



THE UNIVERSITY OF
WESTERN
AUSTRALIA

CITS3200 Project Team 18

**UWA Academic Skills Drop-in - Client queue flow and usage reporting
software**

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1. What is this project?

1.1 Authors

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- Liam Hovell
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- Alex Hoffman
- Alex Mai
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1.2 References

Albert Einstein photo ref: MPI/Getty Images Diagrams by Jasper Paterson and Simon Dransfield Background art by Jordan Hartley

2. User

2.1 User Documentation

2.1.1 How to access the website

Click [here](#) to redirect to the website. User will need username and password to login.

There will be 3 main tabs in the website, which are Queue, Data Analytics and Export Data

2.1.2 Queue

User can manage student sessions in the Queue tab. There are 3 tables, 2 of which are STUDYSmarter queue and Librarian queue. Students will be put into either queue depending on user's choice.

Staff management

On the right side of the queue home page, you can see 2 small boxes saying "STUDYSmarter Team Available" and "Librarians Available". You can click the "+" and "-" icon to modify the number base on your current available staff.

The screenshot displays the ReSQ web application interface. On the left is a sidebar with three tabs: 'Queue' (selected), 'Data Analytics', and 'Export Data'. The main content area is titled 'STUDYSmarter and Librarian Queues' and includes an 'ADMIN LOG-OUT' link in the top right corner. A large table titled 'Current Sessions' is the central feature, with columns: Team, Name, Student Number, Unit Code, Enquiry Type, Session Time, and End Session. To the right of this table is a purple 'ADD TO QUEUE' button and two staff availability controls, which are highlighted with a red rectangle. The first control is 'STUDYSmarter Team Available' with a value of 3, and the second is 'Librarians Available' with a value of 2. Below the main table are two smaller tables: 'STUDYSmarter Queue' and 'Librarian Queue', each with columns: Name, Student No., Unit Code, Enquiry Type, Wait Time, and Actions.

If you try to add student to the inSession queue which exceeds your current setup for each staff type, the website will give a warning alert and require you to modify the staff number.

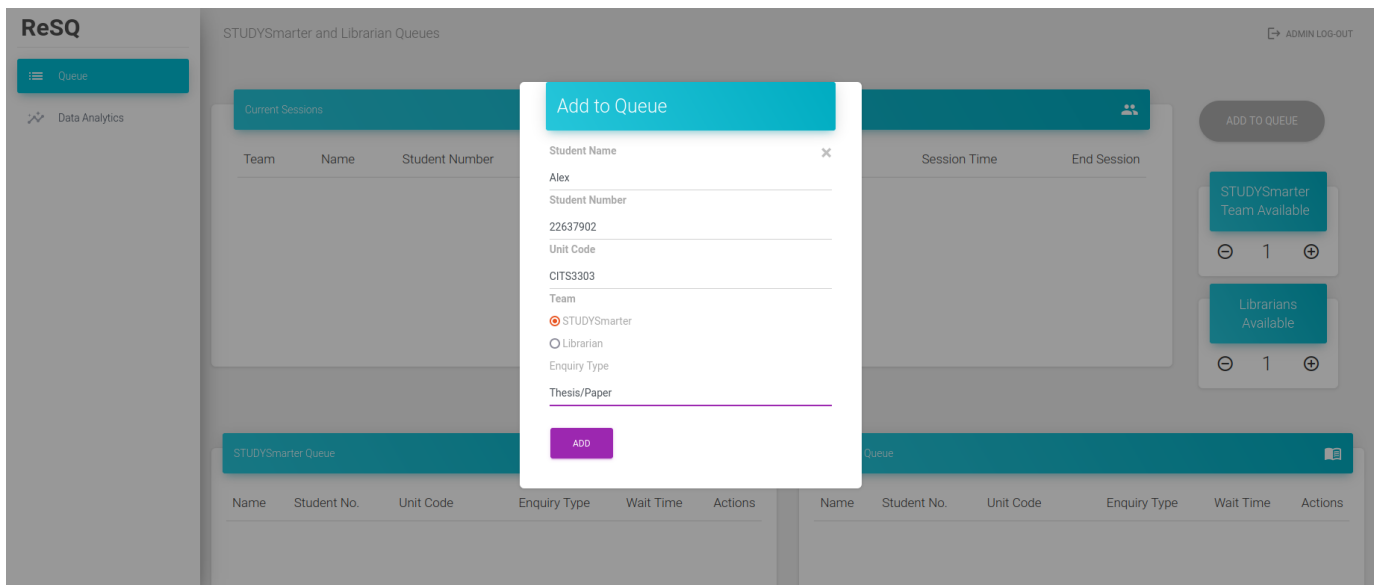
The screenshot shows the ReSQ interface with a warning message in the center: "0.0.0.0:5000 All STUDYSmarter staff already in a session. Finish a session or increase staff available." The interface includes a sidebar with "Queue", "Data Analytics", and "Export Data". The main area is titled "STUDYSmarter and Librarian Queues" and contains three sections: "Current Sessions", "STUDYSmarter Queue", and "Librarian Queue". The "Current Sessions" table has columns: Team, Name, Student Number, Unit Code, Enquiry Type, Session Time, and End Session. The "STUDYSmarter Queue" table has columns: Name, Student No., Unit Code, Enquiry Type, Wait Time, and Actions. The "Librarian Queue" table has columns: Name, Student No., Unit Code, Enquiry Type, Wait Time, and Actions. On the right, there are buttons for "ADD TO QUEUE", "STUDYSmarter Team Available", and "Librarians Available", each with a counter and plus/minus buttons. An "ADMIN LOG-OUT" link is in the top right corner.

Add to queue

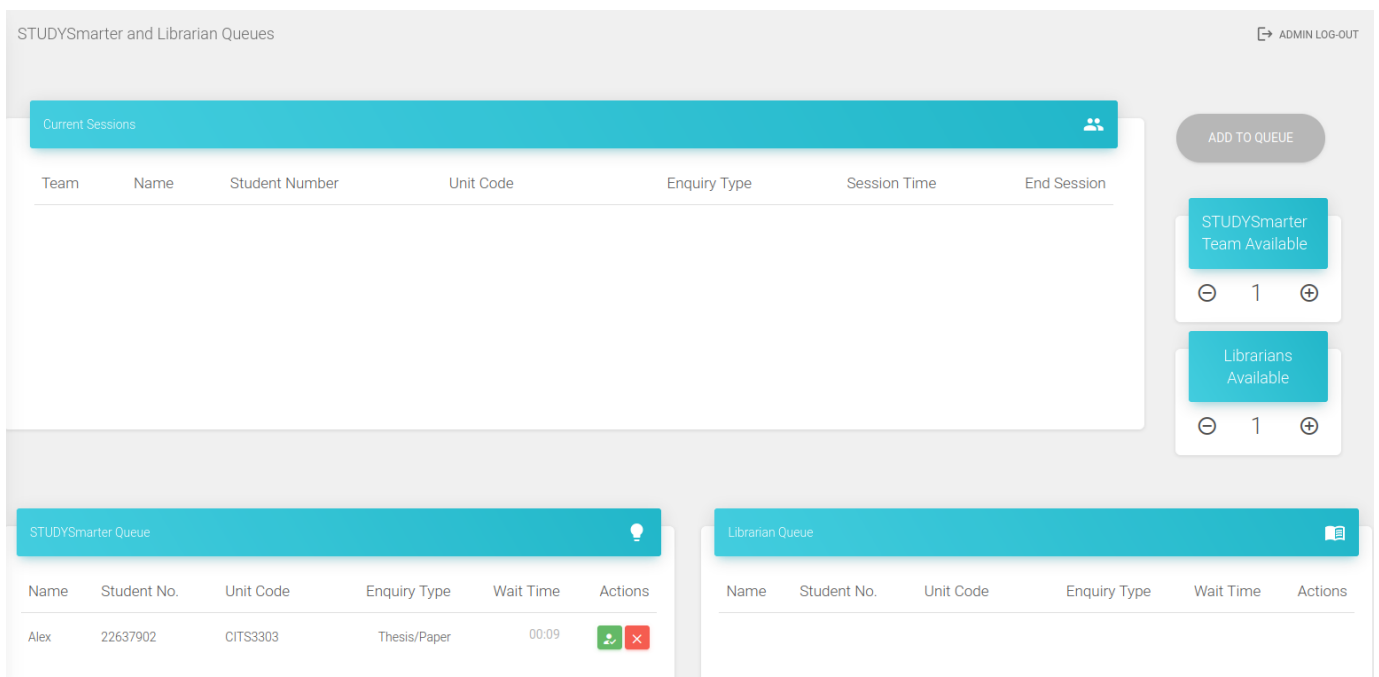
In order to add a student to a waiting queue, look for the "ADD TO QUEUE" button in the top right corner

This screenshot highlights the "ADD TO QUEUE" button in the top right corner of the ReSQ interface. A red arrow points to the button, which is enclosed in a red rectangle. The interface layout is the same as the previous screenshot, but the "Current Sessions" table is empty. The "STUDYSmarter Queue" and "Librarian Queue" tables are also empty. The "STUDYSmarter Team Available" and "Librarians Available" buttons show a count of 1.

A form will show up as below. In this form, you can enter student information and choose the queue type between "STUDYSmarter" and "Librarian"



When successfully added, the student information will show up in the corresponding queue. Below is an example



Managing a session

If you want to move students from either waiting queue to "Current Session" table, click the green button in the "Actions" column

STUDYSmarter and Librarian Queues ADMIN LOG-OUT

Current Sessions

Team	Name	Student Number	Unit Code	Enquiry Type	Session Time	End Session

ADD TO QUEUE



STUDYSmarter Team Available

⊖ 1 ⊕

Librarians Available

⊖ 1 ⊕

STUDYSmarter Queue

Name	Student No.	Unit Code	Enquiry Type	Wait Time	Actions
Alex	22537809	CITS2200	Assignment	00:05	 

Librarian Queue

Name	Student No.	Unit Code	Enquiry Type	Wait Time	Actions

Show all

If a student cancel the appointment, you can remove her/him from the waiting queue by clicking the red button in the "Actions" column



A message box will show up and ask to confirm your action, click "Yes".

Finish/Undo a session

When a session is done, user can click the green button to finish the session.

When user accidentally added a student to this table from waiting queue, undo it by choosing the undo button

Current Sessions

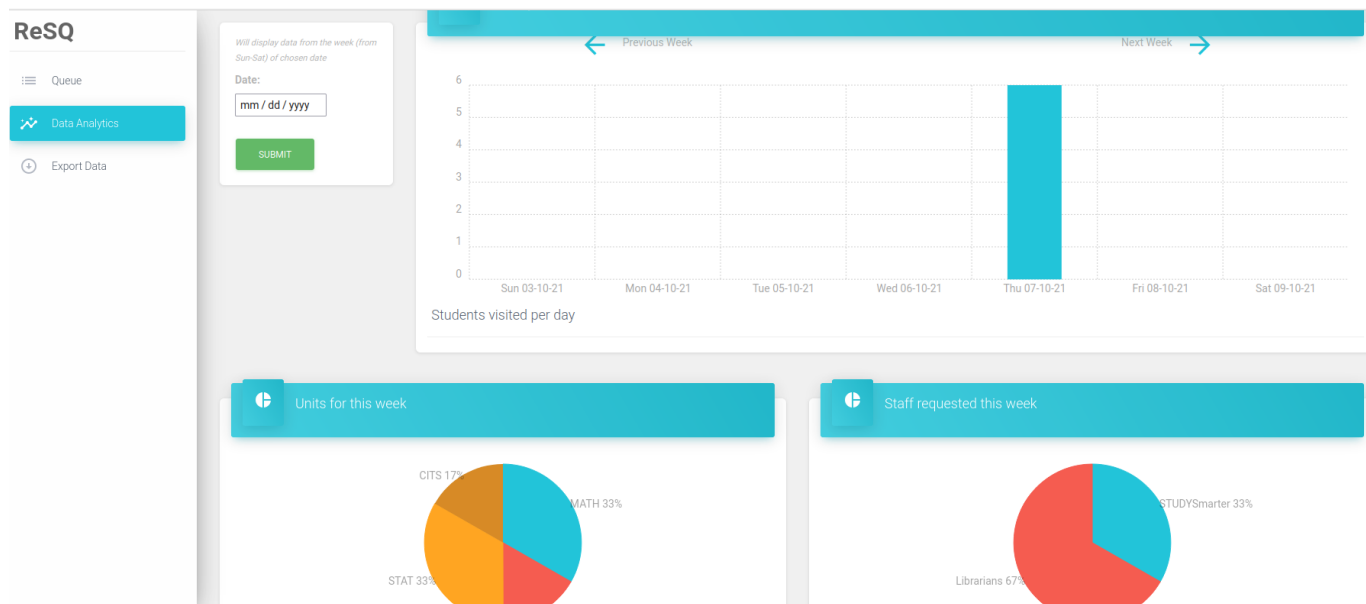
Team	Name	Student Number	Unit Code	Enquiry Type	Session Time	End Session
STUDYSmarter	Alex	22537809	CITS2200	Assignment	00:30	 

2.1.3 Data analytics

This website provide some basic data analytics for "at a glance" view.

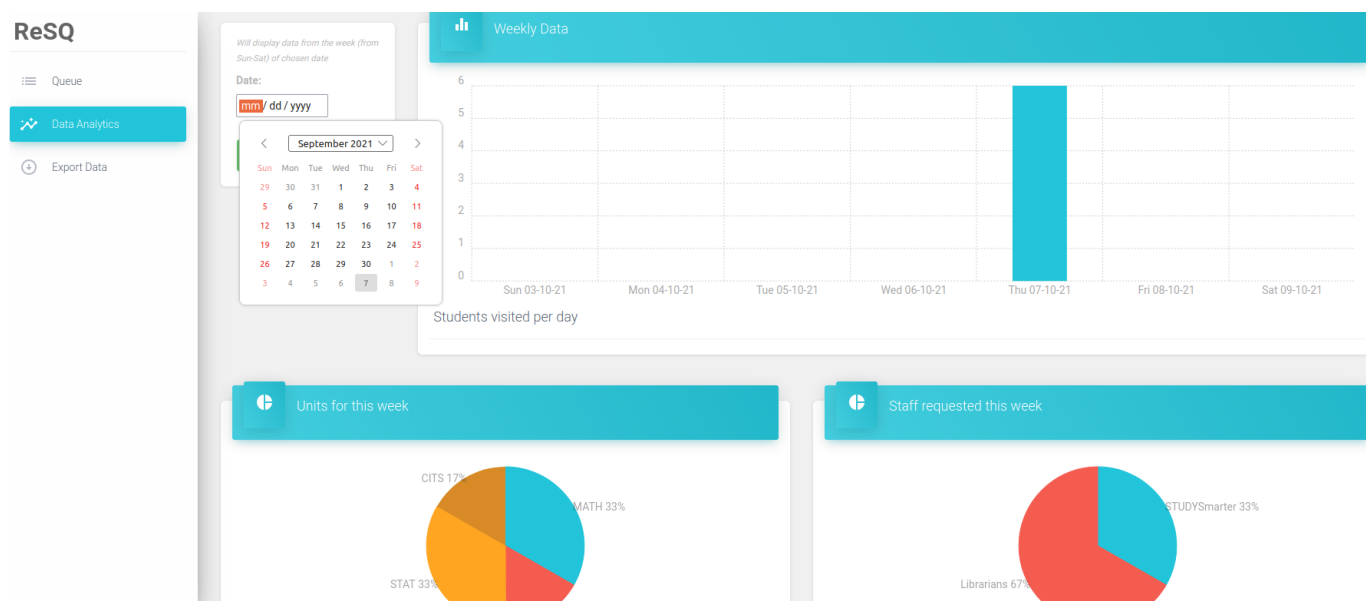
There will be 3 charts generated in the Data analytics tab:

- Students visited per day in the chosen week
- The percentages of popular units in that week
- Comparison between students enter STUDYSmarter and Librarian queue in that week



In order to generate data analytics for a chosen week:

- Choose an arbitrary day in the week you want to generate data



- Click submit

2.1.4 Export data

If user wants to export data to a csv file for further data analysis:

- Step 1: Navigate to the 'Export Data' tab
- Step 2: There are premade options such as "Last week" or "Last Day". You can also choose "Custom" option to export data between a period of your choice

The screenshot shows a web browser window with the URL `0.0.0.0:5000/export`. The page title is "Export Data". On the left, there is a sidebar with the "ReSQ" logo and three menu items: "Queue", "Data Analytics", and "Export Data" (which is highlighted with a blue bar). The main content area features a form titled "Export to CSV". This form includes five radio button options: "Last Day", "Last Week", "Last Month", "Last Year", and "All Time". The "Custom" option is selected, indicated by a red dot. Below these options are two input fields: "Start Date" and "End Date", both with a placeholder format of "mm / dd / yyyy". A green "SUBMIT" button is located at the bottom of the form. In the top right corner of the main area, there is a link for "ADMIN LOG-OUT". The bottom right corner of the page contains the text "Realtime STUDYSmarter Queue".

- Step 3: Click 'Submit', then download the file

3. Administrator

3.1 Administrator Documentation

4. Developer

4.1 Technical Documentation for Developer

4.1.1 Application

The website is run using a flask server. Flask is a micro framework for the backend of the website. Jinja is used inside the HTML so the display can adapt to server data as well as for running loops. Users and test attempts are saved inside a SQLite database. The username, password, and scores of the user are saved so progress can be encouraged.

4.1.2 Development Workflow

This project uses docker to orchestrate multiple services. Make sure to install docker, see [here](#) for documentation.

Once you have it installed do the following:

Environment Variables: Create the .env file

There is a file called `template.env`. This contains all the configurations for the entire application for database, flask app, and pgadmin. Copy this to `.env` (you have to create this file).

Run the Docker-Compose

Run the following command

```
1 docker-compose up
```

This one command will build all the containers. Most notably this will create the Flask Application with pip installation, and database migration to PostgreSQL.



Rebuilding containers

If you do need to build containers, run the following:

```
1 docker-compose up --build
```

Services that are running

There are a couple of services that are running

Services	URL
PostgreSQL Database	http://localhost:5432
PgAdmin (PostgreSQL GUI)	http://localhost:8002
ReSQ Flask App	http://localhost:5000
MkDocs Documentation	http://localhost:8001

Going inside the container / Remote Code Execution

Most likely you will be developing inside this container such as doing pip installation and other commands. You can do remote code execution to the container using the following command

```
1 docker exec -it resq_app bash
```

This will allow you to connect to the container and do whatever command that pleases you.

4.2 Requirements

4.2.1 Acronyms, Abbreviations and Definitions

- UWA: The University of Western Australia

4.2.2 Aim and Scope

4.2.3 Requirements

Stage 1 Functional Requirements

The following are the core functional requirements for the first stage application

USERS

Stage 2 Functional Requirements

"Nice to have"

Some of the "nice to have" of this project will be covered in this requirements documents. However, "nice to have" usually will come along as the users of the system see fit. This will be documented in the [Issue Tracking Management sytem](#) of the code repository.

Non-functional Requirements

Identifier	Name	Description
NFR1	Security	Only authenticated and authorised users should be able to perform actions such as adding equipment, updating equipment location and information, or searching for specific equipment.
NFR2	Performance	The loading time should not hinder the user experience and productivity of the user in the website. The page/actions should have a loading time < 5 seconds on most computing environments on standard internet connections**
NFR3	Maintainable and extensible	The website should be relatively easy to update and extended to accomodate for new contexts.
NFR4	Recoverable	In the event of the web server or database server crashing, all stored data should be fully recoverable.
NFR5	Intuitive user interface	The website should have an intuitive / easy-to-use user interface, so that users will be able to easily use the website and update the equipment database
NFR6	Compatibility	The application should be compatible with recent versions of the major browsers (Safari, Chrome, Firefox and Edge) on laptop and desktop computers
NFR7	Deployability	The application should be compatible with deployment in the SHL VPS

4.2.4 Proposed Solution

The proposed solution is to build a custom web application that will encompass and satisfy the requirements (by completing the suggested "ideal solution" as per the [Aim and Scope](#)).

Some research for existing design solution has been done for this project see [Appendix: Existing Design Solution](#). The beauty of custom web application for the team is that it upskills the current software engineers as aligned in the purpose of this unit, and the high possibility of extending application depending on the requirements without being constrained with the bulk of codebase

of other unmaintained opensource projects. Comparatively to enterprise systems, most enterprise systems will charge per users that use the system, this easily becomes expensive because the amount of users that will use the system should be able to accomodate the number of users that are interested in looking for the assets.

Core Technologies

The custom web application will aim to satisfy all the requirements in here along with the "Nice to have's" as they come up. The application will be built using the ...

The authentication system will be outsourced to the UWA PHEME Authentication API to allow any users in with a UWA PHEME account to login.

DOCKER

Docker is a deployment technology that allows virtualization in a server to allow the packaging of software into containers for deployment. To satisfy NFR7 - Deployability, the web platform will use docker to allow the deployment through the SHL VPS Server.

Furthermore, Docker will be used for orchestration of different services in development to increase speed of development, and reduce inconsistency between developers devices (NFR3 - Maintainable and extensible).

CODE QUALITY

The code quality will be ensured by peer reviews between the developers in the team.

CODE STORAGE AND DEVELOPMENT CONTROL

Git source control will be used, using the remote UWA System Health Lab organisational GitHub (NFR3 - Maintenance and Extensibility).

Prototype

See the Prototype mentioned in [Figma Interface Prototype](#)

Execution Team

The development of the web platform will be performed by

4.2.5 Development and Methodology

As per the staged requirement, majority of the development will take place on the stage 1 whereas stage 2 are feature-based requirements for the system.

4.2.6 Appendix

Existing Design Solutions

Some of the design solutions that have been considered with great detail and justification are here.

4.3 Coding Patterns

4.3.1 Casing

This codebase will be using camel casing.

4.3.2 Linters / Formatters

This will automatically format your code if you install [ESLint](#) in VS Code or type `yarn lint` in the specific folders.

Make sure you have installed the devDependencies so additional linters can be used.

4.3.3 Github Issues and Pull Requests

Most changes in the codebase can be matched to a github issue that contains description of the work that needs to be done. Each of the pull request are matched to this github issue with the branch name that has a standard `c{Issue Number}-{branch name}`. The issue number allows referencing especially when resolving reason for change.

4.3.4 Development with Docker

The development is done with Docker to orchestrate multiple services as defined in the `docker-compose.yml` file:

- Documentation at localhost:8001

4.3.5 Inconsistencies

During the project, different developers have different terminology. Some of the inconsistencies are documented below

4.3.6 queue means Team Name as well

`queue` refers to where the student belongs to in the queue. This can either be `StudySmarter` or `Librarian` team.

4.4 Frontend/Client-Side App

4.4.1 Frontend

4.5 Backend/Server-side App

4.5.1 Backend

4.6 Automated Testing

4.6.1 Unit Testing

Unit testing is created using [Pytest](#). Refer documentation closely to [Pytest-Flask](#) for this project.

conftest

`conftest.py` are a special file for pytest that is automatically loaded by pytest and typically contains fixtures and other setup code.

Docker Container Running

Make sure that you are running the docker container before doing any testing.

How to run unit tests?

Use the docker remote code execution

```
1 docker exec -it resq_app pytest
```

or if you want to generate the coverage data

```
1 docker exec -it resq_app coverage run --source="." --rcfile=.coveragerc -m pytest
```

Coverage File

This will produce a file called `.coverage` that contains the records and can be converted to reports.

Allure Results

Whenever you are running this tests, it will produce a folder called `test_results` that will contain results of the test. Refer below for more information about Allure.

HOW TO GET COVERAGE REPORT?

If you've run the tests using the above command and have `.coverage` file, you can generate the reports in multiple ways. More information in [here](#).

```
1 coverage report -m
```

will print the coverage report in the terminal.

```
1 coverage html
```

for the html report.

What is `.coveragerc` file?

This file contains the configurations for the coverage testing.

Unit Testing in Pipelines

This was part of [#12](#), but was cut out of scope. Some artefacts of the code can be seen here.

One particular one is the docker `runtime.sh` that can accomodate a `APP_ENV=UNIT_TESTS` to only run unit tests inside the docker.

4.6.2 Allure Report Generator

Allure Testing report is used as a tool to generate test report. More information here <https://docs.qameta.io/allure/>

This repo has a file called `send_and_generate.py`. It is a simple script that sends a test report to Allure and generates a report. This is currently integrated with the [UWA System Health Lab Allure Setup](#). Documentation can be seen [here](#).

4.6.3 Integration Testing

The integration tests are created with [Cypress](#). This integration testing allows us to create frontend tests and obtain video or screenshots that can improve the quality of the test.

Running Tests Via Cypress IDE

Installment Prerequisite

1. Install [Nodejs](#) and NPM (should be automatically installed with Nodejs).
2. Go to `integration_tests` folder and do `npm install`. That is going to install your `package.json` packages.

1. In one terminal, run `docker-compose up` for running application.
2. Without closing terminal opened in 1), open a new terminal and go to `/integration_tests` and:
 - Run `yarn run cypress:open` or
 - Run `npm run cypress:open`

Note that by using this, the Cypress IDE will be running outside the docker container.

Configuring Cypress

Cypress configuration can be adjusted in the `cypress.json` file. If you want to define global variables, this is the place to do it. Global variables can be used in the code with `cypress.env('VAR')`.

More information can be seen in the official docs <https://docs.cypress.io/guides/references/configuration>

Writing Tests

There are 2 ways to create tests:

1. By writing code tests, see [Writing Test](#)
2. Or by using the [Cypress Studio](#)

Cypress studio makes it easy to create test by recording the user action through the Cypress IDE. Upon action of the user, Cypress studio writes codes in the tests which could be adjusted later for flexibility.

To use Cypress Studio Test Creation

Firstly, you need a test suite ends with `.spec.js` in the `integration_tests/cypress/integration` folder (either newly created from a test template or existing test).

Test Template

```
1 describe('Test Suite', () => {
2   beforeEach(() => {
3     // Setup Scripts Here
4   })
5
6   it('Test Name', () => {
7     // Extend test with Cypress Studio
8   })
9 })
```

1. Select a test suite in the Cypress IDE to extend
2. Hover on the test, and click the "magic wand" icon near the test
3. Interact with the Cypress Web interface as if you are the test runner
4. Save the test when you are done
5. Modify the tests created by Cypress IDE as you need

Magic Wand Icon

Magic Wand Icon

Test files and directory organization

All test specs are located in `integration_tests/cypress/integration`. We recommend follow an structure by feature.

In `integration_tests/cypress/support` you can write reusable pieces of code for execute in all your tests with [commands](#).

Test Results

Results after tests suite finished are stored in the following folders:

- `integration_tests/cypress/screenshots`: Screenshots generated by cypress
- `integration_tests/cypress/videos`: Videos generated by cypress
- `integration_tests/cypress/results`: Allure formatted results

Allure Integration with Cypress

Cypress test runner has installed an allure plugin which is used to generate tests results with allure format.

- [Documentation](#)

4.7 Continuous Integration Pipeline

These are just scripts that run whenever you do pull requests and successful merges. There are a couple of scripts that are currently configured see `.github/workflows`:

4.7.1 Automated Documentation Deployment `docs.yml`

This automatically deploys this documentation whenever `main` is updated with new changes.

4.8 Deployment

The deployment of ReSQ is in the UWA Infrastructure (to be precise in the [UWA System Health Lab](#)). The reason being is that permission is granted to Frinze Erin Lapuz (Software Team Lead of the Redbacks Team at the UWA System Health Lab).

There a couple of steps that were involved in doing this:

4.8.1 DNS Configuration

This is a 1 time configuration

The domain name is set to "resq.systemhealthlab.com" in UWA Cloudflare.

4.8.2 NGINX Configuration

Using [Binchicken](#), I have created the NGINX configuration that will handle all requests going to the application (reverse-proxy).



Nginx Configuration

```

1  server {
2      server_name resq.systemhealthlab.com;
3      location / {
4          proxy_set_header Host $host;
5          proxy_set_header X-Real-IP $remote_addr;
6          proxy_pass http://localhost:10023;
7          proxy_set_header X-Forwarded-Proto $scheme;
8          proxy_http_version 1.1;
9          proxy_set_header Upgrade $http_upgrade;
10         proxy_set_header Connection "upgrade";
11         proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
12         proxy_read_timeout 3m;
13         proxy_send_timeout 3m;
14     }
15
16     listen [::]:443 ssl;
17     listen 443 ssl;
18     ssl_certificate /etc/letsencrypt/live/systemhealthlab.com/fullchain.pem;
19     ssl_certificate_key /etc/letsencrypt/live/systemhealthlab.com/privkey.pem;
20     include /etc/letsencrypt/options-ssl-nginx.conf;
21     ssl_dhparam /etc/letsencrypt/ssl-dhparams.pem;
22 }
23
24 server {
25     listen 80;
26     listen [::]:80;
27
28     server_name
29         resq.systemhealthlab.com
30         www.resq.systemhealthlab.com;
31     return 301 https://resq.systemhealthlab.com$request_uri;
32 }
```

Diagrammatic Explanation

graph TD
 User -->|User goes to resq.systemhealthlab.com| Cloudflare
 Cloudflare -->|Sees that it is under the DNS registered on VPS| VPS
 subgraph VPS
 UWA_Infra[UWA Infrastructure]
 subgraph VPS
 Config[Configuration on Locations]
 NGINX[NGINX]
 end
 NGINX -->|Host Port Location| VPS
 end
 VPS -->|ReSQ subgraph Docker ReSQ Other_UWA_SHL_Services end end

4.8.3 Deployment with Docker Image

This requires access towards the application inside the VPS. The easiest way to do this is to have access with the VPS through SSH (you may need permission for this).

Once you are in there, do

```
1 git pull
```

to pull in the new changes from the `main` branch.

 `git pull`

This assumes that you already have the repository in the VPS. If it does not exist, just do `git clone`.

Then run

```
1 sh deploy.sh
```

This will rebuild all the containers (for production) as well as the new code.

4.8.4 Gunicorn Process in Production

The reason as to why we gunicorn process instead of `flask run` in production is for the main following reason:

- gunicorn allows parallelising of HTTP request
- automatic disconnect towards the database after the short-lived process (of responding to HTTP request)

More information about its setup [here](#).