

SLOs and SLIs in the Real World: A Deep Dive

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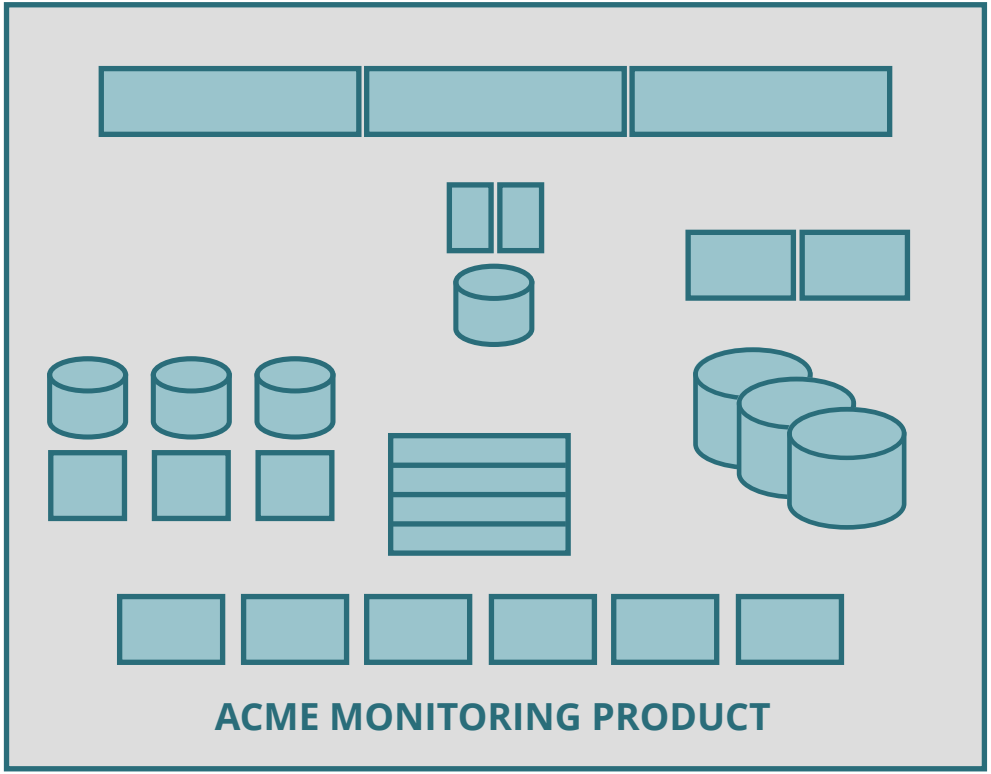
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Service Level Indicator	Service Level Objective	Service Level Agreement
X should be true…	Y proportion of the time	or else…
“10 key takeaways about SLIs delivered in 30 minutes”	99.9% of the time	We owe the conference organizers a drink

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Start with the Big Picture

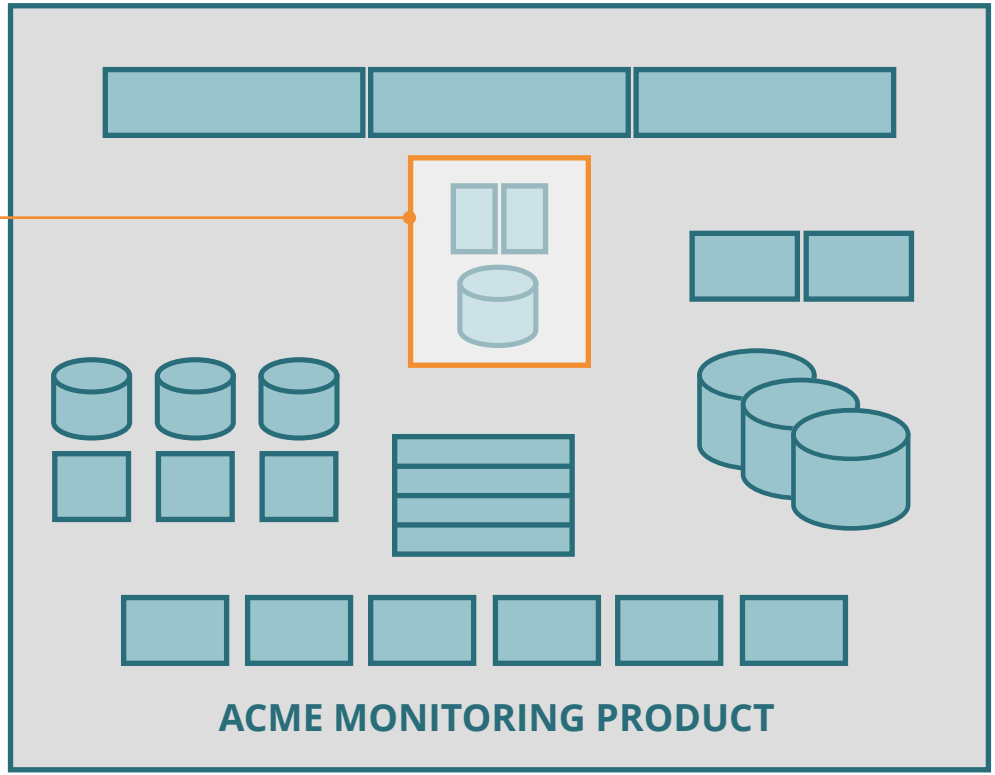
"Data is being collected properly, and customers can login to the system and view their data 99.9% of the time"



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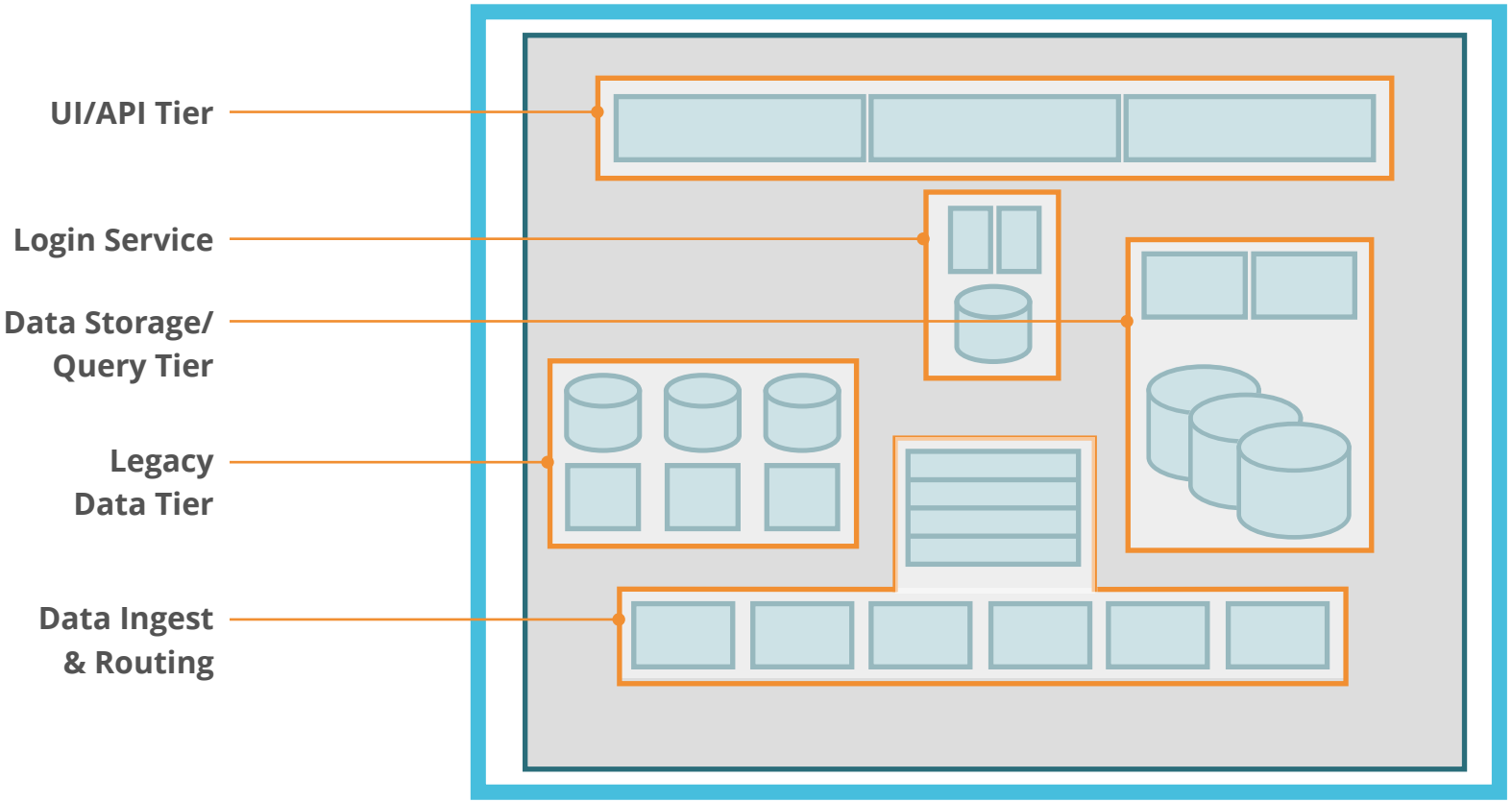
System Boundaries

Login Service:
Authenticate user credentials



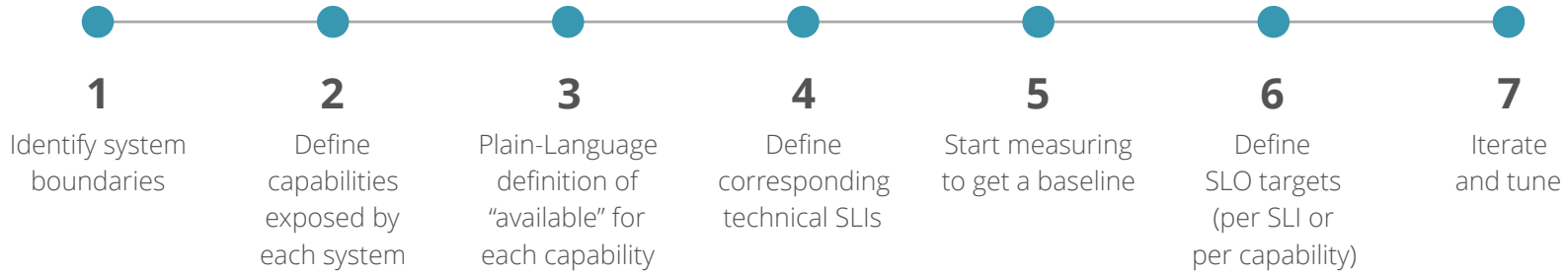
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A System of Systems



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SLIs + SLOs: A Simple Recipe



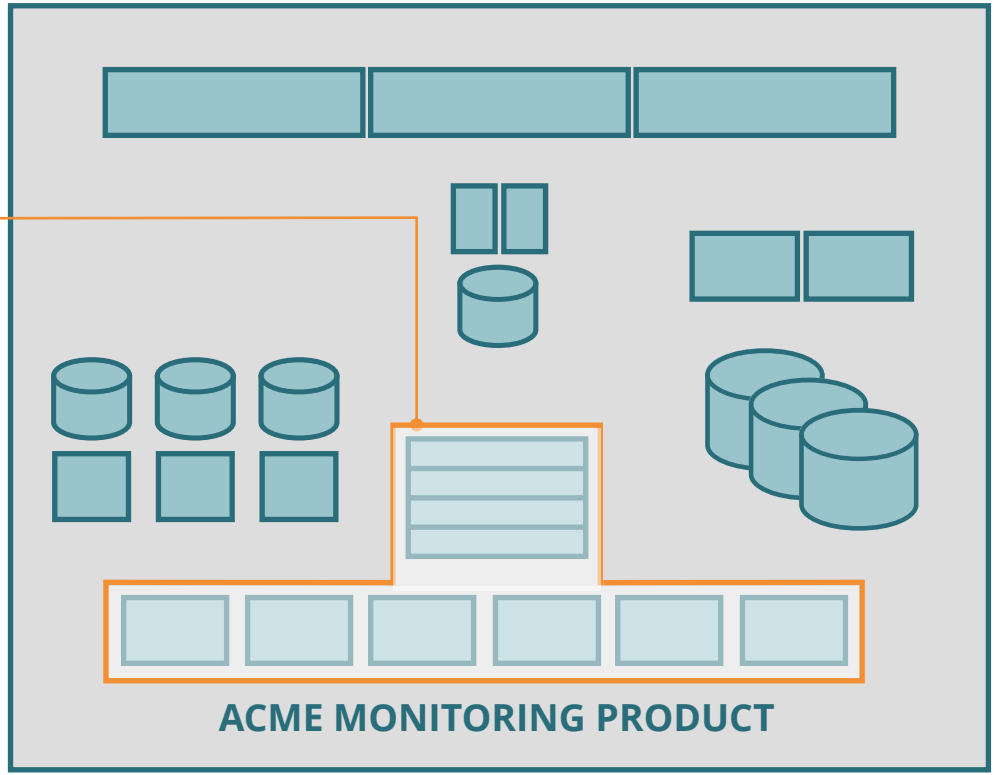
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Capabilities Drive SLIs

Data Ingest Tier

Multiple capabilities

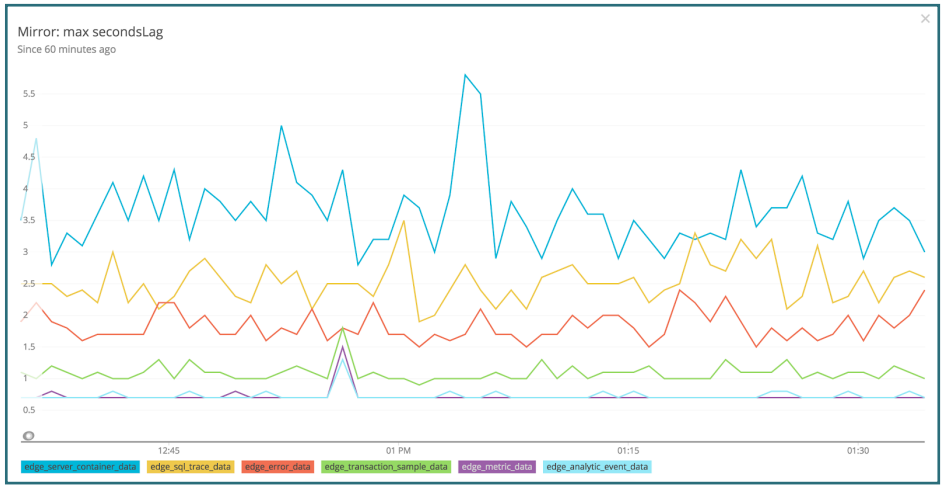
- Data ingested
- Data routed



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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

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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

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SLIs Act as Broad Proxies for Availability

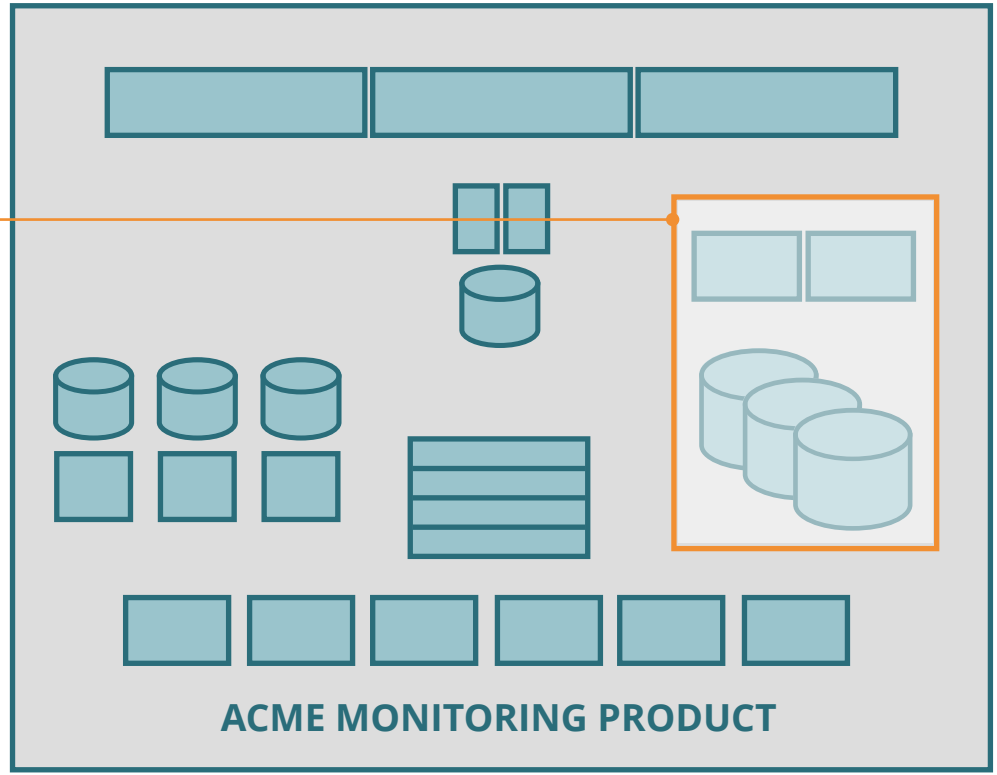
Horizontally Scaled Data Tier

Multiple Capabilities

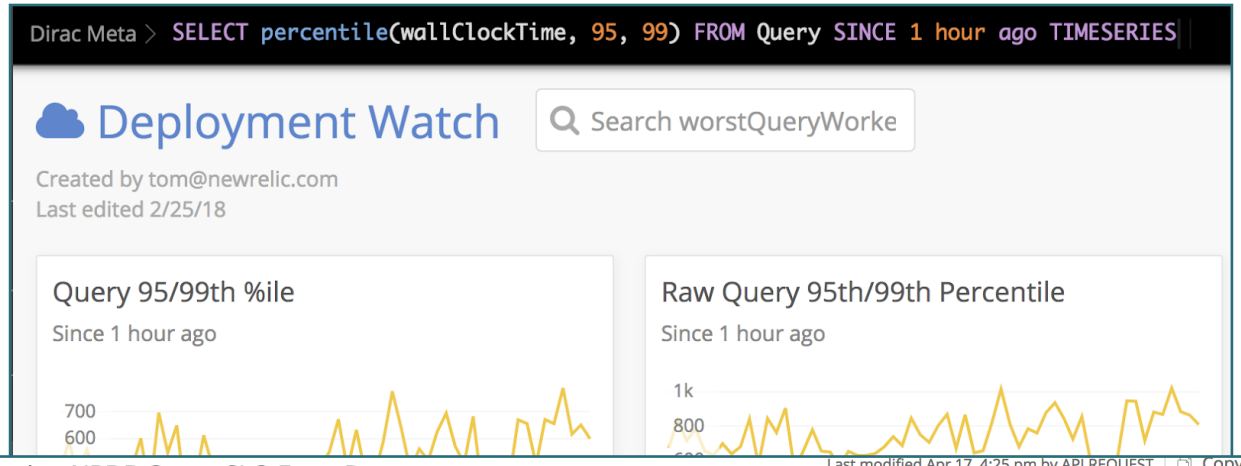
- Insert data
- Query data

Multiple SLIs

- Insert latency
- Query response time
- Query error rate



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NRQL QUERY **Production NRDB Query SLO Error Percentage**

Last modified Apr 17, 4:25 pm by API REQUEST | Copy | Delete | On

NRQL> SELECT percentage(count(*), where status != 'successful') FROM Query

Query query result is > 1 unit for at least 5 mins

Add a warning threshold

NRQL QUERY **EU Production NRDB Ingest SLO - Insert Worker Lag - Sev.1**

Last modified Apr 18, 12:22 pm | Copy | Delete | On

NRQL> SELECT count(*) as 'Lagging Partitions' FROM KafkaConsumerLag WHERE group = 'dirac_batch_insert' AND secondsLag/60 > 6 AND cluster = 'eu-production'

KafkaConsumerLag query result is > 0 units for at least 30 mins

Add a warning threshold

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

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SLIs/SLOs for Hard Sharded Systems

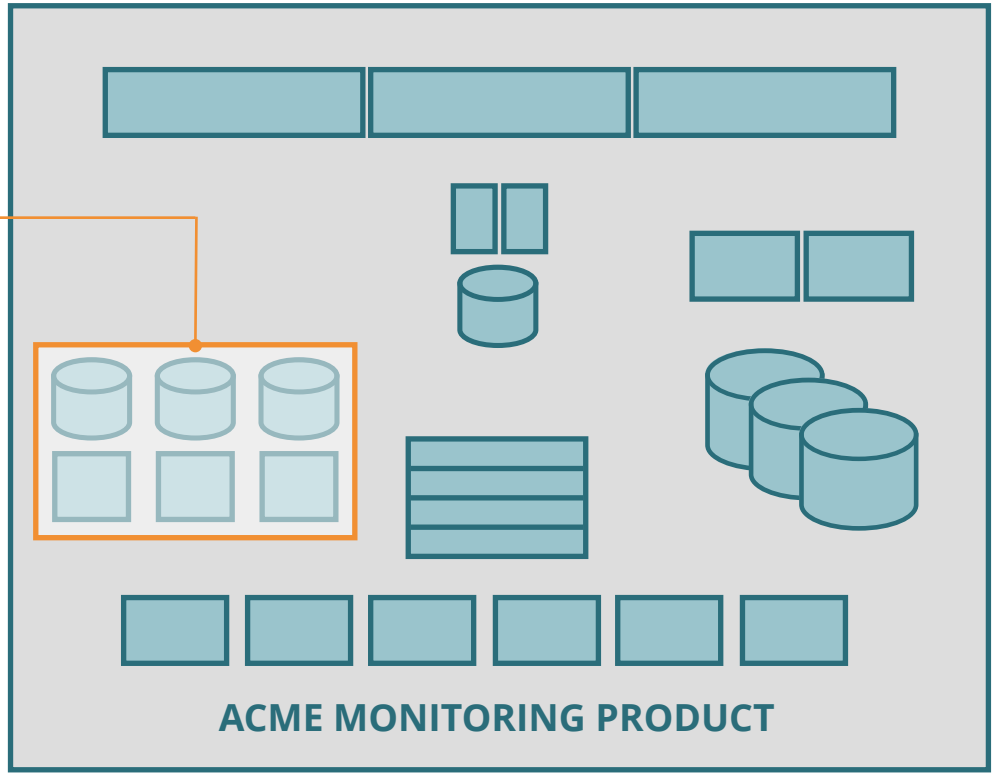
Hard Sharded Legacy Data Tier

Multiple Capabilities

- Insert data
- Query data

Multiple SLIs

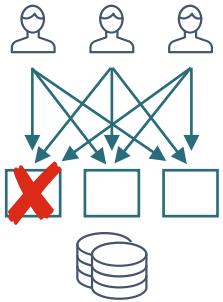
- Insert latency
- Query response time
- Query error rate



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Sharded vs. Horizontally Scaled SLOs

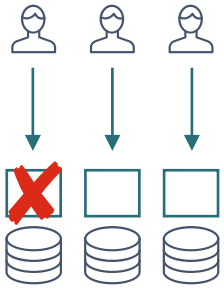
Horizontally Scaled



SLO

66%

Hard Sharded

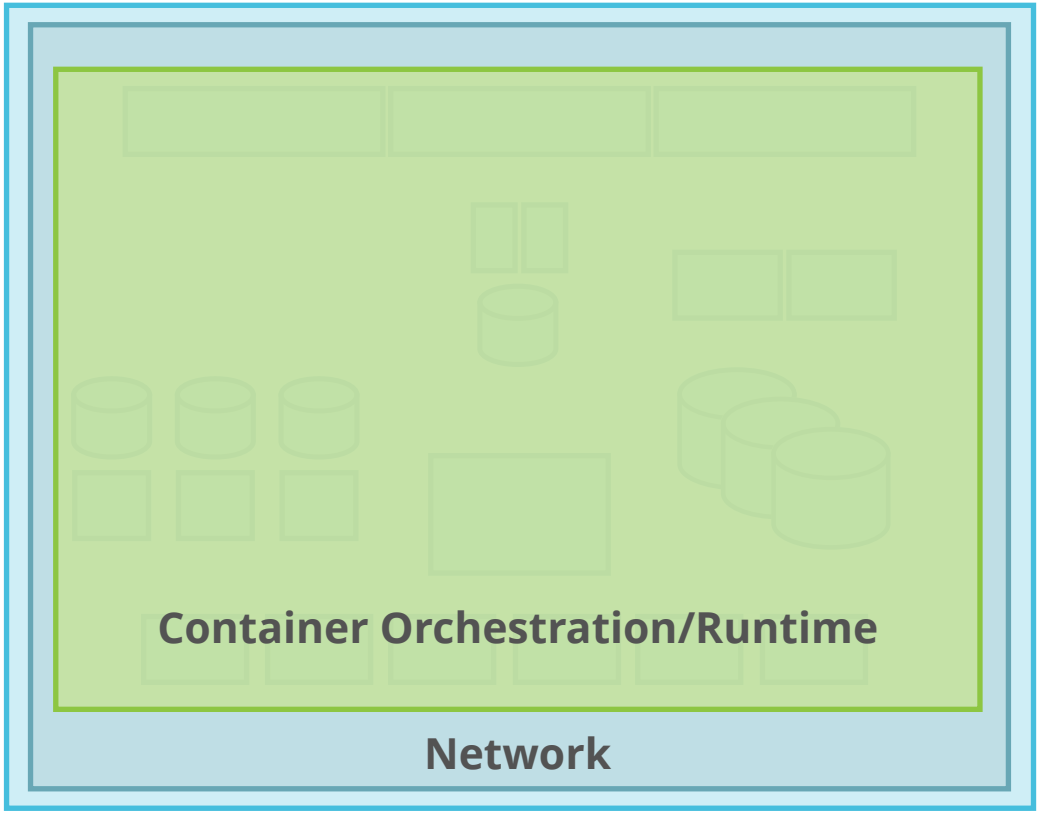


SLO SLO SLO

0% 100% 100%

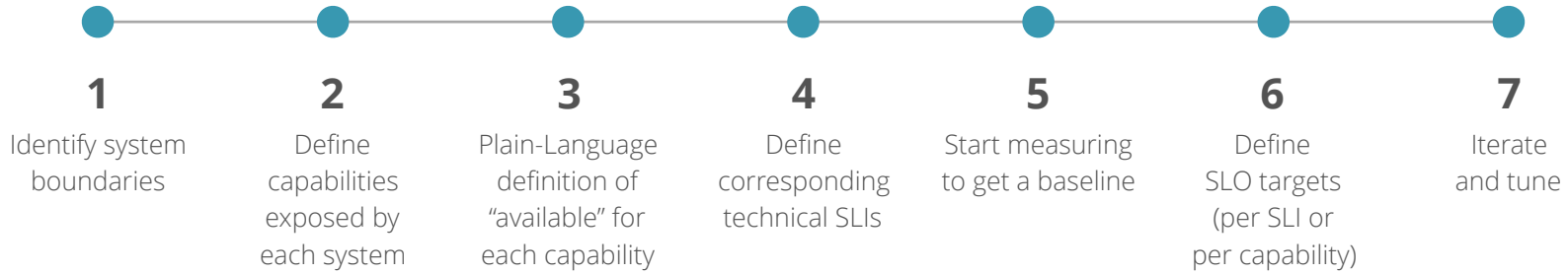
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Defining SLIs/SLOs for Core Infrastructure



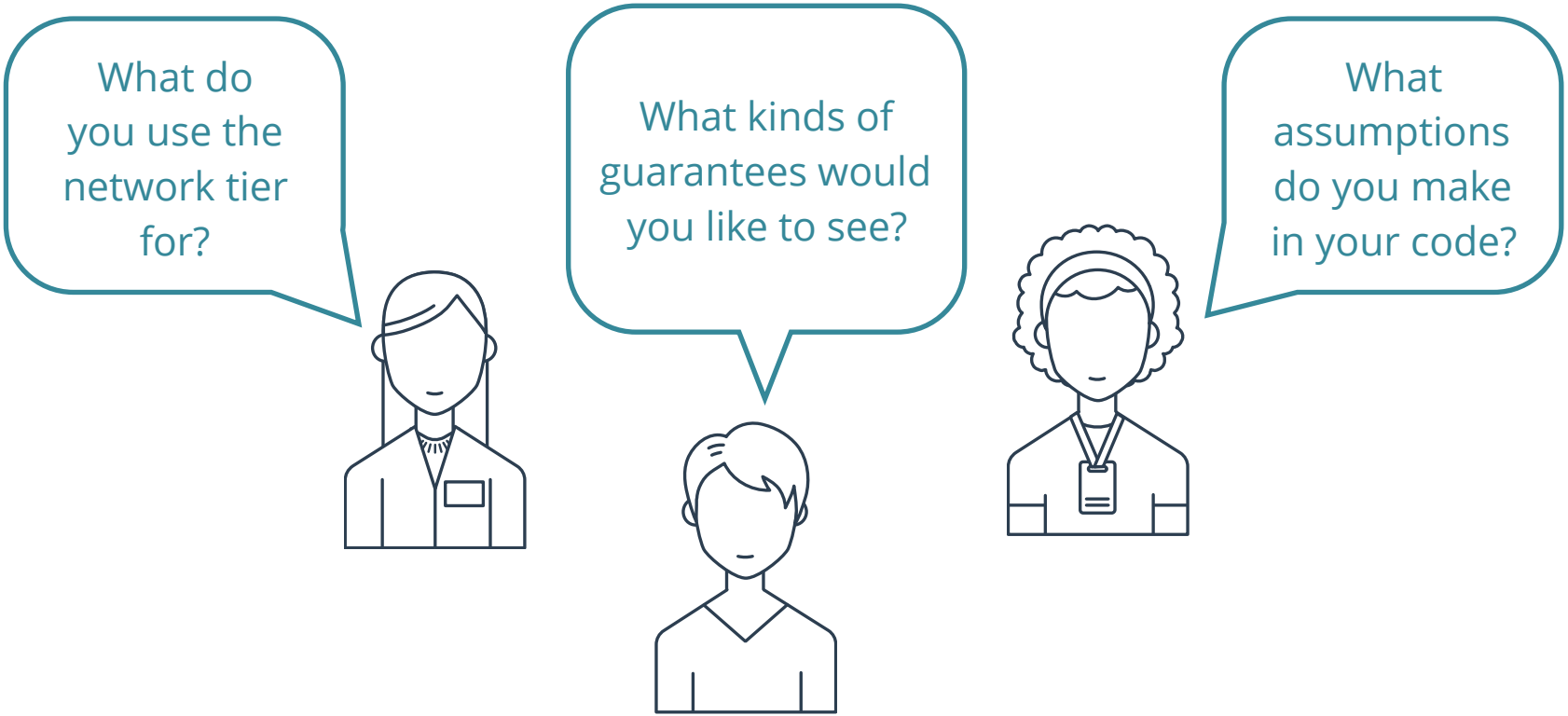
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SLIs + SLOs: A Simple Recipe



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Ask the Customer!



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Networking Tier SLOs

Network

Multiple Capabilities

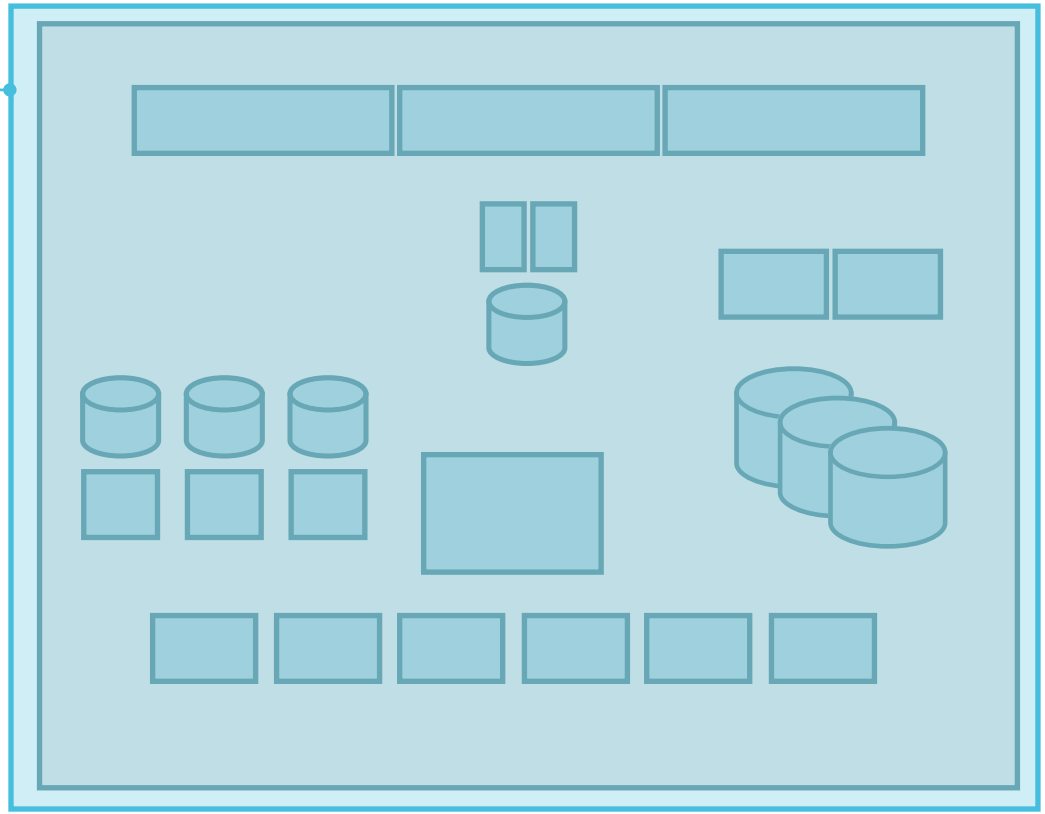
- Load balancing
- Intra-AZ routing
- Inter-AZ routing

Multiple SLIs

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

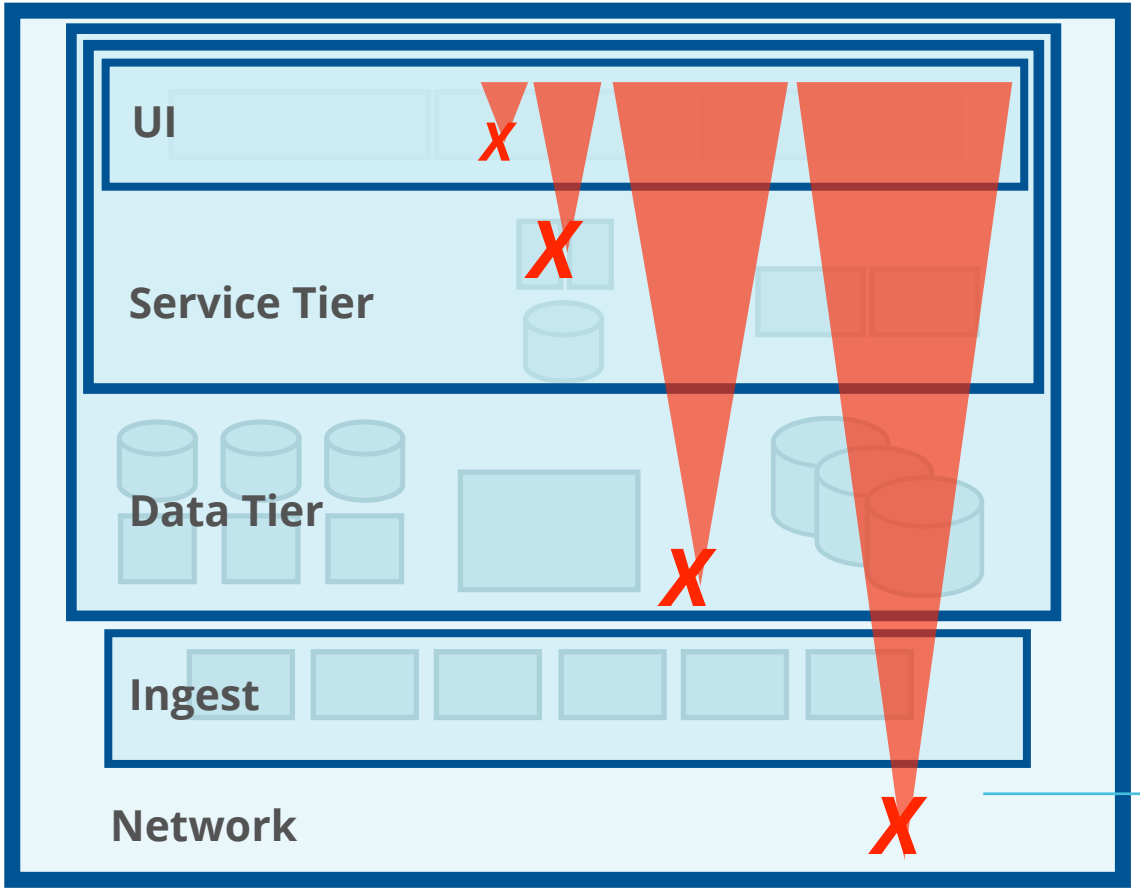
One SLO per capability

- 99.99% goal



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Hard Dependencies Require Higher SLOs



- MTTR typically increases with # impacted service tiers
- Graceful degradation harder to implement for infrastructure outages

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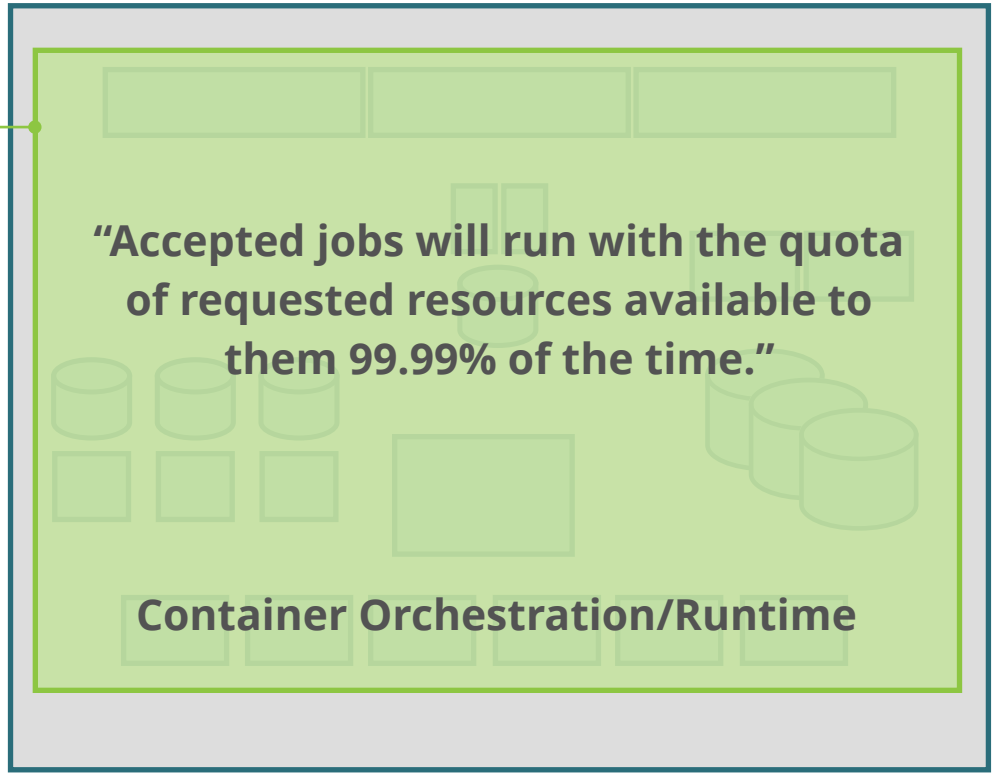
Capabilities Clarify Contracts

Container scheduler/ cluster

Single Capability

- Run jobs with expected resources

Multiple SLIs??

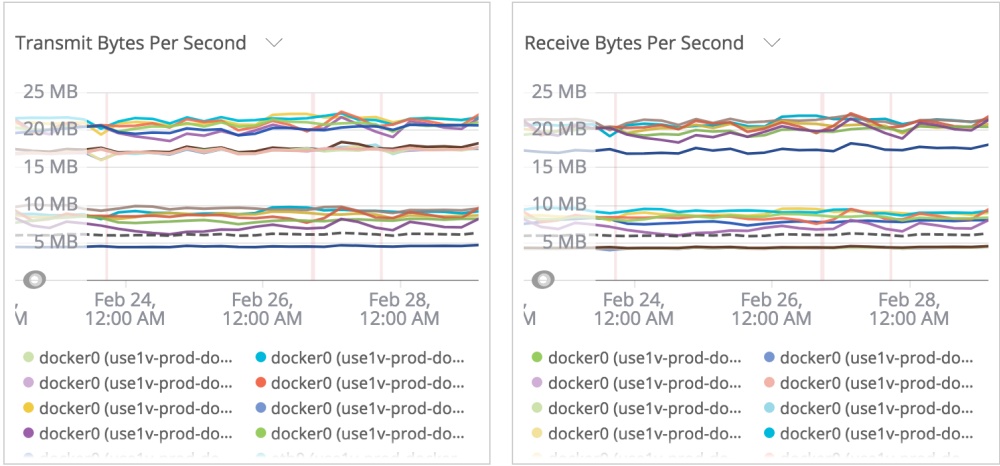


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“Accepted jobs will run with the quota of requested resources available to them 99.99% of the time.”

Expected resources available to jobs

- CPU and memory quotas FTW
- Network saturation is possible



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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.
}
```


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SLIs/SLOs for UIs

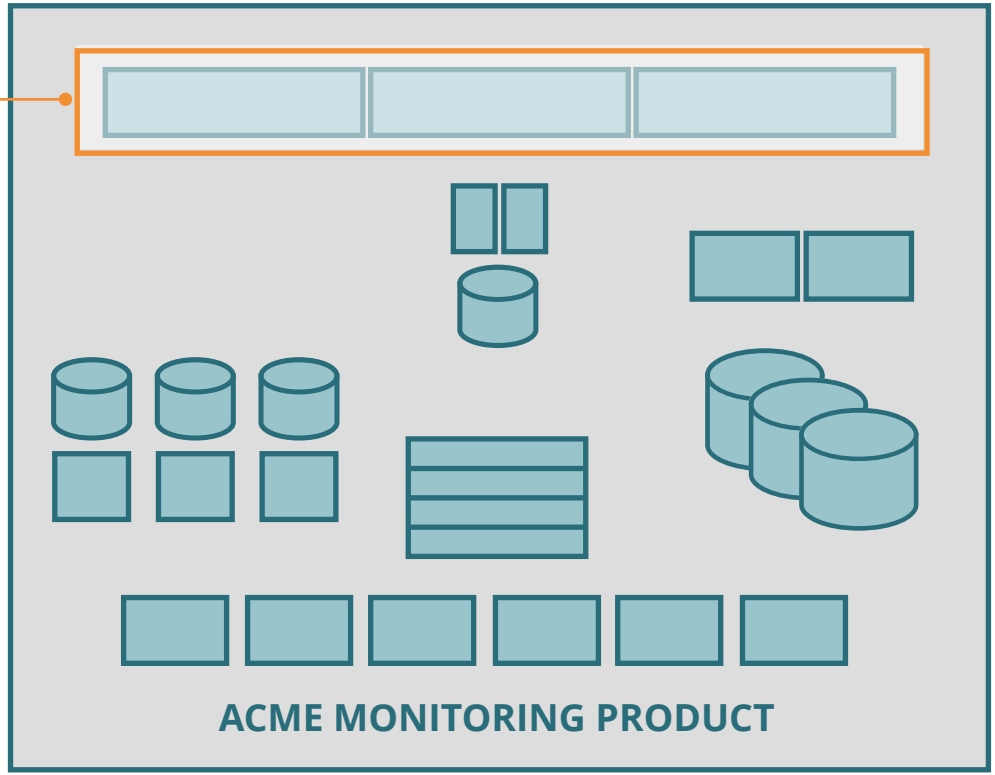
UI Tier

One Capability

- Deliver fast, error-free UI

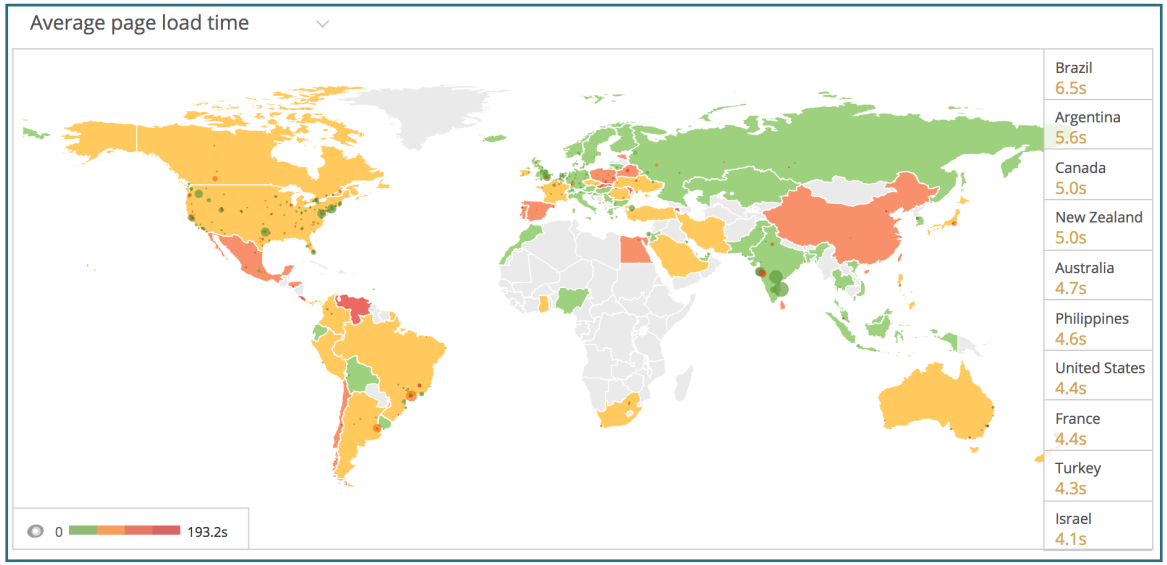
Multiple SLIs

- Page load time (by geo)
- Browser interaction time (by geo)
- Server error rate
- JS error rate (by browser)



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SLIs/SLOs for UIs



Welcome to your data, let's get querying

NewRelic Administration > `SELECT percentile(duration, 95) FROM BrowserInteraction WHERE `mobileOptimized` IS NULL and `userAgentName` like 'Chrome' TIMESERIES FACET category SINCE 30 minutes AGO LIMIT 500`

Run

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Don’t Forget the Big Picture

Overall

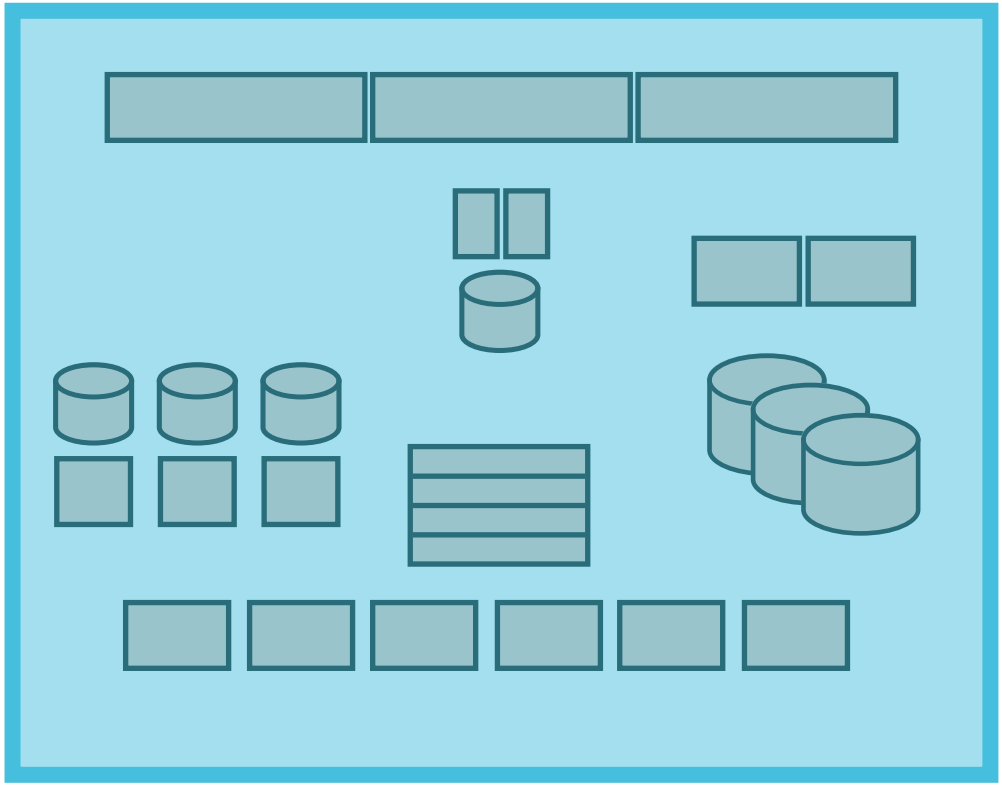
Multiple Capabilities

- Collect data
- Login
- View data

Single dumb SLI

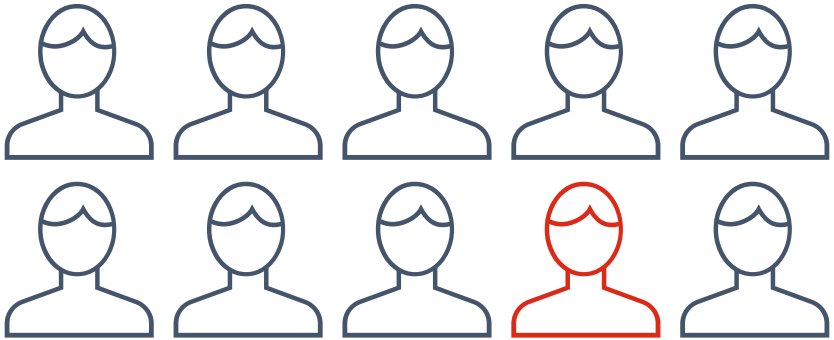
- Does sample workflow succeed

Allows us to sanity check individual system SLIs/SLOs



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Customer Specific SLOs



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Recap

1. Worry about SLIs more than SLOs
2. Start with Plain-Language 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

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Service Level Indicator

“10 key takeaways about SLIs delivered in 30 minutes”

Service Level Objective

99.9%
of the time

Service Level Agreement

…or we owe the conference organizers a drink.”

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Thank you

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