THE ANNE SUILLIVAN CENTRE
Increasing Staff Efficiency by Improving Current Systems
March 2011

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ABSTRACT

The aim of this project was to maximize the quality of life for residents in the Anne Sullivan Centre by increasing staff efficiency. This meant eliminating the current paper-based system and advising the client on establishing an integrated computer network between the separate buildings. This involved automating the 8 week staffing roster, creating a database of the resident’s logs and making further system recommendations to increase staff efficiency. The interactive roster was designed in Microsoft Excel and includes Microsoft Visual Basic. The database was created in Microsoft Access and will produce analysis reports on the residents’ behaviour, diet and activities.
The project was completed for the Anne Sullivan Centre, a lifelong residential and educational care for people who are deaf/blind, with additional disabilities.

The project constructed and completed two fully functional systems that not only meet, but exceeded, the client’s requirements, by adding analysis reports generated by an efficient database, along with further constructive advice and research into the rostering system.

The complexity of the client’s requirements grew with each meeting, starting with improving the staff time-keeping system. However, after in-depth discussions and analysis of the paper based system, a number of significant ad hoc tasks became a part of the solution to increase staff efficiency.

I would like to thank my supervisor, Dr. Eileen Drew. Her support and guidance for the length of this project was very much appreciated. I would also like to thank Finola Loughney, Patricia Curran and Fiona McCay of the Anne Sullivan Centre and along with the rest of the team within the Centre. Their contributions, kindness and patience were of enormous help in the design and development of this project.
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28th March 2011

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<td>G.1</td>
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1. INTRODUCTION

This chapter outlines the background relating to the client and project. It also provides a summary of the remaining chapters.

1.1 The Client

The Anne Sullivan Centre is a non-profit organization providing residential and educational care for people who are deaf/blind with a variety of additional mental and physical disabilities. The main objective of the Centre is to maximize the quality of life of its residents who have life-limiting conditions such as congenital rubella syndrome (CRS). There are three residential houses and a day centre where the core administration takes place.

1.2 The Project Background

There are approximately 60 social care workers employed by the Centre who carry out a large amount of unnecessary manual administration tasks along with caring for the residents. For example, they record their hours on paper-based time sheets at the beginning of their shift. Managers manually check for vacant shifts over an eight-week period, in three separate books, and fill them out.

The client would like to maximize the time utility of its staff with the residents and reduce the time and costs associated with non-productive hours, e.g. administrative and manual tasks. One way of optimizing staff time would be to implement an array of automated systems, including a database of the resident's logs, spreadsheet model for the weekend roster and research into a staff time and attendance system. This could indirectly contribute towards a better quality of life for the residents by allowing staff to spend more time with them on their daily activities.

1.3 Terms of Reference

Following consultations with the client, the following terms of reference were agreed:

- In-depth discussions with the client to establish their requirements and constraints;
- Review of current paper based system of staff time keeping in consultation with the client;
- Research hardware and/or software solutions for a time clocking system and other automated systems;
- Design an automated system that will check for vacant shifts;
- Create a database that will allow staff to input and store the residents' daily records;
- Examine other factors relevant to the system, i.e. use of internet, intranet or alternative methods;
- Further advice and recommendations for proposed systems.
1.4 Project Summary

The remaining chapters are summarised below:

- **Chapter 2** describes the current system, highlighting its uses and limitations. It outlines the proposed new system and recommendations.
- **Chapter 3** contains a description of the work carried out for the project; this includes the detailed solutions and methodology used.
- **Chapter 4** contains the conclusions and recommendations for any further development of the systems.
2. SYSTEMS OVERVIEW

This chapter describes the purpose and objectives of the proposed system from a business perspective. The flaws associated with the current system are discussed in detail. The chapter also provides a diagrammatic systems overview of the proposed solution.

2.1 Project Background

The original objective of this project was to implement an employee time management system that would reduce the time spent on administration tasks, so that more staff time could be spent with the residents. Following further investigations, a number of underlying important issues began to surface.

It was initially believed that implementing a time management system would save a significant amount of staff time. However, after some examination it was noted that more time was being spent on other ad hoc administration tasks: filling out the daily logs, behaviour and diet charts and recording their own working hours. On average, staff would spend half an hour, out of an eight-hour shift, carrying out these tasks. This accumulates to 351 hours a year that are spent on administration or an average of €5,177.25 wasted every year on unproductive tasks. It takes staff approximately ten minutes to sign in and out for their shift. The time assigned for other administration work is twenty to thirty minutes.

These figures took into account the one week at Christmas and Easter in which the Centre is closed and the residents go home. Cross shifts were excluded as they are kept to a minimum, compared to the normal afternoon/evening shifts.

The new staff clocking system had been sought to optimize staff hours. It was also sought to eliminate un-recorded absenteeism, to keep track of absent staff. Another affect of this system would free up administrative hours leaving more time for staff training in the new systems. For these reasons, a qualitative investigation of available time clocking systems was undertaken.

The 8 week roster will improve staff communication between the three houses and Centre. The team will stay updated with shift changes and have access to the subsequent 8 weeks ahead; this will allow for more flexibility to make changes to the roster if needed.

The database that stores residents’ charts will produce reports providing the Centre more insight into how the residents’ behaviour and health are progressing. It will also offer the Centre with some areas to improve on, for example a report may show that a resident’s challenging behaviour may increase after certain meals, hence the need to re-evaluate the food served to that particular resident.

Resident Logs

Each resident has their own ring bound folder which is refilled at the start of every week. These folders contain blank forms to be filled out twice a day by the staff working with that resident. These forms include daily log, diet and behaviour charts. Examples of the paper based daily log, diet and behaviour chart can be found in Appendix E, p. E.1 – p. E.3.
There is a small office space in each of the houses containing shelves that get crowded with folders relating to each of the residents’ daily logs. Folders are often mislaid, requiring staff to work overtime to fill out the daily logs, which costs the Centre additionally. The unorganised nature of the paper-based system fabricated more wasted time from staff looking for a particular form from a specific week in a large pile of documentation.

There are four problems associated with these paper-based forms:

- Staff often make mistakes on the form, which can be hard for other people to read. There are at least seven forms to be filled out leaving a lot of room for mistakes.
- The forms are stored in filing cabinets in a locked room in the main centre. This method of storing data makes it impossible to view any former patterns of a resident’s behaviour or weight over a period of time.
- The forms have been deteriorating over the years and any updates or alterations made on the forms are not recorded.
- Some forms contain both the AM and PM fields to be filled out on the same sheet while other forms have the AM and PM on two separate sheets.

Another factor contributes to the build up of inefficient hours. This arises when staff turn up late or leave early, from their shift. If an employee is over fifteen minutes late, they are required to fill out a ‘Tardy Form’ as well as the ‘Sign in Log’ and time sheet, which may take another fifteen minutes to complete. Effectively, the Centre is paying extra so that these forms can be filled out. Approximately twenty five hours each year are wasted as a result of staff being late. Similarly, it is hard to track the working hours of staff that have the opportunity to leave early, before handing over to the subsequent staff, by manually filling out the time sheet for the full shift hours that mirror what is in the sign in book.

**Management Forms and Diaries**

Supervisors and house leaders are required to fill out the resident’s forms as well as having the responsibility for ensuring that each house are not left short-staffed. Supervisors or house leaders ensure that the eight week roster is covered.

Assigning weekend relief staff can be complex and is currently done manually on paper. This problem does not apply to the weekday staff as they have permanent full-time shifts. Changes are never made to the weekday roster unless a full-time employee decides to resign.

There are currently three separate diaries assigned to each of the three residential houses: 7, 19 and 20. Each diary contains a roster for staff allocated by the supervisor to work weekend shifts in that specific house, over an eight week period. A key problem with this system is the lack of integration of the three diaries. As a result, the same employee could be booked for two separate houses on the same day. Hence, the need to integrate this information in order to eliminate any incidence of a double booking.

The existing method used to fill shifts is time-consuming since it requires that the three diaries be checked, compared and hand written records of shifts noted, along with details of: the date and time of the shift and the house number. Managers then ask all staff if they can work at these times/days by circulating the shift details to relief staff, in the form of an SMS to their mobile phones. The key concern is to have a clear view of who is working when,
identifying the empty shifts, while ensuring that staff do not have to travel to each separate house to check what days/times and house they are working.

2.2 Technical Environment

This section provides a brief overview of the current technical environment. A satellite view of the Anne Sullivan Centre and the residential houses is shown in Appendix E, p. E.4, to underline the geographical problems and barriers in setting up an intranet connection between the four buildings.

The Centre

There is an intranet network set up for use of administrators and the Director within the Centre itself. The administrators use three computers (running Microsoft Windows) to carry out tasks such as payroll and writing up memos for staff etc. They also have an internet connection and use Microsoft Outlook for work related e-mails. No other staff have access to these computers.

Residential Houses

Houses 7 and 19 both have computers, running on Microsoft Windows, which are used for *ad hoc* jobs, such as typing up and printing minutes of staff meetings, writing up any policies and procedures for staff members regarding working with the residents, printing out notices for the staff within the residential house. There is no network or internet connection between the houses and the Centre. These resources could be used to improve the efficiency of the staff. The only house lacking a computer is 20.

2.3 Overview of Proposed Solutions

This section provides an overview of the proposed solutions. This includes three sub projects which will be discussed in more detail in chapter 3.

Proposal 1: Network Implementation

The first proposal concerns the implementation of a network between the three houses and the Centre. Before designing a database of the residents’ logs, integrated 8 week roster and staff time-keeping system, there needs to be the appropriate hardware in place in each of the three houses and the Centre. Secondly, a network connection needs to be set up in order for a time keeping system to be implemented.

Proposal 2: EXCEL 8 Week Roster

The second proposal addresses the problems associated with the 8 week roster that affects all members of staff. At weekends, the main administrator may change the roster in order to divide out shifts evenly. This leaves staff finding out at the last minute whether their shift is cancelled or if they are needed. The proposed new system would allow administrators to update the weekend roster on a shared network, so staff can check the roster from remote locations rather than coming into the Centre to check or ringing up the supervisors or house leaders. A tailored EXCEL macro can search for shifts within the roster for immediate
updates. An EXCEL model of the weekend shifts would integrate the shifts for Friday, Saturday and Sunday, along with the three houses 7, 19 and 20. This integrated roster should be available for all staff to check regularly, especially by relief workers who are slotted into shifts at any time. This saves staff time in figuring out what shifts need to be filled, by whom, as well as minimizing confusion over swapping shifts.

Proposal 3: Access Database of Residents’ logs

The third proposal was to replace the current resident’s logs with an interactive database. The client’s requirements were followed when selecting a suitable application for a system database. It was noted that there might be possible resistance from staff to a new system. Staff of the Centre have been using a paper based system since it was established in April 1989. Hence, the most important factor to make this new system work is ease of use in order to avoid staff resistance. The proposed system must have a clear graphical user interface (GUI) and should allow for automatic summary reports of behaviour and diet patterns of particular residents, to be available over a period of time. This would require a member of staff to physically input the information to a computer from the logs themselves. Microsoft Access is an application that can produce summary reports fed in from these forms while providing simple user interfaces for front end users. Appendix E.12, p E.14 shows an example of the data flow within the proposed database system.

The proposed system uses forms within Microsoft Access Database to store the resident’s logs in order to generate daily, weekly, monthly or annual reports to facilitate closer monitoring of the resident’s diet, behaviour and sleeping patterns etc. This system also allows for new resident details to be added to the system. A sample report output can be seen in Figure 2.6.1. These daily reports could be carried out within the residential houses. They represent a new concept to the Centre making new key performance indicators available to provide new insights into residents’ lives. The database has no restrictions to its users. This permits for valuable communication and open knowledge sharing among staff.

![Residents' Sleeping Patterns](image)

Figure 2.6.1- Sample Report on Residents’ Sleeping Patterns

Diagrammatic System Overview

The following diagram gives a visual overview of the proposed systems. The diagram describes the shared network, in the form of a ‘cloud’. Cloud computing offers software-as-a-service to businesses of all types. This is software deployed over the internet on a local area network or personal computer. The cloud refers to web based applications that do not
require the user to consider the specific limitations of hardware resources when adopting a new system. Miller (2008: 7) states that “Cloud computing portents a major change in how we store information and run applications. Instead of running programs and data on individual desktop computer, everything is hosted in the “cloud”- a nebulous assemblage of computers and servers accessed via the Internet.” (Michael Miller; Cloud Computing).

The cloud contains the applications in order to run the database, spreadsheet and time-keeping system, with three computers installed in houses 7, 19 and 20 using Microsoft Excel and Microsoft Access. The advised time and attendance system is called Time Point. In order to connect these machines to the cloud, an internet connection is needed. The Centre and residential houses use the cloud’s software-as-a-service as an information sharing method. Software as a Service is software that is launched over the internet. However, the main database would be held within the Centre.

![System Overview](image)

**FIGURE 2.6.2 – System Overview of the Proposed System**
3. DESCRIPTION OF WORK DONE

This chapter sets out, in detail, the work undertaken and the methodology used for the project. Each component of the project is thoroughly explained.

3.1 Network Integration

The options for implementing a network connection among the three houses and main Centre would involve either: a wireless enabled intranet; an ethernet network connection; or an internet connection. The size and complexity of the organisation needs to be taken into account before building this connection.

Client Criteria

The client has requested that when considering network integration, they would like to make amendments using their current service provider, NSSL. This created some project difficulties as it narrows down the assortment of the possible solutions, which may have resulted in the client not getting the most appropriate solution. However, there are benefits with the current software provider. Consistency is of key importance to the Centre as they are not experts in software systems. NSSL are the only company that are familiar with the client’s technical environment. The client would rather stay loyal to their current software provider and the relationship they’ve built, which frequently results in quicker service and likely discounts. NSSL are located in the Sandyford Industrial Estate which is located five minutes away from the Centre. Various different solutions that NSSL provide were investigated. After visiting and speaking to NSSL, there were three options available for implementing a network. The following sections outline each possibility.

Option 1: Wireless Intranet

The wireless intranet connection would be feasible if the machines were located within the same building. Computers that are located within the houses might receive only 10% to 15% of the signal processing, compared to computers within the Centre. In other words, these computers would be much slower. There is the risk of interference from all the household appliances used in the kitchen and gym. A wireless intranet connection for only 4 computers is therefore not feasible. Usually, intranet wireless connectivity is associated with a large building consisting of at least 40 PCs with a main central server. Hence, the need to examine alternatives.

Option 2: Ethernet Connected Intranet Option

The main barrier to this type of connection is the layout of the client site. The satellite photograph indicates an area of trees surrounding the main centre itself. This is shown in Appendix E, p. E.4. This would end up being a labour intensive job, physically setting up the wires, one going in the direction of house number 7 and the other going in the direction of houses 19 and 20. House number 7 is approximately 60 meters from the main Centre while houses number 19 and 20 are approximately 55 meters away. This would require at least 130 metres of cable. The 100BASE-TX is the most common of ethernet standards and would be the cheapest and most reliable source, as it is supported by most ethernet
hardware. However, the maximum segment length of this cable is 100 meters. Taking into account the forest of trees and the high walls, this would not be the most practical solution, although extremely reliable. The cost would average between €4000 and €5000, taking into account the manual labour.

**Option 3: Internet Connection – The Cloud**

The third solution was deemed to be the most appropriate. Unlike the first two options, there is no need for the Centre to be physically connected to the three houses. The plan would involve setting up a separate internet connection in each of the three houses. The Centre already has access to the internet. This option would allow the sharing and storage of information through an online sharing service or “cloud”.

A report carried out by McKinsey & Company (2009) argues that clouds prove to be most efficient for small and medium sized businesses. Larger scale businesses face technical, operational and financial barriers that need to be defeated before clouds can be used. Nevertheless, security concerns exist when any business considers implementing a cloud.

![Diagram of Cloud Computing]

**FIGURE 3.1.1 – The Pros and Cons of Cloud Computing (source: http://www.tridens.si)**

Figure 3.1.1 illustrates the risks along with the benefits of cloud services. The benefits for using this in the Anne Sullivan Centre include:

- High speed document management;
- Faster software implementation, done by experts;
- No extra hardware needed;
- Lower IT labour costs;
- Portable access to the Centre’s documents;
- Collaboration with other staff in multiple locations;
- The Centre can purchase technology services that may be less expensive than before.
The drawbacks associated with cloud include:

- Security issues– the Irish Data Protection Commission has raised concerns about where information is being stored and if it is safe;
- The Centre may begin to rely on the cloud provider whenever they wish to retrieve or work on their documents; this may present difficulties if the cloud company were to crash;
- If the user is editing documents, there is a risk of them being lost or deleted if the user suddenly becomes disconnected from the internet;
- The risk of being locked in a contract with a cloud provider could become a problem if the cloud provider goes out of business.

The arguments for cloud computing in small scale businesses relate to the: cost of electricity, network bandwidth, operations, software and hardware. There are no upgrade or maintenance costs. The ‘pay as you go’ model charges only for the resources needed that do not require a long-term investment in all the resources the cloud can offer. The overall features of cloud computing can offer low cost services that will save time and money for the long term objectives of the Centre. The cloud is easier to control and implement for small and medium sized business since there is less at stake.

**Comparing Cloud Services**

The top cloud services recognized are evaluated against each other to see which offers the best platform as a service for the Centre. Paas (Platform as a service) is a facility available to software and its development tools. Each cloud is different; there are many benefits and drawbacks with any platform. A number of features are studied in table 3.1.1. The chosen providers were Amazon AWZ, Google App Engine, Windows Azure and Force.com. These are some of the top, most suitable cloud providers. The features found most useful for the Centre were compared over each provider. These features include the database support, MS Access and backup.

**TABLE 3.1.1 – Comparison of Cloud Providers**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Amazon AWS</th>
<th>Google App Engine</th>
<th>Windows Azure</th>
<th>Force.com</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Support</td>
<td>MySql</td>
<td>Provides a data store of its own</td>
<td>Sql azure</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Access/Usage report</td>
<td>Amazon Cloud watch</td>
<td>View access data and error entries</td>
<td>Detailed access reports</td>
<td>No Access Features</td>
</tr>
<tr>
<td></td>
<td>Analyze traffic</td>
<td>Grouped by date and account key</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Browse application’s datastore</td>
<td>Manage indexes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View status of application’s tasks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup</td>
<td>Patched the database software</td>
<td>User is responsible</td>
<td>User is responsible</td>
<td>Data stored on primary database</td>
</tr>
<tr>
<td></td>
<td>Stores backups for specified period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Backs up the database</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Benefits</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
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</table>

**3.2 Staff Time Keeping**

**Client Criteria**

In order for the Anne Sullivan Centre to consider integrating a time keeping system, a number of strict criteria need to be taken into account. The most obvious criterion is to minimise cost and to minimise un-recorded absenteeism and lunch breaks. The quality of the time-keeping system is also important. The Centre is not interested in state of the art technology, but rather a low cost standard system for clocking in and out by each employee.
Given the nature of the physical working environment, the system would need to be adaptable for installation for residential houses. The following section investigates the different time-keeping options.

Option 1: Northgate Arinso
This time and attendance solution comes with a range of attractive features including the following:

- Real-Time Data: instead of having to perform batch uploads, this application uploads an action as soon as it is recorded.
- Rostering: it offers a highly flexible solution which is imperative given the mix of full-time day, weekend relief, night and sleepover staff, all of whom work different schedules.
- Flexible Reporting: it has the ability to produce simple reports for pinpointing staff who habitually turn up late to work. New reports can be created, using tailor-made criteria for a specialized organisation. For example, monitoring would be put in place so that the staff working the PM shift may not leave early at switch over.
- Leave Management: the Centre receives frequent requests for annual leave by full-time, weekend and night staff which can be overwhelming using the current paper based system. A feature that can process these requests would be a time saver. House leaders and supervisors would only need to authorize the requests for leave.
- Email Notifications: there is no need for email notifications when an employee wants to apply for annual leave or any changes. There is no need for email service between the employees.
- Real-time Data: this is arguably a key advantage, given the centre only holds around 60 staff at a time, it is not necessary for immediately uploading time clocking data, especially as the staff get paid in the last week of every month.
- Graphing: this is a needless feature of the system. A function like graphing is more useful for larger organisations. There is no new information with this function that the reports can’t give.
- Alerts: again this function is useless for the managers; there is no need to be setting up alerts for managers via email. Managers themselves will be working one on one with the residents and don’t have time to be checking email notifications. They can easily use the report function if they desire to see who has turned up late on particular days.

Northgate also offer a unique phone system. This type of system requires only an internet connection, the time clocking system that would be installed in the house would dial back to the main PC in the centre with the time clocking information recorded that day. The price for this system ranges between €5000 and €8000.

The client would rather keep things as uncomplicated as possible and avoid spending money on functions that are not essential. Northgate Arinso deal with clients such as Supervalu that deal with employee storage capacity of up to 5000.
Option 2: Time Clox  
Time Clox specialize in basic time clocking systems. Unlike Northgate Arinso, this system would be too basic for the Centre. The system requires the staff to clock in and clock out only recording the time and date of the clocking. The system does not take into account the pre processing of the data. The ideal time-keeping system would carry out the two steps of the pre processing stages involved in calculating an employee’s wage. The first stage would calculate the different weekend, fulltime, supervisor, night-shift and sleepover rates. While the second stage transforms this information into a CSV type file that is compatible with Sage Payroll. This is the most important feature that needs to be included in the system. The total cost for the clocks, punching cards and USB keys is €2100.

Option 3: Flextime Ltd  
This company has similar attributes to Time Clox. They each have poor websites to be considered as a reliable systems integrator. Flextime Ltd offer a vast range of products, however, despite the name none of their products are flexible enough to suit the requirements of the Anne Sullivan Centre. They have similar products to Northgate Arinso in that they may be unnecessarily equipped with too many programs. Neither Flextime Ltd, Northgate Arinso or Time Clox gives a list of current customers on their website. Customer testimonials are highly valued when it comes to choosing companies. The cost of this system is €2100, which is too expensive.

Option 4: Time Point  
This system had been successfully installed and implemented in the only other Centre for adults who are deaf/blind in Dublin. Time Point is familiar to this type of specialized health care organization. This system eliminates the manual time-keeping tasks. Time Point gives a list of their current customers on their website. The company knows that the Anne Sullivan Centre is a non-profit organisation and have offered a discount price on their quality products, as follows: the total system cost for hand clock, software, 3 training and installation sessions and link to the payroll system is €1,950. The annual maintenance contract is free for year 1 and 12.5% of total cost per annum thereafter. Sample time and attendance reports can be found in Appendix E.11, p. E.11. The information is a detailed look at the properties of what Time Point software products can deliver. It will eliminate un-recorded absenteeism within the Centre. This particular software was referred to by Time Point to suit the Anne Sullivan Centre.

3.3 Microsoft Access Database: Resident’s Logs  
A cost effective solution is essential given that the centre is a non profit organisation and wants to minimize the costs of technical administrative tasks. Microsoft is a cost effective application that runs on most Windows platforms.

Choosing the Database  
The nature of the client needed to be taken into account in choosing a database system to automate the resident’s logs. The application chosen to create this database was Microsoft Access. The vast majority of the staff come from a social studies background and have basic
computer knowledge. This application is already installed on some of the client’s computers. The Centre has the necessary hardware and software to run this database. This is the most cost effective database software. Already this eliminates the cost of implementing a new software application. Currently, two out of the three houses have the necessary hardware.

3.4 Access Functionality

The following section describes the database features and the three main functions it executes. The database stores information about the resident’s daily activities, diet and behaviour.

User Interface
The home page is the first form designed to open up automatically when the database is accessed. In order to open the form automatically “AutoExec” is the name required for the macro. The action used in this macro was “OpenForm” in the design view and the form name needs to be called. In this case it’s called “Home”. The Anne Sullivan header used on the home page was taken from the Anne Sullivan Website to keep a constant logo for the organisation. On opening, a security warning appears just above the home page showing a command button stating “Options...”. On clicking this button and choosing “Enable Content” from the menu, the database will run with full functionality. This warning sign appears as a result of running macros within the database, the application must permit the use of macros. The user interface can be seen in figure 3.4.1.

A command button called “Help” near the bottom of the home page opens a form containing the procedure guidelines. It has some tips on carrying out the functions within the database such as adding a new resident’s details. See figure 3.4.2. and Appendix D, p. D.1.
Reports
The “Reports” function can be found on the home page. The reports require the attributes of a relational database in order to summarize a particular resident or date. There needs to be a set of relationships and links to be made in order for concise reports and comparisons to be created. The entity relationship database can be found in Appendix E, p. E.5.

Add New Resident
This function can be found on the home page under the command button “Add New Resident”. It is a simple process to add new residents’ details to the database. This form automatically updates the table containing the current list of residents so that the rest of the database forms and reports can be updated.

Main Menu
Once either the command button for AM or PM shift is selected, the database navigates to the main menu (See Appendix E, p. E.6). The user is prompted to select each of the forms to fill out relating to their shift.

Daily Log Charts
The current daily log charts gives an overall record of a resident’s day. The paper based forms are split in two; AM shift from 8am to 3pm and PM shift from 3pm to 10pm. Appendix E.7, p. E.7 shows a breakdown of each field within the proposed database form. The fields stay closely in line with the original paper record. The forms were designed to allow ease of entry and make sure all relevant data is entered correctly. There is less room for mistakes
using field tabulation, validation rules and combo boxes to choose the resident’s name, day and date. When the user selects the “Add Record” button, it automatically saves into the daily log table. A macro is used in this button to store current record and then go to a new record with setting the action as “GoToRecord” = “New”.

**Behaviour Charts**
The current behaviour charts record a resident’s behaviour from 8am to 10pm. This encompasses two separate shifts, AM and PM. Staff must record the resident’s behaviour on a thirty-minute basis. A breakdown of the form can be seen in Appendix E.8, p. E.8. Currently the employees fill out these paper records with either a number or letter in each field that represents a type of behaviour.

In order to keep in line with the client’s requirements, the database behaviour form needs to be easily accessed, recognisable and where possible, avoid data entry mistakes. Clicking on the button called “Behaviour Chart” accesses the behaviour chart. The form is made up of fields to input the types of behaviour throughout the day. Combo boxes are used for entering in the behaviour type every half hour. Lists of behaviours are already there to choose from at each time. In design view of the form the “Row Source Type” must be set to “Value List” so that the list of behaviours can be entered in the form of a list. The next step is inputting the behaviours into a column. This is in the properties window in design view; the filed for “Row Source” can be selected to open a new window that allows a list to be entered. The default value of every field in behaviour type is set to calm, tailored to the residents to make the form quicker to fill out. From talking to the members of staff that regularly fill out the form, the majority of the time “Calm” would be recorded for most of the residents.

**Diet Charts**
The current diet charts record the resident’s beverage and food intake over the course of a week. By the weekend, the form becomes tattered with at least fourteen separate entries taken every week. The new diet chart can be accessed from the main navigation window of the database when the user either selects the AM or PM shift. The form consists of various validation rules for “Client”, “Day” and “Date” as well as the other forms and is stored in the same way, by clicking on “Add Record”. An example of the diet chart can be found in Appendix E.9, p. E.9.

**Validation Rules**
All of the forms footer’s were invisible in order to make the whole form visible without the user having to scroll. The footers weren’t needed for the forms. This was done by going to design view, clicking on the footer and in the properties window, setting “Visible” to “No”.

The command button wizard can be used to tell the button what to do. To make the button open up a new form, “Form Operations” is selected under the categories column. After, the “Open Form” action is selected. This leads on to selecting the form that must have been created in the database already that you want the button to open. The next step is naming the button with a label for the user to know what form the button is going to open, i.e. Behaviour Chart.

Combo boxes are used to enter the client’s name. This adds consistency to the reports and eliminates any spelling mistakes the user may make. Another reason exists for using the
combo box: it refers directly back to the table created with the list of clients within the centre. This is means when a new resident arrives, only one table needs to be updated for all the daily log forms to include the new resident in the drop down list. All the user has to do is select the drop down option and click to select the chosen resident’s name. The field for “Day” also gathers the information in the form of a combo box for the same reasons outlined above. Validation rules for the “Date” field are added in the properties window. A small calendar icon appears beside the field for the user to select a date directly from the calendar instead of typing it in. This is important for consistency in reports as people have different methods of recording the date. In order for the forms to open up a new blank record any time they are accessed, the value for “Data Entry” must be set to “Yes” in the properties window of design view. Buttons on every form were added to either navigate home or back to the previous list of forms for the chosen time of shift instead of staff having to look through the database themselves. A button called “Add Record” was added to each of the forms in order to save the data into a table already created within the database. This is done by selecting the “Add Record” as the action and subsequently goes to the next record after the record has been saved to the corresponding table. If the user makes any mistakes in the forms, it is possible to edit the data by entering the latest addition in the associated table.

### 3.5 Microsoft Excel: 8-Week Roster

This section gives a detailed description of the 8 week roster and its functionality.

**Client Criteria**
The client wanted a quick and easy way of integrating the staff roster between all three houses and the centre and a more efficient method of pinpointing the empty shifts needing cover in the form of a list. The Microsoft Excel 8 week roster is for the benefit of all staff. The house leaders are responsible for all weekend shifts to be filled over 8 week periods. The client wanted an automated list of empty shifts to include the time of the shift, the house, and the week number.

**Choosing the Application**
The two options to choose from were Microsoft Access and Microsoft Excel in order to implement this system. The layout of this project needs to be a clear overall look at the staff shifts over the eight weeks. Microsoft Access is particularly designed as a database application. Microsoft Excel can easily display this in the form of a table and it can also handle the required macro to run a check on the 8 weeks. The supervisors and house leaders would be more familiar with Microsoft Excel which is a simple enough application that will not scare away or discourage the staff from using it.

**8-Week Roster Spreadsheet**
This is a macro based model to allow house leaders and supervisors search for empty shifts in all houses and not just the one house they are working in. It also allows relief staff to confirm when and where they are working. Information on the weekend shifts was gathered from each of the three diaries from houses 7, 19 and 20. This information included the
names of staff working, the time of the shift they are to work either AM (8am-3pm), PM(3pm-10pm) or a cross shift (11-6) and what house they are allocated to that week. Along with this information come the shifts needing to be filled. The employees allocated to the weekend shifts every 8 weeks, usually stay roughly the same with minor changes to the roster when people are sick or on annual leave. The data about the shifts were mapped out in an EXCEL spreadsheet called “Roster”. A screenshot example of the spreadsheet including the first 4 weeks can be found in figure 3.6.1. The shifts are allocated with an asterisk in which the blank cells mean that only one or two people are needed that day. The macro creates one list of these empty shifts instead of three separate lists, including the time of the shift, house number and the week number that needs to be filled. An example of the output can be seen in Appendix E.10, p. E.10.

<table>
<thead>
<tr>
<th>Shift</th>
<th>House</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Friday AM</strong></td>
<td>No. 20</td>
<td>Mark * Marie</td>
<td>Mark * Marie</td>
<td>Mark * Marie</td>
<td>Mark * Marie</td>
</tr>
<tr>
<td></td>
<td>No. 7</td>
<td>Alicia * Pamela</td>
<td>Alicia * Pamela</td>
<td>Alicia * Pamela</td>
<td>Alicia * Pamela</td>
</tr>
<tr>
<td></td>
<td>No. 19</td>
<td>Rachel * Patrick</td>
<td>Rachel * Patrick</td>
<td>Rachel * Patrick</td>
<td>Rachel * Patrick</td>
</tr>
<tr>
<td><strong>Friday PM</strong></td>
<td>No. 20</td>
<td>Derek * Claire</td>
<td>Derek * Claire</td>
<td>Derek * Claire</td>
<td>Derek * Claire</td>
</tr>
<tr>
<td></td>
<td>No. 7</td>
<td>Catherine * Mary</td>
<td>Catherine * Mary</td>
<td>Catherine * Mary</td>
<td>Catherine * Mary</td>
</tr>
<tr>
<td></td>
<td>No. 19</td>
<td>Tracey * Catherine</td>
<td>Tracey * Catherine</td>
<td>Tracey * Catherine</td>
<td>Tracey * Catherine</td>
</tr>
<tr>
<td><strong>Saturday AM</strong></td>
<td>No. 20</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
</tr>
<tr>
<td></td>
<td>No. 7</td>
<td>Mary * Catherine</td>
<td>Mary * Catherine</td>
<td>Mary * Catherine</td>
<td>Mary * Catherine</td>
</tr>
<tr>
<td></td>
<td>No. 10</td>
<td>Jimmy * Catherine</td>
<td>Jimmy * Catherine</td>
<td>Jimmy * Catherine</td>
<td>Jimmy * Catherine</td>
</tr>
<tr>
<td><strong>Saturday Cross</strong></td>
<td>No. 19</td>
<td>terrific * John</td>
<td>terrific * John</td>
<td>terrific * John</td>
<td>terrific * John</td>
</tr>
<tr>
<td><strong>Saturday PM</strong></td>
<td>No. 20</td>
<td>Mary * Jimmy</td>
<td>Mary * Jimmy</td>
<td>Mary * Jimmy</td>
<td>Mary * Jimmy</td>
</tr>
<tr>
<td></td>
<td>No. 7</td>
<td>Henry * Ann</td>
<td>Henry * Ann</td>
<td>Henry * Ann</td>
<td>Henry * Ann</td>
</tr>
<tr>
<td></td>
<td>No. 19</td>
<td>terrific * John</td>
<td>terrific * John</td>
<td>terrific * John</td>
<td>terrific * John</td>
</tr>
<tr>
<td><strong>Sunday AM</strong></td>
<td>No. 20</td>
<td>Fiona * Mary</td>
<td>Fiona * Mary</td>
<td>Fiona * Mary</td>
<td>Fiona * Mary</td>
</tr>
<tr>
<td></td>
<td>No. 7</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
</tr>
<tr>
<td></td>
<td>No. 10</td>
<td>Mary * Patrick</td>
<td>Mary * Patrick</td>
<td>Mary * Patrick</td>
<td>Mary * Patrick</td>
</tr>
<tr>
<td><strong>Sunday Cross</strong></td>
<td>No. 19</td>
<td>terrific * Mark</td>
<td>terrific * Mark</td>
<td>terrific * Mark</td>
<td>terrific * Mark</td>
</tr>
<tr>
<td><strong>Sunday PM</strong></td>
<td>No. 20</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
<td>Alice * Mark</td>
</tr>
<tr>
<td></td>
<td>No. 7</td>
<td>Pamela * Mary</td>
<td>Pamela * Mary</td>
<td>Pamela * Mary</td>
<td>Pamela * Mary</td>
</tr>
<tr>
<td></td>
<td>No. 19</td>
<td>Mary * Catherine</td>
<td>Mary * Catherine</td>
<td>Mary * Catherine</td>
<td>Mary * Catherine</td>
</tr>
</tbody>
</table>

**FIGURE 3.6.1 – Screenshot Example of 4 weeks out of the 8 Week Roster**

**Microsoft Visual Basic**
A macro was used in Microsoft Visual Basic to run this application of automating the 8 week roster. To run this macro, the button called “Vacant Shifts” must be clicked and can be found in the main sheet called “Roster”. The Anne Sullivan Foundation Logo was used to keep consistency between the different applications. This macro is called “Button3_Click” and consists of two ‘while’ loops; the first loop is set up to go across each column week by week starting from week 1. The embedded loop then searches for the asterisk in each cell within the column, if it finds an asterisk, code is written to take the information about that empty shift and print it in a new sheet called “Queries”. The loops stop automatically when they reach the number of column and rows they were
told to search for. On clicking the button for “Vacant Shifts”, EXCEL directly navigates to the “Queries” sheet where the outputs of the vacant shifts are printed. The code used to write the macro can be seen in Appendix F, p. F.1. The logo was brought across to the “Queries” sheet, providing more consistency with the tailored application. With this click of a button the supervisor or house leader can easily check all the weekend shifts over the 8 weeks in each house at once and compare to see if staff have been double booked.

3.6 Systems Testing

In order to test the functionality of the database and spreadsheet model, it was crucial to test them with fabricated data. Once the tables were populated, all features of the database were able to be tested such as the embedded macros within the form’s command buttons, the source tables of the combo boxes, i.e. make sure the data given within the “Client Name” drop down list is reading directly from the associated table called “Client”. Tests were also carried out to ensure the function for “Add New Client” updated the rest of the database where the residents’ details were needed.

The reports were automatically constructed and formatted to suit the client. This proved that it was possible to automate reports as well as the appropriate adjustments for the client. See Appendix G, p. G.1 for further testing details.

Technical Difficulties

As a result of the different behaviour attributes, it was difficult to populate the combo boxes in the behaviour forms with common attributes that could be used for any resident. The nature of the current system allows the staff to enter a variety of ways of describing the behaviour of the residents. The new system had to incorporate the flexibility of the paper based method while remaining consistent.

In order to avoid staff resistance, ease of use was a main concern. This required a number of formatting elements within the database. The home page had to open automatically so the user doesn’t have to search through the database forms. Command button links had to be added in to the main navigation page which turned out to be time consuming for this project.

Due to the incompetent nature of the current 8 week roster system, it was difficult to assemble the three diaries within houses 7, 19 and 20. Divisions had to be made between the full and part time staff in order to formulate a spreadsheet model. For this reason, staff names had to be investigated individually to ensure they had their guaranteed weekend shift.
4 RECOMMENDATIONS AND CONCLUSIONS

There are a number of recommendations to ensure the full potential of the new system.

New versus Existing System
Rather than immediately replacing the existing systems, the old and new systems should be run in parallel for at least 6 weeks. This would require staff to fill out the paper based forms as well as the Microsoft access forms. It would also involve using the excel spreadsheet roster for changes alongside the current system involving the 3 diaries. This would provide additional security backup for the new system allowing comparison with the paper based records. This will reassure staff and raise their confidence by seeing the new system working. It is also important for the management to insist on a strict time frame, if the old and new systems were to run together for too long, data may fall between both systems.

Staff Training
It is important for staff to feel comfortable when using this computerised system. Staff at the Anne Sullivan Centre should be provided with training sessions to ensure the correct standards of use and to enable staff to trust their new technical environment.

Archiving and Back-up
It is recommended that every 12 months the database be cleared of all resident’s details and archived. This would ensure that the system can work at its full capability and allow for year by year or quarterly comparisons. There should be a back-up edition of the database to be kept separate from the system in use. A daily back-up of the system is recommended to avoid any possibility of losing data, should the system crash. This could be stored either on a separate computer or on a USB flash drive, data storage device that is rewritable and removable. The Centre is in possession of three USB flash drives which offer portability and ease of use.

Administration
A member of staff should be delegated as the chief administrator. Their responsibilities would be to ensure that the database is kept up to date. For example, if a new resident were to join the Centre, the administrator would enter their details into the “Client” table. Random system checks should be carried out to identify whether any alterations are needed. Another member of staff should be assigned to the task of ensuring that the 8 week roster is kept up to date. This is important when staff resign, to remove them from the roster.

Network Integration
The methodology behind choosing the Google App Engine’s cloud as a form of network integration included the following factors; cost effectiveness, fast implementation, no additional hardware and the possibility of viewing and analyzing data. A combination of these features best suited the nature of the Anne Sullivan Centre. For full effect, a computer must be installed in house 20.
Time and Attendance System
Time Point was chosen as the most appropriate vendor for the following reasons; they offer the Anne Sullivan Centre a discount rate, previous knowledge with working for special needs organisation and suitable, reliable and effective hardware/software.

4.1 Further Systems Development

The following suggestions should be taken into account for future expansion of the system.

Incorporating Other Records
Information relating to residents’ weight, medical, toileting and menstrual cycles could all be added to the current database system. These can all influence a resident’s well-being and behaviour and could be incorporated into reports. Incident reports could also be incorporated into the database to cut down the time spent manually handling the documentation.

Developing Further Reports
A chart on the time(s) of the day that a resident might display challenging behaviour could be used to obtain a better understanding by identifying the activities happening at that time that may upset the resident. Reports are kept simple and legible, as staff get used to the idea, new complex reports and charts can be added to the database as they are a key feature of the database.

4.2 Conclusion

Incorporating the use of a time management system, resident’s log database and 8 week roster will not take long for staff to adapt to, staff morale is increased creating a positive work culture. Staff conditions were improved to support the residents; staff have a sense of ownership over the project as a result of many consultations. This is probably the most important technical development the Centre has had over the 22 years since it opened.

As stated by Cooke-Davies “success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business “(Cooke-Davies, 2002). Based on this, the solutions and advice offered in this project exceeded the client’s requirements at the beginning of the project. A combination of these proposals would improve the efficiency of staff as well as presenting innovative information and reports for the Centre.

“Total Quality is total in the sense that it involves all the people and all the activities in a company, all the time. Total Quality is also continuous improvement of everything by everyone.” (Drew, Mullins and Stuart, 1995). This reflects the Centres’ approach to this technical solution. The least obvious factor in a special needs centre can directly contribute vastly to the quality of life of the residents. Administration will have approximately double the amount of spare time to train staff adding value to their caring abilities for the residents. It is anticipated that these new solutions will act as a stepping stone towards further evolution of automated systems within the Anne Sullivan Centre, which will have an indirect enhancement on the resident’s lives by providing them with more one on one contact with the staff.
APPENDICES
A ORIGINAL PROJECT OUTLINE

Client: The Anne Sullivan Centre
Project: Implementing database to replace paper records and analysis of client data.
Location: The Anne Sullivan Centre, Brewery Road, Stillorgan, Co. Dublin
Client Contact: Finola Loughney; 01-2989339; finolaloughney@hotmail.com
School Contact: Eileen Drew

Client Background

The Anne Sullivan Centre is primarily a home for life, a residential and educational centre for Deaf/Blind people with additional disabilities. The centre also serves as an information and advisory centre for professionals, parents and other agencies while also being available as an outreach and respite centre for those who need our services.

The Anne Sullivan Centre opened under the auspices of The Anne Sullivan Foundation as the first residential home in Ireland for Deaf/Blind people with additional disabilities. Subsequently, to improve the quality of life of the residents, they now live in specially adapted houses in the very nearby community from where they walk to the Anne Sullivan Centre every day.

Our specially trained staff offer programmes with a substantial educational element on a lifelong basis. Skilful, patient, teaching and faithful companionship, as exemplified by Anne Sullivan herself, are vital if the Deaf/Blind person is to overcome their isolation and achieve a degree of independence, in the adult world.

Fundamental learning characteristics enable the Deaf/Blind person to interact meaningfully within their environments. These include:

- Development of initial attachment and security
- Development of the senses in relation to the world
- Development of the ability to structure the world
- Development of natural communication symbols

Most importantly however, the Anne Sullivan Centre provides a real home for life where the happiness, dignity and independence of the residents are of prime importance.

**Project Background:**

A part of the staff’s role is to fill out daily logs including behaviour and medical logs. These logs are filled out twice a day, every day after the AM and PM shift. Each hour of the day is documented with different numbers associated with different forms of behaviour. The process of these log entries is filling out paper forms. There is no database system in place to input and store this information. With these reports, it would be possible to see and compare how behaviour has changed over the years given the changes in the client’s medication. Currently all the client information is stored as a series of hard copies only and is hard to see changes over long periods of time by looking through these reports separately. This would also be very informative for new staff members to learn about the client’s history and if one’s behaviour is cyclical or random.

**Client Requirement:**

- Create a survey for staff members of the centre to see which aspect is most important of a client’s life they think is most important to perform analysis on Challenging behaviour, Health, Staff turnover, trips home etc
- Create database for the centre and for the staff to be able to fill out and store
- In-depth analysis on client(s) past behaviour with various factors of their life on a day to day basis and longer term.
- Overall improve the efficiency of the centre by transporting paper work to a user friendly database.

**What is involved for the student?**

The project will involve a survey of staff in relation to the questions raised above. If time permits, the project may include further analysis of the client’s life from a staff perspective i.e. if staff turnover affects a client’s behaviour and is it possible to predict cyclical behaviour cycles.

**Further Reading:**

http://www.annesullivan.ie/
Review of Background:
The Anne Sullivan Centre is a non-profit organization providing residential and educational care for people who are Deaf/Blind with a variety of additional mental and physical disabilities. The main objective of the Centre is to maximize the quality of life of its residents who have life-limiting conditions such as congenital rubella syndrome (CRS). There are three residential houses and a day centre where the core administration takes place. Currently, there are 60 employees who record their hours on paper based time sheets at the beginning of their shift. The administrator manually inputs staff hours and calculates their monthly earnings before sending this information through to Sage Payroll. The client would like to maximize the time utility of its staff with the service users and reduce costs on non productive hours, e.g. time spent on administrative tasks. A key way of optimizing staff time would be to implement an automated system of time keeping and tracking which could indirectly contribute towards a better quality of life for the residents by allowing more time to be spent on their daily activities.

Terms of Reference:
- In-depth discussions with the client to establish their requirements and constraints.
- Review of current paper based system of staff time keeping in consultation with the client.
- Analyze the pattern of full-time and part-time staff hours.
- Conduct research into possible hardware and software solutions for a time clocking system.
- Implement the optimal solution within the three houses and the centre.
- Review the time and costs of the current and proposed systems.
- Examine other factors relevant to the system, i.e. use of internet, intranet or an alternative method.
- Review the necessary documents needed for internal planning purposes.

Work undertaken to date:
- Meetings and discussions with the client to finalize the requirements.
- Terms of reference finalized with the Director, house leader and head of administration.
- Documented the existing system.
- Collection of documents currently used for internal planning purposes.
- Researched different time-clocking hardware.
The following is further work to be carried out:

**Christmas break:** Produce a systems development report outlining each step involved including software and hardware requirements for the selected approach.

**Week 1:** Select and implement a network between the three houses and the Centre.

**Week 1&2&3:** Construct the software time keeping database that is compatible with Sage Payroll.

**Week 4:** Test plan for the system ensuring that it is working correctly before signing off.

**Week 5:** Further analysis and documenting of the benefits and costs associated with the old and new systems.

**Week 6:** Create a user manual for staff of the Anne Sullivan Centre.

**Week 7:** Draft final report.

**Week 8:** Complete the full report.

**Conclusions:**

- The proposed system will reduce time spent by both staff and administration in recording and calculating hours worked, allowing more time to be spent with the residents. It will need to address the efficiency for management along with ease of use for staff.
- There are a number of possible solutions. The recommended solution needs to be suited to the client’s expenditure constraints, work efficiently and be user friendly.
C TECHNICAL COMMENTARY

I was interested in taking on this project as it presented me with the opportunity to utilize a wide range of expertise learnt through my four years of academic study. It was a stimulating project, seeing how my skill set could indirectly solve problems for a real company with fulfilling goals of enhancing a person’s life within the Centre. Applying my knowledge in creating new systems, and seeing the positive affects was a rewarding experience.

Communication with the client was critical in understanding the organisation and their goal requirements in order to agree upon a terms of reference. The skills needed for this task were constantly challenged from many aspects such as; understanding and collecting the appropriate data, considering the staff and residents’ needs, performing analysis and research bearing in mind the client’s requirements. Communication with the client was constant throughout the project, through regular meetings I was able to suggest or develop new ideas at the same time, sticking to the particular requirements. As a result of visiting the client site most weekends, further developments of the systems became possible.

Working alongside the company and presenting proposed solutions to the client was an exceptional learning experience, from which I have enhanced my technical, business, interpersonal and presenting skills.

This project had a number of different tasks to execute; creating a database in Microsoft Access, automating the 8 week roster in Microsoft EXCEL and completing research on time and attendance systems along with network integration. Each of these tasks collectively works well to produce an innovative solution to the overall goals of the client. I had some experience working with Microsoft Office; however the project harnessed my skills to use features I had not formerly exercised. I had to advance my research skills to company visitations and product demonstrations.

The testing phase proved to be an additional learning experience it was vital to perform a comprehensive testing in all tasks throughout the project. This improved my technical knowledge of background applications. All details of the testing can be found in the Testing Documentation of Appendix G.
C.1 Glossary of Technical Terms

100BASE-TX: is the predominant form of Fast Ethernet, and runs over two wire-pairs inside a category 5 or above cable (a typical category 5 cable contains 4 pairs and can therefore support two 100BASE-TX links).

*Combo Box:* is a commonly-used graphical user interface widget. It is a combination of a drop-down list or list box and a single-line textbox, allowing the user to either type a value directly into the control or choose from the list of existing options.

*Database:* is a system intended to organize, store, and retrieve large amounts of data easily, usually in digital form.

*Entity:* A single, separate object in which data can be stored.

*Field:* A field is an individual set of data items that are of the same type.

*Form:* is made up of one or more fields that allow the user to enter information.

*Graphical User Interface (GUI):* a type of user interface that allows users to interact with electronic devices with images rather than text commands.

*Macro:* A macro is a way to automate a task that you perform repeatedly or on a regular basis. It is a series of commands and actions that can be stored and run whenever you need to perform the task. You can record or build a macro, and then play the macro to automatically repeat the series of commands or actions.

*Microsoft Access:* is a relational database management system from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software-development tools.

*Microsoft Visual Basic:* It's a computer programming system developed and owned by Microsoft. Visual Basic was originally created to make it easier to write programs for the Windows computer operating system.

*Property:* is an attribute of an object or a feature of its activities.

*Query:* With a query you can apply a filter to the table's data, so that you only get the information that you want.

*Relationship:* a connection established linking common fields within two tables.

*Relational Database:* matches data by using common characteristics found within the data set. The resulting groups of data are organized and are much easier for many people to understand.
**Report:** reports are utilized for enhanced record output. They allow you to represent the data through text and/or charts, perform calculations on information, and sort and summarize grouped information.

**Software-as-a-Service:** is software that is deployed over the internet and/or is deployed to run behind a firewall on a local area network or personal computer.

**Table:** A collection of specific data stored in fields.

**Validation Rule:** is a criterion used in the process of data validation, carried out after the data has been encoded onto an input medium and involves a data vet or validation program. This is distinct from formal verification, where the operation of a program is determined to be that which was intended, and that meets the purpose.
D. **PROCEDURE GUIDELINES**

This section describes guidelines on using the Access database efficiently. The Access database is self explanatory and simple to follow.

1. **Adding Resident’s Logs to the Database**

   On opening the Access database, the home page automatically appears with an AM or PM option. After the user selects one of the shifts, the central navigation page opens with a choice of “Daily Log”, “Diet Chart” or “Behavior Chart”. The user can select any one of these options to fill out first. After the user has chosen the form they wish to fill out, the command button redirects them to the form itself. The user can select the relevant resident’s name and day from a drop down list and choose the date from the calendar. The rest of the fields are in the form of text boxes for the user to enter the data. After the user has completed the form, the next step is to add it to the database. The “Add Record” button adds the record to the database and resets the form to blank.

2. **Accessing Resident Reports**

   On opening the Access database, the home page automatically appears with an AM or PM option. The command button called “Reports” is clicked and the user is redirected to the “Reports” menu. This menu contains the reports accessible to the user.

3. **Adding a New Resident to the Database**

   First, open up the main home page and select the button for “Add New Resident”. Figure D.1.1 shows the form to enter the details of the new resident into the database. Select “Add New Resident” in order to store and refresh the form.

![Add New Resident Form](image-url)  
*FIGURE D.1.1 –New Resident Entry Form*
4. **Exiting the Database**

The “Exit” command on the home page will close the whole database. Another option is to select the X at the top right hand corner to exit.
This appendix describes the details of the current paper-based forms, data models and sample input screen relevant to the report.

### E.1 Sample Paper Records – Daily Log

The form shown in figure E.1.1 shows the daily log paper record. This is how staff members currently record the residents’ daily log for the PM shift.

<table>
<thead>
<tr>
<th>STUDENT’S NAME:</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.M.</td>
<td></td>
</tr>
<tr>
<td>Rest</td>
<td></td>
</tr>
<tr>
<td>Schedule</td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td></td>
</tr>
<tr>
<td>(Please give details)</td>
<td></td>
</tr>
<tr>
<td>Tea</td>
<td></td>
</tr>
<tr>
<td>D.I.S.</td>
<td></td>
</tr>
<tr>
<td>Rest</td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td></td>
</tr>
<tr>
<td>Toileting Record</td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Bed</td>
<td></td>
</tr>
<tr>
<td>Additional comments: incl. independence &amp; indicates activity, signs etc.</td>
<td></td>
</tr>
<tr>
<td>Signed</td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE E.1.1 –Daily Log Paper Record**
### E.2 Sample Paper Records – Behaviour Chart

The chart in figure E.2.1 illustrates the paper record for a residents’ behaviour. It shows how tedious it would be to input data written by hand for every half hour of the day into a computer. The spaces left for recording the behaviour are very limited, thus resulting in poor legibility.

![Figure E.2.1 – Behaviour Paper Record](image)

<table>
<thead>
<tr>
<th>NAME:</th>
<th>BEHAVIOUR CHART</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>MONDAY</td>
</tr>
<tr>
<td>08.00</td>
<td></td>
</tr>
<tr>
<td>08.30</td>
<td></td>
</tr>
<tr>
<td>09.00</td>
<td></td>
</tr>
<tr>
<td>09.30</td>
<td></td>
</tr>
<tr>
<td>10.00</td>
<td></td>
</tr>
<tr>
<td>10.30</td>
<td></td>
</tr>
<tr>
<td>11.00</td>
<td></td>
</tr>
<tr>
<td>11.30</td>
<td></td>
</tr>
<tr>
<td>12.00</td>
<td></td>
</tr>
<tr>
<td>12.30</td>
<td></td>
</tr>
<tr>
<td>13.00</td>
<td></td>
</tr>
<tr>
<td>13.30</td>
<td></td>
</tr>
<tr>
<td>14.00</td>
<td></td>
</tr>
<tr>
<td>14.30</td>
<td></td>
</tr>
<tr>
<td>15.00</td>
<td></td>
</tr>
<tr>
<td>15.30</td>
<td></td>
</tr>
<tr>
<td>16.00</td>
<td></td>
</tr>
<tr>
<td>16.30</td>
<td></td>
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<tr>
<td>17.00</td>
<td></td>
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<tr>
<td>17.30</td>
<td></td>
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<tr>
<td>18.00</td>
<td></td>
</tr>
<tr>
<td>18.30</td>
<td></td>
</tr>
<tr>
<td>19.00</td>
<td></td>
</tr>
<tr>
<td>19.30</td>
<td></td>
</tr>
<tr>
<td>20.00</td>
<td></td>
</tr>
<tr>
<td>20.30</td>
<td></td>
</tr>
<tr>
<td>21.00</td>
<td></td>
</tr>
<tr>
<td>21.30</td>
<td></td>
</tr>
<tr>
<td>22.00</td>
<td></td>
</tr>
<tr>
<td>22.30</td>
<td></td>
</tr>
<tr>
<td>23.00</td>
<td></td>
</tr>
<tr>
<td>23.30</td>
<td></td>
</tr>
<tr>
<td>24.00</td>
<td></td>
</tr>
<tr>
<td>00.30</td>
<td></td>
</tr>
<tr>
<td>01.00</td>
<td></td>
</tr>
<tr>
<td>01.30</td>
<td></td>
</tr>
<tr>
<td>02.00</td>
<td></td>
</tr>
<tr>
<td>02.30</td>
<td></td>
</tr>
<tr>
<td>03.00</td>
<td></td>
</tr>
<tr>
<td>03.30</td>
<td></td>
</tr>
<tr>
<td>04.00</td>
<td></td>
</tr>
<tr>
<td>04.30</td>
<td></td>
</tr>
<tr>
<td>05.00</td>
<td></td>
</tr>
<tr>
<td>05.30</td>
<td></td>
</tr>
<tr>
<td>06.00</td>
<td></td>
</tr>
<tr>
<td>06.30</td>
<td></td>
</tr>
<tr>
<td>07.00</td>
<td></td>
</tr>
<tr>
<td>07.30</td>
<td></td>
</tr>
</tbody>
</table>

- A = Screaming
- B = Pulling her hair
- C = Squeezing staff’s hands
- D = Pushing staff
- E = Slapping herself
- F = Checking doors
- G = Resting
- H = Vocalising
- I = Spinning
- J = Other
- K = Calm
- L = Laughing

FIGURE E.2.1 – Behaviour Paper Record
The chart shown in figure E.3.1 illustrates a residents’ food and beverage intake throughout the week. It is confusing to look at or to draw any insightful information as there are no links between any other forms.

### DAILY DIET CHART

<table>
<thead>
<tr>
<th>Week beginning Date/Time</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-11 am Breakfast Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-1 pm (Snack) Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 pm (Lunch) Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-5 pm (Snack) Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 pm (Dinner) Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-9 pm (Supper) Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE E.3.1 – Diet Chart Paper Record**
E.4 Arial View of the Anne Sullivan Centre

An Arial photograph of the Anne Sullivan Centre and the residential houses shows the barriers of intranet integration. The forest of trees is the most obvious barrier and the distance of the Centre from the houses.

E.5 Entity Relationship Diagram

Figure E.5.1 shows a detailed representation of how the data is stored within the database. These entities are shown by the database tables with related fields. These entities are associated with each other by the Client’s Name. These related fields are indicated with the black lines. The field for Client Name is the primary key in each of the tables, represented by the small key symbol. This diagram depicts the relational database as the tables are referencing each other.

FIGURE E.5.1 Entity Relationships between Database Tables
Main Menu for AM Shift

Figure E.6.1 shows a screenshot of the main menu for the AM shift. When a selection has been made, the user is navigated to one of the three forms to fill out.

FIGURE E.6.1 List of AM Charts
E.7 Daily Log AM Form

Figure E.7.1 shows the form for the AM daily log. The fields in this form are identical to the fields in the paper based form. Staff only need to sign off on this form as it's an over view. It has some diet and behaviour details, but in general the details are left to the diet and behaviour charts.

![Daily Log AM Form](image)

FIGURE E.7.1. Screenshot of the Daily Log AM Form
A dropdown list allows the user to click on a particular resident’s name. This field contains the list of resident’s names directly from the “Client” table. This avoids any misspelling.

Another dropdown list is designated for the “Day” field.

A validation rule for the “Date” field is set to avoid people entering different date formats. This keeps consistency throughout the database.

Combo boxes are used for the behaviour fields. They are set to “Calm” by default as the resident’s are calm throughout most of the day.

The user selects “Add Record” to save the form to the assigned table. This automatically opens up a new blank record for the next user.

The button for “AM Forms” navigates the user back to the
E.9 Diet Chart AM

Figure E.9.1 shows the form for the AM Diet Chart. The “Client”, “Day” and “Date” fields have the same characteristics as the Behaviour and Daily Log Charts. This form shows the calendar in which the user must choose the days date.

---

Fig E.9.1 - Diet Chart AM
E.10 8 Week Roster: Sample Output of Shifts to fill

The figure in E.10.1 shows a sample output from the 8 week roster. The layout is similar to the formatting of the “Roster” spreadsheet. It clearly indicates the week, house and time of the shifts that need to be filled.

FIGURE E.10.1 - Screenshot Example of 8 Week Roster Output found in “Queries” Sheet.
E.11 Time Point Sample Reports

E.11.1 Detailed Clock Report

This report shown in figure E.11.1.1 illustrates days clocked, raw clocking, calculated in and out times, breaks and calculates daily basic, overtime, holidays, sick, lieu, bank holiday etc. These are subtotalled to give weekly totals for each employee. Processing rules are customised for each person. The rules applied below are:

![Detailed Clock Report Diagram]

FIGURE E.11.1.1 – Sample Detailed Clock Report

E.11.2 Weekly Timesheet & Payroll Link

Table E.11.2.1 shows total weekly hours for basic, overtime, lieu time, holidays, sick, bank holidays etc. The columns used are customised for each person according to how long they have been working in the organisation and what position they hold. A comma delimited version of this report excluding salaried staff can be exported directly into your payroll software.

TABLE E.11.2.1 – Sample of Total Weekly Hours Report
**E.11.3 Absence Calendar**

This calendar in figure E.11.3.1 shows worked (yellow), holidays (blue), sick (green), bank holidays (turquoise), unplanned / late/ early out (red). For example patterns can be seen when employees are frequently absent on Mondays or after bank holidays.

![Absence Calendar](image)

**FIGURE E.11.3.1 – Sample Report of Absence Calendar**

**E.11.4 Roster Report**

Table E.11.4.1 shows example print out of a week’s roster. The employee’s total hours and costs can be removed from the table in order for all staff to view their hours only. A comparison can be made between the hours and costs per employee to the budget. This may not be necessary for this project.

**TABLE E.11.4.1 – Sample Roster Report**

<table>
<thead>
<tr>
<th>Name</th>
<th>Sun 23/09/07</th>
<th>Mon 24/09/07</th>
<th>Tue 25/09/07</th>
<th>Wed 26/09/07</th>
<th>Thu 27/09/07</th>
<th>Fri 28/09/07</th>
<th>Sat 29/09/07</th>
<th>Hrs.</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derek Peppard</td>
<td>6:30 10:00</td>
<td>9:00 17:00</td>
<td>23:00 7:00</td>
<td>18:00 2:00</td>
<td>6:30 14:00</td>
<td>34:30</td>
<td>282.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carmel Ryan</td>
<td>12:30 20:00</td>
<td>20:00 2:00</td>
<td>12:00 16:00</td>
<td>8:30 15:00</td>
<td>22:00</td>
<td>195.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paul Egan</td>
<td>9:00 17:30</td>
<td>9:00 17:30</td>
<td>9:00 17:30</td>
<td>11:00 19:30</td>
<td>40:00</td>
<td>310.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E.11.5 Part Time Holiday Entitlement**

Table E.11.5.1 illustrates hours worked, holiday entitlement, what they have taken and their holiday balance. The similar Bank Holiday Entitlement report shows hours due based on hours worked over 5 or 13 weeks. In this case for the Centre it would be over 8 weeks.

**TABLE E.11.5.1 – Sample Report of Holiday Entitlements**

<table>
<thead>
<tr>
<th>Staff No.</th>
<th>Surname</th>
<th>Forename</th>
<th>Hours Worked</th>
<th>Entitlement</th>
<th>Taken</th>
<th>Balance Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>Peppard</td>
<td>Derek</td>
<td>100.00</td>
<td>8.00</td>
<td>0.00</td>
<td>8.00</td>
</tr>
<tr>
<td>125</td>
<td>Ryan</td>
<td>Carmel</td>
<td>410.00</td>
<td>32.80</td>
<td>16.00</td>
<td>16.80</td>
</tr>
<tr>
<td>56</td>
<td>Doyle</td>
<td>Paul</td>
<td>660.00</td>
<td>52.80</td>
<td>7.00</td>
<td>45.80</td>
</tr>
<tr>
<td>168</td>
<td>O’Connor</td>
<td>John</td>
<td>341.50</td>
<td>27.32</td>
<td>11.00</td>
<td>16.32</td>
</tr>
</tbody>
</table>
E.11.6 Deviation Report

Deviations are people early, late, worked late etc. e.g. people who worked extra time > 30 minutes are shown below. This can be altered to show >15 minutes if the client had a specific time frame that constitutes being late or early for a shift. Table E.11.6.1 gives an example of staff deviations.

TABLE E.11.6.1 – Example of Staff Deviation Report

<table>
<thead>
<tr>
<th>Date</th>
<th>Staff No.</th>
<th>Name</th>
<th>Times Roster</th>
<th>Actual</th>
<th>Deviation Mins'</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/09/2003</td>
<td>56</td>
<td>Deor Peppard</td>
<td>22:00</td>
<td>23:30</td>
<td>-90</td>
<td>Late Exit</td>
</tr>
<tr>
<td>17/09/2003</td>
<td>125</td>
<td>Carmel Ryan</td>
<td>14:00</td>
<td>17:00</td>
<td>-180</td>
<td>Late Exit</td>
</tr>
<tr>
<td>18/09/2003</td>
<td>56</td>
<td>Deor Peppard</td>
<td>12:00</td>
<td>11:00</td>
<td>-60</td>
<td>Early In</td>
</tr>
<tr>
<td>18/09/2003</td>
<td>168</td>
<td>Paul Egan</td>
<td>18:00</td>
<td>20:30</td>
<td>-120</td>
<td>Late Exit</td>
</tr>
</tbody>
</table>
E.12 Data Flow Diagram

The data flow diagrams are utilized to demonstrate the flow of data into and out of the system. The diagram in figure E.12.1 shows the objects within a data flow diagram. The Access database is made up of various tables containing raw data. Relationships and links are necessary between the database tables.

FIGURE E.12.1 – The Objects of Data Flow Diagram

The diagram in figure E.12.2 contains explanatory information about the different object variables for the residents’ sleeping patterns. The output report of this query is showed in figure E.12.3.

FIGURE E.12.2 – Residents' Sleeping Patterns

FIGURE E.12.3 – Report Residents’ Sleeping Patterns
F. Microsoft Visual Basic Source Code

The following code was used for the EXCEL 8 week roster macro to search and print out empty shifts. The macro was accessed through the button “Vacant Shifts” found on the sheet named “Roster”. The code consists of two “While” loops and further formatting code to make the output easy to read. The comments are written in green throughout the code.

```vba
Sub Button3_Click()
    Application.ScreenUpdating = False
    Sheets("Roster").Select

    Dim k As Integer
    Dim i As Integer
    Dim j As Integer
    i = 1
    j = 0
    k = 2
    l = 2
    m = 2

    Range("C3").Select

    Do While (j < 24)  // This loop allows the macro to search horizontally through the selected range until it reaches the 24th cell, which is the end of the 8 weeks on the spreadsheet.
        i = 1
        Do While (i < 20)  // This loop allows the macro to search vertically through the selected range until it reaches the 20th cell, which marks the end of the subsequent weeks on the spreadsheet.
            If ActiveCell.Value = "***" Then
                Sheets("Queries").Range("A2").Offset(k, 0).Value = ActiveCell.Offset(-i, 0).Value
                k = k + 1  // When the macro finds the cell containing "***" it prints out the associated house, time and week to a new sheet called “Queries”.
                Sheets("Queries").Range("B2").Offset(l, 0).Value = ActiveCell.Offset(0, -j - 1).Value  // This part of the code is organising the new sheet for the output data.
                l = l + 1
                Sheets("Queries").Range("C2").Offset(m, 0).Value = ActiveCell.Offset(0, -j - 2).Value
                m = m + 1
            End If
        End If
    End If
End Sub
```
Sheets("Roster").Select
ActiveCell.Offset(1, 0).Select
    i = i + 1  // this part of the loop lets the search go on to the subsequent column
    Loop
ActiveCell.Offset(-19, 1).Select
    j = j + 1  // this part of the loop lets the search go on to the subsequent row
    Loop

Sheets("Queries").Select
Range("A4").Select
Range(Selection, Selection.End(xlDown)).Select
Selection.Font.Bold = False
Selection.Font.Bold = True
With Selection.Font
    .Name = "Calibri"
    .Size = 14
End With
//the following section of the code formats the output data in the “Queries” sheet into
//a similar theme to the “Roster” spreadsheet. This adds consistency to the
//application.
With Selection.Font
    .ColorIndex = xlAutomatic
End With
Columns("C:C").EntireColumn.AutoFit
Range("A2:C2").Select
ActiveCell.FormulaR1C1 = "Shifts to Fill"
Range("A2:C2").Select
Range("A2:C2").Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorAccent6
    .TintAndShade = 0.599993896298105
End With

Range("A4").Select
Range(Selection, Selection.End(xlDown)).Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorAccent4
    .TintAndShade = 0.599993896298105
End With

Range("B4").Select
Range(Selection, Selection.End(xlDown)).Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorAccent1
    .TintAndShade = 0.799981688894314
End With

Range("C4").Select
Range(Selection, Selection.End(xlDown)).Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorAccent1
    .TintAndShade = 0.799981688894314
End With

Range("A2:C2").Select
Range("A2:C2").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .ReadingOrder = xlContext
    .MergeCells = False
End With

Selection.Merge
Selection.Font.Bold = True
With Selection.Font
    .Name = "Calibri"
    .Size = 16
    .Underline = xlUnderlineStyleNone
    .ThemeColor = xlThemeColorLight1
    .TintAndShade = 0
    .ThemeFont = xlThemeFontMinor
End With

Range("A4").Select
Range(Selection, Selection.End(xlToRight)).Select
Range(Selection, Selection.End(xlDown)).Select
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
End With
.TintAndShade = 0
.Weight = xlThin
End With

With Selection.Borders(xlEdgeTop)
.LineStyle = xlContinuous
.ColorIndex = 0
.TintAndShade = 0
.Weight = xlThin
End With

With Selection.Borders(xlEdgeBottom)
.LineStyle = xlContinuous
.ColorIndex = 0
.TintAndShade = 0
.Weight = xlThin
End With

With Selection.Borders(xlEdgeRight)
.LineStyle = xlContinuous
.ColorIndex = 0
.TintAndShade = 0
.Weight = xlThin
End With

With Selection.Borders(xlInsideVertical)
.LineStyle = xlContinuous
.ColorIndex = 0
.TintAndShade = 0
.Weight = xlThin
End With

With Selection.Borders(xlInsideHorizontal)
.LineStyle = xlContinuous
.ColorIndex = 0
.TintAndShade = 0
.Weight = xlThin
End With

Range("A2:C2").Select
Range("B3").Value = "House Number"
Range("C3").Value = "Time of Shift"
Range("B3:C3").Select
Selection.Font.Bold = True
Columns("B:B").EntireColumn.AutoFit
Columns("C:C").EntireColumn.AutoFit
Range("B3:C3").Select
With Selection.Interior
  .ThemeColor = xlThemeColorAccent4
  .TintAndShade = 0.599993896298105
End With

Range("A2:C2").Select
Selection.End(xlDown).Select
Range("A2:C3").Select
Range("A3").Activate
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
  .LineStyle = xlContinuous
  .Weight = xlThin
End With

With Selection.Borders(xlEdgeTop)
  .LineStyle = xlContinuous
  .Weight = xlThin
End With
With Selection.Borders(xlEdgeBottom)
  .LineStyle = xlContinuous
  .Weight = xlThin
End With
With Selection.Borders(xlEdgeRight)
  .LineStyle = xlContinuous
  .Weight = xlThin
End With
With Selection.Borders(xlInsideVertical)
  .LineStyle = xlContinuous
  .Weight = xlThin
End With
With Selection.Borders(xlInsideHorizontal)
  .LineStyle = xlContinuous
  .Weight = xlThin
End With
Range("A2:C2").Select
G. TEST DOCUMENTATION

This section of the appendix describes the testing techniques incorporated into the development stage of the database and 8 week roster which is necessary before implementation. Thorough assessments were essential to ensure that the systems were functioning correctly and bug-free before implementation. The “White-box” technique was used for the testing. This technique tests the internal configuration of the application. All functionality within the two systems were verified using trial case entries.

G.1 Testing Technique

The first section describes the testing carried out for the Access database functionalities.

Testing for Access Database
Every element of a new software system must be tested before being implemented. Test were first executed on the database tables. Validation rules were applied for all attributes of the tables. Figure G.1.1 shows an example the data type required for the form’s date data for the daily log chart. The user is directed to pick a date from the calender on clicking the field. These rules were tested by inputing sample data into the tables to ensure the validation rules were operating correctly.

![Fig. G.1.1 – Screenshot of Date Validation Rule](image)

The next test validator is to ensure that the data entered into the form gets saved into the correct table entity. The expression builder is accessed through the control source in the properties sheet. Figure G.1.2 shows the field and forms to choose a location for the “Form on Waking” data to be stored. Test data was used and tracked to make sure it was stored to the correct table.
The next step was to ensure correct use of macros when linking forms within the database. Embedded macros within the command buttons were tested to ensure they perform correctly. Figure G.1.3 shows the event on clicking the button for “Add Record” within the daily log form. The action is saved along with the “Action” going to a “New” record for the next user to enter their data.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
<th>Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td>[MacroError]&lt;&gt;0</td>
<td>MsgBox</td>
<td>=MacroError.[Description], Yes, None</td>
</tr>
<tr>
<td>Onerror</td>
<td>GotoRecord</td>
<td>, , New,</td>
</tr>
</tbody>
</table>

Fig. G.1.3 – Embedded Macro Assigned to “Add Record” Command Button

The behavior chart’s combo boxes were tested after entries for “Value List” were entered into the field for “Row Source” in the “Data” tab of the properties window. Sample forms were filled out testing each combo box for flaws in the value list. Figure G.1.4 shows a GUI for the value list allocated to the behavior fields.

FIGURE G.1.4 – List of Behavior Values in the form of a Combo Box
Testing was essential to make sure the addition of new residents to the system would update the rest of the records within the database. Figure G.1.5 shows the table for “Clients”. This table needed to be verified whenever a new resident was added through the “New Resident” form. This is one of the most important tables in the database; it relates the tables together as key identifiers, thus allowing for concise reporting.

Reports were examined for readability and to make sure that only the relevant information requested was shown appropriately. Reports would have been utilized by the supervisors, house leaders and administrators, for this reason guidance was sought from the client on the structure and format. Various versions of the reports were tested and the final layout was selected by the client.

**Testing for EXCEL Spreadsheet**

Testing was essential in order to make sure the macro for the 8 week roster was working in full capacity. The macro connecting to the command button for “Vacant Shift” was tested to make sure it only searched each cell within the roster matrix. The macro was designed to start at week 1 and work down the three columns before hitting week 2 and so on. Loops were used in order to count the number of cells to stop when the search exited the table, both horizontally and vertically. The next step was to print out the related time, house and week each time the search would come across an asterisk. Tests were carried out to ensure a new sheet was opened and the information was stored in the form of a list. The test had to make sure the macro was printing only the shift details that had an asterisk, as these cells were designated as “Shifts to fill”.

**G.2 Further Testing**

Further testing was carried out to ensure the hardware was up to date and compatible with the EXCEL and Access applications. After testing the software, Microsoft Access was compatible with their computers. Tests were also carried out to ensure the computers would be compatible with any internet browser chosen to host the time keeping system “Time Point”. All computers within the Centre and residential houses were capable of supporting all proposed applications.
REFERENCES


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