
Operating Microservices

Surfacing Governance: Human Registry

- You're going to have a lot of services
- One (or more) for each business capability
- Sometimes humans want to understand the service estate
  - Governance, planning, organisation alignment, process re-engineering, etc
- You'll need to surface your estate in an accessible way
  - Not JSON apis
- But if you have an automated operational view of your estate, you already have what you need…

Mapping the Estate

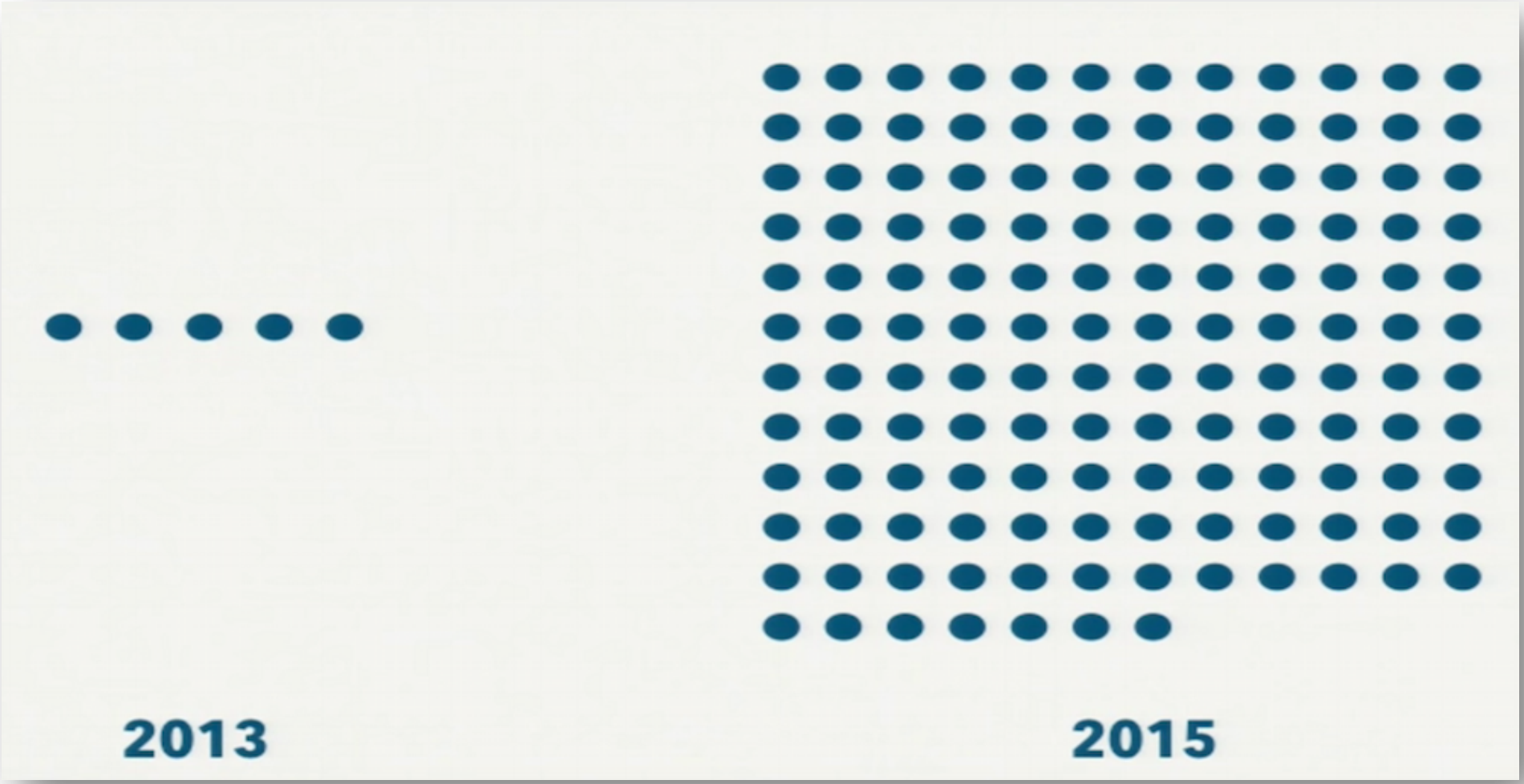
- You already have excellent data about the operational characteristics of your services
- Add small amounts of useful descriptive text into your service definitions in that operational management system
- Then you have your registry
  - Even better than just having a wiki
  - And way better than some heavyweight “proper” registry
- See operating microservices for how this is done for real

Motivating Example: Lending Club

- Lending Club is the world's largest credit marketplace
  - P2P lending
- Real money at stake for borrowers and investors

https://neo4j.com/blog/managing-microservices-neo4j/

Explosive Growth in Services

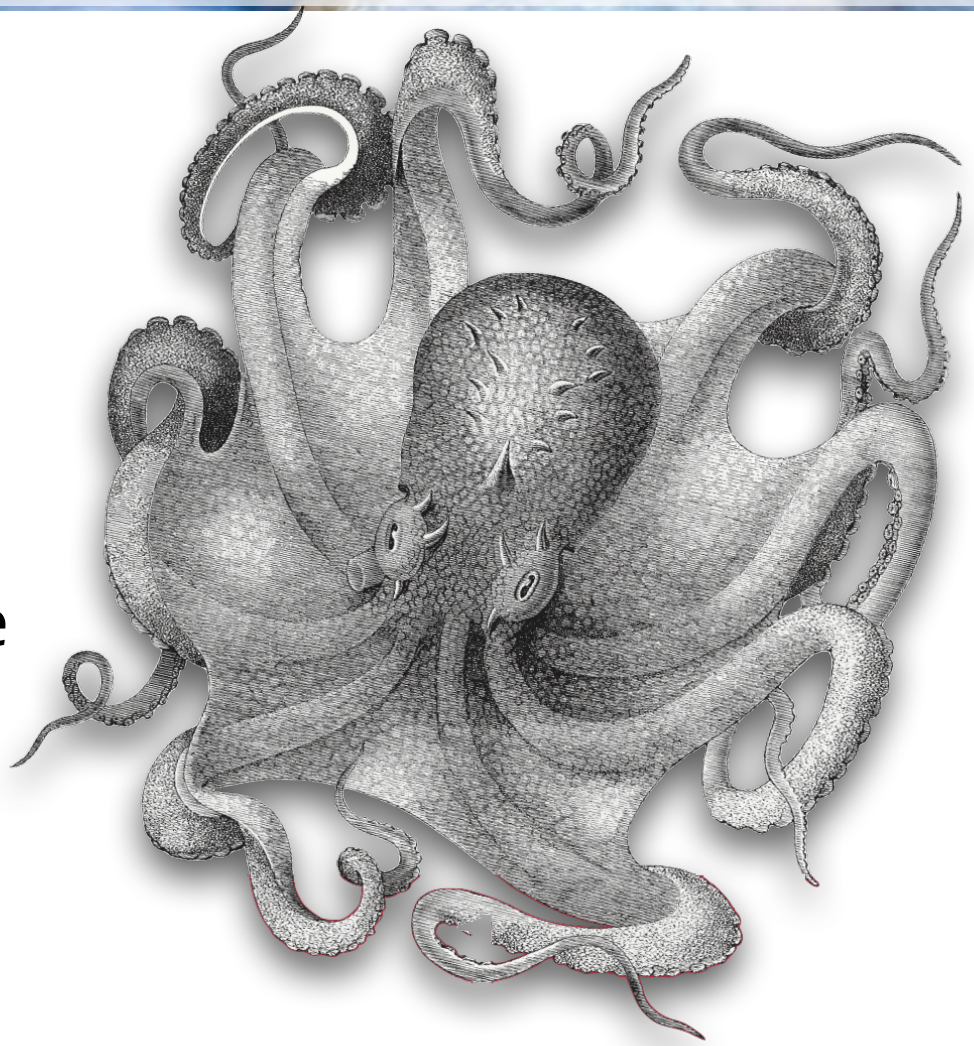


It’s not (Just) About Containers


MACGYVER

MacGyver has its Tendrils Everywhere

- GitHub
- AWS
- Splunk
- HipChat
- Vmware
- And plenty more

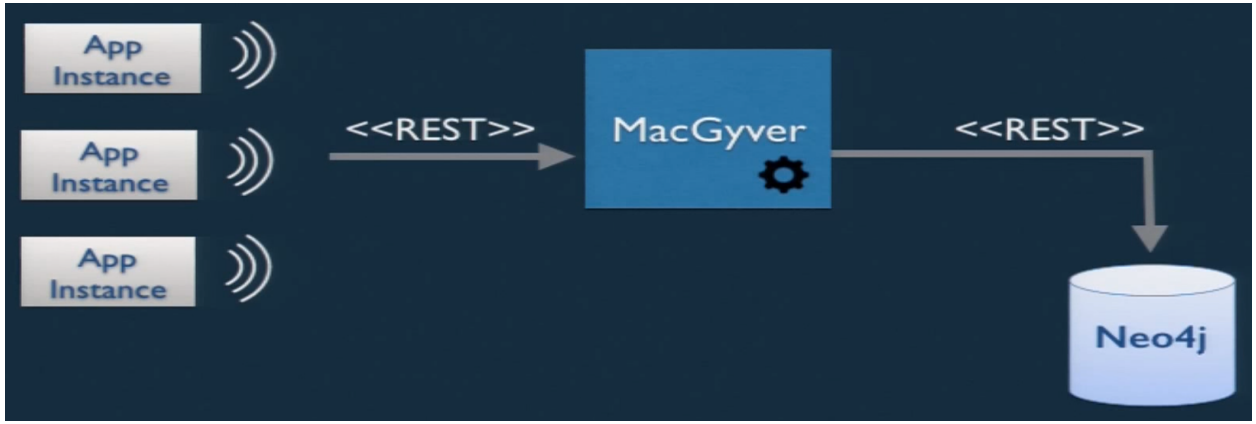


Important information is siloed

App Check-In and Service Discovery

- Over 1,000 servers, hard to keep track of what's out there, and what's going on,
- All servers to phone home to MacGyver every minute
  - App ID
  - Revisions
  - Environment

App Check-In and Service Discovery



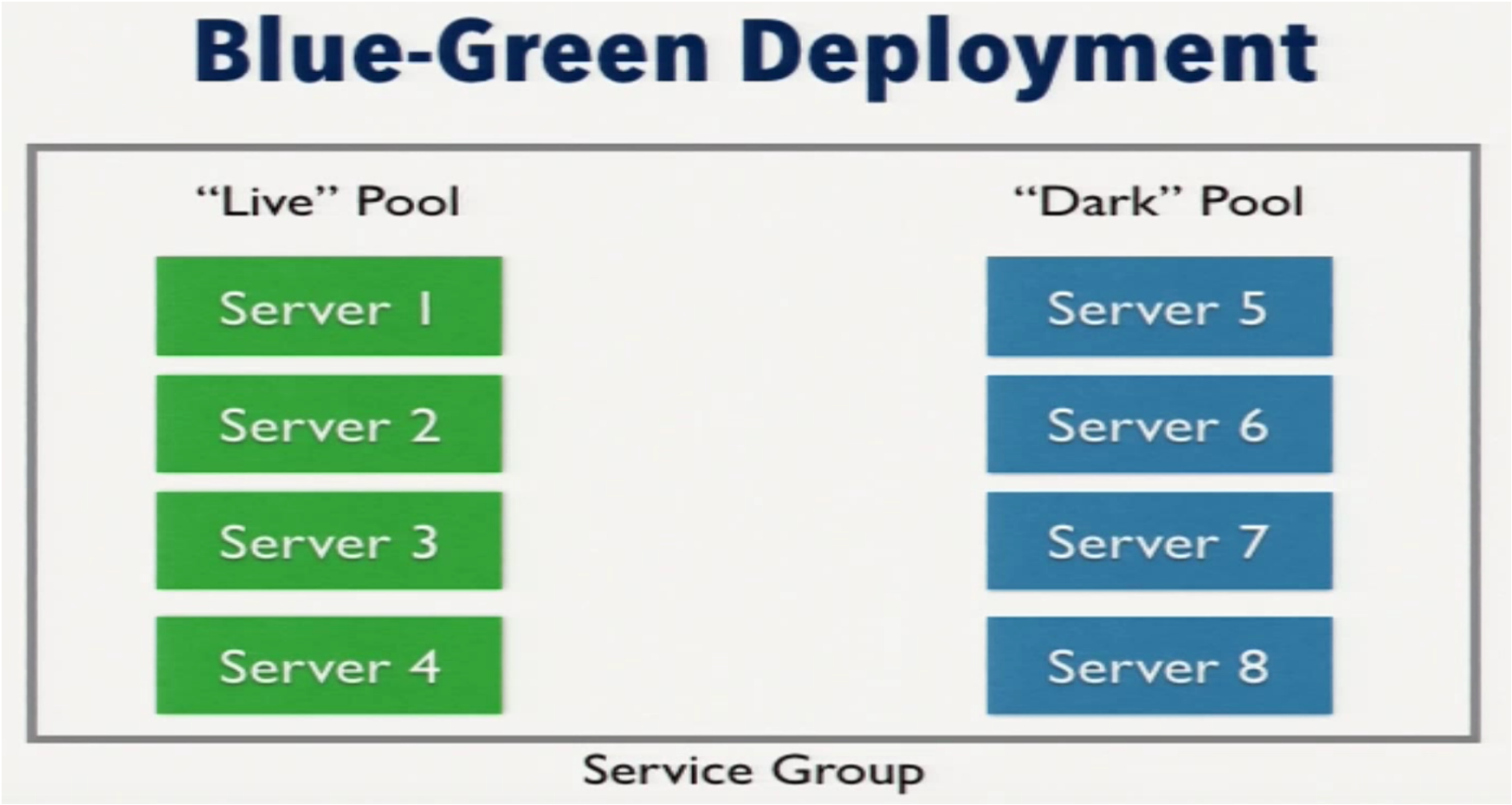
"Show me all the instances of app X in environment Y"

```
match (x:AppInstance
        {appId:'lcui', environment:'prod_nevada'})  return x;
```

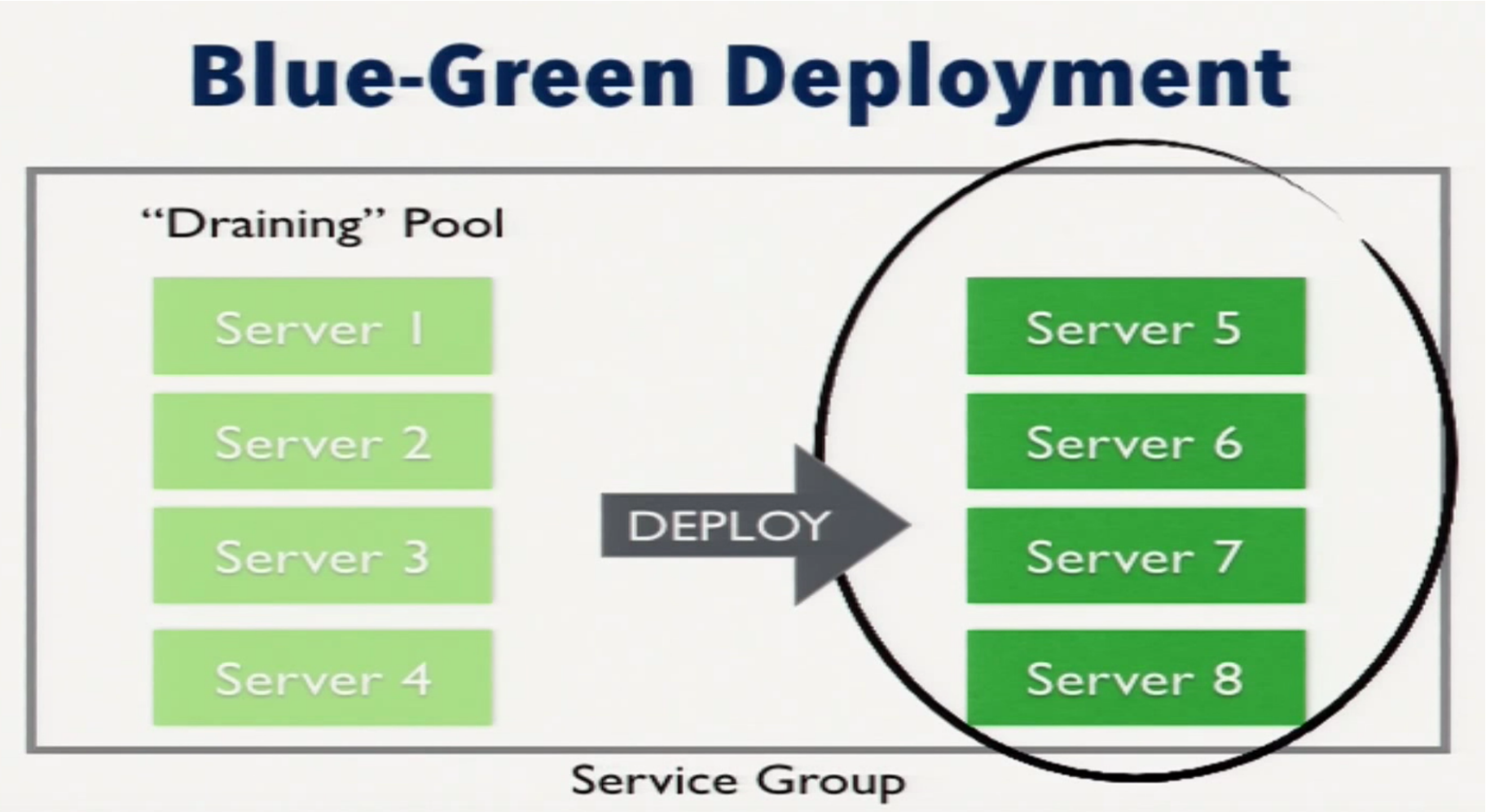
Deployment and Release Automation

- Blue-green deployments used
- One live pool and one dark pool at any given time
  - half the servers are live and half of them are dark within a service group
- Live pool takes all traffic
- During deployment, deploy new code to the dark pool, and then QA and Release testing
- Switch over

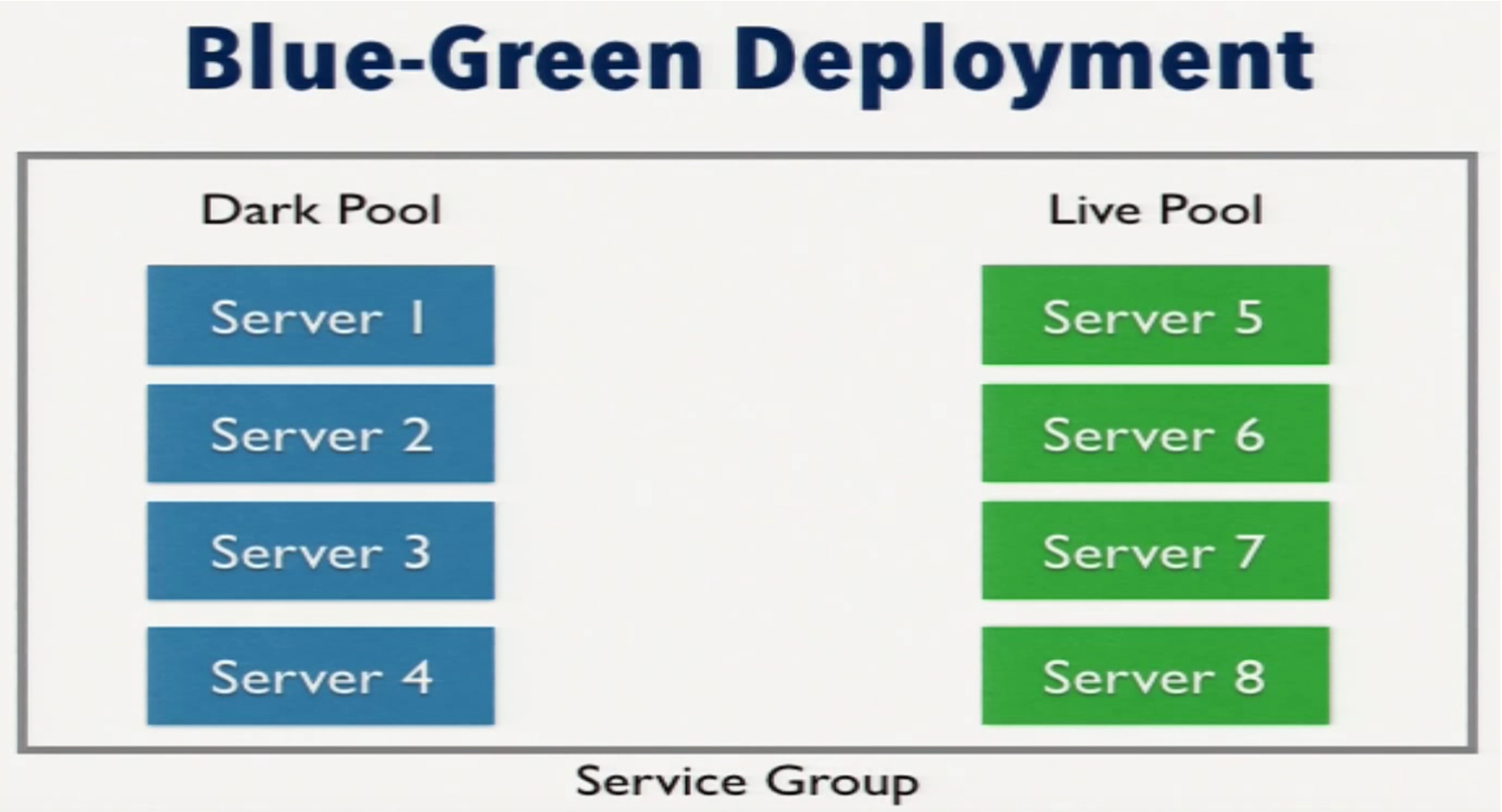
Green is Live



Transitioning



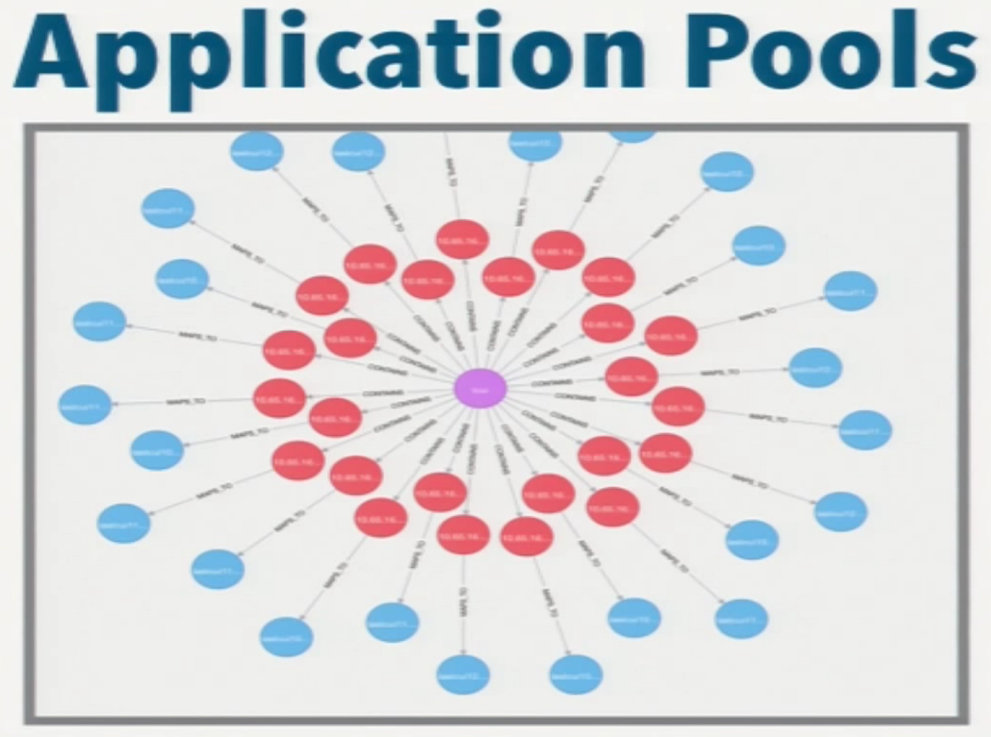
Old Blue is new Green and is Live



Problem

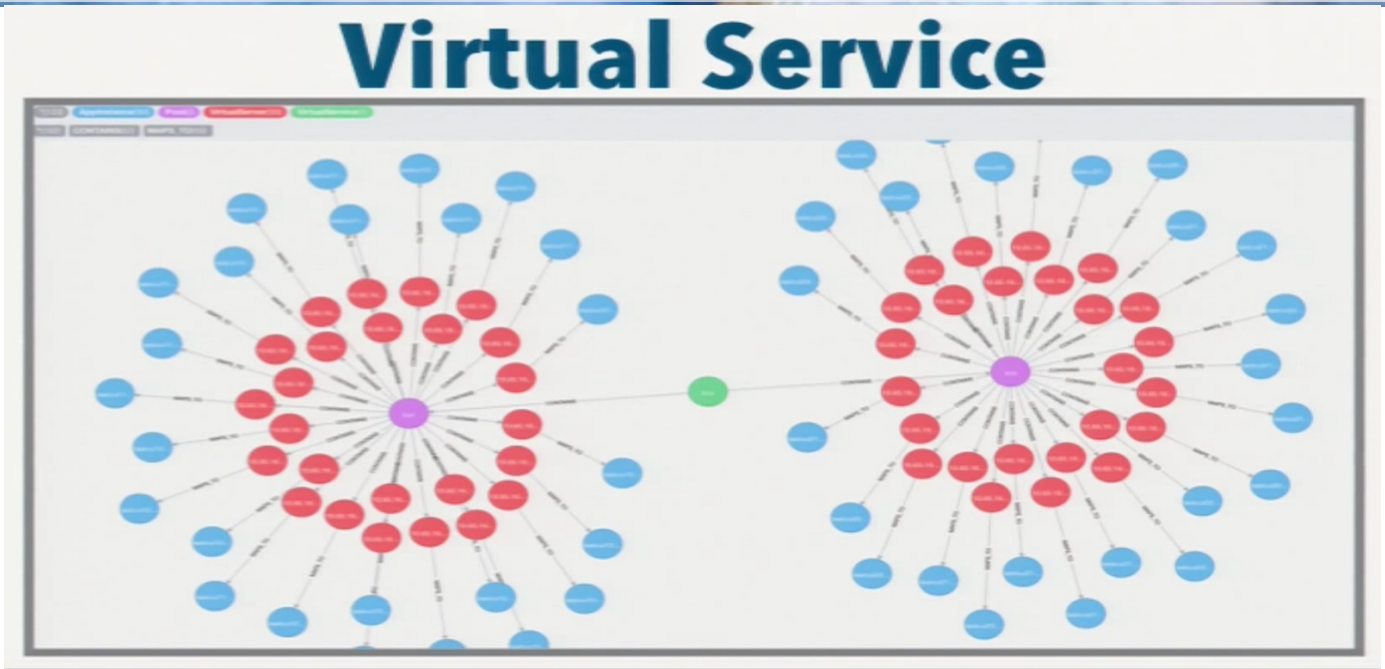
- Load balancer associates servers with each service group
  - But couldn't tell which servers were in each pool
- App instances reported to MacGyver knew their revision and app ID, but not their state
  - They didn't know if they were live or dark

Solution



- Collect virtual servers and aggregate according to their app ID and state
  - Create pools
- Purple dots are pools
- Each pool contains many servers
- Each servers has a 1:1 mapping to app instances

Infrastructure Dependencies



- Each pool knows whether it's live, dark or draining
- Each service has a live pool and a dark pool
- Map pools into a virtual service (green dot)

Wherefore art thou?

What pool should I deploy to?

```
match (x:VirtualService {appId:'lcui',
                         environment:'prod_nevada'}) return x.darkPool;
```

Or even more importantly…

Are live pool revisions in sync in different environments?

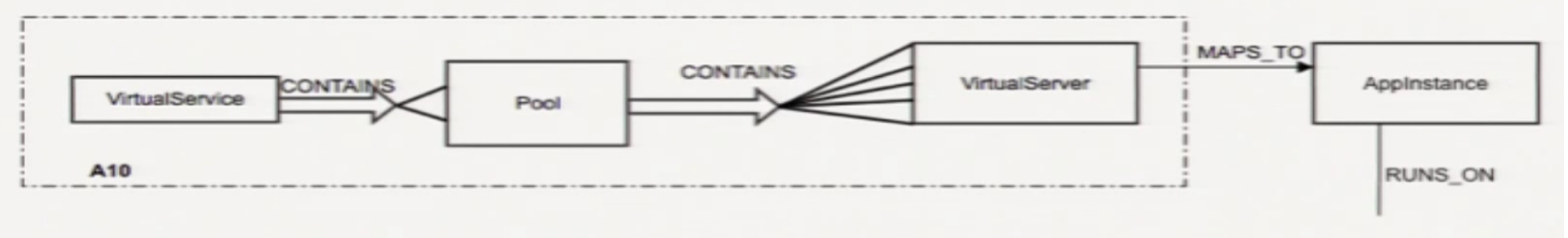
```
match (p:Pool {appId:'lcui', state:'live'})
                        return p.revision, p.environment;
```

And from a governance perspective…

Do multiple revisions exist within a single pool?

```
match (p:Pool)-[:CONTAINS]-(s:VirtualServer)
                        return distinct s.revision;
```

Infrastructure Mapping



- Problem: low visibility into what pools were live, what pools were dark, what servers were in a virtual service or even what app instances were out there
- Problem extended to entire infrastructure

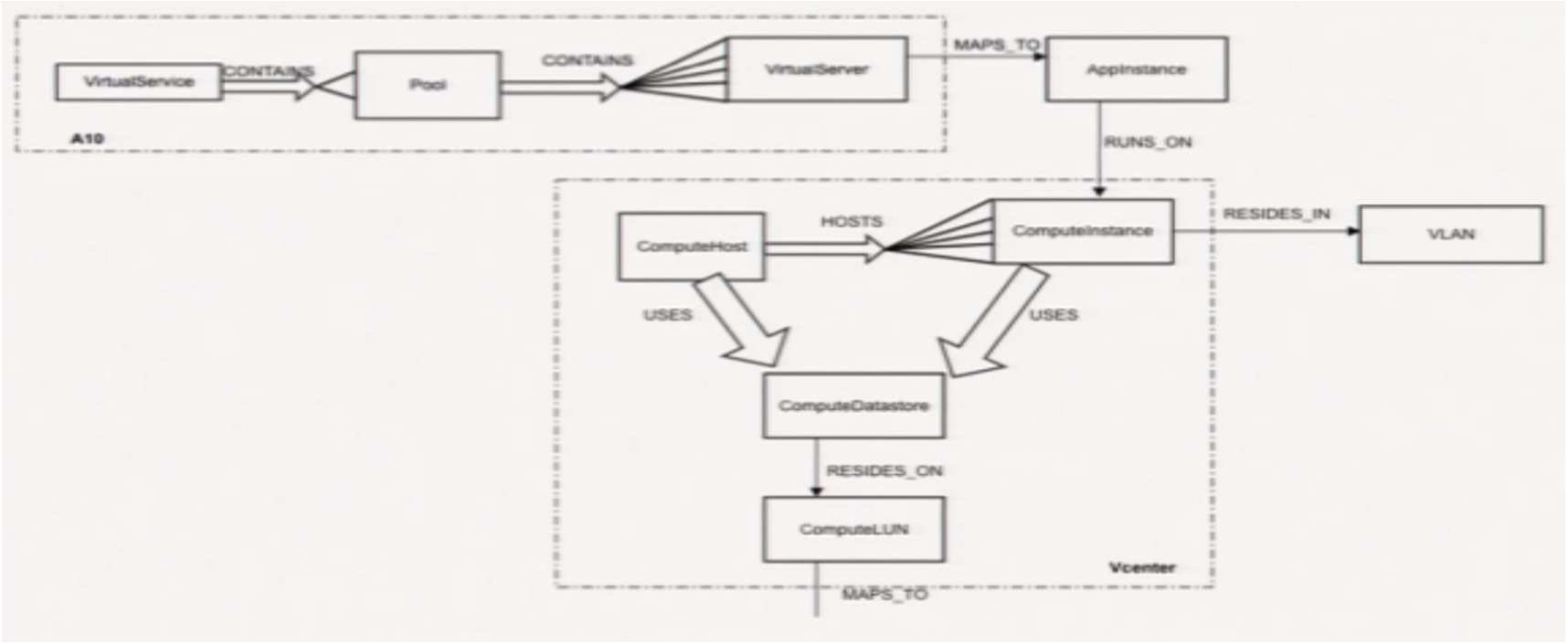
Infrastructure Mapping

Are any servers in a live pool degraded?

```
match (x:Pool {state:'live'})--(y:VirtualServer)
                    where NOT y.state=1 and NOT y.priority=16 return y;
```

- Every virtual service contains two pools, which contain a number of virtual servers, which maps to an app instance.
- Exposing this data allowed us to ask, “Are any servers in the live pool degraded?”

SPOF Spotting



- Import a bunch of data from vCenter
  - All the app instances map to compute instances which are hosted by compute hosts

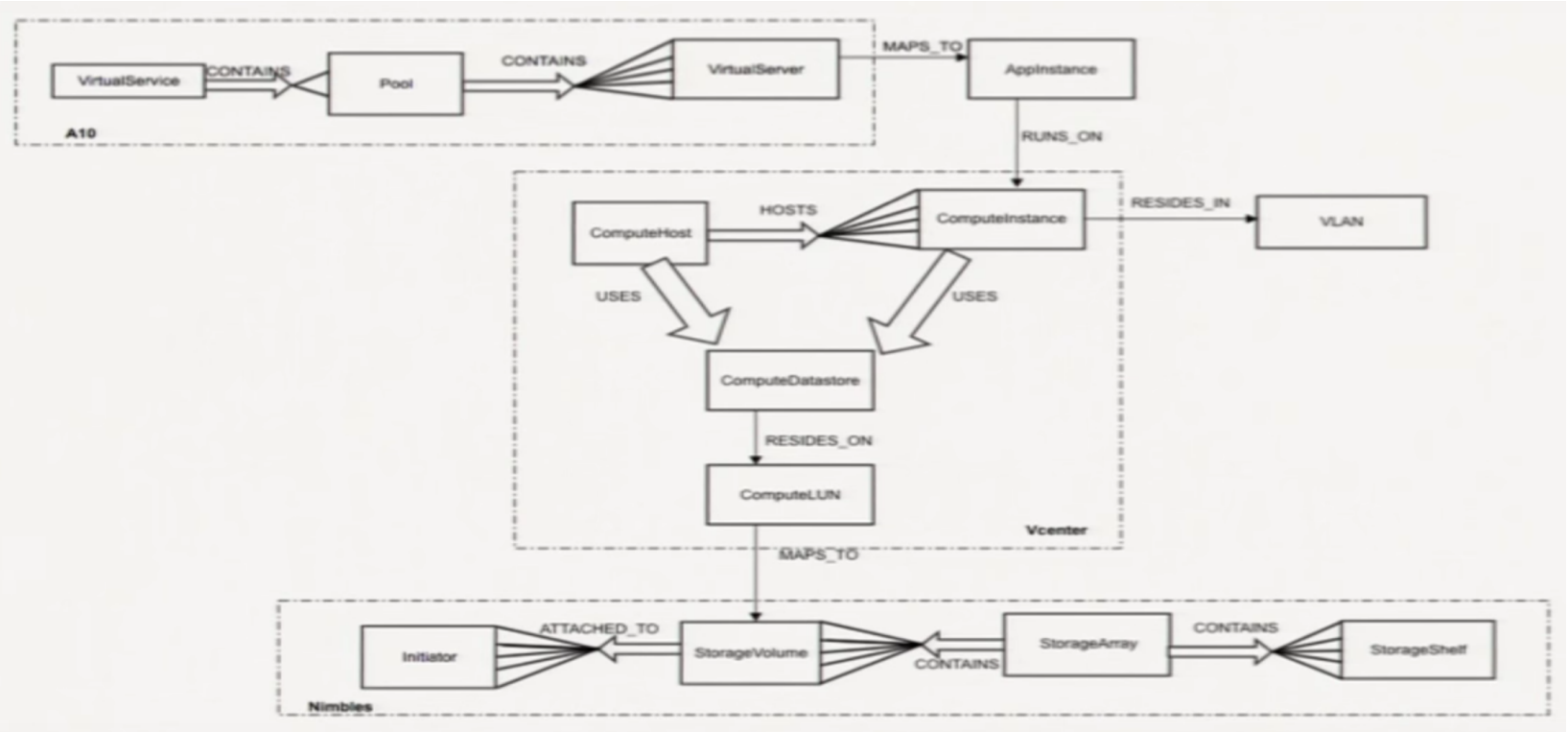
SPOF Spotting

Do we have a single point of failure among any of our services?

```
match (p:Pool {appId:'lcui', environment:'prod_nevada'})-[:CONTAINS]-
(v:VirtualServer)-[:MAPS_TO]-(a:AppInstance)-[:RUNS_ON]-(i:ComputeInstance)<-
[HOSTS]-(h:ComputeHost) return distinct h.name;
```

- If at any given time within a pool all those servers are hosted on one host in vCenter, if that host goes down, then we definitely have a problem
- Because we are mapping this, we are able to expose this data in a way that we weren't able to before
- Fix SPOFs at design time

Deeper and Deeper…



- Can bring in shared (hardware) services like storage

Deeper and Deeper…

If storage volume #3 goes down, what services will be impacted?

```
match (x:StorageVolume {name:'lasappesxi-lasnmb01-prod'})<-[*7]
                                -(y:VirtualService) return distinct(y.appId);
```

- Can bring in shared (hardware) services like storage

Powerful and Incremental

- Plan for operations that grows with your services, tames them
- Keeps them honest all the way up the stack
  - Storage to API

Blatant Neo4j Plug

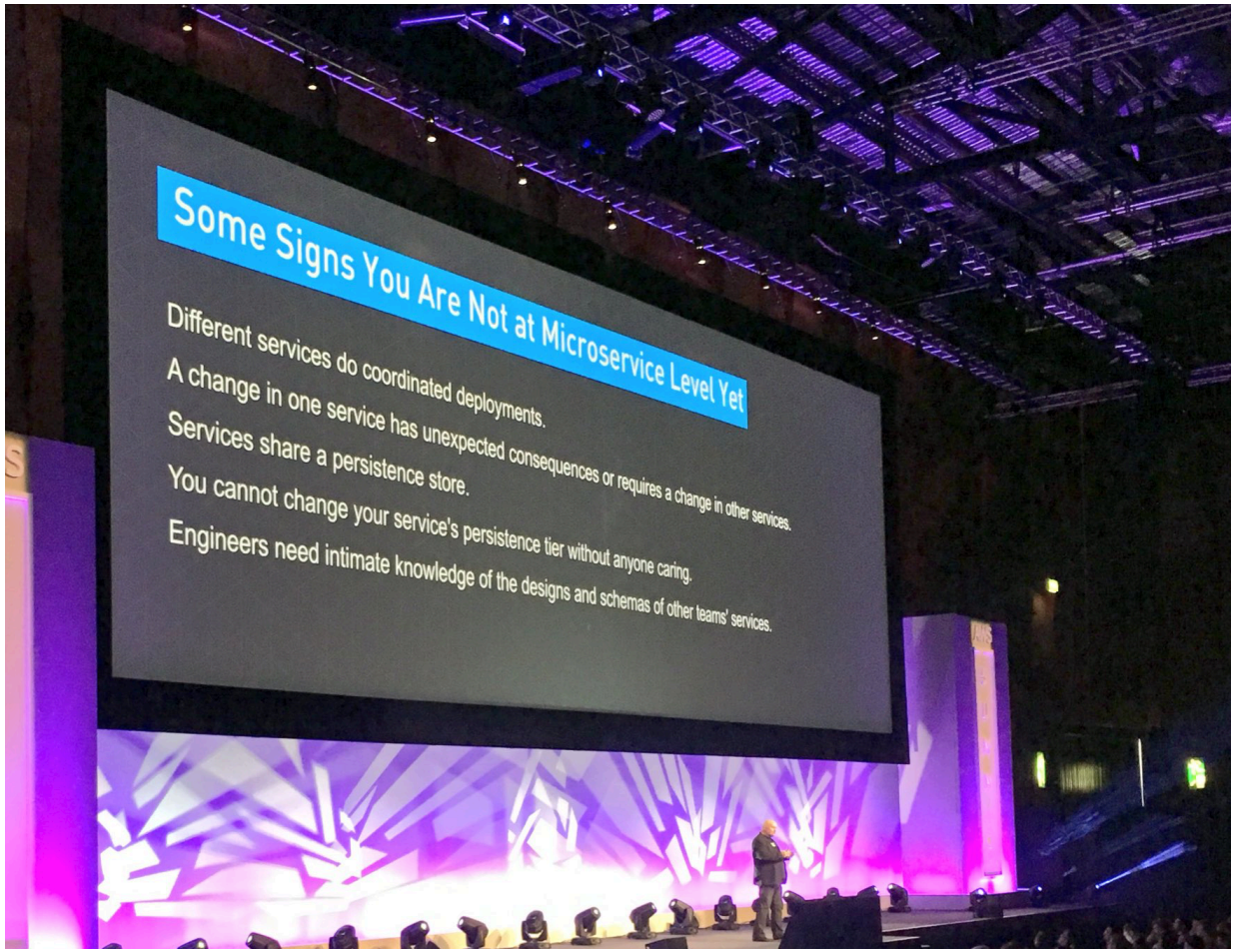
- Neo4j has all of the characteristics of a database that we need:
  - Really fast queries
  - Really great join and traversal capabilities
  - Really easy to use
  - Really flexible
  - Really scalable
  - Really great ad hoc queries through Cypher

It's a graph!

And then the obvious stuff…

- Once you have a map of your system-of-services, then:
  - Global charts and alerts:
    - KPIs of each service
    - Shared services (e.g. storage)
  - Localised charts and alerts:
    - Service SLA
    - Logs
    - etc

Spotting Failures



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Summary

- Microservices will grow in number, as will third-party dependencies
- Think about how you deploy your service and embrace automation
- A map or registry is really helpful, but…
- But tooling needed to bring it all together
- Great tooling provides insight and the ability to reason about your system-of-services