SLOs and SLIs in the Real World: A Deep Dive

Elisa Binette
@elisabPDX

Matthew Flaming
@mflaming

Service Level Indicator

X should be true…

"10 key takeaways about SLIs delivered in 20 minutes"

Service Level Objective

Y proportion of the time

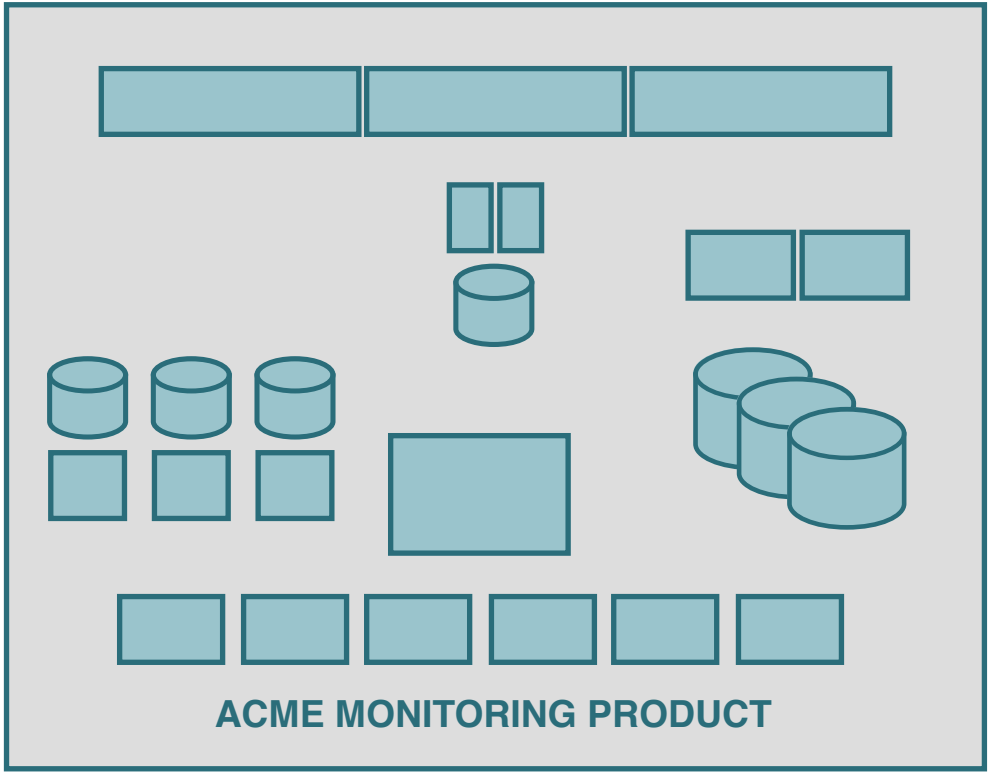
99.9%
of the time

Service Level Agreement

or else…

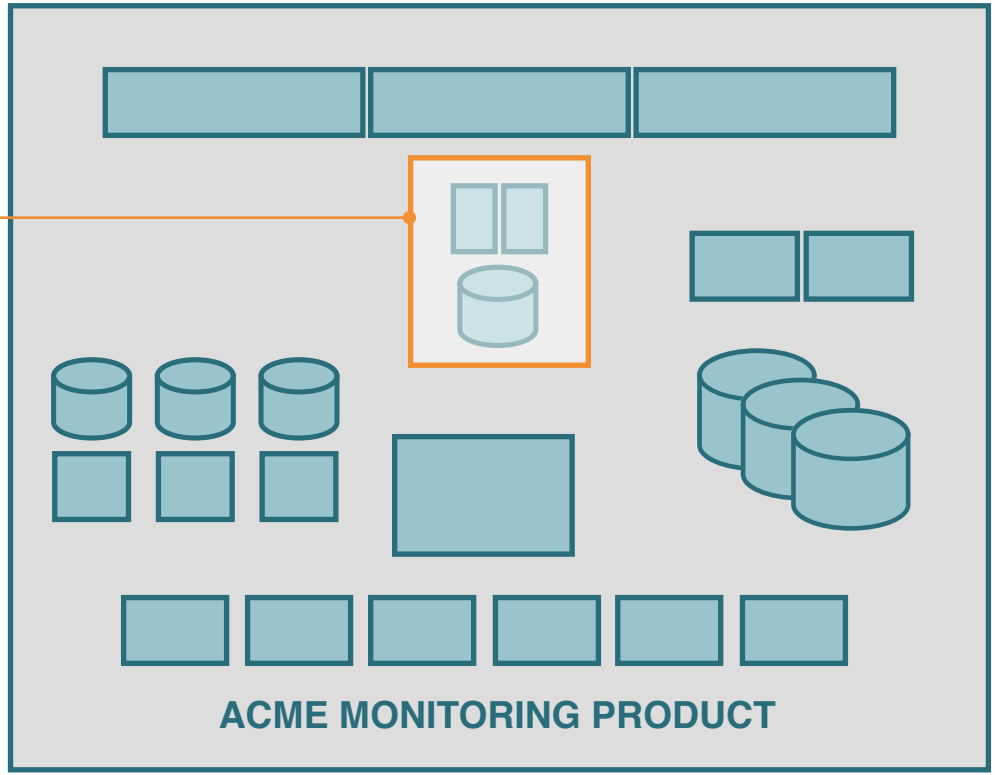
We'll mail you a Wookie

“Data is being collected properly, and customers can login to the system and view their data 99.9% of the time”

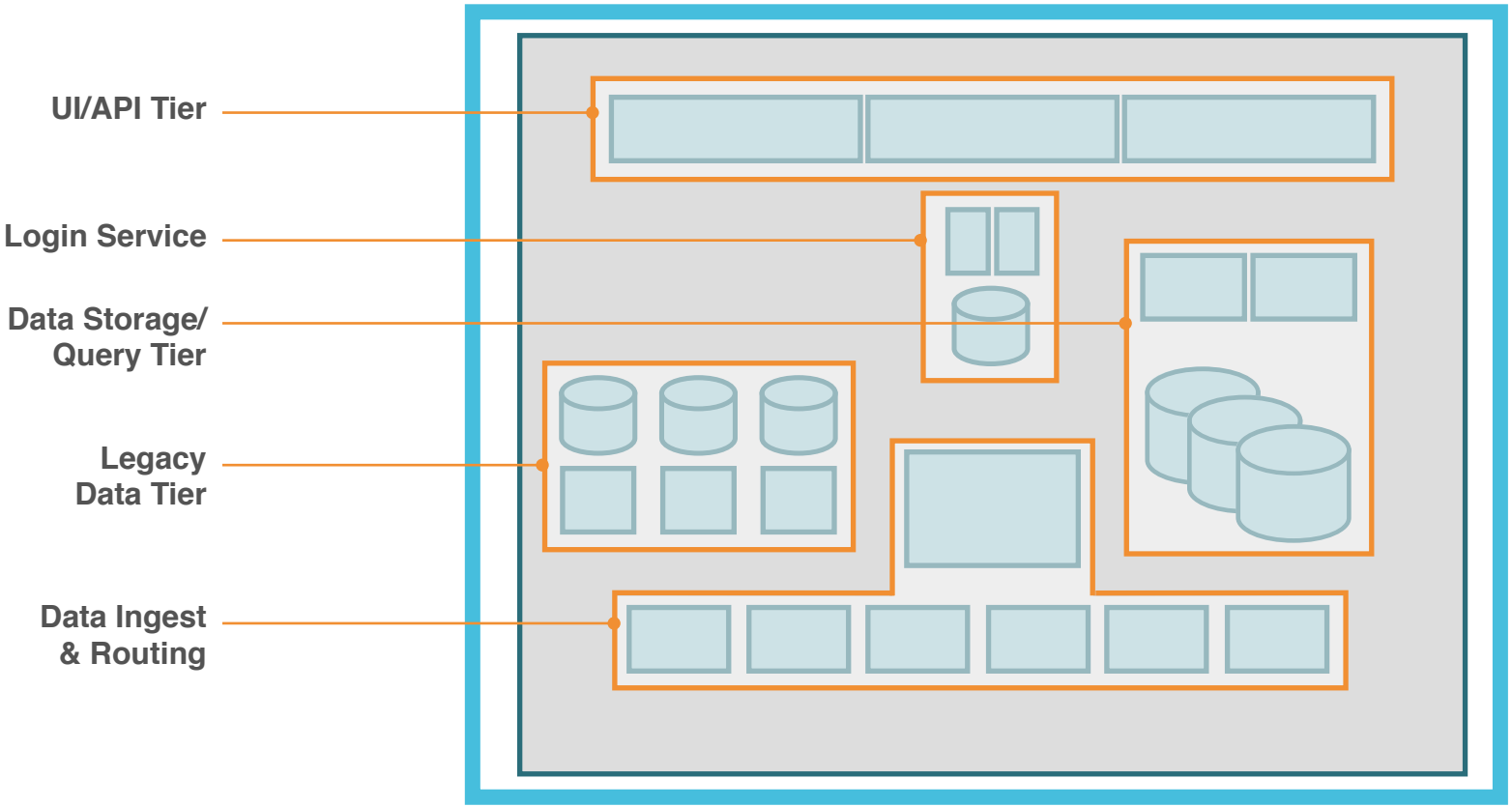


System Boundaries

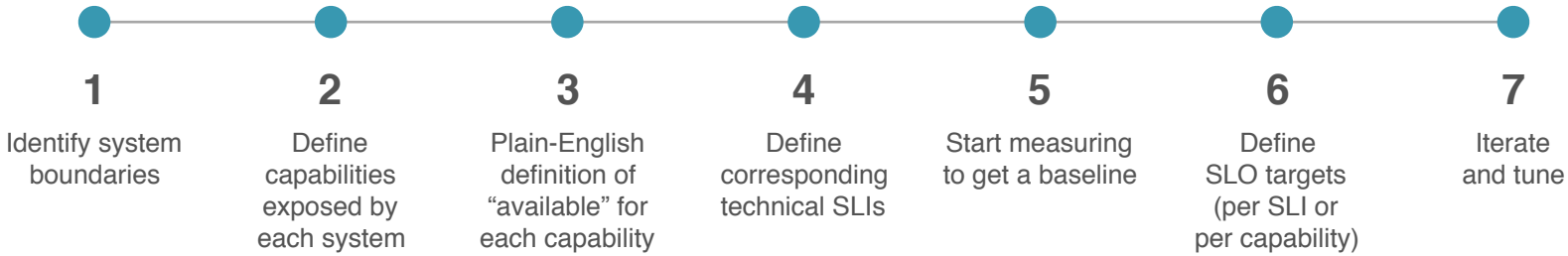
Login Service:
Authenticate user credentials



A System of Systems



SLIs + SLOs: A Simple Recipe

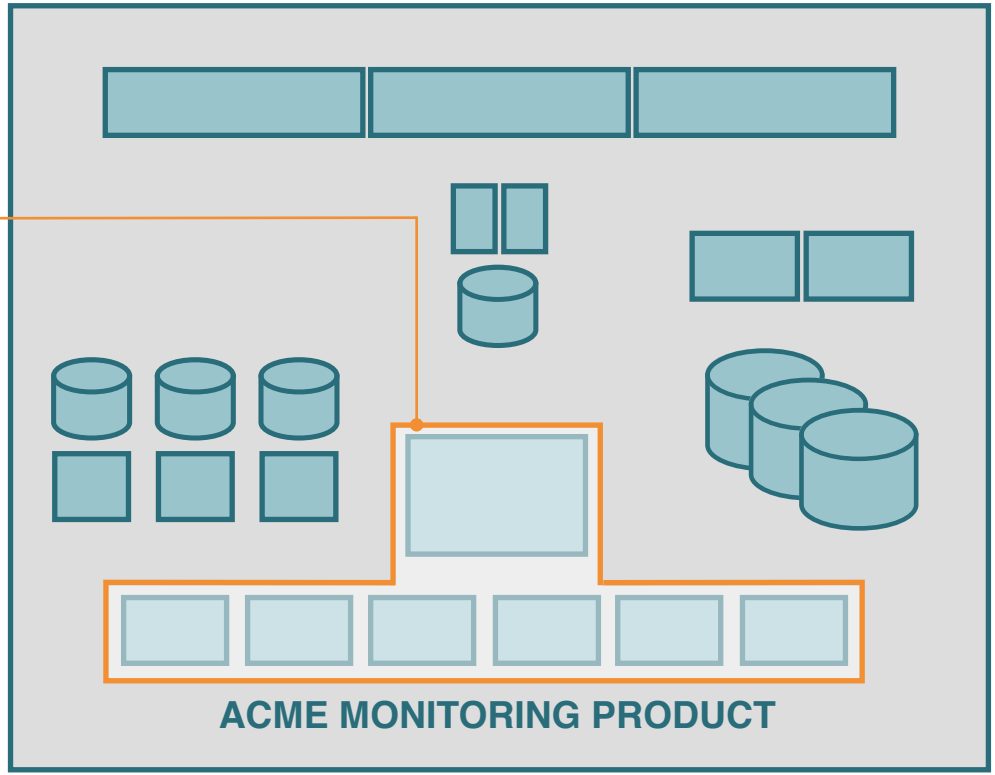


Capabilities Drive SLIs

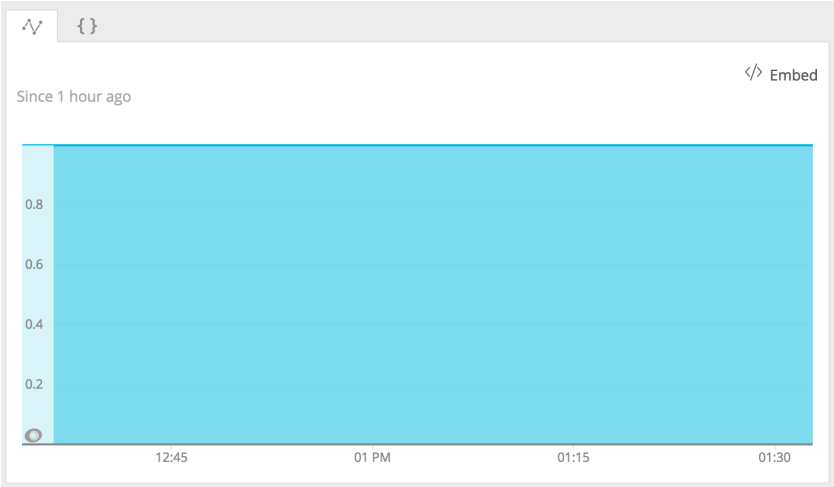
Data Ingest Tier

Multiple capabilities

- Data ingested
- Data routed

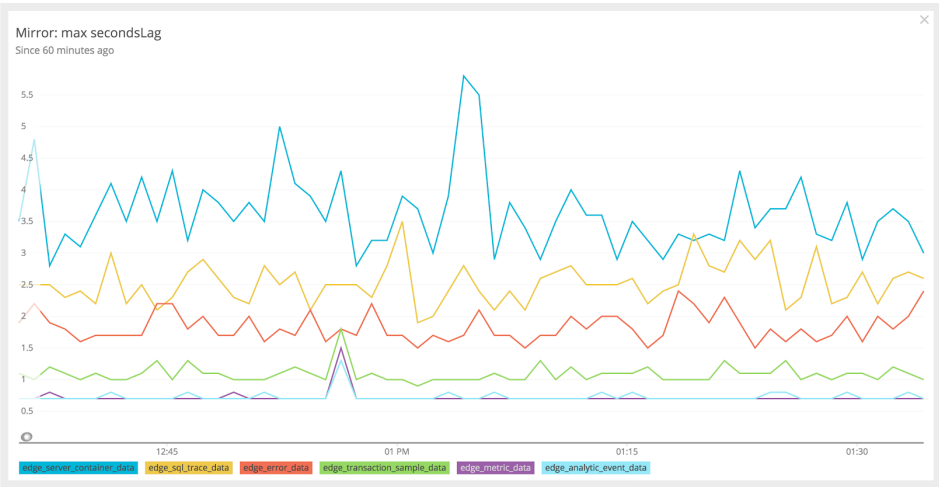


One (or more) SLIs per Capability



Data Ingest SLI
Percent of well-formed payloads accepted

Data Ingest SLO
99.9%



Data Routing SLI
Time to deliver message to correct destination

Data Routing SLO
99.5% of messages in under 5 sec

Choosing SLO targets

SLO numbers need to be:

- What the team *actually* commits to supporting
- What the org *actually* commits to supporting
- Reflective of technical reality

SLOs represent an ongoing commitment!

When in doubt, measure first

SLIs Act as Broad Proxies for Availability

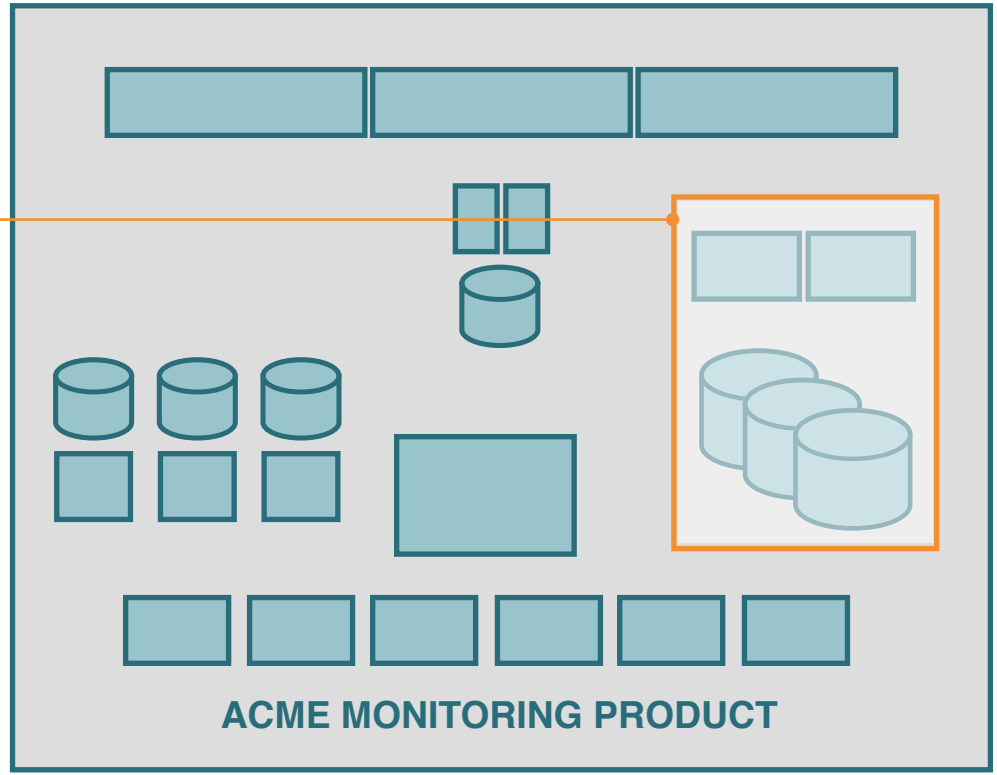
Horizontally Scaled Data Tier

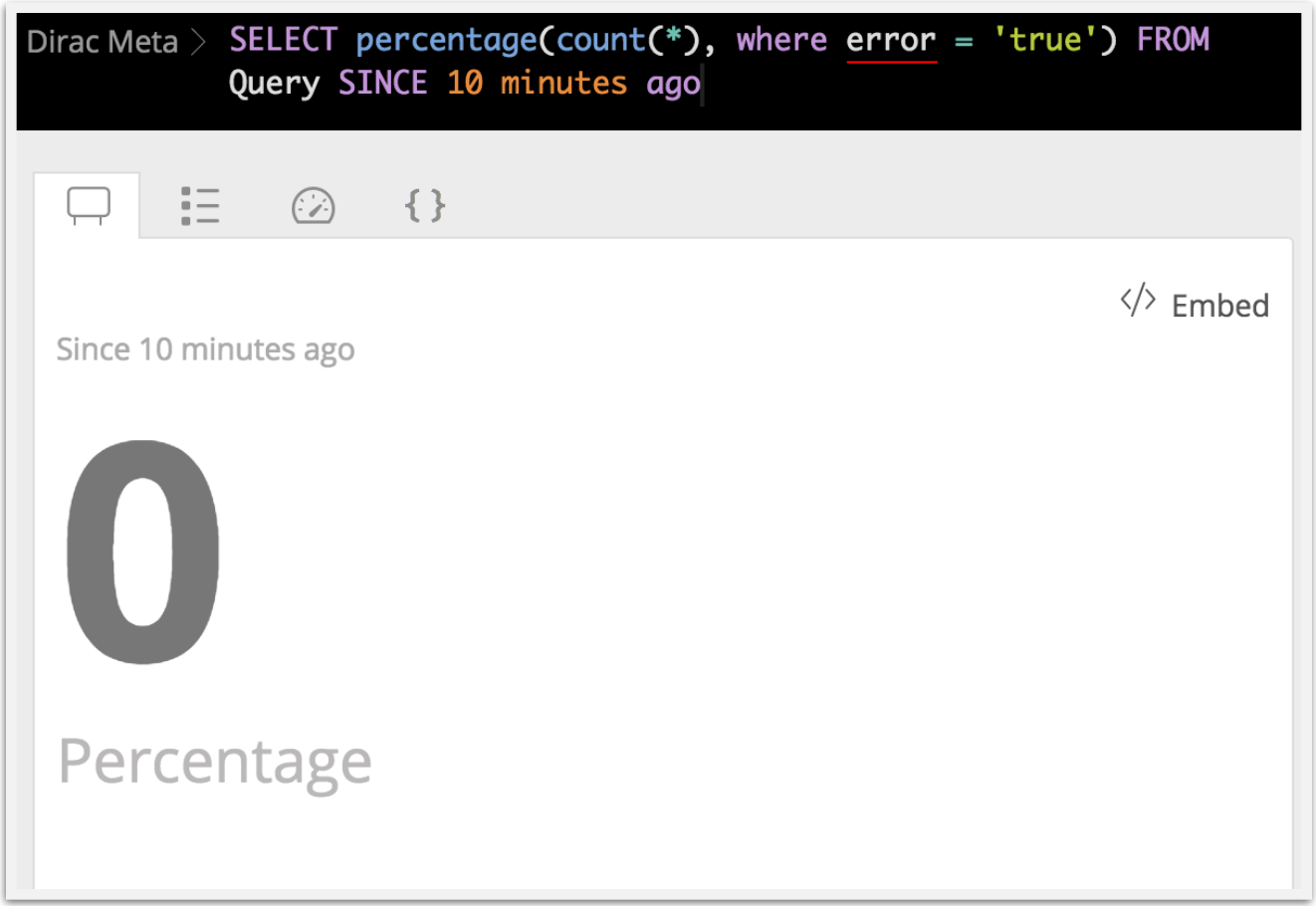
Single Capability

- Query data

Multiple SLIs

- Latency
- Correctness/error rate





Compound SLOs

99.95% of well formed queries
will receive well formed responses

99.9% of queries will be answered
in less than 1000ms

99.9% of well formed queries
will receive well formed responses in
less than 1000ms

SLIs/SLOs for Hard Sharded Systems

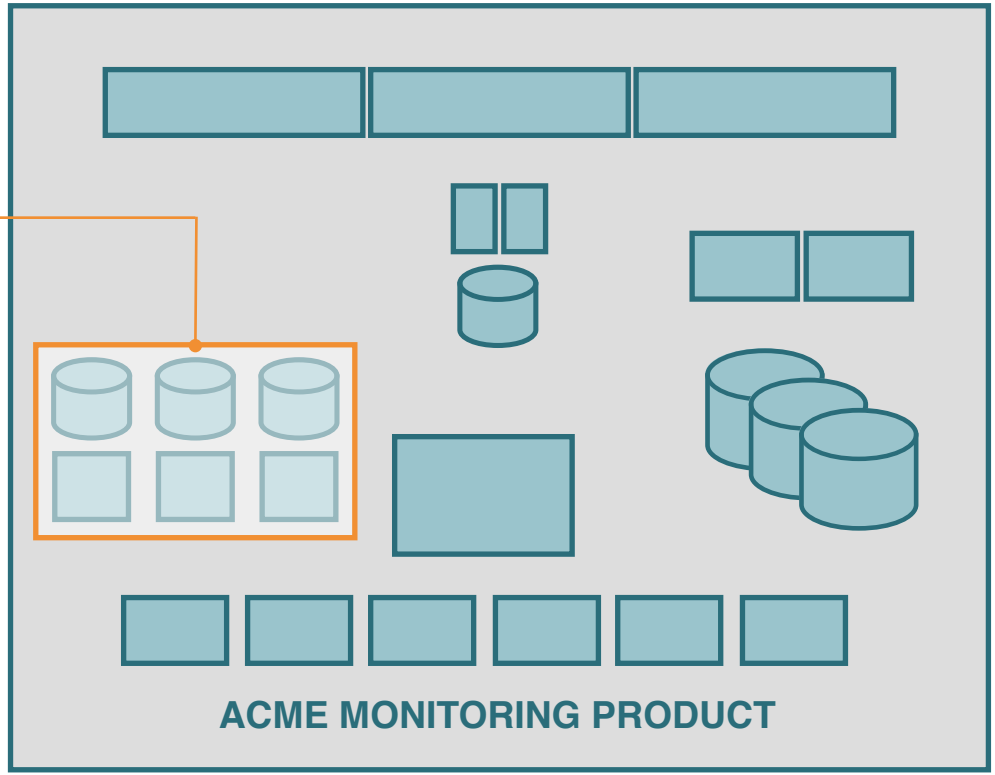
Hard Sharded Legacy DBs

Single Capability

- Query performance

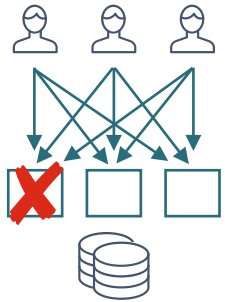
Multiple SLIs

- Latency
- Correctness
- Freshness



Sharded vs. Horizontally Scaled SLOs

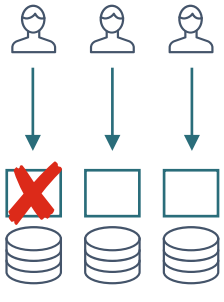
Horizontally Scaled



SLO

66%

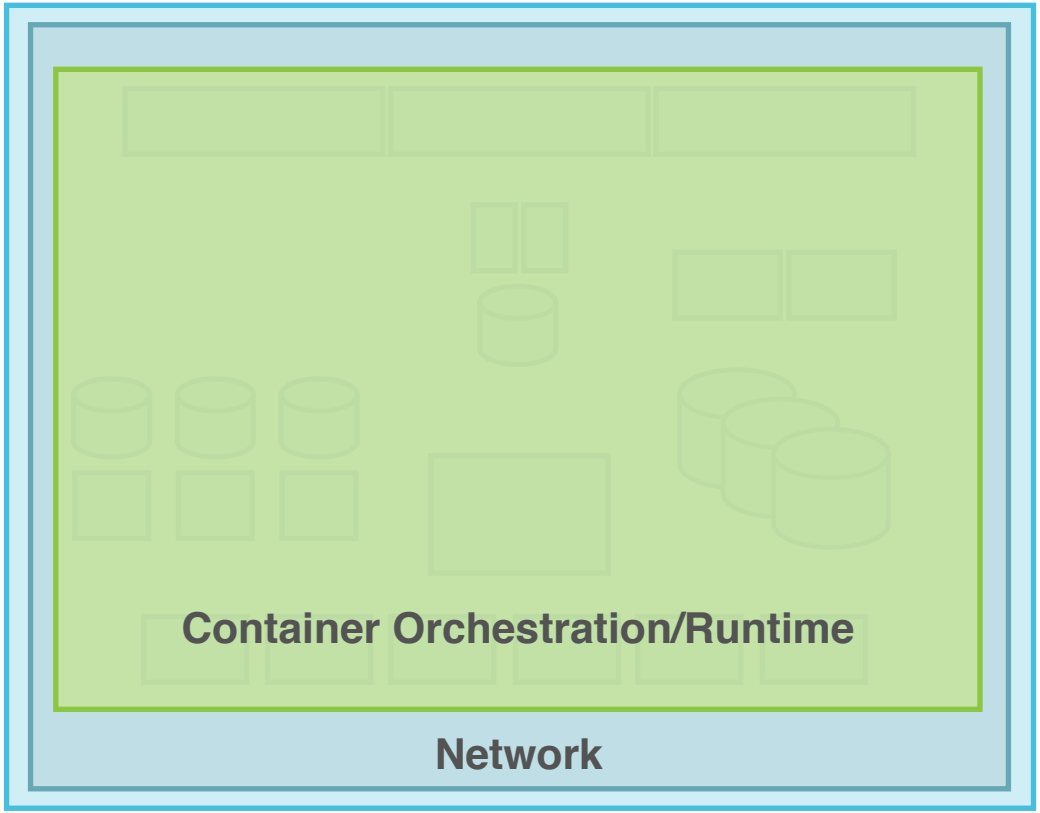
Hard Sharded



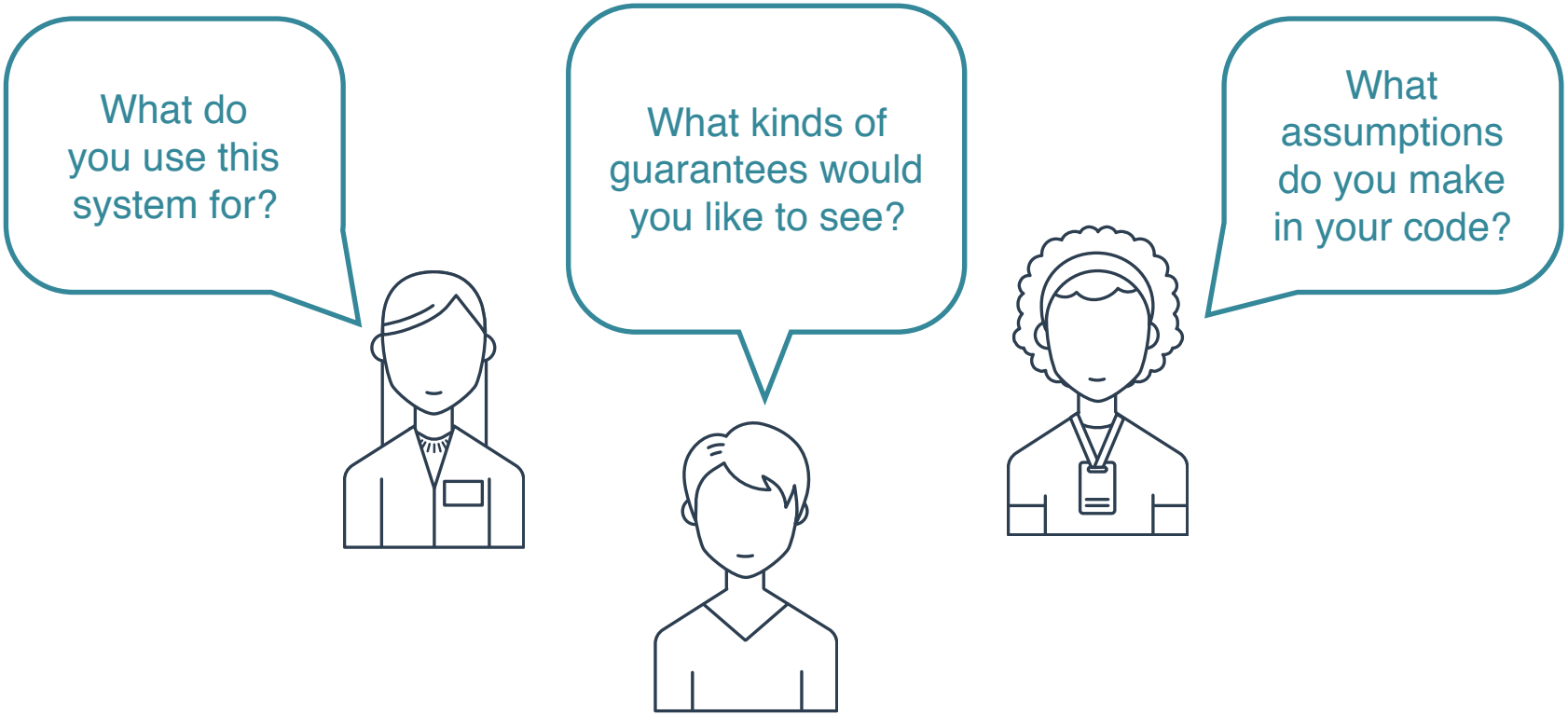
SLO SLO SLO

0% 100% 100%

Defining SLIs/SLOs for Core Infrastructure



Ask the Customer!



Hard Dependencies Require Higher SLOs

Network

Multiple Capabilities

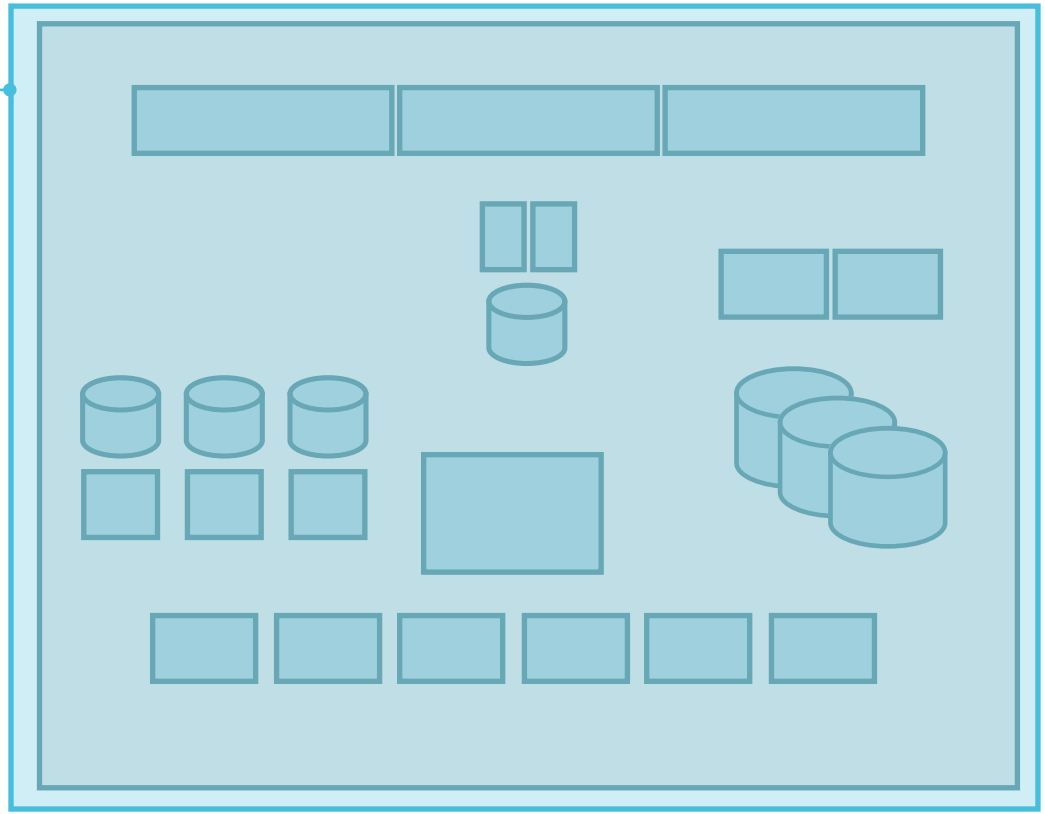
- Load balancing
- Intra-AZ routing
- Inter-AZ routing

Multiple SLIs

- Load balancer endpoint uptime
- Intra-AZ latency/packet loss
- Inter-AZ latency/packet loss

One SLO per capability

- 99.99% goal



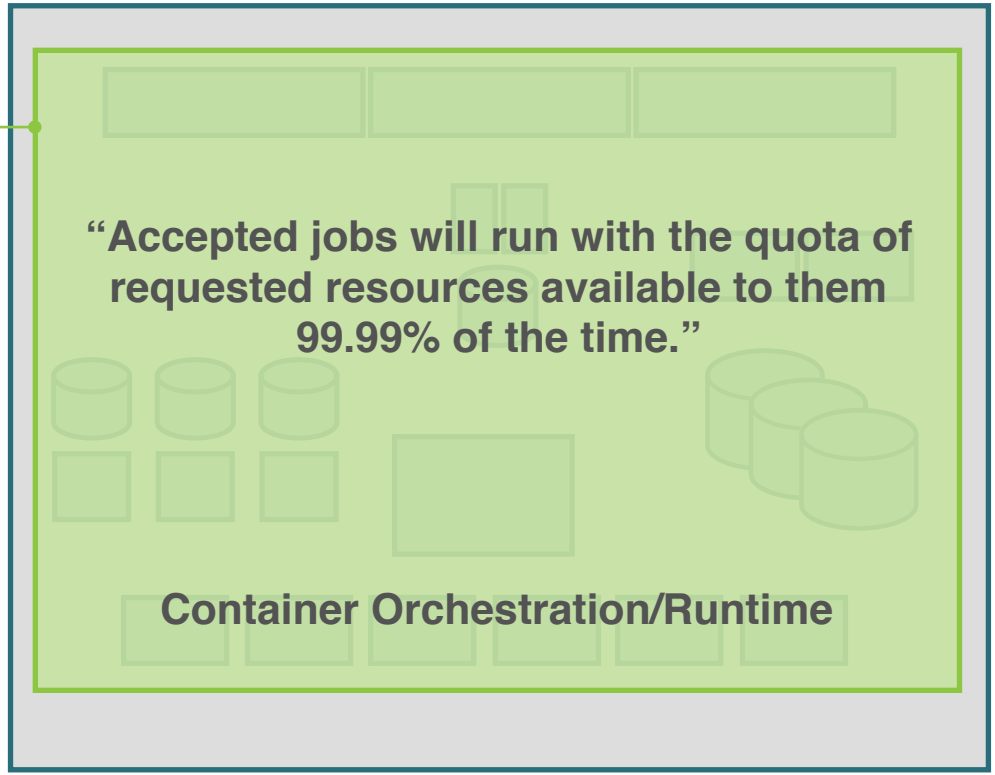
Capabilities Clarify Contracts

Container scheduler/cluster

Single Capability

- Run jobs with expected resources

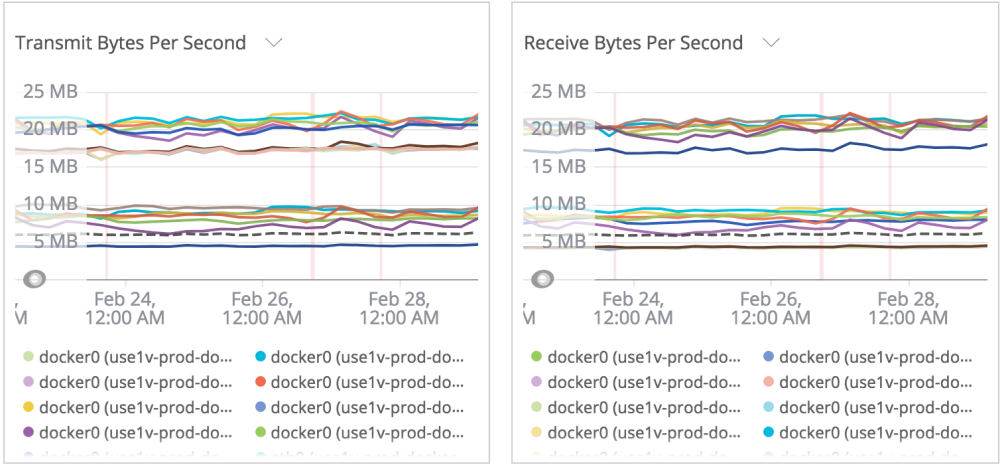
Multiple SLIs??



“Accepted jobs will run with the quota of requested resources available to them 99.99% of the time.”

Expected resources available to jobs

- CPU and memory quotas FTW
- Network saturation is possible



Jobs in runnable state 99.99% of time

- Potential uptime vs. job correctness

"Accepted jobs will run with the quota of requested resources available to them 99.99% of the time."

```
/**
 * Describes possible task states. IMPORTANT: Mesos assumes tasks that
 * enter terminal states (see below) imply the task is no longer
 * running and thus clean up any thing associated with the task
 * (ultimately offering any resources being consumed by that task to
 * another task).
 */
enum TaskState {
  TASK_STAGING = 6;  // Initial state. Framework status updates should not use.
  TASK_STARTING = 0; // The task is being launched by the executor.
  TASK_RUNNING = 1;
  TASK_KILLING = 8;  // The task is being killed by the executor.
  TASK_FINISHED = 2; // The task finished successfully on its own without external interference.
  TASK_FAILED = 3;   // TERMINAL: The task failed to finish successfully.
  TASK_KILLED = 4;   // TERMINAL: The task was killed by the executor.
  TASK_ERROR = 7;    // TERMINAL: The task description contains an error.
  TASK_LOST = 5;     // The task failed but can be rescheduled.
  TASK_DROPPED = 9;  // TERMINAL: the task failed to launch because of a transient error.
  TASK_UNREACHABLE = 10; /// The task was running on an agent that has lost contact with the master
  TASK_GONE = 11;    // TERMINAL. This can occur if the agent has been terminated along with all of its tasks
  TASK_GONE_BY_OPERATOR = 12; // The task was running on an agent that the master cannot contact
  TASK_UNKNOWN = 13;  // The master has no knowledge of the task.
}
```

Don’t Forget the Big Picture

Overall

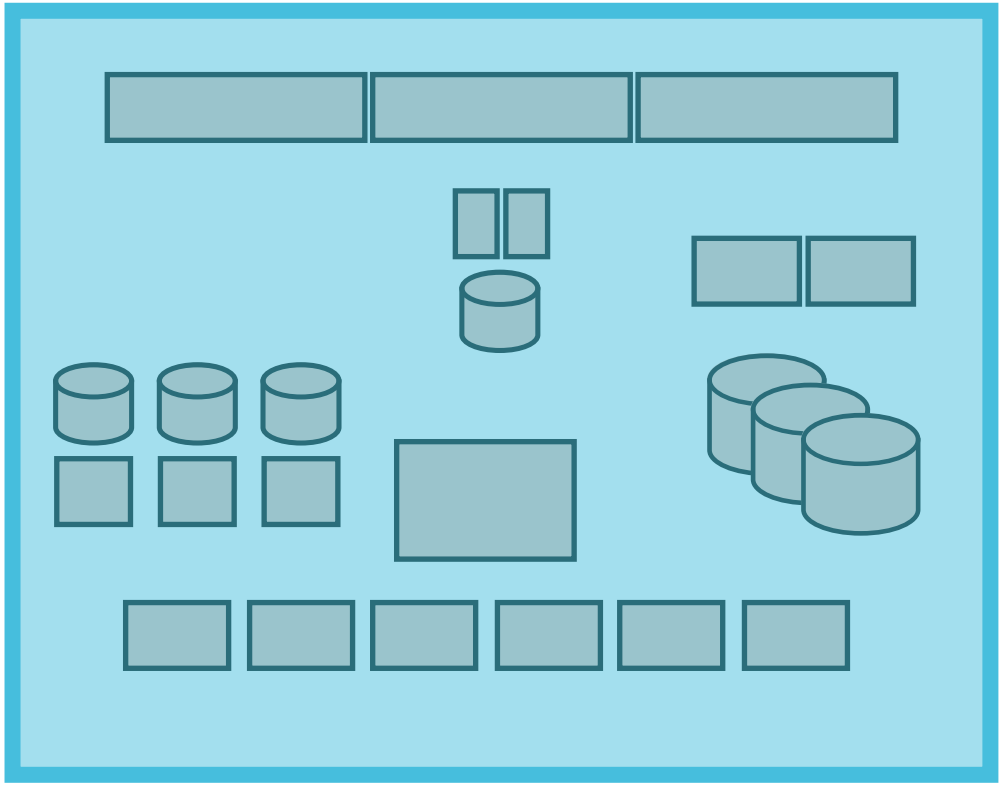
Multiple Capabilities

- Collect data
- Login
- View data

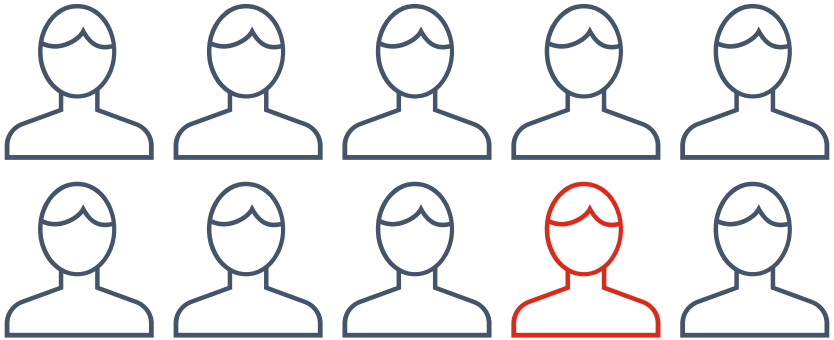
Single dumb SLI

- Does sample workflow succeed

Allows us to sanity check individual system SLIs/SLOs



Customer Specific SLOs



Recap

1. Worry about SLIs more than SLOs
2. Start with plain English descriptions of availability, not with technical underpinnings
3. Define SLIs and SLOs for specific capabilities at system boundaries
4. Each logical instance of a system (e.g., hard shard) gets its own SLO
5. SLIs are not the same as alerts, and are not a replacement for thorough alerting
6. “AND” together SLIs for a given capability into a single SLO for that capability
7. Write down your SLI/SLO contracts and share them
8. Key customers may need their own SLOs/SLIs
9. Assume SLOs and SLIs will both evolve over time
10. SLOs represent an ongoing commitment

Service Level Indicator

“10 key takeaways about SLIs delivered in 20 minutes”

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99.9%
of the time

Service Level Agreement

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Thank you

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