

# Infs3202 Proposal

## Chapter 1

### Requirements Engineering

#### 1.1

##### Rationale

The service is designed to solve a very specific problem, borne of our own experience at university.

We noticed that immediately after leaving classes, we was sending similar message to many group chats across Slack and Facebook, asking if anyone was free for lunch

Thus, I required a service that would:

- Be aware of when I was leaving classes
- Be aware of my friends timetables, and when they were likely to be on breaks between classes
- Inform me, immediately on leaving a class, who was free and how long they were free for

My friends also expressed frustration that it was difficult to find times where all members of a certain group had breaks between classes, to coordinate meetups.

They required a service that would:

- Allow them to create groups of people of whom they wished to see shared break timetables
- Be aware of the group timetables, and when they were likely on breaks between classes
- Create a list of free times that the group can meet together

I realised that both of these problems could be addressed by very similar services.

#### 1.2

##### Business Function

A client wishing to use the service (henceforth referred to as SyncUQ or 'the app' ) would face the following workflow.

- If the client is using a
  - desktop, upon navigating to syncuq.com.au, the client is presented a landing page, advertising the features of SyncUQ. A button allows the client to use Facebook Login, so that they may use the service.
  - mobile, using the SyncUQ app, the client is asked whether they would like to permit the app to send them push notifications. The client is then presented the landing page.
- After completing the Facebook Login, the primary app interface is presented.

- The client is presented a choice of different tabs, corresponding to different features. Each tab, presents a different workflow.
  - Import
    - \* The client is presented with instructions on how to acquire a calendar link from [timetableplanner.app.uq.edu.au](http://timetableplanner.app.uq.edu.au).
    - \* The client may enter this calendar link into a field. Clicking the corresponding Submit button will cause the service to subscribe to the specified calendar.
  - Friends
    - \* The client is presented with an Add Friends button. Clicking this button presents a list of SyncUQ users, who are also Facebook friends of the client. Clicking a friend's corresponding Follow button, sends a follow request.
    - \* The client is presented with a list of friends that they have followed. These entries have two forms:
      - Pending follow, where the the friend has not approved their follow request
      - Pending follow request, where a friend has requested to follow the client, but the client has yet to approve the follow request. Two buttons, a ✓ button, and a × button, allow the client to confirm follow requests.
      - Confirmed, with a date and time, indicating the instant that both the client and that friend share a break, a Time until, indicating the duration in time and minutes until that instant begins, and a Duration, indicating the duration of the shared break. The entry doubles as a progress bar, depicting the progress into the break that friend has made. Clicking the entry presents a timetable of breaks that are shared.
  - Settings
    - \* The client is presented with a list of settings, that may include:
      - A toggle for Incognito Mode, which, when enabled, prevents a clients friends from seeing their breaks
      - A toggle for Notifications at end of classes, which, when enabled, whenever a client's scheduled classes are ending, the client will be notified of which of their friends are currently are on, or are starting, breaks. 'Opening' this notification will present the client the Friends tab of the app. Enabling this option would prompt the client to enable push notifications on their mobile device, if the app has not already done so.

## Chapter 2

# Architecture

## 2.1 Development Language and Environment

### 2.1.1 Backend

Six requirements on the backend language and environment were identified.

1. Could not be Perl, PHP, or Java
2. Should support a mature, stable and frequently used microframework
3. Should support an industry-grade date and time library
4. Should support a stable iCalendar (.ics) file parser
5. Should be syntactically and semantically familiar to all members of the group
6. Should have first-class support or documentation for deployment to Amazon EC2 or Heroku cloud services

A number of considered languages and environments failed to meet these requirements.

- Haskell, using Scotty failed requirements 3, 5, and 6
- Rust, using Rocket, failed requirements 2 (on the grounds that Rocket was immature), 3, 4, 5 and 6
- Clojure, using Compojure, failed requirement 5

Python and Scala met all requirements.

If Python were to be used, it would use

- The Flask microframework
- The Flask-SQLAlchemy database abstraction layer
- The datetime standard library module
- The icalendar iCalendar parser
- The mypy static type checker
- Heroku, with the Python buildpack

If Scala were to be used, it would use

- Play framework, or http4s interface with circe JSON library
- The doobie database abstraction layer
- The java.time library, which is a port of Joda-Time into the Java 8 standard library
- The iCal4j iCalendar parser
- The cats library for useful functional programming abstractions
- Heroku, with the Scala buildpack

With further investigation of the Python and Scala stacks, both were deemed sufficient for use on the project. Ultimately, two, rather insignificant issues, broke the tie.

1. Scala requires tooling support to be ergonomic. The group decided that they would rather not burden their laptops limited CPU, memory and battery life with heavyweight IDEs.
2. The group decided that they would prefer to prioritise development speed by using a dynamic, interpreted language, with optional mypy static type checking, rather than deal with Scala's crippling slow compilation and typechecking processes. Thus, the Python stack was chosen.

### **2.1.2 Frontend**

Four requirements on the frontend language and environment were identified

1. Should support a framework that uses a virtual DOM
2. Should be easy to learn for group members who have no former frontend development experience
3. Should support an ergonomic Foreign Function Interface (FFI ) to JavaScript
4. Should support the ergonomic use of React components and libraries

A number of considered languages and environments failed to meet these requirements.

- Elm failed requirements 3 and 4
- TypeScript with React failed requirement 2.

Thus, PureScript with Pux was chosen.

Furthermore, the Sass framework to be used is Bulma, chosen on aesthetic and usability grounds.

## **Design**

### **3.1**

#### **Web Standards**

Compliance with web standards ensure accessibility, robustness, interoperability and usability of all webpages and websites. Significant efforts have been made to ensure that the backend exposes an idiomatic, standards compliant RESTful API. Ajax with JSON will mediate client-server communications, with server responses adhering to the Google JSON Style Guide.

#### **3.1.1**

##### **Endpoints**

REST endpoints that may need to be implemented include

- GET /friends -> Ok[List[UserID]]
- GET /friends/:userid -> Ok[FriendDetails]
- GET /friend breaks -> Ok[Map[FriendID, List[Break]]]
- POST /upload calendar -> Created[CalendarDetails]
- ...

## 3.2

### **Advanced Features**

Advanced dynamic functionality, powered by PureScript, includes

- A reactive, Single Page App, which permits the following actions to be performed without page reloads:
  - Sending friend follow requests
  - Confirm/deny/cancel of pending follow requests
- Advanced visual effects and information display features, including:
  - In-app alerts
  - Dynamic progress bars
  - Dynamic timers
  - Friend searching and filtering

## 3.3

### **Environment**

The app is to be auto-deployed to a Heroku staging environment, triggered by a GitHub push hook. Manual deployment, environment configuration, and debugging facilities can be accessed with the Heroku CLI.

The use of Git Submodules, with the Heroku Submodules Buildpack allows the frontend and backend repositories to be developed in separate Git repositories, and pulled together during the deployment process.

Postgres was chosen as the database, due to its large community and support from SQLAlchemy. Heroku provides integrated Postgres database provisioning through Heroku Postgres.

## 3.4

### **Color Scheme**

In order to represent the university, the primary color choice for this webapp is the purple used by many UQ apps and services. A color scheme was then built around this color using a 'triad' approach.



### 3.5

## Mobile Layout

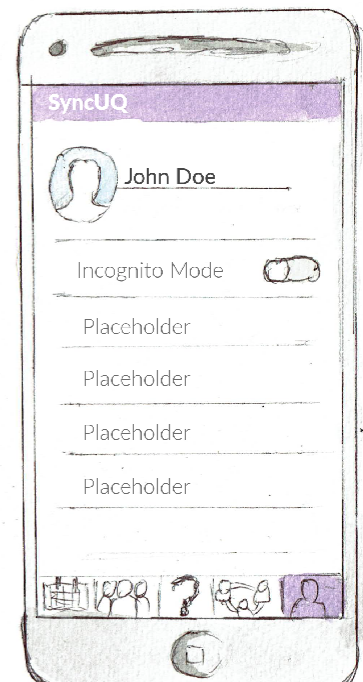
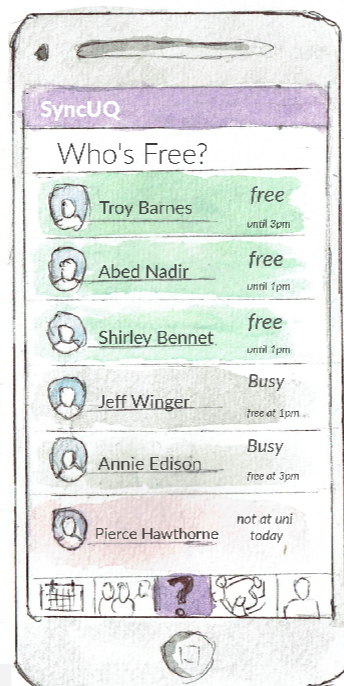
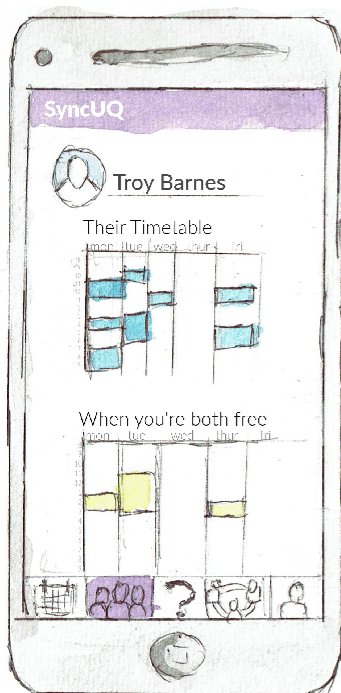
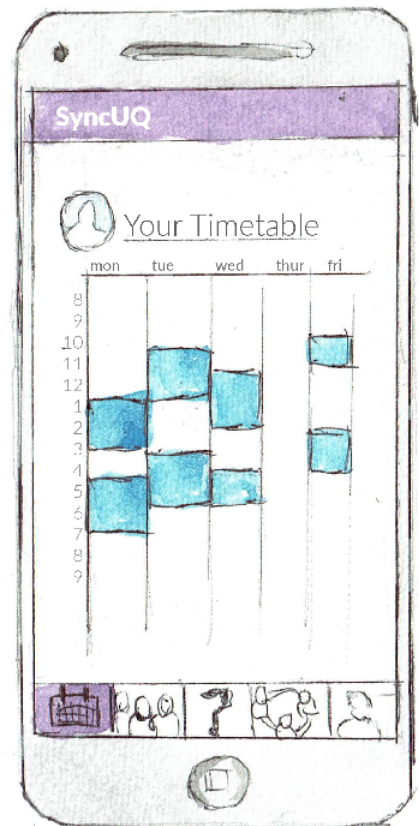
This app is expected to be used by people 'on the go', and so a mobile first design is imperative.

The UX/UI closely follows that of popular modern designs such as spotify and instagram. This approach utilises a simple icon based navbar at the bottom, with context specific buttons used to navigate from within the page.

This design was chosen as the app at its core is relatively simple, and thus should have minimal navigational items.

The bottom nav bar navigates to the pages (from left to right):

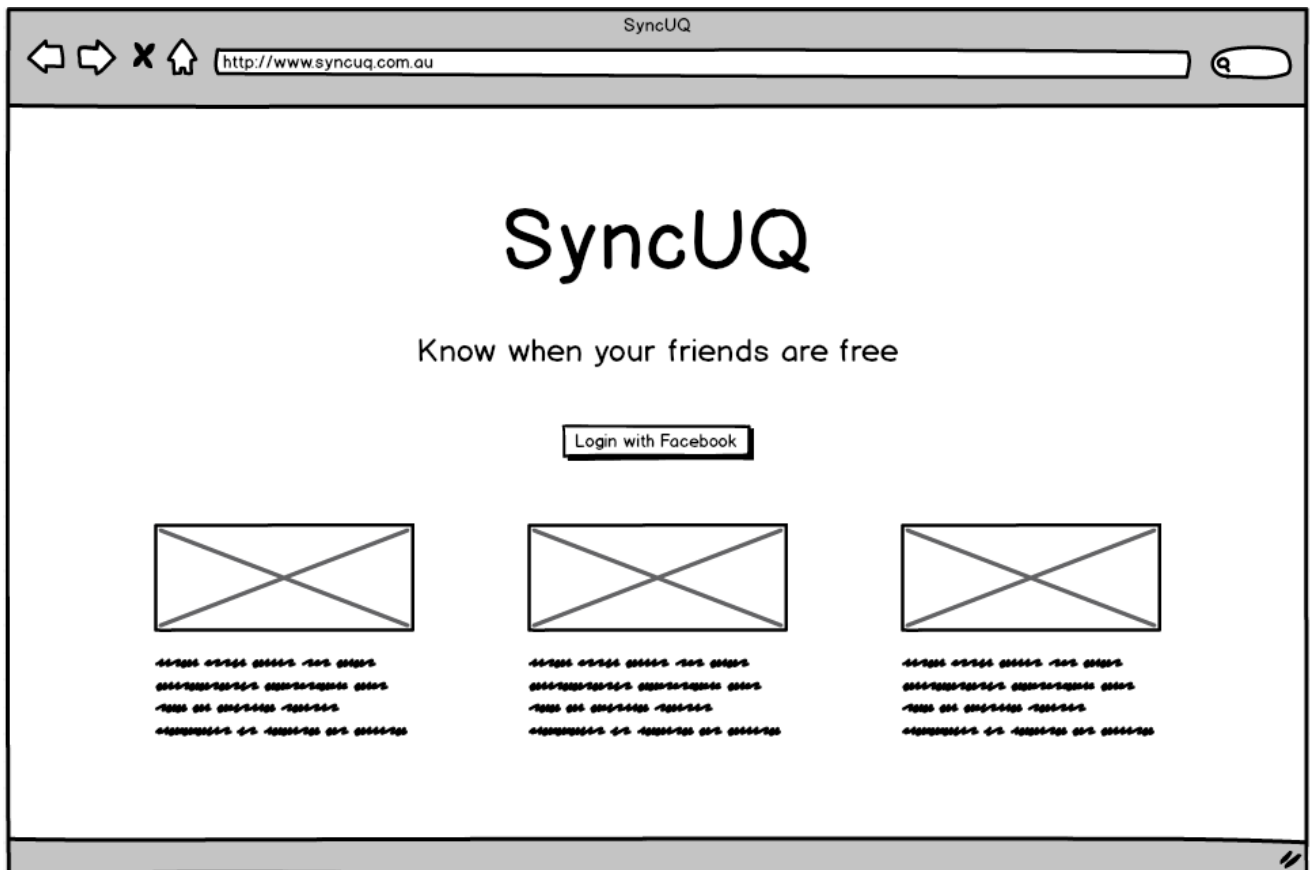
- **Your Timetable** (view your timetable)
- **Friends** (view friends, add friends, accept friend requests)
- **Who's Free?** (A concise and informative list of who of your friends are free)
- **Groups** (Manage a group of friends timetables)
- **Profile** (Manage your profile, as well as access security options)



### 3.6

## Website Layout

A functional website is still very important, as University students are often using a laptop or desktop computer. The website content and color scheme is fundamentally the same as the mobile version. However, the layout has changed to a more desktop oriented design.



As you can see the nav has moved to the top. However, functionality remains the same.

