

Hearth

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Hearth
Journal • Reflect • Pray

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Introduction

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Overview

Hearth is an iOS mobile app that helps users build daily habits of reflection, gratitude, and journaling. Hearth also includes faith elements to support a well rounded, grounded daily routine

- Daily Journaling Reminders
- Gratitude Prompts
- Suggested Self Reflection
- Prayer Reminders
- Daily Bible Verses

Project Requirements

MVP

- Daily journaling
- Daily bible verse
- Calendar
- Push notifications
- Onboarding

Version 1.0

- Prayer reminders
- Gratitude prompts
- Reflection algorithm
- Apple “Testflight”

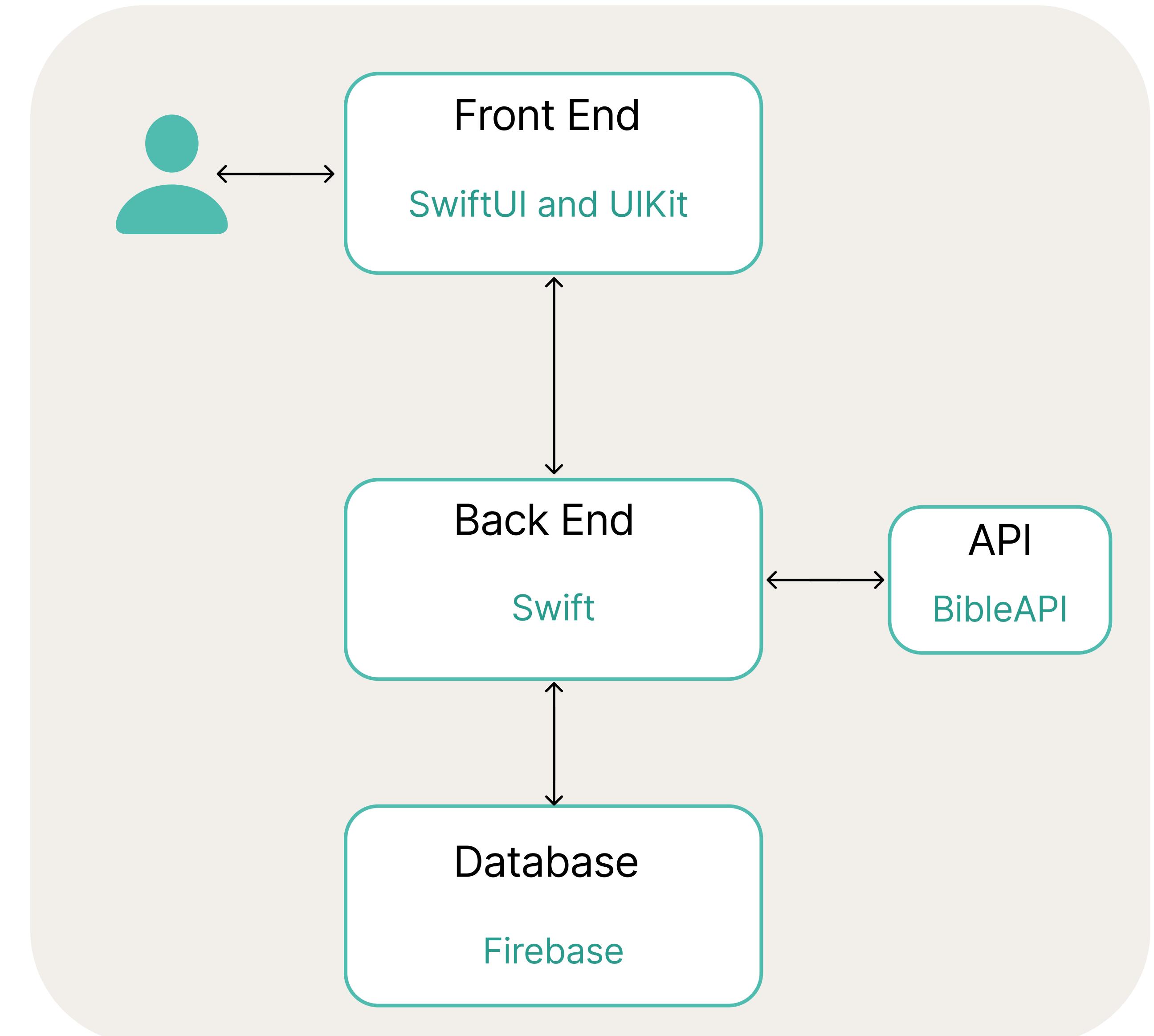
Version 2.0

- Hands free tools
- Multimedia tools for journal entries
- Streaks & Goals
- Subscription service

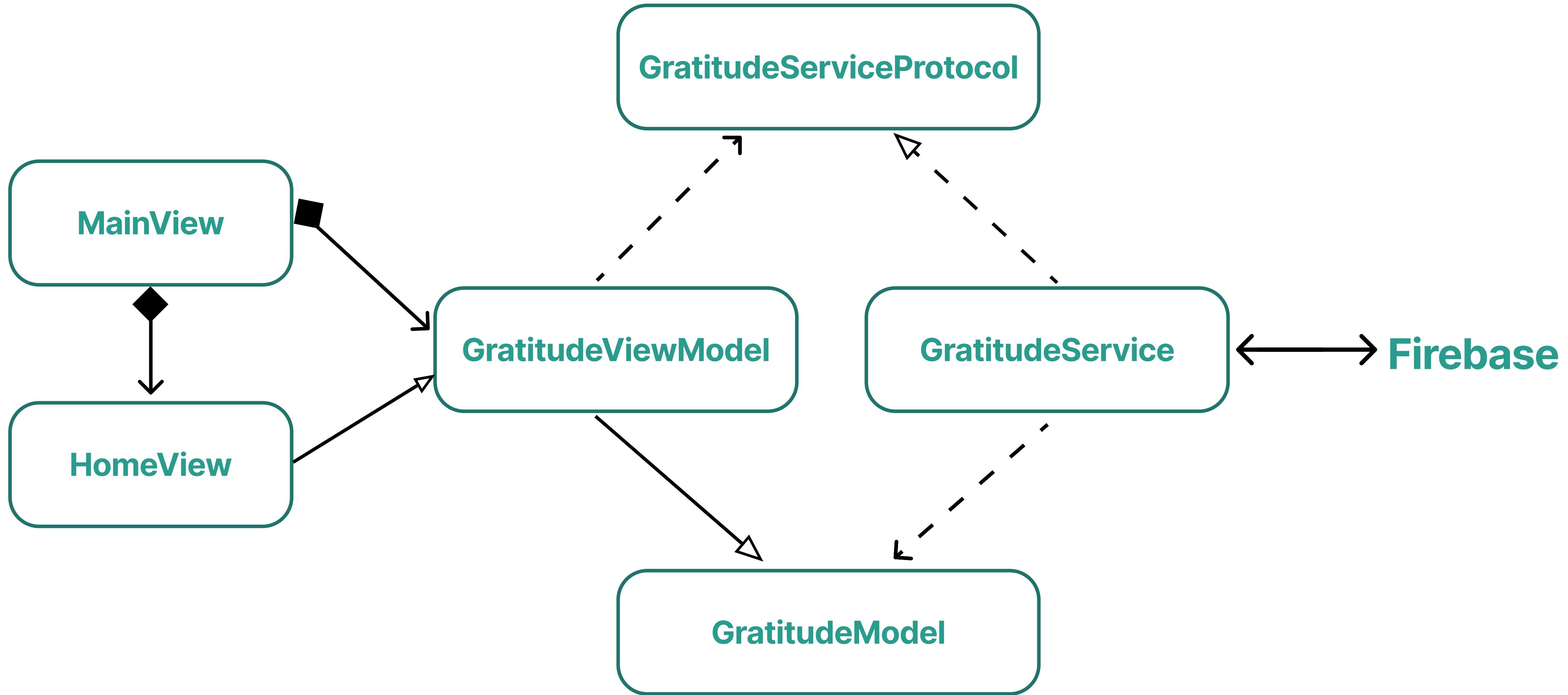
System Design

Built using Xcode using MVVM architecture and protocols to mock database functions for test

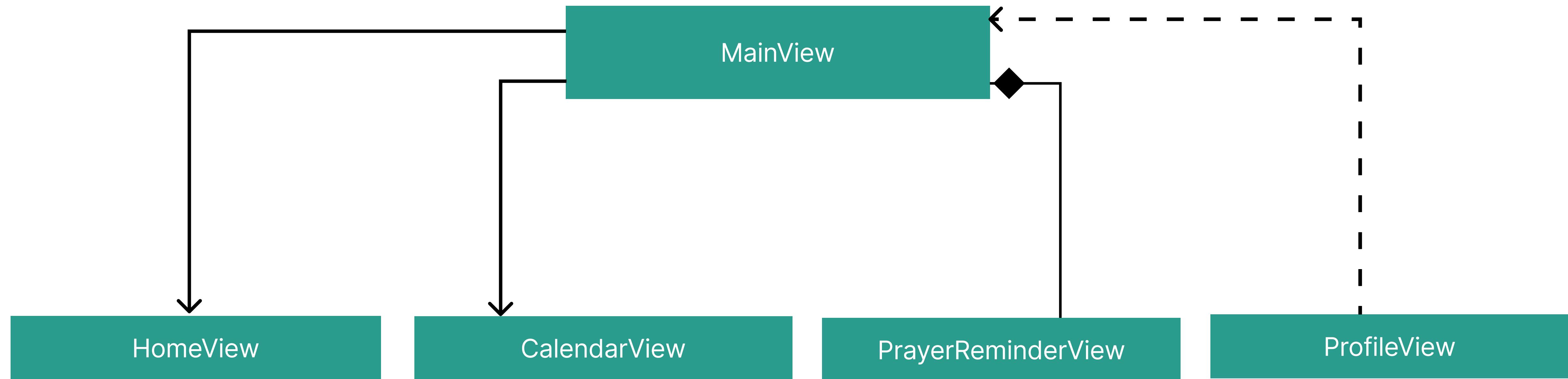
- Front end - SwiftUI
- “Backend” - Swift
- Database - Firebase
- API - BibleAPI



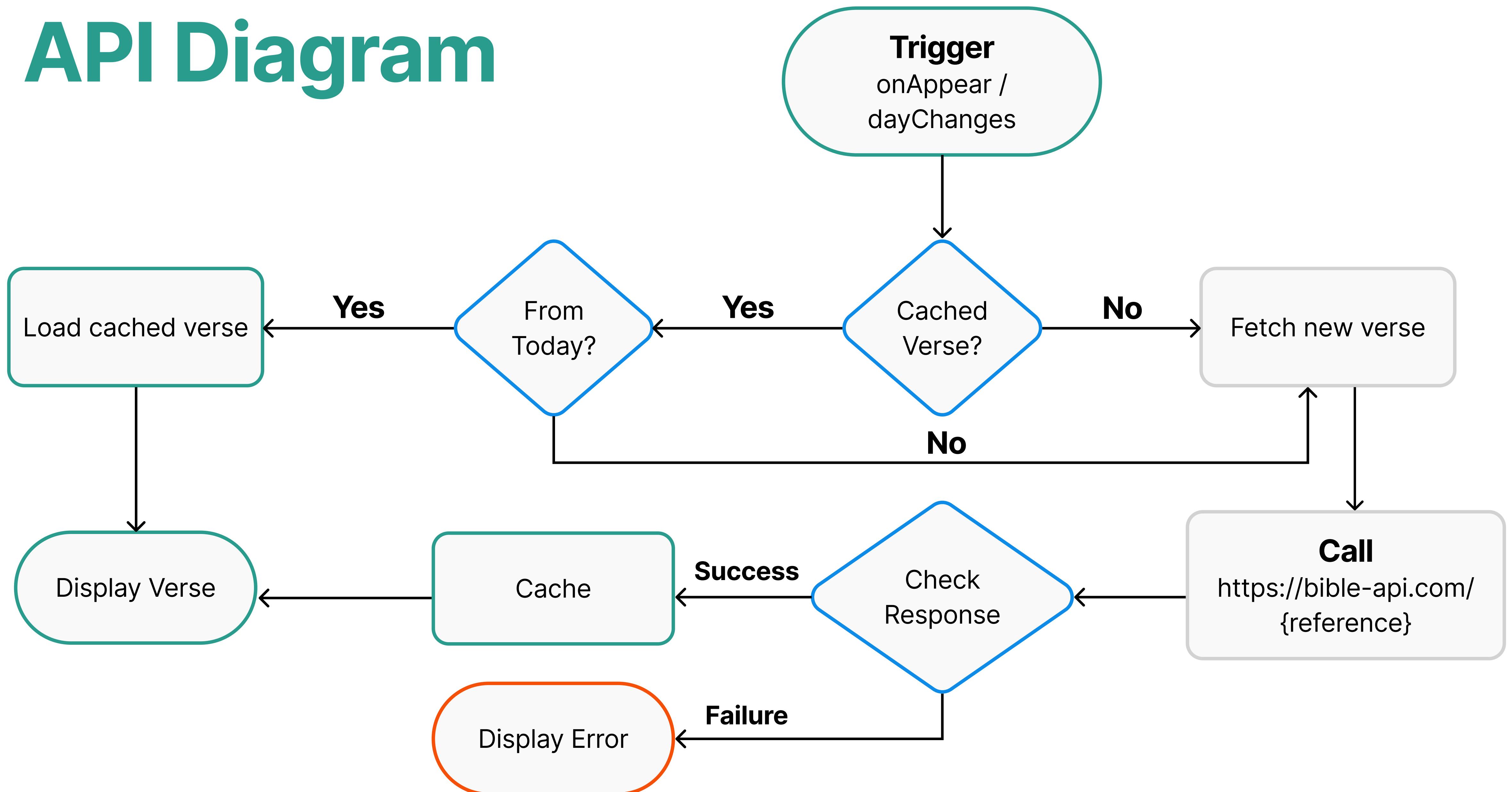
Architecture



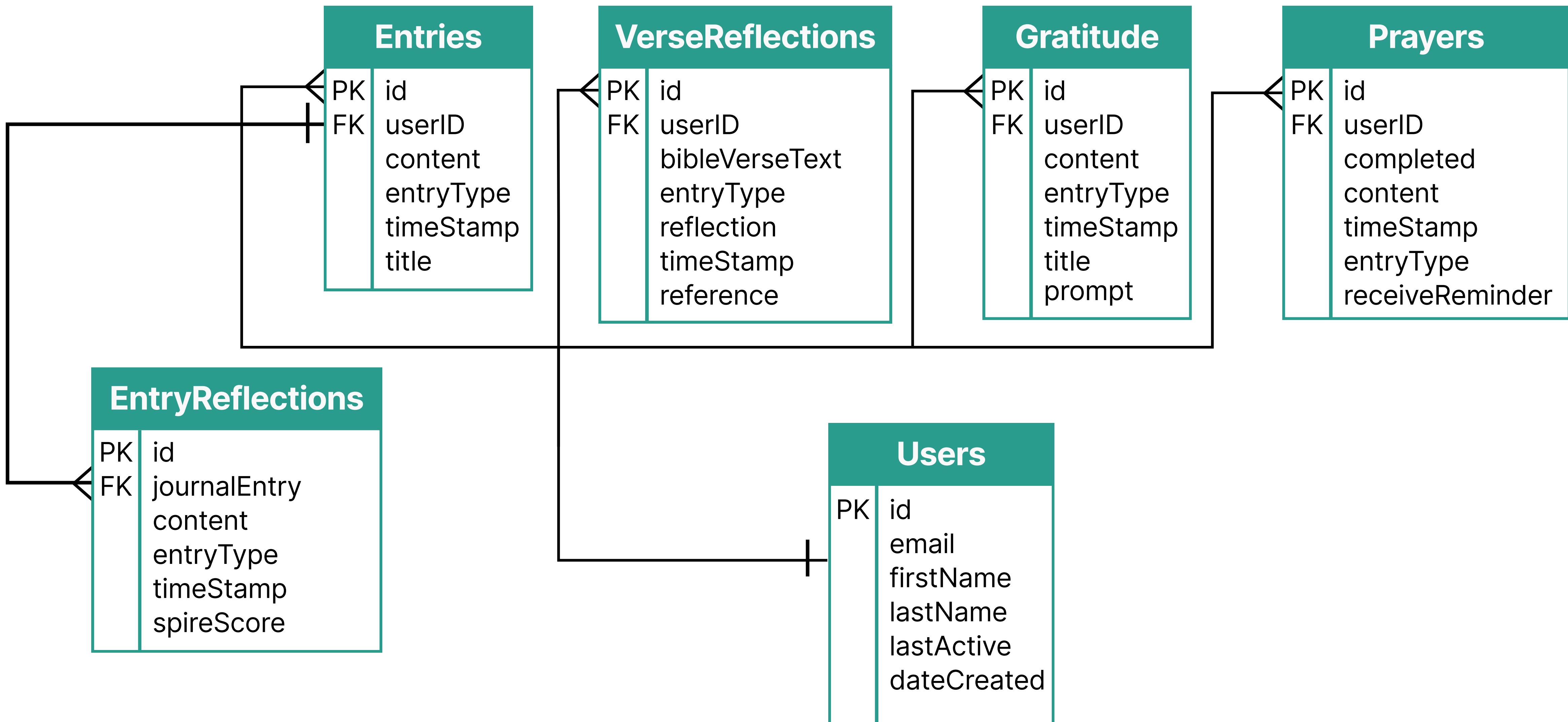
Architecture



API Diagram



Database Design



S.P.I.R.E. Algorithm

- S** Sentiment Intensity: Two step analysis. First pass uses a lightweight model to determine overall tone (good or bad). The second pass uses Apple CoreML model to analyze each sentence. The two are combined and a sentiment score is produced.
- P** Pronoun Density: Using NSLinguisticTagger the algorithm detects first person pronouns. Higher pronoun frequency scores correlates with self reflection.
- I** Insightful Keywords: Using NLP the algorithm lemmatizes words and matches against a predefined impact dictionary. {"depressed": 2.0, "excellent": 1.5} Every hit is summed and a score is produced
- R** Relevance Rhythm: Searches for phrases like "from now on", "a moment ago", "this morning". Every hit gets summed and a score is produced. Analyzes punctuation frequency as well.
- E** Engagement Depth: Tokenizes each word, finds the count, and then performing logarithmic normalization against the other entries word counts to avoid bias.

S.P.I.R.E. Example

Really Good

Omg today was AMAZING!!! I aced my chem final - like seriously crushed it when I was expecting to barely pass. Then Jake texted me out of nowhere about grabbing coffee tomorrow?? Haven't talked to him since that party last month! And then my roommate surpri...

Good

Today was pretty solid. Finally got my research paper done for Prof. Wilson's class - not my best work but definitely not terrible either. Weather was super nice so I studied outside for a couple hours which felt way better than being stuck in the library. Got a decent...

Neutral

Just another Tuesday I guess. Classes were whatever - took notes in sociology but zoned out a bit during the second half. Probably should rewatch that lecture. Had that same sandwich from the campus shop for lunch. It was fine. Did laundry after my last class which need...

Bad

Ugh today sucked. Slept through my alarm and missed my 8am discussion section which is 15% of my grade for participation. Then spilled coffee all over my notes right before the midterm review. The professor went through everything super fast and I'm pretty sure I ...

Really Bad

I can't even deal with today. Failed my stats exam that I studied all week for. Like completely bombed it. Then got an email saying my financial aid is on hold because of some form I apparently never submitted, so now I have to figure that out asap or I'm screwed for next seme...

S.P.I.R.E. Results

Really Good

Pronoun Score: 0.66
Insight Score: 0.00
Relevance Score: 1.00
Engagement Score: 0.92
Single Pass Sentiment: 1.00
Sentence-Level Sentiment:
0.71
SPIRE Score: 0.75

Good

Pronoun Score: 0.03
Insight Score: 0.00
Relevance Score: 0.10
Engagement Score: 0.90
Single Pass Sentiment: 0.91
Sentence-Level Sentiment:
0.51
SPIRE Score: 0.56

Neutral

Pronoun Score: 0.00
Insight Score: 0.00
Relevance Score: 0.00
Engagement Score: 0.92
Single Pass Sentiment: 1.00
Sentence-Level Sentiment:
0.71
SPIRE Score: 0.58

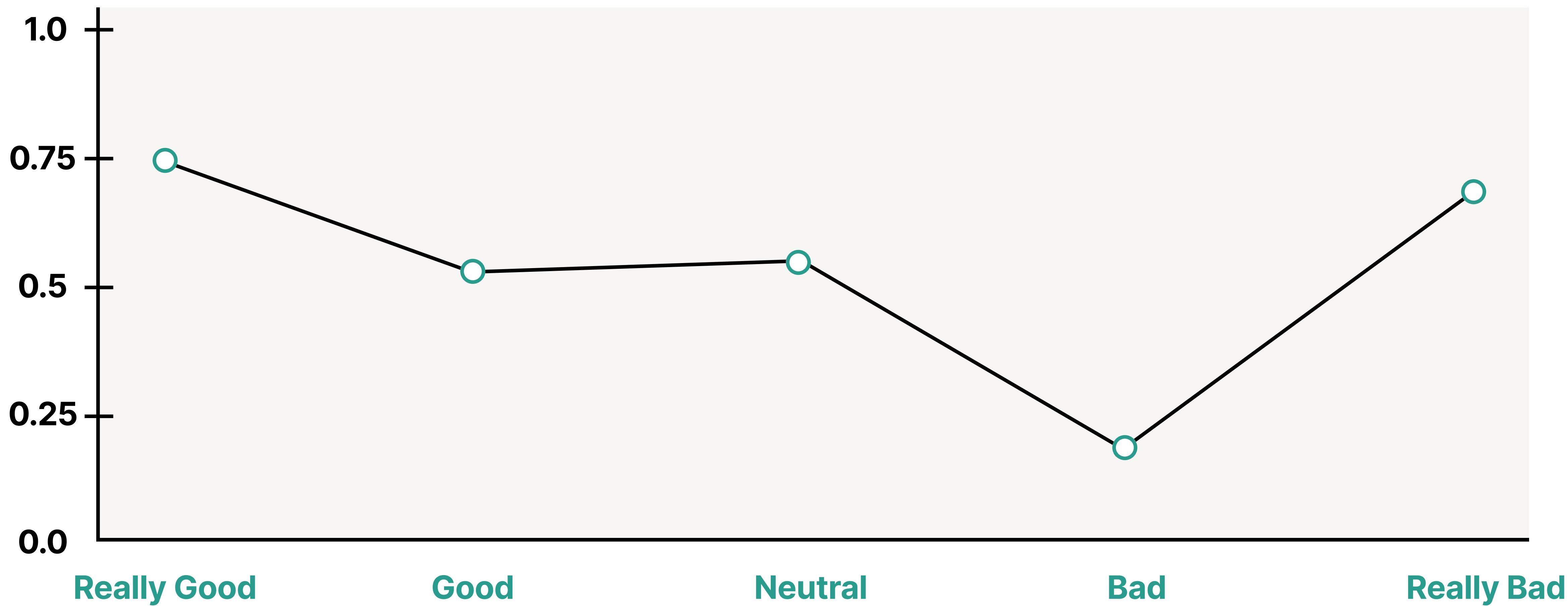
Bad

Pronoun Score: 0.25
Insight Score: 0.00
Relevance Score: 0.10
Engagement Score: 0.94
Single Pass Sentiment: 0.00
Sentence-Level Sentiment:
0.88
SPIRE Score: 0.22

Really Bad

Pronoun Score: 1.00
Insight Score: 0.00
Relevance Score: 0.30
Engagement Score: 1.00
Single Pass Sentiment: 0.95
Sentence-Level Sentiment:
0.60
SPIRE Score: 0.71

Final S.P.I.R.E. Score



Testing

Could not use Testflight due to a lengthy review process. Thus the app was never distributed to people outside the development process

Manual Testing

- Using features as intended
- Try to break the features
- Edge cases

Unit Tests

- Viewmodel functions
- Test database operations
- Data validation

Demo

Challenges

Testing was a part of the plan but not planned properly. The MVVM architecture made it difficult to test. The issues were-

- Viewmodels would directly instantiate service files
- This resulted in tight coupling between the.viewmodel and the concrete implementation
- Because of this, testing the VM was difficult because I could not inject mock data or simulate behavior
- This was a violation of the dependency inversion principle

Future Work

- Gamification through streaks/goals to keep the user invested
- Caching data from Firebase to cut down costs
- 100% coverage with unit tests
- Allow additional fields for journal entries
 - Pictures, locations, tags/themes
- Much more robust algorithm
- Release it...?

Thank you!

Questions?

