Site Reliability Engineering: What you need to know about Service Level Indicators (SLIs), Service Level Objectives (SLOs) and Error Budgets

TechTalkThursday@nine
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Go to www.menti.com and use the code 22 10 84

What does «reliability» mean to you?

Reliability is the most important feature of any system

SLI: Service Level Indicator

A quantifiable measure of service reliability

SLO: Service Level Objective

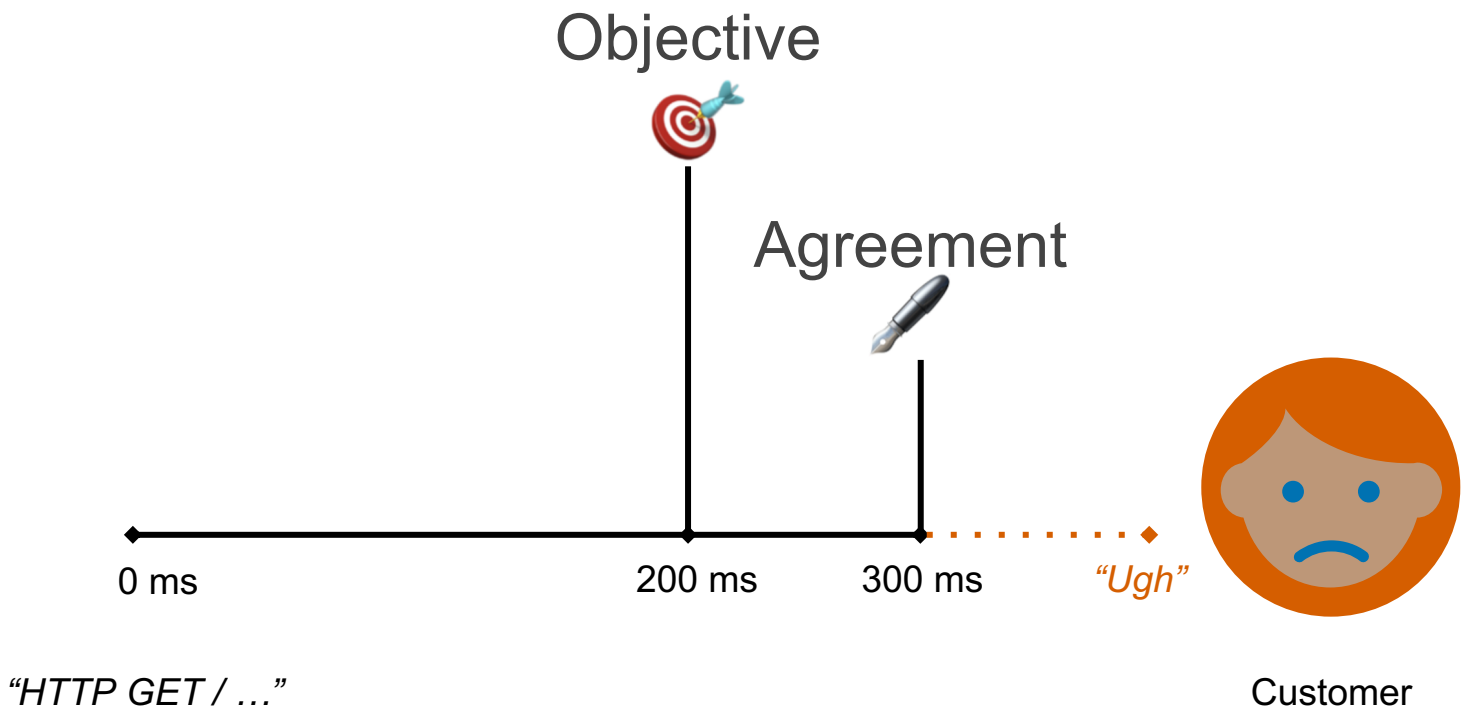
Set a reliability target for an SLI

SLOs should capture the performance and availability levels that, if **barely met**, would keep the **typical customer** of a service happy

“meets SLO targets” ⇒ “happy customers”
“sad customers” ⇒ “misses SLO targets”

Source: The Art of SLOs by Google https://cre.page.link/art-of-slos

SLOs and SLAs

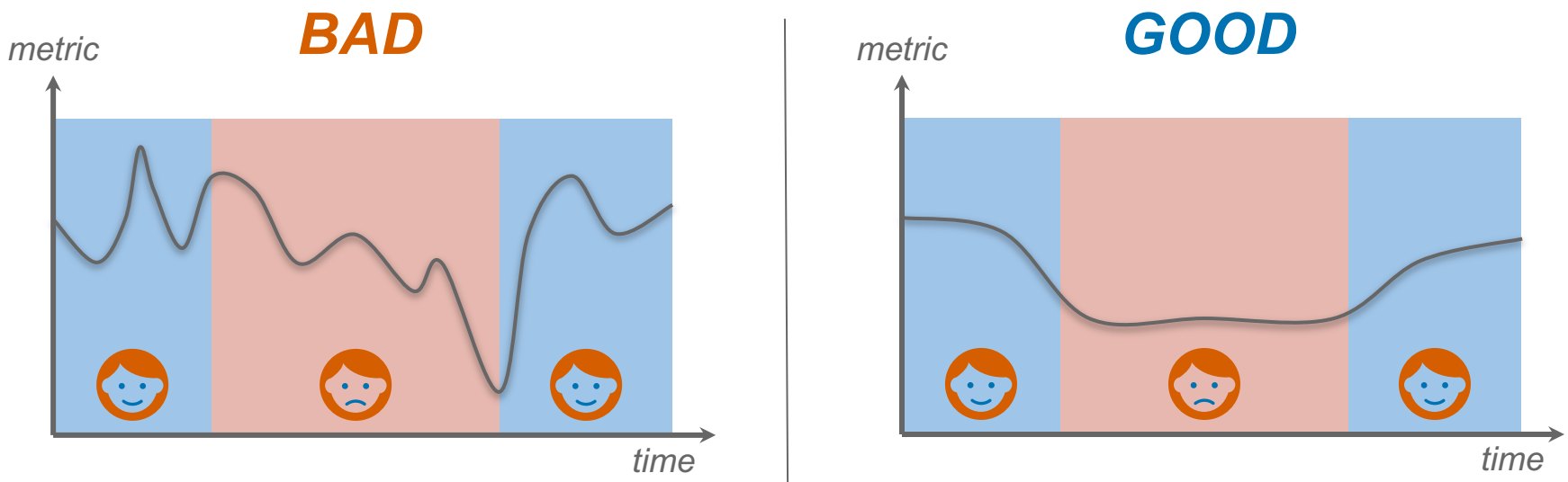


Source: The Art of SLOs by Google https://cre.page.link/art-of-slos

Error Budgets

- An SLO implies an acceptable level of unreliability
  - This is a budget that can be allocated

Choosing a good SLI



$$\text{SLI} : \left(\frac{\text{good events}}{\text{valid events}} \right) \times 100\%$$

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SLI Menu

Request / Response	Availability Latency Quality
Data Processing	Coverage Correctness Freshness Throughput
Storage	Throughput Latency

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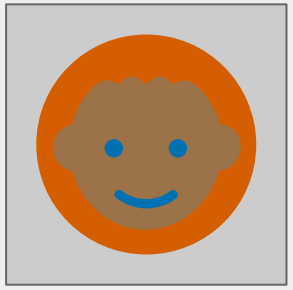
Example: Fang Faction Game

https://fangfactiongame.com/profile/someuser



SomeUser

Tribe of Frog

Faction Score: **31337**

Midwest Canyon

1. Tri-Bool
2. **65535**
3. Tri Repetae **61995**
4. Triassic Five **52391**
5. Tricksy Hobbits **37164**
6. Tribe of Frog **31337**

Trite Examples **29243**

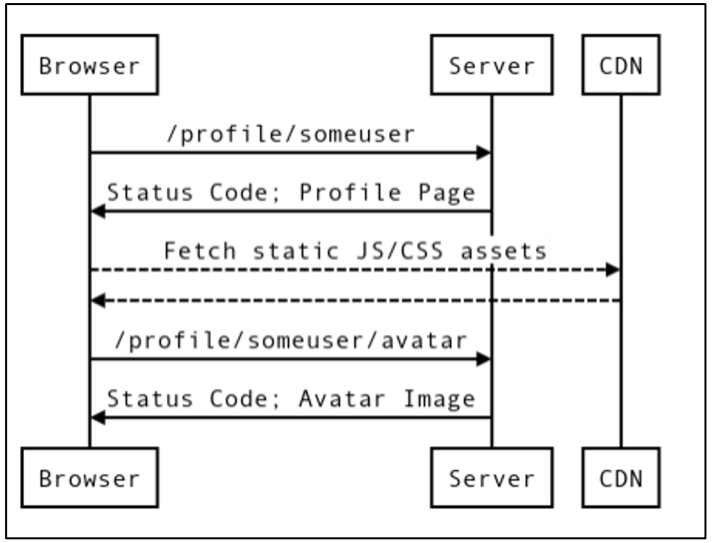
SomeUser's Profile

Faction Name: Tribe of Frog

Leader Name: SomeUser

Email Address: user@example.com

Update



Source: The Art of SLOs by Google https://cre.page.link/art-of-slos

Example: SLI Implementations

Availability

Proportion of **HTTP GET** requests
for **/profile/{user}** or **/profile/{user}/avatar**
that have ***2XX***, ***3XX*** or ***4XX* (excl. 429)** status
measured at the **load balancer**

and

Proportion of **HTTP GET** requests
for **/profile/prober_user** and **all linked resources**
returning **valid HTML containing "ProberUser"**
measured by a **black-box prober** every 5s

Latency

Proportion of **HTTP GET** requests
for **/profile/{user}**
that send their **entire response within *X* ms**
measured at the **load balancer**

Source: The Art of SLOs by Google https://cre.page.link/art-of-slos

User Journey: Home Page Load

SLI Type: Latency

SLI Specification:

Proportion of **home page requests** that were served in **< 100ms**

(Above, "[home page requests] served in <100ms" is the numerator in the SLI Equation, and "home page requests" is the denominator.)

SLI Implementations:

- Proportion of **home page requests** served in **< 100ms**, as measured from the 'latency' column of the **server log**.
  (**Pros/Cons:** This measurement will miss requests that fail to reach the backend.)
- Proportion of **home page requests** served in **< 100ms**, as measured by **probers** that execute javascript in a browser running in a virtual machine.
  (**Pros/Cons:** This will catch errors when requests cannot reach our network, but may miss issues affecting only a subset of users.)

SLO:

99% of home page requests in **the past 28 days** served in < 100ms.

Source: The Art of SLOs by Google https://cre.page.link/art-of-slos

Summary

SLI	SLO	SLA	Error Budget
service level indicator: a monitoring metric that is indicative of a user's goal	service level objective: a target on an SLI that if barely met, keeps the user happy	service level agreement: SLO + consequences	the maximum amount of time the system can fail without contractual consequences. It is the remainder / inverse of the SLO

Further Information

- The ART of SLOs: https://cre.page.link/art-of-slos
- Site Reliability Engineering: Measuring and Managing Reliability https://www.coursera.org/learn/site-reliability-engineering-slos
- Site Reliability Engineering Books (free): https://landing.google.com/sre/books/