(GROUP 1) HELPFUL HACKERS- FINAL POE SUBMISSION

Work Integrated Learning (WIL) (XBCAD7319)

HELPFUL HACKERS TEAM MEMBERS:

Jordan Conor Green ST10083222
Cameron Luke Pillay ST10083199
Daylin Shadrach ST10083296
Mishra Mohammad ST10083182
Mpumelelo Candice Mchunu ST10153265
Nhlakanipho Philani Khumalo ST10083213
Siyambonga Akhona Mfeka ST10083151

GitHub Repository Link: https://github.com/VCDBN/XBCAD7319-XBCAD7329-G1-2023/tree/master

Contents

1) Introduction to DUTApp Factory Ticket Automation Project:

The core values of any types of business in today's market is to always satisfy their customer's needs and wants by providing effective service throughout any encounters and to provide constant assistance where it is needed. This concept applies to our educational institutions as it focuses on shaping the minds of young adults to enter the working world provided with the best experience and knowledge that is required to be obtained to gain a competitive edge in a company. Every intuition is strived to also cater for student's needs by responding to any concerns or queries they may have. We as the innovative software development team known as Helpful Hackers, were approached with the concept of developing a prototype solution designed to revolutionize the way student queries are addressed and support requests at the Durban University of Technology Institution through an automated process.

DUT has always been committed to providing the standardize and effective educational experience for students to enter in the business world of technology. As part of ongoing efforts to enhance student satisfaction and streamline administrative processes, we embarked on a journey to create a tailored solution that directly addresses the needs of students. In our evolving digital world, students are looking for efficient and user-friendly ways to seek assistance and get answers to their questions. DUT Assist represents the response to this challenge.

We believe that DUT Assist will not only improve the student experience but also empower staff members to better serve the student community by quickly and effectively responding to student-related queries. It is a testament to their commitment to innovation and dedication to delivering practical solutions.

At DUT, the process of addressing and resolving student queries and support requests has become increasingly cumbersome and less efficient. The current system relies heavily on manual interventions, email correspondence, and dispersed communication channels, leading to several critical issues:

Lack of Centralized Tracking: There is no centralized system for tracking and managing student inquiries, making it challenging to ensure timely responses and resolution.

Reduced Student Satisfaction: Prolonged response times and difficulties in tracking the status of queries have led to declining student satisfaction and frustration with the support services provided.

Limited Visibility: Administrators and support staff lack a comprehensive view of student issues, hindering their ability to identify recurring problems, trends, or opportunities for process improvement.

To address these challenges, DUT recognizes the urgent need for a modernized and centralized Automated Student Ticketing System. This system aims to provide students with a modernized and unique platform to submit queries and requests while empowering staff with efficient tools for managing, and responding to these inquiries. The objective is to enhance the overall student

experience, optimize administrative processes, and foster a more responsive and proactive support ecosystem at DUT.

1.1) **Helpful Hackers' Work Agreement:**

The Helpful Hackers SCRUM team abides by under the following work agreement:

1) We as a collective team shall assemble and schedule online Microsoft Team's meeting every Tuesdays and Fridays at 2pm for approximately fifteen minutes to half-an-hour for a SCRUM and Sprint retrospect meetings to discuss any outstanding operations and to discuss progress for each sprint.
2) We will discuss any challenges faced from the previous discussion within the online meeting and formulate and brainstorm solutions to combat these challenges.
3) We will record minute schedules to monitor progression and attendance.
4) We will provide open and sincere assistance and feedback if challenges occur within the next deliverable outcome.

1.2) **Helpful Hackers' Definition of Ready:**

Items Helpful Hackers considered for Definition of Ready:

Actionable – For the previous initializing and planning Sprint stages of the development of the Automated Support Management System (Sprint 0 and Sprint 1), the Helpful Hackers innovative SCRUM team understood and were able to identify the key components and required features that were vital to be added to our application that was crucially advised by our production client and was documented within the Product Backlog as well as the further additional Sprint Planning Documents such as the implementation of Microsoft Authentication (with two-step authentication where it assists users to access their accounts in a more secure manner because passwords can be forgotten, stolen or compromised), the creation of a support ticket page where the student users can submit any technical support queries that they would like assistance to, as well as a technicians admin's page, where support technicians can view all ticket queries as well as the response templates that the technician will add in response to a user query and further additional features we collectively brainstormed during our weekly SCRUM meetings such as a rating system for services received from the support technicians. The Helpful Hackers team have concurred that all the story items that were presented, reviewed by the client, and further modified by the SCRUM team were regarded as actionable as we conducted extensive online research with each task that was assigned to the team members as requested by the project's team lead and everyone worked collectively to continuously provide support to each other and their tasks if required and they outperformed in their assigned tasks as the Helpful Hacker's team lead was quite satisfied with the desired outcome as well as we periodically requested online

consultation sessions with the team lead to discuss any outstanding tasks and to constantly update the progress of the assigned tasks and everyone was up-to-date with everything and we consulted with the client and SCRUM Master to provide feedback on the tasks we have completed thus far, although there was some minor changes we were required to update, overall the response was positive. We have identified a few external dependencies such as MailKit (which is referred to as an email library extension for .NET software program projects that provides a high-level API for working with email protocols, including SMTP (Simple Mail Transfer Protocol), and is commonly utilized to send, receive, and manage email messages in .NET applications.), an Azure timer trigger that we included as part of our notifications to the technical support agent as result of escalation – where it allows Azure Functions to be accomplished on a schedule, such as every hour, day or week, this is beneficial for the automation of tasks to according to specified time intervals which includes data integration, periodical cleanups, producing reports as well as dispatching consistent notifications (**Microsoft Ignite, 2023**), as well as the Microsoft Authentication extension with the utilization of Microsoft's Identity Platform as well as Azure Active Directory to authorize software developers to enable Single Sign-On (SSO) services with a client ID to allow users to be logged onto the website using one set of credentials. (**Fortinet, N.D.**) With these external dependencies, we utilized them as part of the required features that were emphasized by the client and in turn, we ensured that it was correctly implemented and easy-to-use for the user. (**agility.im, N.D.**)

Refined – Each item in the sprint planning documents such as the Product and Sprint Backlogs did undergo a stage of refinement before the sprint planning stage commenced as during our initial consultation meetings with our SCRUM master, they did inform us that we did not elaborate and explain certain story items that we initially stated such as "users will have access to personalized features" this is a result of not explaining what features certain users can have access to, this includes users cannot have access to other respondent's ticket queries. Through consistent streamlining of the relevant sprint planning documents, the Helpful Hackers SCRUM team formulated a well-presented and easily-identifiable documentation procedure where the team lead provided the team with a clear direction of the definition of each story item such as we provided extensive online research to gather information of how to incorporate Microsoft Authentication frameworks to the application, to incorporate an Azure timer trigger that will connect through a cloud-hosting environment provided in Microsoft Azure as per escalation of tickets through the administrative portal, etc. The Helpful Hackers team have identified a sequence of rapport where there is a mutual understanding of how to implement the chosen story items to be implemented in the final solution. For instance, with the user-ticket-creation page, we as a team acknowledge that the application will be a Model-View-Controller (MVC) classification to provide user-friendly web interfaces which manipulates data and design in conjunction with the source-code login, and we will be encompassing a Create-Read-Update-Delete (CRUD) operations for students to engage with ticket creation purposes, etc. (**agility.im, N.D.**)

Value – Just like with any profession, where the roles and responsibilities of specified employees is to provide ongoing customer support for the products and services that they offer, in provides the same role with any educational institution such as Varsity College and DUT, where its

students must be provided with the constant support and direction to be the driving force in the world's economy today. With this universities must be given the most effective way of supporting student-related queries without the need for manual assistance, as where technology is highly advancing by the second there is always a need to perform online assistance for user-convenience. We as the Helpful Hackers software team have provided a fruitful and worthwhile solution to combat this challenge and to provide a user-friendly student-query assistance applicant that can be utilized with the greatest of ease. The business value of a supported automated response application is stated by the following: (**agility.im, N.D.**)

1) **Improved Efficiency**:

    - Quicker Response Times: Automation allows for immediate responses to incoming tickets, reducing the time customers must wait for a resolution.

    - 24/7 Availability: Automated systems can operate round the clock, ensuring that customer inquiries are addressed promptly, even outside regular business hours.

2) **Cost Savings**:

    - Reduced Labor Costs: By automating routine and repetitive tasks, you can reduce the need for a large customer support team, leading to cost savings in terms of staff salaries and benefits.

3) **Scalability**:

    - As your business continues to expand, you can handle a higher volume of tickets without a linear increase in support staff.

4) **Consistency**:

    - Standardized Responses: Automation ensures that customers receive consistent and accurate responses to common questions or issues, maintaining a high level of service quality.

    - Compliance: Automated systems can be programmed to follow regulatory and compliance guidelines, reducing the risk of errors and non-compliance.

5) **Enhanced Customer Experience**:

    - Instant Acknowledgment: Customers value in receiving immediate acknowledgment of their issues, even if the resolution takes time. This can

improve overall satisfaction of student-relationships.

- Self-Service Options: Some ticket systems can provide self-service options, allowing customers to find answers to their questions without human intervention.

6) **Data Insights**:

- Analytics: Automated ticket systems can collect and analyse data on customer inquiries, helping you identify trends, common issues, and areas for improvement in your products or services.
- Customer Feedback: The collection of data on customer interactions can help you refine your offerings based on customer feedback.

7) **Workflow Optimization**:

- Prioritization: Automation can help prioritize tickets based on urgency, complexity, or other factors, ensuring that high-priority issues receive prompt attention.

- Routing: Tickets can be automatically assigned to the most suitable support agents or departments, improving efficiency.

8) **Resource Allocation**:

- Focus on Complex Issues: With routine tasks handled by automation, human support agents can concentrate on more complex and high-value tasks, leading to better resource allocation.

Estimated – The Helpful Hackers team initially allocated fewer story-task items per Sprint as we intended to cover three items per Sprint (Sprint 0, Sprint 1 and Sprint 2) and we consolidated this agreement to the SCRUM master during forming of the team and commencing with the planning documents, however the SCRUM master suggested to rather increase the number of story items to be implemented and engaged with by the team to approximately seven or more in order to maximize our effort to achieving our intended target of producing an efficient final solution of the application. The team lead amended the feedback received within the Sprint planning documents and we were able to plan accordingly as the duration of each Sprint consisted of approximately three months, so we ensured that we provided sufficient information to submit by the allocated deadline, and we delivered as per consolidation. We constantly scheduled weekly feedback meetings to discuss the overall performance of the team during each consolidated Sprint, and the team reassured the team lead that they were making significant progress with each allocated task that was required, as well as the team agreed that all allocated story items per Sprint were pleasant in nature as if a team member required assistance with a broaden task, additional team members helped where possible, this includes a team member inquiring from another team member of the structure of developing a privacy policy within the system itself for

users to gain a detailed background of who the Helpful Hackers team members are and how did they band together and shared ideas which contributed to their success. (**agility.im, N.D.**)

Acceptance criteria – During the initial planning stage of the development of the project, the Helpful Hackers team did not apply a comprehensive Acceptance Criteria within the product backlog and sprint backlog as instead we initially were defining more of the logic and the definition of each story item in the user story description. When we were inquiring feedback from the SCRUM master in regards to our commencing product backlog, they informed us that we did not supply adequate information in the Acceptance Criteria for the software developers to start with preparing the software code. An example of this includes our opening point in our original Acceptance Criteria for the product backlog stated "Website supports multiple languages," these states to a developer that they may be quite unsure how to begin coding with this lack of detail, however if we state that statement to "this website should be internationalized to simplify multi-language support." Which refers to that the website needs to be designed in a way that allows it to be easily adapted for multiple languages, which is a common practice in web development for reaching a broader audience. (**agility.im, N.D.**) With this feedback, we made significant updates to the product backlog and placed all the logic behind every button action, design layout and functionality that we intended the application to perform to utilize the performance of support management in a more systematic approach to be placed in the Acceptance Criteria for both the sprint backlog and the product backlog, this will in turn provide the conditions that must be met to achieve the most effective outcome of the product. (**alexsoft, 2021**)

Demo – The Helpful Hackers innovative SCRUM team conducted a presentation to the SCRUM master towards the closing of the initial opening Sprint to discuss and review a retrospect of the planning that was undertaken during the initial SPRINT as well as to provide a plan-of-action to progress to the remaining sprints to complete the final solution. The constructive criticism received from the SCRUM master was initially negative, however we accepted the required feedback and what we were required to adapt as well as to adopt that feedback to progress forward, which would successfully produce a desirable project outcome. We also scheduled online feedback sessions with the SCRUM master which in turn became a more positive outcome which provided for us motivation to continue in our remaining tasks. For the commencing of the final sprint, the team acknowledged the process of providing a live testing demonstration of the final solution to our project, whereby we conclude and adjourn the project development process by suppling the background of the project and what it entails, the different achievable milestones that were accomplished by the team across the development stage, as well as to provide a direct testing of the application in the presence of the client and the SCRUM master to explain each functionality that we included as per the client's request. (**agility.im, N.D.**)

1.3) **Helpful Hackers' Definition of Done:**

1) **Definition of Done checklist for User Story:**

- Code reviewed.
- Criteria for acceptance were satisfied.
- Passing functional tests.
- Met non-functional needs.
- User Story is approved by the product owner.

---

2) **Definition of Done checklist for Sprint:**

- Every single user story that is part of the sprint has its DoD met.
- All unit tests passing.
- Product backlog updated.
- Project launched on a platform that is identical to the production environment in testing.
- Device/browser tests on those indicated in the manual were successful.
- Backward compatibility tests were successful.
- Performance testing were successful.
- No bugs remained.
- The Product Owner marked the sprint as prepared for production deployment.

---

3) **Definition of Done checklist for Release:**

- Code Complete.
- Environments are prepared for release.
- All functional and unit tests have passed.

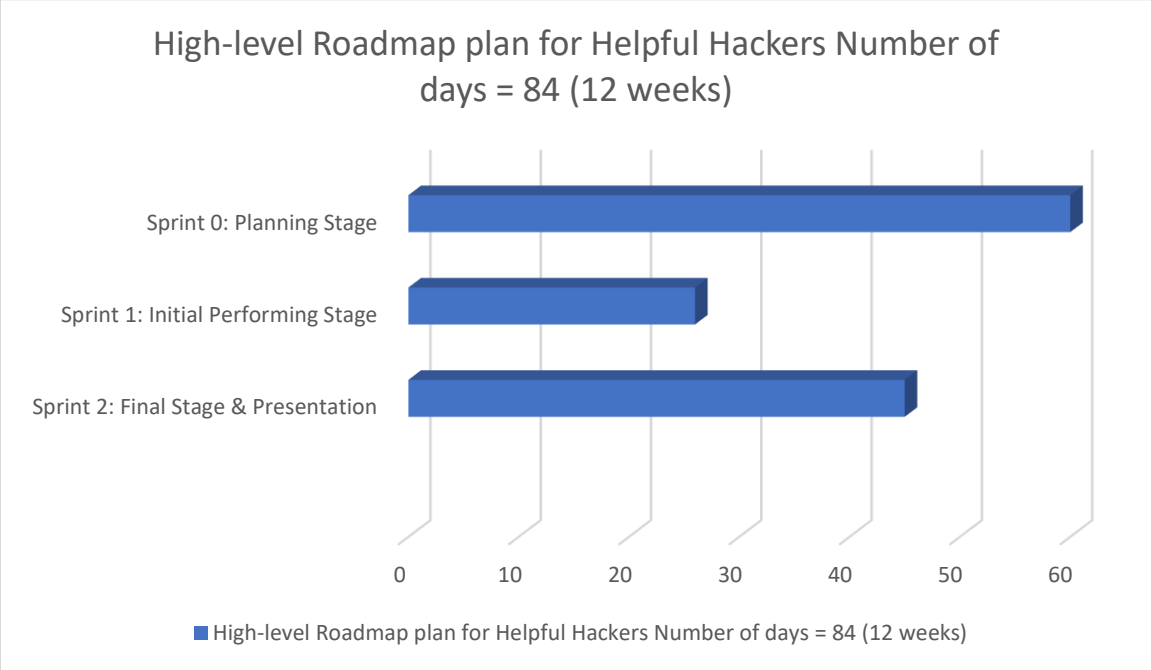
- All the acceptance criteria are met.

- All issues were found and fixed during quality assurance.

- OK from the team: QA, project manager, software architect, UX designer, developer, etc.

- Verify that no staging or development environment has any unfinished work still in progress.

1.4) **Helpful Hackers' Roadmap:**



The initial Sprint 0: Planning Stage

Sprint Goal: Sprint 0 commenced on the 14th of April 2023 and concluded on the 5th of July 2023, where all SCRUM teams were required and allocated specified timeslots to present our initial findings and planning procedures (through the documents such as the product backlog, sprint backlogs, defining our Minimum Viable Product, and to present design documents such as UML class diagrams Entity Relationship Diagrams and Wireframe design imagery) as well as to present any initial stage of DevOps implementation to the project solution.

Sprint 1: Initial Performing Stage

Sprint Goal: Sprint 1 was viewed as a more concise, extensive SPRINT procedure as each project team were to officially commence with the software development process of the entire

project procedure, to consolidate the story items they referenced in the sprint documents (user-stories from the product backlog, and sprint backlog as well as to consolidate the logic and object-oriented programming structures placed in the UML class diagrams and ERD as well as to view the initial design set in the UI/UX design of each intended page and its purpose within the website project).

Sprint 2: Final Stage & Presentation

Sprint Goal: The adjournment of the team as well as the finalization of all the concluding documentation and finalized software application is completed in the final Sprint deliverable. Additionally, all SCRUM teams will present a conclusion demonstration presentation where all deliverables and outcomes covered from the previous planning sprints will be assessed under controlled conditions and it will be discussed with the client and will be provided with feedback and given direction of our attempt to resolving the current scenario.

2) **Helpful Hackers' Requirements:**

2.1) **Helpful Hackers' User Roles:**

Jordan Conor Green: Project Team Lead, manager and administrator that schedules weekly SCRUM meetings, as well as delegates and supervises operations given to each team member.

Mishra Mohammad: Analyst and software developer who provides the meeting minutes recorded from each SCRUM meeting as well as to support the creation and implementation of the sprint backlog as well as to support the escalation procedure that occurs where no response is provide by the technician for student-generated queries.

Nhlakanipho Philani Khumalo: Software developer and editor who collaborated in conjunction with Mishra Mohammad to produce the sprint backlog as well as to support the filtering and sorting of user-created tickets stored on the admin portal, where tickets can be arranged based on priority (high, medium, and low), as well as to provide database connectivity for the successful storage and retrieval of tickets created by students.

Siyambonga Akhona Mfeka: Provides support and is a software developer and is responsible for the logical schema development of the Entity Relationship Diagram (ERD) that will supply as the principle for designing the actual database schema and will act as a referencing guide to illustrate any reshaping and adding entities to the database and how it will affect the remainder of the solution. As per the product backlog, Siyambonga Akhona Mfeka ventured in adding the downloading of ticket reports from the user dashboard to view the full details of all tickets requested by specified users, as well as to provide a rating system that users can submit and will be displayed in the admin portal whereby users can evaluate the experience, feedback and response received from the technical staff member.

Mpumelelo Candice Mchunu: Moderator, analyst and assisting support developer as they were responsible for providing the UML class diagrams as it assisted the Helpful Hackers team with providing the design and planning information in regards to our software program as well as it provides the foreground of the encapsulation and abstraction principles in object-oriented programming. They show which attributes and methods are public, private, or protected, aiding in creating well-structured and maintainable software. Mpumelelo Candice Mchunu was also delegated to displaying the user's email address as a means of parsing the item once the user is authenticated as a means of personalization as this feature can permit personalized content delivery by tailoring the information on a page based on user preferences, history, or behaviour.

Daylin Shadrach: Content creator, editor, and software developer as they provided the CSS styling design of the application and they were delegated the largest task of the project development process in enabling and providing Microsoft Authentication extension for the application through the use of creating an Azure client ID as well as to install the "Microsoft.Owin.Security.OpenIdConnect" NuGet package extension and to reconfigure the authorization method and functionality. Daylin Shadrach was also delegated with the task of developing a privacy and about us page where we can provide a confidential agreement to state the use of user authentication credentials to log into the application as well as to provide an additional background of the who the Helpful Hackers are and what their values are.

Cameron Luke Pillay: Researcher, editor, and developer support where they were delegated to comprise the product backlog sprint document where we as a team outlined the most effective story items to be included as a requirement to develop the designated features identified in the product backlog when we commenced the development process of the application. Cameron Luke Pillay was also delegated to include error handling to redirect a student-user back to the home page when no tickets are available to view in their designated dashboard to act as a roadblock to prevent them from proceeding further as well as to provide the automated response list that will be generated for the technical support agent when responding to user-generated queries to provide convenient methods for technicians to respond to repeating queries.

2.2) **Helpful Hackers' User Stories:**

Story ID	User Stories/Descriptions	Sprint Number	Backlog Priority	Estimated Effort	Story Success
PB001	As a project team member, I want to conduct online research to investigate authentication and signing in to the website during the Sprint Planning process.	0	Priority Poker - 1 (High Priority)	Planning Poker - 2	Successful as all team members were able to conduct extensive online research in regards to each assigned delegated by the team lead towards the successful completion of tasks per allocated SPRINT.
PB002	As a project team member, I want to create a prioritized Product Backlog with a list of features and user stories during the Sprint Planning Meeting so that we can plan and prioritize our work effectively and proceed with responding to user stories from the product backlog.	0	Prority Poker - 1 (High Priority)	Planning Poker - 5	Successful as the Helpful Hackers team consolidated with the SCRUM master within a frequent basis to examine the various versions of our sprint documents and apply updates where applicable to produce a cohesive final solution.
PB003	As a project team member, I want to conduct student research and gather requirements during the Requirement Analysis phase so that we have a clear	0	Prority Poker - 1 (High Priority)	Planning Poker - 3	Successful as we engaged with the initial encounter with the client as well as through the SCRUM master to

	understanding of the users' needs and expectations.				formulate an understanding of the direct requirements needed to accomplish the entire project as well as to ask any clarifying questions if any information is obscured, and to conduct extensive online research for each required task for an effective solution to combat any challenges from occurring.
PB004	As a project team member, I want to create user personas and user stories during the Requirement Analysis phase to better understand our target audience and their specific requirements.	0	Prority Poker - 1 (High Priority)	Planning Poker - 3	Successful as we were able to identify logically where to assign each task within user story items in our sprint documents according to the user requirements that were specified by the client; this includes stating the authentication medium to be allocated as a single-story item to be specify the tool we would like to incorporate to the application

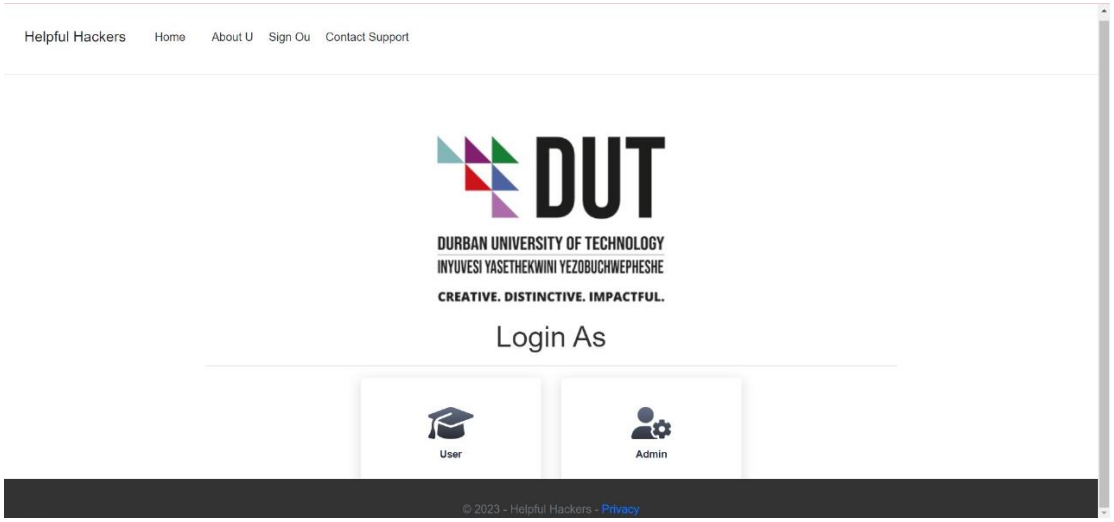
					using the Microsoft authentication extension.
PB005	As a project team member, I want to develop a UI/UX design that meets user requirements during the Design phase to ensure an intuitive and user-friendly website will be implemented.	0	Prority Poker - 1 (High Priority)	Planning Poker - 5	Successful as we were able to provide screenshots of all updated webpage User Interface designs and functionality that was specified by the client and we provided additional designs such as a Privacy Policy agreement and an about us page whilst identifying the required features such as a login page, ticket creation page for the user portal, and administrative portal for ticket responses.
PB006	As a project team member, I want to create a UML Use Case Diagram to visualize the system's functionality during the Design phase so that we have a clear understanding of how different components interact with each other.	0	Prority Poker - 1 (High Priority)	Planning Poker - 4	Successful as we defined the logic through the data models from saving ticket information such as the ticket number, the date issued, and the description of the issue, as well as to provide external properties such

					as rating system reviews, the status of the ticket if it is required to be further escalated and the category of the ticket.
P0007	As a project team member, I want to design and implement UML Class Diagram to predict the design blueprint of the system during the Design phase to understand and describe attributes and operations of a class and also the constraints imposed on the system.	0	Prority Poker - 1 (High Priority)	Planning Poker - 3	Successful.
PB008	As a project team member, I want to design an Entity Relationship Diagram (ERD), to provide a visual starting point for database design that can also be used to help determine the basic information system requirements.	0	Priority Poker - 1 (High Priority)	Planning Poker - 5	Successful as we identified the overall database schema where data manipulation is stored online.
PB009	As a project team member, I want to develop a theme that will be implemented across the entire system during the Development phase to visualize the overall style, presentation, appearance, and atmosphere of the website.	0	Priority Poker - 1 (High Priority)	Planning Poker - 5	Successful as we have identified a common CSS styling and layout of the overall application.
PB0010	As a student, I want to be automatically logged into the system, so that I will be able to use the system.	1	Priority Poker - 3 (Medium Priority)	Planning Poker - 3	Successful as we are incorporating Microsoft Authentication as their users will be automatically

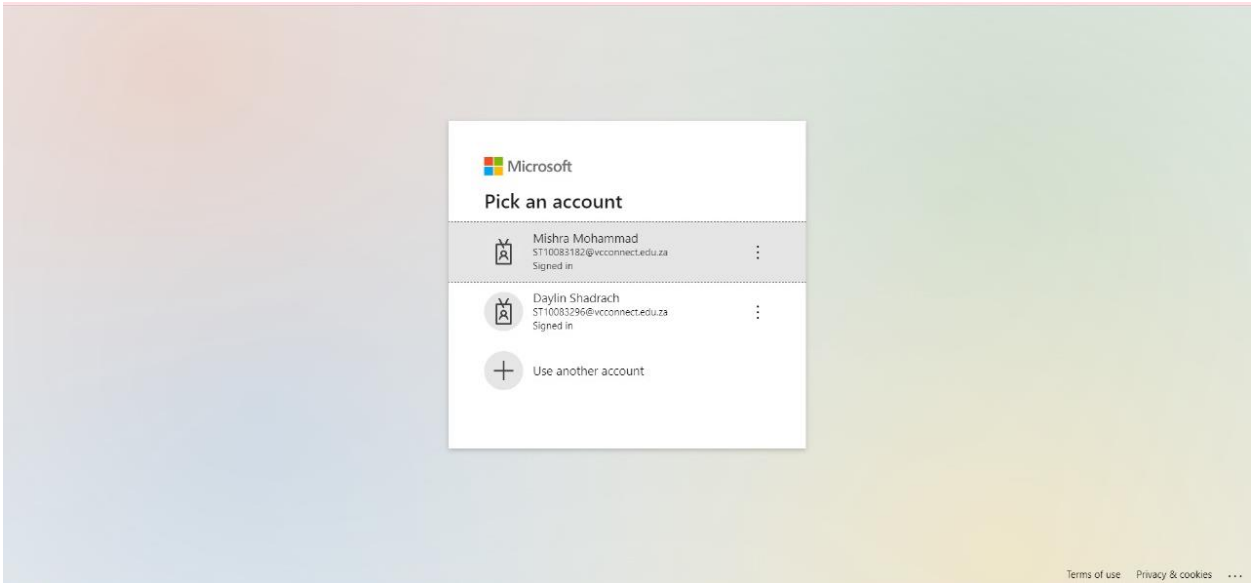
					logged into the system using Single-Sign-On functionality where all applications can be accessed with their credentials.
PB0011	As a student, I want to be able to create support tickets on the system, so that I may be able to raise any concerns that I would like assistance to.	1	MoSCoW Model - 1 (High Priority)	Planning Poker - 2	Successful.
PB0012	As a technical support technician, I want to be able to prioritise the tickets on the system, so that it may be responded to based on the severity of the ticket.	1	Opportunity Scoring - 3 (Medium Priority)	Three-Point Method - 3	Successful as administrative personnel can set up and submit a response to the user-related query and the reference of a response created will be displayed in an email reference with the response placed in an email.
PB0013	As a student, I want to be able to cancel and delete a ticket request from the system, so that I may be able to resend a new ticket in the case I encountered an error with the original ticket.	1	Stack Ranking - 3 (Medium Priority)	Dot Voting - 5	Successful.
PB0014	As the system, I want to notify technical support technicians through an email that a certain ticket(s) have not been responded to within 2 working days.	2	MoSCoW Model - 1 (High Priority)	Planning Poker - 2	Successful.

PB0015	As a technical staff member and manager, I want to be able to create a list of templates for automatic responses to support queries.	2	Priority Poker - 1 (High Priority)	Planning Poker - 1	Successful.
PB0016	As a technical support technican, I want to be able to view and use various response templates to effectively reply to requests.	2	Stack Ranking - 1 (Medium Priority)	Bucket System - 1	Successful.
PB0017	As a technical support technican, I want to be able to respond to support queries requested by students without templates and close responded tickets to provide assistance to technical issues.	2	Opportunity Scoring - 1 (High Priority)	Planning Poker - 1	Successful.
PB0018	As a student, I want to be able to contact the additional support agent if my ticket is still unresolved.	2	Opportunity Scoring - 1 (Medium Priority)	Relative Sizing - 2	Successful.
PB0019	As a student, I want to be able to provide feedback and rate the use of the overall system through a star selection method and by stating possible improvements required for future assistance provided by staff members.	2	Opportunity Scoring - 1 (Medium Priority)	Three-Point Method - 3	Successful.
PB0020	As a software developer, I want to be able to construct a report to individually log each request made by a specific student and staff member.	2	Priortiy Poker - 1 (High Priority)	T-Shirt Sizes - 4	Successful.

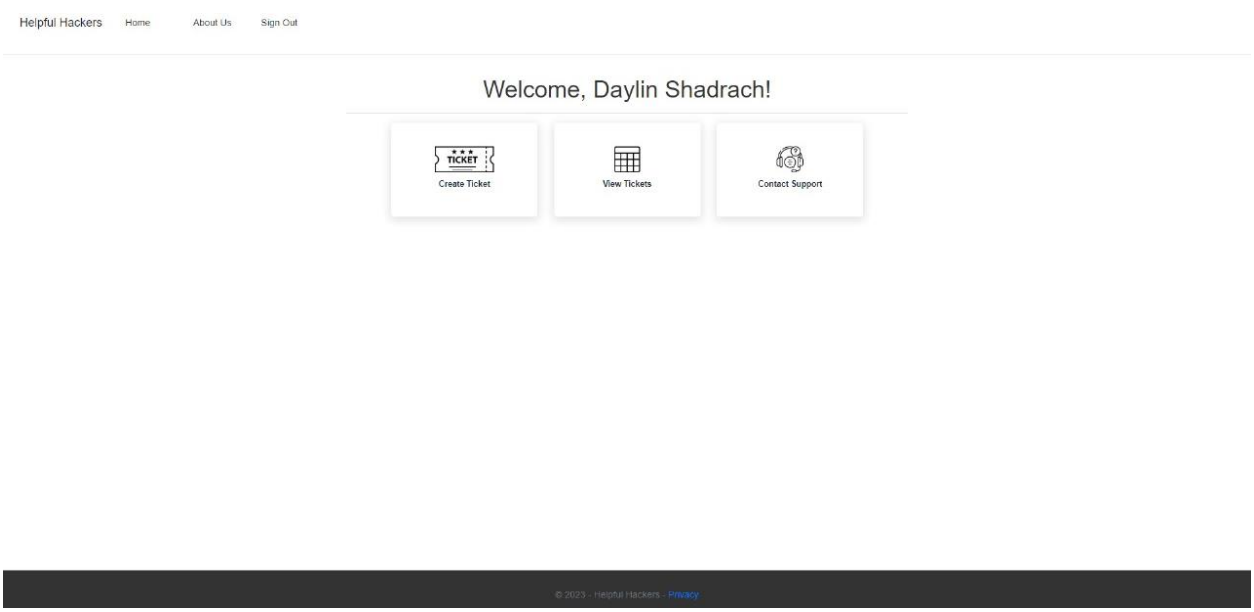
2.3) **User Experience Journey Map:**



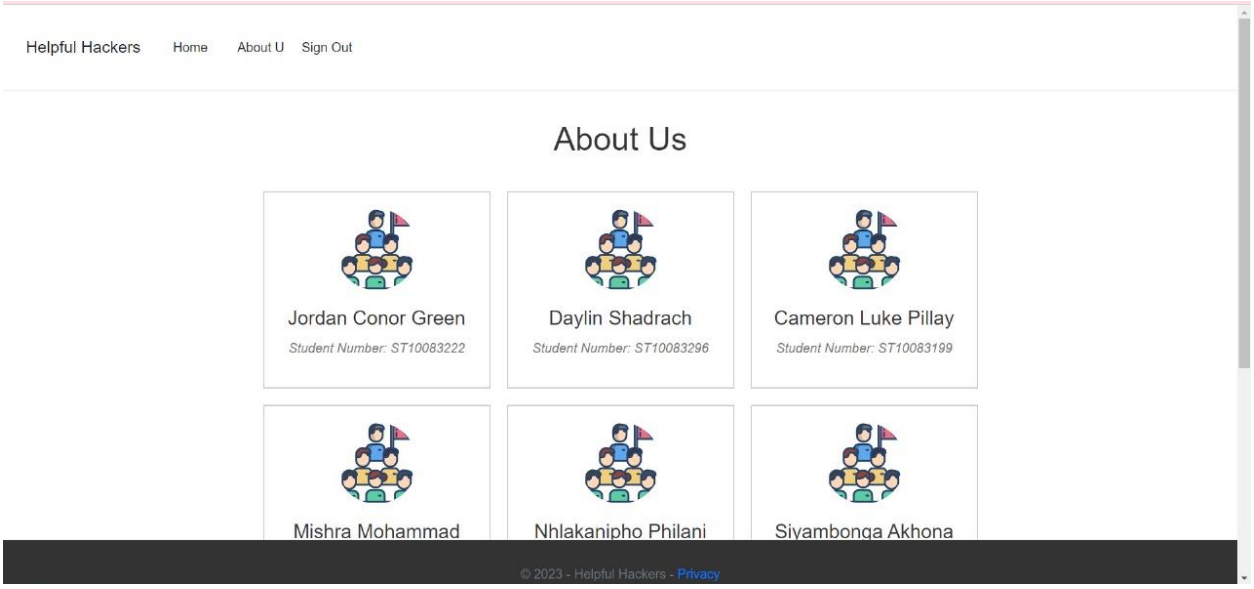
Once the user executes the application, they will be greeted with the welcome page where someone can choose if they would like to log in as a user to be transferred to the user portal to create tickets or as an admin to view all ticket responses.



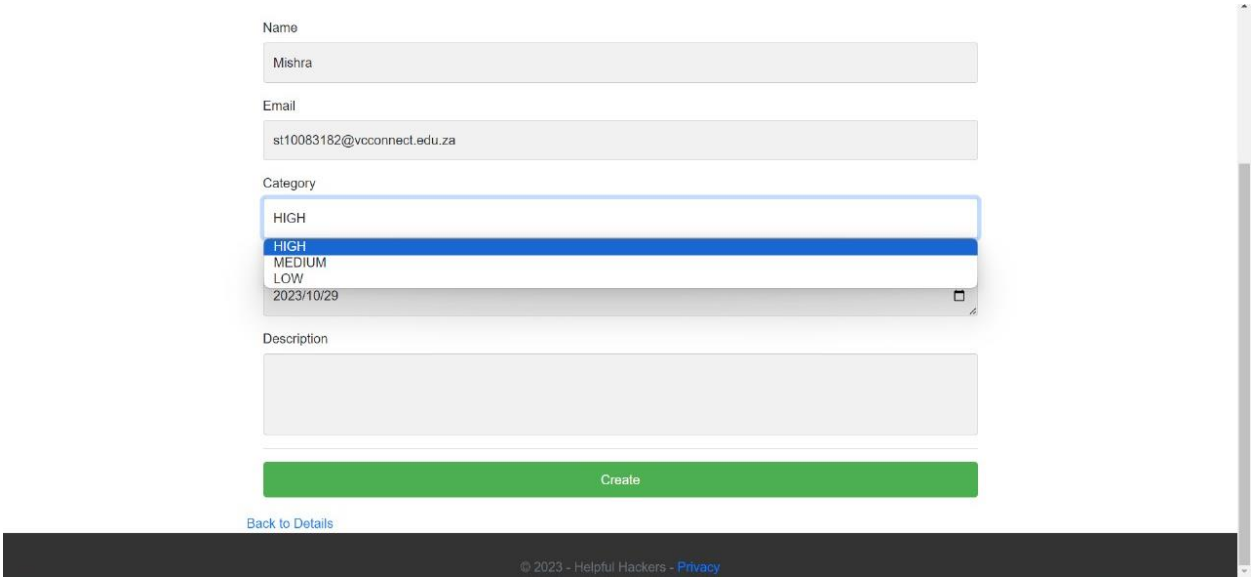
Once a user has logged into the system either as a user or admin, the Microsoft Authentication portal window where a user can authenticate and verify their credentials before transferring to the website further.



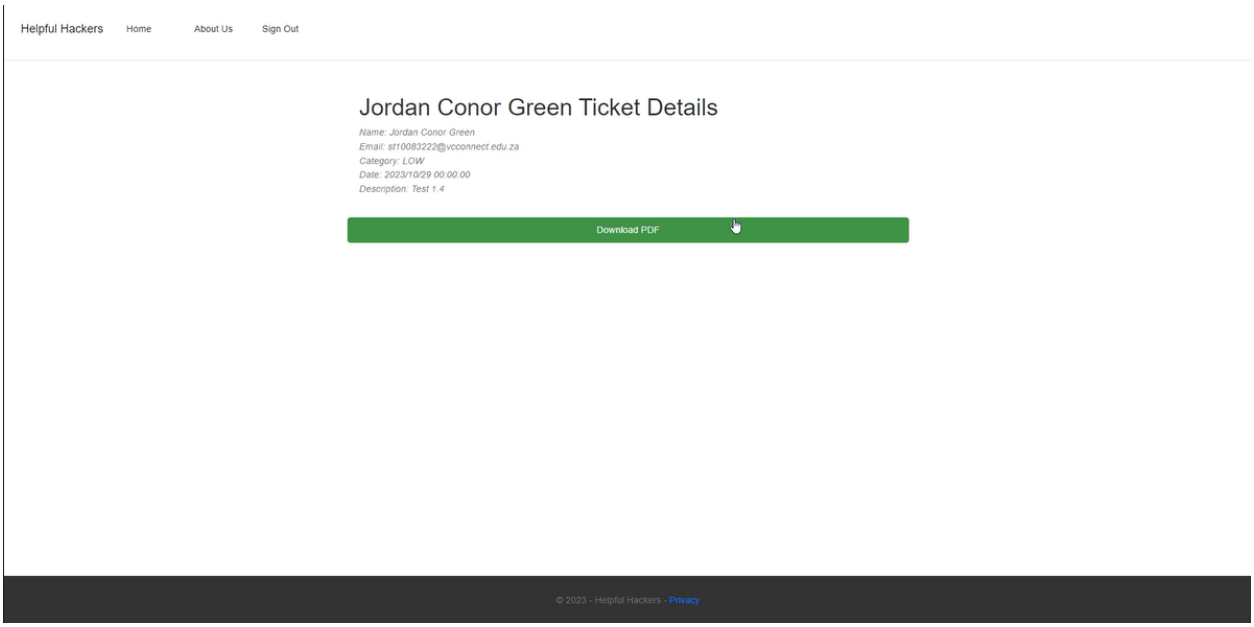
The design snippet above shows the ticket-creation where a student-user can create a ticket, view all logged tickets as well as to contact additional support if a query is still unresolved after the response was generated by the support technician.

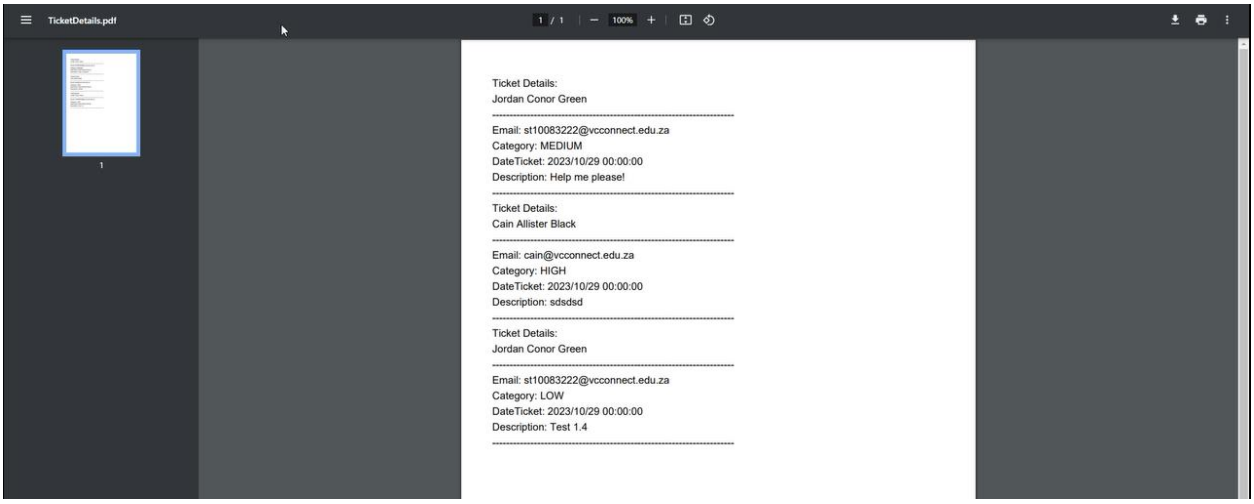


Through any portal, users can access the dedicated navigation bar where a user can sign-out of the application as well as view the About Us page to give a brief background of who the Helpful Hackers team are.

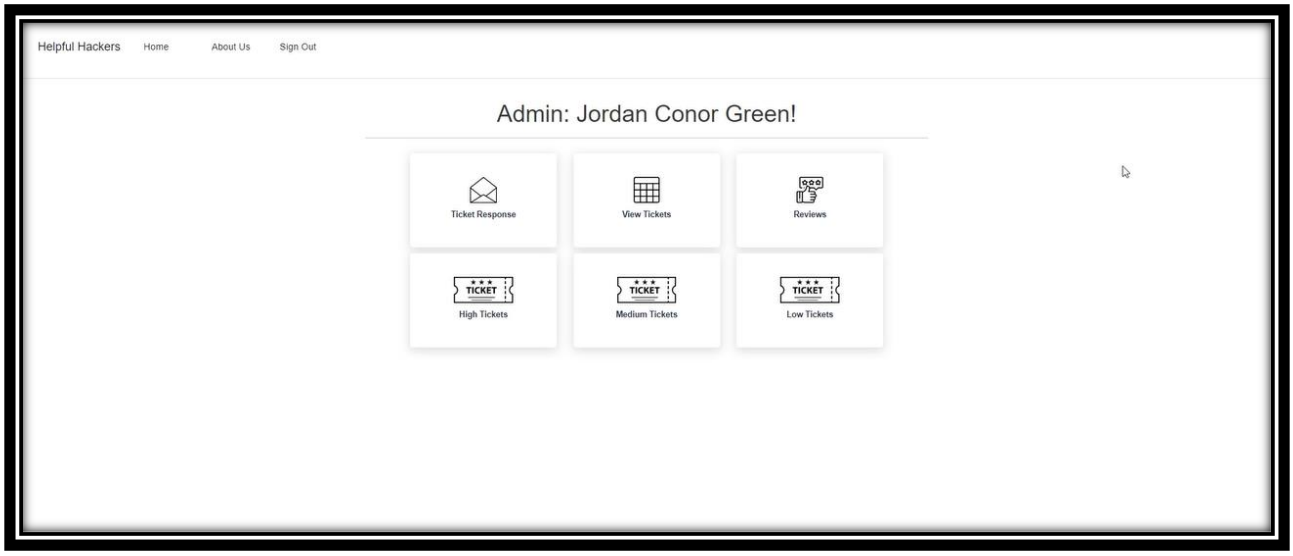


The above design snippet includes the process of submitting a support-query ticket where a student can add the required information in the desired fields and click the button to save to the database and draw it and it will save it locally on the website.

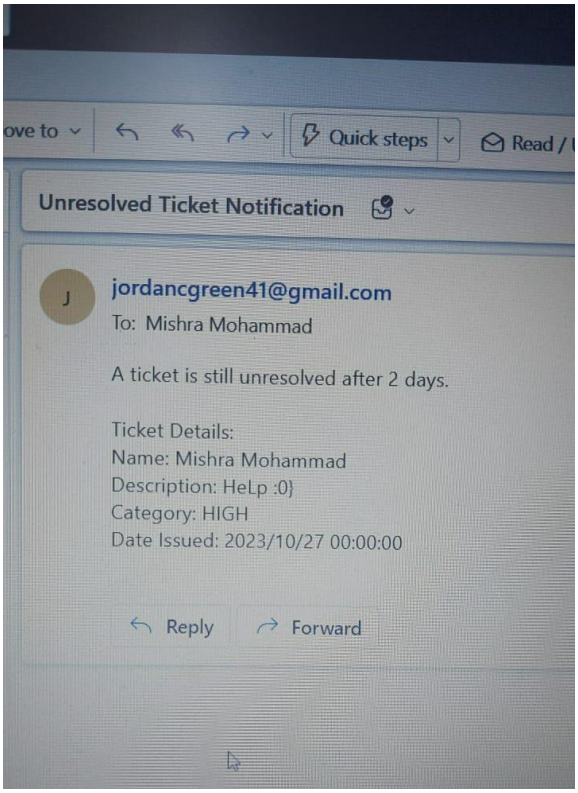




The above design snippets show if a user wishes to view the details of a specified ticket they may download a PDF report of all tickets created to observe if a similar ticket was submitted to access the course of action that was advised by the support technican.



The above design snippet shows the administrative portal where a user can manipulate ticket submission made as per request as well as to provide an effective response to each submission to assist with controlling automated student queries.



The above design snippet refers to the escalation process whereby the administrative technical support personnel will receive a notification email to state that a specified user-ticket has not been responded to within 2 days and must respond urgently to prevent student-dissatisfaction for user experience gained.

3) **Helpful Hackers' Non-Functional Requirements:**

- Performance: Our system should execute and load within two seconds as the intended runtime of the Google recommended page is shy of two seconds. (**Blue Corona, 2019**) We should also accommodate for 500 concurrent user capacity. (**Cloudkul, N.D.**)

- Scalability: With the possibility of increase spike in data volumes, data throughput (referring to the concept in data transmission which represents the amount of data that is actively moving successfully from one place to another within a given timespan (**Burke, N.D.**)) and scalability measures may become pedantic considerations. The Helpful Hackers team have identified the most vital in designing and configuring a system that can easily scale up or down to accommodate the desired data throughput. Scaling up (vertical scaling) a system requires the increase in resources (hardware devices) such as CPU, disks and RAM chips which allows the system to support larger data volumes and temporarily manage high load and the primary reason for scaling up is due the result of magnifying data processing speed and monitoring significant input data. The concept of scaling down (horizontal scaling) allows for the addition of new machines (such as software nodes) to meet the workload and resource requisites. When the load

spike diminishes, reduction in capacity is highly crucial to optimize costs. An elastic system pool can dynamically respond to varying loads. (**Kaur, N.D.**)

- Security: With the incorporation of Microsoft Authentication, it covers the concept of Single-Sign-On which prevents users from registering new credential with weak passwords and it conforms with data encryption key management to protect encryption keys and implement proper key management practices to protect encrypted data effectively.

- Reliability: The system should be available between the 8am-5pm to adhere to regular scheduling working hours and if a response was submitted after the available time, the response will be attended to at the next business day.

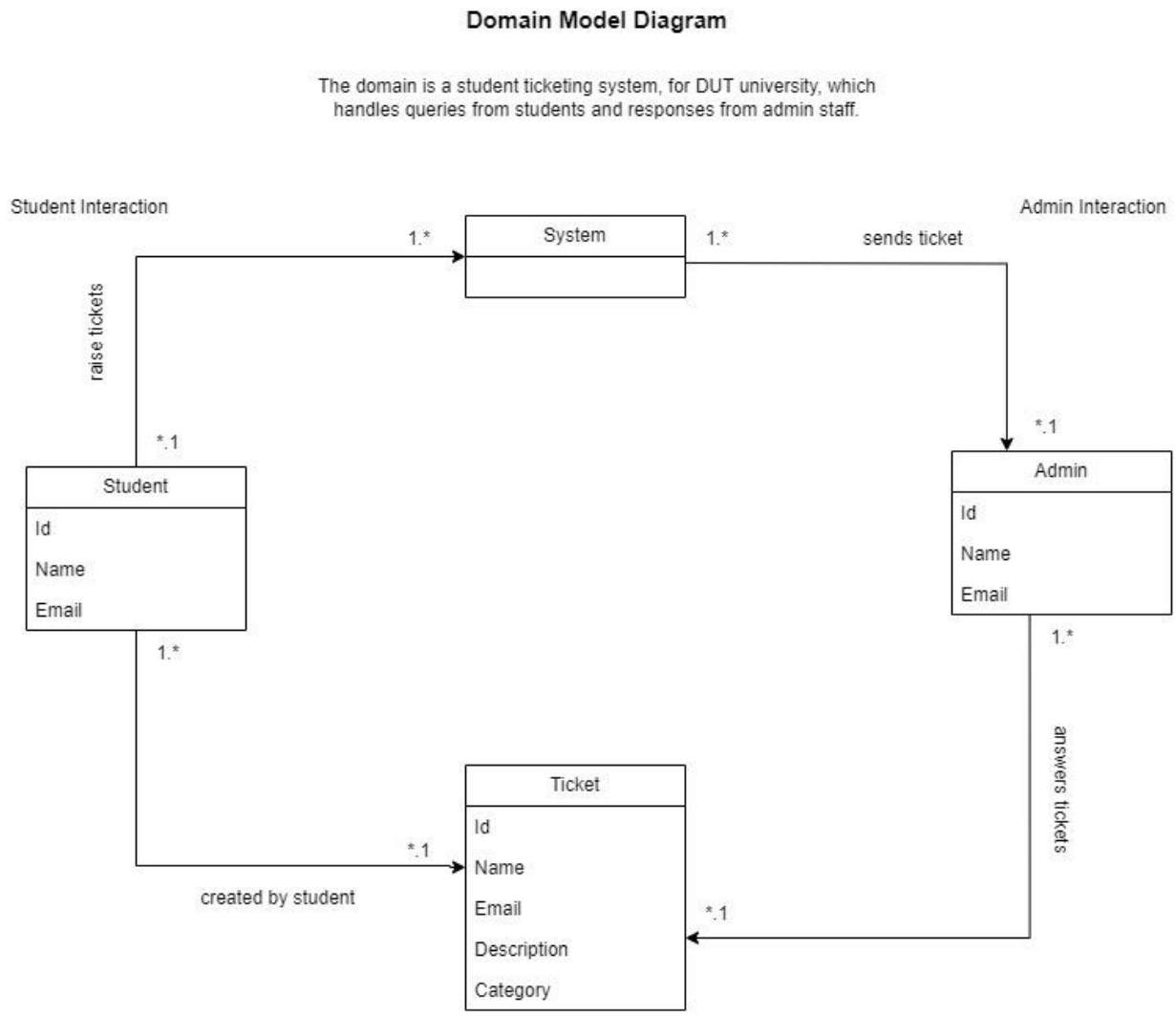
- Usability: The system should be clearly documented to ensure that the users fully understand the procedures of using our application such as on-website instructions. As well as it should be backed up every three months.

- Maintainability: As the system is constantly backing up every three months, we will ensure that the correct software updates should be put into place for maximum efficiency during operations.

- Portability: The system should be adaptable and scaled based on user device choice as to provide convenience to those who operate their work operations using a mobile smartphone and who do not have direct access to a computer.

4) **Helpful Hackers' Analysis Artifacts:**

4.1) **Helpful Hackers' Domain Modelling:**



The student entity represents the primary user within our application as this website will cater their need of accomplishing automated responses that will be responded to by a technical support consultant. Once the student-user has placed and submitted their ticket for a common issue they are experiencing, it will be processed on the system, where the student will receive a reference email by the system stating the acknowledgment of the ticket received and it will be delegated to the relevant and available personnel equipped to respond. Once administrative personnel receive the ticket that was just created, they will acknowledge the ticket stating the appropriate solution necessary for a student to undertake to resolving their issue, and the student will receive

confirmation along with a response from the system stating the solution that was provided by the technician.

4.2) **Helpful Hackers' Design Artifacts:**

The domain model constitutes the core concepts and business rules of the Helpful Hackers application. Implementation models are the actual classes, data structures, and code that make up your software system. The following steps refer to our approach in analysing the domain model to instrument implementation models which consolidates in developing a vigorous software application:

- Recognizing the Domain Model: Review the domain model, which may include domain entities, value objects, aggregates, repositories, services, and other domain-specific concepts. We ensured that we have a clear understanding of the domain's business rules and requirements outlined by the client.

- Identify Key Concepts: Identify the key concepts and entities within the domain model. These are the nouns or objects that represent the core elements of your application.

- Classify Entities: Determine which entities should become classes in your implementation model. Typically, entities correspond to classes in your code.

- Defining Value Objects: Identify and define value objects keys in the domain model. Value objects are objects that have no identity and are immutable. They can be implemented as classes or structures in your code.

- Design Aggregates: We provide regulation on how to group entities and value objects into aggregates. Aggregates are clusters of domain objects treated as a single unit. Each aggregate should have a root entity that serves as the entry point for operations.

- Create Repositories: If the domain model includes repository interfaces, implement these as part of your implementation model. Repositories are responsible for data access and should be designed to persist and retrieve aggregates.

- Implement Services: Identify and executing domain services if our domain model specifies any. Services are stateless, domain-specific operations that don not naturally belong to any specific entity.

- Define Value Objects as Immutable Classes: We developed fixed classes for value objects. These classes should have no setters and should be used as data structures to

hold values. Ensure immutability by not allowing changes after creation.

- Implement Business Rules: Translatting the business rules from the domain model into code. Ensure that the implementation model enforces these rules to maintain consistency and integrity.

- Define Interfaces and Contracts: Designing interfaces and contracts for our implementation classes, following the principles of abstraction and encapsulation. This allows you to decouple the implementation from the domain logic.

- Handle Persistence: Implement the data access and persistence logic, including database interactions if required. This may involve creating database tables, data access objects, or using an ORM (Object-Relational Mapping) framework.

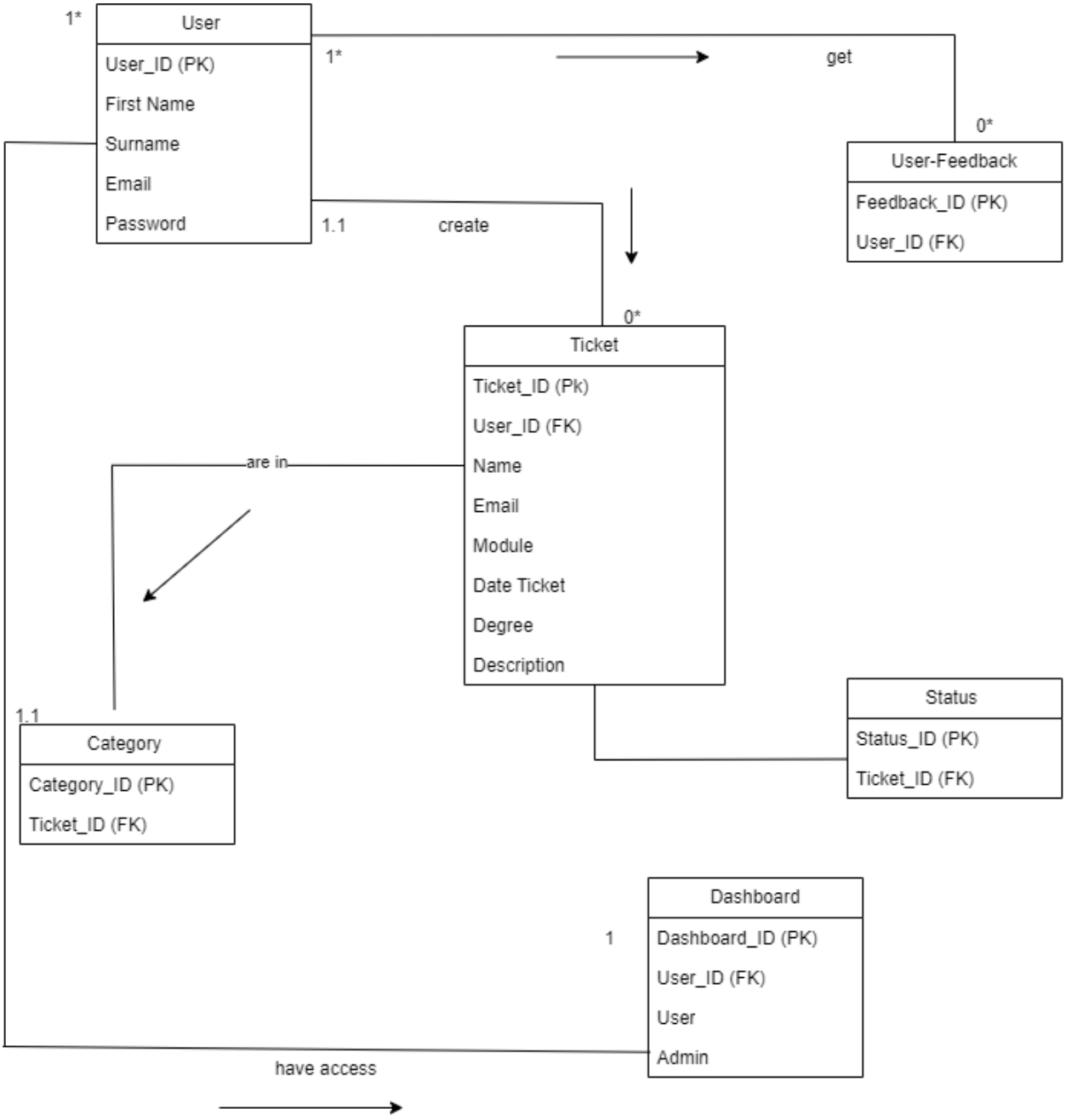
- Maintain Separation: Ensure a clear separation between the domain model and the implementation model. The domain model should remain free of technical concerns and dependencies.

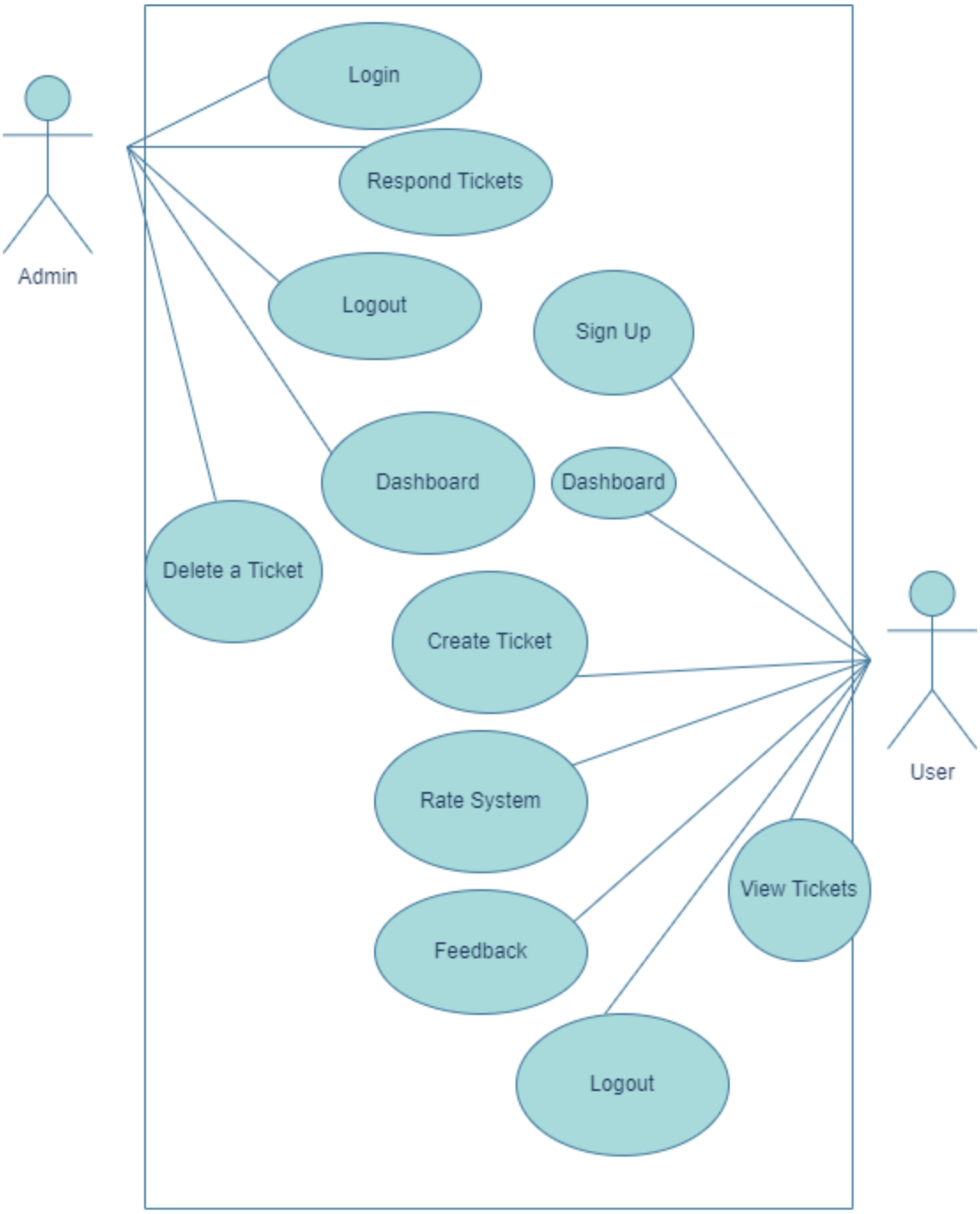
- In-Depth Testing: Develop unit tests, integration tests, and functional tests to validate the correctness of your implementation model. Ensure that it adheres to the business rules and requirements.

- Refine and Iterate: Refine your implementation models as you learn more about the domain and its intricacies. Be prepared to iterate and make changes as needed.

- Document and Communicate: We also documented the implementation models and communicate them effectively with the development team to ensure everyone understands the design and can work collaboratively.

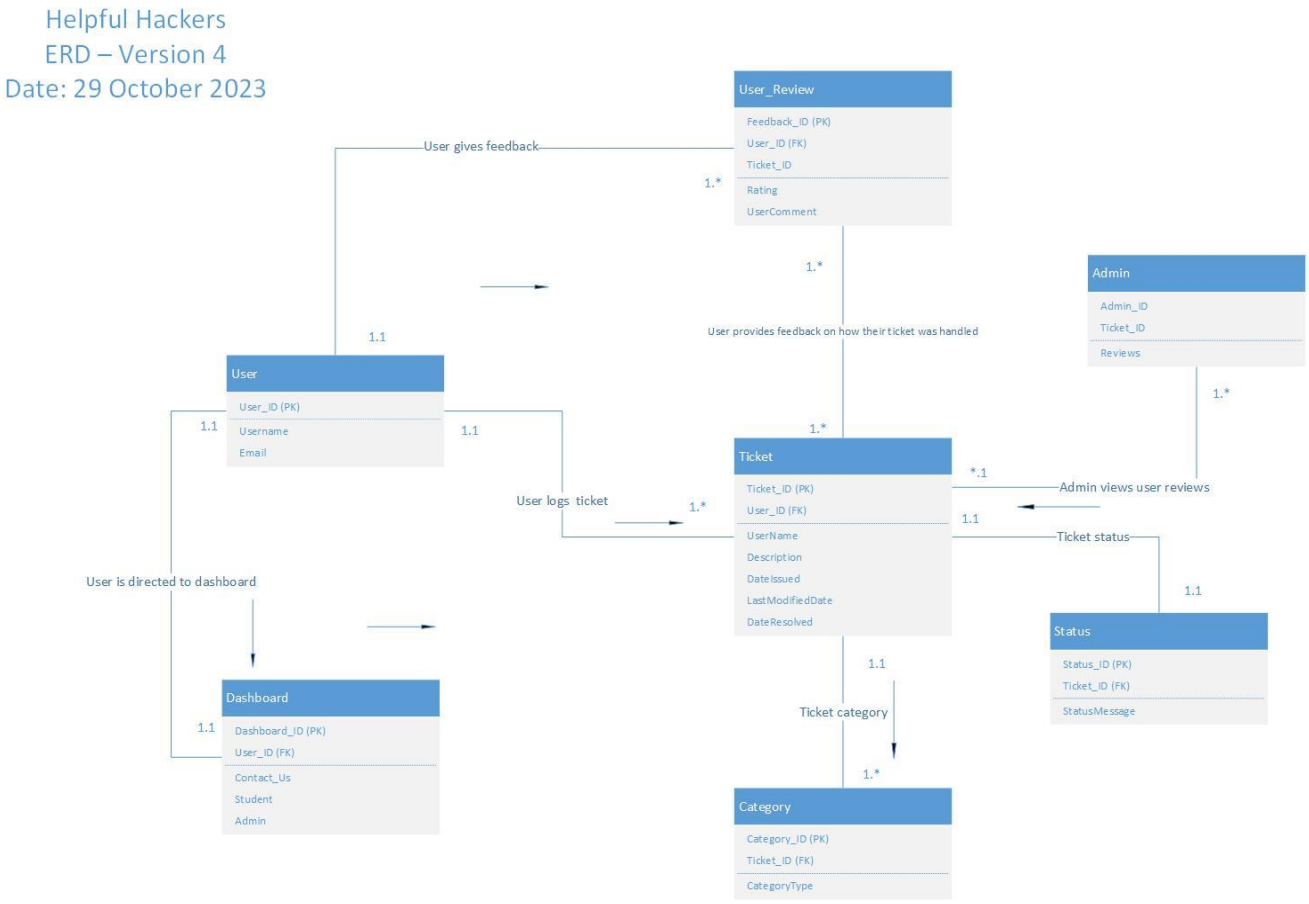
5) **Helpful Hackers' Implementation Documentation:**




Admin
Login
Respond Tickets
Logout
Dashboard
Delete a Ticket
Sign Up
Dashboard
Create Ticket
Rate System
Feedback
Logout
View Tickets
User

6) **Helpful Hackers' Data Schema Documentation:**

We are encompassing an Azure SQL database as a process of providing a cost-effective data storage method to supply a built-in generation of availability for designated Helpful Hackers team members as well as to provide a crisis-eversion tools such as a backup version of the database in the case of inaccessibility for updates as well as an Azure service shutdown incursion.



7) Helpful Hackers' Architecture Artifacts:

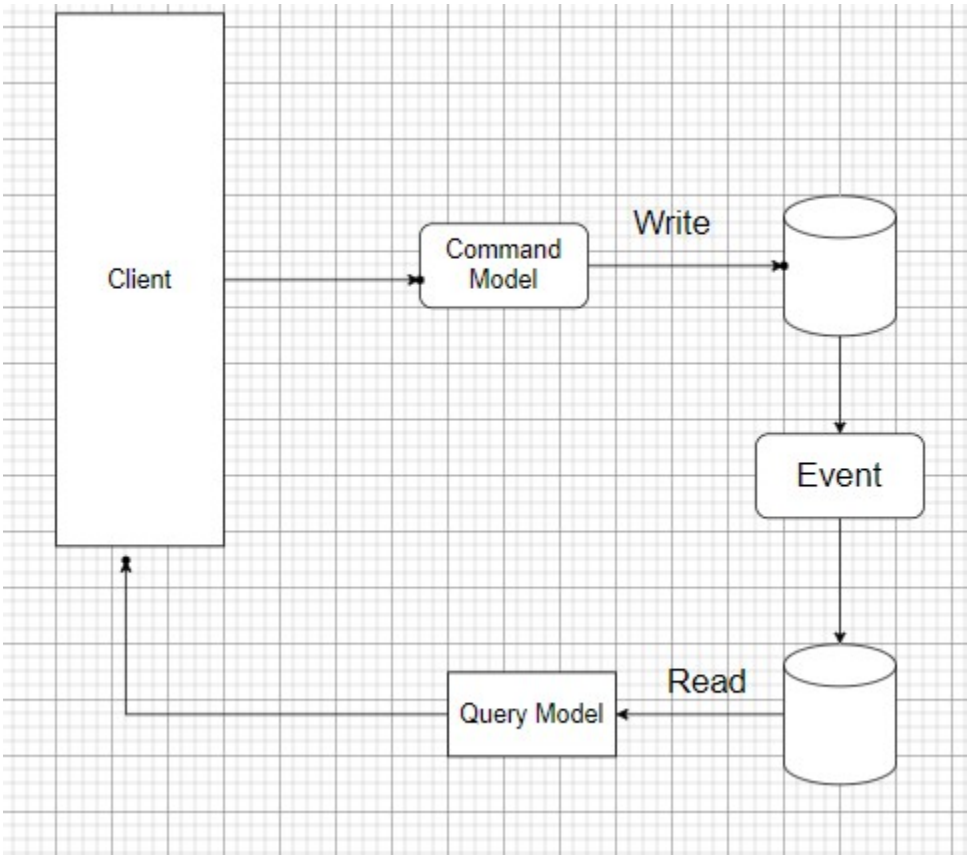
7.1) Helpful Hackers' Design Patterns:

We have developed a singleton pattern based upon the creational design patter as we have identified creation mechanisms as our authentication instance is used throughout our application to encompass the Microsoft Authentication extension as well as to embed it to determine if a user will be logging into the system as a user or an admin. We also provided a singleton design pattern in the sense for ticket implementations as the same ticket reference with the user-related query is stored can be accessed in the admin portal where the technician will provide a response to the issue.

7.2) Helpful Hackers' Architecture Patterns:

We have selected a Model-View-Controller (MVC) application as our architecture pattern as it provides quick development processes and supports for asynchronous techniques which refers to the incorporation of adapting the capability of manipulating PDF files which is a story item we incorporated in the product backlog as well as it separates the logic of each method and object reference in an effective manner by offering developers to incorporate numerous webpages if required where MVC can support the logic and processes as well as provide effective user input and validation as required.

7.3) **Helpful Hackers' Cloud-Based Architecture Patterns:**



We have hosted an online database using a Microsoft Azure environment, where all team members have access to it where the data can be manipulated to save user-ticket query. The above diagram illustrates the hosted client website of our application sending a command model (creating a ticket) and writing it to a database which in turn acts as an event to the database to read the response ticket query it to the model and display it the admin view portal.

8) **Helpful Hackers' Security Procedures:**

In terms of best security practices that we are adhering for our project is through Microsoft Authentication. The following are the security practices that Microsoft offers:

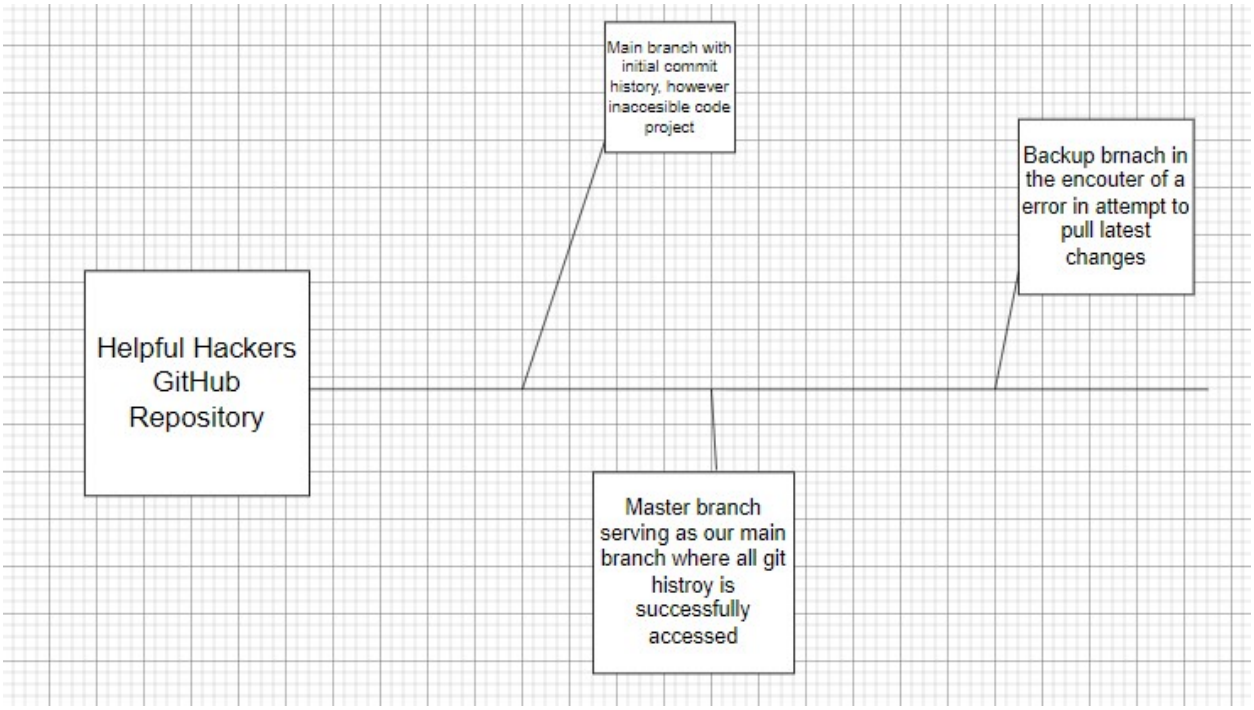
- Multi-Factor Authentication (MFA): Microsoft earnestly recommends and often enforces MFA for all user accounts. This includes an extra layer of security by requiring users to provide more than one form of verification before granting access,

such as a password and a temporary code sent to a mobile device.

- Single Sign-On (SSO): SSO in Microsoft environments allows users to sign in once and access multiple applications without re-entering credentials. This improves security for our application once it is executed and operating functionally as it reduces the risk of weak passwords or password reuse.

9) Helpful Hackers' DevOps:

9.1) Helpful Hackers' GitHub Actions Pipeline:



We provide constant updates to our source-code project and we constantly pull any recent changes made by each team member and we merge the changes and sync it back to our master branch to provide a consist git commit history of the work performed through the development process.

10) Helpful Hackers' Running Costs:

Predicted Monthly Cost = (Upfront Costs + Recurring Costs) / (Number of Months)

Upfront Costs: This involves expenses such as domain registration and initial website design or development. Assume that the amount is R2000.

Recurring Costs: These are ongoing monthly expenses, which typically include web hosting, domain renewal, and any software or services you subscribe to. Assuming these related costs amount to R300 per month.

Number of Months: 24 (2 years)

Predicted Monthly Cost = (R 2,000 + (R 300 * 24)) / 24

Predicted Monthly Cost = (R 2,000 + R 7,200) / 24

Predicted Monthly Cost = R 9,200 / 24

Predicted Monthly Cost is approximately R 383.33

So, the estimated monthly cost for running a website over two years would be approximately R 383.33, assuming the specified upfront and recurring costs.

11) **Helpful Hackers' Change Management:**

The Helpful Hackers team is a team of hardworking individuals who collaborated that offered a unique solution to the chosen scenario as we included additional features such as report functionality as well as to promote the most cost-effective, engaging, and easy-to-use application that promotes order in supporting student-related queries at the DUT institution. The reason why users will adopt our software is that it is pleasing to view as it provides a cohesive styling design across all web page content to promote positive engagement and provide the ability to explore more whilst still possessing the required functionality detailed by the client and SCRUM master. Our strategy to gain adoption between the business (DUT) and student-users is to promote consistent involvement in providing easy-to-use field inputs to create a ticket request and to provide simplistic manipulation for DUT technical staff, where this project can be used across multiple different institutions around South Africa to promote sustainable involvement between university staff and students to effectively respond to sever queries that occurs in a systemize manner to control workflow of automated staff responses as oppose to manual labour as well as to promote convenience to all parties.

12) **Helpful Hackers' Appendices:**

12.1) **Helpful Hackers' Declaration of Authenticity:**

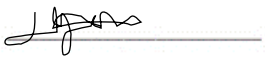
Declaration of authenticity

I, **Jordan Conor Green** ID Number, **ST10083222**

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.



STUDENT SIGNATURE DATE **10/30/2023**

Declaration of authenticity

I, **Cameron Luke Pillay** ID Number, **ST10083199**

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.

STUDENT SIGNATURE

DATE **10/30/2023**

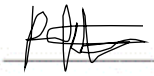
Declaration of authenticity

I, Philani Khumalo ID Number, ST10083213

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.



STUDENT SIGNATURE DATE 10/30/2023

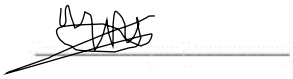
Declaration of authenticity

I, Mishra Mohammad ID Number, ST10083182

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.



STUDENT SIGNATURE DATE 10/30/2023

Declaration of authenticity

I, Daylin Shadrach ID Number, ST10083296

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.

STUDENT SIGNATURE

DATE 10/30/2023

Declaration of authenticity

I, **Mpumelelo Mchunu** ID Number, **ST10153265**

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.

STUDENT SIGNATURE

DATE **10/30/2023**

Declaration of authenticity

I, **Siyambonga Mfeka** ID Number, **ST10083151**

hereby declare that this portfolio, and any evidence included therein, contains my own independent work and that I have not received help from other groups.

I confirm that we have not committed plagiarism in the accomplishment of this work, nor have I falsified and/or invented experimental data.

I accept the academic penalties that may be imposed for violations of the above.

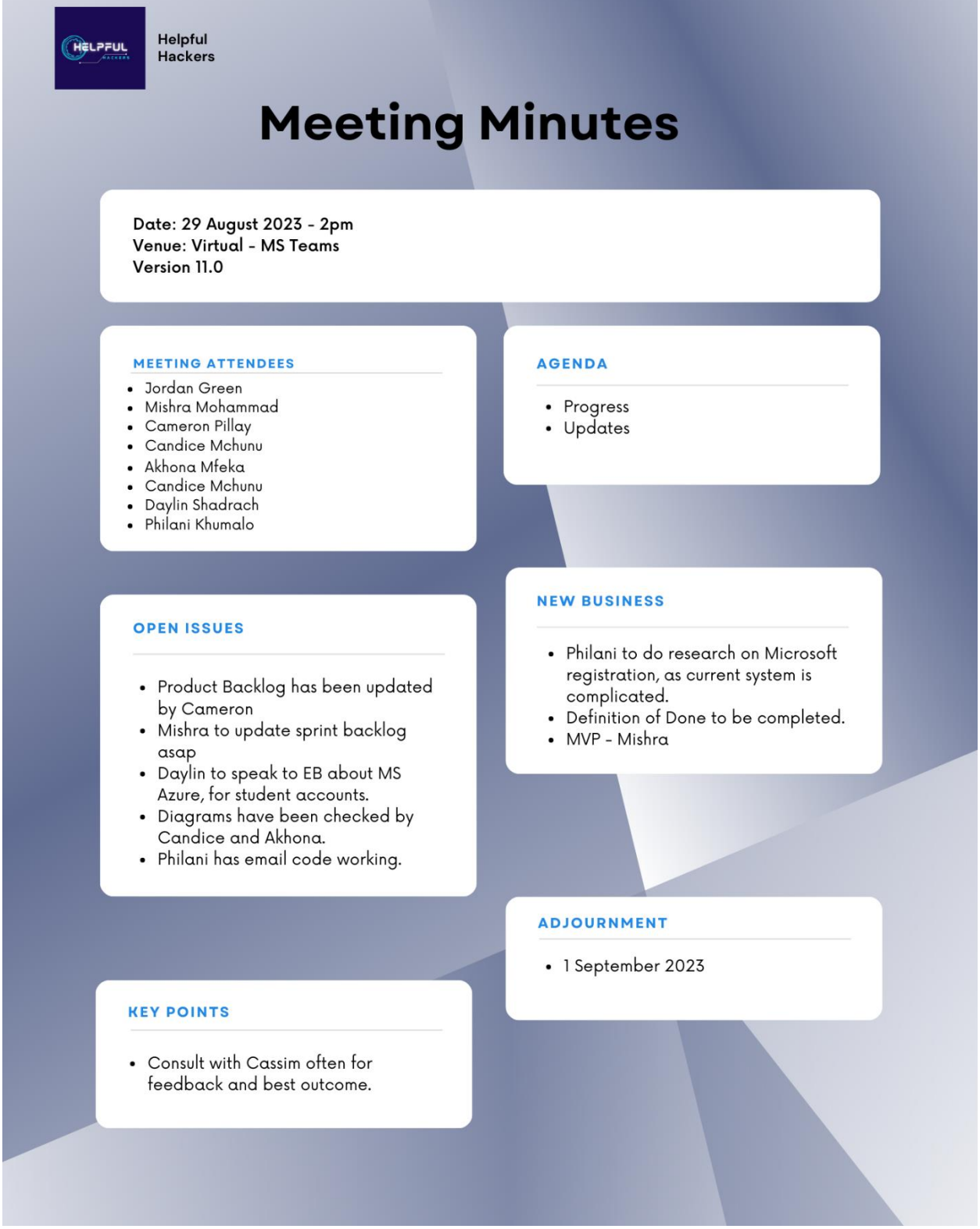
STUDENT SIGNATURE DATE **10/30/2023**

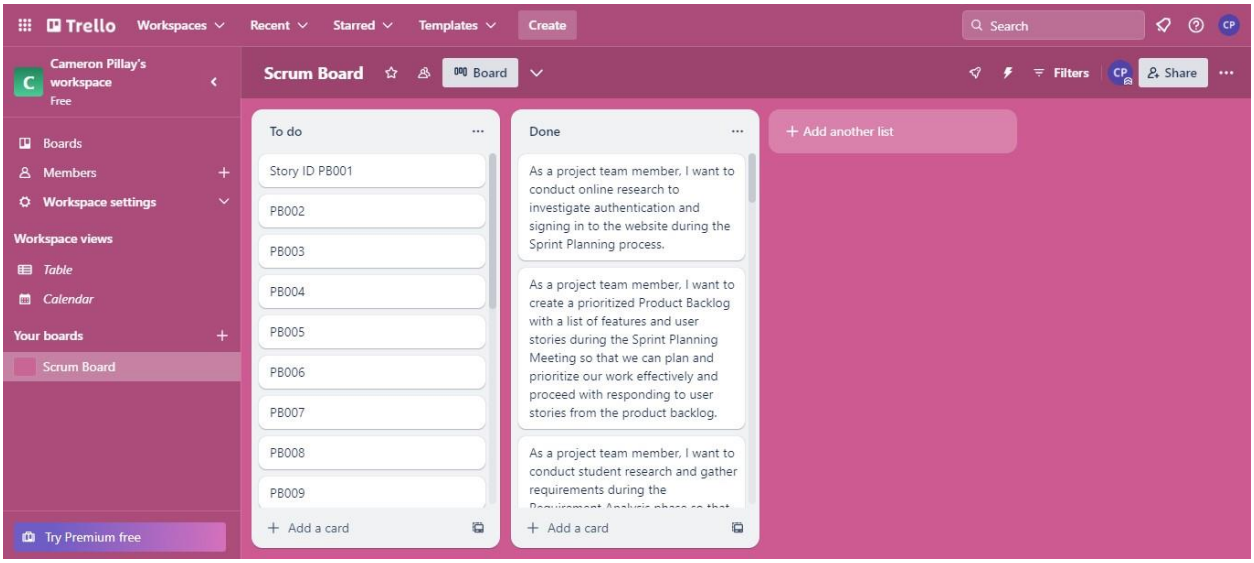
12.2) **Helpful Hackers' Scrum Artifacts:**

(Group 1): Helpful Hackers – Meeting Minutes Register

1) Jordan Conor Green: ST10083222
2) Daylin Shadrach: ST10083296
3) Mishra Mohammad: ST10083182
4) Mpumelelo Candice Mchunu: ST10153265
5) Nhlakanipho Philani Khumalo: ST10083213
6) Siyambonga Akhona Mfeka: ST10083151
7) Cameron Luke Pillay: ST10083199

Client: Goolam Rasool Ramjan


Helpful Hackers
Meeting Minutes
Date: 29 August 2023 - 2pm
Venue: Virtual - MS Teams
Version 11.0
MEETING ATTENDEES
Jordan Green
Mishra Mohammad
Cameron Pillay
Candice Mchunu
Akhona Mfeka
Candice Mchunu
Daylin Shadrach
Philani Khumalo
AGENDA
Progress
Updates
OPEN ISSUES
Product Backlog has been updated by Cameron
Mishra to update sprint backlog asap
Daylin to speak to EB about MS Azure, for student accounts.
Diagrams have been checked by Candice and Akhona.
Philani has email code working.
NEW BUSINESS
Philani to do research on Microsoft registration, as current system is complicated.
Definition of Done to be completed.
MVP - Mishra
ADJOURNMENT
1 September 2023
KEY POINTS
Consult with Cassim often for feedback and best outcome.



https://trello.com/b/a2jQ0bzm/scrum-board (SCRUM board link)

12.3) **Helpful Hackers' Presentation Rubric:**

9 ANNEXURE I: Presentation Rubric

This is the rubric your lecturer will mark your group and individual presentation against. Please refer to this when preparing your presentation.

PRESENTATION RUBRIC

NAME OF STUDENT GROUP ..... **MODULE: .....**

CRITERIA	0-1 Does not meet the required standards	2 – Meets the required standards	3 – Partially exceeds the required standards	4 – Exceeds the required standards	TOTAL
VISUAL AIDS & TIMING					
Physical & Electronic e.g., demonstration of working application, PowerPoint slides, etc	• Unrelated to presentation.	• Poor, distracts audience, adds nothing to presentation.	• Commercially available visual aids, relevant to topic, enhance understanding and explanation.	• Original visual aids, relevant to topic, support and enhance understanding and explanation.	/5
GROUP DYNAMIC					
Present as a team	• Only one person presents	• The whole team are involved in the presentation	• The whole team are engaged with the audience while presenting	• Presentation flows naturally between all team members without any prompting from other team members	/5
GENERAL LECTURER FEEDBACK:					
				TOTAL:	**/10**

References

agility.im. What is a definition of ready. [Online]. Available at: https://agility.im/frequent-agile-question/what-is-a-definition-of-ready/ [Accessed 22 October 2023]

alexsoft. 2021. Acceptance Criteria for User Stories: Purposes, formats, Examples, and Best Practices, 18 May 2021. [Online]. Available at: https://www.altexsoft.com/blog/business/acceptance-criteria-purposes-formats-and-best-practices/ [Accessed 29 October 2023]

Blue Corona, 2019. HOW FAST SHOULD A WEBSITE LOAD?, 24 November 2019. [Online]. Available at: https://www.bluecorona.com/blog/how-fast-should-website-be/#:~:text=If%20you%20want%20a%20quick,it%20comes%20to%20customer%20service. [Accessed 30 October 2023]

Burke, J. throughput, TechTarget. [Online]. Available at: https://www.techtarget.com/searchnetworking/definition/throughput#:~:text=In%20data%20transmission%2C%20network%20throughput,gigabits%20per%20second%20(Gbps). [Accessed 30 October 2023]

Cloudkul. How to measure the concurrent users that an eCommerce can handle?. [Online]. Available at: https://cloudkul.com/blog/what-is-concurrent-users/ [Accessed 30 October 2023]

Fortinet. What is Single Sign-on (SSO)?. Fortinet. [Online]. Available at: https://www.fortinet.com/resources/cyberglossary/single-sign-on#:~:text=Single%20sign%2Don%20(SSO)%20is%20an%20identification%20method%20that,the%20authentication%20process%20for%20users. [Accessed 28 October 2023]

Microsoft Ignite, 2023. Timer trigger for Azure Functions, Microsoft Ignite, 11 September 2023. [Blog]. Available at: https://learn.microsoft.com/en-us/azure/azure-functions/functions-bindings-timer?tabs=python-v2%2Cisolated-process%2Cnodejs-v4&pivots=programming-language-csharp [Accessed 28 October 2023]

Novoseltseva, E. 2019. Definition Of Done Examples For Software Projects, Apiumhub, 26 September 2019. [Blog]. Available at: https://apiumhub.com/tech-blog-barcelona/definition-of-done-examples-software-projects/#:~:text=For%20example%2C%20in%20software%2C%20a,automation%2C%20integrated%20and%20documented.%E2%80%9D [Accessed 1 September 2023]

Kaur, T. Scaling Data Engineering Infrastructure: Lessons Learned from Industry Experts, Medium. [Blog]. Available at: https://medium.com/womenintechnology/scalability-refers-to-a-systems-ability-to-handle-larger-workloads-including-considerations-3a3d609efeb9 [Accessed 30 October 2023]