L-Università ta' Malta
Faculty of Information & Communication Technology

CPS1010 - Collaborative Practical Project

B.Sc Computer Science

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Introduction

The Agile Process is nowadays one of the most commonly used software development methodologies. It ensures a constant interaction between the client and user thus resulting in a higher end-product satisfaction. The aim of this assignment was to experience this process in a similar environment as to that in a workplace by carrying out sprints on a regular basis together with iterations. In addition weekly stand-up meetings were held between the team, throughout which scrum poker was used to establish user story points. This was done to ensure a better organization and order in which the tasks were executed. Throughout the assignment customer satisfaction was prioritised and adapting as a team to evolving user requirements was critical.

Project Process

2.1 First meeting

A product inception meeting was set up and the project aim was clarified. The client's request was to have the team create an app together with a website in order to gather data from software developers through surveys. The users can answer questions through the app which the researcher publishes via the website. The researcher should then be able to view reports with data on his studies. These frontends communicate with a server which receives/sends data to/from a database. Following this meeting it was agreed that the work was to be split up as shown hereunder

- Chris Frendo and Daniel Sumler on the API
- Esther Spiteri and Francesca Chircop on the APP
- Kelsey Marie Debono and Tristan Oa Galea on the Website

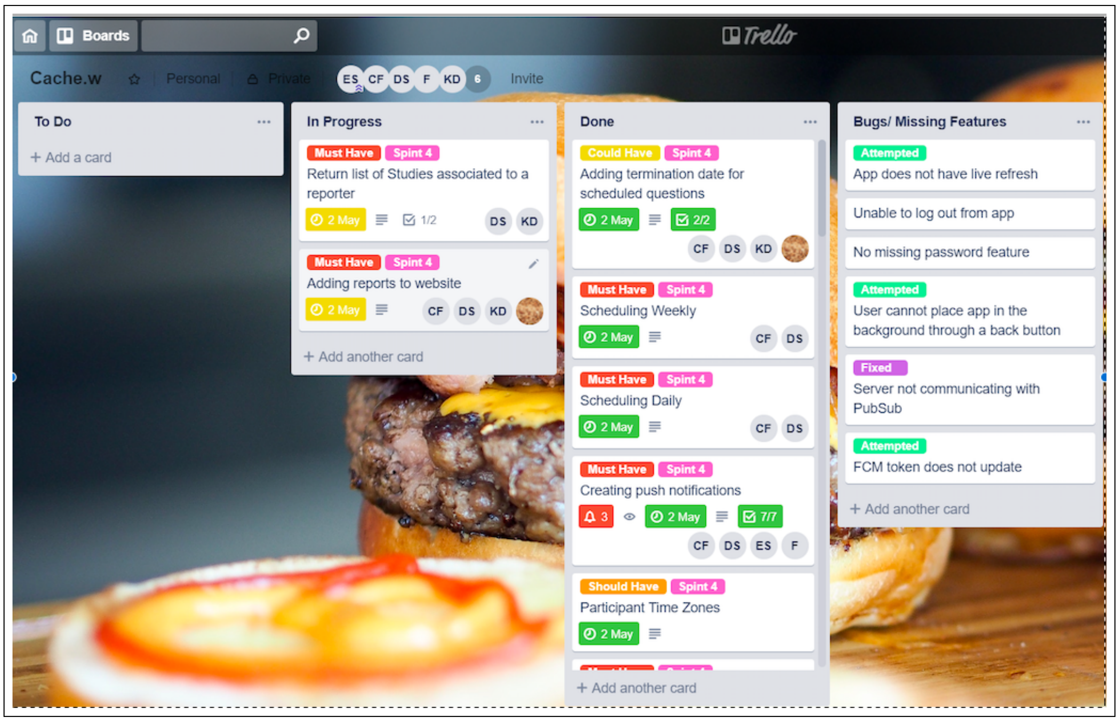
Weekly standups were set and in each one every team member answered the following three questions:

1. What has been carried out in the past week?
2. What are the current plans for the coming week?
3. What problems were encountered?

It was decided with the client that sprints were to each last two weeks and that we would meet at the end of each sprint. Iteration meetings between the team would take place once every two weeks to match with the client meetings. The team decided that it would be best if we were to meet at least once, ideally twice a week if possible, to have periods of working together in the same physical space.

2.2 Iteration 0

After the inception meeting with the customer the team had an idea of what technologies might be needed and an iteration 0 meeting was setup in order to discuss what technical infrastructure was to be used. During this iteration it was agreed that the team will use Trello as a Team Wall in order to be more organised by using checklists and due dates. Trello was also used for bug tracking and to keep a list of potential features that would be implemented if there was enough time.



To Do
+ Add a card

In Progress
Must Have · Spint 4 — Return list of Studies associated to a reporter — 2 May · 1/2 · DS KD
Must Have · Spint 4 — Adding reports to website — 2 May · CF DS KD
+ Add another card

Done
Could Have · Spint 4 — Adding termination date for scheduled questions — 2 May · 2/2 · CF DS KD
Must Have · Spint 4 — Scheduling Weekly — 2 May · CF DS
Must Have · Spint 4 — Scheduling Daily — 2 May · CF DS
Must Have · Spint 4 — Creating push notifications — 3 · 2 May · 7/7 · CF DS ES F
Should Have · Spint 4 — Participant Time Zones — 2 May
+ Add another card

Bugs/ Missing Features
Attempted — App does not have live refresh
Unable to log out from app
No missing password feature
Attempted — User cannot place app in the background through a back button
Fixed — Server not communicating with PubSub
Attempted — FCM token does not update
+ Add another card

A github repository *[https://github.com/ChrisFrendo/Cachew]* was used for version control. A Jenkins job was setup (configuration discussed later) to monitor builds. During Iteration 0 it was concluded as a team that as part of the process parameters of this project functionality would be given more importance over design and aesthetic since the latter required much more experience and keeping up with current trends. Every team member installed the respective tools and started doing research.

- API
  - Node.js
  - MongoDB
  - Postman
- APP
  - Android SDK
  - Ionic framework
  - AngularJS
- Website

  - HTML, CSS and Javascript
  - Bootstrap

2.3 Iteration 1

Creation of Studies

MoSCoW: Must Have Story points: 40

Description
In order to allow surveyors to create studies,
As a surveyor,
I want to be able to create studies

Acceptance Criteria
Given I am a surveyor,
When I fill in the create study form,
And it is filled in correctly,
Then a new study should be created

Register

MoSCoW: Must Have Story points: 20

Description
In order to allow users to use the website or application,
As a participant,
I want to be able to register for an account

Acceptance Criteria
Given I am an unregistered user,
When I fill in the registration form,
And I fill it in correctly,
Then I should be registered as a participant/surveyor

Retrospectives

- Creation of studies took longer than expected as it was the first time the team was working together on these technologies.
- Specialized research of the task at hand was to be done in more detail.
- Better time management was planned for the following iteration.

2.4 Iteration 2

Researchers only can login using website

MoSCoW: Must Have Story points: 8

Description
In order to allow only researchers to access the website,
As a participant,
I should not be allowed to login

Acceptance Criteria
Given I am a registered researcher,
When I try to login on the application,
Then I should not be allowed,
And shown an error message,

Given I am a registered participant,
When I try to login on the application,
And I enter my login credentials correctly,
Then I should be logged in

Participants only can login using app

MoSCoW: Must Have Story points: 13

Description
In order to allow only participants to access the application,
As a researcher,
I should not be allowed to login

Acceptance Criteria
Given I am a registered participant,
When I try to login on the website,
Then I should not be allowed,
And shown an error message,

Given I am a registered researcher,
When I try to login on the website,
And I enter my login credentials correctly,
Then I should be logged in

Delete Questions if Study POST fails

MoSCoW: Should Have Story points: 13

Description
In order to prevent having questions not linked to a study,
When creating a study is not succesful,
The website should send a delete request to delete the the submitted questions

Login Tokens

MoSCoW: Should Have Story points: 13

Description
In order to fetch only the logged in user's data,
The system should store some sort of token or session id on the logged in user

Study subscriptions

MoSCoW: Must Have Story points: 8

Description
In order to allow participants to subscribe to certain studies,
As a participant,
I should be allowed to choose which studies I want to subscribe to

Acceptance Criteria
Given I am a registered participant,
When I click on a subscribe button on a particular study,
Then I should be subscribed to that study

Subscription Management

MoSCoW: Must Have Story points: 40

Description
In order to allow only participant to manage their subscriptions,
As a participant,
I should have a page where I can view the studies I follow

Acceptance Criteria
Given I am a registered participant,
When I try access the supscribtions page on the app,
Then I should see all of my subscribed studies,
And there should be a way to unsubscribe from a particular study,

Scheduling Questions

MoSCoW: Must Have Story points: 13

Description
In order to schedule questions,
As a researcher,
I should have the option to specify the time to send particular questions of my study

Acceptance Criteria
Given I am a registered researcher,
When I create a study,
Then I should be allowed to specify a time and date to ask each of my questions (in my own time zone)

Study Search

MoSCoW: Would be nice to have Story points: 40

Description

In order to allow participants to search for studies,
As a participant,
I should have a page in the app where I can search for certain studies based on their genres, targets and title.

Acceptance Criteria
Given I am a registered participant,
When I am searching for study,
Then I should be shown studies based on my search criteria.

Study target demographics

MoSCoW: Must Have Story points: 13

Description
In order to allow researchers to select their target demographic for a particular study,
As a researcher,
I should be allowed to specify my targets based on their demographics (age, country, industry, job role, gender etc...) or specify that this is a generic study

Acceptance Criteria
Given I am a registered researcher,
When I am creating a study,
Then I should be given the option to specify my target demographic

Retrospectives

- Time management was observed to improve from the previous iteration.
- Scheduling of questions was not completed fully.
- In this iteration the team agreed on too many user stories due to lack of experience so in future meetings with the customer there were better discussions regarding workloads which also helped to manage customer expectations and prioritisation.
- During this iteration the team realised that it was important to think of future features that the user might want to implement in order to have the current features compatible with the future ones. This is why it was decided that project visibility was to be discussed with the client during following meetings.

2.5 Iteration 3

Targeted Study Search

MoSCoW: Should have Story points: 20

Description

In order to search for studies,
As a user,
I should see a list of studies which are targetted to my demographics

Acceptance Criteria
Given I am a user,
When I go on the new studies page,
Then I should see only studies which are targetted to my profile

N.B. API should have some sort of checking to only send studies which are targetted to the logged in user

Study questions notification

MoSCoW: Would be nice to have Story points: 40

Description

In order to know when a question is available to answer,
As a user,
I should see the number of questions next to the study

Acceptance Criteria
Given I am a user,
When I subscribe to a study,
Then I should see the number of questions available

Flag to indicate scheduled questions

MoSCoW: Would be nice to have Story points: 20

Description

In order to know if a study has scheduled questions,
As a user,
I should see an icon next to my subscribed studies to indicate that this study has scheduled questions

Acceptance Criteria
Given I am a user,
And I am subscribed to at least one study,
When I open the dashboard page,
Then I should see my list of subscribed studies,
And next to each study which has scheduled questions there should be an icon to indicate this.

N.B. API needs to send a boolean for front end to interpret

Multiple Choice

MoSCoW: Must Have Story points: 5

Description

In order to allow researchers to ask a multiple choice question
As a researcher,
I should be allowed to input the different choices a user can choose in a single
text box delimited by a new line character

Acceptance Criteria
Given I am a registered researcher,
When I am creating a study,
Then I should be given the option to ask a multiple choice question

Updating Scheduling UI

MoSCoW: Must Have Story points: 20

Description

In order to allow researchers to schedule different questions at different times,
As a researcher,
I should be allowed to specify my preferred scheduling times for different questions from a drop down menu. The options in this menu include: 'Just Once', 'Daily', 'Weekly', 'Monthly'.

Acceptance Criteria
Given I am a registered researcher,
When I am creating a study,
I should be able to schedule questions I create based on a date and a frequency preference

Updating Study Target Demographics UI

MoSCoW: Could Have Story points: 8

Description

In order to allow researchers to select their target demographic for a particular study,
As a researcher,
I should be allowed to specify my targets based on their demographics (age, country, industry, job role, gender etc...) or specify that this is a generic study, allowing the researcher to choose multiple targets

Acceptance Criteria
Given I am a registered researcher,
When I am creating a study,
Then I should be given the option to specify more than one target demographic

Study page

MoSCoW: Must Have Story points: 40

Description

In order to answer questions,
As a user,
I should have a question page

Acceptance Criteria
Given I am a user,
When a study has a question,
Then I should be allowed to answer it through a question page

Retrospectives

- Refresh issues were encountered in the app in order to update data when questions are completed or new questions are sent by the researcher. This was partially overcome via refresh on switching back to the subscribed study page. However, a solution for live refresh was not found.
- Improvement in time management resulted in a better presentation of work during the iteration meeting.

2.6 Iteration 4

Adding Tests for API

MoSCoW: Should Have Story points: 8

Description
Add tests using postman to be used when building job in jenkins

Scheduling Just Once

MoSCoW: Must Have Story points: 20

Description
In order for the app to show just once scheduled questions when their time comes,
The server should check whether a question's time is within 5 mins of the current

N.B: The Server should also take into account the timezones of both the researcher when creating the question and the user who is requesting the question.

Adding termination date for scheduled questions

MoSCoW: Could Have Story points: 20

Description
In order to be able to input a termination date for a daily/weekly scheduled question,
As a researcher,
I should have an input field where I can enter the termination date for my question

Acceptance Criteria
Given I am a logged in reseracher,
When I am creating a new question for a study,
And I selected a daily or weekly schedule,
Then an input field should pop up where I can enter the termination date for my question

Participant Time Zones

MoSCoW: Should Have Story points: 13

Description

In order to recieve questions at the correct time,
The system should push questions to the participants according to their timezones

Scheduling Weekly

MoSCoW: Must Have Story points: 40

Description

In order for the app to show daily scheduled questions when their time comes,
The server should check whether a question's scheduled time is within 5 mins of the current time

N.B: The Server should also take into account the timezones of both the researcher when creating the question and the user who is requesting the question.

Scheduling Daily

MoSCoW: Must Have Story points: 40

Description

In order for the app to show daily scheduled questions when their time comes,
The server should check whether a question's scheduled time is within 5 mins of the current time

N.B: The Server should also take into account the timezones of both the researcher when creating the question and the user who is requesting the question.

Creating push notifications

MoSCoW: Must Have Story points: 40

Description
In order to be able to recieve push notifications when a question is availabe,
The app should be connected to fcm and send the server the fcm token.

The server should be connected to pubsub and fcm. The server should also create a topic for each study and subscribe participants on firebase through their fcm tokens to the studies which they subscribe to.

The server should also have a cron job running every minute to check for any due questions and send a push notification if it finds one.

Return list of Studies associated to a reporter

MoSCoW: Must Have Story points: 20

Description
In order to be able to select a study to view reports,
As a researcher,
I should have a dropdown list with the study titles that I created

Acceptance Criteria
Given I am a logged in researcher,
When I am on the reports page,
Then I should have a drop down list populated with my studies' titles.

Adding reports to website

MoSCoW: Must Have Story points: 40

Description
In order to be able to view reports for questions,
As a researcher,
I should have a page where I can view the reports in a graphical manner where appropriate

Acceptance Criteria
Given I am a logged in researcher,
When I want to view the reports for my studies,
Then I should have a page where I can access my studies and view reports for their questions.

N.B: The reports should have a live update feature and they should have buttons to change chart type. Client also said that if we want we can add export to CSV option.

Retrospectives

- The work on time specifications was continued. For example an input field was added in order to be able to input a termination date for a scheduled question. In addition the time zones were also set for both the researcher and the user.
- Tests were added using postman to be used when building job in jenkins.
- Everything was joined together and the last final touches were sorted and divided again between the contributors.
- It was observed that things went more smoothly in this iteration since the members had a much better idea on the workload of each story and because the team was gaining experience working with the technologies.

2.7 Wire Frames

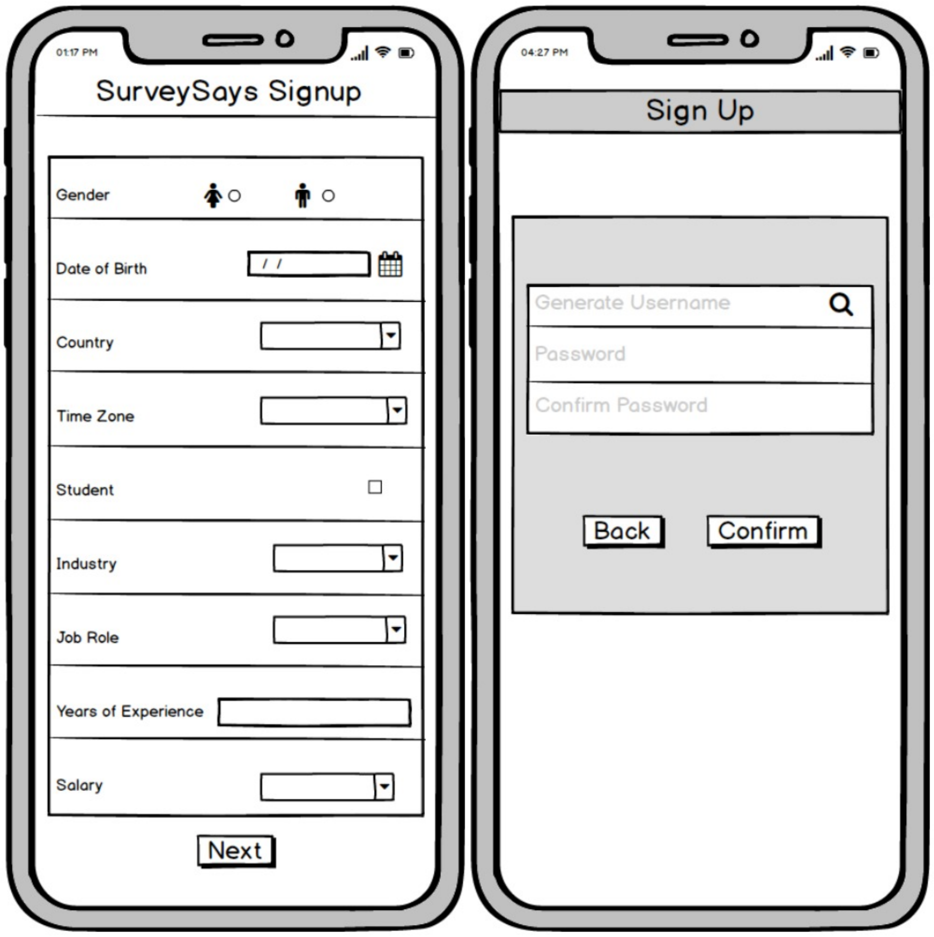


Figure 2.1: Sign up page including details page, username generator & password setup

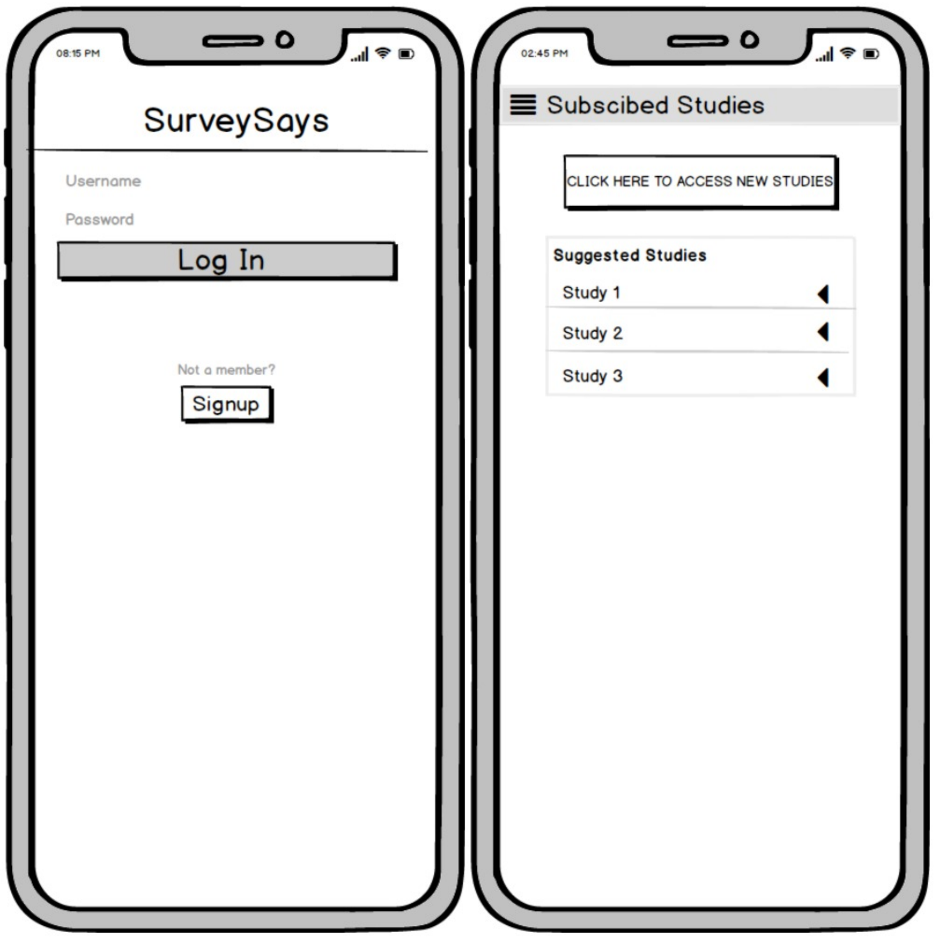


Figure 2.2: Log in page including sign up button & user dashboard page including suggested studies if no subscribed to studies

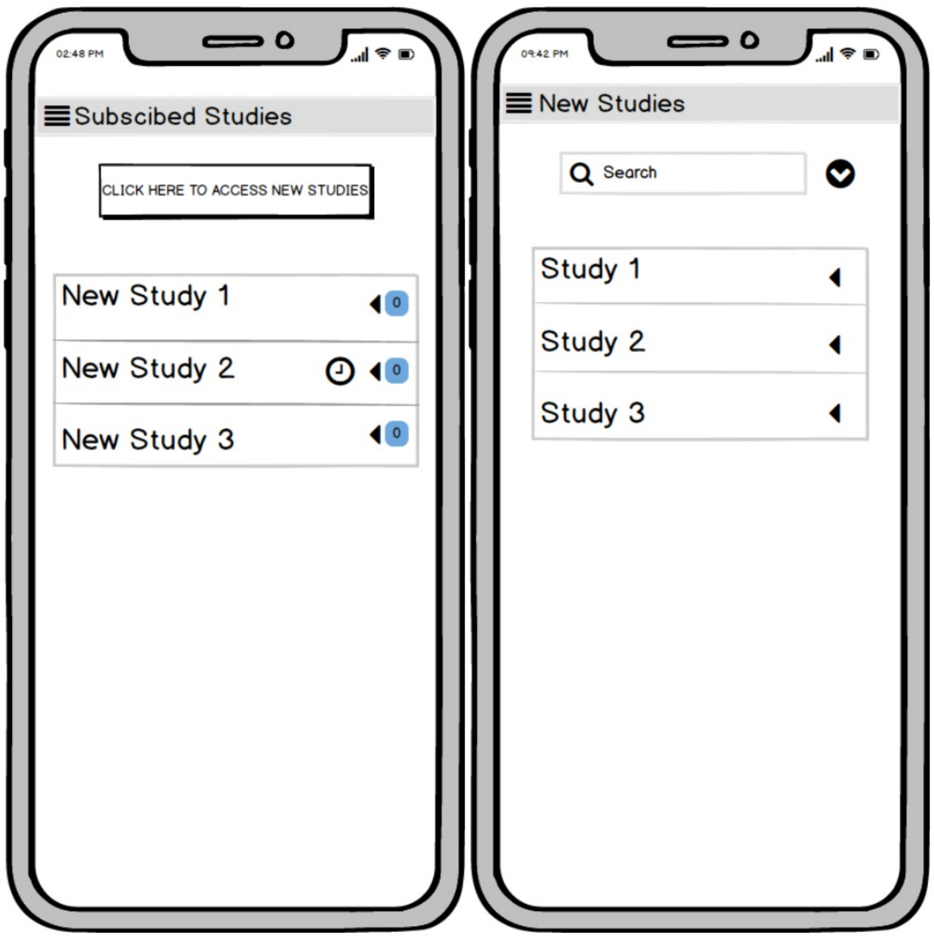


Figure 2.3: Subscribed Studies page including a button to access more studies New Studies page including a search box

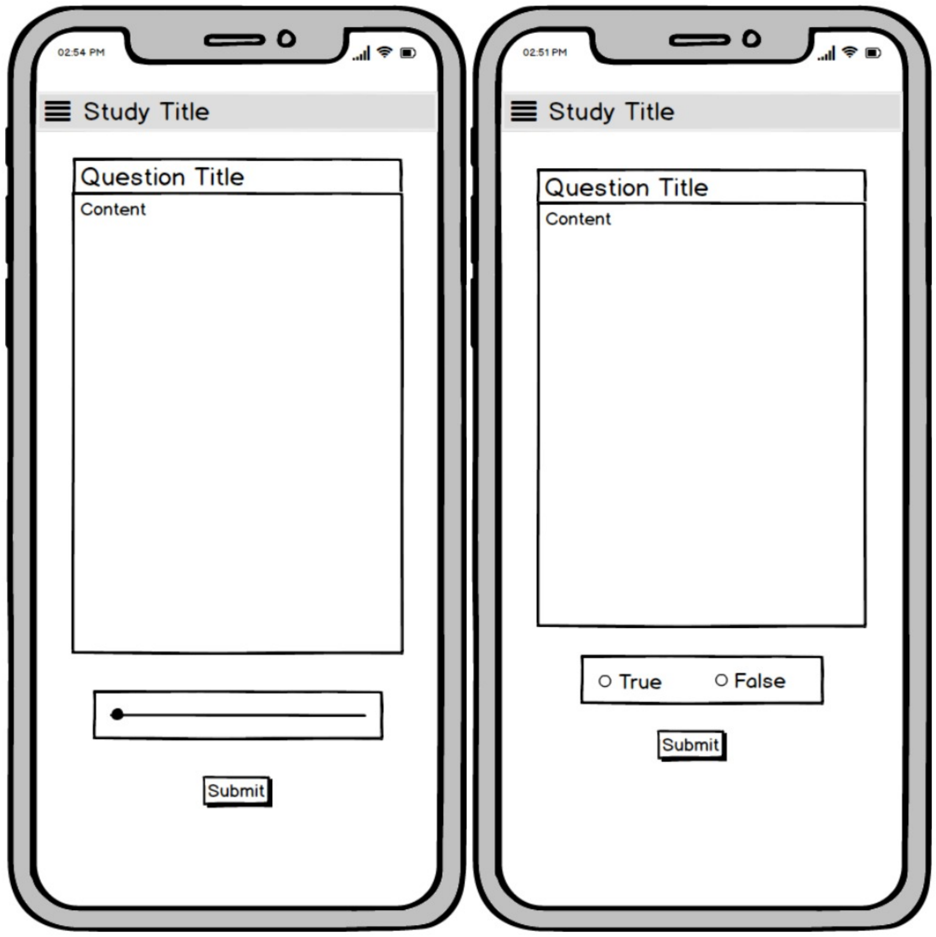


Figure 2.4: Study pages including one with a slider (Rating question) and boolean type

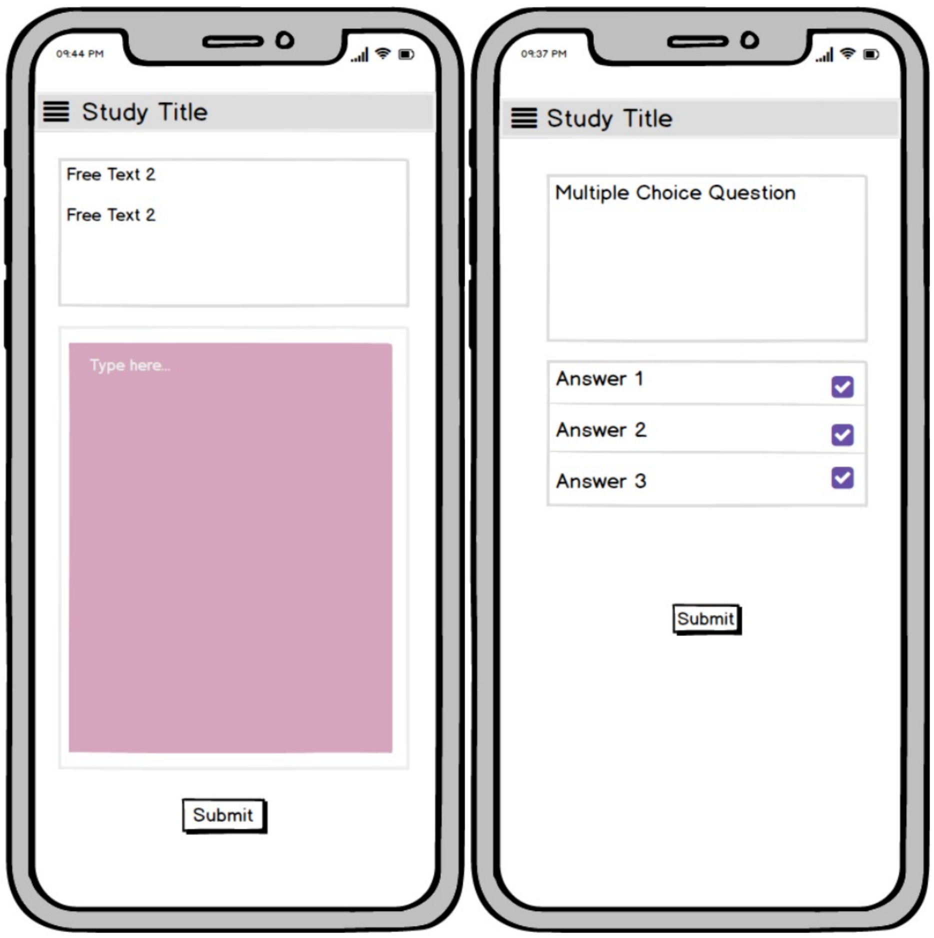


Figure 2.5: Study pages including one with an open ended question and multiple choice question

2.8 Improvements throughout the iterations

1. MoSCoW was introduced between the first and the second iteration. [However, for completeness, MoSCoW was also applied to the previous iterations.]
2. From one iteration to the other, judgement of the user stories' workloads and priorities was improved. More consideration was being taken when assigning story points to the tasks in order to achieve more realistic time frames.
3. Co-ordination between the three teams in order to work simultaneously on the same task was improved throughout the allocated time for co-located work.
4. Issues on Github were implemented for iteration 4 to better organise issues and enhancements between the collaborators.

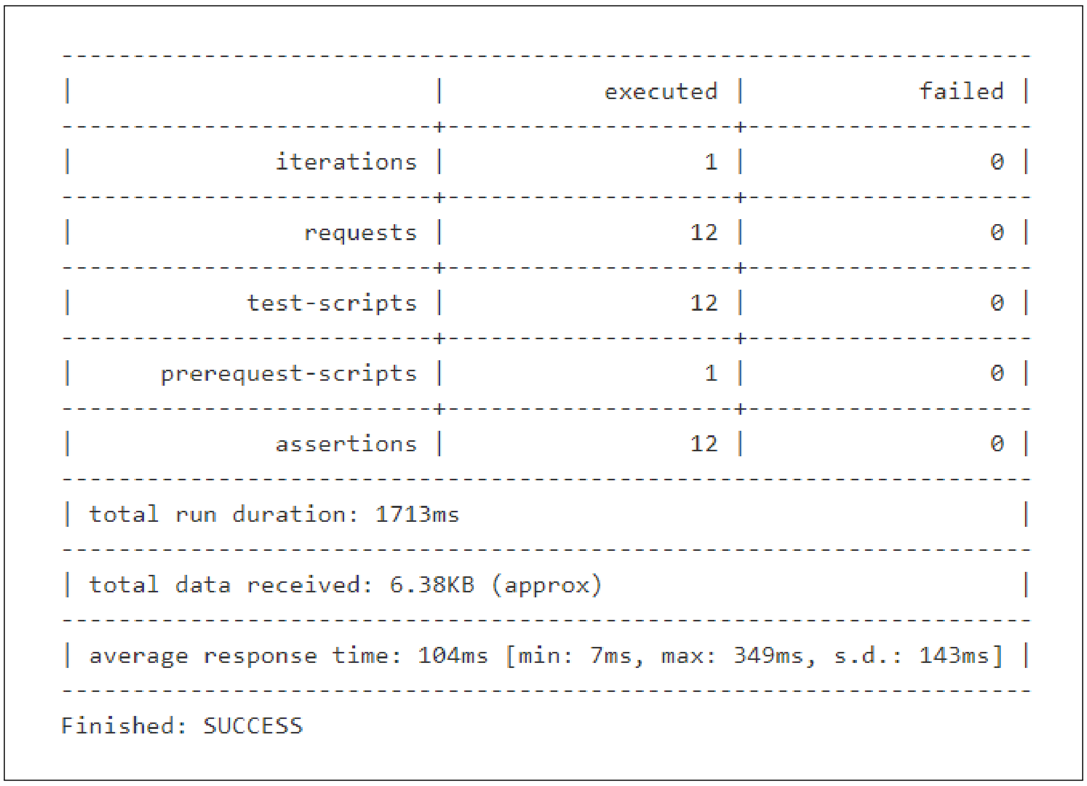
2.9 Showcases

Showcases were carried out biweekly with the client. During these meetings the team would first show the customer the newly added functionalities from the previous iteration and then discuss the next set of features to be implemented in the following sprint. During these showcases the team would give a brief overview on how the particular feature was implemented without going into extra technical details unless the customer asks for it.

In all showcases the client was satisfied with the team's work and results especially in the last two iterations since the client could see the differences in the newly added features. After giving the customer a demo of the added functions and verifying that the client is satisfied with the product a release would be created on GitHub. This was done to ensure that there was a record for each showcase presented to the client, and it helped with sorting the time-line of all commits into versions.

Jenkins configuration and instructions

A Jenkins job called *Cache.w* was created to keep track of git changes and keep the team informed if any builds failed. It was setup to poll every 15 minutes from the github repository's master branch and check if there had been any changes. If there were then it would create a build. When building it executes a shell script which uses *newman* to run a custom postman test script. An snippet of a build's console output can be seen below. If the build fails due to a failing test or any other cause, Jenkins will send emails to all the team members. The project consists of three main parts as discussed before: Server, Website and Mobile App. Note that the app was not tested on an iPhone since there were problems when installing dependencies on the Mac machine so the instructions will be for android.



```
---------------------------------------------------------------------
|                          |           executed |            failed |
--------------------------+--------------------+--------------------
|               iterations |                  1 |                 0 |
--------------------------+--------------------+--------------------
|                 requests |                 12 |                 0 |
--------------------------+--------------------+--------------------
|             test-scripts |                 12 |                 0 |
--------------------------+--------------------+--------------------
|       prerequest-scripts |                  1 |                 0 |
--------------------------+--------------------+--------------------
|               assertions |                 12 |                 0 |
---------------------------------------------------------------------
| total run duration: 1713ms                                        |
---------------------------------------------------------------------
| total data received: 6.38KB (approx)                              |
---------------------------------------------------------------------
| average response time: 104ms [min: 7ms, max: 349ms, s.d.: 143ms] |
---------------------------------------------------------------------
Finished: SUCCESS
```

- Website
  - When connected on the UoM network either through wifi or vpn simply enter the ip 10.60.10.66 in the address bar of your browser to access the website.
  - Alternatively you can download the files from Jenkins and open the html files which can be found in the directory *SurveySaysWebsite*.
- App
  - The app is available on the Google Play store. Simply search Survey Says on the Play store or enter *https://play.google.com/store/apps/details?id=com.cachew.surveySays*
  - Alternatively you can download the files from Jenkins and run the application in an emulator on your machine.
    1. Install the following dependencies: npm, android SDK and android AVD

2. Using CMD navigate to directory *surveySays*
3. Execute command *npm install* to install necessary node modules
4. Execute command *ionic cordova platform add android* to add the android platform
5. Execute command *ionic cordova run android* to generate and run the apk.

- Server
  - The server is running on a machine on the university's network and the front-ends are setup to connect to it so there is no need to install a local server.
  - Alternatively you can download the files from Jenkins and run a local server. Note that this required having MongoDB and npm installed.
    1. Install MongoDB and npm
    2. Navigate to directory *rest_api*
    3. Execute command *npm intall* to install all dependencies
    4. Change all variables that store the ip of the server to you own ip address or to *localhost* on both website and app code
    5. Execute command *node index.js* to run the server

Process Evaluation

4.1 Limitations

- App
  - Back button to exit the APP
  - Google plugin issue when it came to accessing the received push notifications
  - Automatically set time zone for user
  - Logout
- API
  - Delete study option
  - Delete user
  - No forgot password option
- Website
  - Suboptimal user experience

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