Construction 2

Document 3: Supplementary Specification

HexaTech

INFO3003A

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Version Control

Updates to documentation from elaboration 1 to elaboration 2.

Update	Details
Reports	• Added a narrative description for both reports • Adjustments to the reports themselves – added a more refined time slicer. • Minor adjustments to report motivation.

Business Rules

Application specific rules

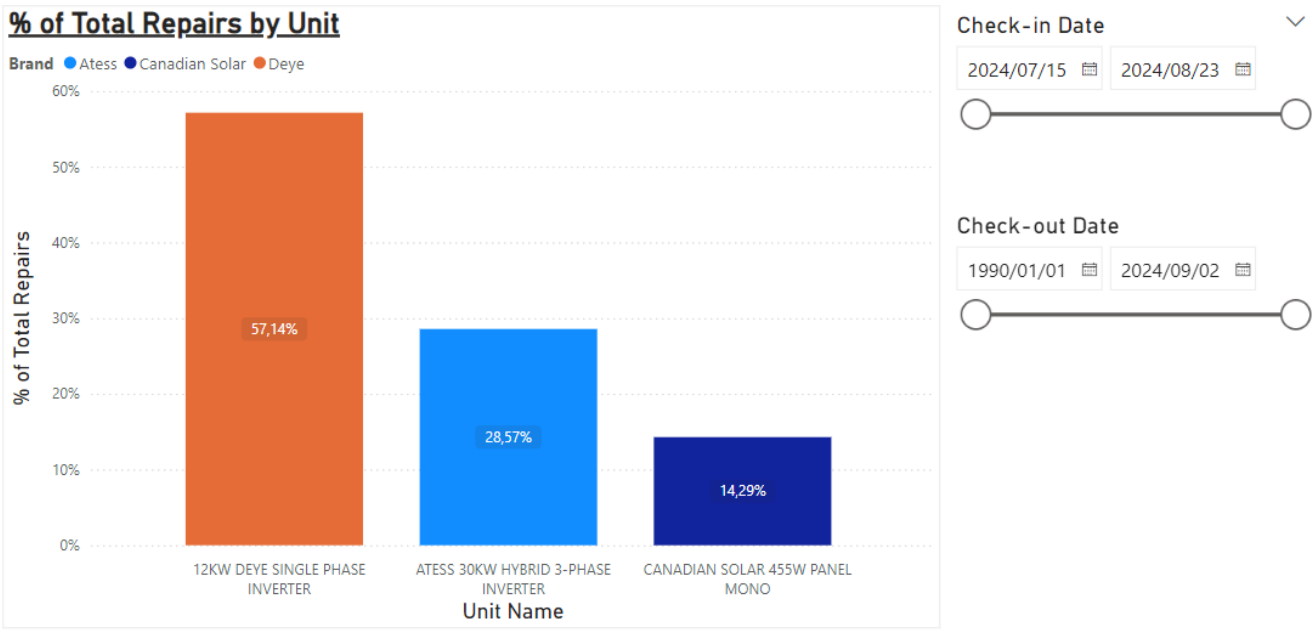
1. Customer Sign-Off rule: SolarWay Suppliers requires customers to sign when they receive their completed repaired unit.
2. Equipment List rule: The business requires that technicians list the parts used in any specific repair.
3. Fault Description rule: SolarWay Suppliers requires the technician working on a repair to document in brief format what was wrong with the unit and what was done to repair the unit.

General industry rules

1. Warranty Validity Rule: SolarWay Suppliers only accepts units to be repaired if the unit is still under warranty – in line with industry standards for repairs.
2. Manufacturer Repair rule: If the technicians employed by SolarWay Suppliers are not certified to repair a specific unit, it is sent back to the manufacturer for repair. This is a manufacturer requirement as only certified personnel are allowed to repair units.

Reporting

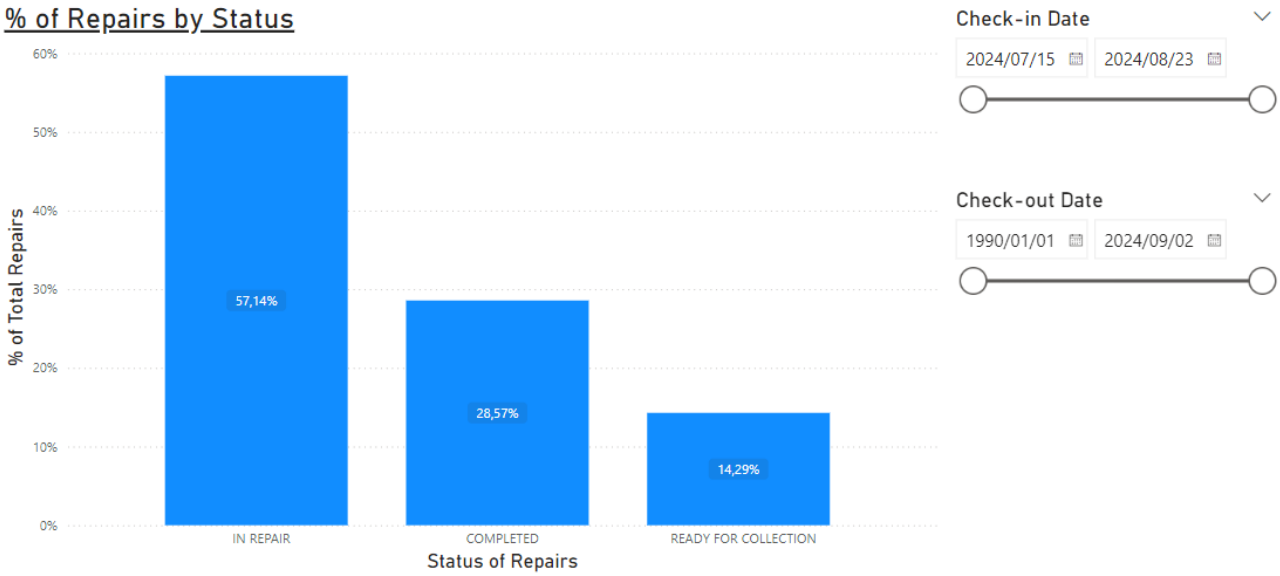
Report 1: % of Total Repairs by Unit



Report Name	% of Total Repairs by Unit
Report Graphic	Stacked column chart.
Report Recipient	Technicians, directors, and owner of SolarWay Suppliers.
Narrative Description	The “% of Total Repairs by Unit” report is designed to show readers the frequency by which repairs are done on the different units SolarWay Suppliers sells. The report uses a stacked column chart that visualises the percentage of total repairs attributed to each unit. Additionally, the report includes a date slicer, providing users the option to limit the date ranges for check-in and check-out date, thereby choosing a specific period for the report to pull data from.
Report Motivation	This report measures which units are most often being repaired, as a percentage of total repairs. It further separates the repairs of the units by the brand type. The report will be according to selected dates by the user to allow for clarity, the dates are selected according to the slider seen in the image, specific dates can also be implemented by clicking on the calendar icon. There is substantial value in this report for maintenance planning, operational efficiency, and cost saving. This report allows readers the insight into which unit are most frequently repaired, and with this knowledge, management at SolarWay Suppliers can make decisions such as what training to implement, which units to stop selling if they are extensively being repaired, what parts to keep in stock, and more. This report provides business value for these reasons as it will allow SolarWay Suppliers to understand which units as well as which brands are most often being repaired and can take decisions to lessen the economic costs of these repairs, such as removing certain

	problematic units from inventory, or implementing new training programs to improve efficiency for high repair count units.
Design Choice	A design decision was taken to display this report in the form of a stacked column chart. This design choice allows report viewers a clear, distinct overall view at which units and brands are most repaired. The choice is use % of total instead of numbers was taken as it gives a better understanding of what proportion of total repairs a certain unit is. The reason for repair is given in the stacked columns, this provides additional information to report viewers to determine if there is a correlation between a unit and a specific issue – adding another benefit of using a stacked column chart. There will be a slicer to allow the user to select a date range for the report.

Report 2: % of Repairs by Status



Report Name	% of Repairs by Status
Report Graphic	Column chart.
Report Recipient	Technicians and directors of SolarWay Suppliers.
Narrative Description	The "% of Repairs by Status" report provides an overview of the current status of all repairs in the system, or according to a selected period – showing what percentage of repairs are at each stage relative to the total sample of repairs. This report also incorporates a time slider to filter the data by specific time periods.
Report Motivation	This report measures the status of units in real time, as a % of the total repairs, according to a specific date range selected by the user. This report provides valuable insight into the repairs process that decision makers at SolarWay Suppliers can use to improve business processes. The report allows the viewer to see, in real time, the status of repairs, and therefore, the efficiency of the repairs process, and to identify any potential bottlenecks or other issues impairing the repairs process. The report adds value to the business by identifying bottlenecks, with this knowledge, decision makers can take action to resolve the bottlenecks, such as training technicians, which improves the repairs process, thereby creating a better customer experience, enhancing the reputation of the business.
Design Choice	A design decision was taken to display this report in the form of a column chart. This design choice allows report viewers a clear, and concise visual that shows where exactly repairs are along the process. The report shows the values as % of total instead of using numbers, this gives viewers a more informed visual on the number of repairs at a certain status as proportion is easier to make decisions on rather than raw numbers.

	There will be a slicer to allow the user to select a date range for the report.

Architecture

Software Architecture

For our proposed system, we are intending to use JavaScript to build a web-based application. With this in mind, we have decided to follow the Model-View-Controller (MVC) software architecture.

The MVC design pattern promotes separation.

The model refers to the repairs database in the application. The model manages the behaviour of the domain. It responds to requests for information about the data or to instructions to change state.

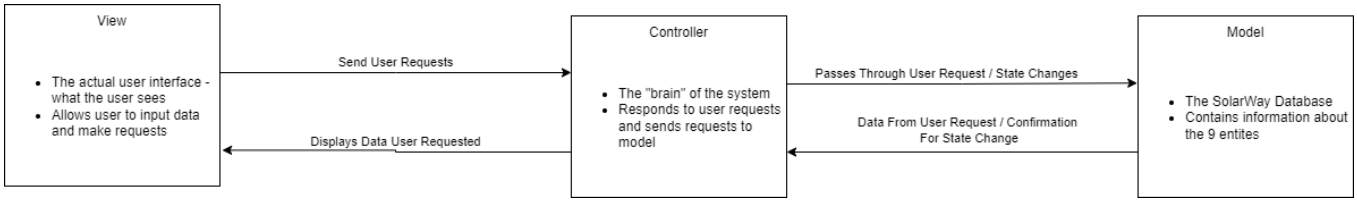
The view refers to the user interface. It displays data from the Model and allows users to interact through user interface elements.

The controller acts as the messenger between the View and the Model. It receives user inputs and processes requests. By using the input from the View, it instructs the Model to perform actions based. Controllers play a crucial role in managing flow.

There are several reasons why we have opted for the MVC architecture:

- Segregation of concerns: the MVC architecture separates different aspects of the application, being the database, interface, and logic controller. This makes it easy to manage and maintain each of the three components independently.
- Scalability: The MVC architecture encourages a structured approach to development with the modulation of components. It is easier to scale the application according to the business's needs and add and edit existing features without disrupting the entire system.
- Multiple views: Web-based applications need to support multiple views based on user roles. MVC allows for the creation and management of different user interfaces (views) without impacting on the underlying logic and data.
- Collaboration: MVC allows for collaborative development, and this is extremely useful in the context of this project, allowing our team to separate responsibilities with regards to the development of the application. Different individuals can work on the different components of the MVC.
- C# specifics: Our decision to use C# through visual studio ties in well with the MVC architecture. Visual Studio has built in support for MVC development. The MVC architecture also integrates with the .NET Framework our system will be based on, allowing for the use of the established libraries of features and third-party tools.

Considering all these benefits, and the fact that the MVC architecture is well suited to web-based applications, we have chosen it as our software architecture.



Hardware Architecture

For our web-based application, we have decided to use a 2-tier hardware architecture. There are 3 components in this form of architecture: the presentation layer, the business/logic layer, and the data layer.

By using the 2-tier hardware architecture, these 3 components are split over two devices. This is a client server type architecture.

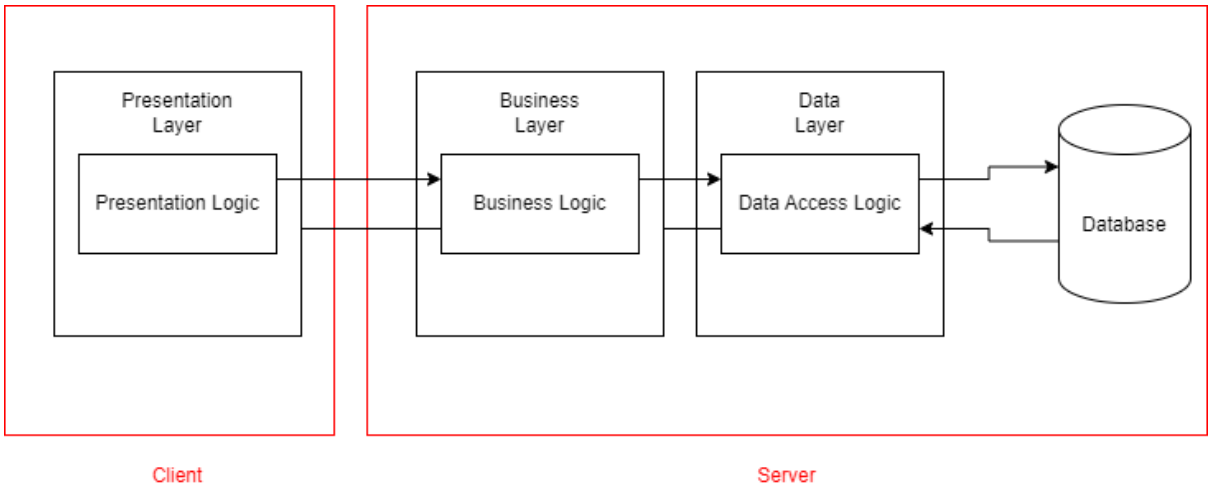
The database and data access layer runs on a server and is a separate tier. This allows easy maintenance of the database.

The business logic of the application is stored on the same server in the same tier as the data layer and database. This allows users to access the business logic via networks.

The presentation logic of the application is a separate tier, being the first tier. This is the client side of this architecture.

A major reason why 2-tier hardware architecture structure is used is ease of development, and with the limited development time as well as the academic nature of this undertaking.

In addition, SolarWay has their own server on site, this allows us to keep the second tier, with the database, data access and business logic on the in-house server, while tier 1, the presentation logic is stored on the client computer. This is a key reason for our choice to use a 2-tier hardware architecture, SolarWay Suppliers requested to keep potential costs of the system to a minimum, and a 3-tier hardware architecture would require a cloud server with an ISP, which is an additional cost.



Important Non-Functional Requirements

We have followed the URPS approach to the non-functional requirements of our system. We will delve into each aspect of URPS, usability, reliability, performance, and supportability.

Usability:

- The system should be aesthetically pleasing for the user.
- The system should have help options provided on the user interface. This allows users to click this option should they need help with using the application.

Reliability:

- The system should be always available 24/7 and on demand, and only go down for maintenance and backup purposes.
- The system's database should be backed up on a regular schedule.

Performance:

- The system should maintain a maximum 5-second response time to any query.
- The system should run on computers with 4GB of RAM or more.

Supportability:

- The system should have a testing period to ensure that the standard of quality meets expectations.
- The system should come with a document that answers potential questions from users, a user manual.

Risk Analysis

Risk type	Details	Mitigation
Security Risks	• Unauthorized entities accessing the sensitive data stored in the system.	• Implementing and enforcing strong password protection protocols.
Technical Risks	• System crashing and being unavailable. • Data loss within the system due to corruption.	• Implementing a plan of regular backups on a specified schedule. • Performing updates and patches to fix any potential issues and bugs in the software.
Operational Risks	• User afraid of not knowing how to use the system. • Lack of support from development team.	• Train workers on how to use the system and ensure an element of comfortability. The training must include an aspect on transitioning from the current system to the new one.
Reputation risk	• Poor functionality can damage the reputation of the business due to customer dissatisfaction.	• Conduct usability tests to discover what the issues users face when navigating through the application and rectify these issues to ensure a pleasant user experience.

Constraints to the Project

Implementation Constraints

- Time Constraints: The project needs to be completed within a year to ensure minimal disruption to ongoing business operations.
- Resource Availability: We are students at a university with limited availability due to other commitments, impacting resource allocation.
- Training Needs: Staff members may require training to effectively use the new system, which adds additional time and resource constraints.
- Integration with Existing Systems: The new system needs to seamlessly integrate with existing systems and processes to ensure smooth operations.

Hardware Constraints

- Compatibility: The new system should be compatible with the existing hardware infrastructure used within SolarWay Suppliers to avoid additional investment in new hardware.

Software Constraints

- Technology Compatibility: The chosen software solution should be compatible with the company's IT environment and support the required functionalities.
- Security: The system should have a robust password protection system to ensure the safety and security of the data stored.

Legal Constraints

- Permission from the university is required to use the software, and the lecturer must sign it over to the company.

Industry Analysis

Competitor Analysis

Through our own understanding and experience, the following can be deduced about competitors in the same industry as SolarWay Suppliers.

There are many different approaches to repairs that solar businesses offer, SolarWay Suppliers, being a wholesaler, is in a more niche area of the industry. All wholesalers have to abide by the warranty requirements of manufacturers of solar equipment. Some businesses, owing to personal experience, offer repairs in the pen and paper way, where customers have to fill out many forms before being able to have their units repaired. They also receive information about their unit over phone calls, manually done by business personnel.

Some businesses may use information system software solutions to track repairs, as one member of our group has interned at SolarWay Suppliers, we are aware that they considered purchasing a software solution for the repairs department, but found the costs involved too high to justify the purchase.

Solar Growth in South Africa

Due to loadshedding, companies and private individuals in South Africa have moved towards off-grid energy solutions (Ferris, 2023), which has caused the solar industry to boom in the country.

The South African Government has also began encouraging solar installations with a rebate scheme to make this renewable energy source cheaper for the consumer (Ferris, 2023).

With this growth in mind, SolarWay Suppliers is in a booming industry, and by ensuring they have efficient protocols and systems in place now, they are poised to profit off this boom.

Appendix

References

Ferris, N. (2023, August 15). *Weekly data: South Africa's unprecedented rooftop solar boom*. Retrieved from Energy Monitor: https://www.energymonitor.ai/tech/renewables/weekly-data-south-africas-unprecedented-rooftop-solar-boom/?cf-view