SuperBasket

Shopping Lists on the Cloud

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Architectural Overview

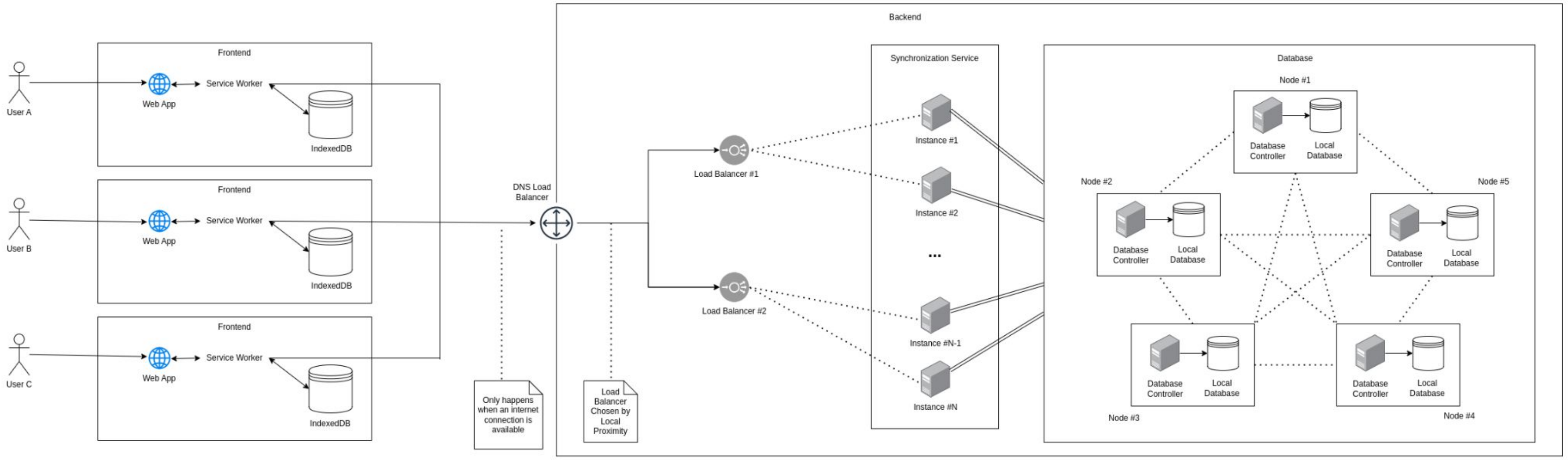


Fig. 1 - Initial Architectural Overview of Super Basket

Repository Structure

Frontend

Sync Service

Database

Frontend

- Interface to modify/add/remove items
- Offline-first
- Instance of IndexedDB per user
- IndexedDB stores user's Shopping Lists

Fig. 2 - Offline-first design

Synchronization Service

- CRDT Library
- Handles data synchronization between the Frontend and the Database
- API to deal with CRDT’s

Database

- Partitioning with **Consistent Hashing** for higher consistency
- Temporary failure handling with **Sloppy Quorums** and **Hinted Handoff**
- Use of **Vector Clocks** to capture causality between data versions
- Communication between nodes using **ProtocolBuffers** and **gRPC** to reduce network traffic and speed up operations

Communication between modules

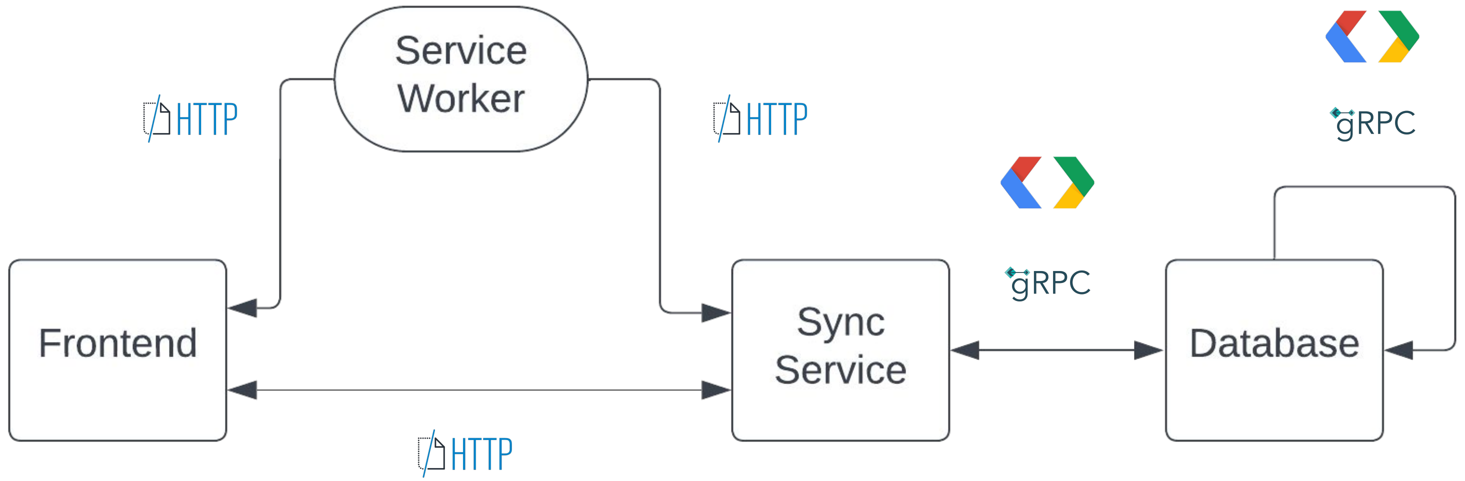
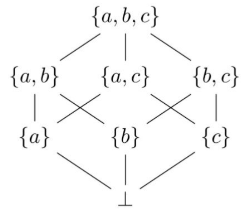


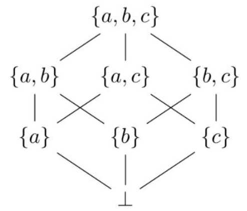
Fig. 3 - Schema depicting the interactions among different modules

CRDTS - Structure



- DotContext
- AWSet*(AWSetHelper)*
- CCounter
- EWFlag
- MVRegister
- AWORMap

CRDTS - Usage



- **Shopping List:**
  - **AWORMap**: Contains the ShoppingLists
  - **DotContext**: Causal Context

- **Simple Item:**
  - **EWFlag**: bought / not bough

- **Multiple Item:**
  - **CCounter**: #requested items
  - **CCounter**: #bought items

Conclusions and further work

- The initial design was too ambitious
- Use MVRegisters in List and Item names
- Implement an anti-entropy mechanism and read repairs in the database

Demo and Questions

Thank you for your time!

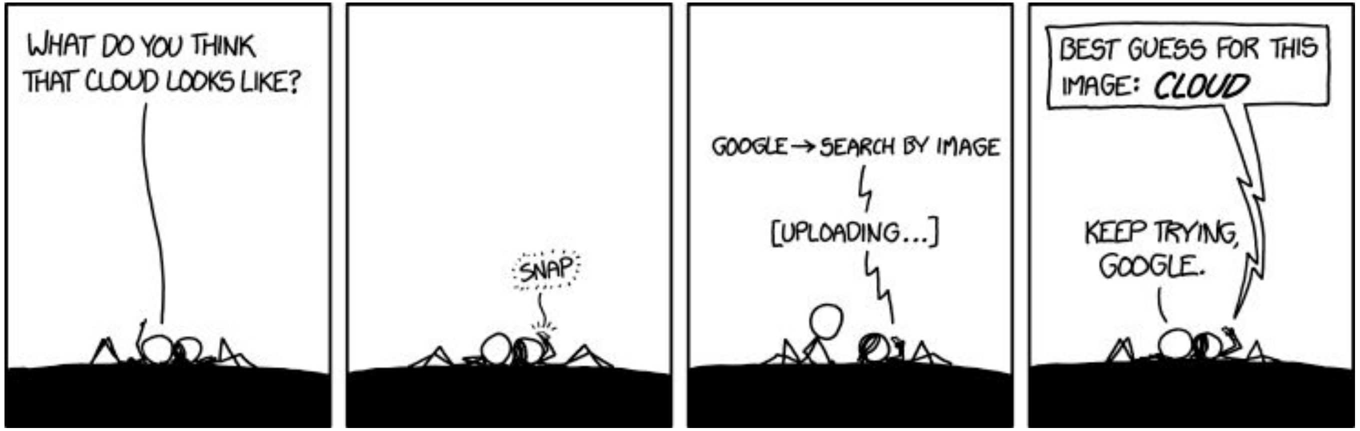

WHAT DO YOU THINK THAT CLOUD LOOKS LIKE?
SNAP
GOOGLE → SEARCH BY IMAGE
[UPLOADING...]
BEST GUESS FOR THIS IMAGE: CLOUD
KEEP TRYING, GOOGLE.

Fig. 4 - xkcd cartoon

References

- https://vite-pwa-org.netlify.app/
- https://www.allthingsdistributed.com/files/amazon-dynamo-sosp2007.pdf
- https://grpc.io/
- https://xkcd.com/