



# Group Assignment

## Group Number: 2

BCAD3 – WIL – 2021

### Documentation

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# DEV SQUAD



## Software Documentation

*DevSquad Technology*

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**DevSquad™ 2021**

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# Introduction

## System Vision Document

### *Problem Description*

Msunduzi Hospice uses a manual timesheet to record employee's attendance. The manual timesheet can be effective in recording the attendance for each employee. The employee is meant to sign in as present and sign out when leaving the premises or patients residence. The manual attendance records are important for the employer to keep track of all employee attendance for the month. Manual attendance records offered the following:

- Inexpensive to set up
- Correcting attendance entries is easy as opposed to some electronic systems which could require or create complicated processes or audit trails
- Data loss is less of a risk if managed safely
- Problems with duplicate copies of the same records are generally avoided
- The process is simplified as there is no need for specialized computer skills in handling the manual records.

The manual system may have its pros, but it certainly has become an issue as the number of employees has grown and efficiency & streamlining of record taking has become a priority. Msunduzi Hospice started experiencing these and other issues:

- Data recorded in timesheet is not perfectly accurate
- Manual data records become tedious and time consuming
- Manual record maintenance and management is an issue
- There is no backup of manual records
- Handling physical documents, especially during COVID-19, is risky, thus a system independent of physical-document-contact is preferable.
- Manually signing in and out created a concern of signature forgery.
- Compiling stats of the attendance records requires managers to spend company time analysing records which is wasteful
- Keeping historical attendance reports takes up physical space and it requires great organizational skills.
- Querying data of manual attendance reports is limited. Queries such as exact time and date the employee signed in and out, or reason for not attending or signing out early, are some of the information areas required from the manager, however simply implementing manual registers for attendance restricts the ability to query data.

## *System Capabilities*

The new system should have these capabilities:

- Record employee details and attendance reports in a digital form
- Be implemented as a Progressive web app i.e., the web app can be used across different platforms (Desktop, Mobile, Web), and be downloaded.
- Store data (employee details, stats, attendance data, QR barcodes) on Cloud Firestore.
- Collect and store employee authorization data via employee signing in through their existing or newly created Google account.
- Generate a unique employee identifier when employee signs into the system for the first time.
- Assign and manage role(s) for employee's access levels.
- Make use of the available device camera(s) to scan QR codes.
- Allow employee to sign in and sign out through valid QR barcodes.
- Displaying a flag/message on the attendance report if the employee sign-out time surpasses designated time to leave.
- Display records of attendance for employees who sign in and out.
- Filter or query attendance records data to produce desired reports.
- Allow admin to print out attendance reports as CSV or other formats.
- Display records of employee information.
- Edit and delete employee records.
- Handle background-sync when there is stable internet connection.

## *Business Benefits*

It is anticipated that the deployment of this new system will provide the following business benefits to Msunduzi Hospice:

- Streamline records for employees and attendance hence improve efficiency and accuracy of data.
- Removes the need or dependency of employees organizing or managing records thus employees can specialize or put more time into other areas of the hospice.
- Maintenance and management of data can be done more effectively, admin and managers of Msunduzi Hospice can create, view, update, read, manipulate records through the web/mobile app.
- Data backups and security of data and costs are covered by the Firebase storage limits.
- Mitigates COVID-19 risk of transmission via physical contact and manual registers.
- Data analysing of employee attendance and statistics of employees can be implemented easily, thus admin will have clear records of the employees who are conducting poorly compared to those who are working diligently.

- Facilitates better communication between employees and managers in terms of attendance and monitoring.
  - Real time interactive web application provides a way for administrators to receive timely and current information regarding employees and attendance.
-

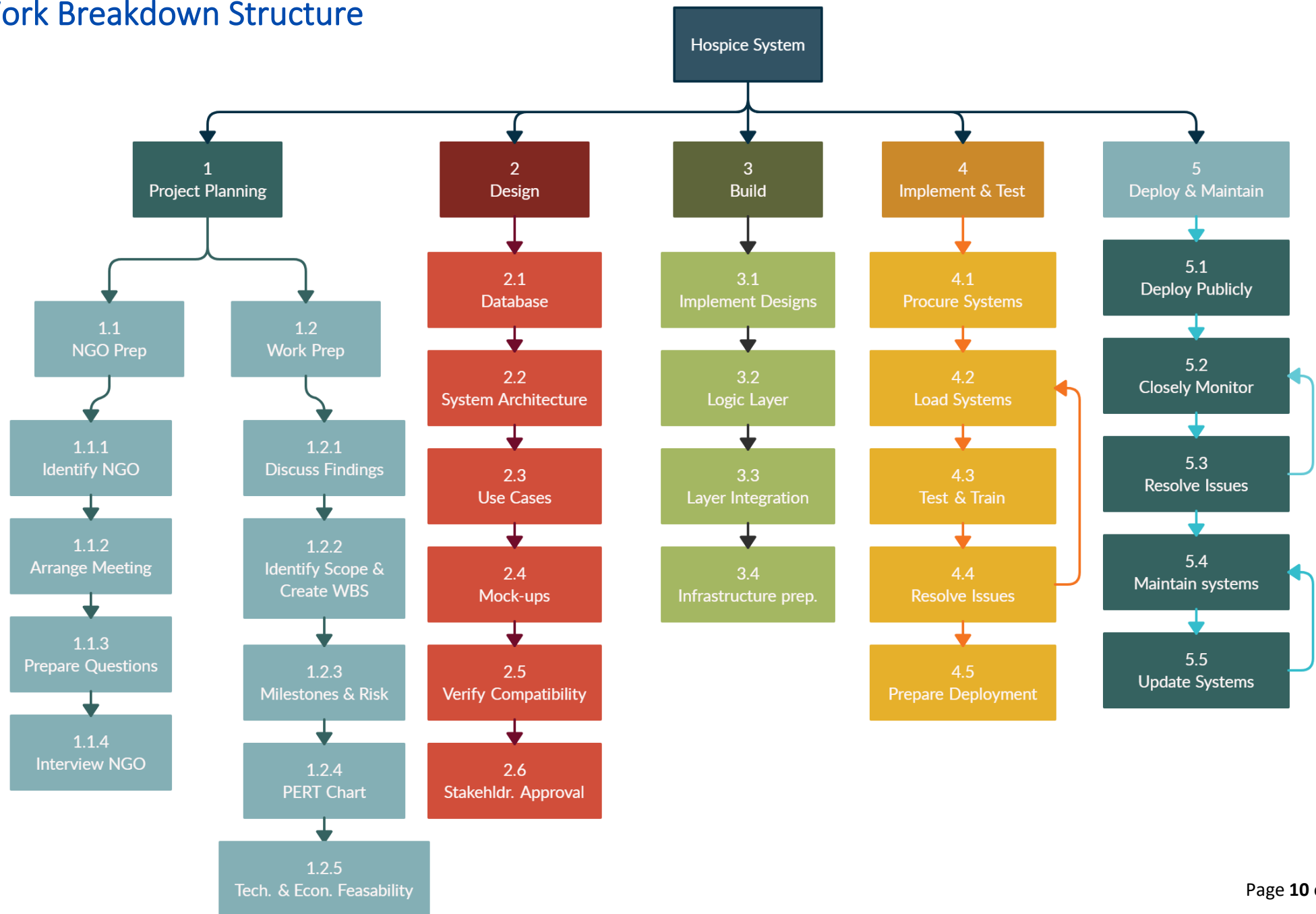
## Milestones and Deliverables

MILESTONES	DELIVERABLES
<b><i>Complete Research and Analysis</i></b>	<ul style="list-style-type: none"> <li>• Conduct onsite and virtual team meetings.</li> <li>• Research potential NGOs with a need for software or improvement to the existing organisation software.</li> <li>• Create a proposal letter to be issued to potential NGOs.</li> <li>• Finalize agreement on NGO selection.</li> <li>• Meet with the stakeholders of selected NGO.</li> <li>• Take note of all software requirements (functional and non-functional requirements) stated by stakeholders.</li> <li>• Analyse all risks imposed on the potential project and list management strategies.</li> <li>• Write feasibility report (Including economic and technical feasibility)</li> <li>• List resources needed to build the desired system, also taking into consideration the restricted budget.</li> <li>• Review findings with team and client to gain project approval.</li> <li>• Document the research and analysis activities.</li> </ul>
<b><i>Completion of prototype development and design (Progressive Web App or PWA)</i></b>	<ul style="list-style-type: none"> <li>• Outline web application main goal/objective in contribution towards the organization.</li> <li>• List on how features/methods will be implemented by team.</li> <li>• Design software architecture for web application.</li> <li>• Database design and authentication implementation.</li> <li>• Web application user interface design.</li> <li>• Plan the navigation/flow of screens for both web app.</li> </ul>
<b><i>Test Plan Review</i></b>	<ul style="list-style-type: none"> <li>• Perform analysis if client's software specification meets with the prototype creation.</li> <li>• Check if database design meets with the clients hosting environment.</li> </ul>
<b><i>Development/building (PWA)</i></b>	<ul style="list-style-type: none"> <li>• Code HTML/CSS pages (front end web application).</li> <li>• Code back-end of web application.</li> </ul>
<b><i>Integration</i></b>	<ul style="list-style-type: none"> <li>• Data Integration of APIs and Database system</li> <li>• Data synchronization- display and update real time data throughout all systems.</li> <li>• Integration of any external libraries.</li> </ul>



<b><i>Evaluate overall project.</i></b>	<ul style="list-style-type: none"> <li>• Analyse software.</li> <li>• Add additional/ new features to improve on project.</li> <li>• Remove obsolete functionalities.</li> <li>• Clean code and structure code so it is easy to read.</li> <li>• Make sure all back-end and front-end code has been commented explaining logic and flow of code.</li> </ul>
<b><i>Finalize documentation for project.</i></b>	<ul style="list-style-type: none"> <li>• Update research and analysis document.</li> <li>• Update design and planning documentation.</li> <li>• Include ReadMe file for web application.</li> <li>• Type out user Manual.</li> </ul>
<b><i>Quality assurance testing</i></b>	<ul style="list-style-type: none"> <li>• Check compliance with the client's standards.</li> <li>• Integration testing.</li> <li>• Unit Testing.</li> <li>• System Testing.</li> <li>• Test security and safety functions of web app</li> <li>• Implement risk-based testing.</li> </ul>
<b><i>User acceptance testing</i></b>	<ul style="list-style-type: none"> <li>• Alpha and beta testing (testing done by internal staff)</li> <li>• Contract Acceptance testing (check if software meets criteria and specifications that were predefined and agreed upon in contract.)</li> <li>• Regulation acceptance testing (examines if software complies with governmental and legal regulations.)</li> <li>• Operational acceptance testing ensures that there are workflows in place such as backup plans, security checks and maintenance processes.</li> </ul>
<b><i>Installation and deployment</i></b>	<ul style="list-style-type: none"> <li>• Release newest version of the software.</li> <li>• Deploy software on a testing server or machine to ensure proper functionality.</li> <li>• Deploy/host software on clients' local server.</li> <li>• Provide various options for configuration to support client's needs.</li> <li>• Monitor performance of software on the new production environment.</li> </ul>

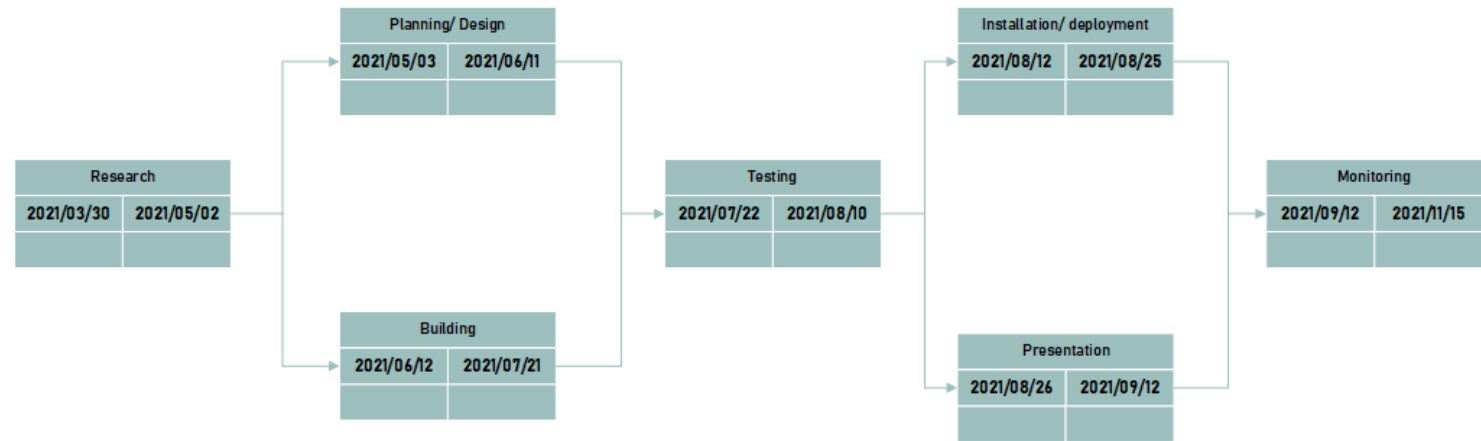
# Work Breakdown Structure



# Project Schedule

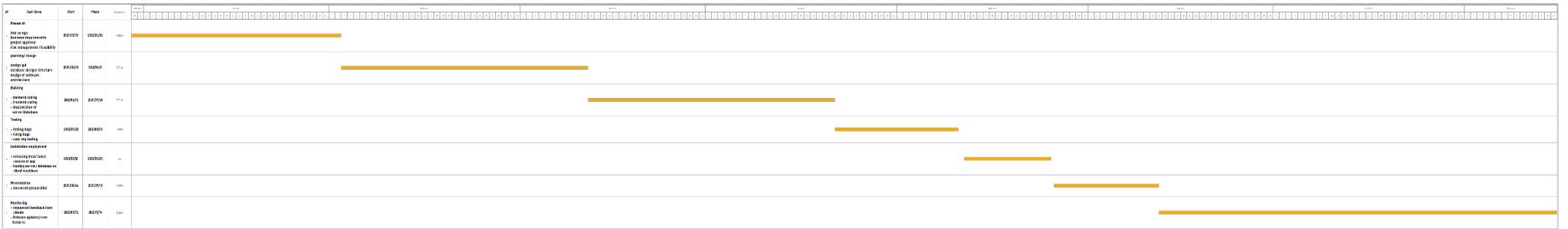
The Gant chart details are expanded below, the visual timeline is displayed at the bottom of this page.

ID	Task Name	Start	Finish	Duration
1	Research find an ngo business requirements project approval risk management / feasibility	2021/03/30	2021/05/02	4,86w
2	planning/ design design gui database design/ structure design of software architecture	2021/05/03	2021/06/11	5,71w
3	Building - backend coding - frontend coding - implantation of server/database	2021/06/12	2021/07/21	5,71w
4	Testing - finding bugs - fixing bugs - user req testing	2021/07/22	2021/08/10	2,86w
5	Installation deployment - releasing beta/ latest version of app - hosting server/ database on client machines	2021/08/12	2021/08/25	2w
6	Presentation - document preparation	2021/08/26	2021/09/12	2,43w
7	Monitoring - Implement feedback from clients - Release updates/ new features	2021/09/12	2021/11/15	9,21w



PERT Chart timeline.

MS Projects 2016.



GANT Chart visual timeline.

## Risk Management

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
Scope risks					
Purpose and scope of the project is not well defined or miscommunicated between parties.	The wrong product is developed and produced.	Medium	Medium	High	Review requirements with all parties and revisit throughout project development.
Technologies and infrastructure not well documented, prepared, or understood.	Team members not able to develop the system or end users not able to use or manage the system.	Low	High	Medium	Avoid by preparing team members and training end users where necessary.
Project deadlines not well drafted or understood.	Deadlines and delivery promise not met.	Low	High	High	Review initial drafts and communicate changes or delays.
Priorities of all parties not shared; individual priorities affecting group priorities.	Differing levels of completion, delays due to dependency status, incompleteness.	Medium	High	Medium	Adequate planning, communicate issues and delays, mixed responsibilities.
Unplanned requirements not considered or prepared for.	Extended time delays, possible team inability or low experience, poor delivery.	Low	Medium	Low	Accept or mitigate shortfalls by reviewing changes and attempting to complete in time remaining.

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>Deliverability risks</b>					
Team member leaves or cannot complete their contributions due to any number of reasons.	Additional workload on remaining members. High possibility of delays to project completion.	Low	High	Low	Review member responsibility. Re-assign tasks. Communicate delays to stakeholders.
Communication issues with project sponsor (manager in our case) with the project client with regards to expectations and deliverables.	Incorrect requirement focus. Low quality products and deliverables. Client possibly pulling out.	Low	High	Medium	Ensure open and detailed communications are maintained. Weekly deliverable check-ups.
Technical expertise issues with regards to project requirements per client needs.	Inability to produce end-goal of client. Client dissatisfaction or pulling out.	Medium	High	Medium	Communicate capabilities and limit/avoid false pretences.
Time constraints, backlogs or generally behind schedule during the project.	Poor deliverability, low quality products, client disappointment or backlash from client stakeholders.	Medium	High	High	Avoid by revisiting deadlines, communicating delays, avoiding unnecessary backlogging.
Unforeseen events like COVID putting strain on delivery or productive communication and deployment.	Potential for client or team members to be affected putting strain on deliverables and feedback chains.	Low	High	Medium	Prepare team members to attend all aspects of project. Communicate and stay up to date on current events.

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>System, infrastructure, dependency, and client risks</b>					
Client no longer wants the services or products.	Project collapse. Development wasted. Team dissatisfaction.	Low	High	Medium	Maintain good team-client relationship. Communicate project development status. Find new client in similar need.
Software costs, monthly costs, changing costs and unexpected costs causing project delays or further issues.	Inability to host, provide, or develop the project. Failure to deliver promises.	Low	Medium	Low	Overcome by finding appropriate alternatives. Discuss with client.
Infrastructure requirements may change during development or at production stages.	Additional costs or preparations to produce deliverables and end products.	Low	Medium	Medium	Mitigate by appropriately scoping the needs and dependencies of the project. Find alternative infrastructure.
Certain services become unavailable or require costs or cost increases that are unexpected or unaffordable.	Inability to maintain service delivery. Client dissatisfaction.	Medium	High	High	Select services in good standing with well-maintained delivery terms and if necessary, pricing.
System assurance and insurance for the client and the infrastructure as well as their data may require costs by law or policy company.	Client requirements may change as laws and policies are enforced. Costs for client to insure.	High	Medium	Medium	Design the system with methods to manage and control data and infrastructure. Avoid on-site insurance needs.
Equipment failure/theft/downtime of client, developers, service providers may put strain on system development or availability to end users.	Poor availability of end products to end users. Poor service delivery from team to client.	Low	High	Medium	Mitigate likelihood for client by using cloud services and having backups and repositories for code created by team members.

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>Team member procedures and client/end-user risks</b>					
Estimated task times are overshoot or not monitored and updated.	Backlogs and unexpected delays will crop up as the project develops.	Medium	Medium	Medium	Frequent reviews and continued monitoring of time spent on tasks.
Client makes request during development which changes deliverables, requirements, dependencies, and other resources.	Requires restructuring time estimations and task assignments which contributes to further delays.	Medium	Medium	Low	Unpredictability poses a challenge which will require appropriate time management.
Software issues arise such as dependency updates or deprecations which require time to overcome or wait for.	General time delays or concerns about acquiring or learning alternative skills or tool sets.	Low	Medium	Low	Communicate delays, overcome using alternative dependencies.
Client feedback requires adjustments to suit their goals and understanding as well as their user's needs.	Time must be spent attending to adjustments and refining usability.	Medium	Low	Medium	Assuming this is post primary delivery, time spent should benefit the client.
End user feedback, bug reports, etc. require time to understand, solve, produce.	Communication issues understanding the user reports. Time and effort to solve issues.	High	Medium	High	Open communication with users and client. Possible implementation of in-app reporting.
Code reviews during development take time and refactoring if needed.	Unnecessary delays for testing and production.	Medium	Low	Medium	Improve repository workflows and review process with tools available in GitHub.
Project and priority conflicts requiring time to overcome or work around.	Time delays and potential for negative impact on team emotional state.	Low	Medium	Low	Mitigate conflict by reviewing docs and requirements and having regular meetings.

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>Human resource and ability risks</b>					
Poor quality, unmaintainable code submissions from any team members	Requires refactoring or simply wasted time figuring out the code.	Low	Medium	Low	Git commit standards enforced. Expectations of team members laid out in advance.
Rushed code to meet deadlines may be bug-ridden and not production safe if it creates security risks.	Bugs and security risks leaking into production. Painful future development experience.	Medium	High	Medium	Frequent deadline reviews. Backlog assistance. Not pushing to live if not reviewed.
Client time & communication ability may affect the developed code and feedback chain.	Time delays and feedback chain backlogs. Continuation prevention due to feedback dependency.	High	Low	Medium	Effective meeting planning and open communication channels with client.
Human resource availability will vary among project members throughout development.	Impacts delivery and production rate. Affects perception of client based on deadline promises.	Medium	Low	Low	Maintain schedules and deadline documents for all team members to achieve and review.
Responsibility and accountability issues regarding explicit, implicit, and unforeseen requirements not being attended to.	Client expectations of 'obvious' features may be overlooked and require time to communicate, understand and attend to.	Low	Medium	Low	Effective communication and scope definitions with client should mitigate.
Idea or understanding clashes; among team members, between members and stakeholders, between members and client etc.	Developing and producing the wrong tools and products for the client. Conflict and issues among team.	Low	High	Medium	Frequent, effective team meetings and effective client meetings should assist in mitigating this.



RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>Risk management and analysis risks</b>					
The inability to predict the unpredictable or unforeseen effects and risks on the project.	These risks pose unpredictable impact but can be detrimental.	Medium	Unknown	High	Stay up to date with current events to better predict or react to potential risks and threats to the project.
Underestimating the impact or value of certain risks.	Time delays and possible project incompleteness.	Medium	High	High	Review risk management sheets with team members and stakeholders to improve or identify estimates.
Neglecting to mention certain risks believing they are not worth mentioning.	Possibility for exactly these risks causing great impacts. <i>Murphy's Law.</i>	Medium	Likely High	High	Mentioning as many potential risks as necessary regardless of expected unlikelihood.
Failure to identify obvious risks.	Serious implications that cause delays or impact deliverability entirely.	Medium	High	High	Review and discuss all possible risks with all stakeholders some end users.

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>Pre-production risks</b>					
Insufficient quality control and testing of produced software across devices and systems which may cause onboarding friction.	Inadequate usability for some or many end-users without notice.	Low	High	Medium	Avoid by designing and developing responsive designs for a wide range of device types and sizes and test.
Inadequate preparation for monitoring, production error catching and reporting, system restorations etc.	Unnoticed system downtime. Critical errors not being reported or attended.	Low	Medium	High	Preparations to monitor and view critical system logs and webhook alerts for downtime with Azure tooling.
Unexpected system or infrastructure bottlenecks or weak points during stress testing or rollout.	Slowness or complete unavailability of system to end users without effective error messages.	Low	Medium	Medium	Adequate preparations using Azure tooling to allow for automatic scaling. Monitoring tools to address issues.
General performance expectations not met or unrealistic.	System failure, downtime, slowness, poor usability, instability. End user dissatisfaction.	Low	High	Medium	Find alternative, temporary, hosting infrastructure whilst issues are addressed with primary host.
Communication issues with regards to deployment status and readiness vs. actual deployments.	Team members deploying incorrectly to production or preview branches, possibly causing database issues, bugs, security flaws.	Low	High	High	Use deployment history tool to seamlessly revert pushes. Restore backups to undo unintended changes.

RISK	CONSEQUENCES	PROBABILITY	IMPACT	PRIORITY	RESPONSE/MITIGATION
<b>Production and post-production risks</b>					
Service providers shutting down services, experiencing major outages or downtime, requiring service fees, or adjusting SLAs.	Extended system downtime if not migrated in time. Financial effects if having to pay for services or change fees.	Medium	High	Medium	Monitor SLA changes, service announcements, etc from providers. Have up-to-date backup plan review frequently.
On-site/client provided infrastructure failure, becoming outdated, theft, data protection, security.	System downtime, data loss, security flaws, external threats. Effort spent resolving. Client dissatisfaction.	Medium	High	Low	Use cloud infrastructure. Have and setup cloud backups, use source control for version history, discuss security with client.
Time spent provisioning, maintaining, and updating the infrastructure may damper service availability.	System downtime when restarting, provisioning, etc. Annual effort and time to resolve SLL and other related client infrastructure setup.	High	Medium	Medium	Use cloud provisioned hosting and SSL. Use managed services and automation scripts if client infrastructure unavoidable.
End user feedback not being received, processed, handled, or resolved.	Wasted time developing unwanted features. Focusing efforts in the wrong areas. Client dissatisfaction.	Medium	High	High	Maintain constant communication check-ups with client and developers. Discuss timings and resolve confusion.
System downtime due to load shedding, natural disaster, flooding, fire, local or widespread internet network downtime.	Complete system downtime. Destroyed equipment, lost data, no explanation to remote end users.	Medium	High	High	Use cloud provisioned infrastructure tiers to host the database and web app service to avoid downtime.

Actual system bottlenecks causing service availability issues without appropriate information provided to client, developers, or end users.	System unavailability. Slow response times. Increased bounce rate. Client dissatisfaction.	Low	Medium	Low	Use error reporting and monitoring tools from cloud service provider. Use analytics reporting and alerts.
Long-term maintainability becoming tedious for client or group members after completion of the project.	System shutdown, security risks, incompatibility, deprecation. Client disappointment and bad reputation.	High	High	High	Future proof, use free cloud tier services to avoid on-site requirements and call outs, consider SLA agreements.

## Technical Feasibility Factors

The Msunduzi Attendance System is a complete Progressive Web App. The main technologies associated with this system are:

- HTML
- CSS & Bootstrap 5.1
- JavaScript
- Typescript
- Angular 12
- Firebase JS SDK Modular V9 (Tree-shakable)
- Collaboration Tools:
  - GitHub
- Diagram drawing tools:
  - Microsoft Visio
  - Draw.IO

Each of these technologies are freely available on the internet or provided by IIE Varsity College. The technical skills required are manageable. Time limitations of the product development and the ease of implementing using these technologies are synchronised.

The Progressive Web App will be hosted for free (within projected usage) with Google's Firebase Hosting. Bandwidth required in this application is very low since it doesn't incorporate any multimedia aspects at present and if required will be implemented to fit within the free usage limits of the Firebase suite. Additional usage limit provision can be made for any Firebase project used for a registered non-profit organisation via a simple online application form.

From these, the Msunduzi Attendance System is technically feasible.

# Economic Feasibility Report

## Introduction

This economic feasibility report demonstrates the net benefit of the proposed project for accepting or distributing funds and assets. When budgets are at play, it is important to determine whether the investment will be worth what is produced. Simply put, in a real-world scenario will this project be feasible for the business to undertake.

## Project or Product Life

The life cycle of this project consists of several stages, namely:

1. Planning and design
2. Execution and Implementation
3. Operation and Maintenance

## Value of product and services

The human needs that the project or product solves can only be met in the final stage of the product or project life cycle, that is, the operation and maintenance phase. Services that meet specific human needs are evaluated by allocating market prices and accounting for them. In this way, the utility value of the product or service is determined.

## Cost of Product and Services

The various stages in the life cycle of this project are also associated with costs, or value sacrificed to create utility value. These costs are incurred during all the stages, namely:

- a) Planning and design costs.
- b) Manufacture or construction costs.
- c) Operation and maintenance costs.

## Cost Analysis – Hourly & Specific

Activity name	Resource(s)	Rate p/h (R)	No. Hours	Act. Cost (R)
NGO identification and project analysis. (Meetings, questions, interviews).	Zander (ex-Member)	75	15	1125
Identify scope. (WBS)	Chris	50	5	250
Milestones and Risks	Ellavarsi	50	4	200
Pert Chart	Kaiish	60	10	600
Technical feasibility report	Yusuf	50	5	250
Economic feasibility report	Yusuf and Ella	50	5	250
Database	Chris & Ella	70	10	700
System Architecture	Yusuf	70	10	700
Use Cases	Ella	50	6	300
Mock-ups	Chris	80	12	960
Verify Compatibility	Chris	70	10	700
Implements Designs	Yusuf and Kaiish	150	40	6000
Logic Integration	Yusuf, Chris, Kaiish, and Ella	180	60	10 800
Infrastructure prep	Chris	90	20	1800
Procure systems	Ella	70	20	1400
Load systems	Chris	80	20	1600
Test and Train	Yusuf & Ella	80	20	1600
Debug resolve issues	Kaiish & Chris	50	20	1000
Prepare deployment	Ella	60	15	900
Deploy Publicly	Kaiish & Yusuf	70	15	1050

Closely Monitor	Yusuf	60	15	1050
Resolve issues	Ella	50	5	250
Maintain systems	Chris & Ella	90	30	2700
Update systems	Ella	100	30	3000
			<b>Total</b>	<b>39 185</b>

### Cost Analysis – Broader software project analysis

		Monthly	Time	Total Cost
<b>Employment</b>	5 Junior Developers	R15 000	6 Months	R450 000
<b>Hardware Equipment</b>	Use of personal staff equipment	R0	Entire life of Software	R0
<b>Software Equipment</b>	Cloud Database and Hosting	R0	Entire life of Software	R0
				<b>R450 000</b>

Activity	Time	Cost
<b>Planning and design costs</b>	1 Month	R75 000
<b>Manufacture or construction costs</b>	5 Months	R375 000
<b>Operation and maintenance costs</b>	Entire life of Software	R150 per month for first 6 months
		<b>R450 900</b>

### Conclusion

In conclusion we determine that in a real-world environment this project will **not be feasible** to create without some initialization and development sponsorship.

However, this project **is feasible** post-deployment as Google's Firebase suite has highly lenient free-use and fair-use tiers with additional provisions available for NGOs and NPOs.



## Team Members - CV



### Ellavarsi Pillay

#### Database Manager

Professional experience in the information technology industry. Proficient with SQL, T-SQL, stored procedures, views, triggers, macros, functions, charts, reports, and spreadsheets. Able to navigate and query a relational database.



bella.ella0425@gmail.com

+27605727689

Durban Chatsworth, South Africa

#### WORK EXPERIENCE:



##### IMMEDIA

Attended Dec 2020 - 1 week training

Promotion glow-tv

- Designed and created tic tac toe app.
- Performed a virtual demonstration and presentation of app
- Improved communication and team skills

##### TUTOR

Student: Yusuf Goga (05/2020-03/2021)

- Tutored Java and C# languages
- Guided through student manual and student guide
- Student achieved distinctions

#### SKILLS:



##### Coding Languages

C#, ASP NET, HTML/CSS, JAVA

##### Frameworks/Systems

MVC, Angular JS bootstrap, Visual Studio, GitHub and Android Studio.

##### Local Database

SSMS, Oracle

##### Cloud Database

Azure, Mongo DB

#### PROJECTS



##### Point Locate Android (2021)

- Mapping app, Navigate between current and destined location via MAPBOX (API)
- Link <https://play.google.com/store/apps/details?id=com.pointlocate>

#### EDUCATION:



##### Varsity College: Westville, Durban South Africa

Degree: Bachelor of computer application development

- Enrolled since Jan. 2019 to present
- 3<sup>rd</sup> year, awaiting

##### Crossmoor Secondary school

NSC- 2 distinctions IT and L/O

- Attended from Jan 2014 to Dec 2018
- Senior Prefect
- Rotary club member



# Christopher Boik

Project Manager and Lead Programmer

Manager plans, directs, and coordinates all activities related to writing software programs. Familiar with all the policies, procedures and technical issues related to software programming. In charge of managing the activities of the software developing team of a company of DevSquad company. Lead programmer.



christopherboik@gmail.com

081 405 7317

Durban, South Africa

## WORK EXPERIENCE:



### **Yard<sup>8</sup>, Kindo Covers, JM & more- Kloof KZN and Remote**

August 2021-Dec 2021 (9 months)

**Position:** Freelance web development contractor

#### **Duties:**

- Design and implement full-stack web apps (PWAs) Flutter web-app, and serverless integrations for multiple clients.
- Migrating existing networking and camera equipment to new warehouses.
- Designing and facilitating wireless networking and IP-camera system for a complex

#### **Reference:**

Stewart Boik- Kindo Covers, Finance- 082 901 0715  
Joshua Munstermann- Web & mobile developer- 061 459 9698

### **Yard<sup>8</sup> software Development- Kloof, KZN**

Feb 2020-August 2021 (1 year, 6 months)

**Position:** Intern Junior Developer

#### **Duties:**

- Maintaining, updating, and implementing client websites
- Developing custom front-end themes, custom plugins, integrations with third-party APIs such as : PayFast, PayGate, SMS

#### **Reference:**

Matthew Baker- Managing Director- Hello@yard8.co.za

## SKILLS:



- **C# Web -2019 present**  
MS ASP.NET, NET Framework, Net Core MVC
- **VueJS and Angular**  
JavaScript, TypeScript, NodeJS, JS Doc
- **WordPress, PHP, Linux**  
WordPress, PHP, Ubuntu, APIs, PayFast
- **HTML5, CSS, JS, BOOTSTRAP, FRAMEWOR**  
Web applications, varsity projects
- **Microsoft Azure**  
MS ASP.NET, NET Framework, Net Core MVC
- **Laravel (2020)**  
PHP, Ubuntu, SQL, Basic NativeScript
- **Java and Android**  
Maven, Gradle, Bukkit API
- **Delphi**  
Jason, Pastebin API, Google Analytics API
- **Amazon Web Services**  
Lamba, ASK, Alexa Skills Kit
- **Flutter**  
Flutter, Dart, APIs, Firebase, Google APIs
- **Google cloud platform**  
Google Firebase suite
- **Discord Integrations and Heroku**  
JavaScript, TypeScript, Google Firebase, Heroku



## EDUCATION:

### GB Bearings PTY LTD -Pinetown, KZN

Jul 2017

#### Duties:

- Organizing server room equipment.
- Filing, general IT enquiries onsite and remote.

#### Reference:

Juliet Rogan- Finance Director – 083 477 9266

### CROW Organizing community service.

Sept 2016

#### Duties:

- Group effort preparing a several enclosures.

### Computer Application Development (TBC 2021)

- Second Year 2020
- 7 Distinctions.
- First Year 2021
- 7 Distinctions

### Matric NSC Bachelor Pass

- 2018: Westville Boys' High School
- Information Technology: 89 percent

## ACHIEVEMENTS



### IT Achievements

2018-2021

- Academic achievement bursaries in 2019 and 2020.
- Top IT subject performer WBHS in 2018
- 2021 IIE Hackathon winner

### First Aid Level-3 Qualification and task team

2014-2018

- Level three qualifications
- Duties
  - Attend to injuries during weekday and weekend sporting events at Westville Boys' High school

# Yusuf Goga

## Graphic Designer

Primarily using design software, they create compelling visuals that inspire and captivate audiences. Graphic Designers strategically combine design elements to develop aesthetically appealing layouts, advertisements, reports, logos, packaging, and more.



yusufgoga@gmail.com

082 816 4761

Durban, South Africa

### WORK EXPERIENCE:



#### Website Developer/ Social Media Manager

Arctic Breeze | 08/2021 to CURRENT

- Built and Maintained Website for company
- Synced website with social media pages
- Established clear brand voice on social media
- Managed Takealot and Facebook marketplace.

#### Computer hardware maintenance/Stock Manager

Alpha Pharm Randerees Pharmacy | 01/2021 - 07/2021

- Provided successful working within tight deadlines and a fast-paced atmosphere
- Hardware and Equipment testing
- Hardware Equipment Maintenance
- Stock Analyst & Stock taking

#### Tutor

Bryan Nelson | 06/2020 -05/2021

- Tutored student in 2 programming languages ( C# and C++)
- Guided student through module handout and student guide
- Distinction gained at end of module.

### SKILLS:



#### Programming Languages:

- C#
- Java
- JavaScript
- SQL
- PL./SQL
- XML/Html
- CSS/Bootstrap

#### Project coordination

#### Time Management

#### Graphic Design

#### Communication Skills

#### Teamwork

### EDUCATION:



#### Bachelor of Application Development in Computer Science

- Varsity College, Durban, South Africa | EXPECTED 11/2021
- Honours: Cum Laude (Avg.Mark :76%)
- Academic Awards (2019 & 2020)

#### National Senior Certificate

- Al-Falaah College, Durban, South Africa | 12/2017
- Given Head Boy position due to trustworthiness and leadership skills.

### PROJECTS



#### Jamiat KZN Salaah Times | 2021

- Muslim prayer times application

#### Waypoint | 2021

- Mapping application that navigates you to your destination, choose your preferred landmark, and start your journey

#### CPF Nav (Central Policing Forum Navigation)

# Kaiish Nameekumar

Software Tester

Designing test scenarios for software usability, running these tests, and preparing reports on the effectiveness and defects to the production team



kaiish3nameekumar@gmail.com

068 590 6419

Durban, South Africa

## EDUCATION:



### High school: Umkomaas Secondary school

- Enrolled since Jan. 2013
- Graduated 2017

### Varsity College: Westville, Durban South Africa

Degree: Bachelor of computer application development

- Enrolled since Jan. 2019 to present
- 3<sup>rd</sup> year, awaiting

## SKILLS:



- Problem solving
- Creativity
- Critical thinking
- Attention to detail
- Adaptability
- Communication
- 3D design Autodesk
- Computer programming
- Java C#
- Web development.

## ACHIEVEMENTS



- Bachelor's degree
- IIE Bachelor of computer and Information sciences in application
- National Senior certificate



### Problem Domain

This Pietermaritzburg-based Hospice aims to ensure a peaceful, quality, and caring environment for patients with life limiting or life-threatening illnesses.

The hospice would like to reduce the effort and flaws of manually recording and reconciling staff attendance timesheets for on-site and remote workers.

At present every staff member is required to complete the attendance register on arrival to and departure from the workplace.

Some of the concerns of this manual time-keeping process are:

- Inaccurate entries
- Forgetting entries throughout a month
- Entering falsified entries
- Clocking in and out on behalf of other staff members
- Manual reconciliation at month-end
- Difficulties associated with remote workers
- Lunch breaks, early departures, etc resulting in incomplete entries



This proposed technical and digital solution will aim to reduce these burdens by streamlining some of the processes and automating processes where best applicable such as automatic clock-out and alerting management to atypical behaviour by means of flagging or notifications.

---

**Inaccurate entries** will be mitigated by using a server-side timestamp when staff members clock-in. Manual entries *will be allowed* but will be flagged in the administrative back end.

A **role-based permission** system will be used to control access to certain activities and control the background service checks for administrative flagging criteria.

To address instances where employees **forget to clock-in**, the installed progressive web app will, by means of the notification API or emails, alert them after the usual-

*Problem domain continued...*

timeframe that they have not yet clocked in.

Additionally, the **location API** background-service could be used to determine whether alerting the employee is required such as in the case where they are not on the premises yet or do not need to be at work on a particular day.

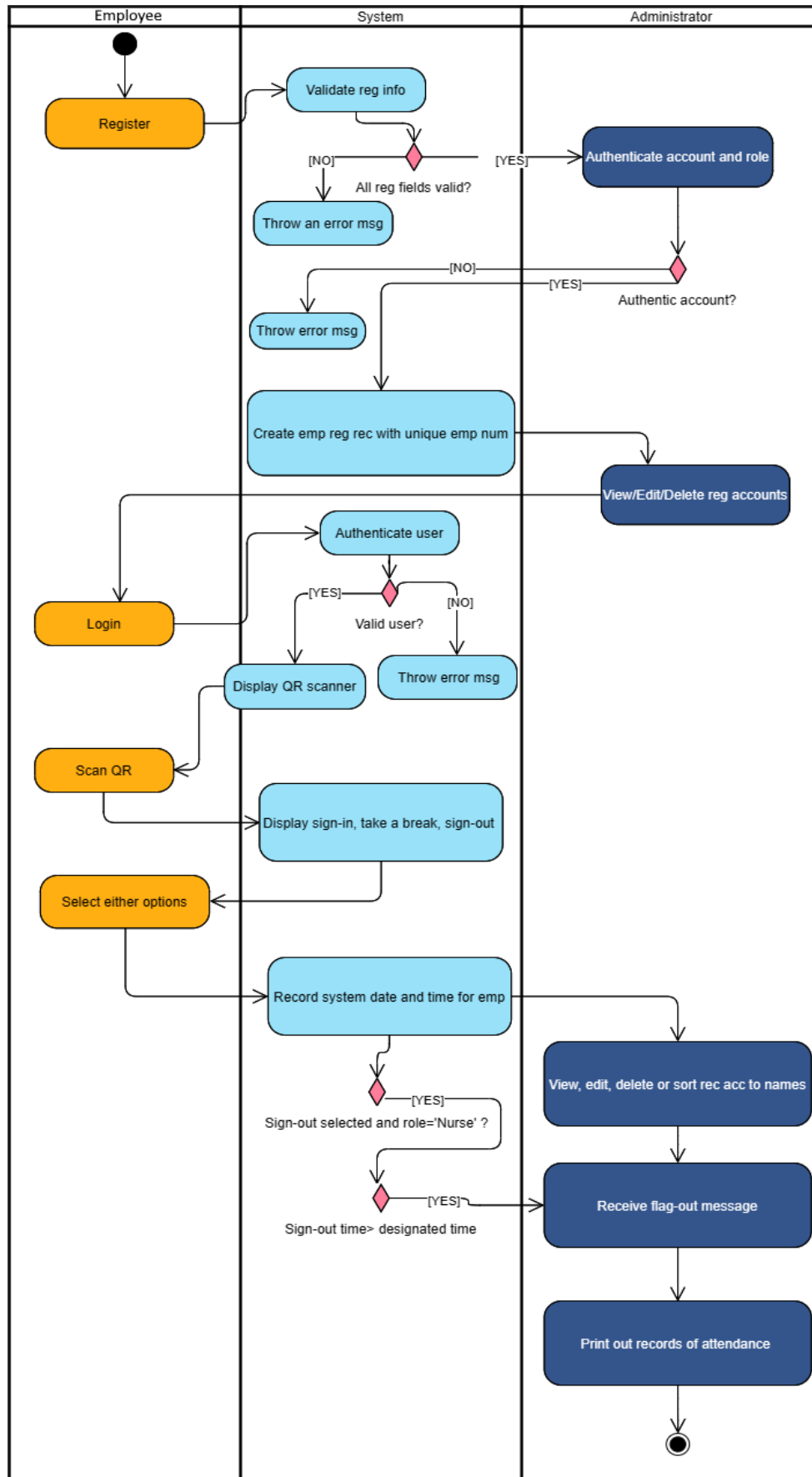
The location API service implementation will also be used to prevent or flag any role-restricted staff members from clocking in or out from outside the physical workplace boundaries as necessary per the Hospice administrators.

An easy-to-use **administrative interface** will be created to provide managerial control over staff-member users, roles and role assignments, and an intuitive dashboard and report page to view real-time and historical data collected across the system.

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# Solution Domain

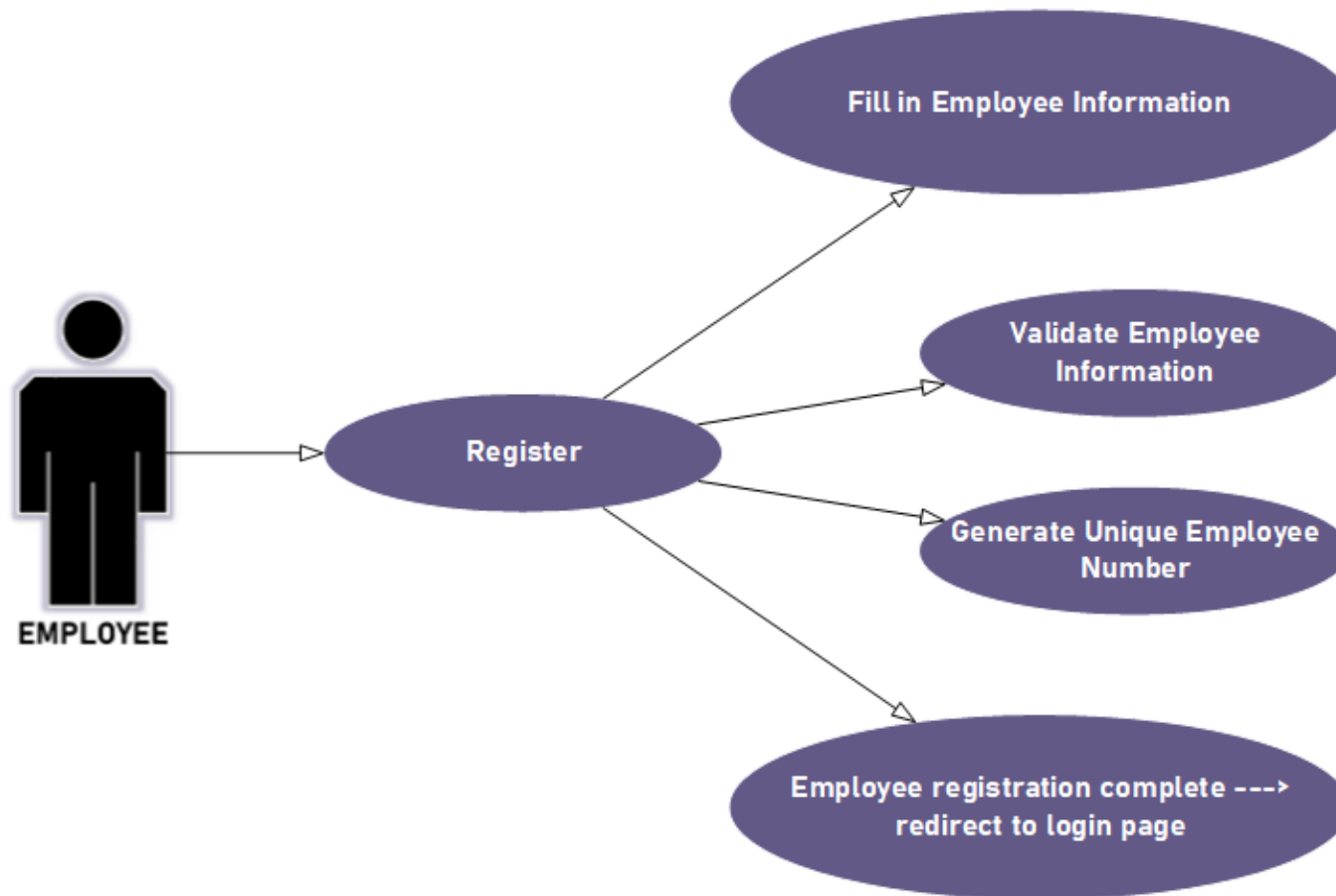
## Activity Diagram



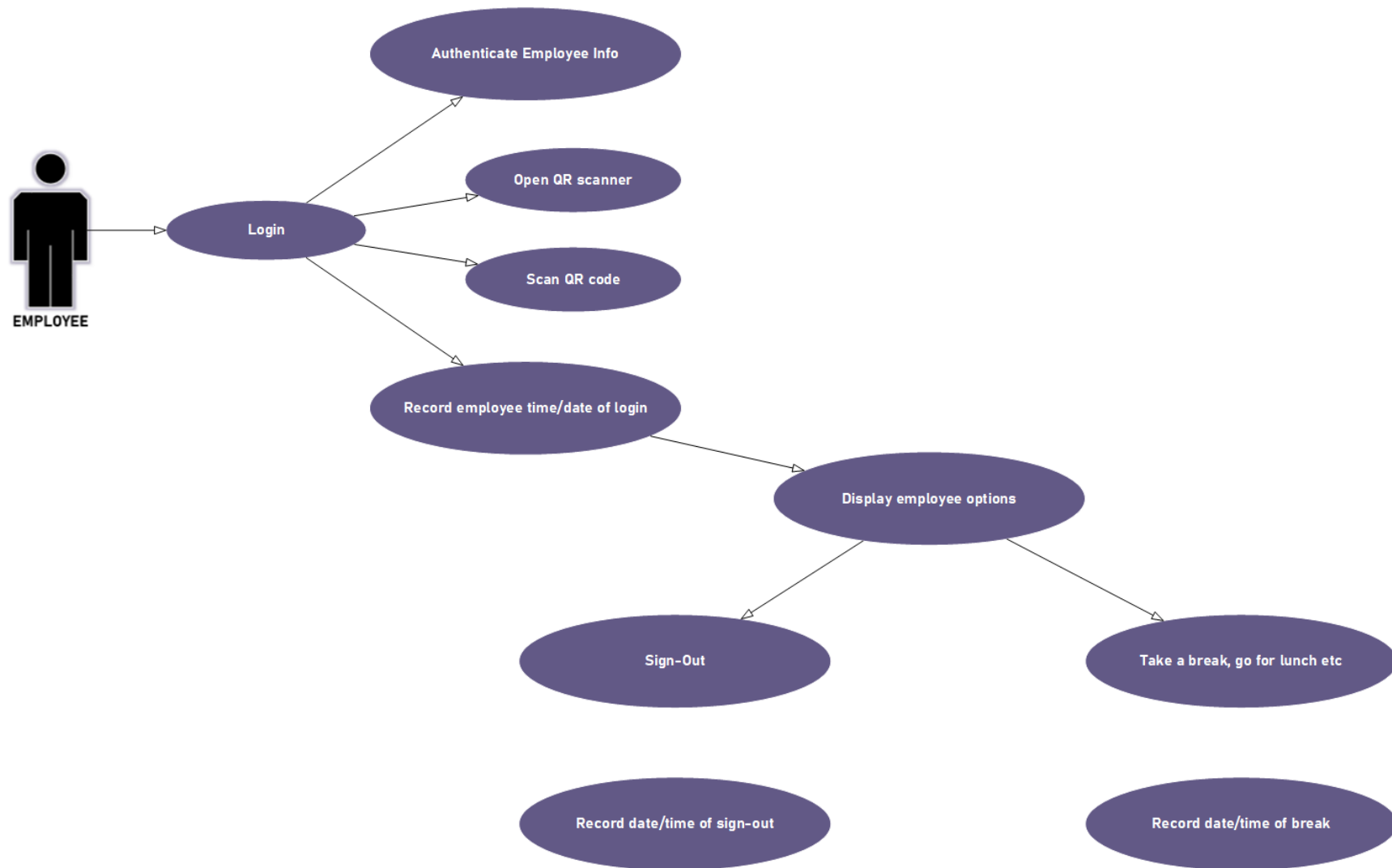


## Use Cases

### Employee Registration Process



## Employee sign-in & processes



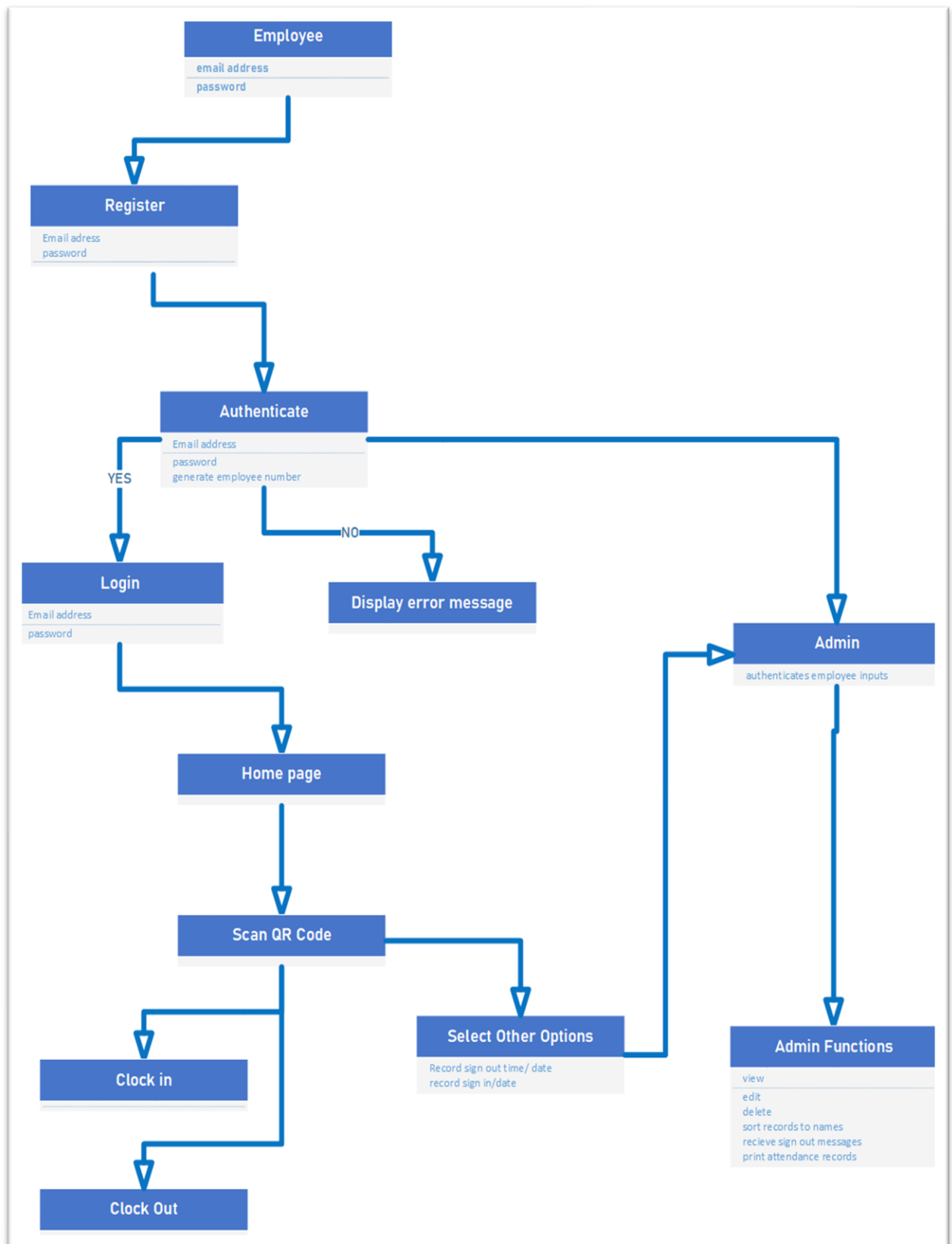
## C.R.U.D Operations Table

Data Entity	CRUD	RESULTING USE CASE
Register User [emp name, unique emp num]	Create, Read	Validates user information Registers a new user
Login user	Read	Authenticates user credentials, logs user in.
Employee Options [Sign-in, Sign-out, break] Record date/time	Create Read Update	Keeps track of employee activity, records sign in and sign out date/time

## Input & Output Operations in GUI

GUI INPUT/OUTPUT	USE CASE	DATA ENTITY AFFECTED
Email and password	Employee login	Employee Registration Accounts
Email and password	Admin login	Admin account
Email, name, surname, role, password and confirm password	Employee registration	Employee registration accounts
QR code	Employee scan QR	Employee attendance data
Sign-in, take a break, sign-out options	Employee can select any options.	Employee attendance data
View, Edit, Delete reg accounts	Admin performs CRUD for registration records.	Employee Registration accounts
View, Edit, Delete attendance records	Admin performs CRUD for attendance records.	Employee attendance data
Flag notification	Admin receives flag notification.	Employee attendance data
Print attendance records	Admin can print attendance records on a weekly/monthly basis.	Employee attendance data

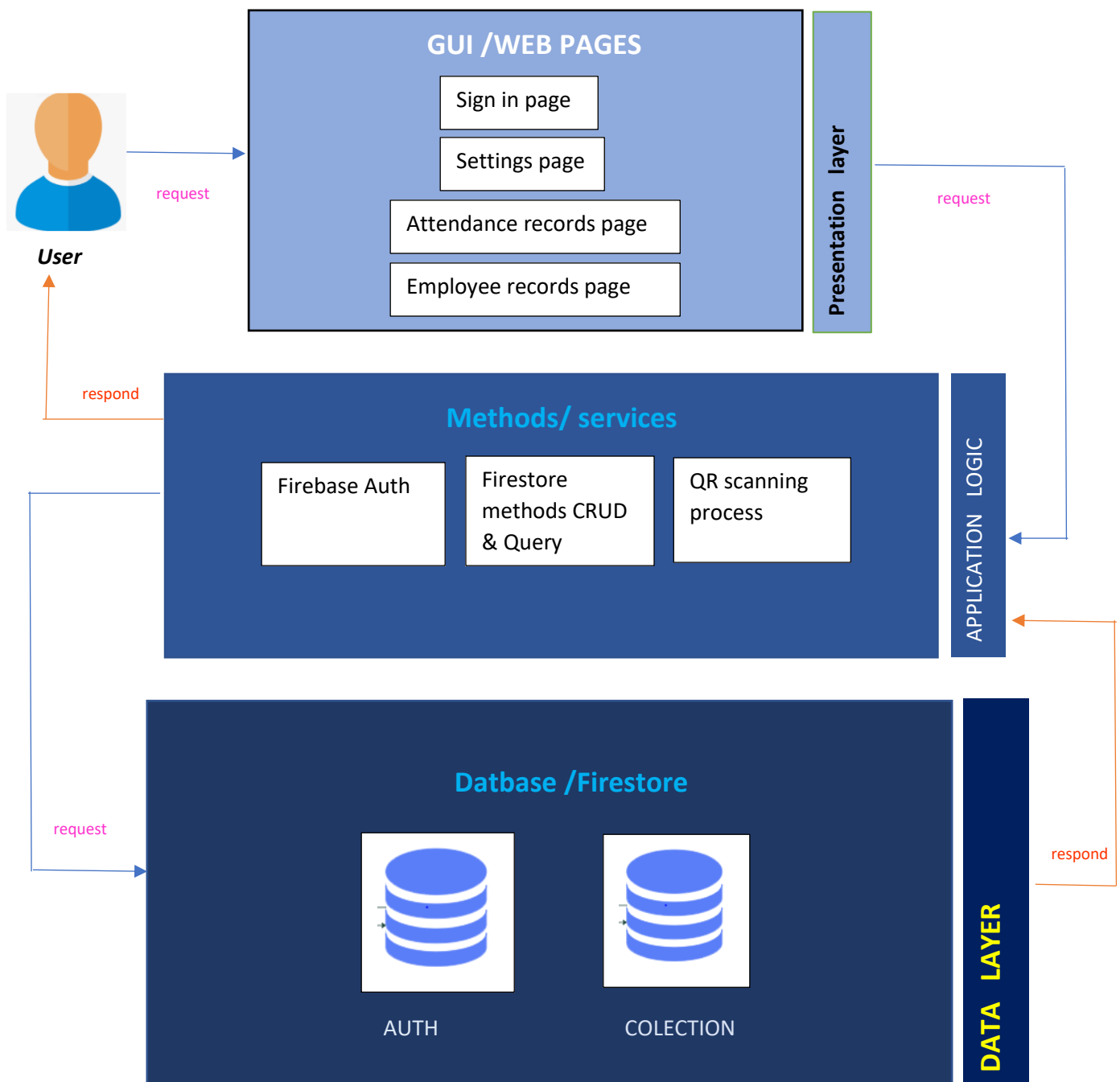
# Class Diagram



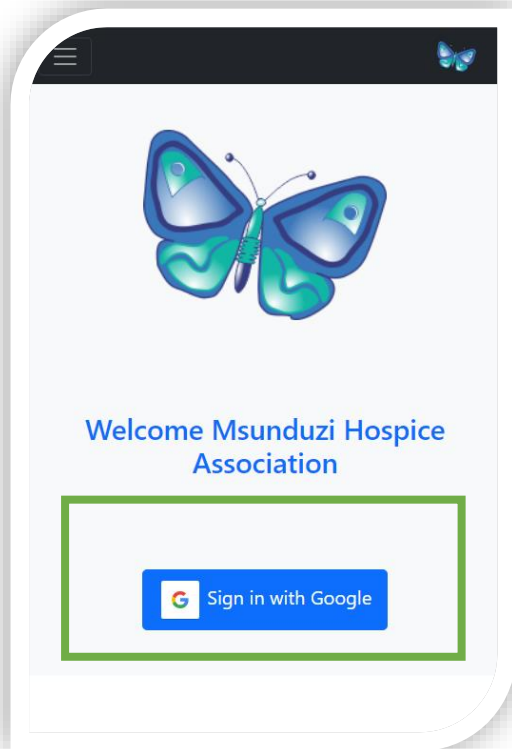


# Design Document

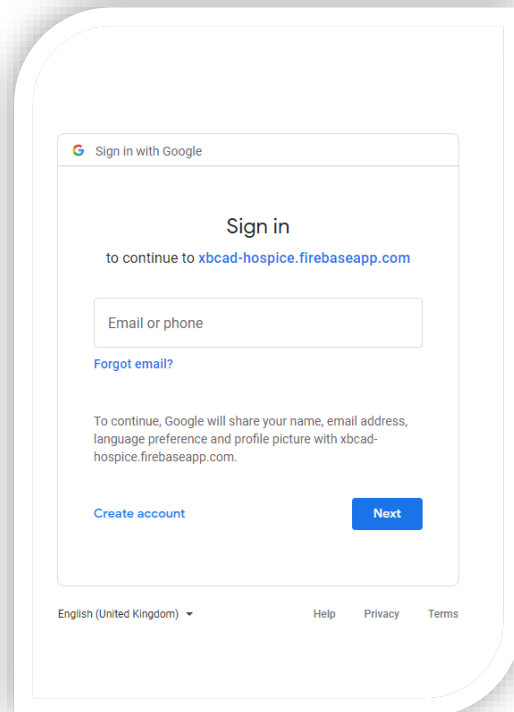
## High Level Logical Architectural Design



## Interactions with the user- (Input)

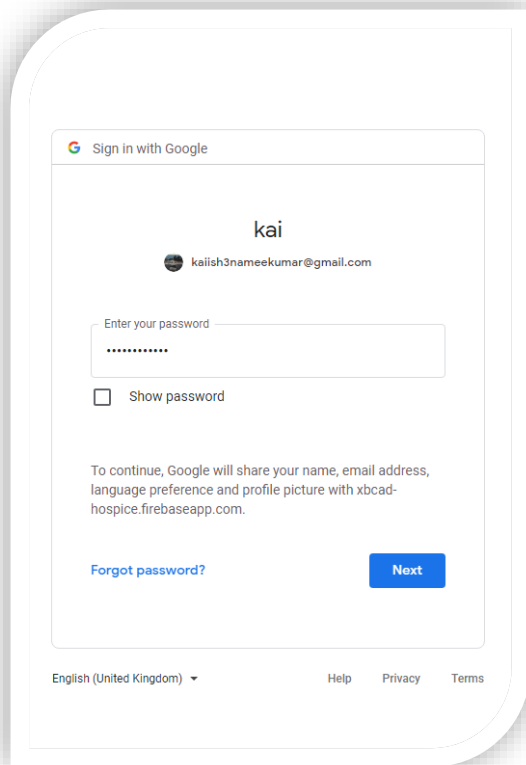


Users must sign in with their google accounts, clicking the following link will redirect the user to the google login page.

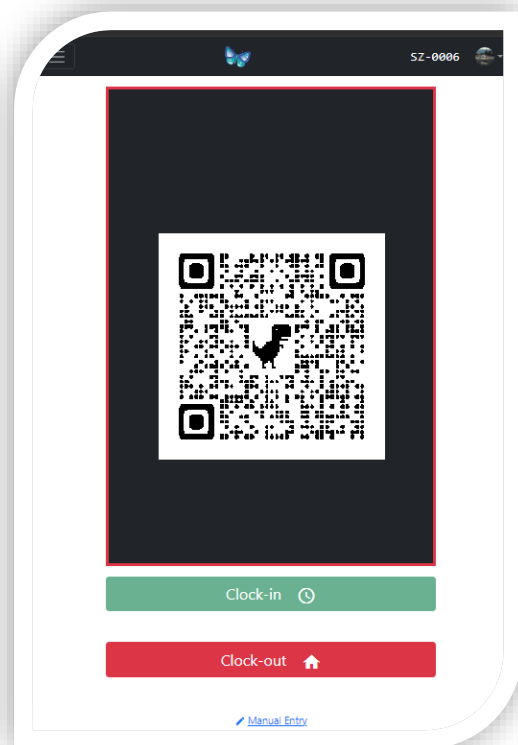


### *Google sign in page*

Users must provide their google email address and password.





Users must provide their google account password. They will be redirected to the hospice home page once their google credentials are authenticated.



Once logged in, the user can clock in by scanning the QR code, they need to grant camera permissions to their device before scanning QR codes.

## Settings Page

 Scan QR Attendance Users QR Codes


NQ-0005

Go Back

### Preferences

Profile

### Profile



**Christopher Boik**  
NQ-0005  
chris@example.com  
[Manage your account](#)

I consent to the use of my personal info

Your information is stored securely and used in accordance with POPI & GDPR.

You can change this setting at any time.

☒ I Agree

**First Name**

**Last Name**

Your Identification Code

NQ-0005

This code is used for administration purposes. Should you need the identifier changed, please speak to Management.

Save

A disclaimer regarding user information is displayed and requires a user's consent by marking the checkbox

Users can edit and save their first and last names.

Identification code for users



## Interactions with the user- (Requests)

### Attendance Reports

Refine Search

Time-frame

Yesterday

From date

2021/12/07

To date

2021/12/07

Events

☐ Clock In

☐ Clock Out

☐ Force Clock In

☐ Force Clock Out

☐ Auto Clock Out

Flags

☐ Manual Entry

☐ Has Notes

☐ Late

Filter these results

E.g. Otis Milburn / MW-0019 / Dec 1, 2021, 7:36:15 PM

Export

	Date & time	Emp. Id	Name	Flags
🏠	Dec 7, 2021, 10:02:41 PM	FJ-0009	Chris Boik	
🕒	Dec 7, 2021, 10:02:35 PM	FJ-0009	Chris Boik	

Filter and refine search- These features are event handlers, handling requests from users. Admin can filter, search for attendance records by time frame options or through start and end dates. Once the admin enters filtering details, the admin can click on 'Filter these results' button to requests all records matching filter request.

Events is an event handler for request made for filtering attendance records to events. Admin will select events options to request specific events to be displayed. Once request is made the attendance records will only show specific events records matching event filter request.

## Attendance Records

### Attendance Reports

2021/12/07

Events

☐ Clock In

☐ Clock Out

☐ Force Clock In

☐ Force Clock Out

☐ Auto Clock Out

Flags

☐ Manual Entry

☐ Has Notes

☐ Late

☐ After Hours

☐ Out of Area

Managed Staff

☒ Any

☐ NQ-0005 - Mystic

Filter these results E.g. Otis Milburn / MW-0019 / Dec 1, 2021, 7:36:15 PM

Export

	Date & time	Emp. Id	Name	Flags
🏠	Dec 7, 2021, 10:02:41 PM	FJ-0009	Chris Boik	
🕒	Dec 7, 2021, 10:02:35 PM	FJ-0009	Chris Boik	

**Flags:** The admin makes a request to filter records according to the flag selection options. When admin selects flags, the records will be filtered to only records containing the selected flags options.

**Export** button feature makes a request to export attendance records to CSV excel file and/or pdf file.






**Manage staff** is a filtering section. Admin can filter the attendance records to show the employees records that is managed by a specific employee manager. Only the employee records under the selected manager employee will be filtered.

## Users Records

### Users

**Refine Search**  
**Managed Staff**  
☒ All  
☐ NQ-0005 - Mystic

**Filter users** E.g. Otis Milburn / MW-0019 / Dec 1, 2021, 7:36:15 PM **Export**

	<b>Mystic</b> NQ-0005 christopherboik@gmail.com	Last active Dec 8, 2021, 8:40:15 PM
	<b>Chris Boik</b> FJ-0009 chris@yard8.co.za	Last active Dec 7, 2021, 10:05:42 PM
	<b>FD-0007</b> FD-0007 - Name hidden Email address hidden	Last active Dec 7, 2021, 5:24:28 PM
	<b>SZ-0006</b> SZ-0006 - Name hidden Email address hidden	Last active Dec 4, 2021, 11:39:56 AM
	<b>NV-0008</b> NV-0008 - Name hidden Email address hidden	Last active Dec 2, 2021, 8:05:09 PM

**Manage staff-** is a filter request that can be performed by the admin to filter employee accounts. The employee accounts can be filtered according to selected designated manager

**Filter users** feature allows admin to make request to show records filtered to specific fields such as time, employee name, employee-ID or dates.

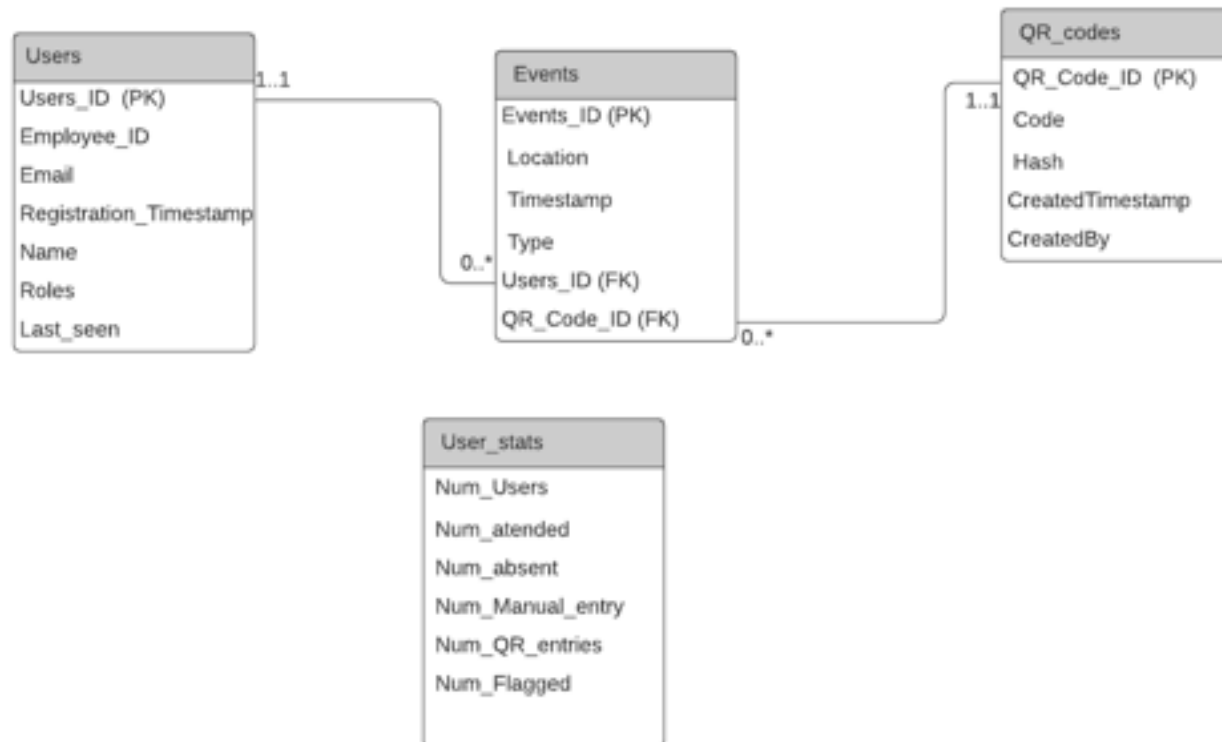
**Export** feature is the same functionality as the attendance records page. Export feature will allow admin to export user's records to an excel CSV file format and/or PDF format.



## Database design (ERD)

(PK): Primary key

(FK): Foreign Key



## ERD entity and attributes additional info

### Events:

Field	Data Type
Event ID <b>(PK)</b>	String
Flags <ul style="list-style-type: none"><li>➤ Location</li><li>➤ Timestamp</li><li>➤ Type</li></ul>	Array <ul style="list-style-type: none"><li>➤ GeoPoint</li><li>➤ Timestamp</li><li>➤ string</li></ul>
User <ul style="list-style-type: none"><li>➤ EmployeeIdentifier <b>(FK)</b></li><li>➤ managers</li><li>➤ name<ul style="list-style-type: none"><li>• First</li><li>• Last</li></ul></li><li>➤ Ref</li></ul>	Map <ul style="list-style-type: none"><li>➤ string</li><li>➤ array</li><li>➤ map<ul style="list-style-type: none"><li>• string</li><li>• string</li></ul></li><li>➤ Reference</li></ul>

### Barcodes:

Field	Data Type
QR_Code_ID <b>(PK)</b>	String
Code	String
Hash	String
CreatedTimeStamp	TimeStamp
CreatedBy	Reference

**PK**- primary key

**FK**- Foreign key

ERD entity and attributes additional info continues...

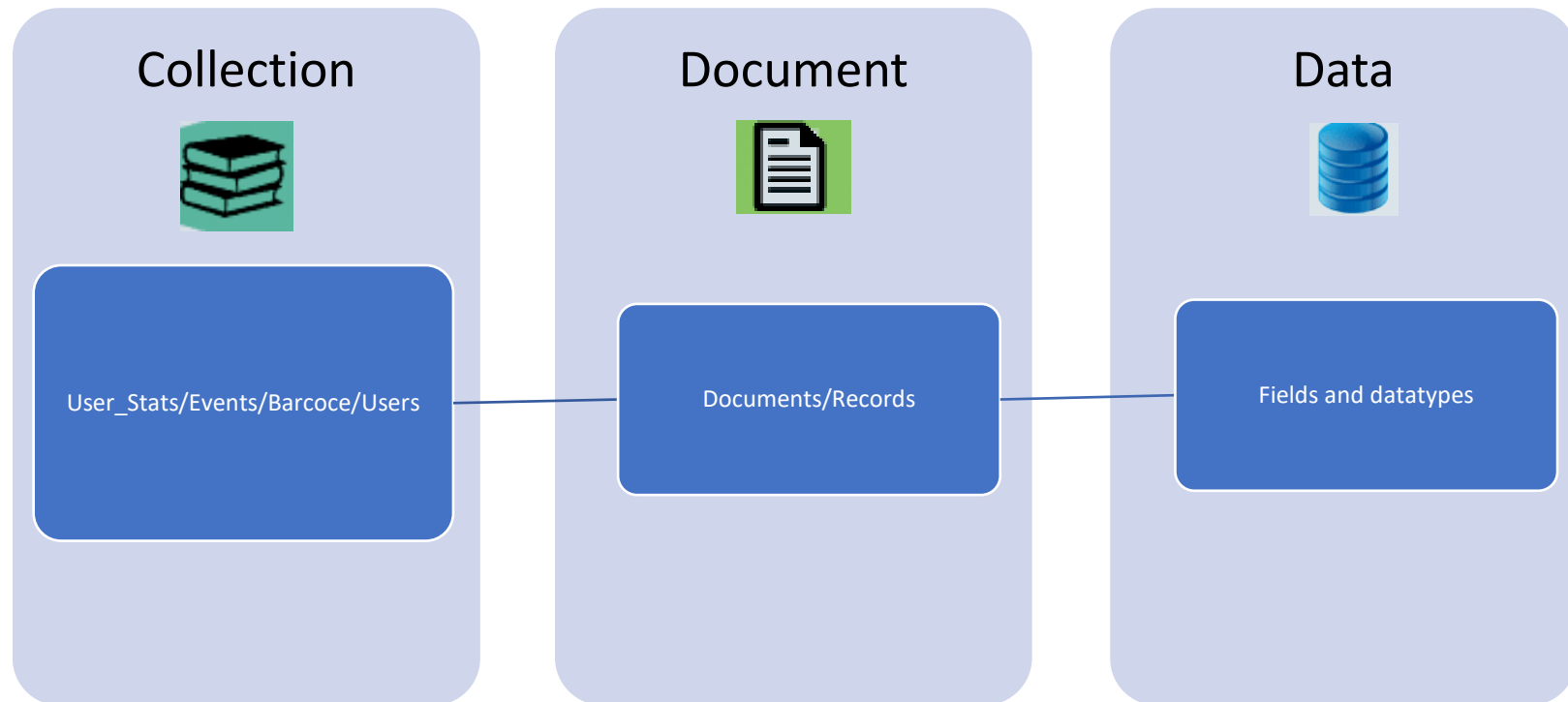
### Users:

Field	Data Type
User_ID <b>(PK)</b>	String
DetailsConsentGiven	Null
Email	String
EmployeeIdentifier	String
MataData <ul style="list-style-type: none"><li>➤ registrationTimestamp</li></ul>	Map <ul style="list-style-type: none"><li>➤ Timestamp</li></ul>
Name <ul style="list-style-type: none"><li>➤ First</li><li>➤ Last</li></ul>	Map <ul style="list-style-type: none"><li>➤ String</li><li>➤ String</li></ul>
Roles	Array
Status <ul style="list-style-type: none"><li>➤ LastSeen</li></ul>	Map <ul style="list-style-type: none"><li>➤ TimeStamp</li></ul>

### User Stats

Field	Data Type
User_Stats_ID <b>(PK)</b>	String
Num_users	Numeric
Num_attended	Numeric
Num_absent	Numeric
Num_manual_entry	Numeric
Num_QR_entries	Numeric
Num_flagged	Numeric

## Database Firebase firestore design





## Report Design

### CSV exported file for employee records

Id.	Photo URL	Name	Email	Registration Date	Managers	Roles	Data Consent	Last Seen
NQ-0005		James Lepel	<a href="mailto:jameslepel@example.com">jameslepel@example.com</a>	Oct 28, 2021, 4:58:57 PM	Hnqymgm4ylPdP8EJl	ADMINISTRATOR	TRUE	Dec 10, 2021, 9:01:36 AM
JJ-0010	<a href="https://lh3.googleusercontent.com/">https://lh3.googleusercontent.com/</a>	-	-	Dec 9, 2021, 5:18:06 PM	-	UNASSIGNED	FALSE	Dec 9, 2021, 5:24:21 PM
FJ-0009	<a href="https://lh3.googleusercontent.com/">https://lh3.googleusercontent.com/</a>	Chris Boik	<a href="mailto:chris@vard8.co.za">chris@vard8.co.za</a>	Dec 7, 2021, 9:12:12 PM	-	UNASSIGNED	TRUE	Dec 9, 2021, 11:22:40 AM
FD-0007		-	-	Nov 7, 2021, 9:36:22 PM	-	UNASSIGNED	FALSE	Dec 7, 2021, 5:24:28 PM
SZ-0006		-	-	Nov 7, 2021, 5:23:28 PM	-	UNASSIGNED	FALSE	Dec 4, 2021, 11:39:56 AM
NV-0008		-	-	Dec 2, 2021, 8:04:58 PM	-	UNASSIGNED	FALSE	Dec 2, 2021, 8:05:09 PM



Report design continued....

### CSV exported file for employee attendance records

Emp. Id	Date & time	Name	Flags
NQ-0005	Dec 8, 2021, 4:43:50 PM	James Lepel	HAS_NOTES,LATE
NQ-0005	Dec 8, 2021, 4:31:06 PM	James Lepel	
NQ-0005	Dec 8, 2021, 3:46:46 PM	James Lepel	MANUAL_ENTRY
NQ-0005	Dec 8, 2021, 3:46:22 PM	James Lepel	
NQ-0005	Dec 8, 2021, 3:46:04 PM	James Lepel	
NQ-0005	Dec 8, 2021, 3:45:44 PM	James Lepel	
NQ-0005	Dec 8, 2021, 3:44:23 PM	James Lepel	MANUAL_ENTRY,HAS_NOTES,LATE,AFTER_HOURS
NQ-0005	Dec 8, 2021, 3:43:54 PM	James Lepel	
NQ-0005	Dec 8, 2021, 8:07:03 AM	James Lepel	
FJ-0009	Dec 7, 2021, 10:02:41 PM	Chris Boik	
FJ-0009	Dec 7, 2021, 10:02:35 PM	Chris Boik	
NQ-0005	Dec 6, 2021, 1:07:40 PM	James Lepel	
NQ-0005	Dec 3, 2021, 4:01:23 PM	James Lepel	HAS_NOTES,LATE
NQ-0005	Dec 3, 2021, 12:22:15 AM	James Lepel	
NQ-0005	Dec 3, 2021, 12:22:00 AM	James Lepel	MANUAL_ENTRY
NQ-0005	Dec 2, 2021, 2:06:45 PM	James Lepel	
NQ-0005	Dec 2, 2021, 1:41:12 PM	James Lepel	
NQ-0005	Dec 1, 2021, 7:36:15 PM	James Lepel	
NQ-0005	Dec 1, 2021, 7:36:14 PM	James Lepel	HAS_NOTES,LATE,AFTER_HOURS
NQ-0005	Dec 1, 2021, 7:36:14 PM	James Lepel	



## Appendix

### Annexure A

#### DEVSQUAD MEETING MINUTES

##### Meeting 1

##### Meeting Details

Meeting Purpose	To get team kicked started with documentation and give team feedback of what is expected from lecturer discussions.
Meeting Date	07 April 2021
Meeting Time	2pm
Meeting Location	Microsoft Teams
Meeting Facilitator	
Attendees	Yusuf, Kai, Chris, Ella, Zander
Apologies	-
Minutes issued by:	Chris Boik

##### Meeting Discussion

- Discuss proposal for meeting with lecturer
- Company/NPO/NGO discussed
- NGO company that is contact with Zander was discussed
- GitHub repository
- Roles discussed such as secretary
- Company/Business and logo
- Another possible NGO "Darulih-san" brought up by Yusuf
- Skills of each team member
- GitHub familiarity discussed amongst team members
- App vs. Website
- App hosting, Zander suggests using his account to host site and database
- GitHub and GitHub Desktop discussed, and screen shared by Chris for basic tutorial
- Discussions from lecturers' meetings discussed

##### Meeting goals

- Finalize NGO choice
- Finalize roles for each team member
- Finalize app hosting
- Ensure team members knows how to use GitHub

- Highlight differences between Website and App.

#### Meeting achievements:

- Gained a general understanding of team skills.
- Decided on NGO to work with.
- Gained a brief idea of how to make app and website similar but also have additional functionalities that make them different.

### Meeting 2

#### Meeting Details

Meeting Purpose	Discuss documentation mainly based on 7.1-7.2 of student manual for XBCAD7319 Work Integrated Learning.
Meeting Date	07 April 2021
Meeting Time	2pm
Meeting Location	Microsoft Teams
Meeting Facilitator	Leavashni Pillay
Attendees	Yusuf, Kai, Chris, Ella, Zander
Apologies	-
Minutes issued by:	Chris Boik

#### Meeting Discussion

- Logo and letterhead submission
- Proposal to NGO, letter from lecturer about permission
- POE mark allocations
- Feasibility, Project plan
- Requirements modelling
- Operational, technical, and economic feasibility
- Project charter
- Needs of client, goals of project and budget constraints and risks
- System vision documents benefits, problem description, system capabilities, business benefits.
- Milestones and deliverables
- Work breakdown structure -levels, duration of tasks, predecessors, resource allocation and task need.
- Pert chart
- Risk management plan- risk→ plan of action→Probability
- Technical feasibility issues
- Task allocation, labour, and external cost analysis.
- Team members details – Short CV, professional headshots, and short CV.

## Meeting goals

- Understand what sections is required for documentation pertaining to sections from 7.1 - 7.2 of student manual
- Discuss sections in detail so that team members know how to approach sections
- Gain a basic idea in the structure of the documentation.
- Assign team members to different sections of documentation to complete.
- Set a deadline for the tasks to be achieved
- Compile documentation, proofread and gain feedback from lecturer to make additional improvements for the first section.

## Meeting achievements:

- Understood the relevant sections to be done for the first part of the documentation i.e. the detailed requirements section.
- Assigned task to team members
- Gained an idea of how the documentation should be structured.

---

## Meeting 3

### Meeting Details

Meeting Purpose	Finalizing NGO choice
Meeting Date	07 April 2021
Meeting Time	6: 50 pm
Meeting Duration	30 minutes
Meeting Location	Microsoft Teams
Meeting Facilitator	-
Attendees	Yusuf, Chris, Ella, Zander
Apologies	Kai Unavailable
Minutes issued by:	Chris Boik

### Meeting Discussion

- Yusuf discusses NGO that would be interested in an app (Old age home, located Overport) however business requirements of NGO is not clearly communicated.
- Ideas discussed about what the potential NGO app and website would entail
- Donations Money and food
- Volunteering registration
- Ranking system for donations/effort/volunteering.
- Zander's hospice NGO choice may require the following functionalities.
- Stock taking, perhaps item scanning statistics

- Catalogue for public facing side.
- Propose meeting with clients of NGO hospice planned following day.
- View hospice website
- Discussions about redesigning/recreating the website and adding new features such as donating and volunteering.
- Agreement (except for kai) was reached regarding Hospice being the final NGO choice.

### Meeting goals

- Discuss business goals of NGO choices
- Weigh out the pro and cons of tackling NGO choices i.e Hospice vs Old age home
- Discuss some of the main functionalities that could be expected from a general NGO based app and webapp.
- Analyse previous systems of NGO that could be improved upon
- Plan meeting with Client of NGO
- Form an agreement of NGO choice.

### Meeting achievements:

- Finalized the NGO choice i.e. Msunduzi Hospice is the final choice as business team member Zander is in close contact and organisation seems really keen on the possibility of developing an app for them.
- Analyzation of Msunduzi Hospice website was done
- Arranged meeting with the client- face to face meeting with Leader Zander.

## Meeting 4

### Meeting Details

Meeting Purpose	General meeting to engage with team feedback on documentation and technical aspects of web and app development.
Meeting Date	05 May 2021
Meeting Time	6:30
Meeting Location	Microsoft Teams
Meeting Facilitator	Leavashni Pillay
Attendees	Yusuf, Chris, Ella, Zander
Apologies	Kai-not attending, Yusuf- leave meeting early
Minutes issued by:	Chris Boik

## Meeting Discussion

- Documentation discussions about estimated due dates as discussed in previous meetings.
- Deeplinking for the QR
- Discussions over cloud vs server
- Progressive web app, cloud hosting, cross compatibility, and firebase.
- Benefits of PWA.
- Discussions over Linux OS on the clients' server, UPS necessity, server
- Security discussions: SSL, physical security if client hosted ect.
- Discussed the requirements of the client to conform understanding,
- Pipelining with Git and Azure to not deal with pushing to live ect.
- Discussions about client needs changing and arranging future meetings
- Future proofing the code base in case other companies want the project or application ect, possibly looking to have the app as a service providing app but will focus on the clients' needs for now.
- Discussions on client expectations with regards to deadlines and timelines.

## Meeting goals

- To evaluate progress of team members with documentation.
- Analyse how clients' business requirements can be implemented taking into consideration the technical and security risks imposed.
- Discussions of expectations of client and client user satisfaction.
- Research and discuss how the system can be developed as a Progressive web app instead of having a separate web app and mobile app. Aim is to implement a system where clients functionalities will be implemented through a PWA.

## Meeting achievements:

- Finalize decision of using PWA (Progressive web app)
- Highlighted client's business requirements and possible technical and security imposed on system as well as how these risks can be prevented.
- Discussed documentation progress and estimated due dates.

---

## Meeting 5

### Meeting Details

Meeting Purpose	General meeting to engage with team feedback from team about documentation and technical aspect of app. Discuss feedback Zander receives from lecturer with documentation.
Meeting Date	23 July 2021
Meeting Time	10:40 am
Meeting Location	Microsoft Teams

Meeting Facilitator	Leavashni Pillay
Attendees	Yusuf, Chris, Ella, Zander
Apologies	Kai - internet issues
Minutes issued by:	Chris Boik

### Meeting Discussion

- Deadline for documentation submission for question 7.1 - 7.2 of WIL student manual
- Discuss PWA concepts again
- Discussed initial role assignments compared to current and future roles for team members
- Request to all members, including (Kai) to send through their parts of documentation to Chris for compiling.
- Discussion platform choices
  - Discussed Database, verdict: Firebase Firestore.
  - Discussed web platform, verdict: MVC (not sure if NET framework or Core)
- Discussion of on-premises and cloud pros and cons.

### Meeting goals

- Fetch parts of documentation that was assigned to team-mates for compiling and finalization of the first part of documentation.
- Discuss what to be expected for the second part of documentation
- Finalize platform choice
- Discussion of cloud pros and cons rather than local databases.

### Meeting achievements:

- Team members are more knowledgeable about PWA concepts. A mutual understanding and agreement of implementation is shared amongst team.
- All team members accomplished assigned documentation tasks- compilation of documents and proofreading to be done by Chris.
- Verdict application framework choice: MVC (not sure if NET framework or core)
- Verdict database: Verdict Firebase Firestore.

### Meeting 6

### Meeting Details

Meeting Purpose	Review part 1 (7.1 – 7.2) tasks with Leavashni also get feedback from Leavashni so documentation can be improved.
Meeting Date	04 August 2021
Meeting Time	4:30 pm
Meeting Location	Microsoft Teams
Meeting Facilitator	Leavashni Pillay
Attendees	Ella, Chris, and Kai
Apologies	Zander and Yusuf- struggling with Covid
Minutes issued by:	Ellavarsi Pillay

### Meeting Discussion

- Include intro from Zander for documentation
- Milestones sections add table summary or put information in a table format
- Risk management: Identify, assess, develop response, develop mitigation and contingency columns, add colour and key.
- Table for economic feasibility: For completed activities and upcoming
- Each activity
- Who (resource)
- Rate X Hours
- Total
- CVs and headshots
- Plagiarism focus, reference any sources, credit any used works.
- 7.3- 7.3.2 of student manual discussion for the last section of documentation
- NGOs problem/need, main goal of the NGOs strive/ mission, how will the system alleviate concern/ issue
- Solution domain: main aim, functions of the site, CRUD table showing use cases.
- CRUD: input, output procedure.
- Step by step for each action on the site.
- Use case diagrams

### Meeting goals

- Gain feedback from Leavashni about first part of documentation
- Based on feedback, improve, and finalize first part of documentation
- Discuss what is expected of second part of documentation i.e. 7.3.1- 7.3.2
- Discuss deadline and assignments of tasks for second part of documentation.

### Meeting achievements:



- Improvement in documentation part 1
- Expectation and understanding of 7.3.1 – 7.3.2 sections of student manual.

## Meeting 7

### Meeting Details

Meeting Purpose	Team general discussion about work progress in terms of documentation, upcoming documentation sections and Zander's situation effects on the group and project.
Meeting Date	18 August 2021
Meeting Time	3: 10 pm
Meeting Location	Discord voice chat
Meeting Facilitator	-
Attendees	Ella, Yusuf, and Kai
Apologies	Zander- absent for days, not reachable. Kai- not available per time designated for meeting.
Minutes issued by:	Ellavarsi Pillay

### Meeting Discussion

- Discussed Zander being unreachable and the impacts on the group and project.
- Discussed the documentation due on the 19<sup>th</sup> of August
- Upcoming documentation sections also discussed
- Discussed project requirements per the recording of the initial client meeting.
- Ella raises points of concern regarding activity diagram and general flow of the project application.
- Solutions and ideas discussed.
- Discussed roles, CVs, project section assignments.
- Discussed secretary and temporary leader workload and assistance.
- Meeting concludes at 3: 58 pm.

### Meeting goals

- Gain feedback from team members about documentation process.
- Discuss how Zander's absence will affect roles and project
- Rediscuss project requirements per recording with client initial meeting.

## Meeting achievements:

- Resolved issues with roles and project development for future without Zander being present.
- Established how the general flow of app would be taking into consideration project requirements from initial meeting.

## Meeting 8

### Meeting Details

Meeting Purpose	Discussion of Zander and design documentation.
Meeting Date	07 September 2021
Meeting Time	5: 05 pm
Meeting Location	Discord voice chat
Meeting Facilitator	Leavashni Pillay
Attendees	Ella, Kai, Chris
Apologies	Yusuf - not available
Minutes issued by:	Ellavarsi Pillay

### Meeting Discussion

- Reached out to Zander but no response
- If Zander returns when work is still being completed then he can join team development but returning to campus closer to completion of completion, then involvement in presentation is encouraged.
- Recover or do task assigned by Zander that has not been complete yet.
- Team members such as Ella and Chis decides on the completion of Zander's part (Technical feasibility and Introduction)
- Feedback on documentation from Leavashni
- Mention the 'app' in the intro and problem domain
- Footer (dev squad name)
- Design documentation- no standard way to present design documents.
- Arrows, text blocks, text boxes, screenshot descriptions, anything goes up team discretion
- Segregate the different parts of the application/website
- Data listing
- Request interaction- columns, initiator, and response participant
- User manual and design document is the same document.
- Separate document /brochure /screenshot document for judges on the day. This is less detailed, more specific to demo and completed web app. Separate to the full documentation for marking.

### Meeting goals

- Review of and improvement of current documentation based on feedback received from Leavashni.
- Discuss design documentation
- Discuss additional documents required (User manual and Brochure)
- Discuss due dates and webapp presentation to Leavashni.
- Discuss how documentation can be done whilst team members are busy with development of application.

### Meeting achievements:

- Team agrees to use for Development app
- Team decides to develop prototype and document simultaneously.
- Team gains an understanding of their participation required for the design docs
- Improvements and adjustments made to documentation.

## Meeting 9

### Meeting Details

Meeting Purpose	Discussion of collaboration work on GitHub, and client's feedback and additional requirements.
Meeting Date	21 September 2021
Meeting Time	2: 15 pm
Meeting Location	Discord voice chat
Meeting Facilitator	-
Attendees	Ella, Chris, Yusuf
Apologies	Yusuf - attended later in the meeting
Minutes issued by:	Ellavarsi Pillay

### Meeting Discussion

- Chris mentions concern of firebase package updates from developers
- Msunduzi IT team has a live- decide to use it if our team gets demo working
- Extensions packages sent on discord- extensions will assist in making coding much easier and efficiently
- Client updates us with updated requirements with regards to users:
- Admin
- Managers
- Employees- Team decides to start with the implementation of these pages
- GitHub discussion on commits single time vs many commits and pull requests
- Team decides to commit many times this will indicate exact changes made
- Yusuf and Kai: need to execute important commands before running project for development.

- Login and registration will be the same page-using google sign in
- Issues with merging request – Failure in building and deploying pull request from authentication, nothing major to stress about in committing and pulling requests.

### Meeting goals

- Develop auth pages (sign in) Identify if new or existing employees sign in
- Create method for roles and generating unique ID for the new employee users in the authentication service.
- Ensure team members work comfortably on GitHub with merging and pull requests.

### Meeting achievements:

- Resolved issues with commits and pull requests. Team is more comfortable in using GitHub.
- Started with auth development pages
- New requirements from clients and feedback has been given, received and taken into consideration for development of application.
- Team is on board with collaboration development.

## Annexure B

Attendance check of team members.

### Team members attendance check



Date	Ella	Yusuf	Kai	Chris	Zander
07 March 2021	✓	✓	✓	✓	✓
05 May 2021	✓	✓	✗	✓	✓
16 April 2021	✓	✓	✓	✓	✓
21 April 2021	✓	✓	✗	✓	✓
23 July 2021	✓	✓	✗	✓	✓
04 August 2021	✓	✗	✓	✓	✗
18 August 2021	✓	✓	✓	✓	✗
07 September 2021	✓	✓	✓	✓	✗
21 September 2021	✓	✓	✓	✓	✗
16 October 2021	✓	✓	✓	✓	✗

## Annexure C

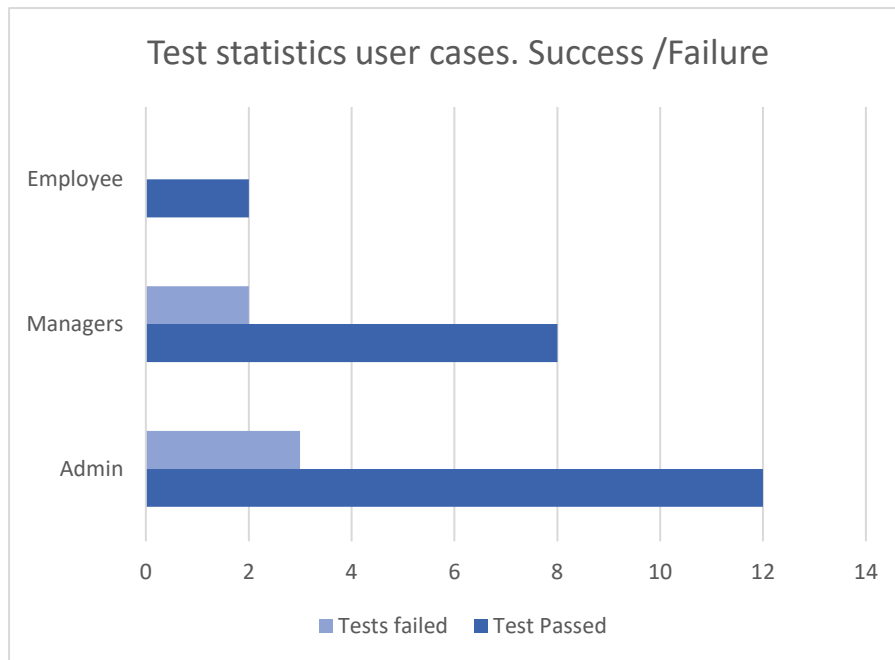
### Requirement testing report

Test Report- Msunduzi Hospice Employee Attendance System				
Iteration/ Cycle				
EXECUTED	PASSED	22		
	FAILED	5		
	(Total) TESTS EXECUTED (PASSED + FAILED)		27	
RESPONSIBLE DEVELOPER	CHRIS BOIK			
TESTER	KAI NAMEE			
Users	Tests Planned	Tests Passed	Identifiable ID letters	User-Color Identifier
Admin	15	12	AT	
Employee	10	8	ET	
Managers	2	2	MT	

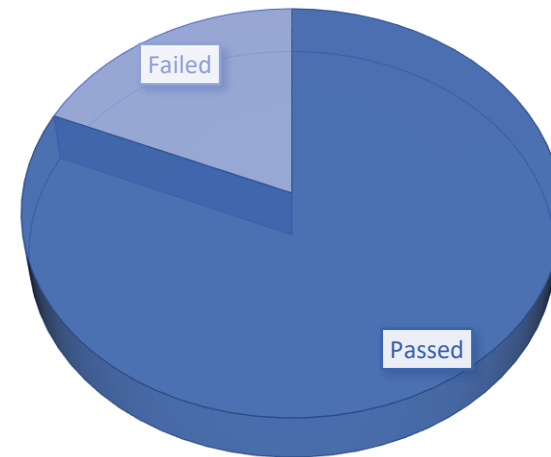
Testing report to be continued...

Test Case ID	Description	Passed/Fail	Comments	User-Color identifier
AT01	Refine search- Time-frame	Passed		
AT02	Refine search- Date filter	Passed		
AT03	Events clock In	Passed		
AT04	Events clock-Out	Passed		
AT05	Events Force Clock Out	Passed		
AT06	Events Force Clock In	Passed		
AT07	Events auto clock out	Passed		
AT08	Flags Manual Entry	Passed		
AT09	Flags has notes	Passed		
AT10	Flags late	Passed		
AT11	Flags after hours	Passed		
AT12	Export. XLS	Passed		
AT13	Export. CSV	Failed	Feature is not functional, code does not execute.	
AT14	Export. PDF	Failed	Feature is not functional, code does not execute	
AT15	Export. XLSX	Failed	Feature is not functional, code does not execute	
ET01	Sign in verification	Passed		
ET02	2 step verification	Passed		
ET03	Clock in	Passed		
ET04	Clock out	Passed		
ET05	Clock in manual	Failed	Could not get feature to function, time constraint	
ET06	Clock out manual	Failed	Could not get feature to function, time constraint	
ET07	Camera permissions	Passed		
ET08	Profile settings-consent	Passed		
ET09	Profile settings-name	Passed		
ET10	Sign out	Passed		
MT01	View records for workers assigned to	Passed		
MT02	Filter records to find specific worker	Passed		

Testing report to be continued...



**TOTAL PASSED USE CASES VS TOTAL FAILED USE CASES**





## Annexure D

### Angular vs MVC or Blazor

Angular

Pros

Cons

Argument	Weight		Argument	Weight	
100% Free Hosting (across many providers)	5		TypeScript is used	5	
Runs client side (Improved perceived performance)	3		Something new	4	
Firebase Auth & Firestore integration out the box	5		Bruce confused us	5	
QR Code scanning easily achieved with an NPM module	4		Learning curve for some	5	
Perceptibly faster loading times	3		File structure (when using custom backend) is confusing	4	
Modern, future-proof, well maintained framework	4				
PWA Support more easily achieved out the box	5				
Better routing and role support (with Angular Router guard)	3				
Debugging appears on screen and in console	4				
Designed with security in mind	2				
"Jamstack", serverless, up and coming technologies	3				

Result

Name	Percentage	Points
Pros	64.06 %	41
Cons	35.94 %	23

## MVC/Blazor (C#)

### Pros

Argument	Weight	
Familiarity with C#	5	
Comfort with structure & separation of MVC	5	
If using Azure, integration built in	4	
Familiarity with VS over VS Code	3	
Easy to start up the project	3	
Variety of paid hosting vendors available	3	
+		

### Cons

Argument	Weight	
Hosting is expensive or difficult to manage long term	5	
Firebase Auth and Firestore no out the box support	4	
Not Hot-Reload (Have to re-run application for small changes)	3	
PWA support not as easily achieved	5	
Requires JavaScript code anyway for PWA, JS Interop	3	
If using SQL, additional costs and performance needed	4	
No built in Security, routing, and roles	2	
QR Code scanning far less easily achieved	4	
Can only be hosted on IIS compliant hosts (Azure, etc)	4	
Hosting pipe-lining not easily achieved (GitHub actions, etc)	3	
EOL (end of life, expected 2022)	3	
+		

### Result

Name	Percentage	Points
Cons	63.49 %	40
Pros	36.51 %	23

## Annexure E

### Firestore security rules

#### Custom Firestore Custom Indexes

				<a href="#">Add index</a>	
Collection ID	Fields indexed			Query scope	Status
events	user.managers Arrays timestamp Descending			Collection	Enabled
events	type Ascending timestamp Descending			Collection	Enabled
events	user.managers Arrays user.managers Ascending timestamp Descending			Collection	Enabled
events	user.ref Ascending timestamp Descending			Collection	Enabled
events	user.employeeIdentifier Ascending timestamp Descending			Collection	Enabled
users	employeeIdentifier Ascending status.lastSeen Descending			Collection	Enabled
users	managers Arrays status.lastSeen Descending			Collection	Enabled

(Firebase, 2021)

## Annexure F - Security Rules Firestore

The screenshot shows the Firebase console interface for the 'XBCAD Hospice' project. The left sidebar contains navigation links for Project Overview, Build, Release & Monitor, and Analytics. The main content area is divided into two tabs: 'Edit rules' and 'Monitor rules'. The 'Edit rules' tab is active, showing a timeline of rule updates on the left and the current security rules code on the right.

**Timeline of Rule Updates:**

- Today • 9:26 PM (Selected)
- Today • 9:25 PM
- Today • 9:24 PM
- Today • 9:20 PM
- Today • 9:00 PM
- Aug 26, 2021 • 11:53 AM
- Aug 26, 2021 • 10:47 AM

**Security Rules Code:**

```
1 rules_version = '2';
2 service cloud.firestore {
3   match /databases/{database}/documents {
4     // Make sure the uid of the requesting user matches name of the user
5     // document. The wildcard expression {userId} makes the userId variable
6     // available in rules.
7     match /users/{userId} {
8       allow read, update: if (signedIn() && request.auth.uid == userId);
9       allow create: if signedIn();
10      allow read, write: if isStaff(request);
11    }
12    match /events/{event} {
13      allow read: if (signedIn() &&
14        /databases/{database}/documents/users/{request.auth.uid} == resource.data.user.ref);
15      allow create: if signedIn();
16      allow read, write: if isStaff(request);
17    }
18    match /user_stats/{stats} {
19      allow read: if signedIn();
20      allow update: if signedIn() && (request.resource.data.numUsers > resource.data.numUsers);
21    }
22    match /{document=**} {
23      allow read, write: if isAdministrator(request);
24    }
25  }
26 }
27 // True if the user is signed in
28 function signedIn() {
29   return request.auth.uid != null;
30 }
31 // True if the user is a staff members (admin, manager)
32 function isStaff(request) {
33   return request.auth != null &&
34     ('ADMINISTRATOR' in request.auth.token.roles
35     || 'MANAGER' in request.auth.token.roles);
36 }
37 // True if the user is an administrator
38 function isAdministrator(request) {
39   return request.auth != null &&
40     ('ADMINISTRATOR' in request.auth.token.roles);
41 }
```

(Firebase, 2021)

## Annexure G

### Pamphlet



# MSUNDUZI HOSPICE ASSOCIATION

WE CARE BECAUSE YOU MATTER

Msunduzi Hospice provides quality home based care for patients who have a life limiting and/or life threatening illness. We are there for you when you need us. We care because you matter.



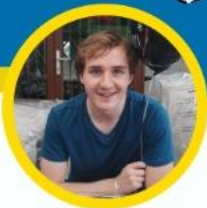
WWW.HOSPICEKZN.CO.ZA  
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# MSUNDUZI ATTENDANCE SYSTEM

*scan me*



## DEV SQUAD TEAM MEMBERS



**CHRIS  
BOIK**

PROJECT  
MANAGER



**ELLAVARSI  
PILLAY**

DATABASES/  
SECRETARY



**YUSUF  
GOGA**

GRAPHIC  
DESIGNER



**KAIISH  
NAMEEKUMAR**

TESTER/  
GUI



## Annexure H

### Msunduzi Hospice Firebase Cloud Function Health Report

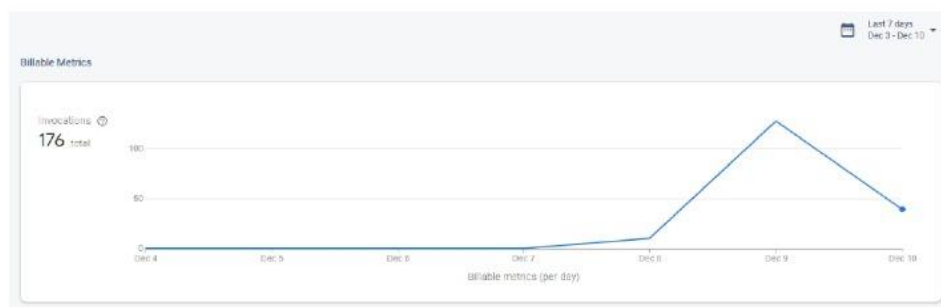


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VAT Reg. No.: 4280115009  
Accredited by Cohsasa (February 2018 to February 2022)

#### CLOUD FUNCTIONS PERFORMANCE INDICATORS



#### BILLABLE METRICS



## Annexure I

### Maintenance and improvements of Msunduzi Online Attendance System

#### Maintenance Plans

- Important security updates
- Monitoring Firebase emails and usage.
- Based on client usage and employee usage of Msunduzi Hospice, any bugs detected will be fixed and updated as new versions iterations.
- Ensure software compatible with new hardware / software changes and shifts.
- Keep user interface updated, modern, accessible, and fluent.
- Implement and complete scheduled system maintenance.
- Monitor Google Auth issues such as privacy policy for personal data. (POPI, GDPR, and more)
- Update and maintenance of database collection tables on Firestore. (Backups, archiving)

#### Additional features/ improvements

- Live QR code generation for unique and accurate attendance events (integrity improvement)
- Automatic clocking out after predetermined time (CRON Job)
- Admin settings menu to control the application parameters
- Remote configuration to adjust app flow and settings without pushing major updates
- Calendar integration
- Implement biometric attendance (faster, more secure)
- Payroll integration (APIs and other)
- Access-level and permissions management
- Advance analytics and statistics records

(Oragui, 2021)



## Bibliography

- 10 Key features of attendance management system.* (2021, December 1). Retrieved from Hrtechnologist: <https://www.hrtechnologist.com/articles/workforce-scheduling/features-of-attendance-management-systems/>
- App.* (2021, December 11). Retrieved from Creately: <https://app.creately.com/diagram/w14cLMHl1WI/view>
- App.* (2021, December 11). Retrieved from Lucid: <https://lucid.app/documents#/dashboard>
- Brown, L. (2021, November 8 11). *Invensis Learning*. Retrieved from An Overview Of Risk Management Examples: <https://www.invensislearning.com/blog/risk-management-examples/>
- Charizen, T. (2021, December 11). *Milestone vs. Deliverable: What's the Difference?* Retrieved from Charizen: <https://www.clarizen.com/milestone-vs-deliverable-whats-the-difference/>
- ClickZ.* (2021, December 11). Retrieved from <https://www.clarizen.com/milestone-vs-deliverable-whats-the-difference/>: <https://www.clickz.com/how-to-assess-the-feasibility-of-your-mobile-project/91689/>
- Firebase.* (2021, December 11). Retrieved from Firebase Documentation: <https://firebase.google.com/docs>
- Msunduzi. (2021, December 12). *Msunduzi Hospice Association*. Retrieved from HospiceKZN: <https://www.hospicekzn.co.za/>
- Oragui, D. (2021, December 2). *What should know about long term app maintenance*. Retrieved from The manifest: <https://themanifest.com/app-development/blog/long-term-app-maintenance>
- Resume Templates.* (2021, December 9). Retrieved from Novoresume: <https://novoresume.com/resume-templates>

**END OF SUBMISSION**

