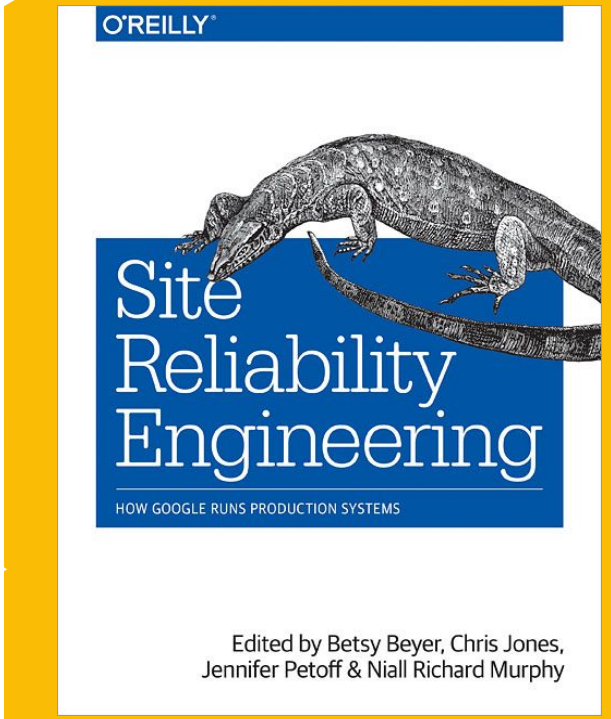
SRE and Error Budgets



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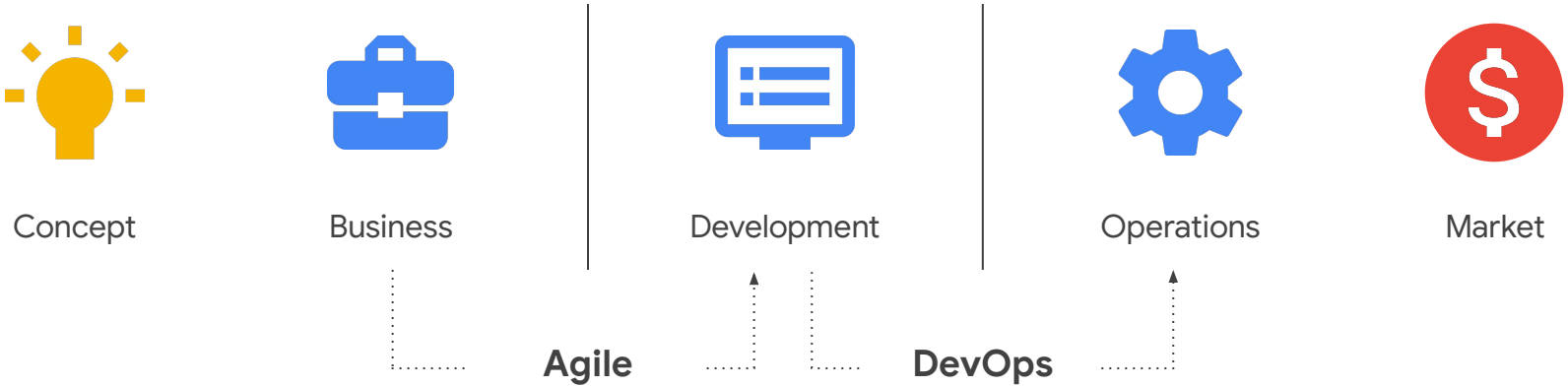
Who are you?

Business

Development

Operations

Reducing product lifecycle friction



Nathen Harvey

Developer Advocate
@nathenharvey
(He/him)

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2019-06-14

Delivering Software

Concept

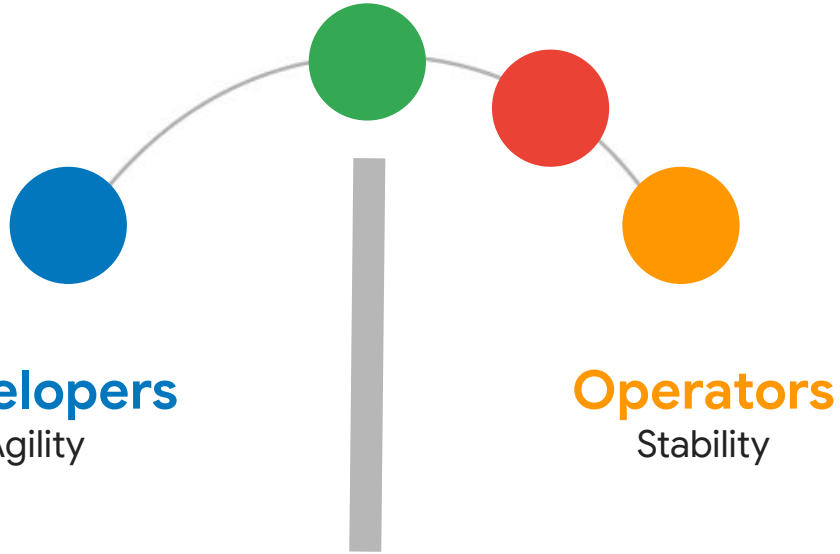
Business

Development

Operations

Market

Incentives are not aligned



Software's long-term cost

40%[1] to 90%[2] of the total cost of software happens after launch.

1 Glass, R. (2002). Facts and Fallacies of Software Engineering, Addison-Wesley Professional; p. 115.

2 Dehaghani, S. M. H., & Hajrahimi, N. (2013). Which Factors Affect Software Projects Maintenance Cost More? Acta Informatica Medica, 21(1), 63–66. http://doi.org/10.5455/AIM.2012.21.63-66

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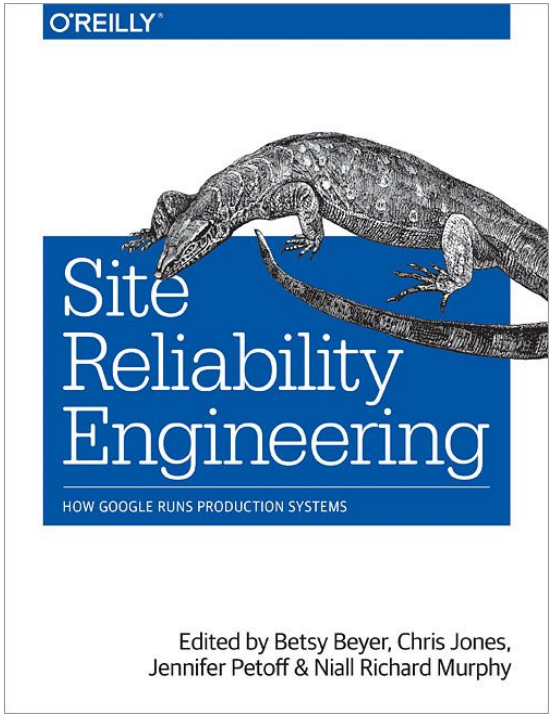
Site Reliability Engineering

SRE is what you get when you treat operations as a software problem. The mission is to protect, provide for, and progress software and systems with an ever-watchful eye on their availability, latency, performance, and capacity.



“100% is the wrong reliability target for basically everything.”

Benjamin Treynor Sloss, Vice President of 24x7 Engineering, Google

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The **most important feature** of any system is its **reliability**

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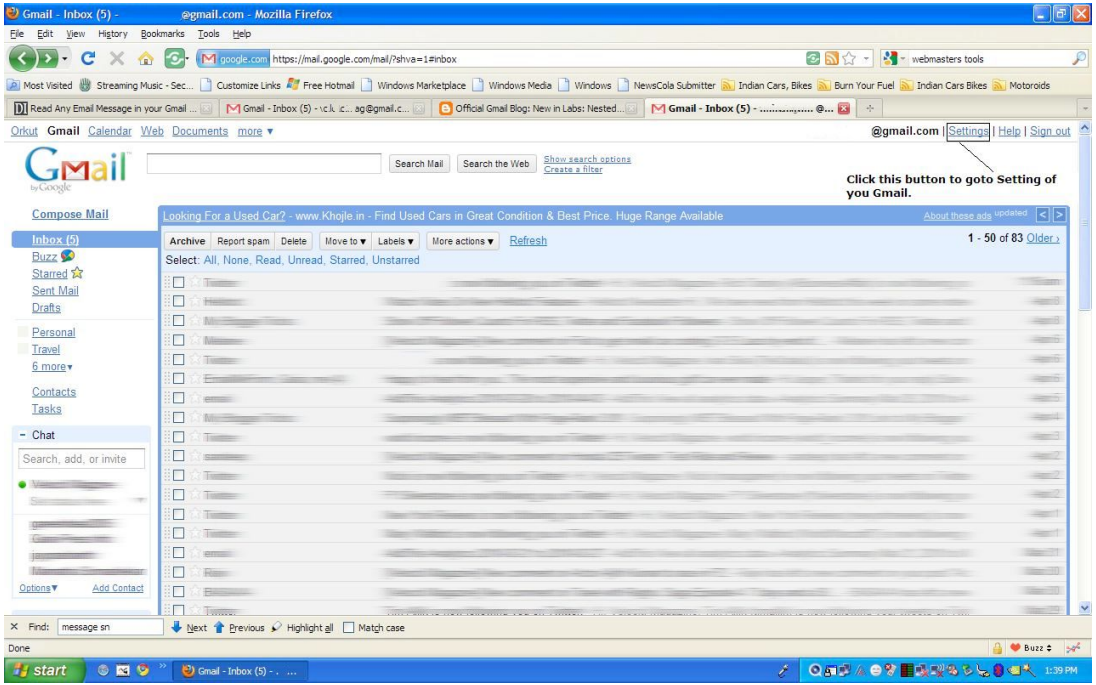
Do you prefer Gmail 2010?



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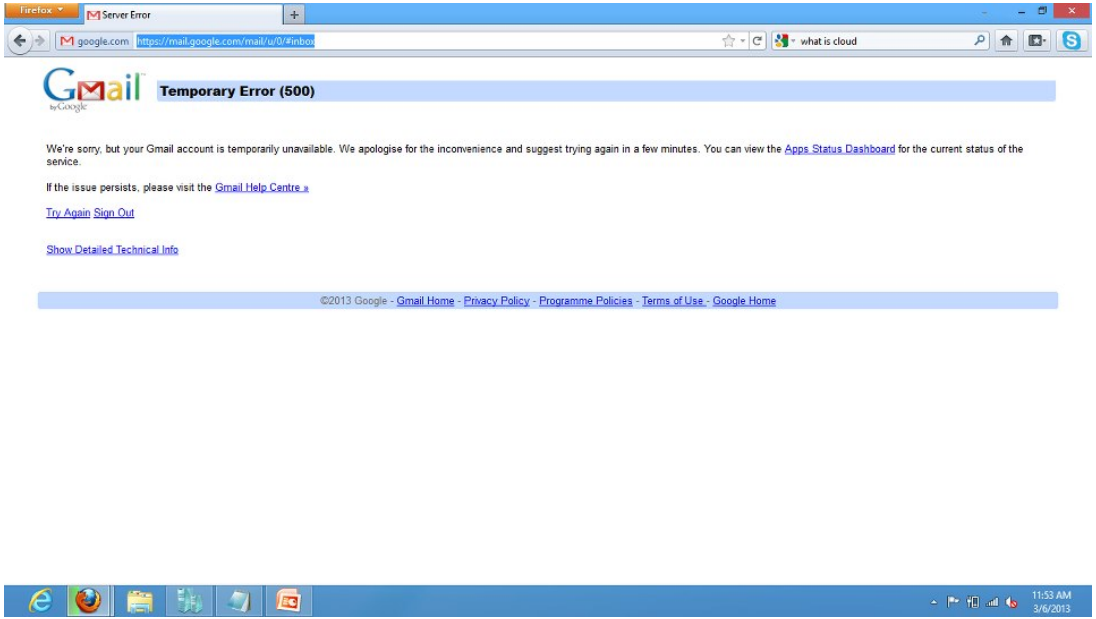
… or Gmail 500?


Firefox
Server Error
google.com
https://mail.google.com/mail/u/0/#inbox
what is cloud
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by Google
Temporary Error (500)
We're sorry, but your Gmail account is temporarily unavailable. We apologise for the inconvenience and suggest trying again in a few minutes. You can view the Apps Status Dashboard for the current status of the service.
If the issue persists, please visit the Gmail Help Centre »
Try Again Sign Out
Show Detailed Technical Info
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3/6/2013

Lily started the first Pet Theory clinic 12 years ago

Lily, veterinarian,
Founder of Pet Theory

Environmentally friendly.

Listen to clients **and** patients.

Pet Theory

A **principled** way
to argue about the
desired reliability
of a service

Error Budgets

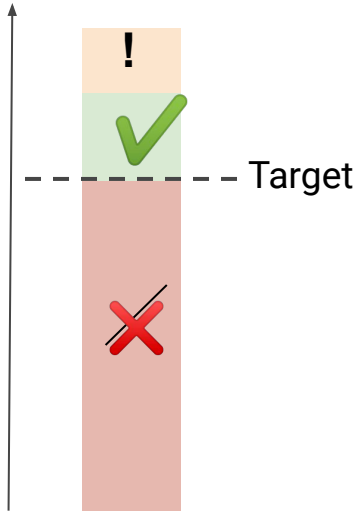
An **acceptable level** of unreliability

*This is a **budget** that can be **allocated***

Error budgets capture the performance and availability levels that, if barely met, would keep the **typical customer** happy.

“meets target error budget” ⇒ “happy customers”
“sad customers” ⇒ “misses target error budget”

Measure Error Budget achieved & try to be *slightly* over target...



...but don't be too much better or users will **depend on it**

What should we **spend** our error budget on?

Error budgets can accommodate

/ releasing new **features**

/ expected system **changes**

/ inevitable **failure** in hardware, networks, etc.

/ planned **downtime**

/ risky **experiments**

Implementation Mechanics

Evaluate **performance** over a set **window**, e.g. 28 days

Remaining budget **drives prioritization** of engineering effort

Error budgets can accommodate

/ releasing new **features**

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/ planned **downtime**

/ risky **experiments**

Creating an Error Budget

Now there are 34 clinics, 302 staff, 50,000+ clients

Growing pains...

I called three times yesterday to change my appointment. No-one answered. Why can't I change my appointment online?

Michael, client

The website is down. Not sure how to bring it back...

Patryk, IT support

I spend more of my time calling insurance companies than treating patients.

Deirdre, veterinarian

I wasn't able to send any invoices yesterday. The phone just kept ringing.

Lisa, receptionist

Service Level Indicator

A **quantifiable** measure of service **reliability**

Let clients make appointments online

Michael, client

I called three times yesterday to change my appointment. No-one answered. Why can’t I change my appointment online?

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

SLI Menu

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

SLI Menu

Measurement Strategies

- Application Level Metrics
- Server-side Logs
- Frontend Infra Metrics
- Synthetic Clients/Data
- Client-side Instrumentation

Availability

The **appointments page** should load **successfully**

Latency

The **appointments page** should load **quickly**

Availability

The **appointments page** should load **successfully**

- How do we define **success**?
- Where is the success / failure **recorded**?

Latency

The **appointments page** should load **quickly**

- How do we define **quickly**?
- When does the timer **start / stop**?

Service Level Objectives

Set a **reliability target** for an SLI

What goals should we set for the reliability of our journey?

Your objectives should have both a **target** and a **measurement window**

Service	SLI Type	Objective
List Appointments	Availability	**99.95% successful** in **previous 28d**
List Appointments	Latency	**90%** of requests **< 500ms** in **previous 28d**
...	...	

Availability

The **appointments page** should load **successfully**

- How do we define **success**?
- Where is the success / failure **recorded**?

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

Latency

The **appointments page** should load **quickly**

- How do we define **quickly**?
- When does the timer **start / stop**?

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

Error budgets

- Product management & SRE define an **availability target**.
- 100% - availability target is a “budget of unreliability” (or the **error budget**).
- Monitoring measures **actual uptime**.
- Control loop for utilizing budget!

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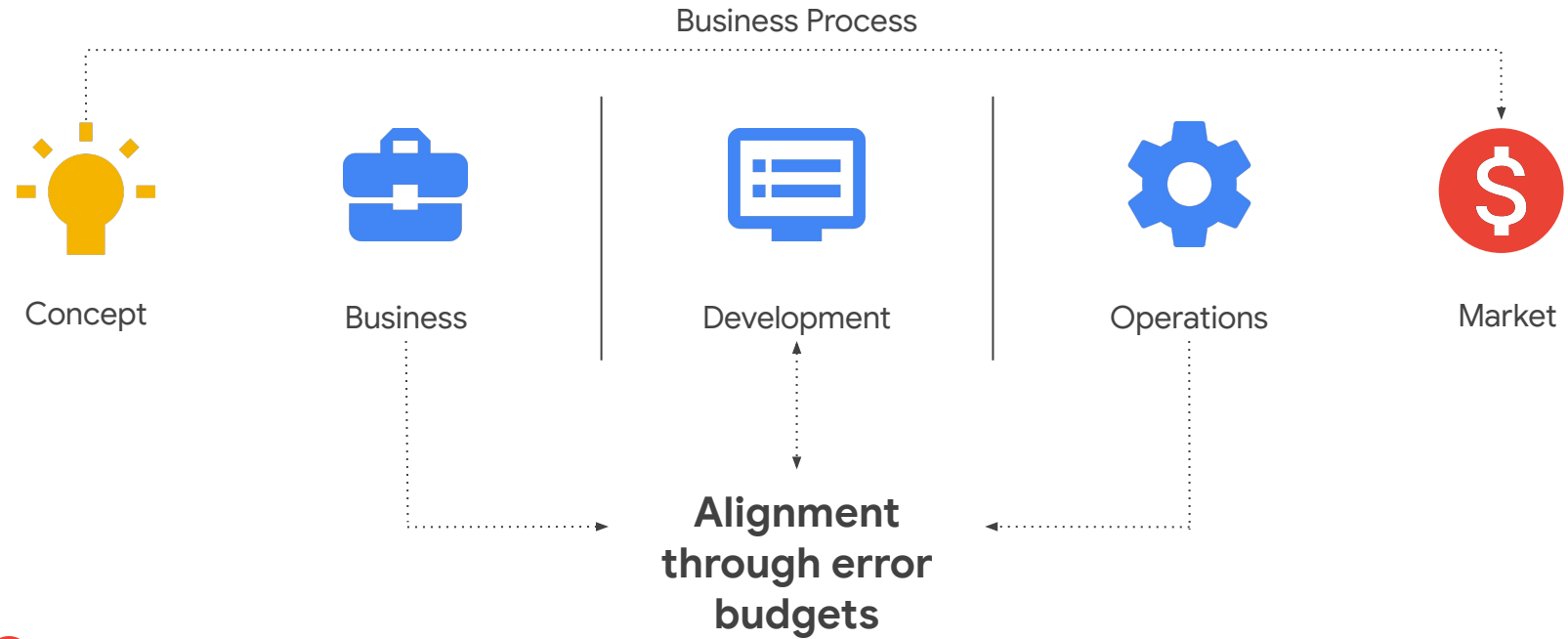
Product lifecycle



Error budgets can accommodate

/ releasing new **features**

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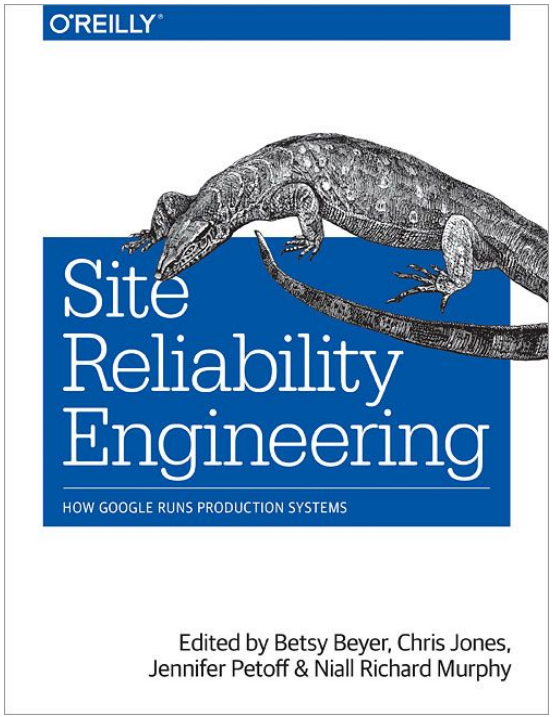
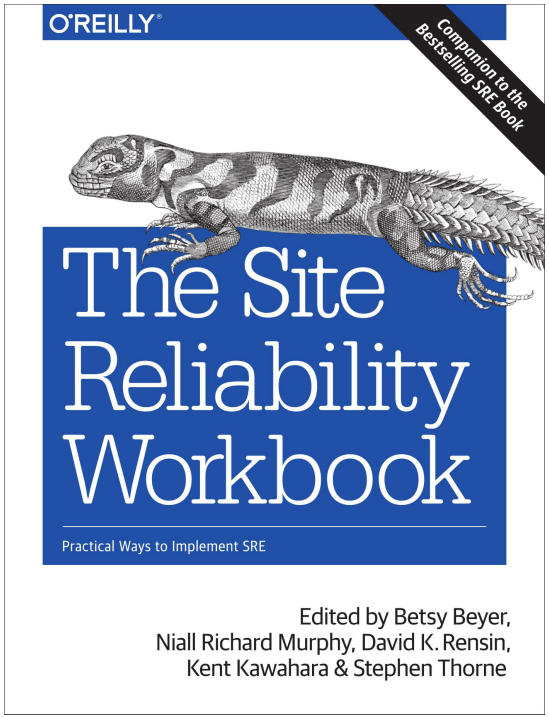
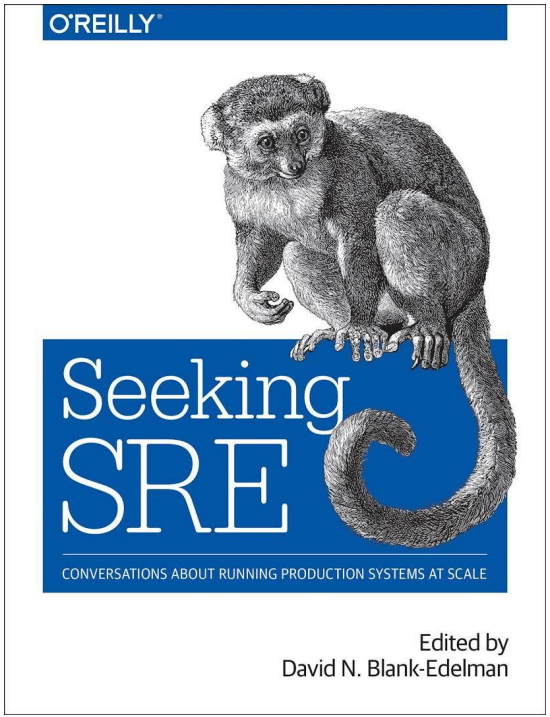
/ planned **downtime**

/ risky **experiments**

https://landing.google.com/sre/books/







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Thank You!

Nathen Harvey
Developer Advocate
@nathenharvey
(He/him)

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