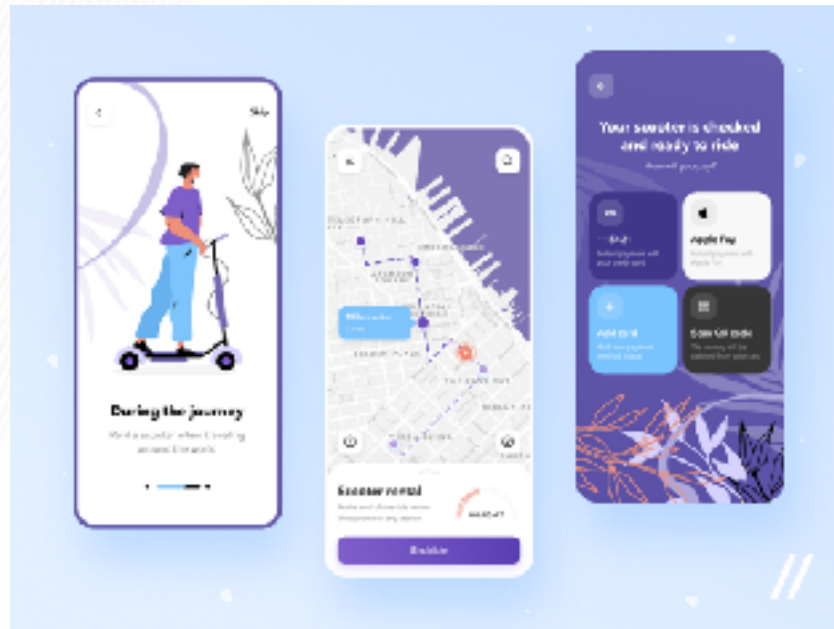# Architecture Design Documentation

17-313 Spring 2023

Administrivia

- Prepare questions for recitation next week

- Project 2C, Due Thurs Mar 2 @ 11:59pm

- Midterm Tues Feb 28th in class

- **TENTATIVE:** Final May 8th 5pm

S3D
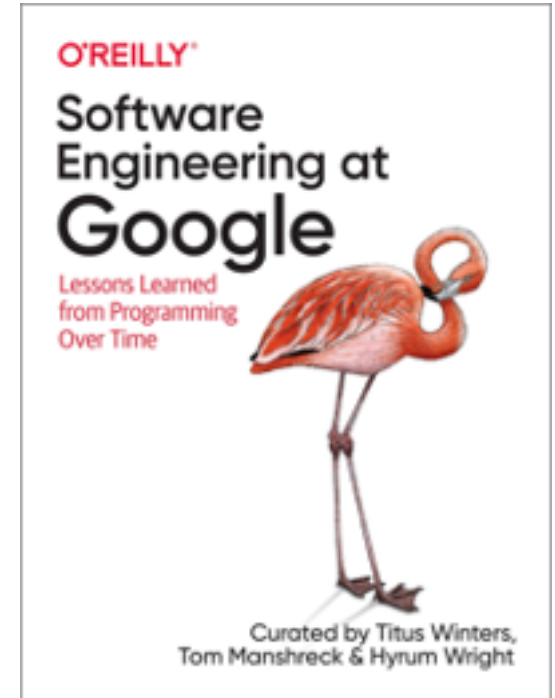
Let's update the app!

What should we think about?

1 Add Payment Methods | 3 More Secure Authentication
2 Add Android Support | 4 Internationalization (i18n)

Learning Goals

- Articulate the various purposes of a design document.

- Use design documentation to ensure that the correct thing is being implemented.

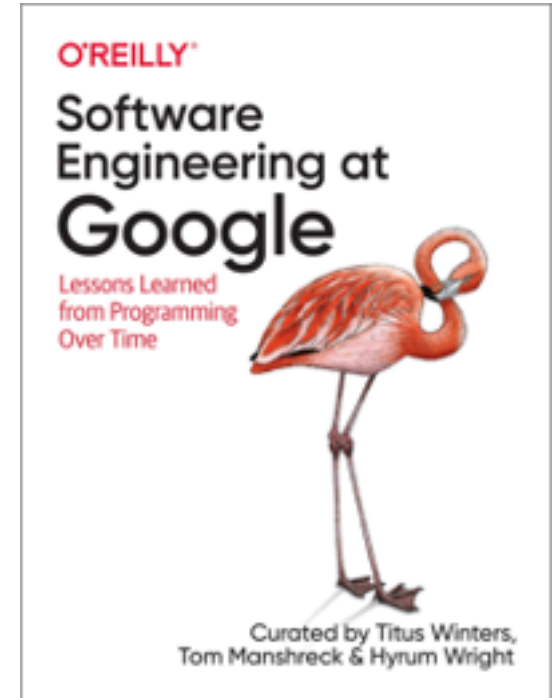- Write useful, clear, high-quality design documentation.

S3D

Types of documentation

- Reference documentation (incl. code comments)

- Design documents

- Tutorials

- Conceptual documentation

- Landing pages

O'REILLY

Software Engineering at Google

Lessons Learned from Programming Over Time

Curated by Titus Winters, Tom Manshreck & Hyrum Wright

Design Documents

- **Code review before there is code!**

- Collaborative (Google Docs)

- Ensure various concerns are covered, such as: security implications, internationalization, storage requirements, and privacy concerns.

- A good design doc should cover:

  - Goals of the design

  - Implementation strategy

  - propose key design decisions with an emphasis on their individual tradeoffs

O'REILLY®

Software Engineering at Google

Lessons Learned from Programming Over Time

Curated by Titus Winters, Tom Manshreck & Hyrum Wright

Companies using an RFC-like engineering planning process*

- Airbnb
- Affirm
- Algolia
- Amazon
- AutoScout24
- Asana
- Atlassian
- Blue Apron
- Bitrise
- Booking.com
- Brex
- BrowserStack
- Canonical
- Carousell
- Catawiki
- Cazoo
- Cisco
- CockroachDB
- Coinbase
- Comcast Cable
- Container Solutions
- Contentful
- Couchbase
- Criteo
- Curve
- Daimler
- Delivery Hero

- Doctolib
- DoorDash
- Dune Analytics
- eBay
- Ecosia
- Elastic
- Expedia
- Glovo
- Gojek
- Grab
- Faire
- Flexport
- GitHub
- GitLab
- GoodNotes
- Google
- Grafana Labs
- GrubHub
- HashiCorp
- Hopin
- Hudl
- Indeed
- Intercom
- LinkedIn
- Kiwi.com
- Klarna
- MasterCard

- Mews
- MongoDB
- Monzo
- Mollie
- Miro
- N26
- Netlify
- Nobl9
- Notion
- Nubank
- Oscar Health
- Octopus Deploy
- OLX
- Onfido
- Pave
- Peloton
- Picnic
- PlanGrid
- Preply
- Razorpay
- Reddit
- Red Hat
- SAP
- Salesforce
- Shopify
- Siemens
- Spotify
- Square

- Stripe
- Synopsys
- Skyscanner
- SoundCloud
- Sourcegraph
- Spotify
- Stedi
- Stream
- SumUp
- Thumbtack
- TomTom
- Trainline
- TrueBill
- Trustpilot
- Twitter
- Uber
- VanMoof
- Virta Health
- VMWare
- Wayfair
- Wave
- Wise
- WarnerMedia & HBO
- Zalando
- Zapier
- Zendesk
- Zillow

*not a complete list

Why is it important

Why is it important

Information Needs in Collocated Software Development Teams

Amy J. Ko
Human-Computer Interaction Institute
Carnegie Mellon University
5000 Forbes Ave,
Pittsburgh PA 15213
ajko@cs.cmu.edu

Robert DeLine and Gina Venolia
Microsoft Research
One Microsoft Way
Redmond, WA 98052
{rdeline, ginav}@microsoft.com

5.6 Reasoning about Design

Developers sought four kinds of design knowledge:

(d1) *What is the purpose of this code?*
(d2) *What is the program supposed to do?*
(d3) *Why was this code implemented this way?*
(d4) *What are the implications of this change?*

focus **cooperative** and human aspects of SE.................

What Makes APIs Hard to Learn? Answers from Developers

Martin P. Robillard, *McGill University*

Understanding Design Aspects and Rationale
Many survey respondents expressed the feeling that a lack of knowledge about the API's high-level design hindered their progress:

I don't understand the design intents behind the API, the overall architecture, why certain functions are designed as such.
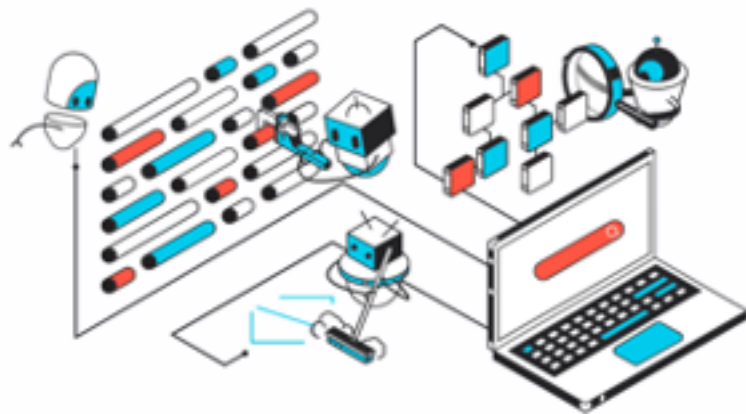
S3D

Common parts/templates

- Overview/feature description: what problem is being solved?

  - High-level requirements, both functional and quality

- Background/key terms

- Goals/non goals

- Design alternatives, tradeoffs, assumptions

- Decision

- Other considerations/elements of design

S3D

Examples:
Sourcegraph RFCs
(Request For Comments)

S3D

Sourcegraph

Great code search helps you write, reference, and fix, faster.

Over 800,000 developers use Sourcegraph to:

- Find anything in multiple repositories, fast
- Navigate with definitions and references
- Make large-scale code changes
- Integrate code with other services

Learn more about Sourcegraph →

S3D

When to use an RFC:

- You want to frame a problem and propose a solution.

- You want thoughtful feedback from team members on our globally-distributed remote team.

- You want to surface an idea, tension, or feedback.

- You want to define a project or design brief to drive project collaboration.

- You need to surface and communicate around a highly cross-functional decision with our formal decision-making process.

Don't use an RFC when:

- You want to discuss personal or sensitive topics one-on-one with another team member.

- You want to make a decision to change something where you are the decider. In the vast majority of cases, creating an RFC to explain yourself will be overkill. RFCs should only be used if a decision explicitly requires one of the bullets in the previous page.

RFCs = asynchronous conversation

- There's no implicit demand for an immediate response.

- Reviewers have time to consider and propose changes.

- More people can collaborate at once without clashing.

- RFCs are easily searchable and referable.

- RFCs are retained indefinitely.

S3D

RFC Labels

- **WIP**: The author is still drafting the RFC and it's not ready for review.

- **Review**: The Review label is used when the RFC is ready for comments and feedback.

- **Approved**: When the RFC is for the purpose of making a decision, the Approved label indicates that the decision has been made.

- **Implemented**: When the RFC is for the purpose of making a decision, the Implemented label indicates that the RFC's proposal has been implemented.

- **Closed**: When the RFC is for the purpose of collaboration or discussion but not necessarily to make a decision or propose a specific outcome that will eventually become Implemented, the Closed label indicates that the RFC is no longer an active collaborative artifact.

- **Abandoned**: When the RFC is for the purpose of making a decision, and there are no plans to move forward with the RFC's proposal, the Abandoned label indicates that the RFC has been purposefully set aside.

Observe sourceGraph Design Docs

Docs are publicly available:

https://drive.google.com/drive/folders/1zP3FxdDlcSQGC1qvM9lHZRaHH4I9Jwwa

S3D

Exercise!

- Background/key terms

- Problem

    - Overview/feature description: what problem is being solved?

    - High-level requirements, both functional and quality

- Proposed Solution

- Trade-offs

    - Pros/cons of each alternative

- Definition of Success

S3D

Design Documents

Best design docs suggest design goals, and cover alternative designs, documenting the strengths and weaknesses of each.