SLOconf
SERVICE LEVEL OBJECTIVE CONFERENCE

Ensuring Reliability with Burn Rates

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Image credit: Objective by WEBTECHOPSLLP from NounProject.com

SLO

A Service Level Objective is a target value for a service, as measured via a specific metric over a time window.

E.g. 99% of all requests from the past 30 days should complete within 500ms

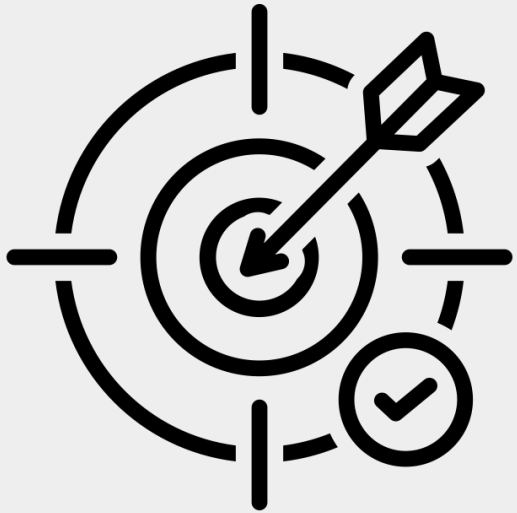

Image credit: Budget Spending by WEBTECHOPSLLP from NounProject.com

Error Budget

An error budget is the maximum amount of time that a technical system can fail without contractual consequences.

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= 1.0 - SLO
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If SLO is 99%, Error Budget is 1% of requests from the past 30 days can take longer than 500ms.

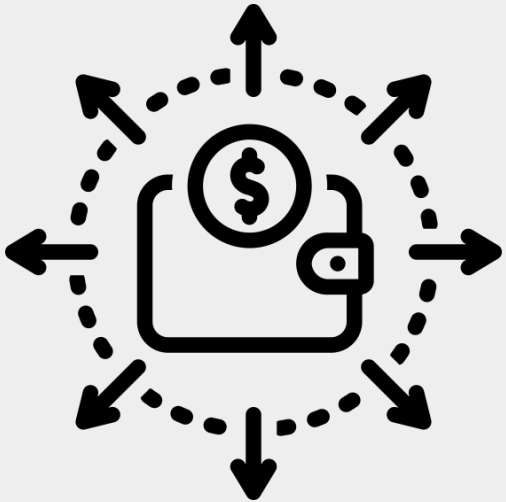


Image credit: Error by Aneeque Ahmed from NounProject.com

Error Rate

Error rate is the real percentage of failures or bad events during the SLO window as measured by your monitoring system.

E.g. out of 1,000,000 requests over the past 30 days, 5000 of them failed. Error rate is 0.5%

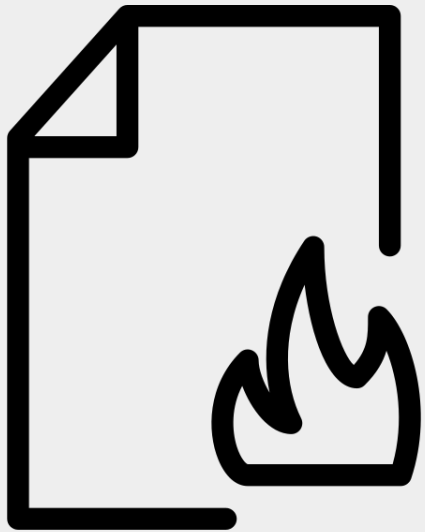
Image credit: File Fire by iconsmind.com from NounProject.com

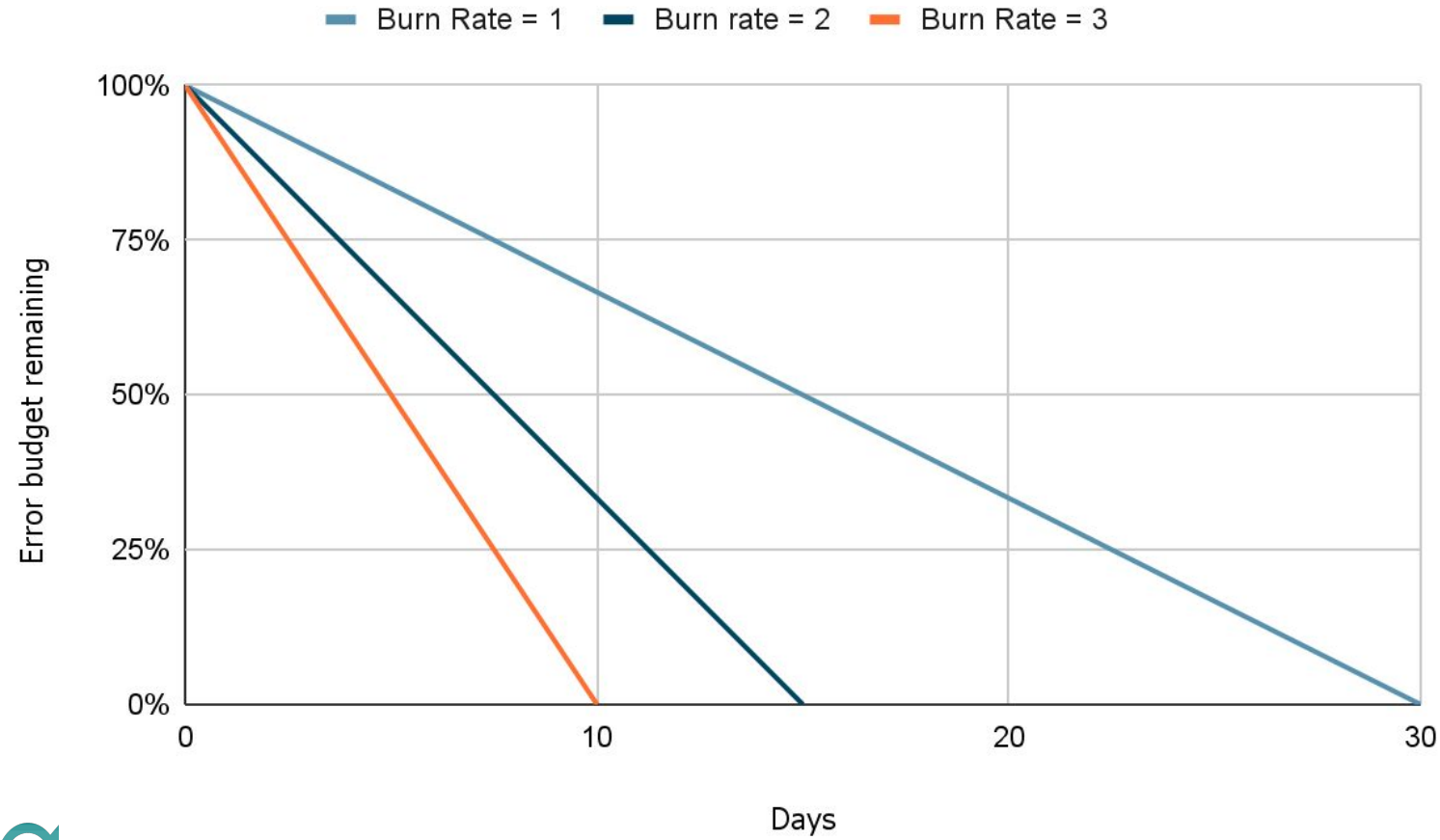
Burn Rate

Burn rate is how fast your error budget is consumed.

Ideal Burn Rate is 1.

$$= \frac{\text{error rate}}{\text{error budget}}$$




Burn Rate = 1
Burn rate = 2
Burn Rate = 3
100%
75%
50%
25%
0%
Error budget remaining
0
10
20
30
Days

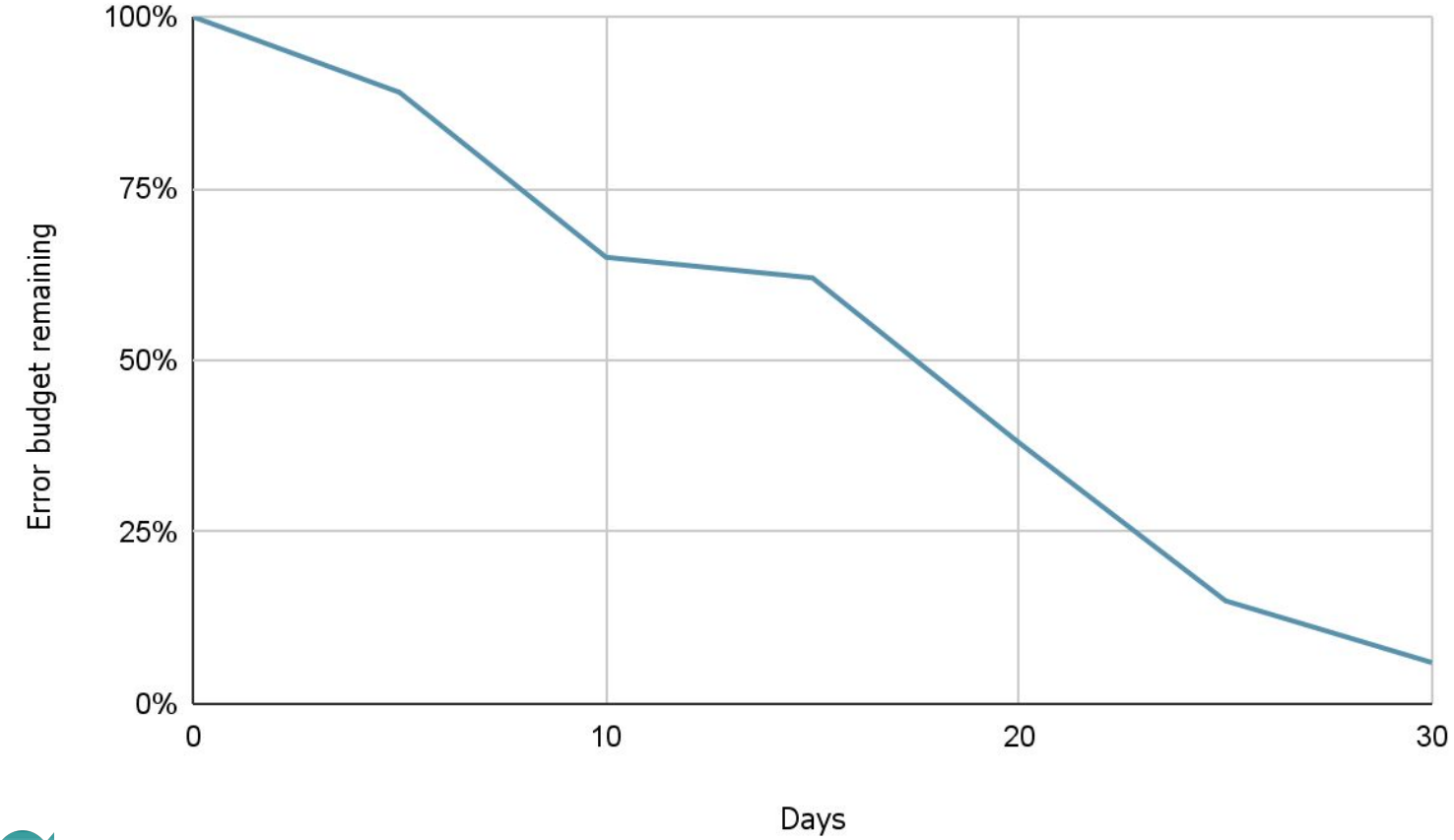

100%
75%
50%
25%
0%
Error budget remaining
0
10
20
30
Days

Image credit: Alert by LINECTOR from NounProject.com

Alerting

- When and how to alert
- Error budget vs burn rate alerting

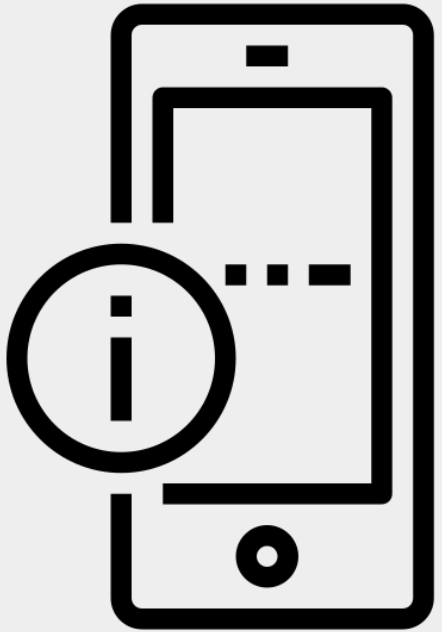
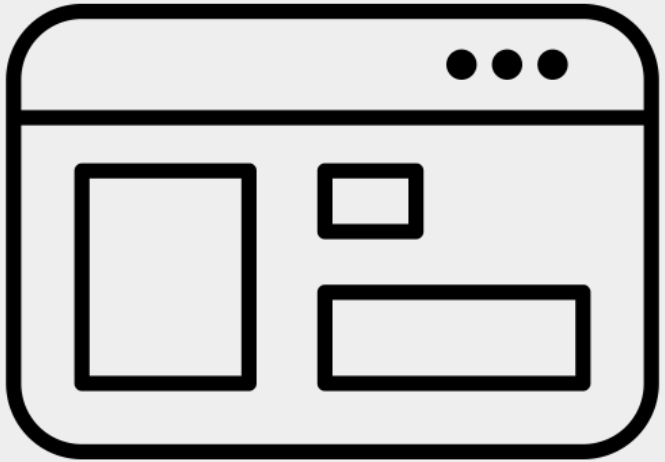


Image credit: Window by Youmena from NounProject.com

Alerting

- Alerting windows
  - Long window
  - Short window
- What is the right burn rate?



Calculating burn rates

$$burn\ rate = \frac{length\ of\ SLO\ target\ (in\ hours) * percentage\ of\ error\ budget\ consumed}{long\ window\ (in\ hours) * 100\%}$$

$$burn\ rate = \frac{7\ days * 24\ hours * 10\%\ error\ budget\ consumed}{1\ hour * 100\%} = 16.8$$

$$max\ burn\ rate = \frac{1}{1 - SLO\ target}$$

Recommendations for burn rates

For 7-day targets:

BURN RATE	LONG WINDOW	SHORT WINDOW	THEORETICAL ERROR BUDGET CONSUMED
16.8	1 hour	5 minutes	10%
5.6	6 hours	30 minutes	20%
2.8	24 hours	120 minutes	40%

For 30-day targets:

BURN RATE	LONG WINDOW	SHORT WINDOW	THEORETICAL ERROR BUDGET CONSUMED
14.4	1 hour	5 minutes	2%
6	6 hours	30 minutes	5%
3	24 hours	120 minutes	10%

Questions?

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References and further reading

https://docs.datadoghq.com/monitors/service_level_objectives/burn_rate/

https://sre.google/workbook/alerting-on-slos/

https://devops.stackexchange.com/questions/8915/how-to-calculate-burn-rate-for-slos

https://blog.mads-hartmann.com/sre/2020/09/08/alerting-on-slos.html#burn-rates

https://medium.com/google-cloud/how-to-alert-on-slos-2a5ce8c4e7dd

https://banzaicloud.com/blog/burn-rate-demystified/

https://cloud.google.com/stackdriver/docs/solutions/slo-monitoring/alerting-on-budget-burn-rate

https://www.youtube.com/watch?v=t1BGo-ll1AM

https://www.youtube.com/watch?v=iAKksNmAZDw

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