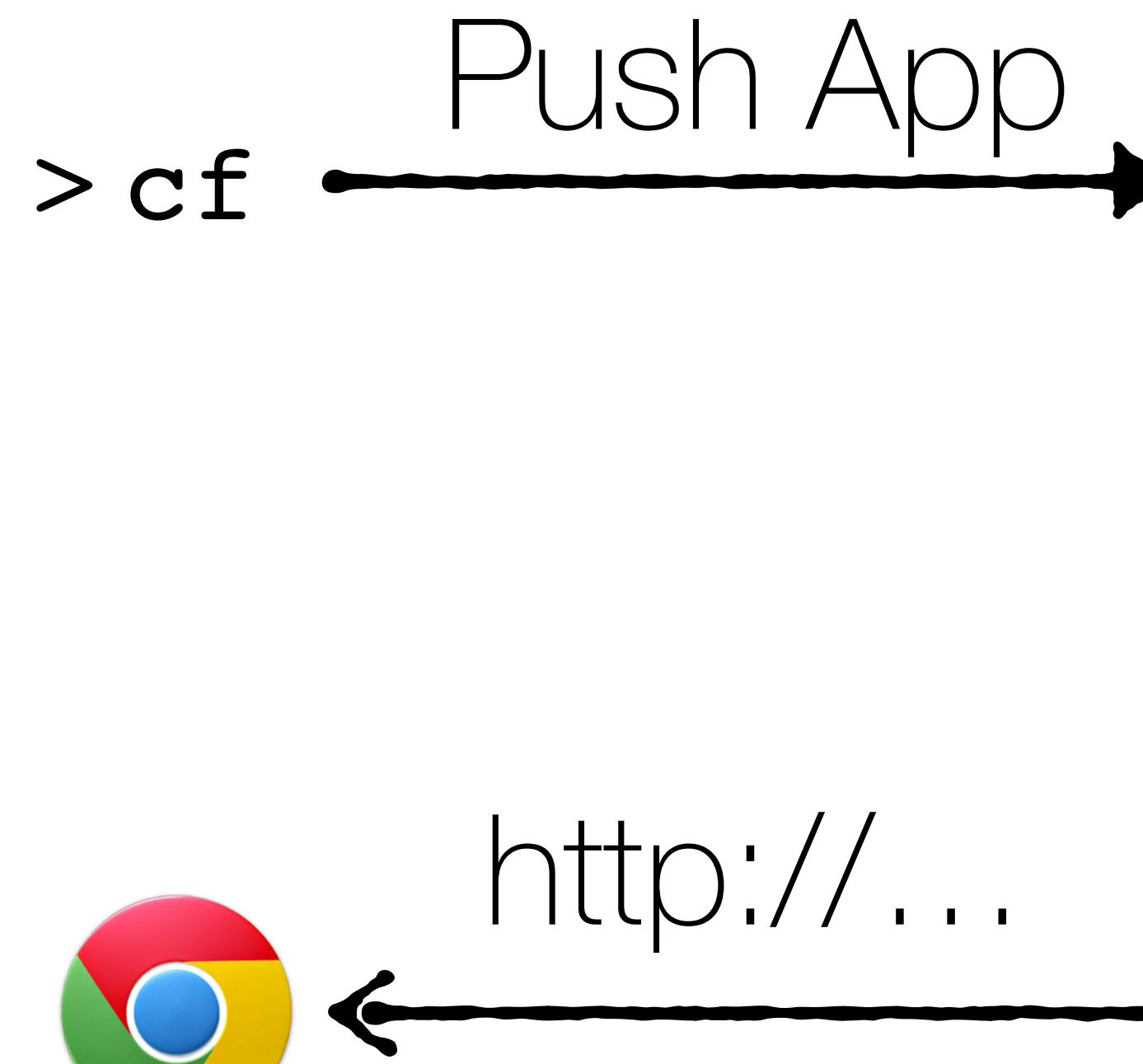
hard to test

hard to reason through

Why rewrite?

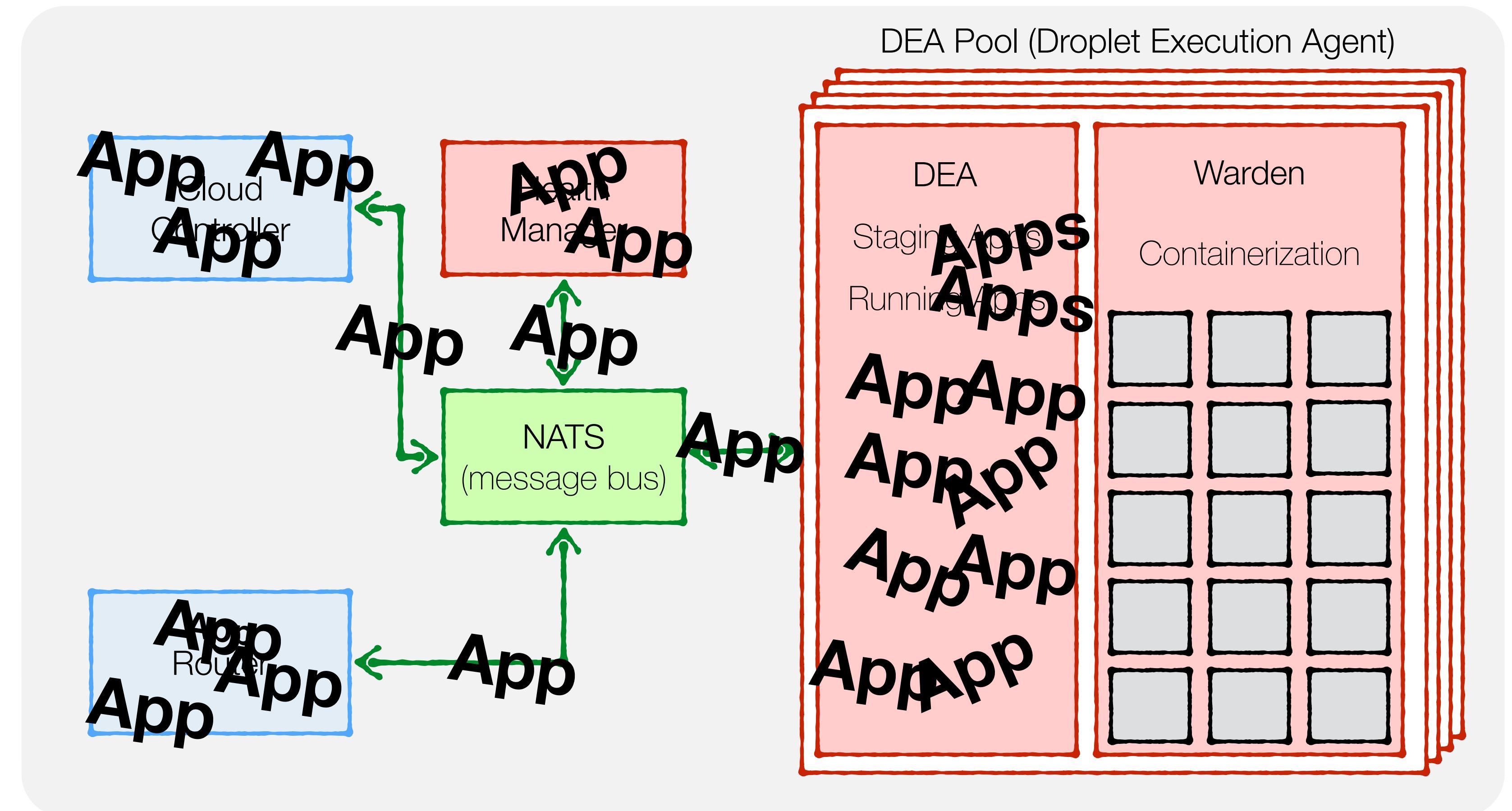
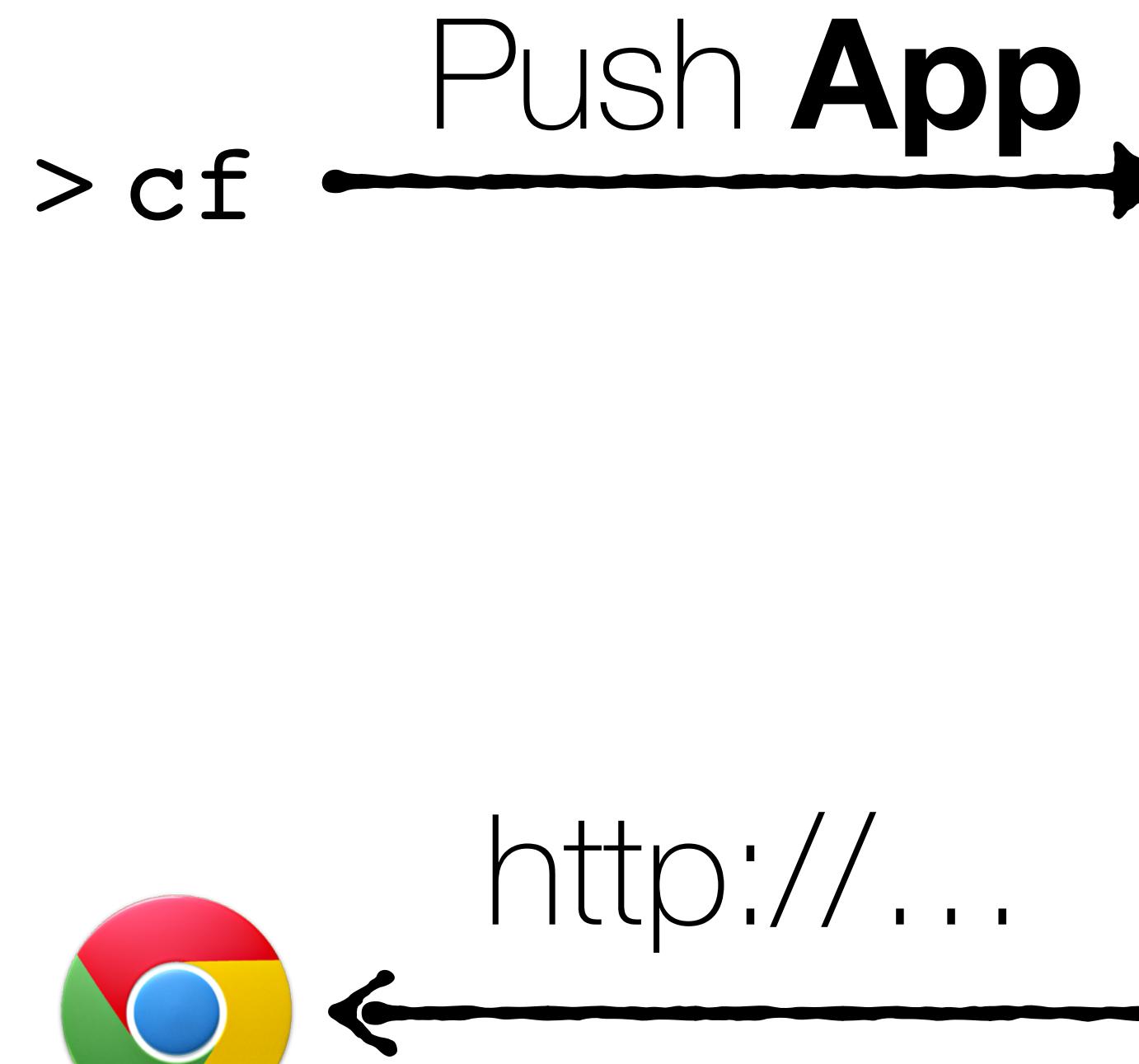
Domain Specific
(app, app, app, app)

Why rewrite?



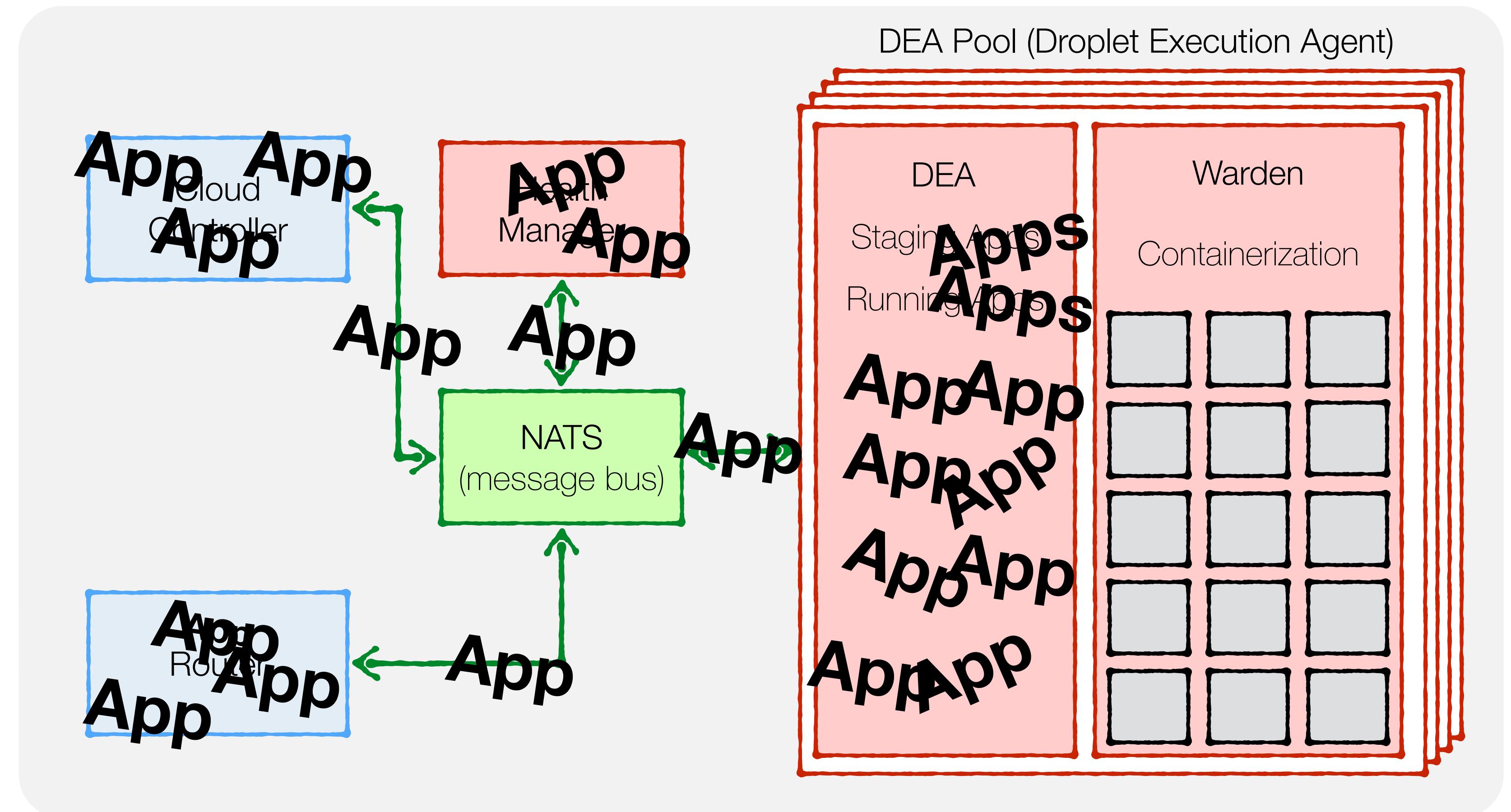
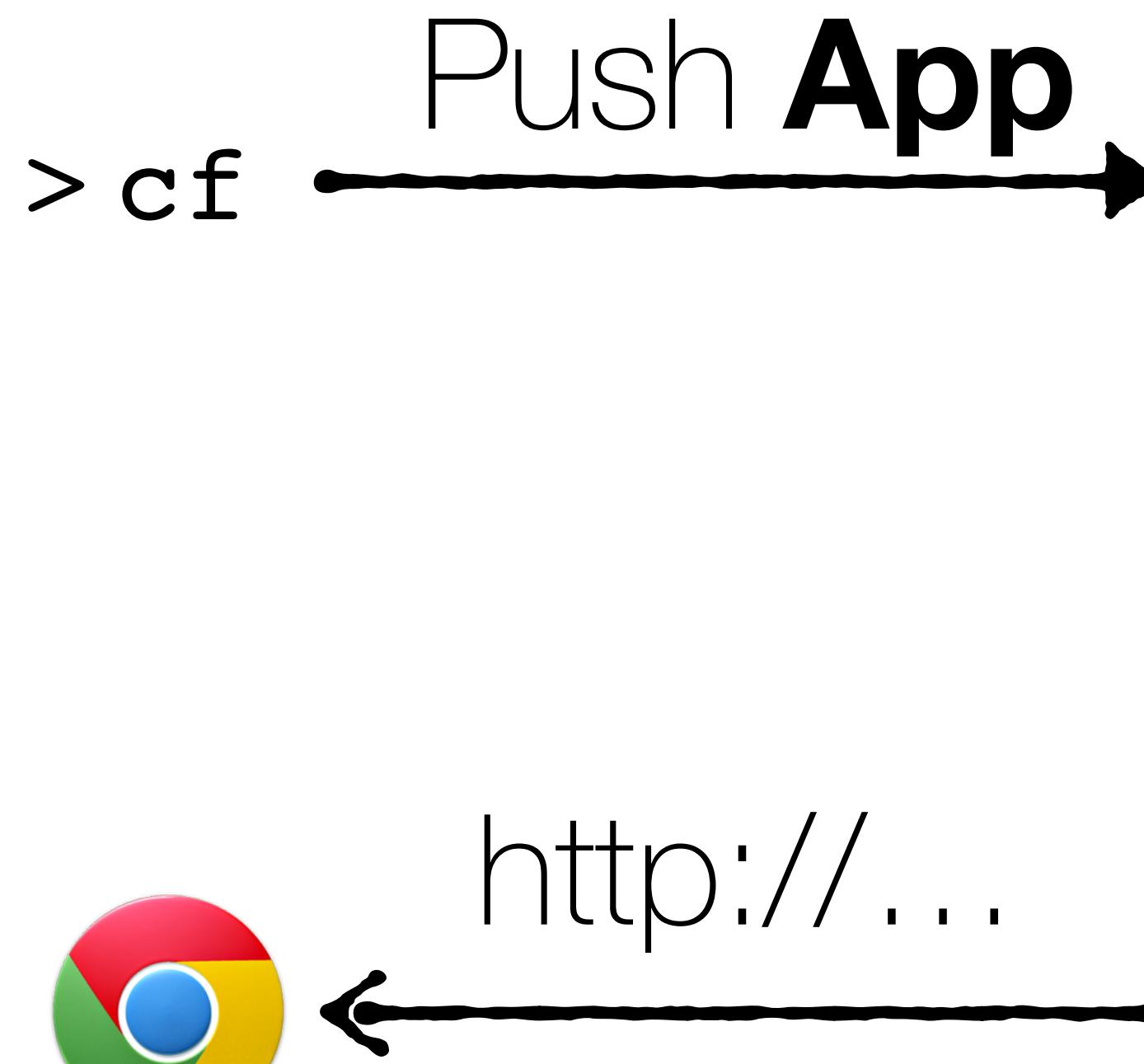
Domain Specific
(app, app, app, app)

Why rewrite?



Domain Specific
(app, app, app, app)

Why rewrite?

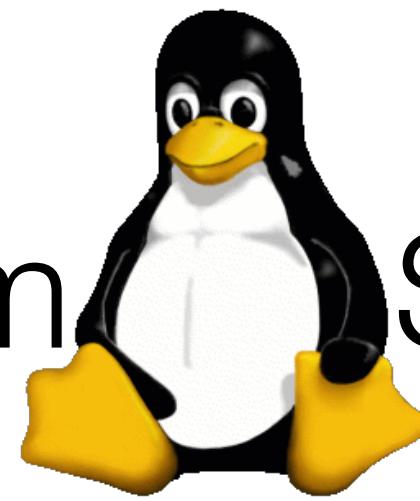


Domain Specific
(app, app, app, app)

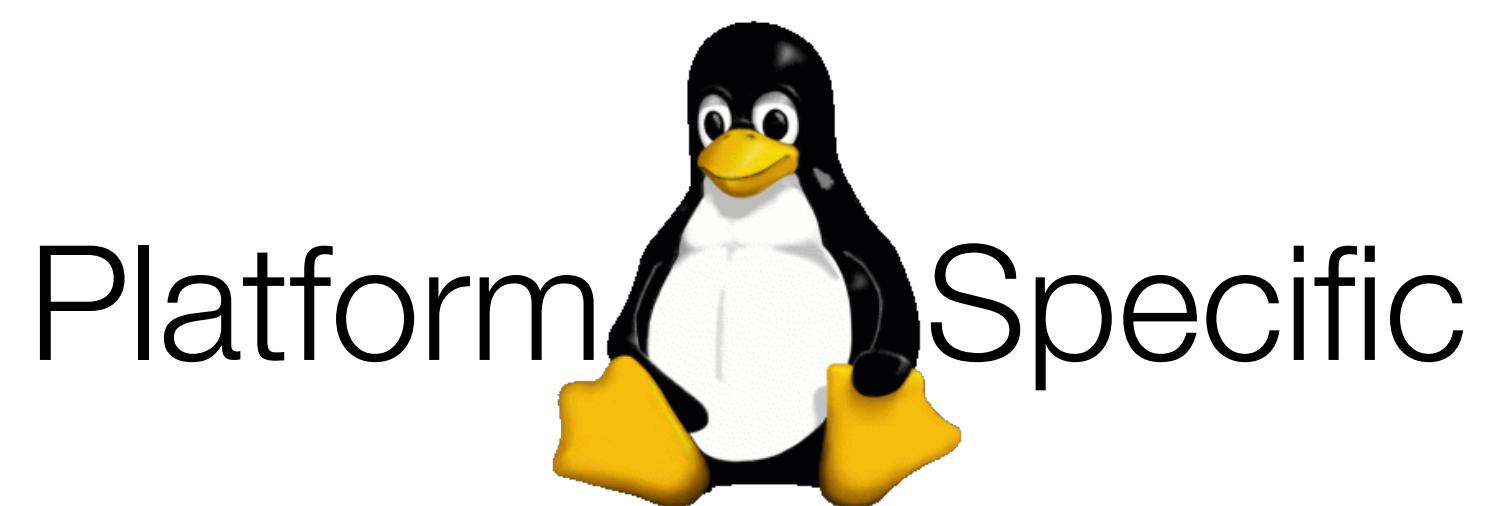
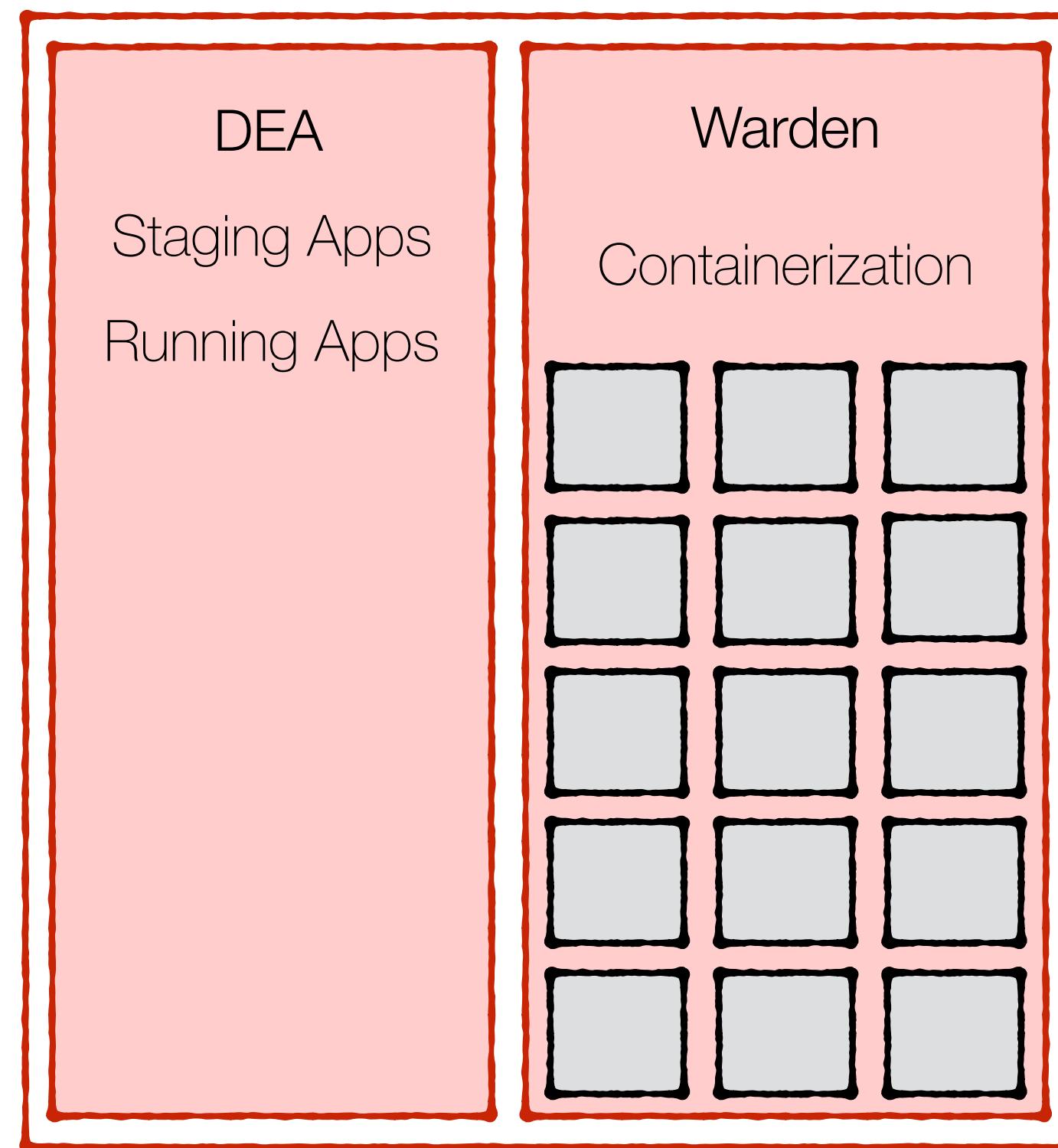
Hard to extend to new domains
(e.g. cron-like jobs)

Why rewrite?

Platform Specific

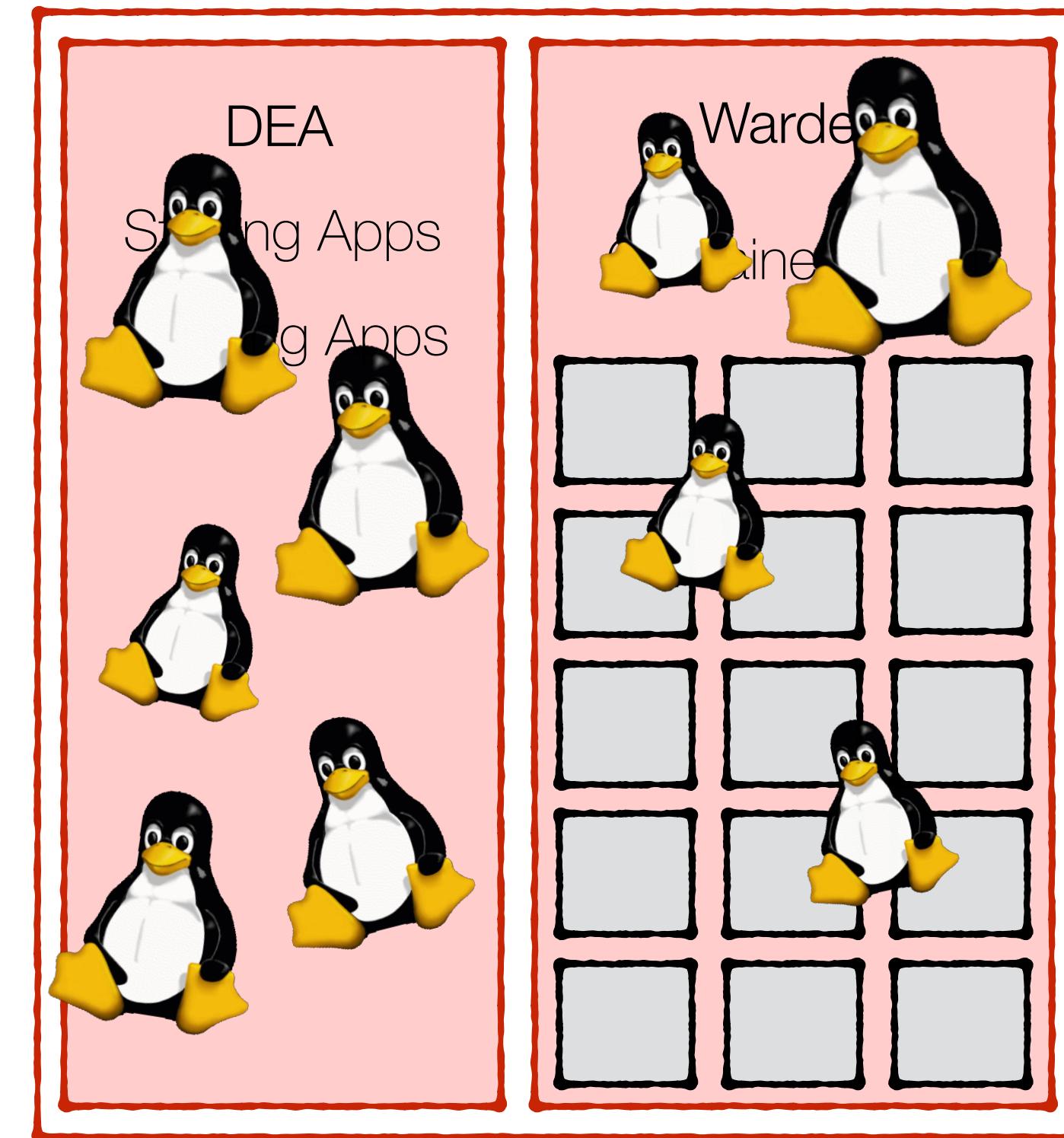


Why rewrite?



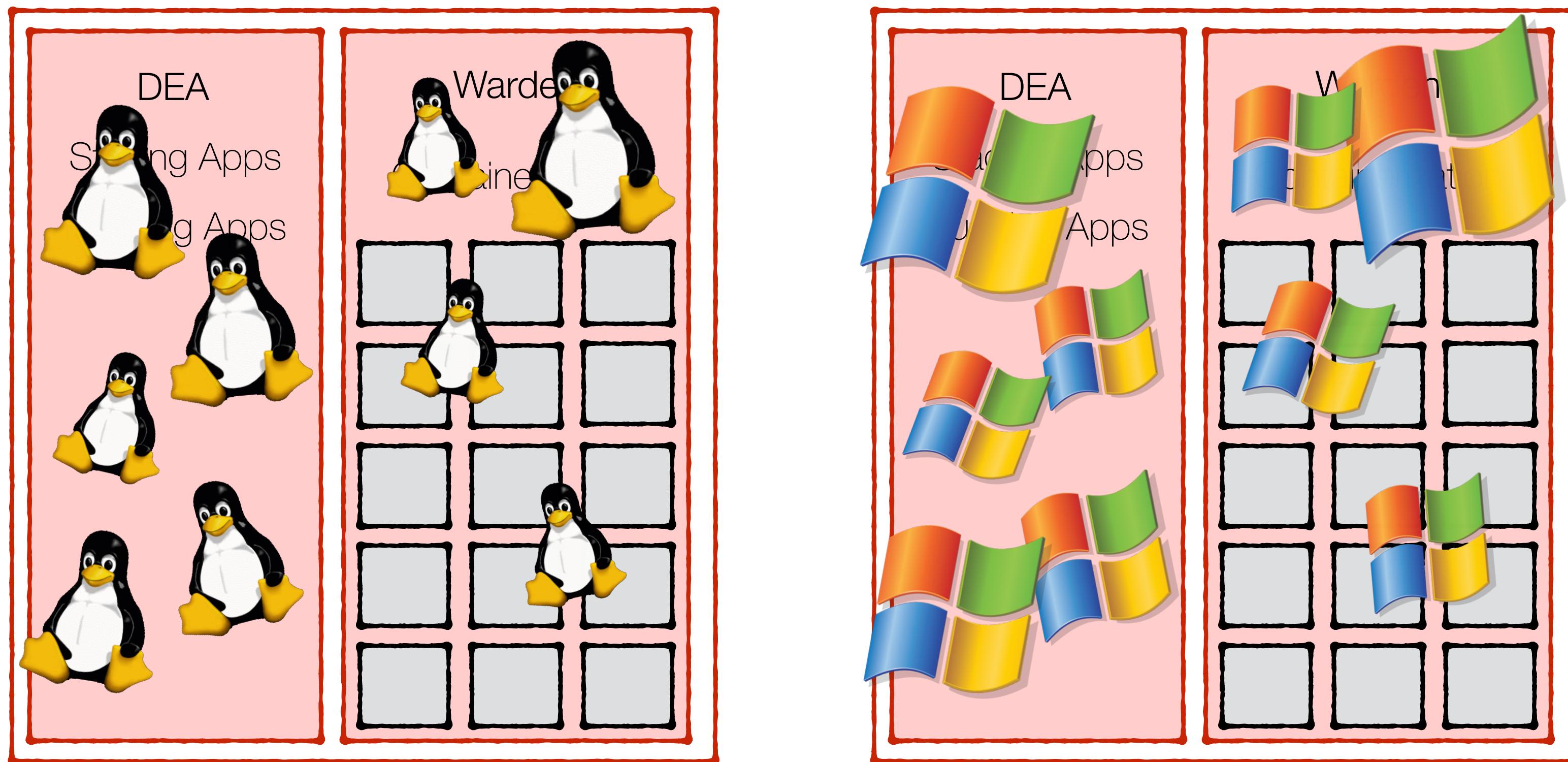
Platform Specific

Why rewrite?



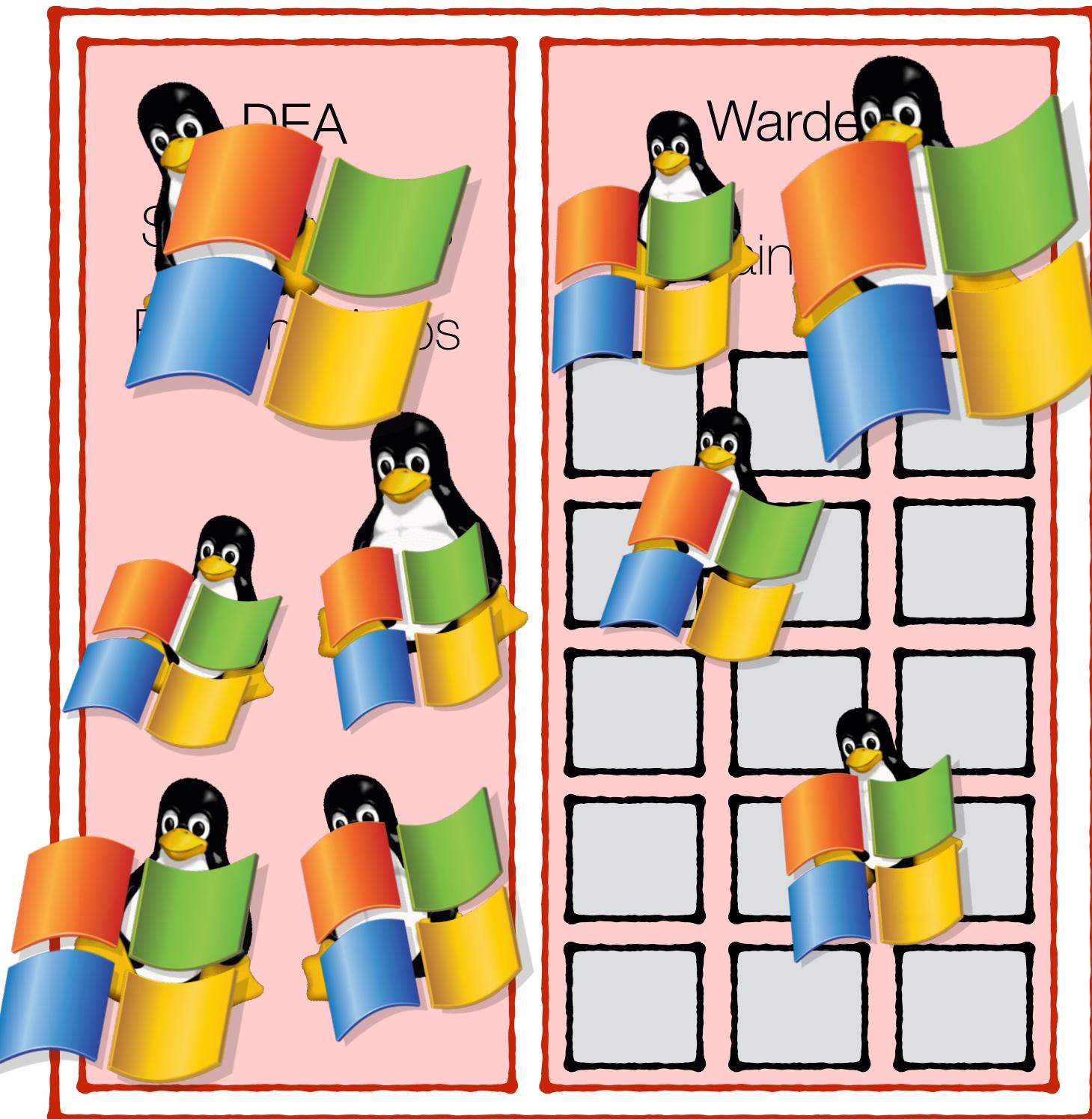
Platform Specific

Why rewrite?

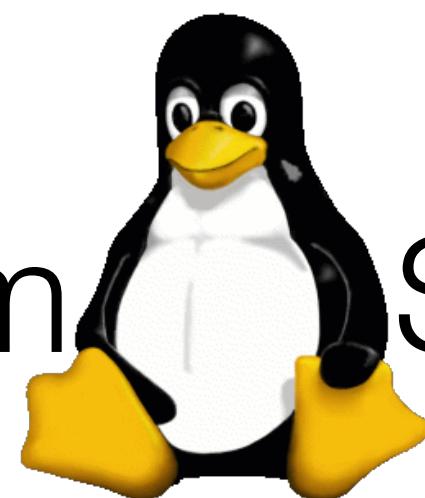


Platform Specific

Why rewrite?

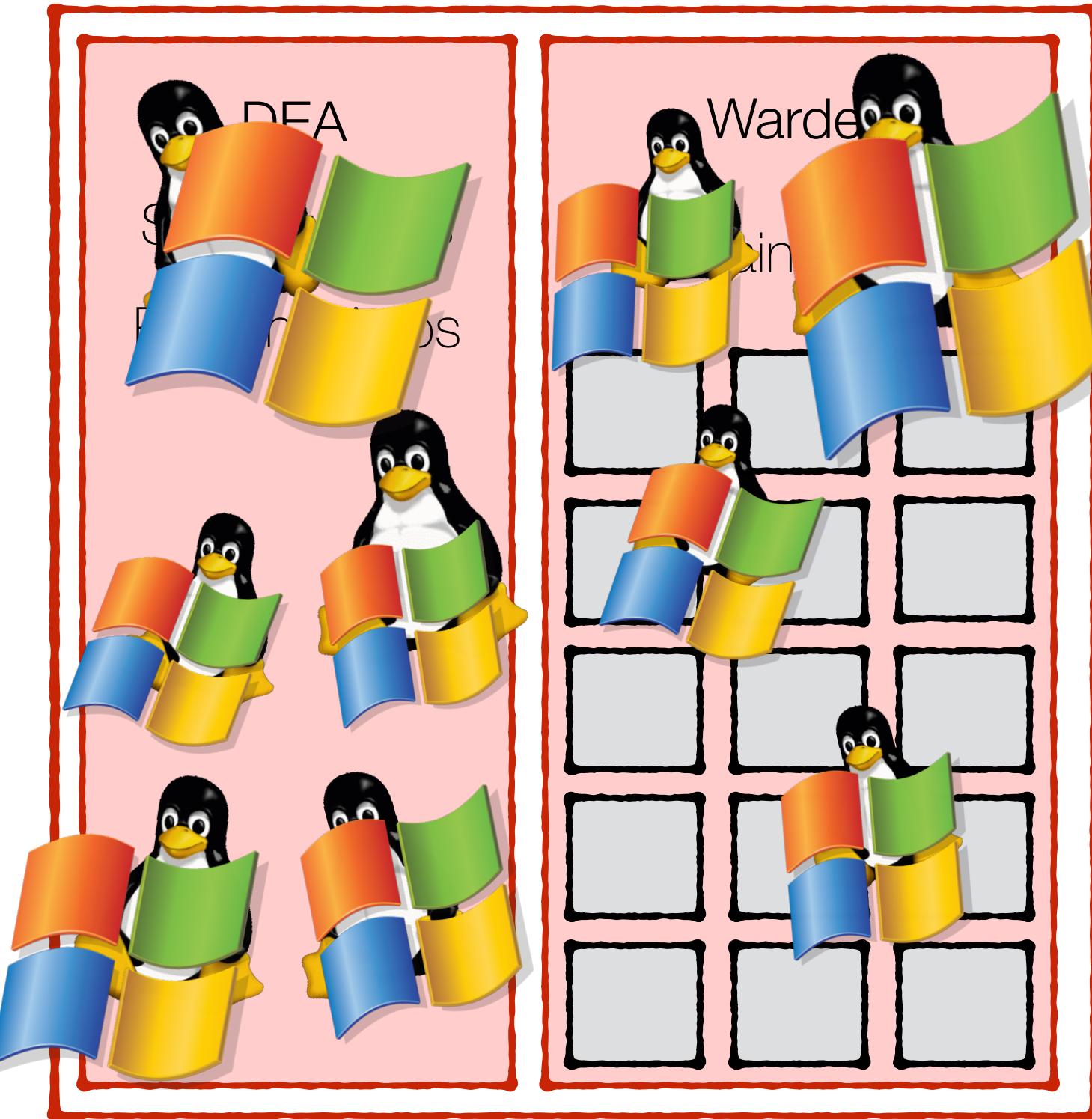


Platform Specific



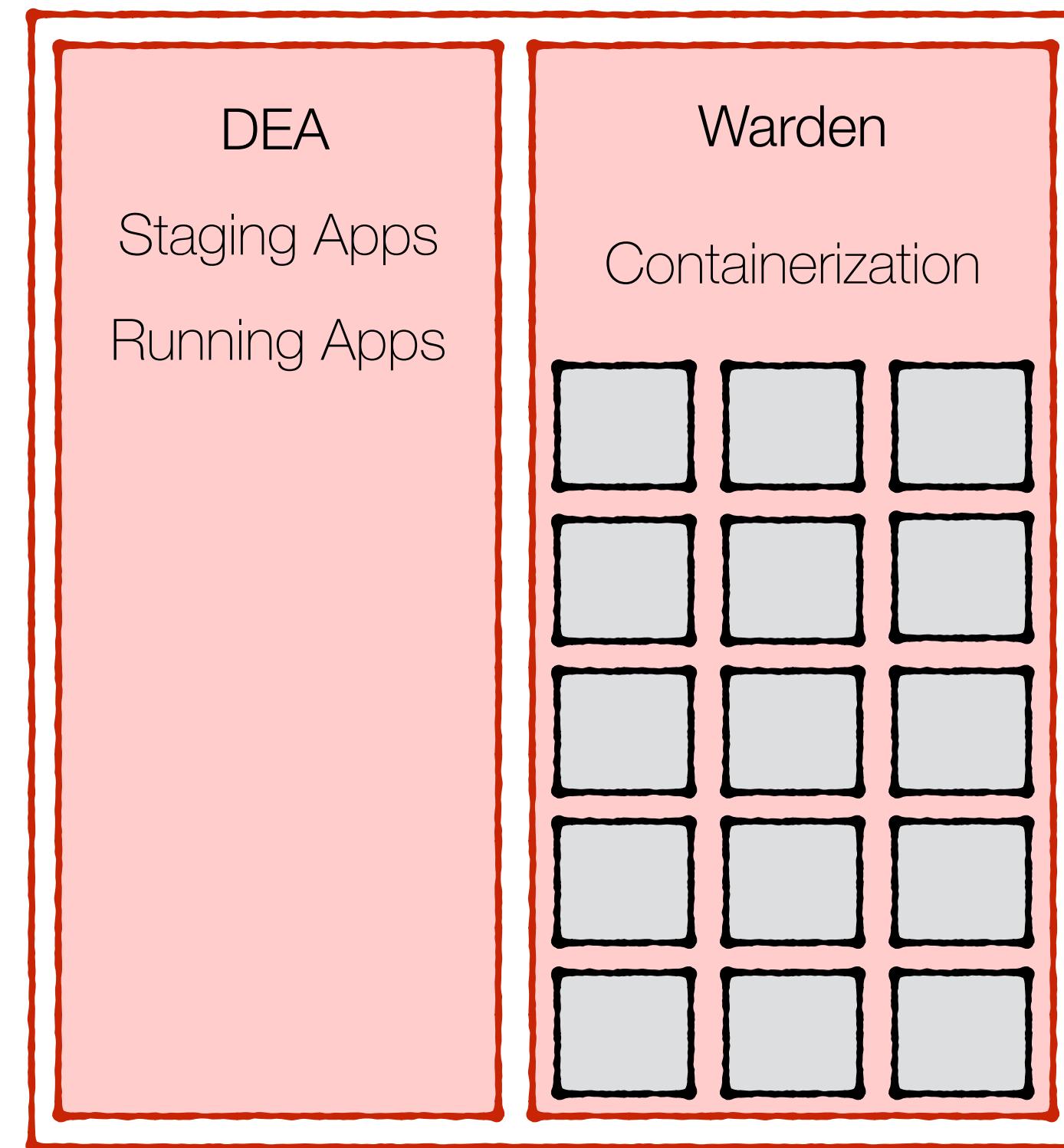
Why rewrite?

hard to maintain



Platform Specific

Why rewrite?



Long-lived processes

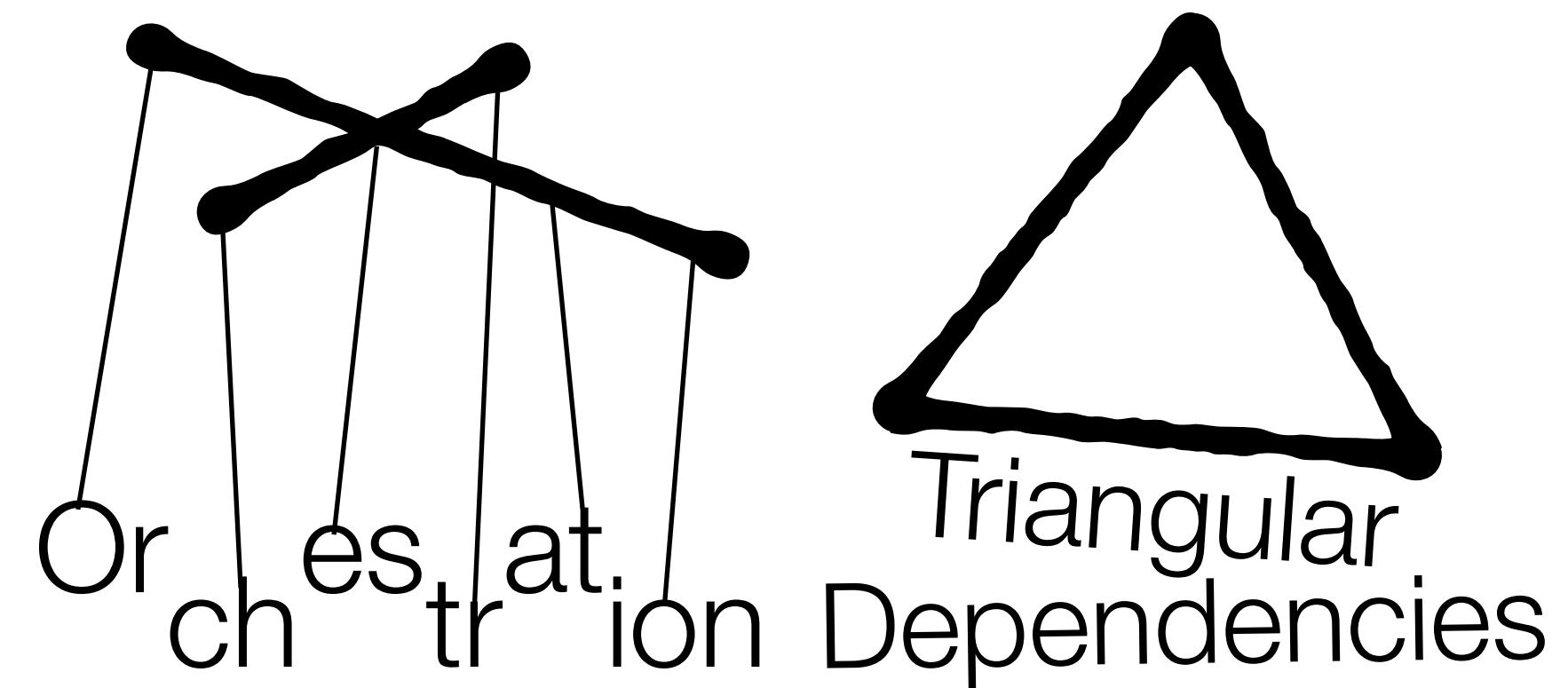
Tons of concurrency

Low-level os interactions



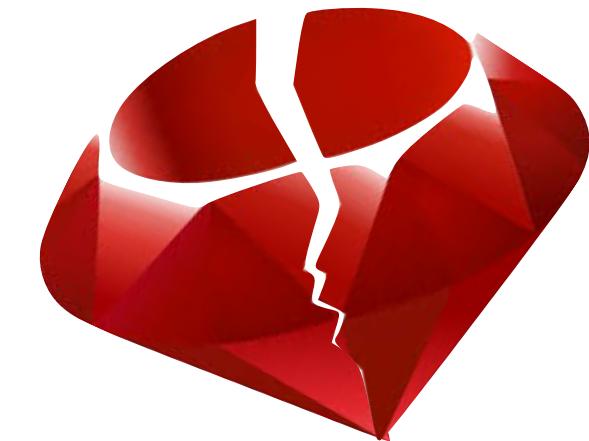
Why rewrite?

Tight Coupling

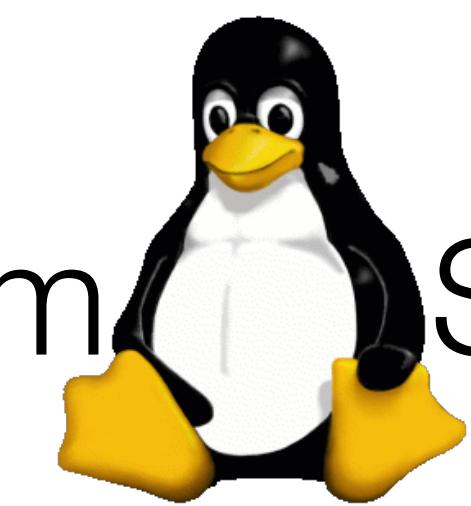


Poor separation
of concerns

Domain Specific
(app, app, app, app)



Platform Specific



Hard
to add new features
to maintain existing features

DIEGO

ElasticRuntime 2.0

What?

Why?

Show me...

The future

Show me Diego

Written in Golang

Strong concurrency support

Strong low-level OS support

Strongly typed

Explicit error handling

Promotes developer **discipline**

Show me Diego

Domain Specific
(app, app, app, app)

**The Right(?)
Abstraction**

One-off Tasks

(guaranteed to only run once)

Long Running Processes

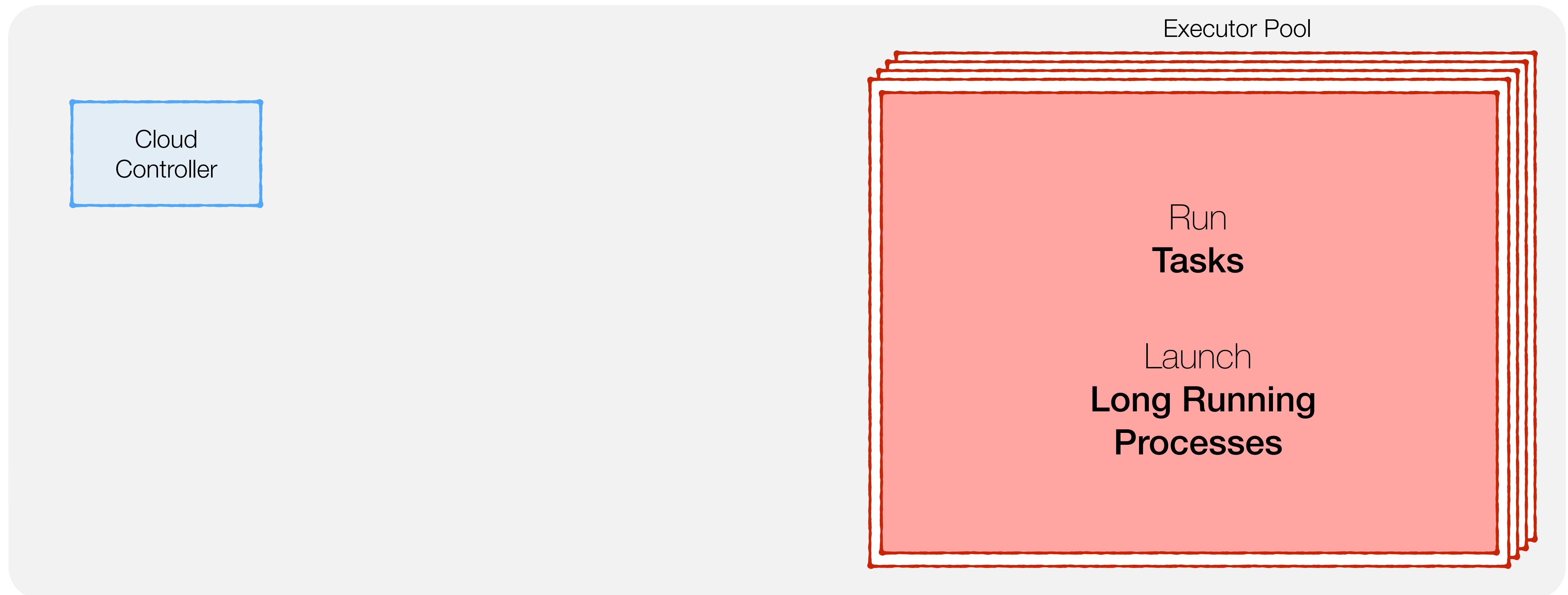
(n monitored instances)

Show me Diego

Cloud
Controller

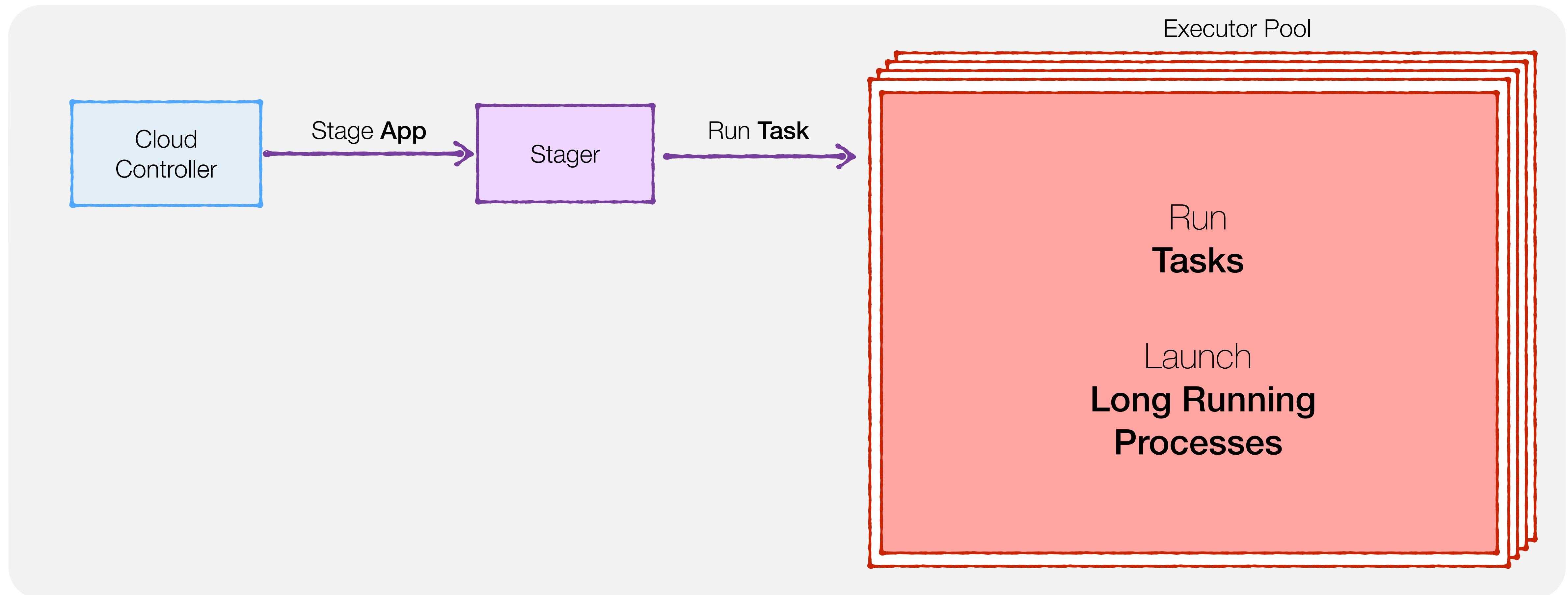
The Right(?) Abstraction

Show me Diego



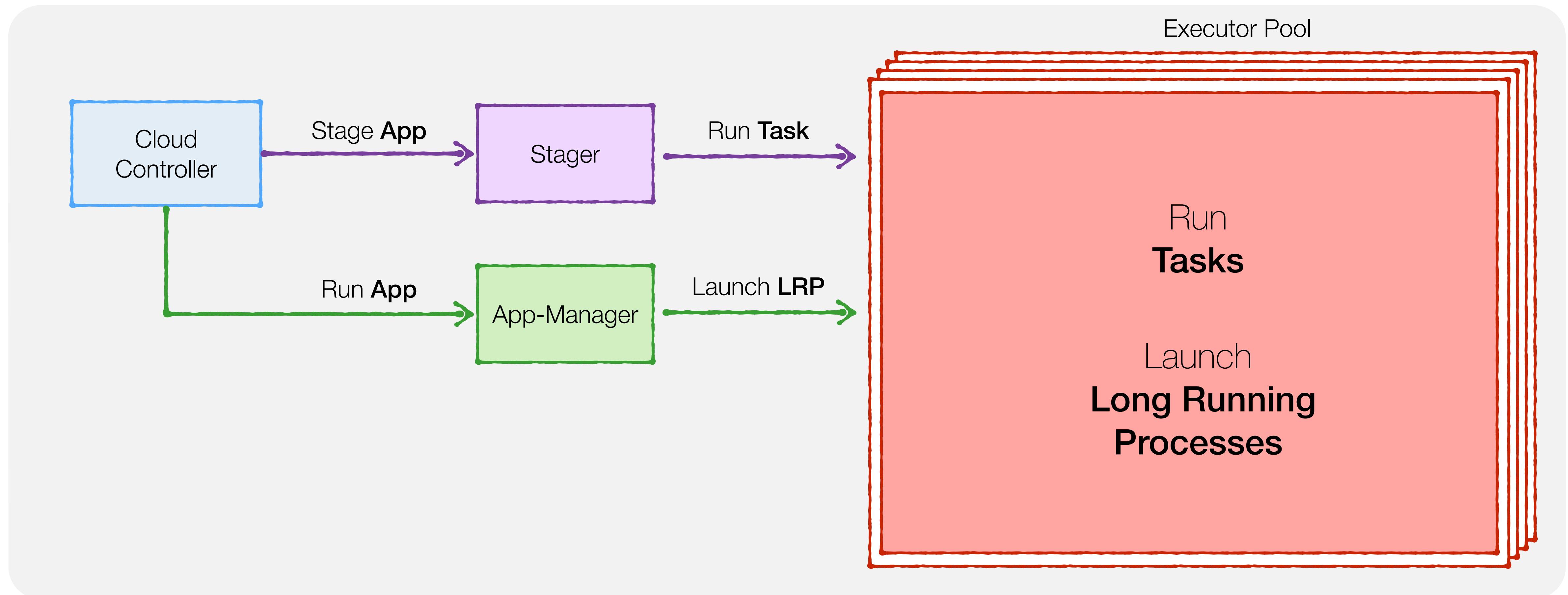
The Right(?) Abstraction

Show me Diego



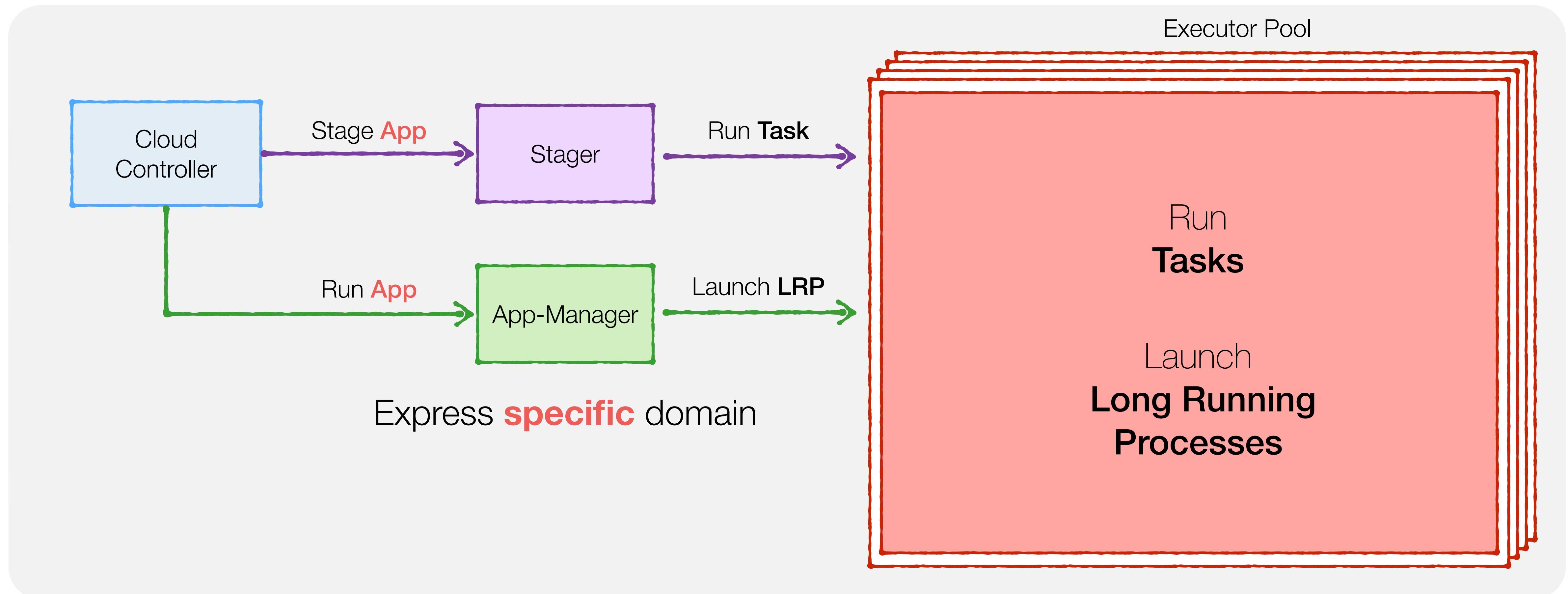
The Right(?) Abstraction

Show me Diego



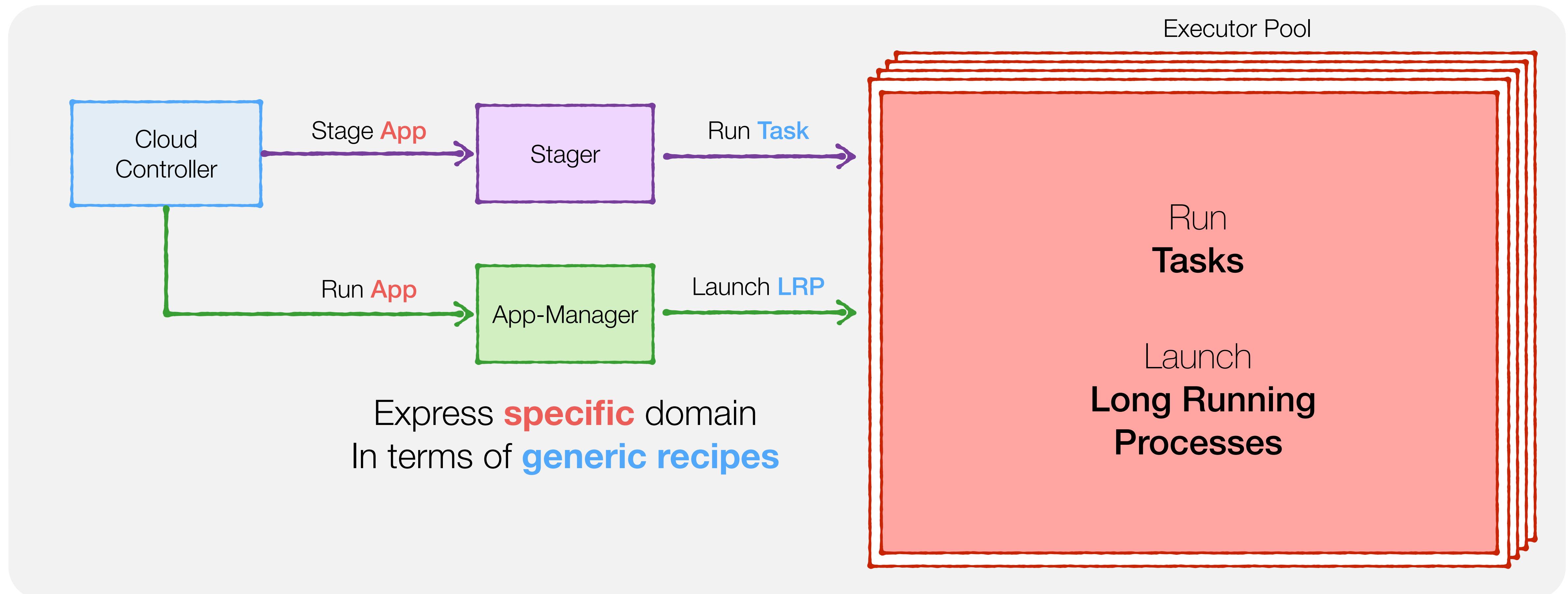
The Right(?) Abstraction

Show me Diego



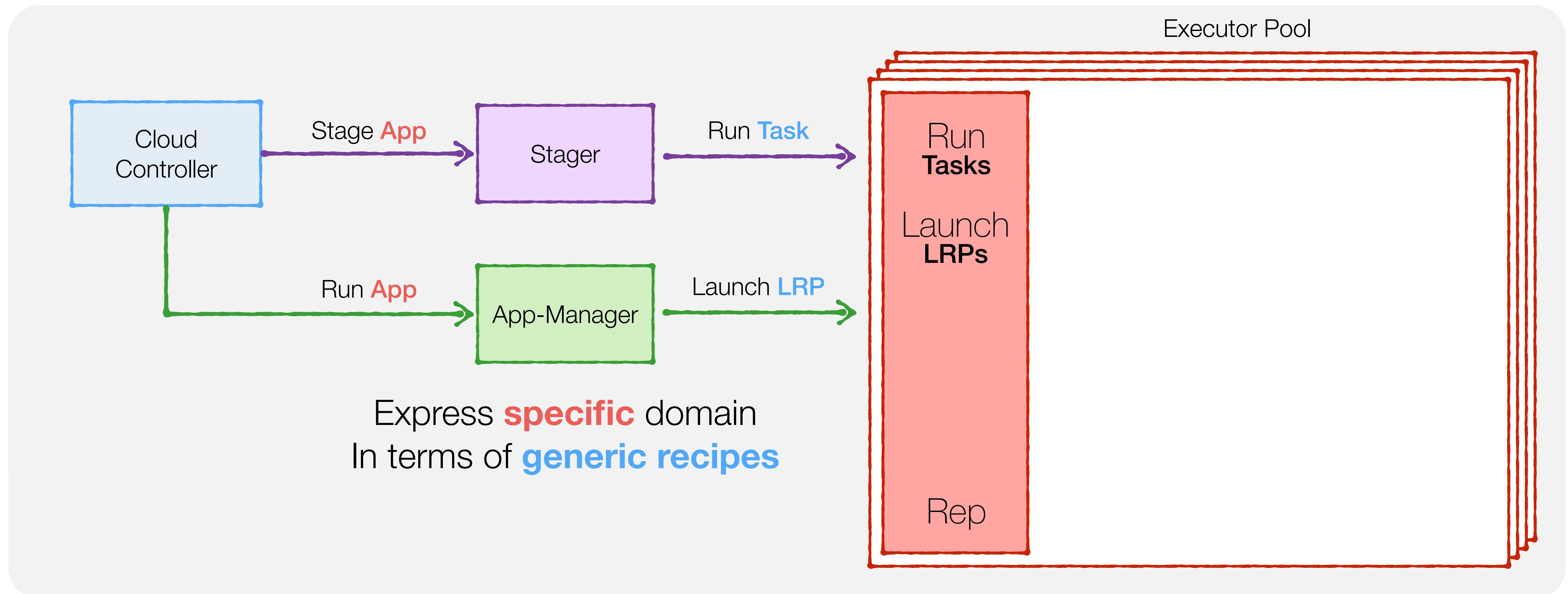
The Right(?) Abstraction

Show me Diego



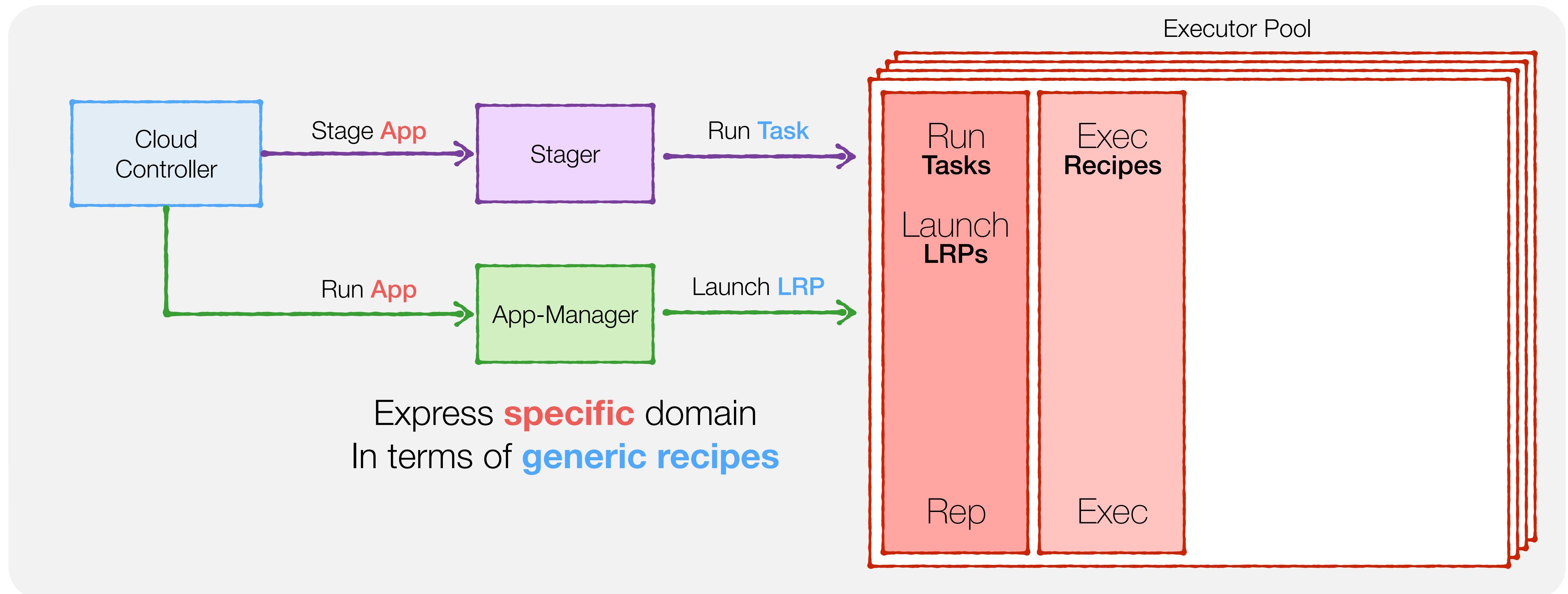
The Right(?) Abstraction

Show me Diego



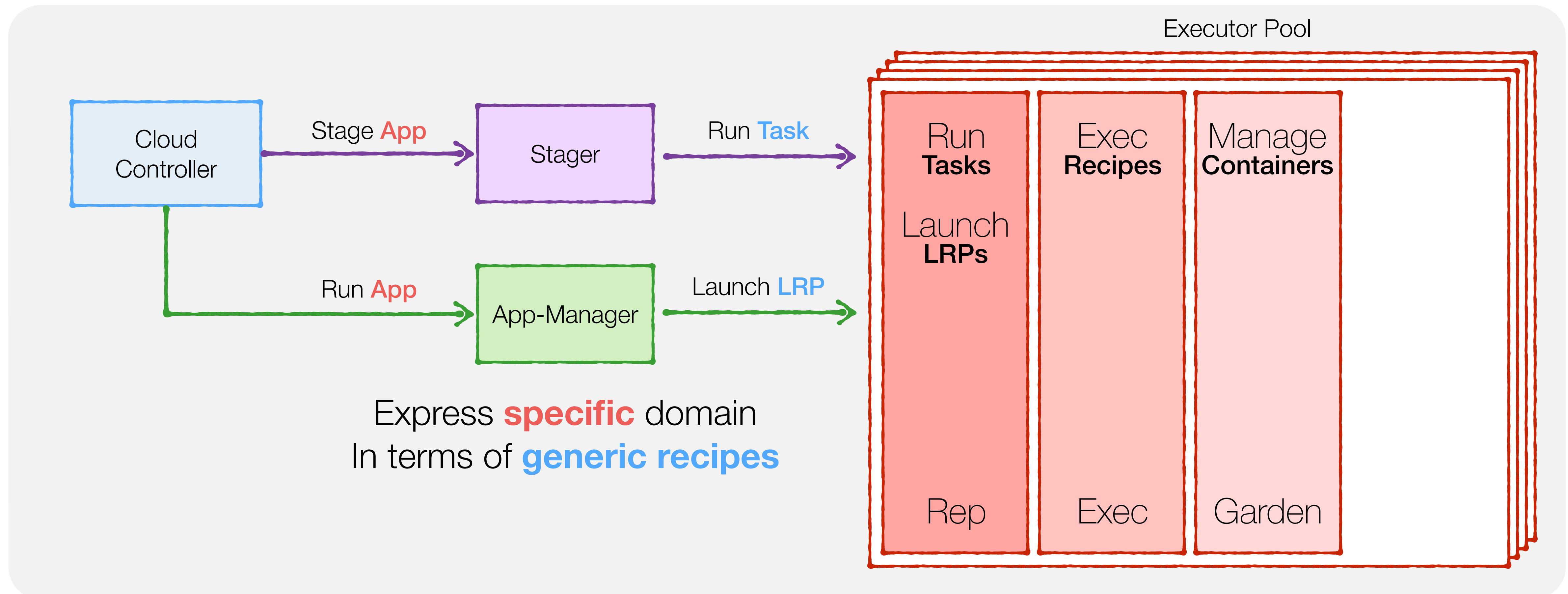
The Right(?) Abstraction

Show me Diego



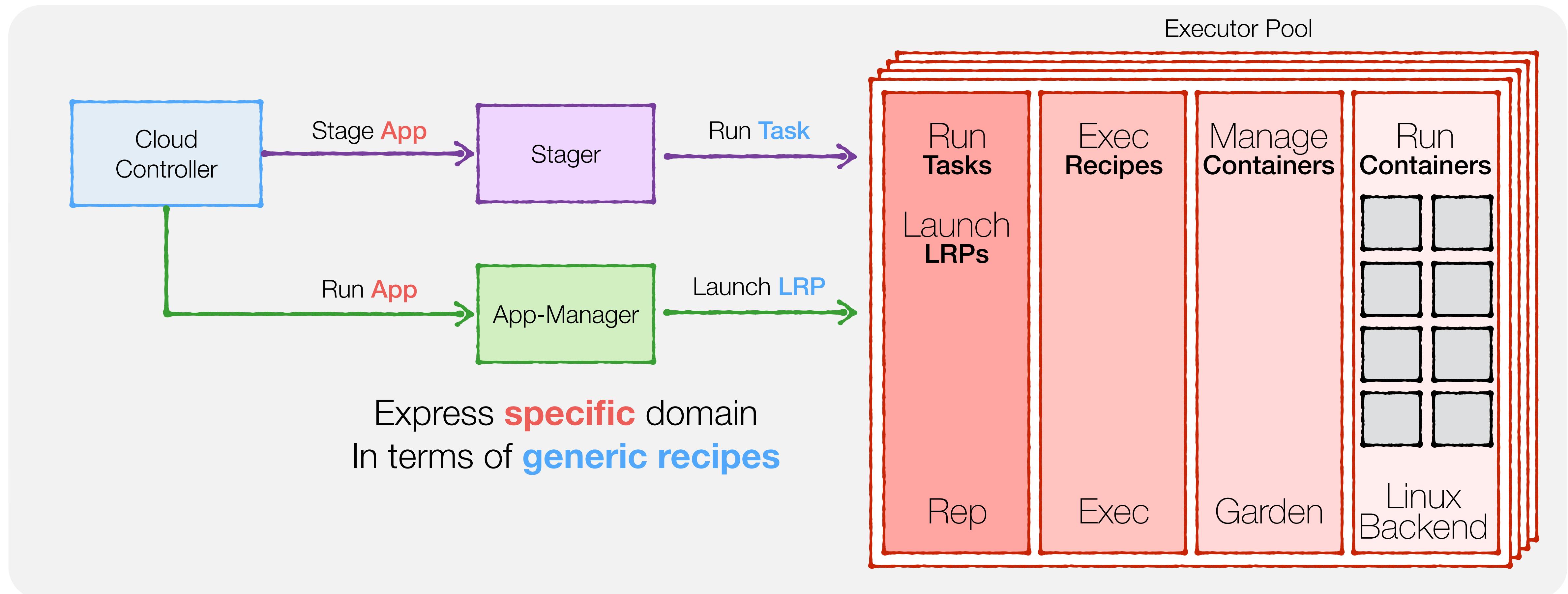
The Right(?) Abstraction

Show me Diego



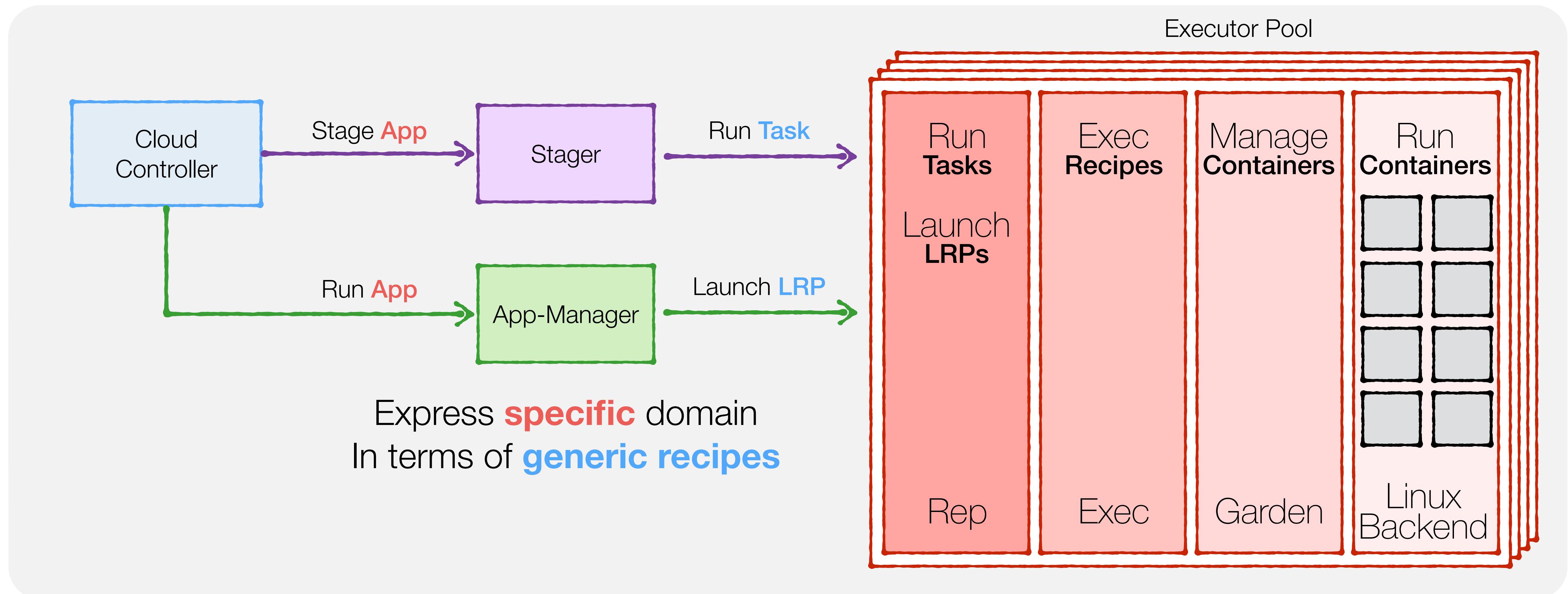
The Right(?) Abstraction

Show me Diego



The Right(?) Abstraction

Show me Diego



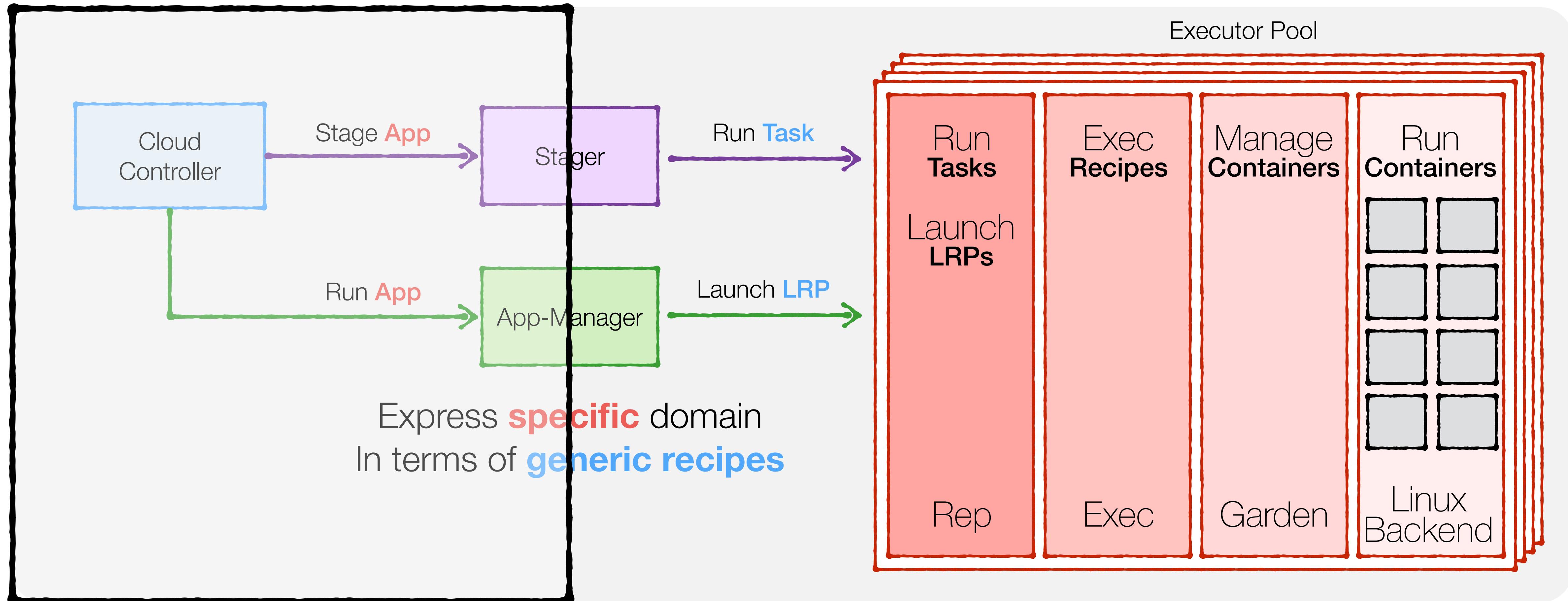
Specific



Generic

Show me Diego

New features go here!
(e.g. cron-like tasks)



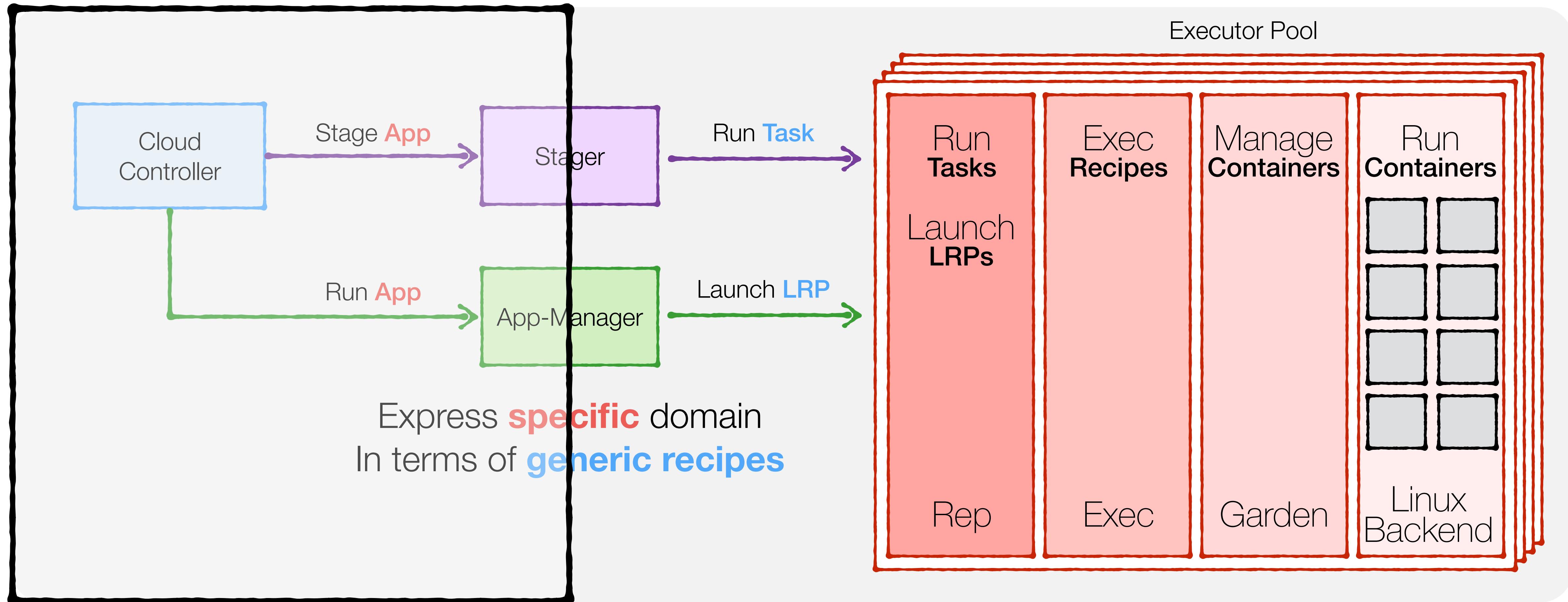
Specific

Generic

Show me Diego

New features go here!
(e.g. cron-like tasks)

Flexibility

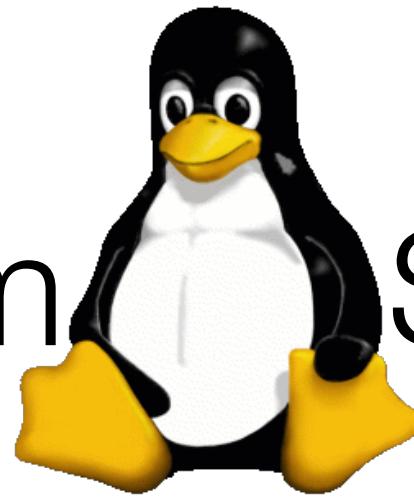


Specific

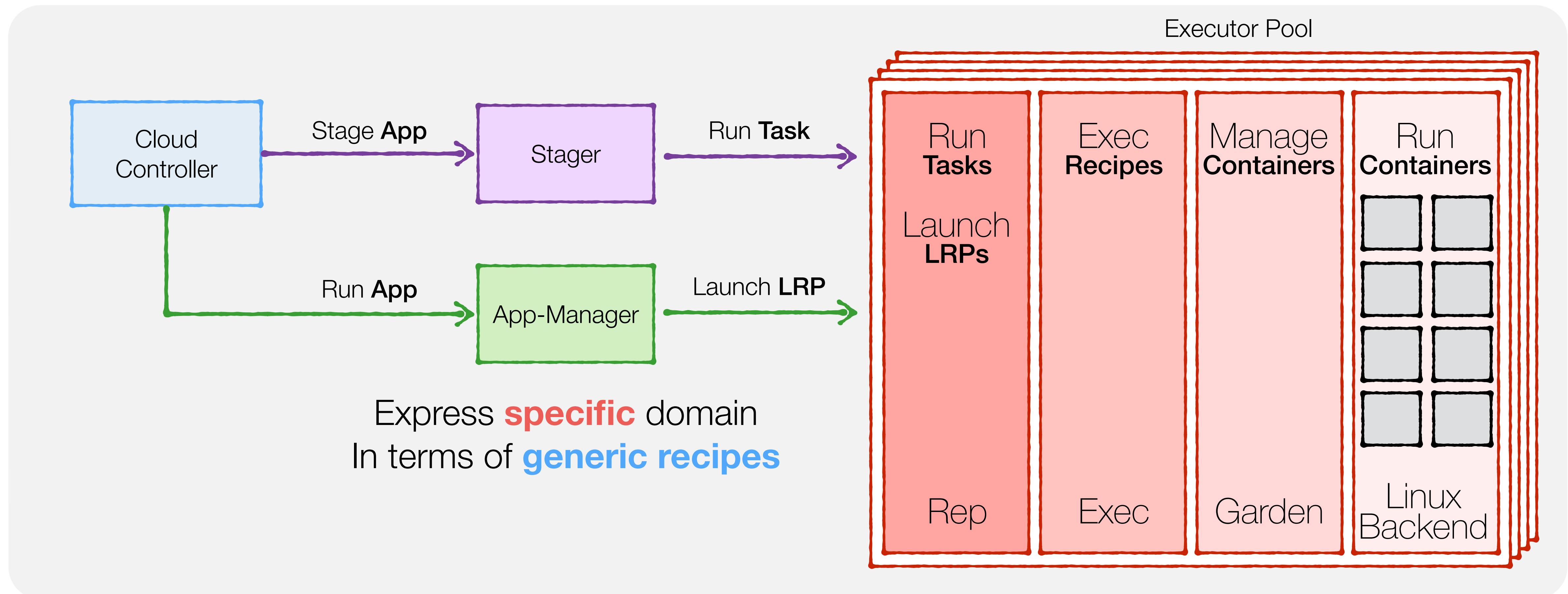
Generic

Show me Diego

Platform Specific

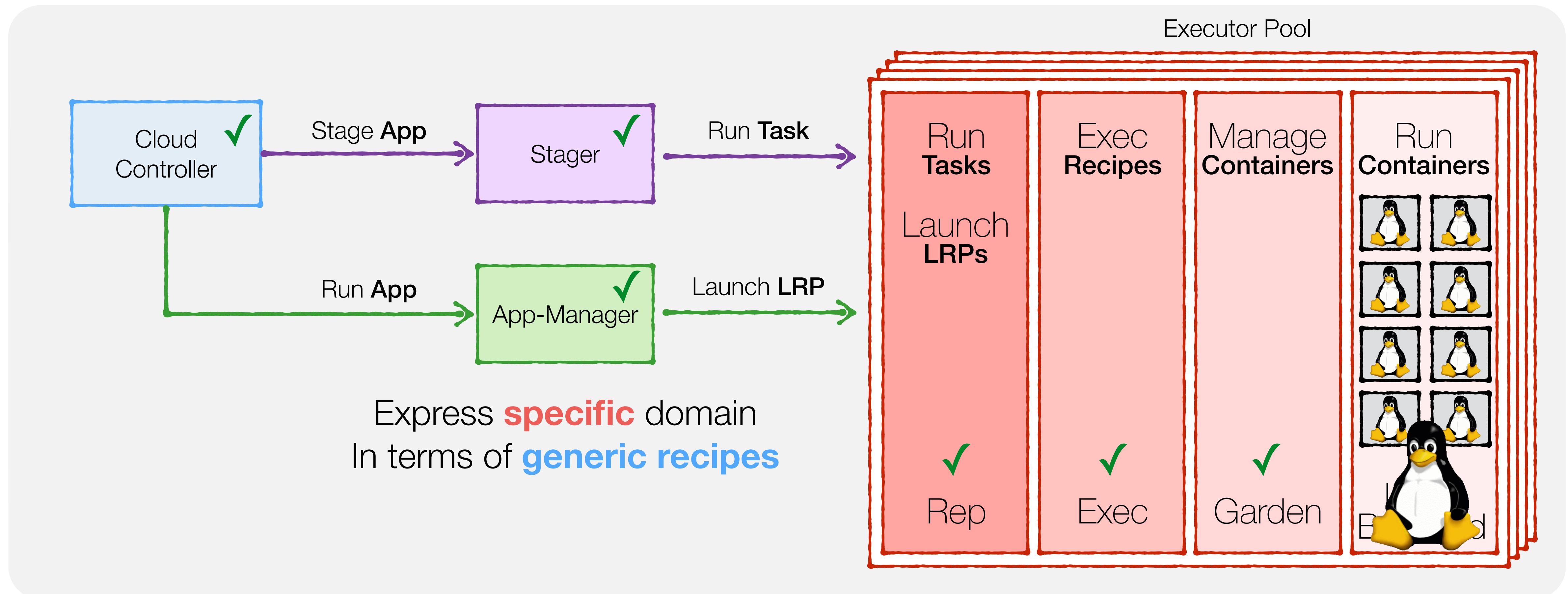


Show me Diego

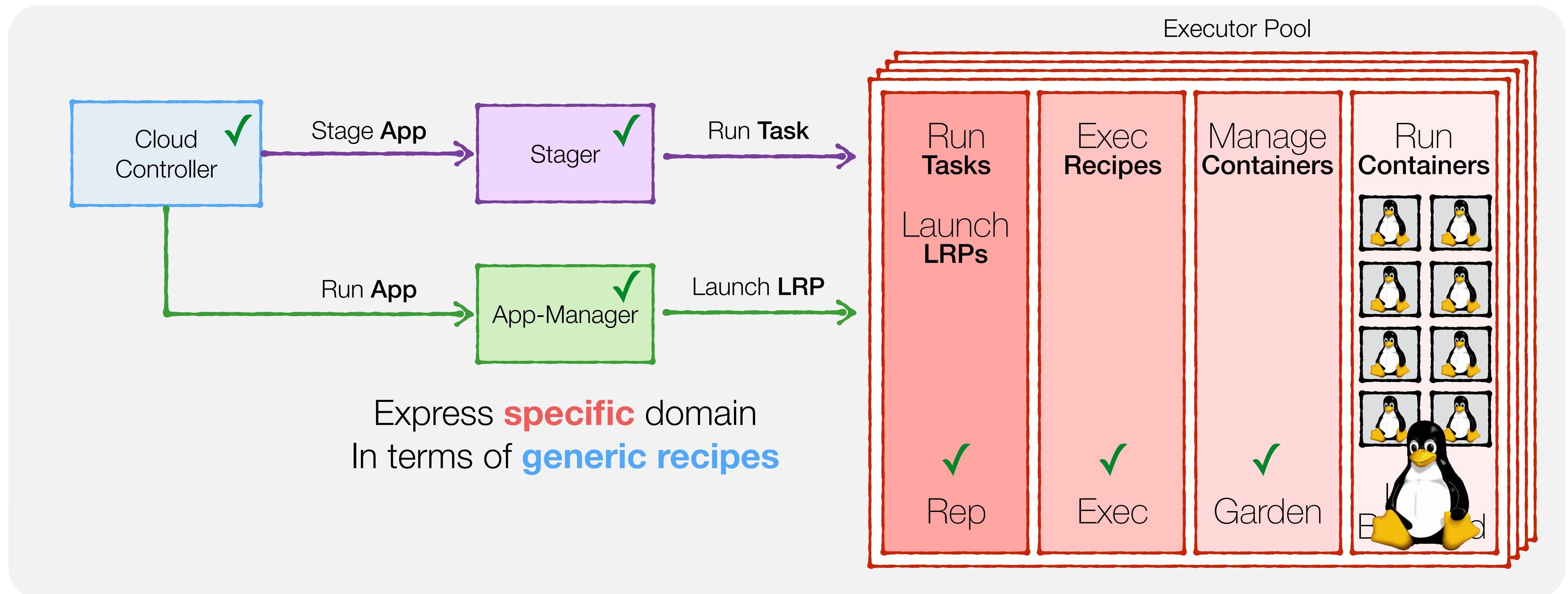


Platform Independent ✓

Show me Diego



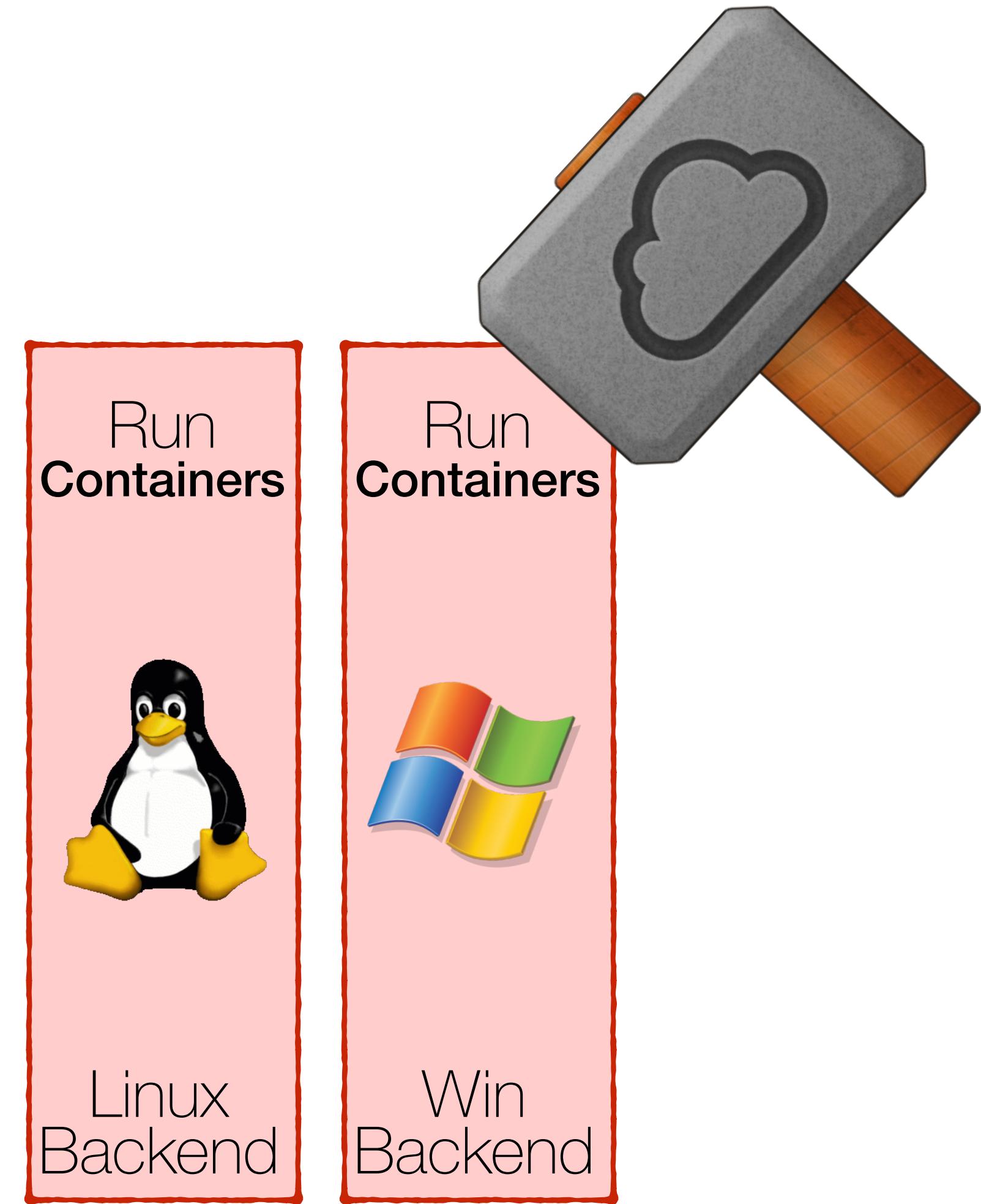
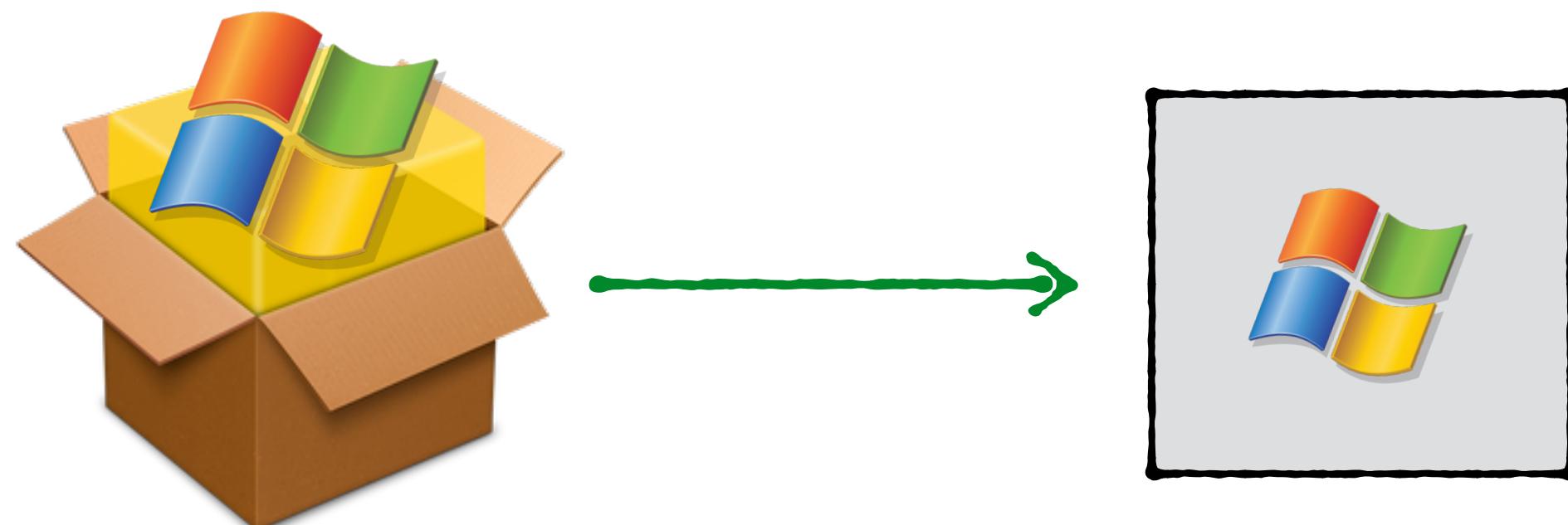
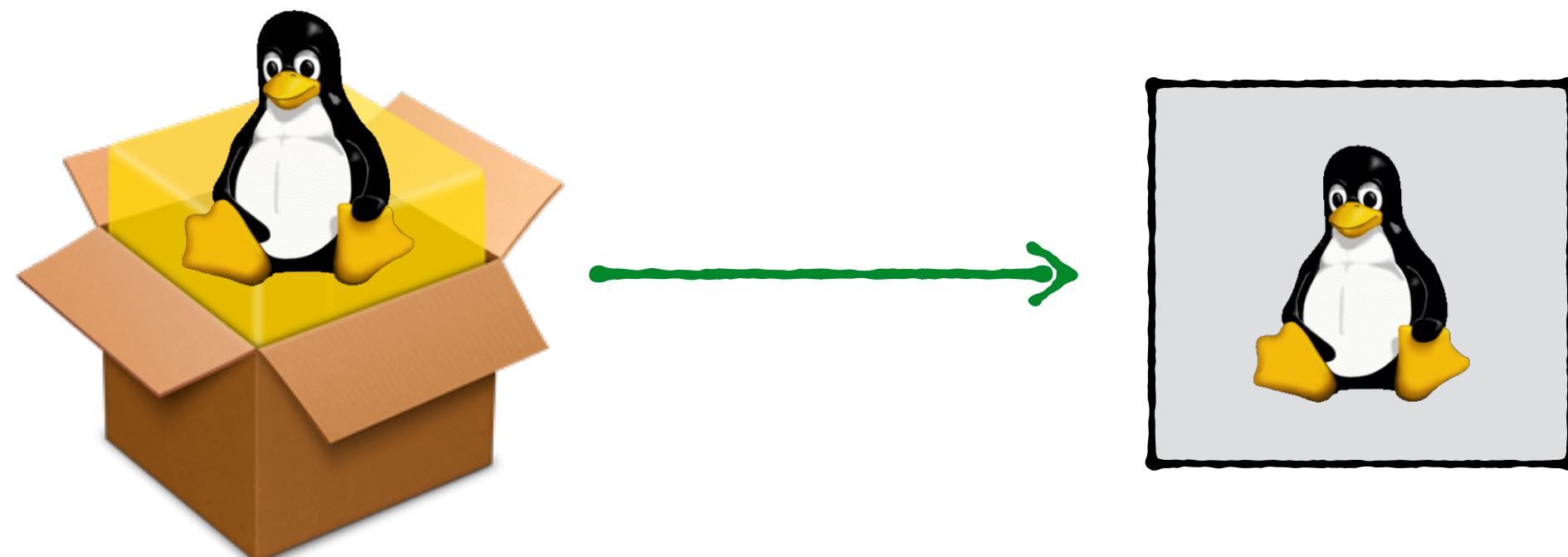
Show me Diego



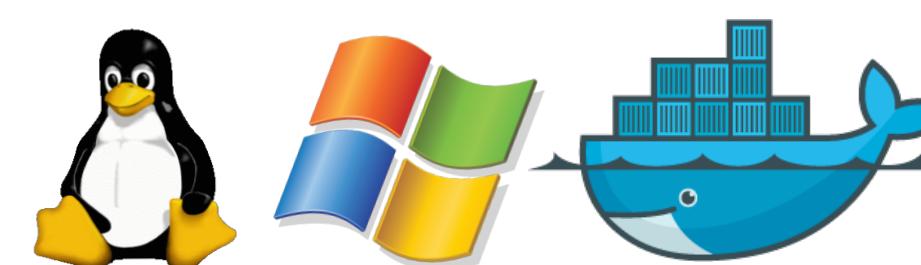
Platform Independent ✓ →

Show me Diego

Just **2** Things:

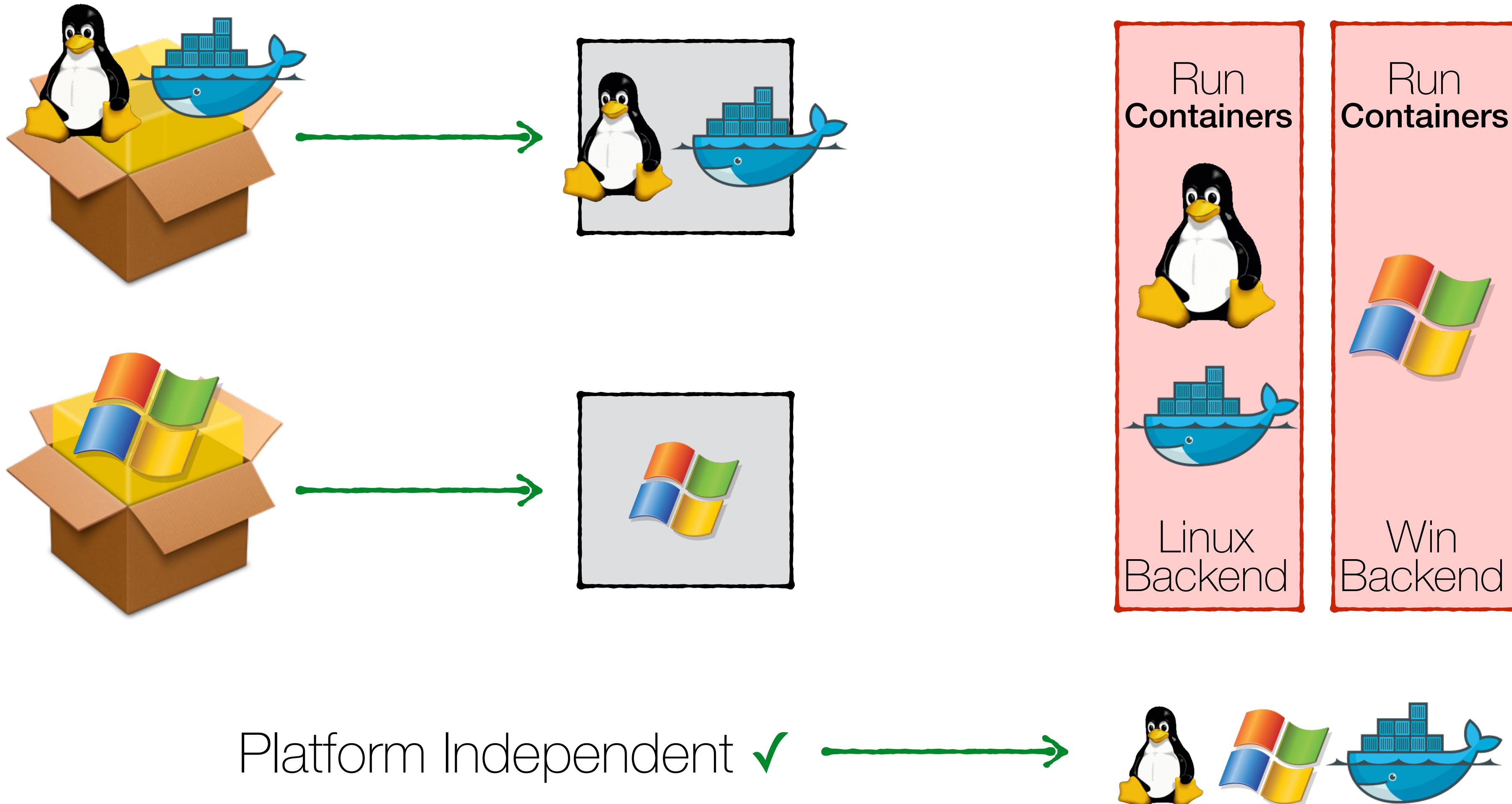


Platform Independent ✓ →



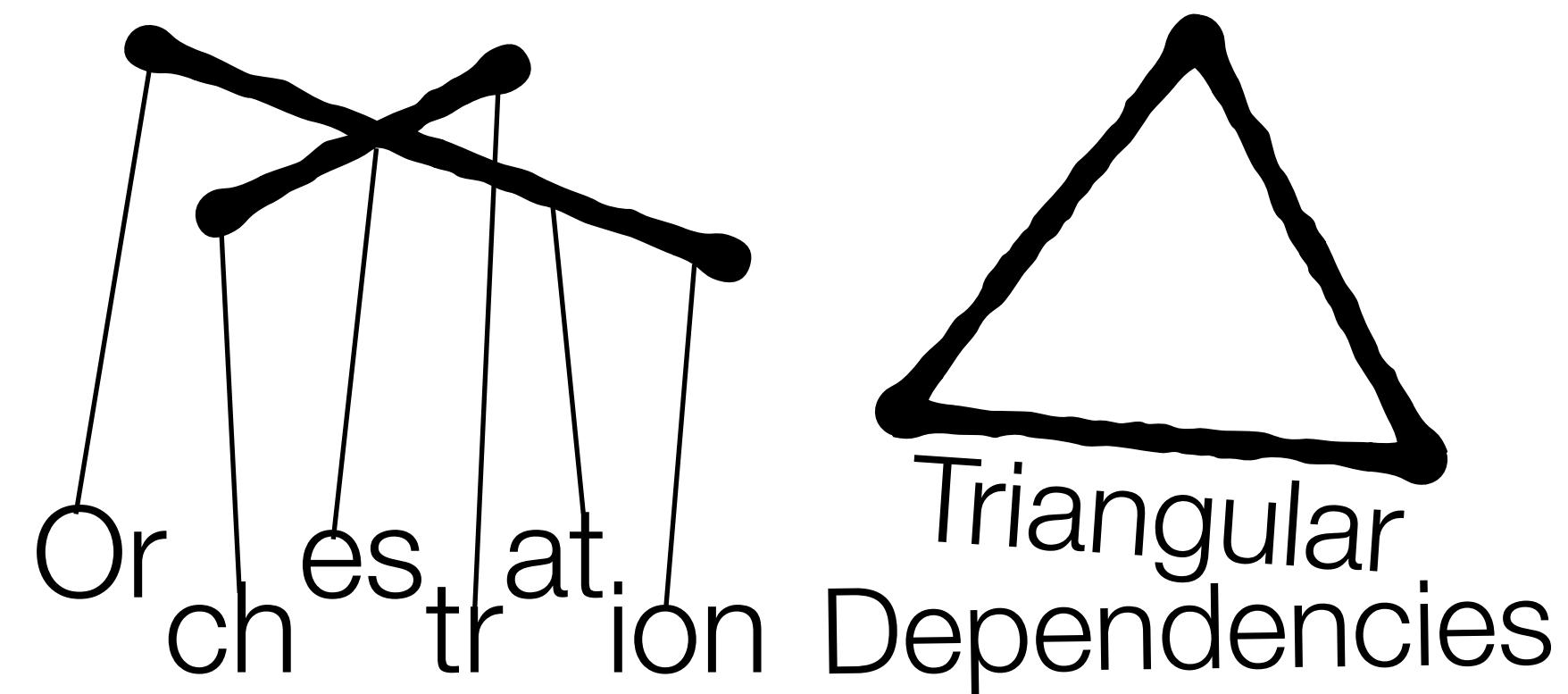
Show me Diego

Just **2** Things:



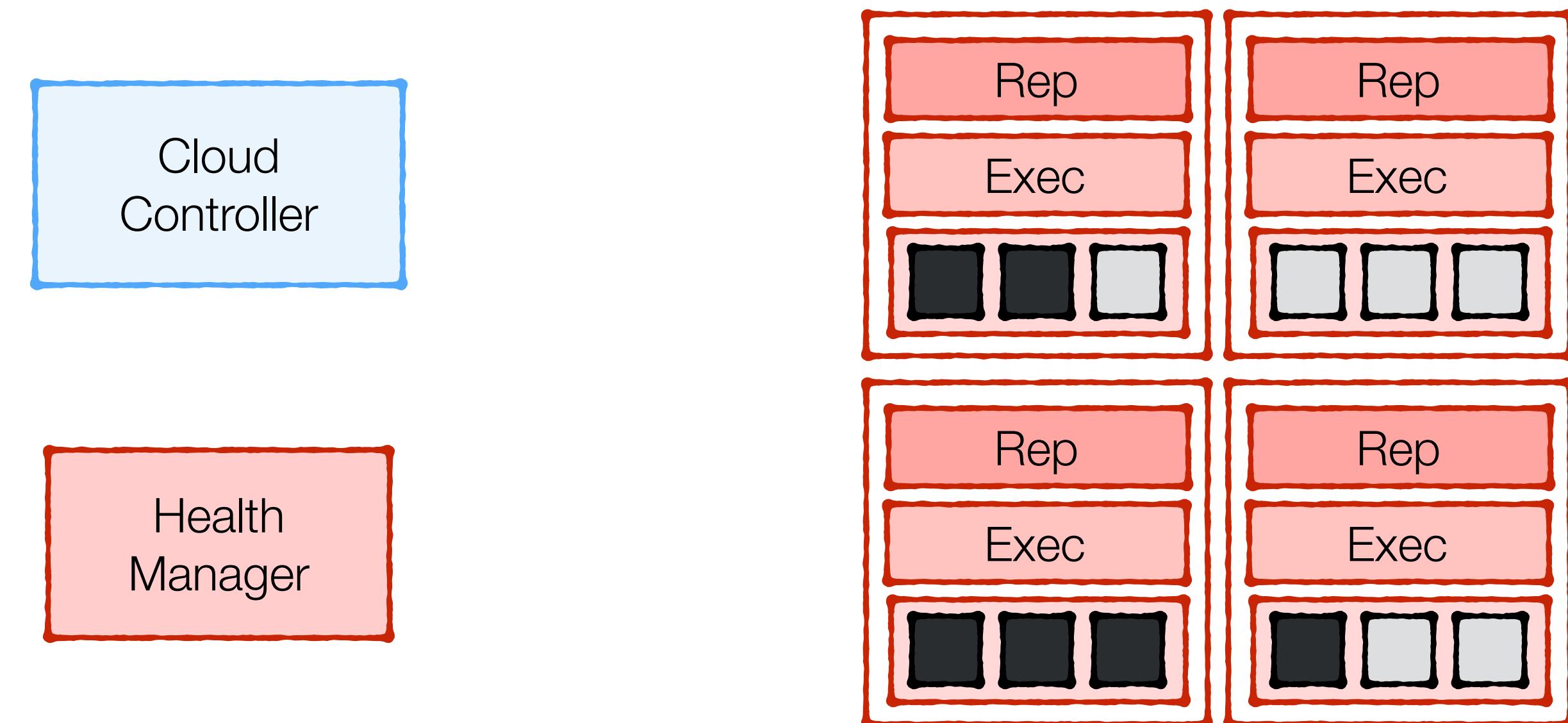
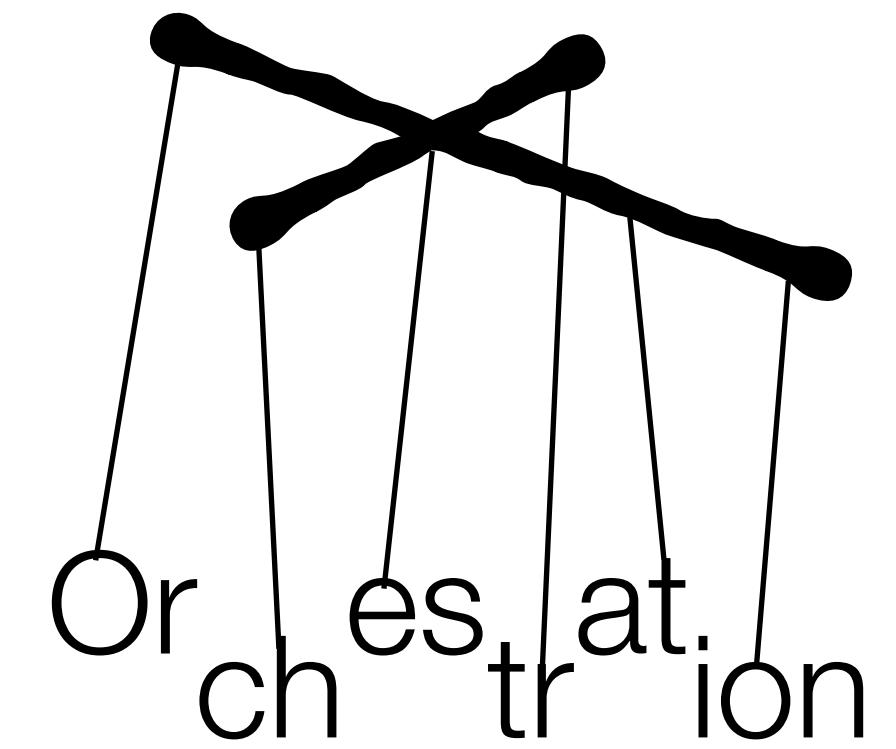
Show me Diego

Tight Coupling

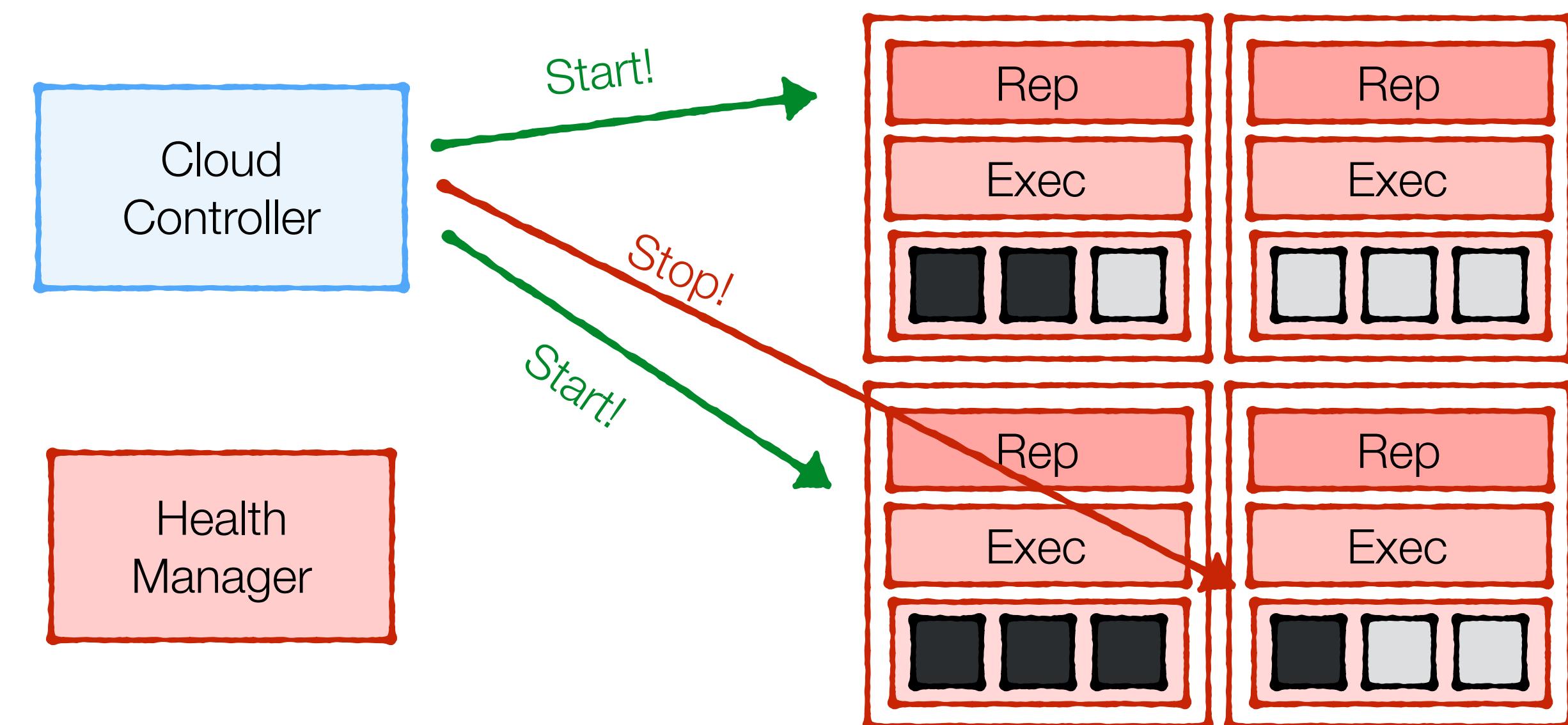
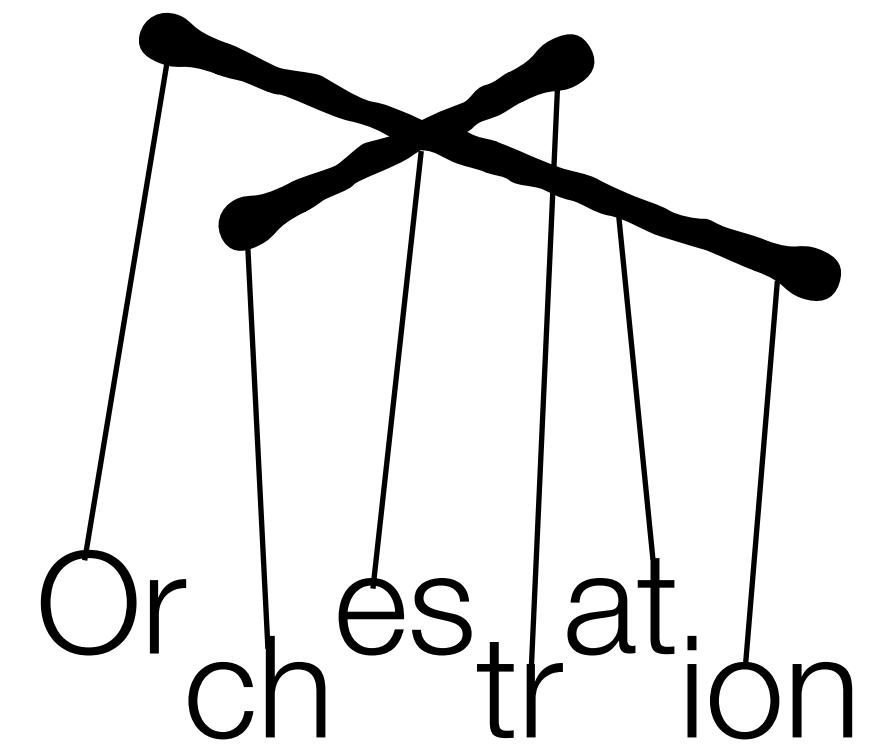


Poor separation
of concerns

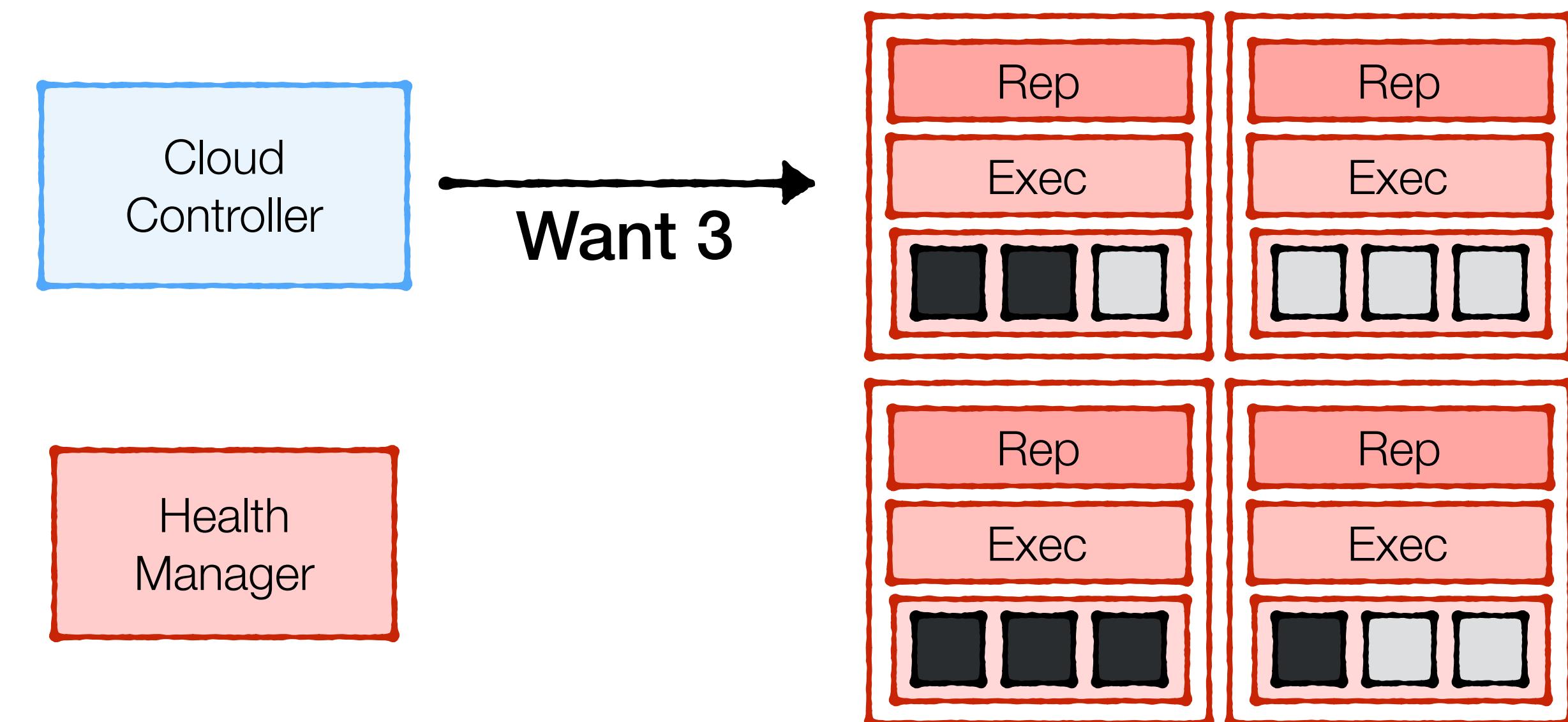
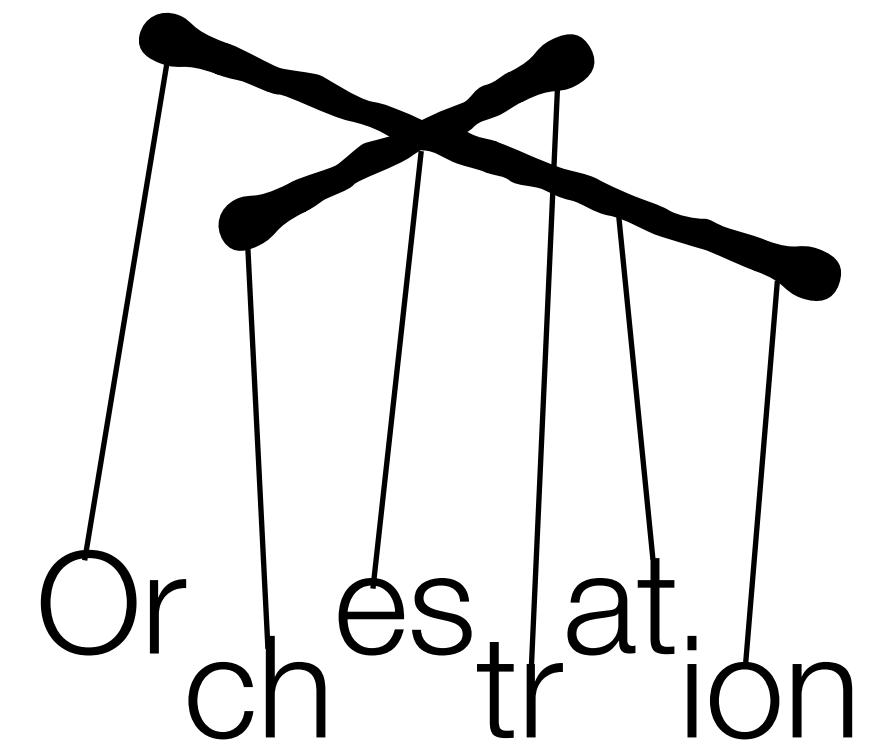
Show me Diego



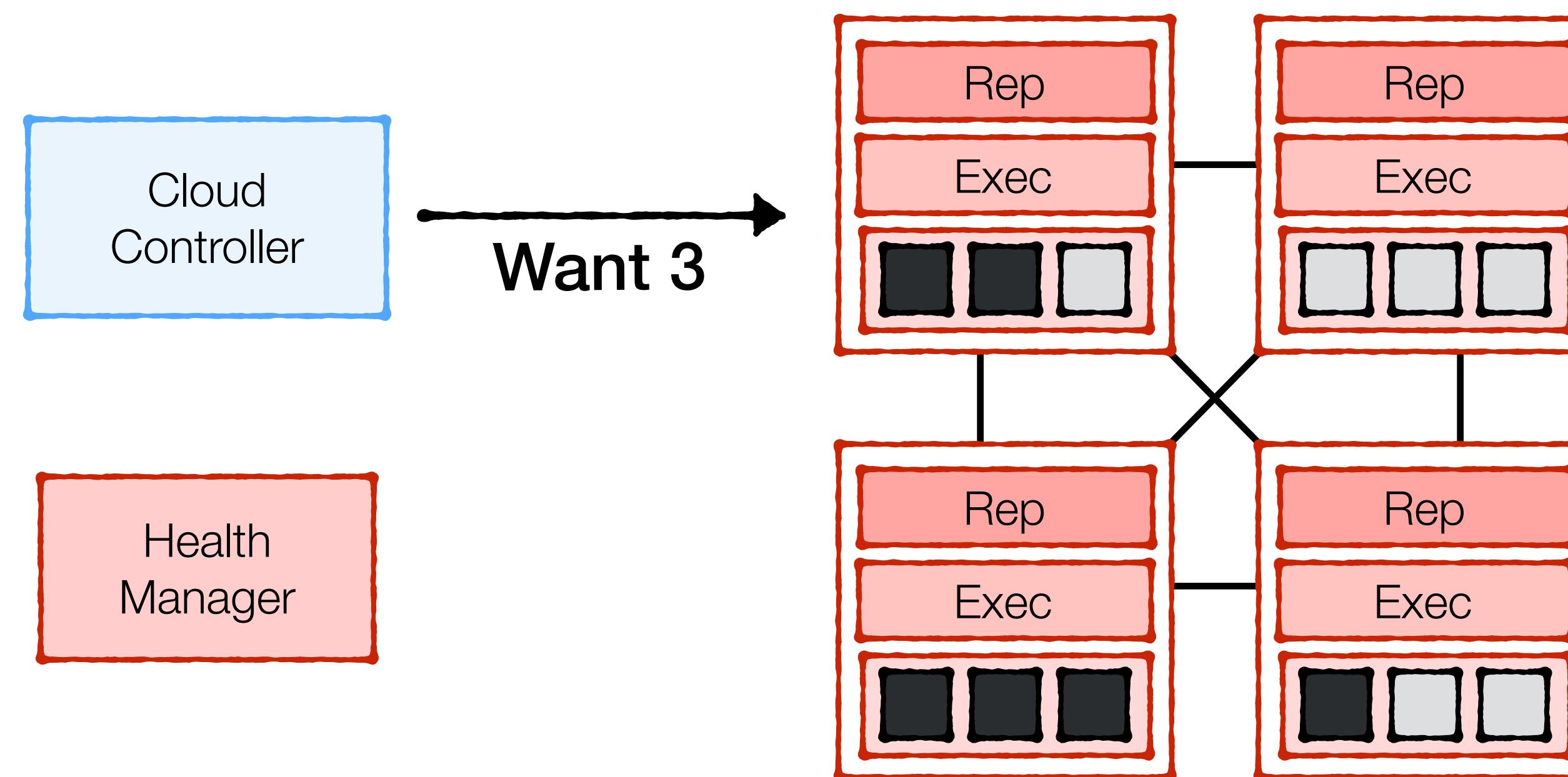
Show me Diego



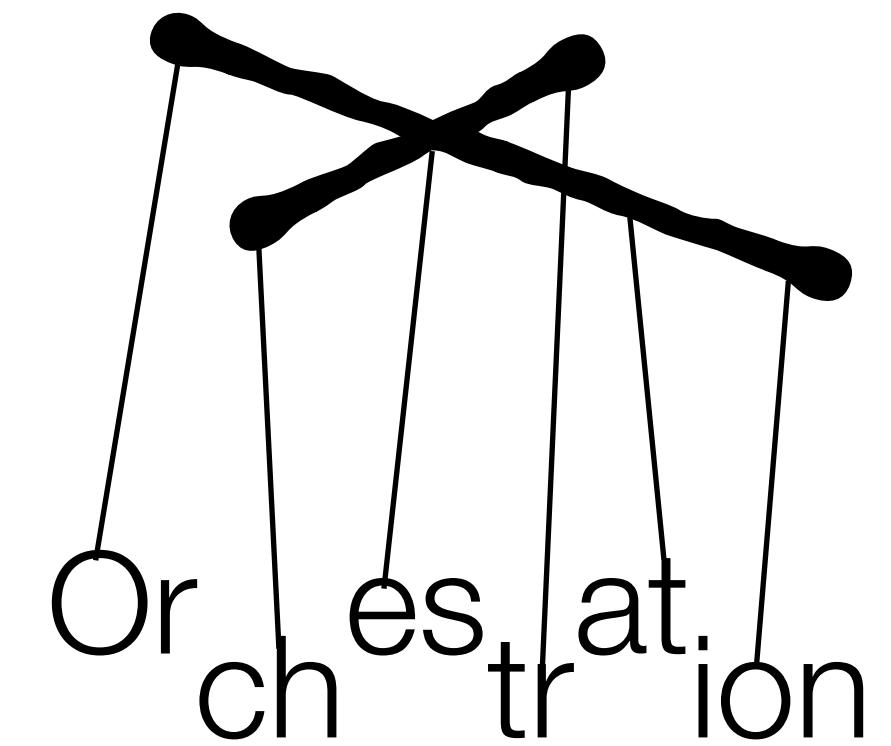
Show me Diego



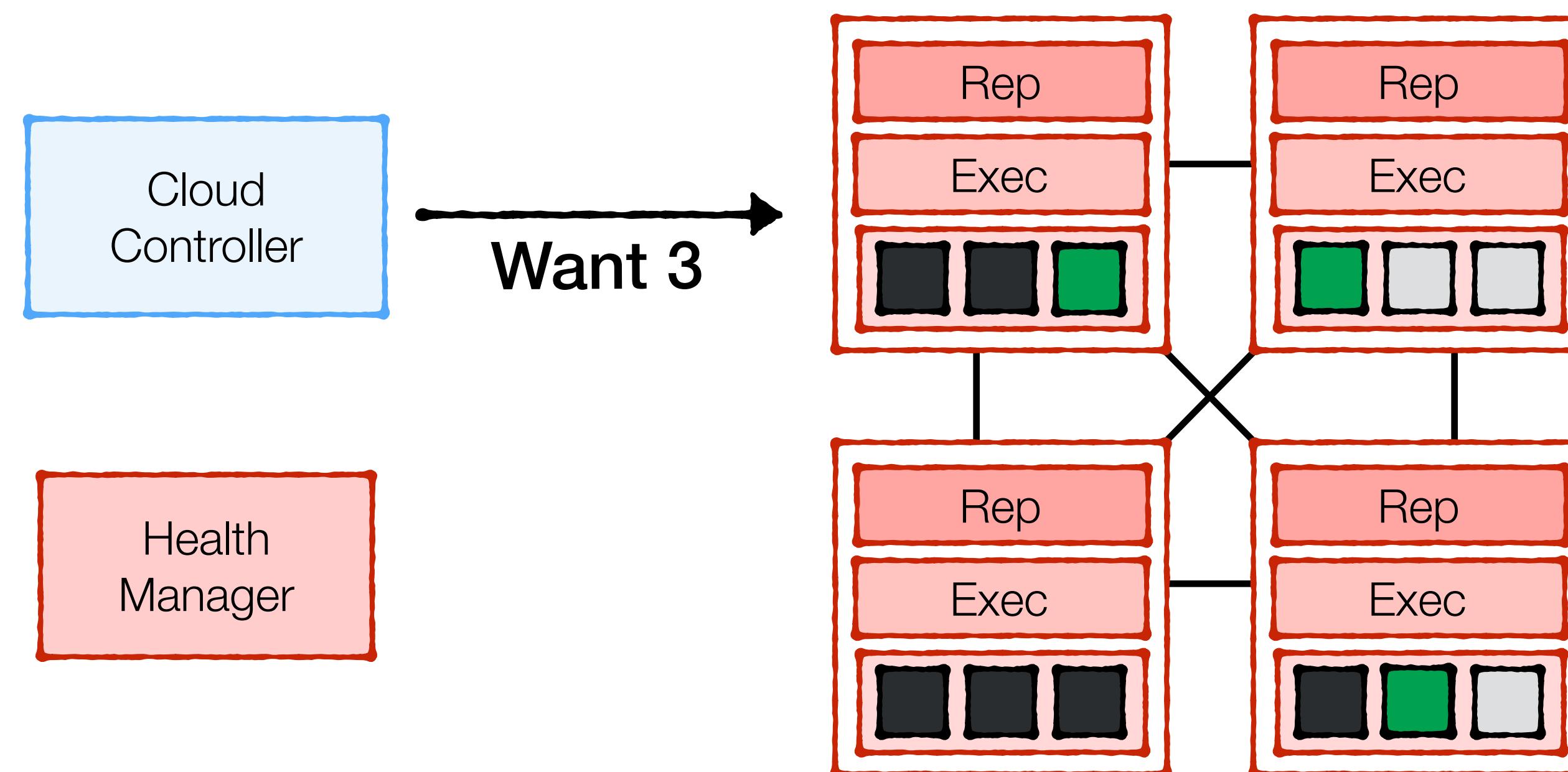
Show me Diego



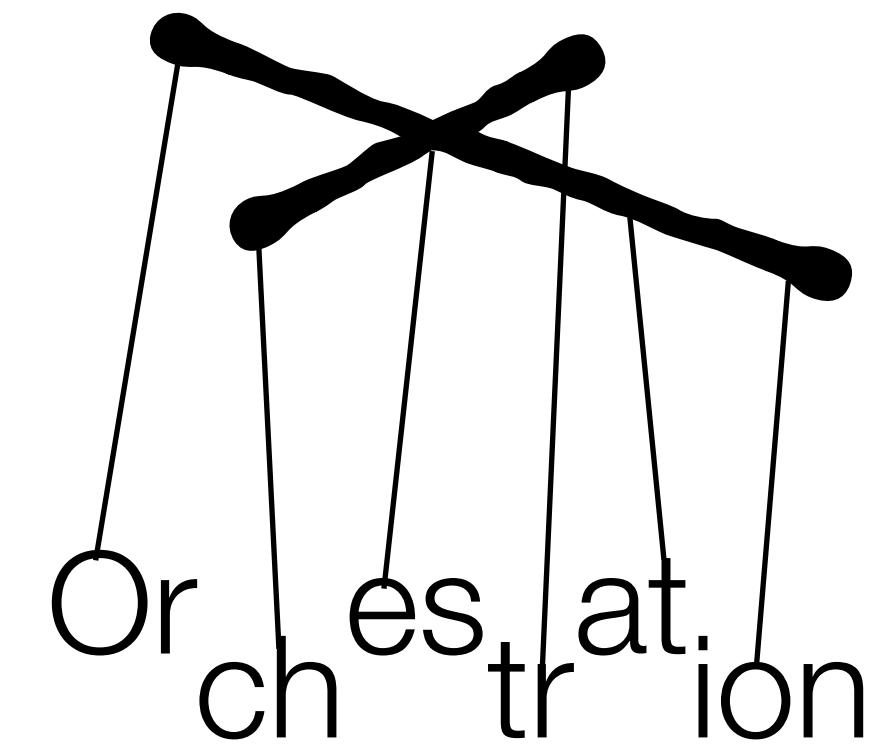
Hold **auctions**...



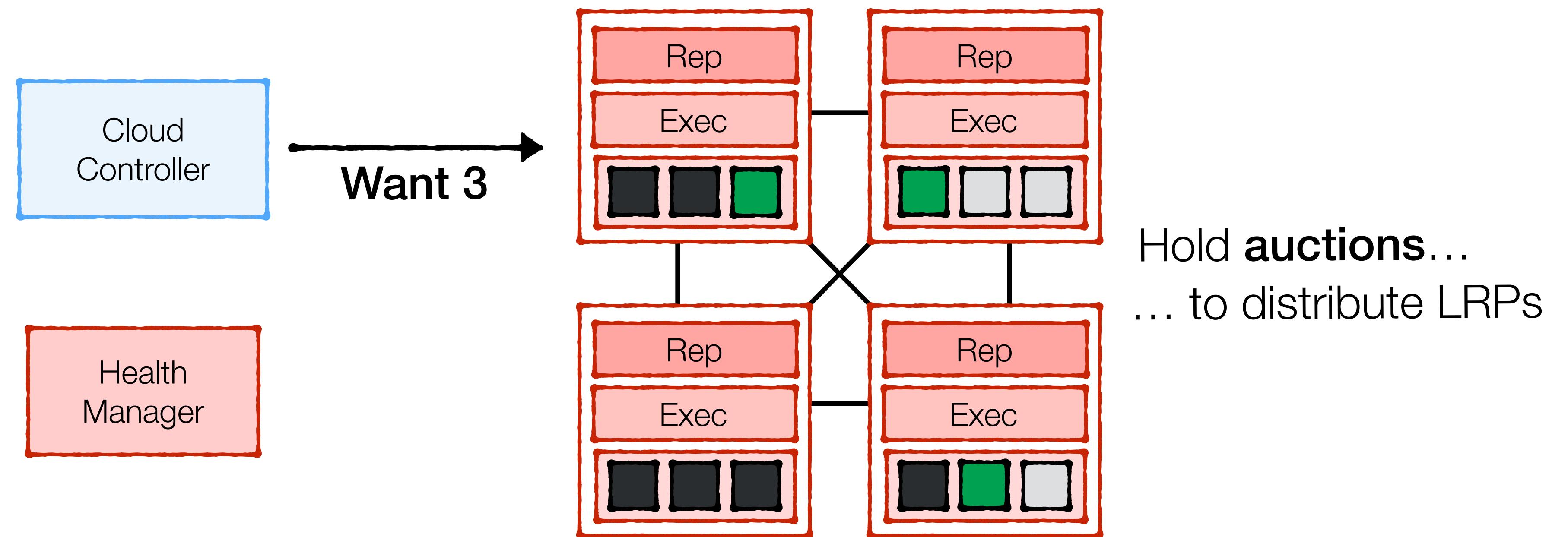
Show me Diego



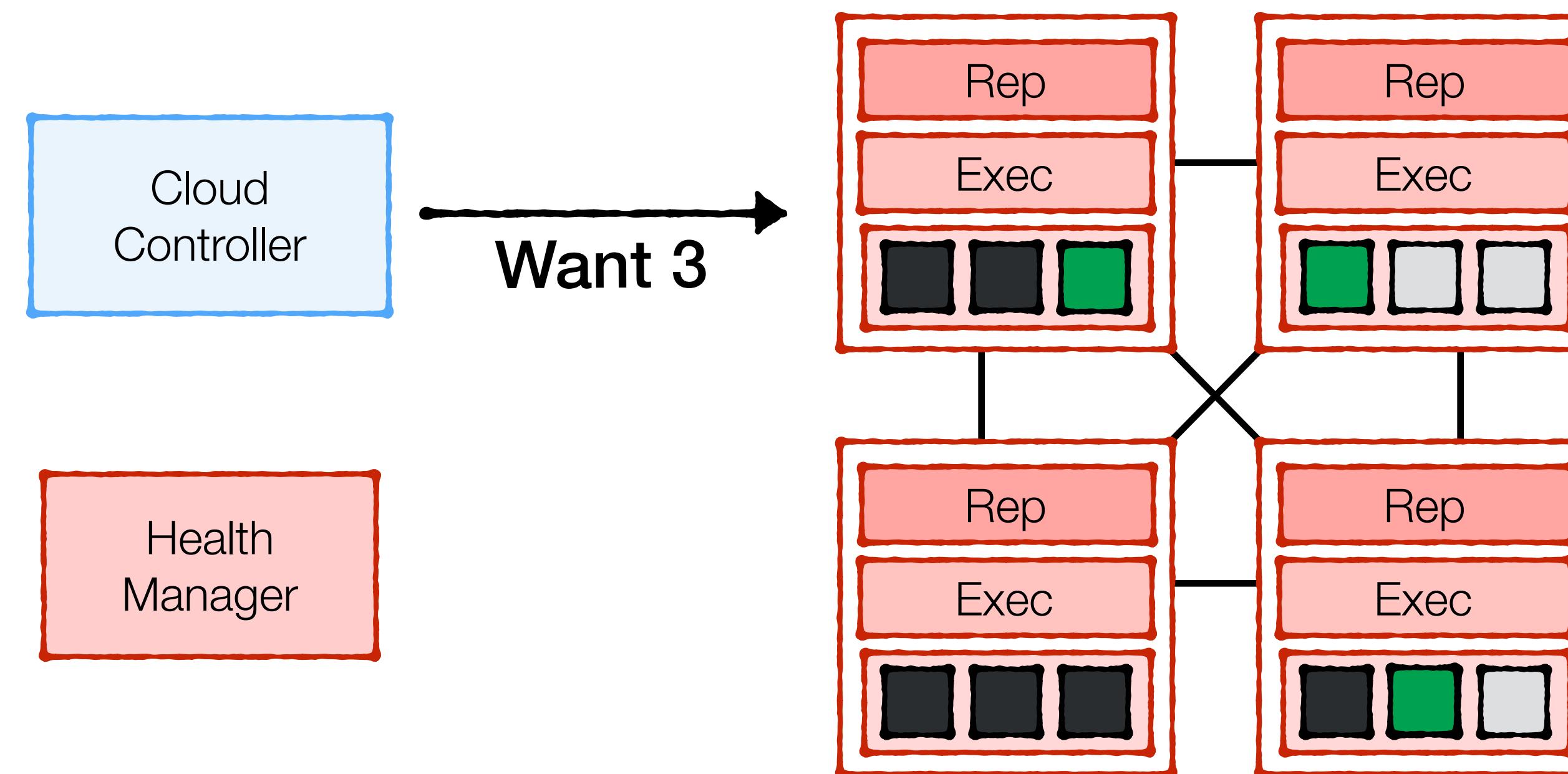
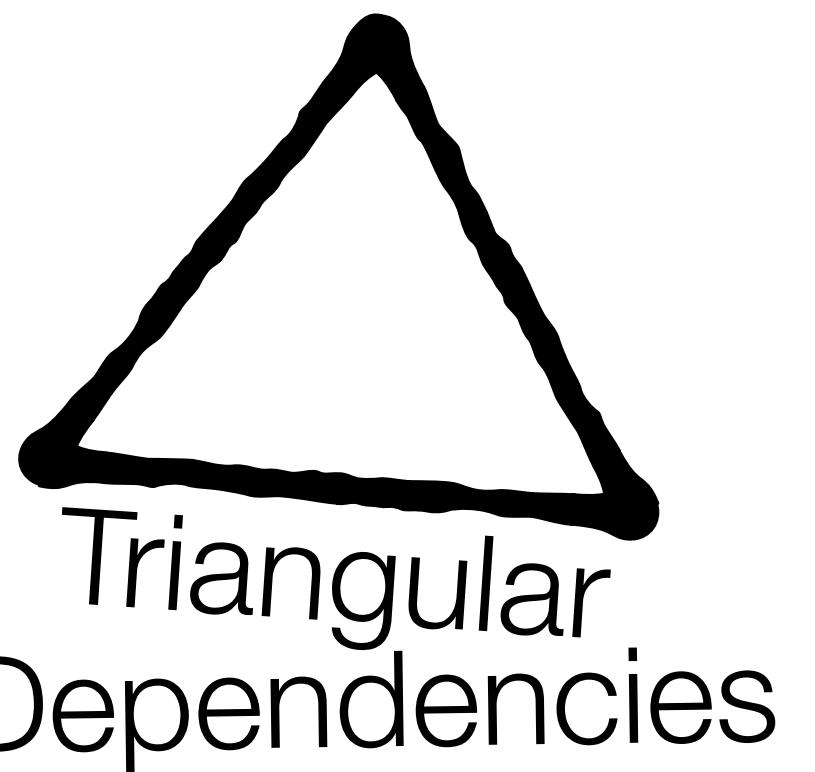
Hold **auctions**...
... to distribute LRPCs



Show me Diego

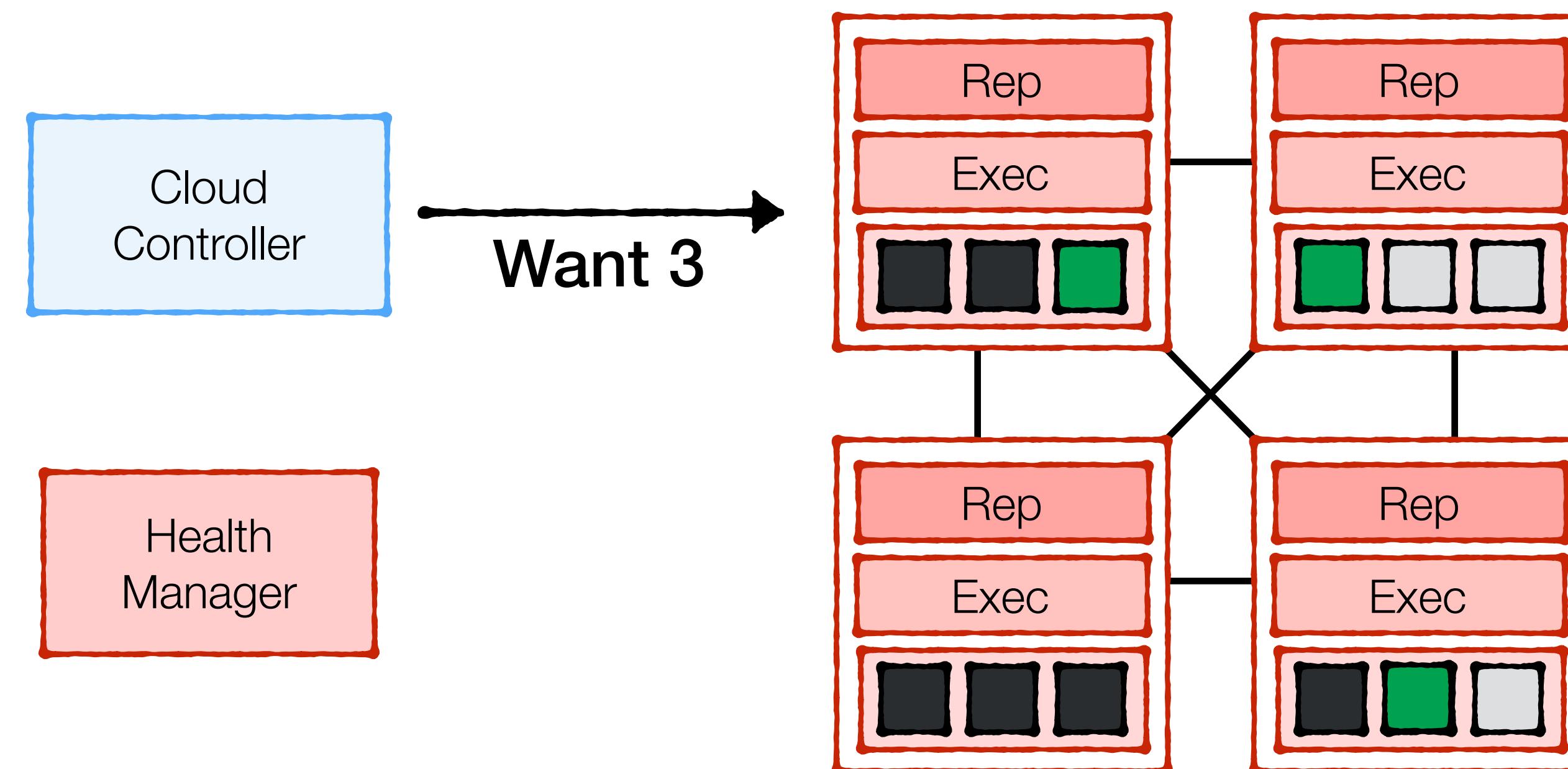


Show me Diego



Hold **auctions**...
... to distribute LRPs

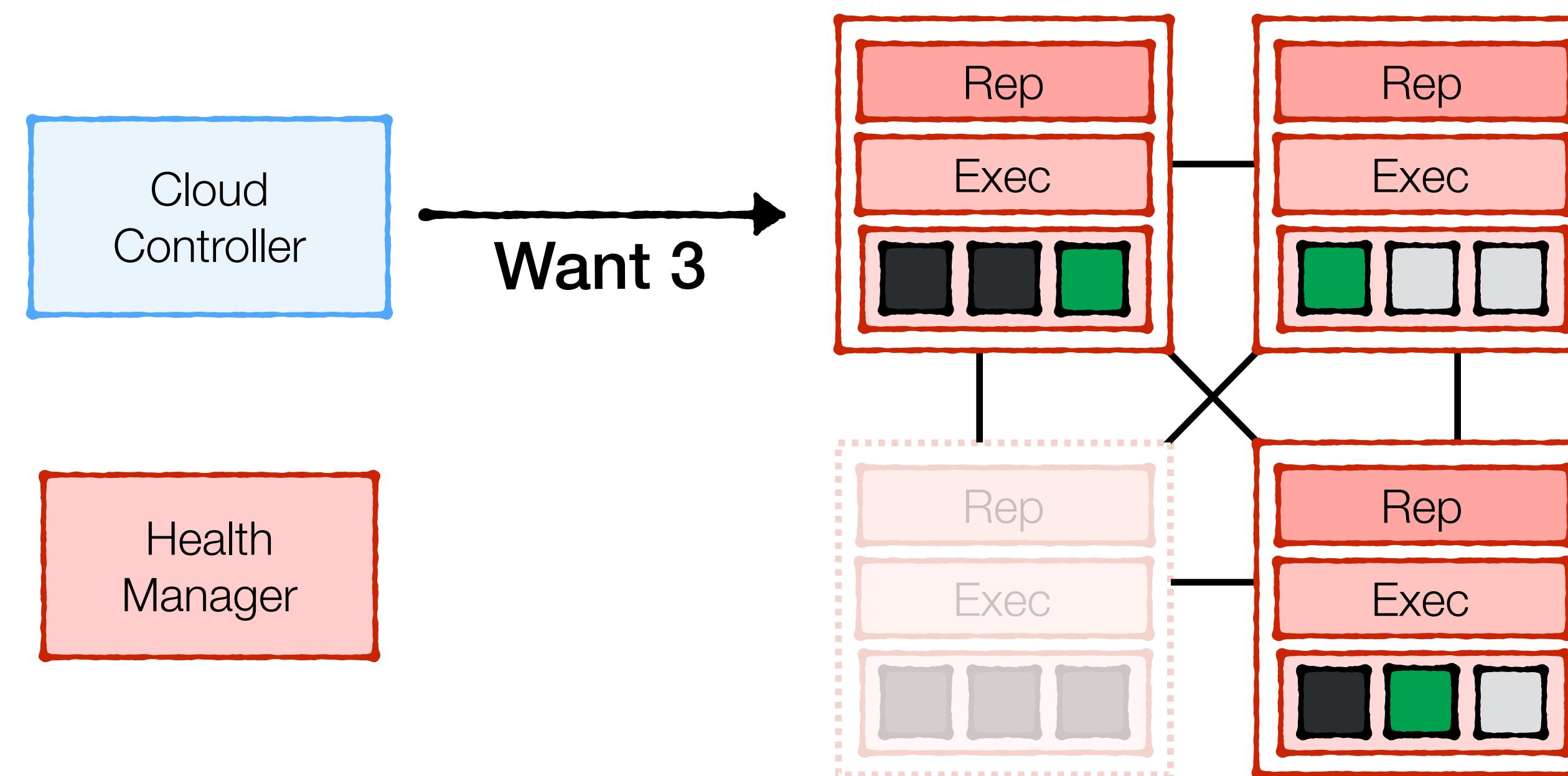
Show me Diego



Triangular
Dependencies

self managing
monitoring
healing

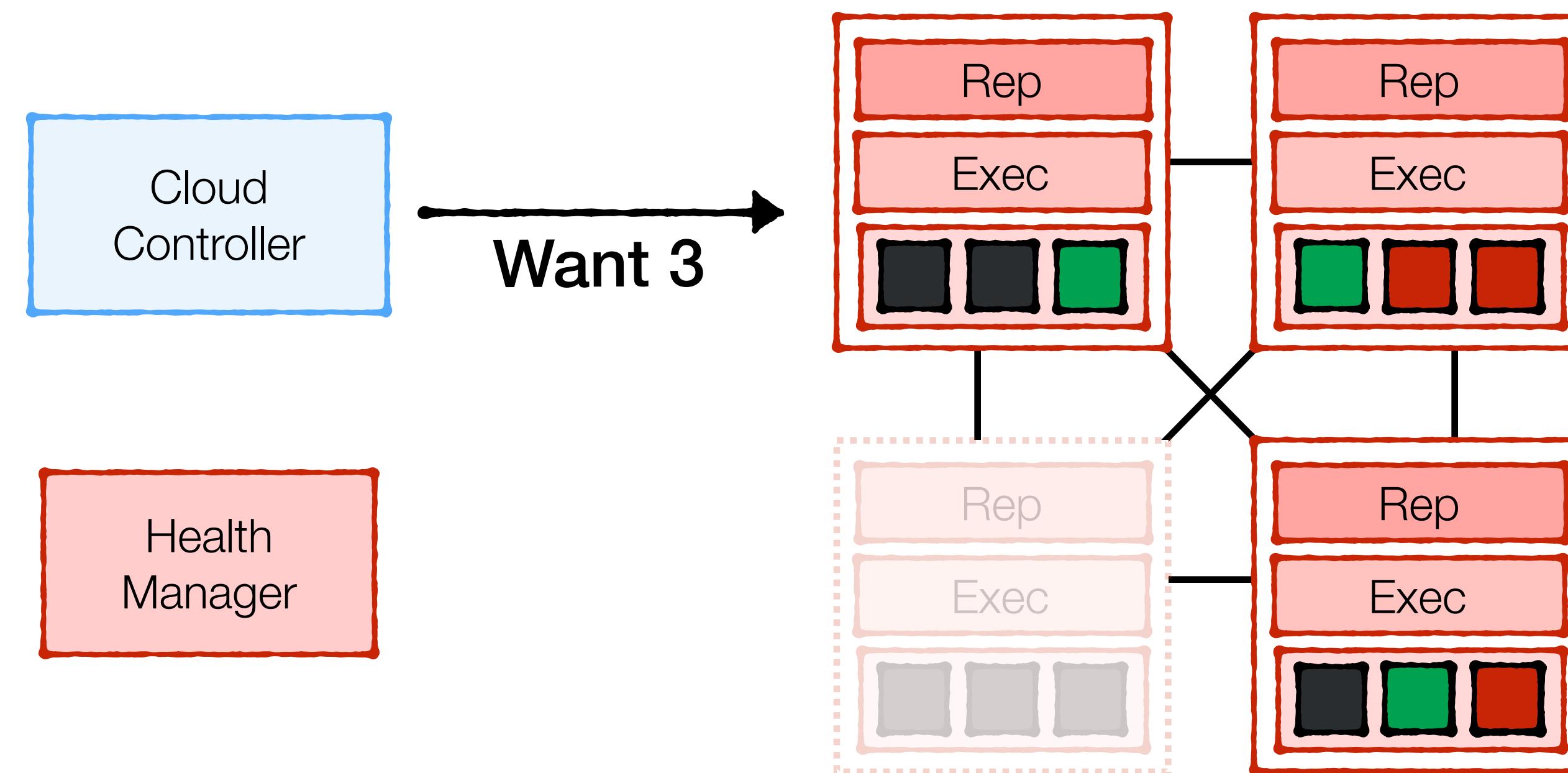
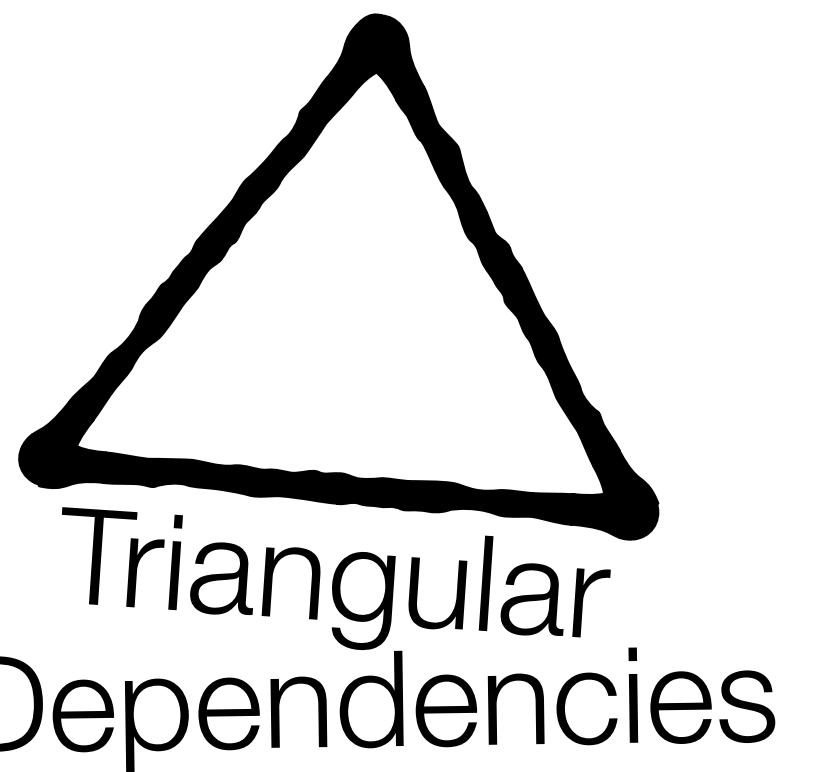
Show me Diego



Triangular
Dependencies

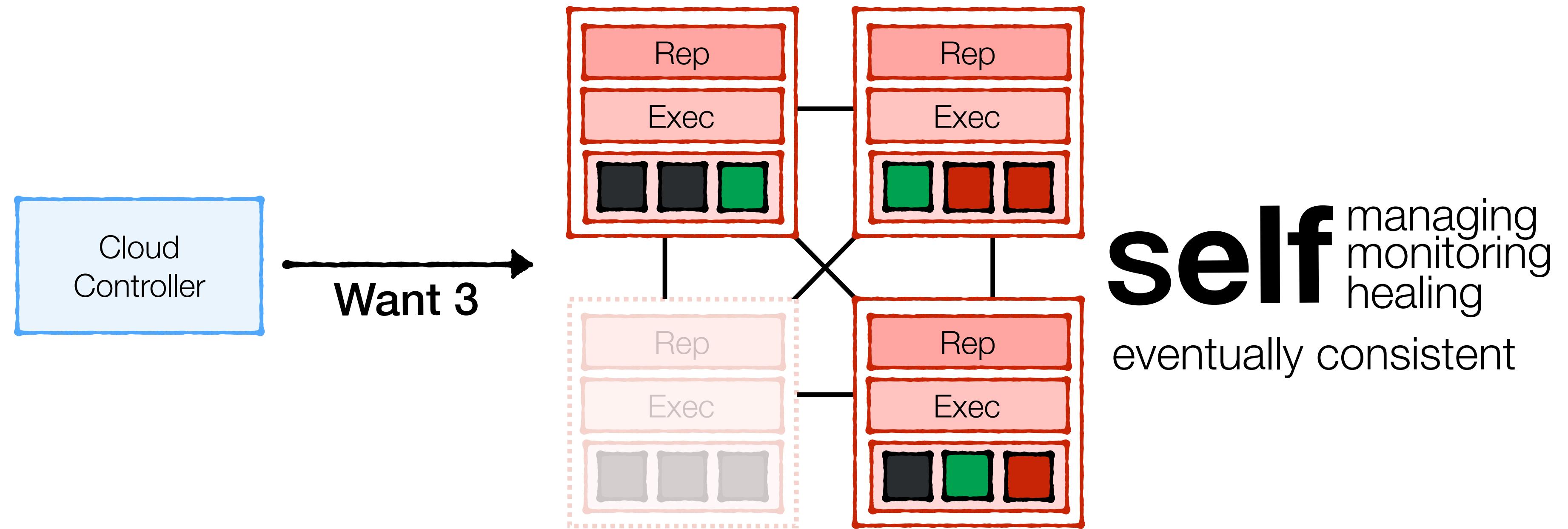
self managing
monitoring
healing

Show me Diego

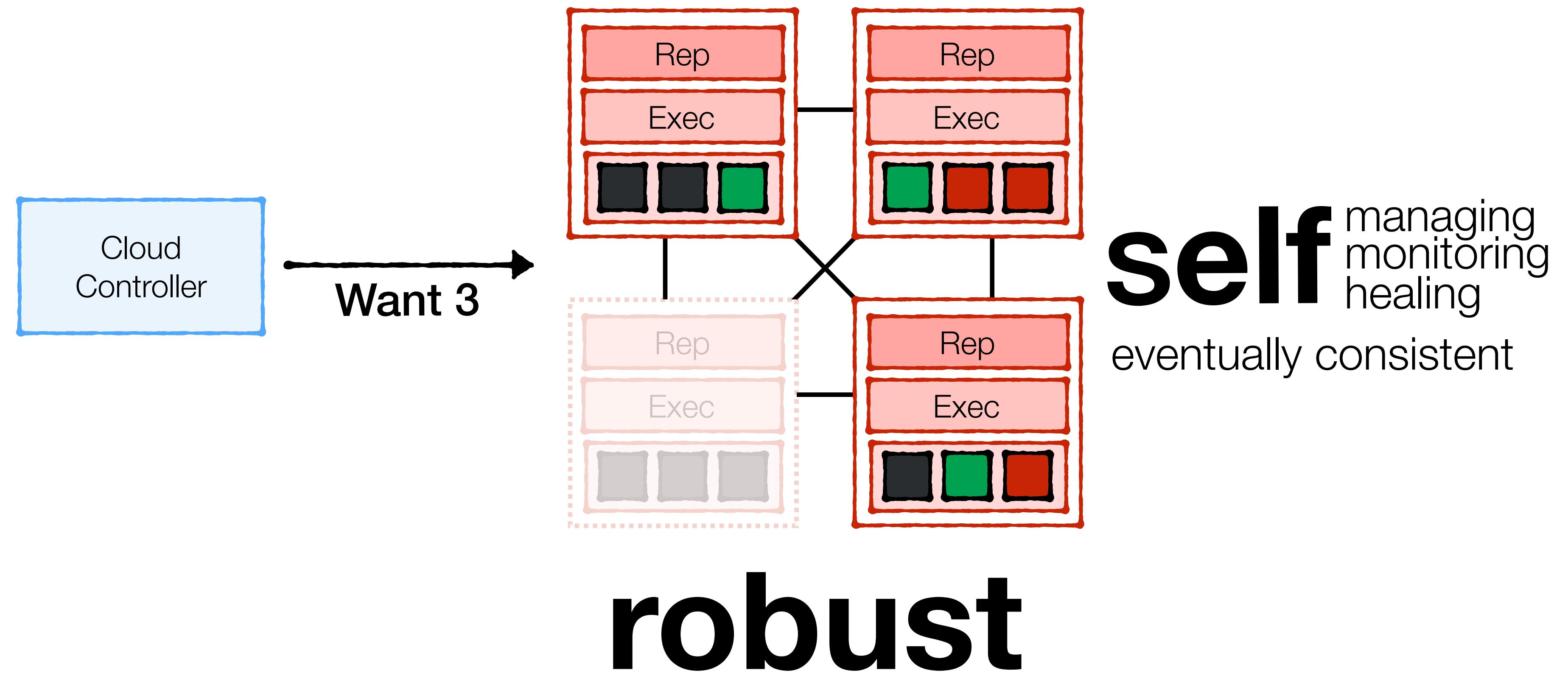


self managing
monitoring
healing
eventually consistent

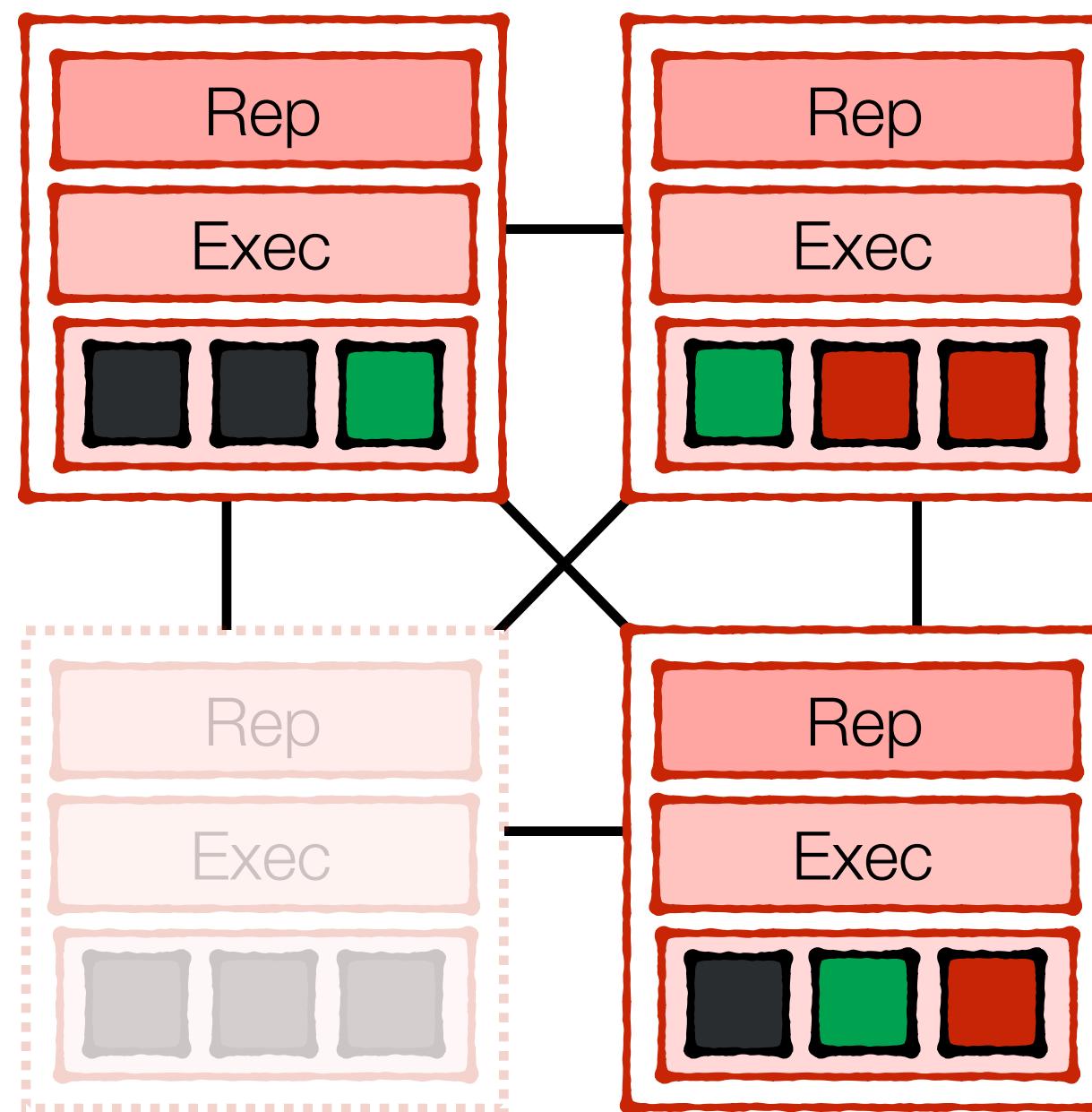
Show me Diego



Show me Diego

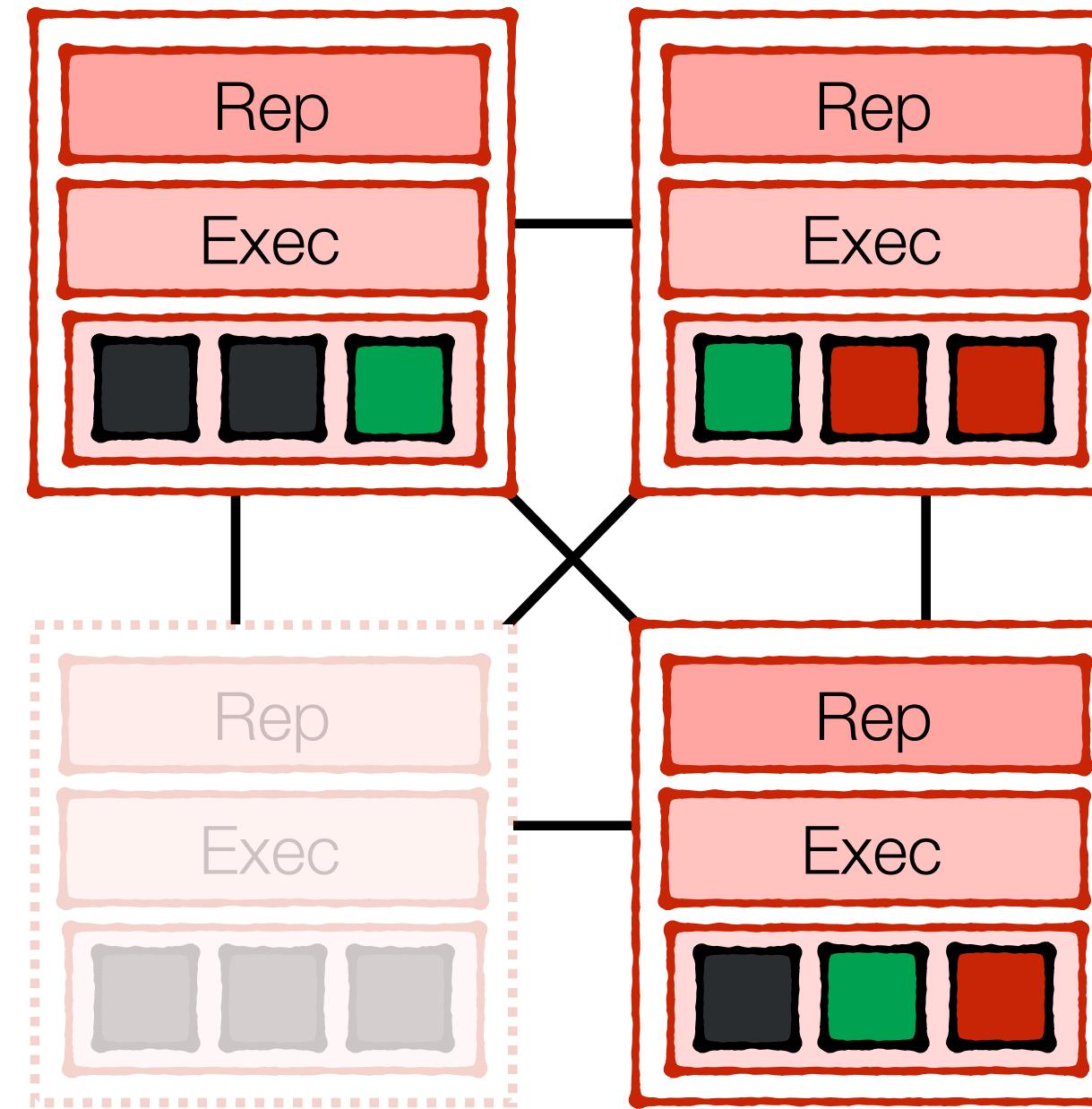


Show me Diego



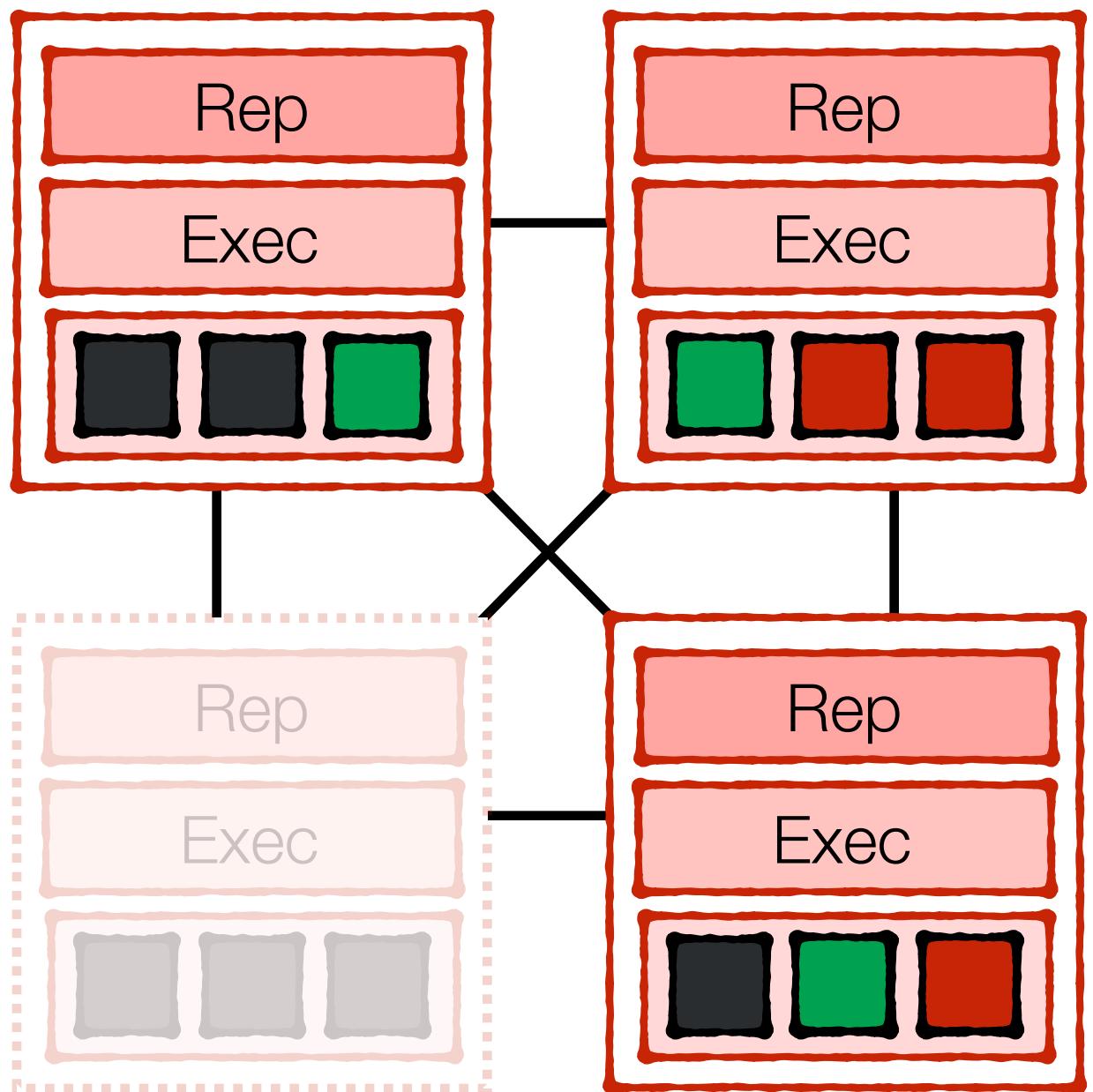
but...

Show me Diego



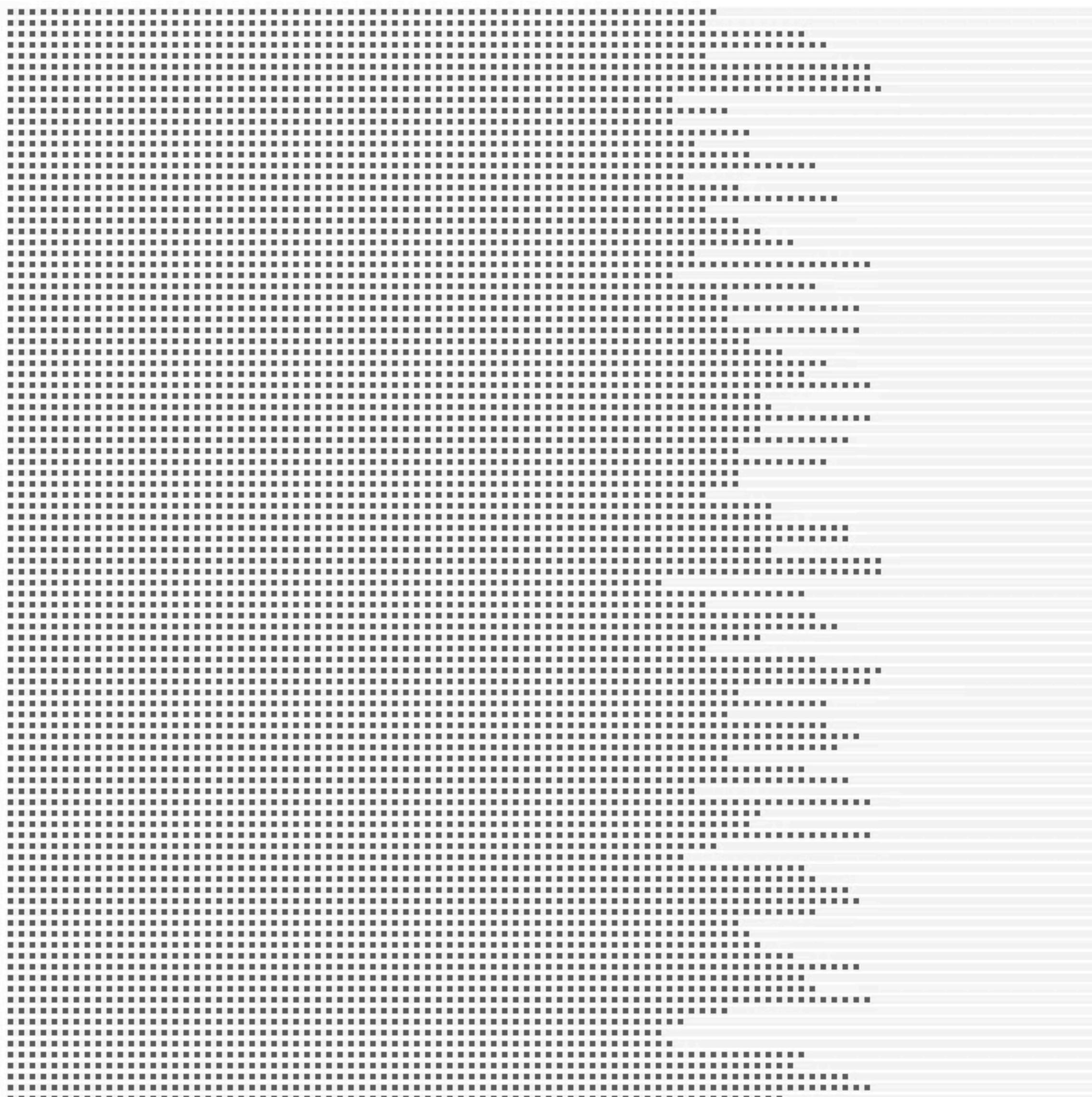
distributed auction
is **complex**
emergent behavior

Show me Diego



distributed auction
is **complex**
emergent behavior

Simulation-Driven Development



Show me Diego

complex interactions

hard to test

hard to reason through

Show me Diego

complex interactions

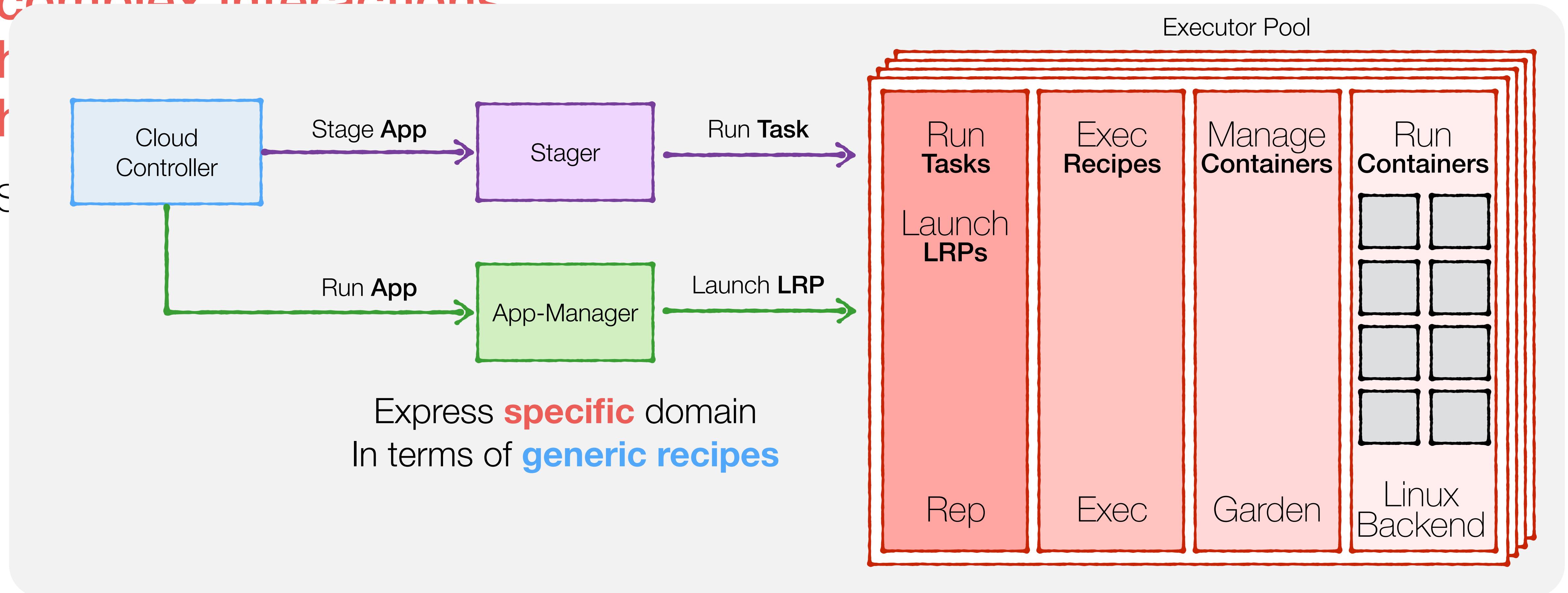
hard to test

hard to reason through

simulation driven

Show me Diego

Complex interactions



Show me Diego

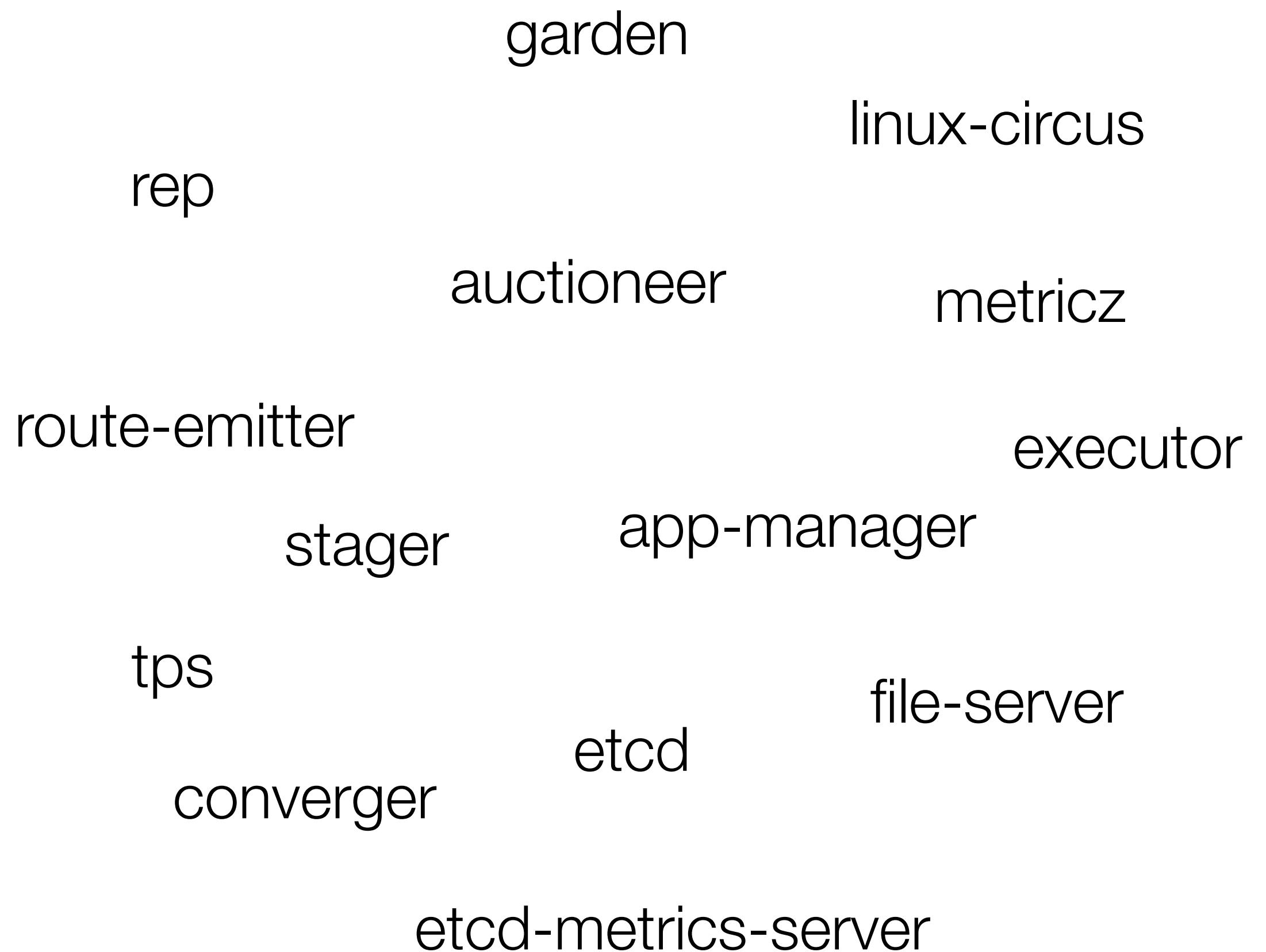
complex interactions

hard to test

hard to reason through

simulation driven

14 small single-responsibility
components!



Show me Diego

complex interactions

hard to test

hard to reason through

simulation driven

unit-tested ✓

garden ✓

rep✓

auctioneer✓

linux-circus✓

metricz ✓

route-emitter ✓

executor✓

stager✓

app-manager✓

tps✓

file-server ✓

converger ✓

etcd ✓

etcd-metrics-server✓

Show me Diego

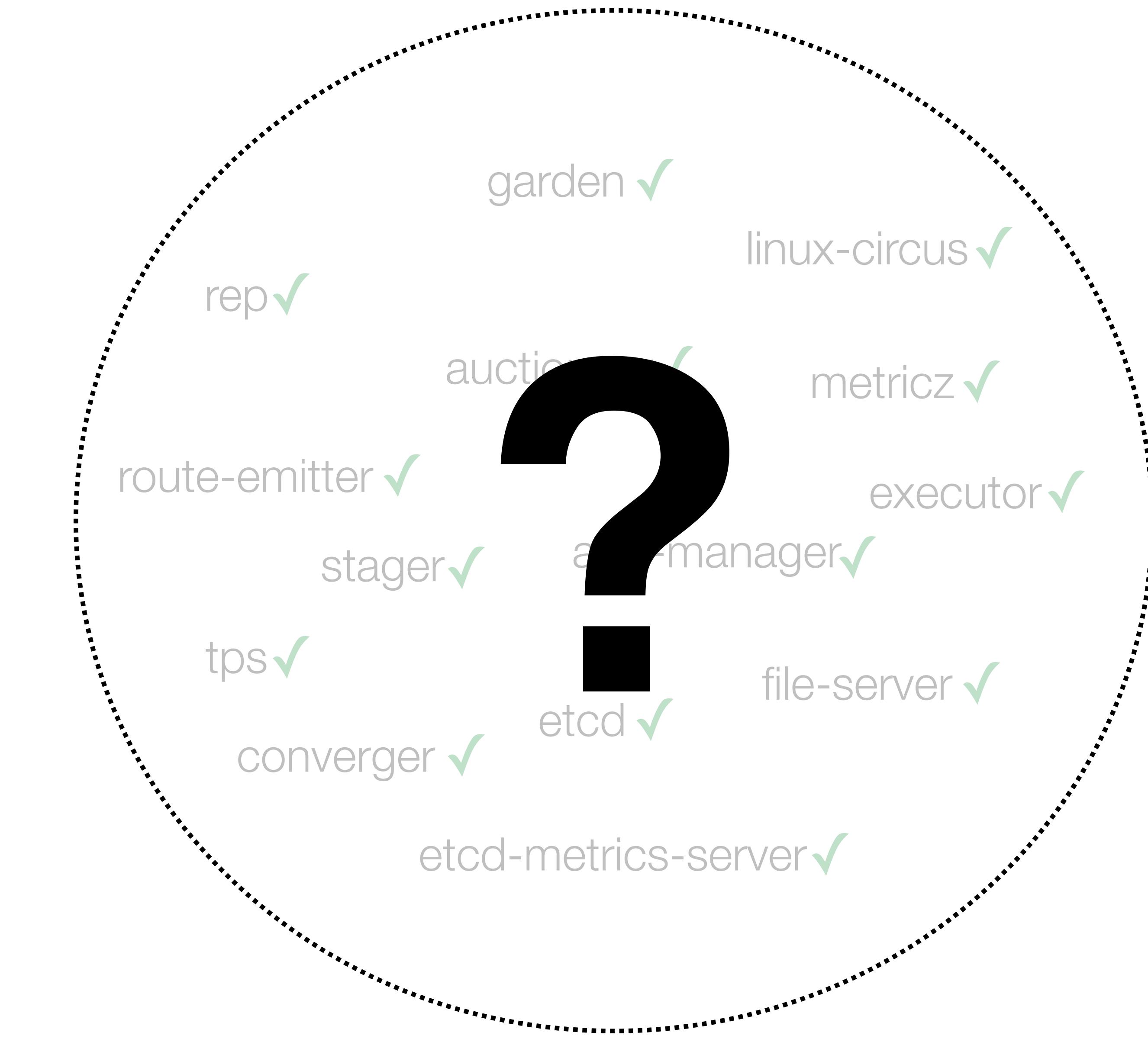
complex interactions

hard to test

hard to reason through

simulation driven

unit-tested ✓



Show me Diego

complex interactions

hard to test

hard to reason through

simulation driven

unit-tested ✓

garden ✓

rep✓

auctioneer✓

linux-circus✓

metricz ✓

route-emitter ✓

executor✓

stager✓

app-manager✓

tps✓

file-server ✓

converger ✓

etcd ✓

etcd-metrics-server✓

Actors

Show me Diego

complex interactions

hard to test

hard to reason through

simulation driven

unit-tested ✓

Actors
Diego is a play

garden ✓

rep ✓

auctioneer ✓

linux-circus ✓

metricz ✓

route-emitter ✓

stager ✓

app-manager ✓

executor ✓

tps ✓

converger ✓

etcd ✓

file-server ✓

etcd-metrics-server ✓

Show me Diego

complex interactions

hard to test

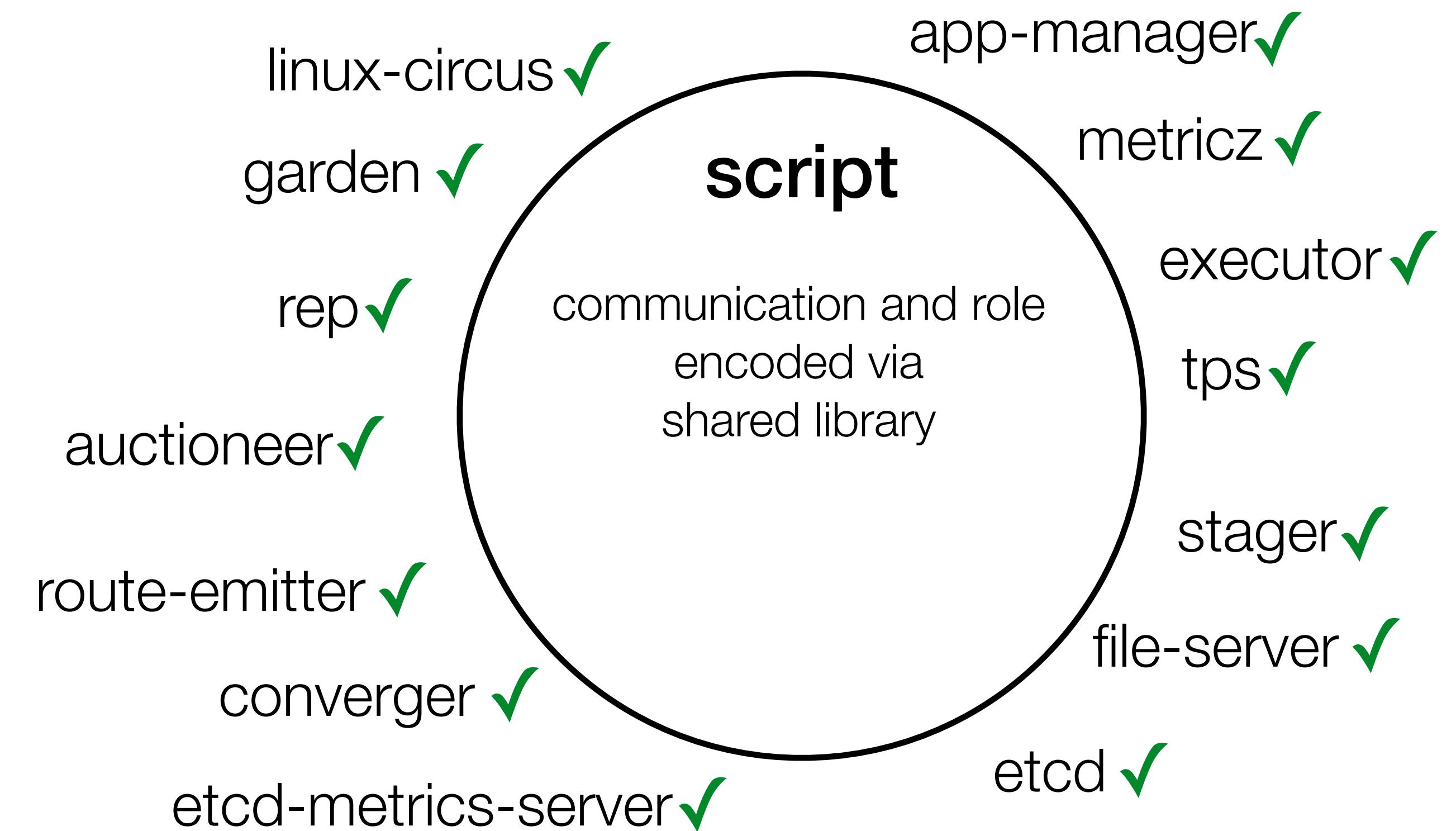
hard to reason through

simulation driven

unit-tested ✓

shared narrative

Actors Diego is a play



Show me Diego

complex interactions

hard to test

hard to reason through

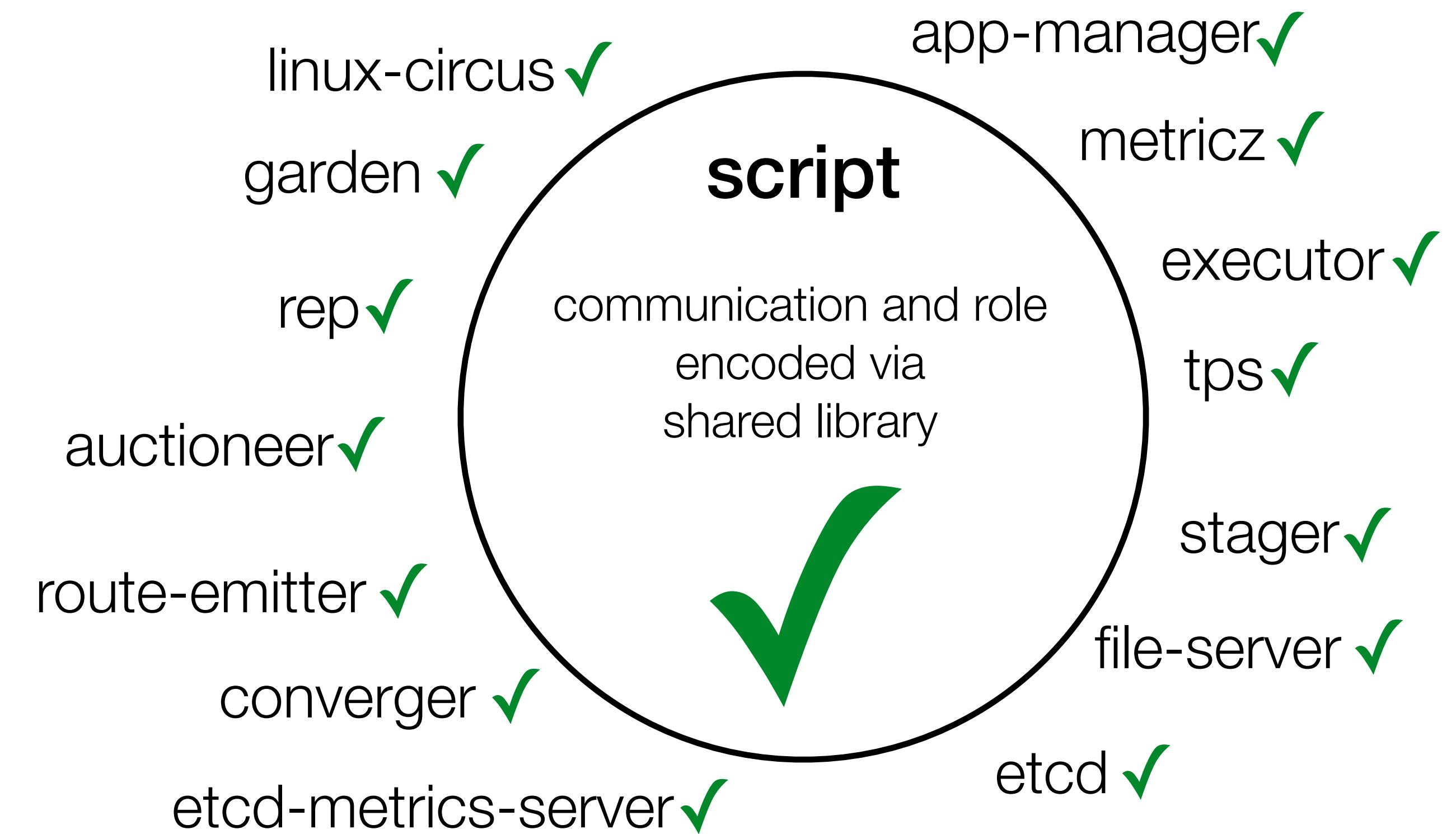
simulation driven

unit-tested ✓

shared narrative

integration tests ✓

Actors Diego is a play



Show me Diego

complex interactions

hard to test

hard to reason through

simulation driven

unit-tested ✓

shared narrative

integration tests ✓

complexity in a distributed system
of this scope is
real and **necessary**

Diego embraces this and tries
to make its complexity:

explicit

transparent

∴ easier to reason about

Show me Diego

Tasks/LRPs flexible abstraction

Platform-Independent extensible

SELFManaging robust

Handle on Complexity agile

DIEGO

ElasticRuntime 2.0

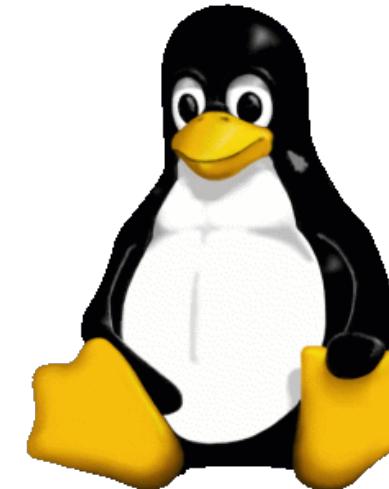
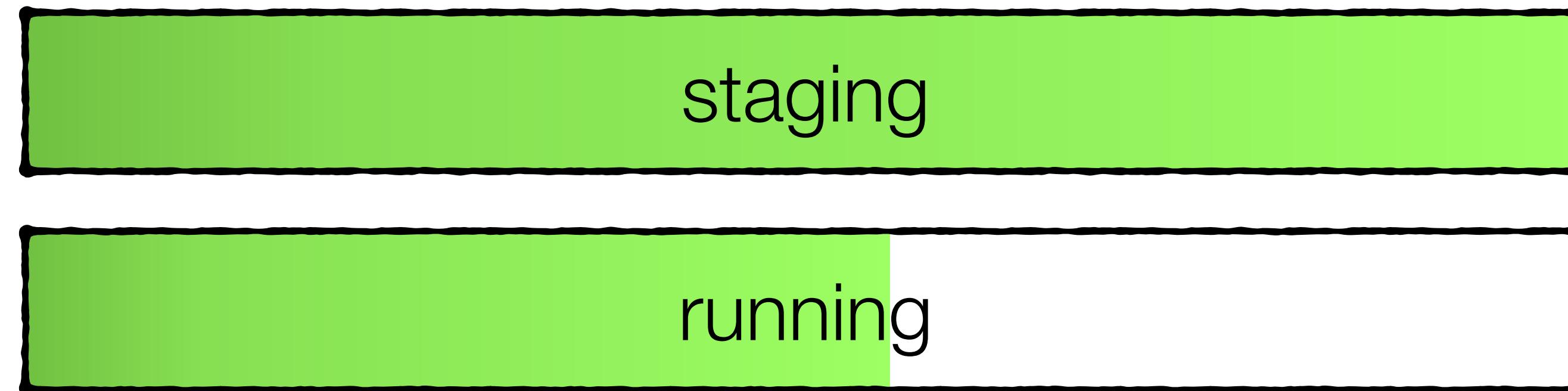
What?

Why?

Show me...

The future

The future

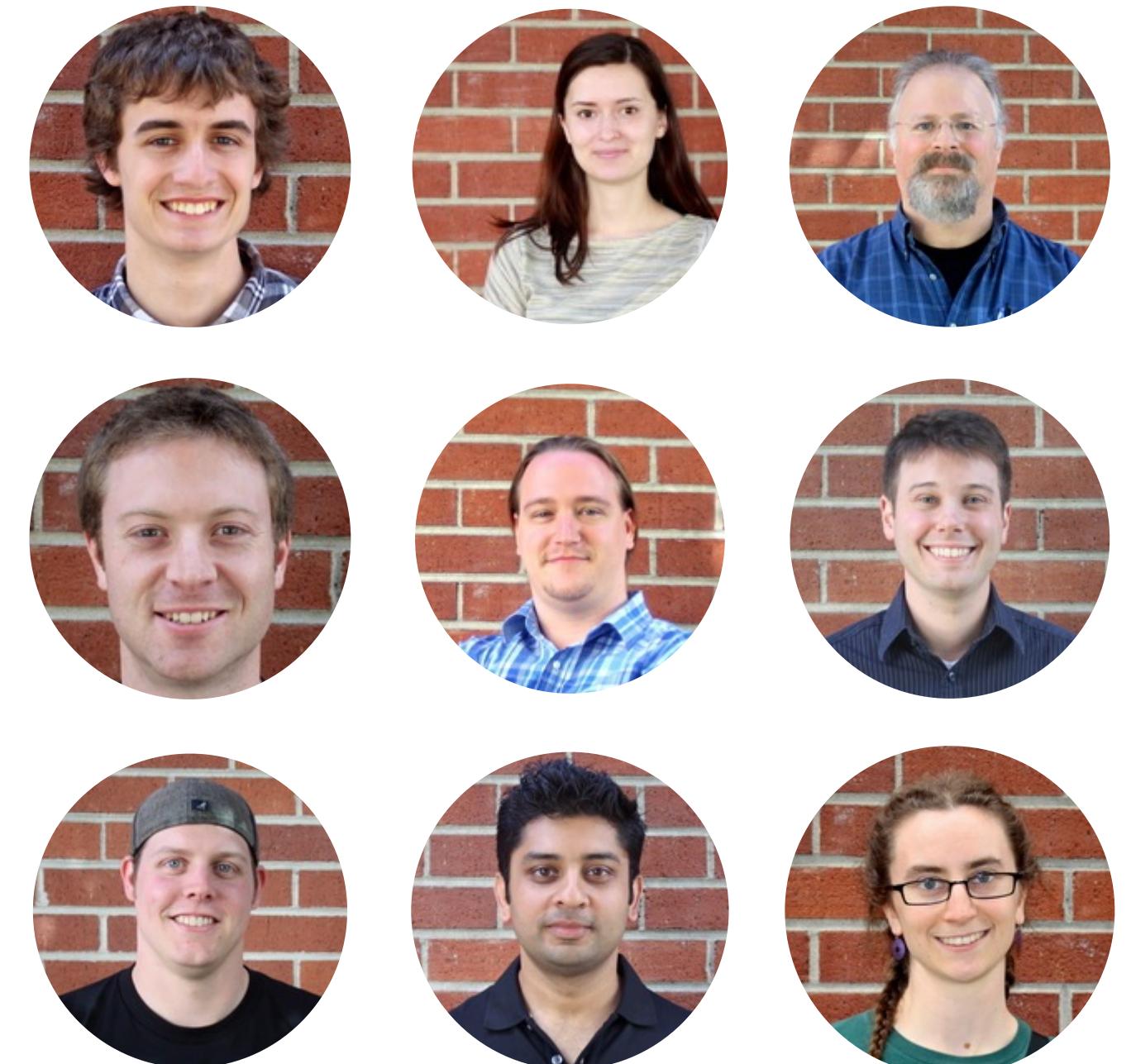
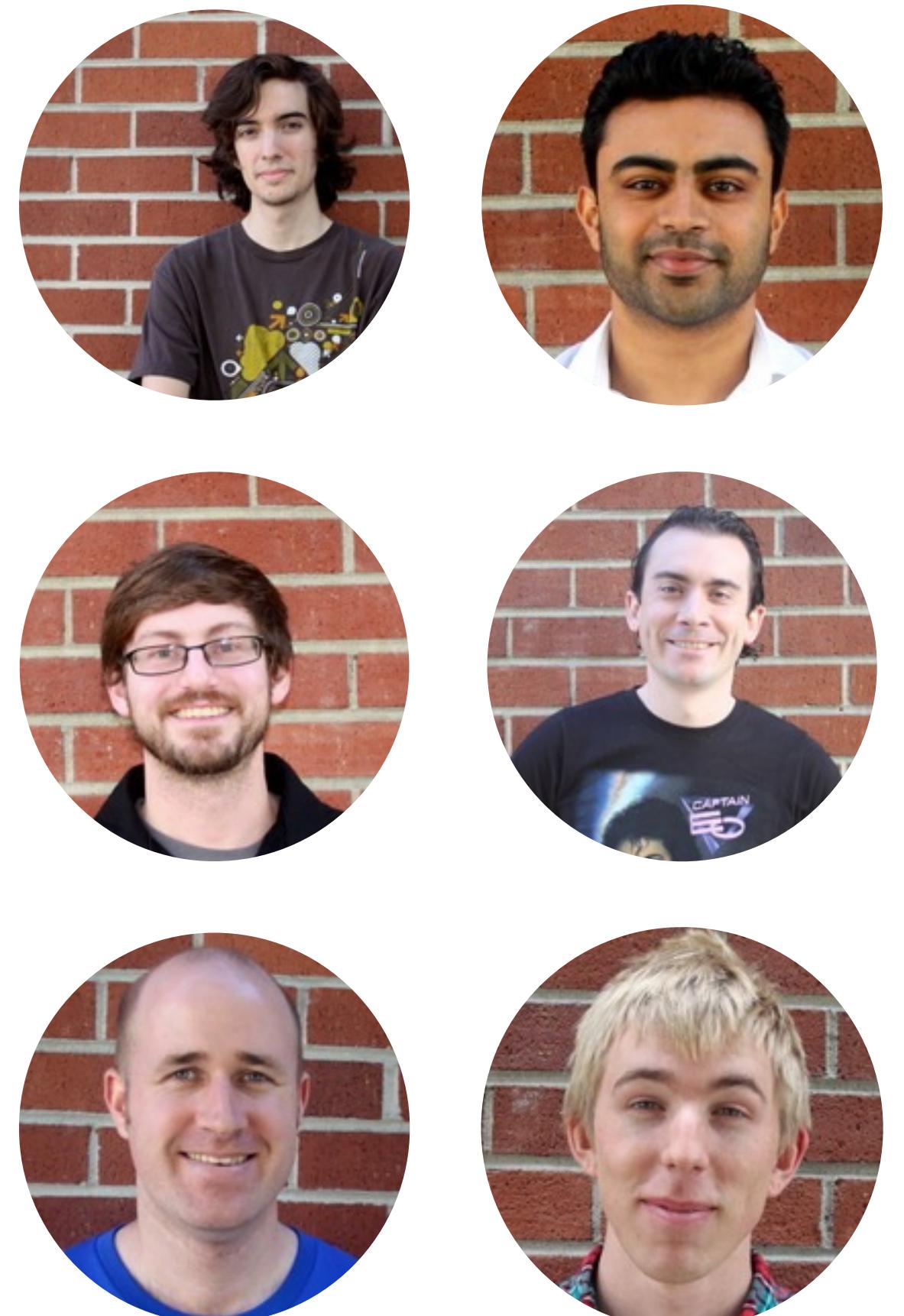
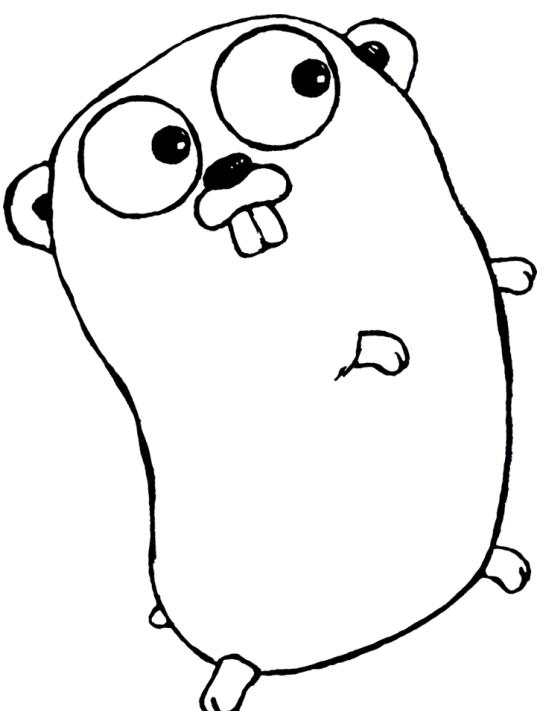
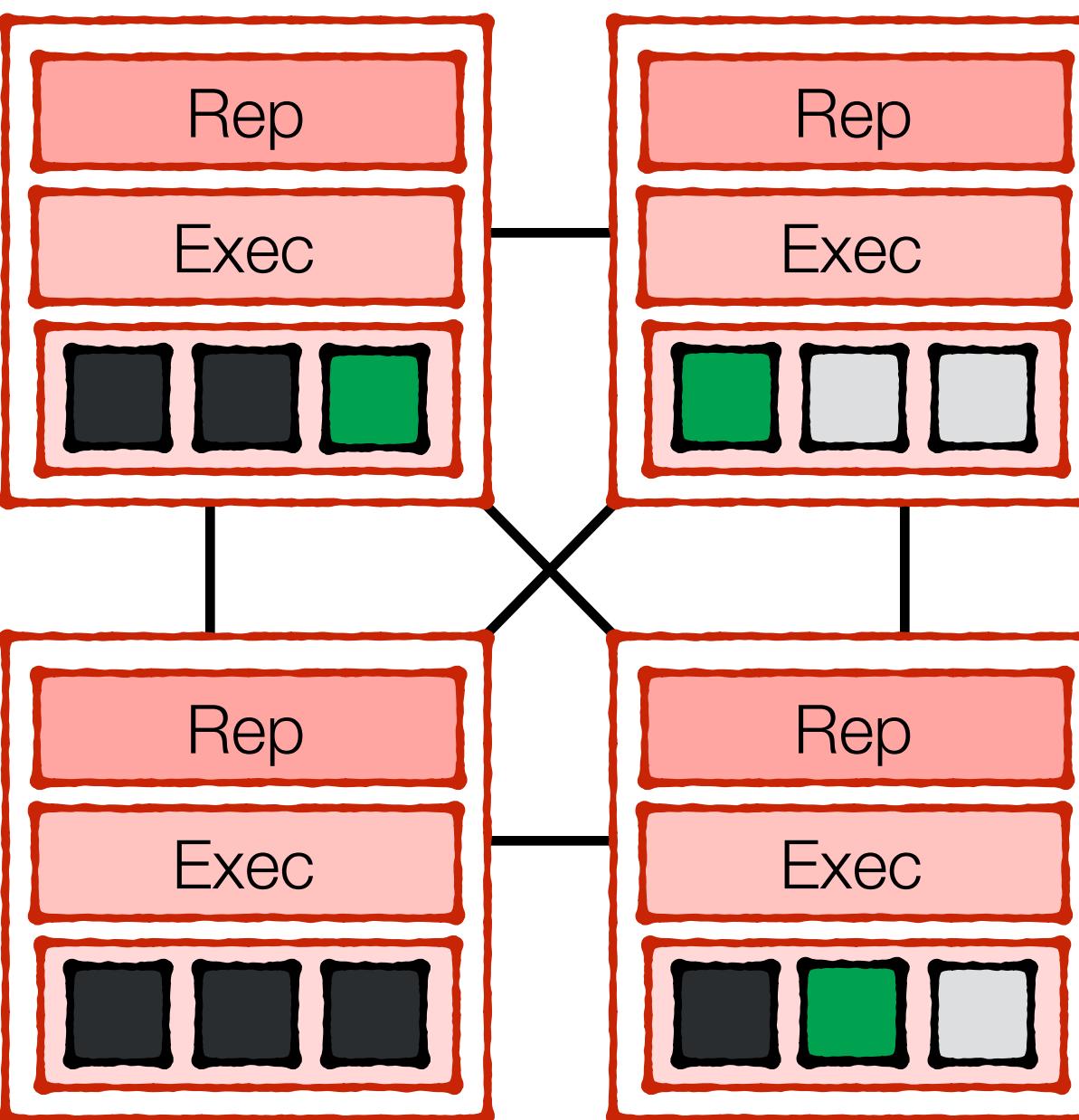


+ buildpacks

placement pools process types dockerfiles
shell access .NET persistent disk
0-downtime deploys auto-rebalancing custom health-checks

DIEGO

ElasticRuntime 2.0



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