

# Reliability from the ground up ...

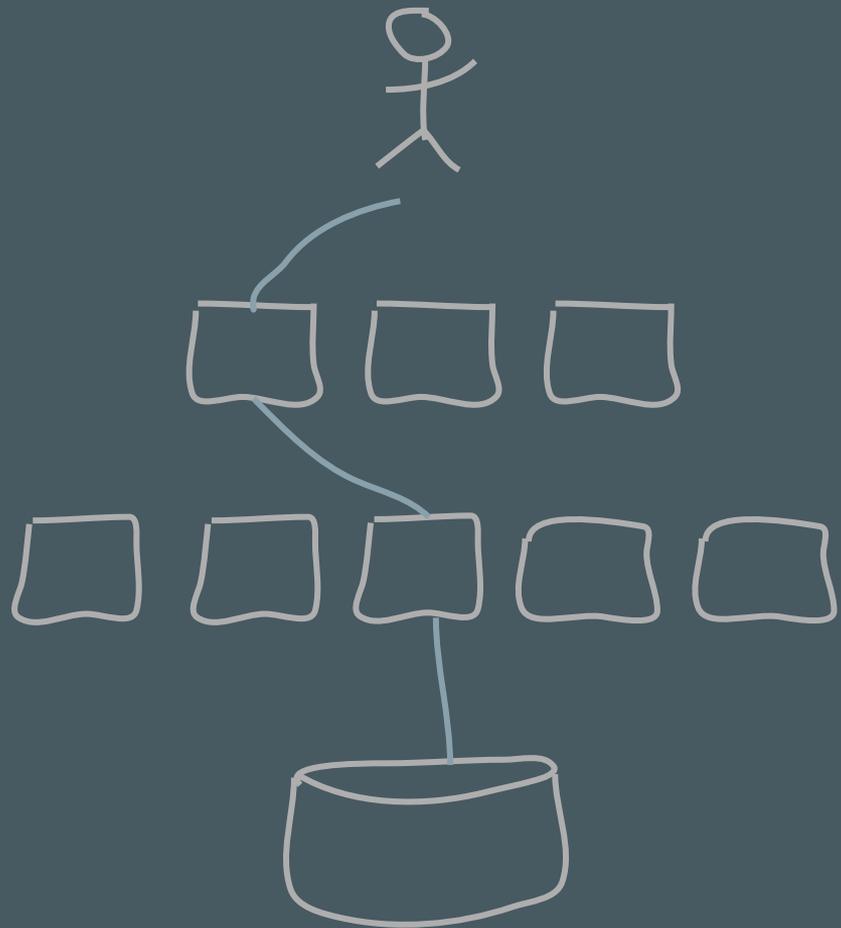
Designing for 5 9s

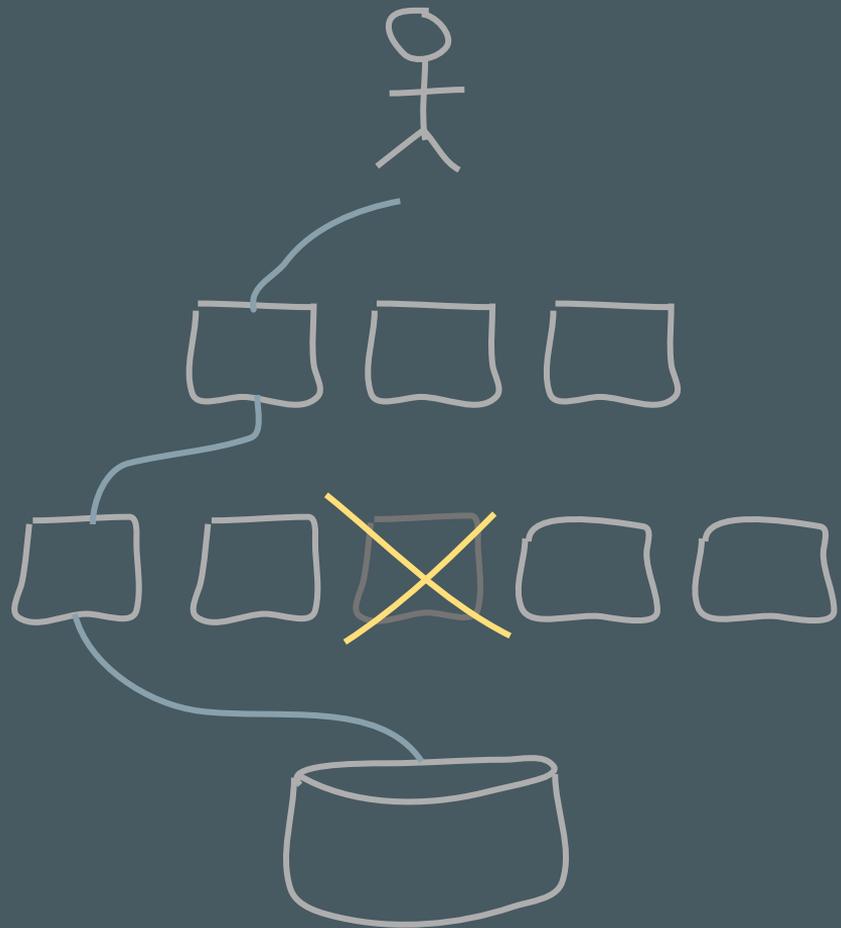
What do we mean when we talk about reliability?

**Reliability, n.** - the quality of being trustworthy or of performing consistently well.

**Resilience, n.** - the capacity to recover quickly from difficulties; toughness, the ability of a substance or object to spring back into shape.

Reliability is a property of the  
system  
not the sum of its parts



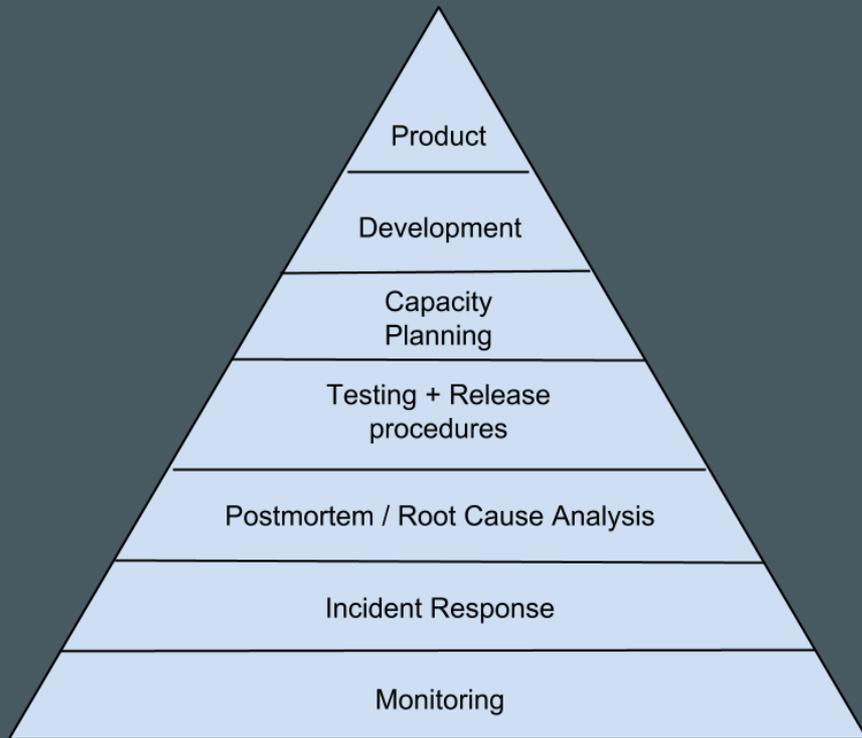


# How much reliability do you need?

Optimizations



Baseline requirements  
for uptime



Mikey Dickerson's hierarchy of reliability

## Time per Year of Downtime

**90%** 36.5 days

**99%** 3.65 days

**99.9%** 8.76 hours

**99.99%** 52.56 minutes

**99.999%** 5.26 minutes

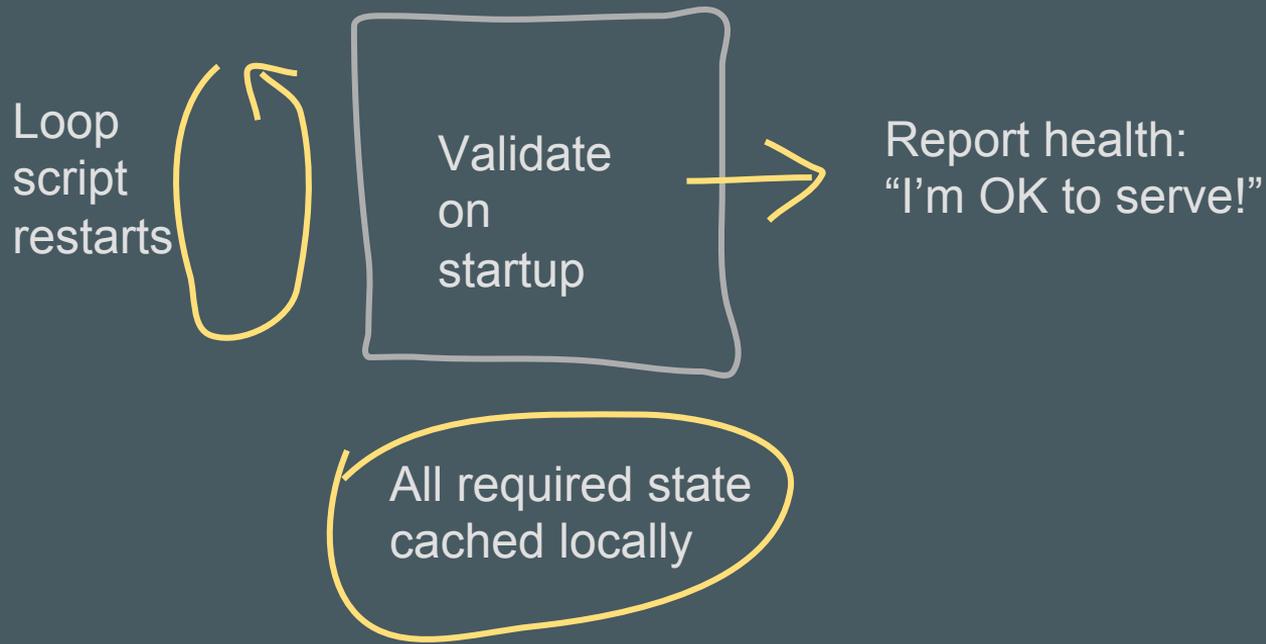
# Principles for resilience

Rule #1:

Every node for itself

“Keep doing what you’re doing, unless it’s actively unsafe.”

# Recovering from failure





Failures of dependencies

# Handling bad inputs



“I’d like a search result and a unicorn!”



“I’ve never heard of a unicorn :-(”



Rule #2:

Everything runs on more than one machine

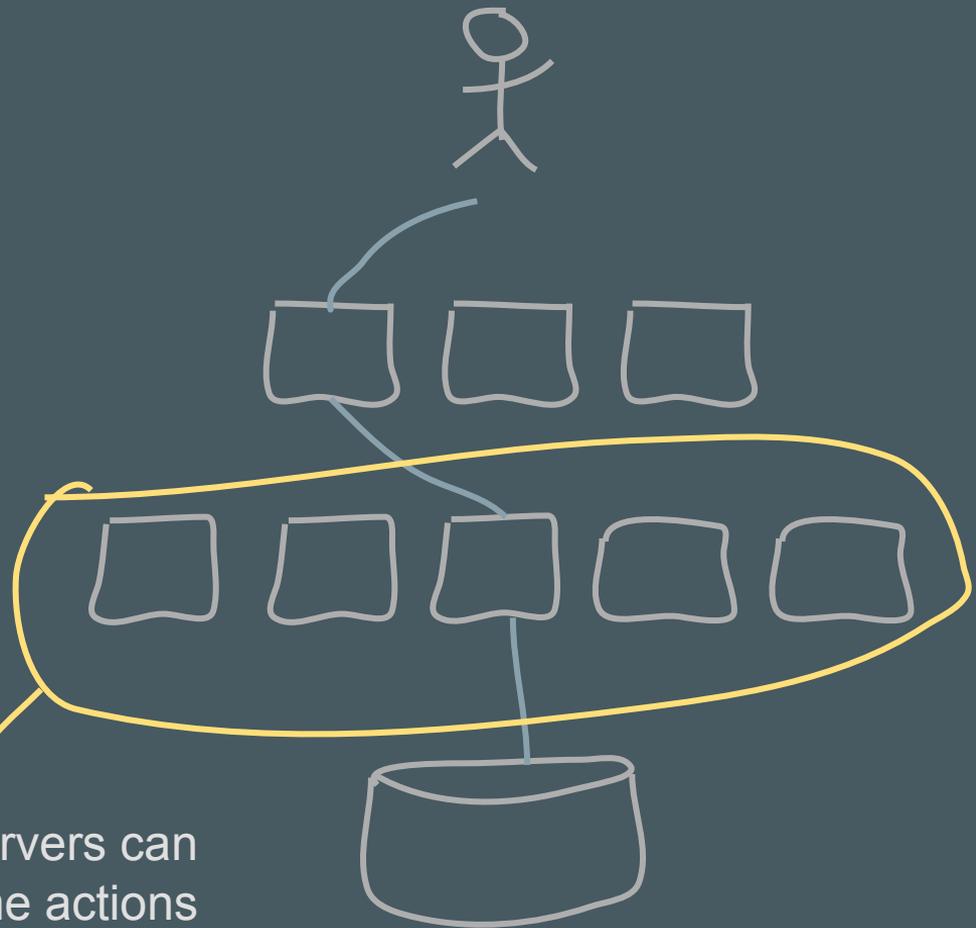
Serving components are stateless

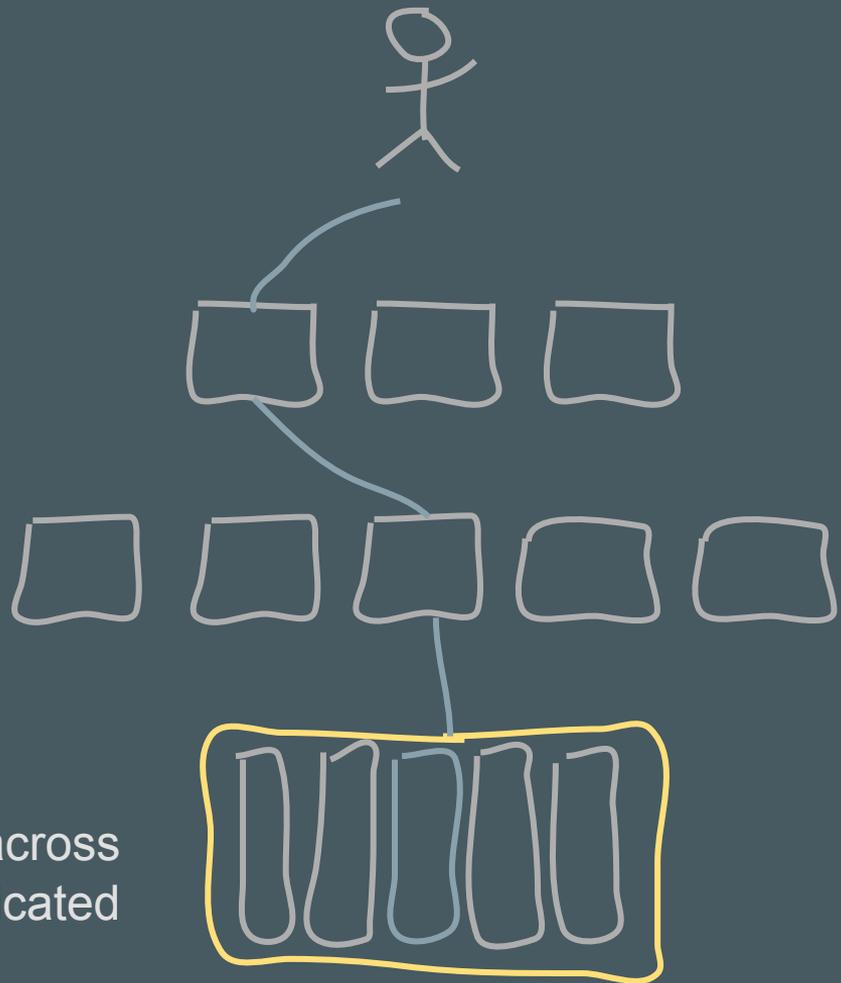
## Idempotency and sharding

Data is split across machines and replicated

# Idempotency

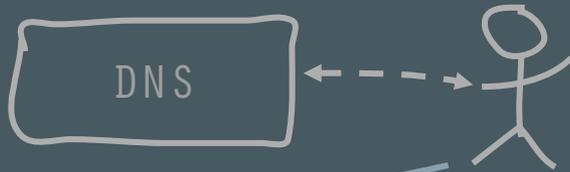
Any of these servers can perform the same actions



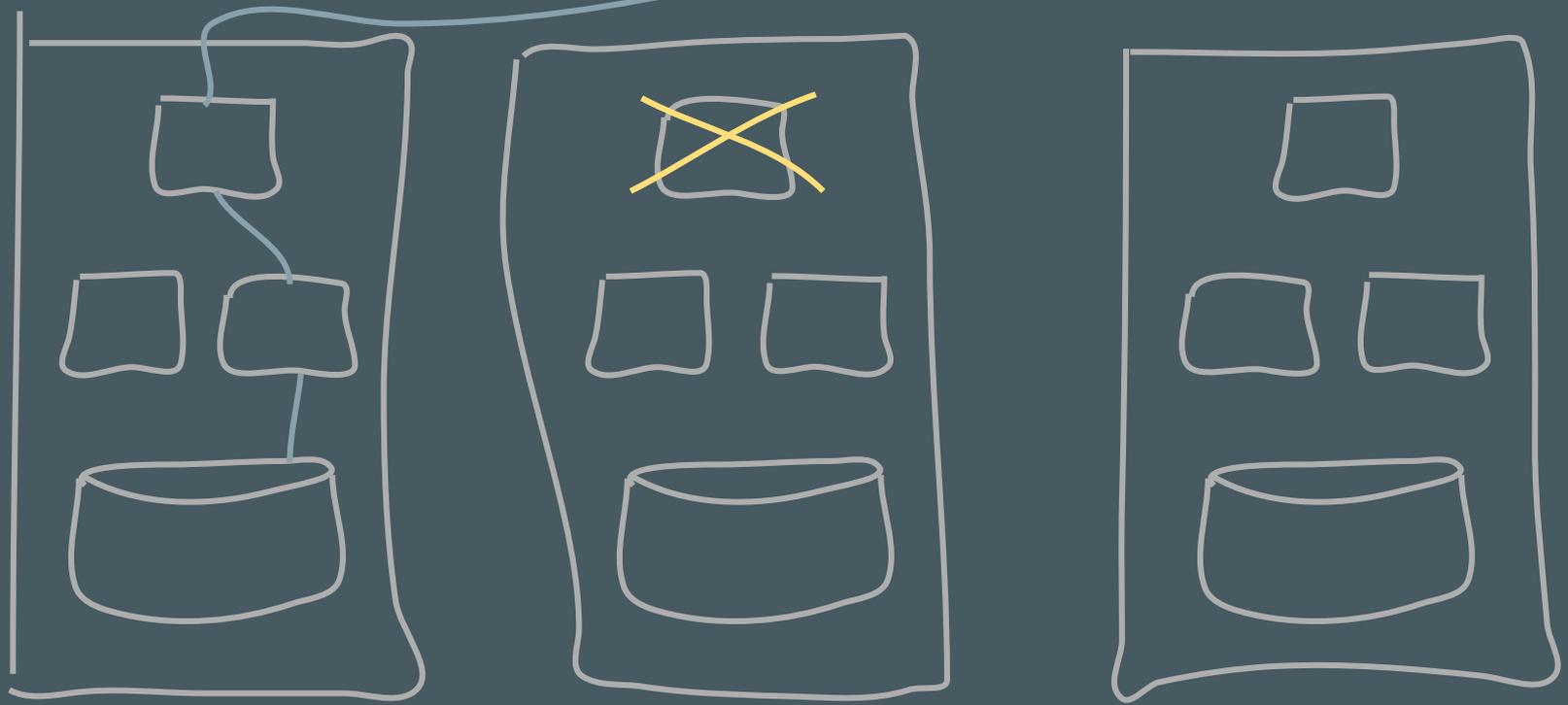


## Sharding

Data is split across machines and replicated

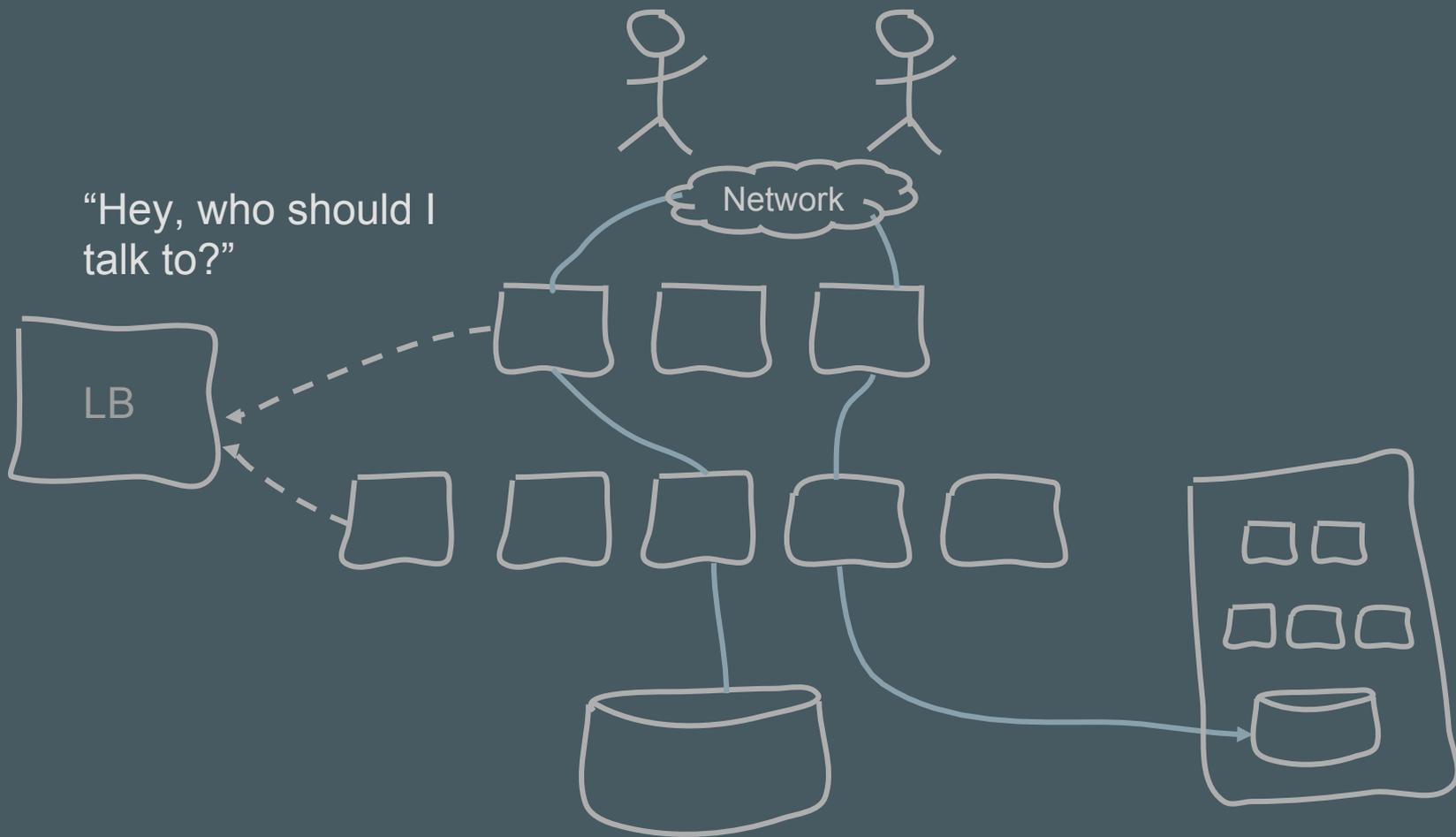


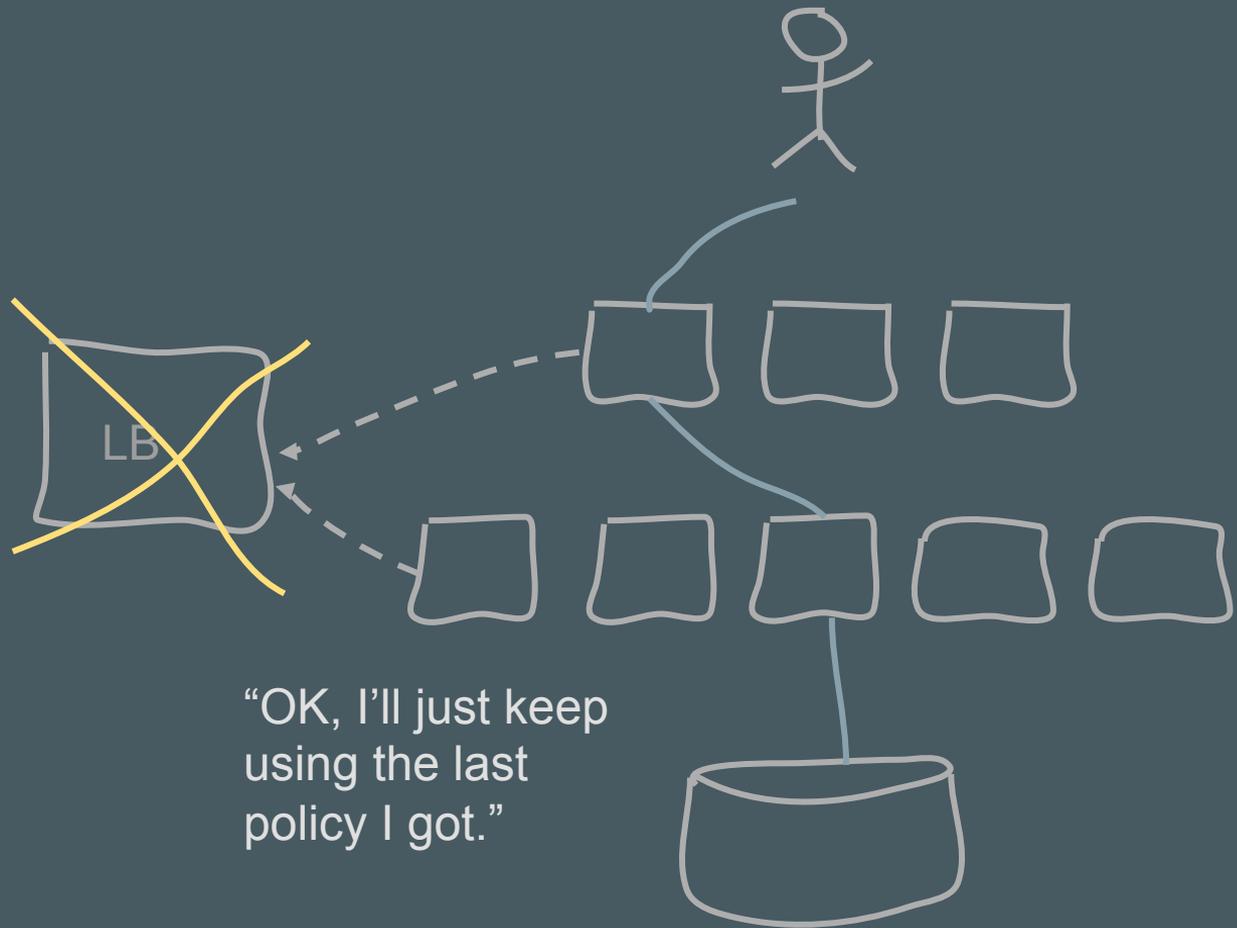
Multiple clusters  
provide better redundancy



Rule #3:

Loosely coupled dependencies





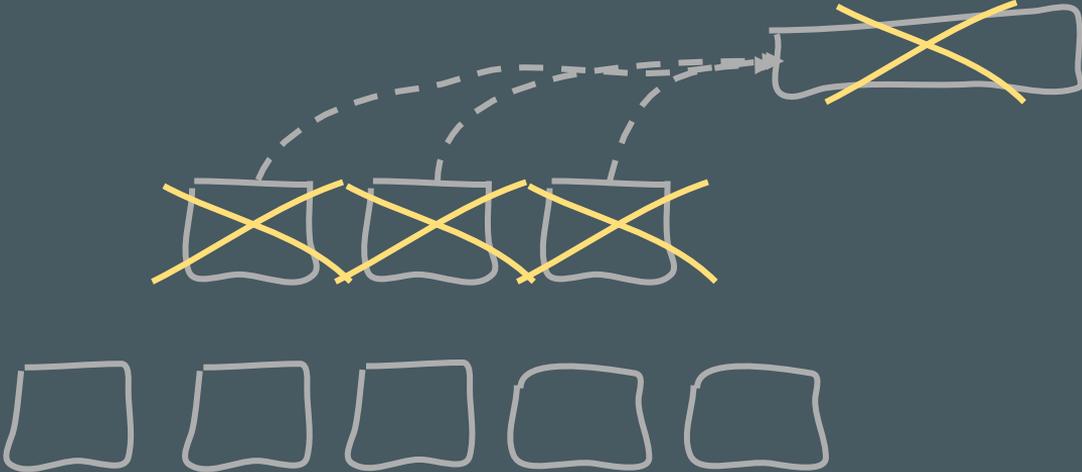
“OK, I’ll just keep using the last policy I got.”

Rule #4:

## Design for change

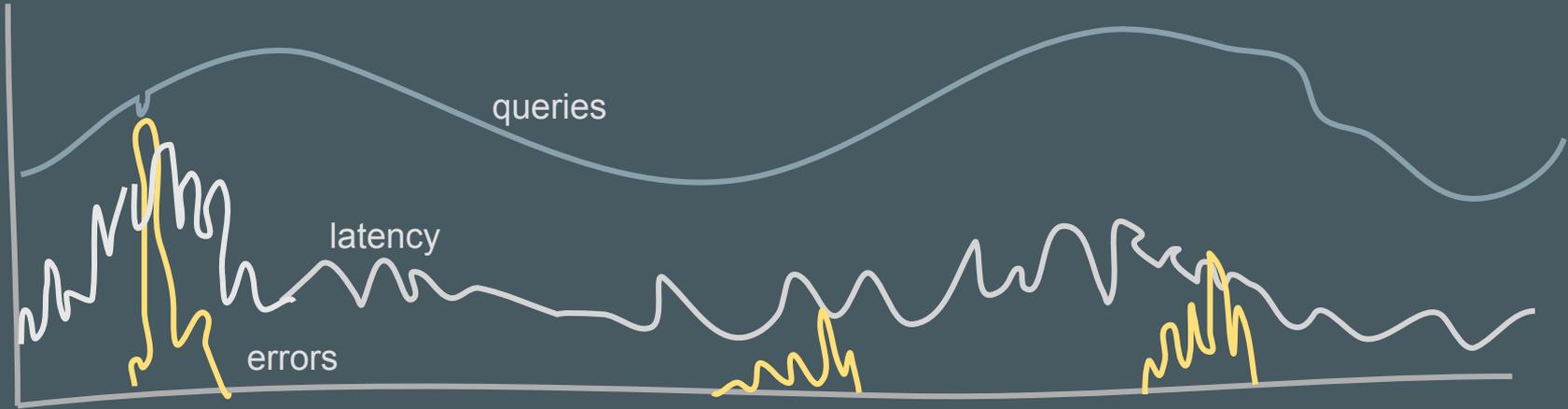
1. Use tools, not processes
2. Check in your configs
3. Canary all changes
4. Rollbacks should always be safe

Global state == global failure



Rule #5:

Observe the system, not the components



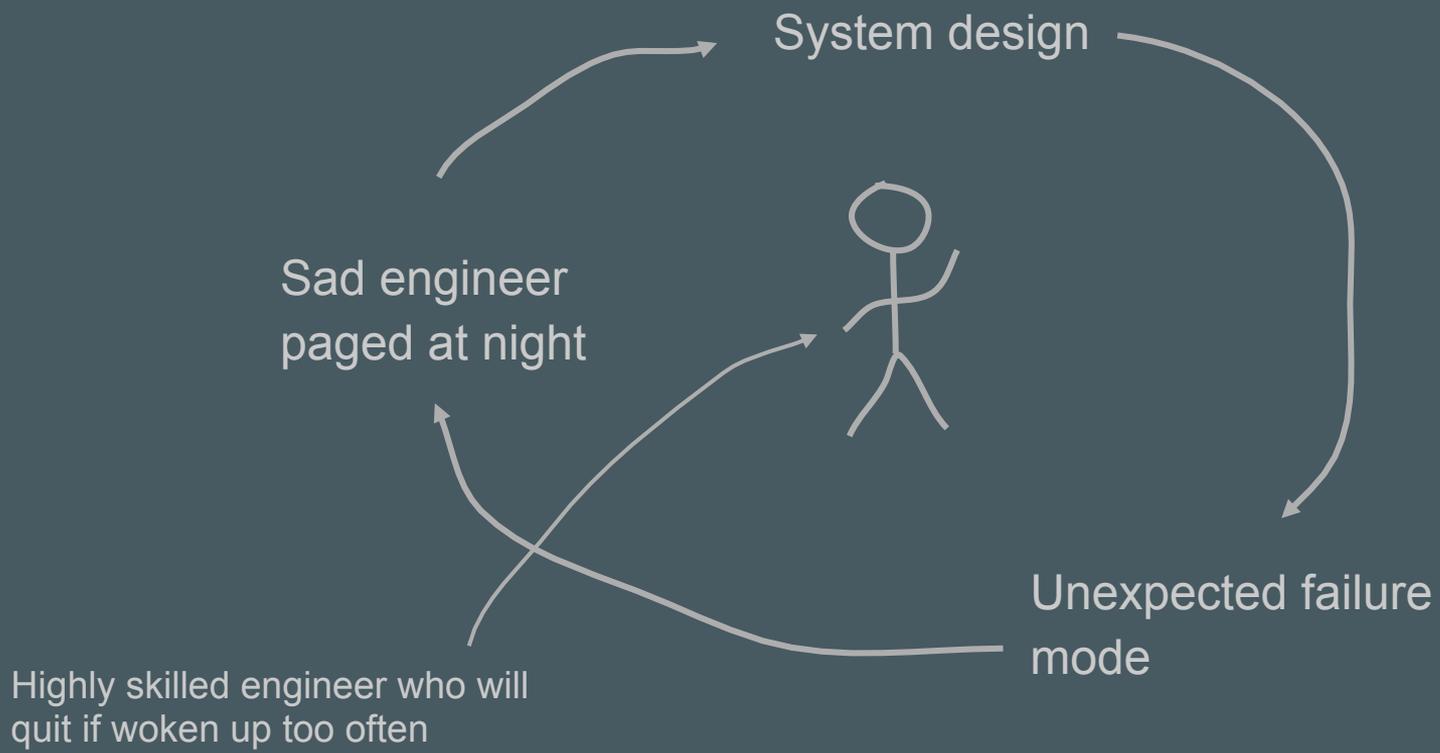
The only\* dashboard you need

Pick a few high level metrics that describe the overall behavior of the system. Make those perfect.

Everything else is background info.

The fifth nine is  
people.

-Trisha Weir



Future proof

# Supporting an ecosystem

- Healthy systems grow, which means more teams and systems
- Tooling and infrastructure scale better than people and processes

(Come to my talk later!)

# The limits of control

grant me the serenity to accept the things I cannot change;  
courage to change the things I can;  
and **wisdom to know the difference**

# Thank you.

**Credits:**

Susan J Fowler, Production Ready Microservices, O'Reilly, 2016

Mikey Dickerson, Hierarchy of Reliability

Trisha Weir et al, The Fifth Nine: Diverse Perspectives on Reliability, GHC 2015

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