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NATIONAL AUTISM SOCIETY OF MALAYSIA-
NASOM PARENT’S SUPPORT SYSTEM:
DIAGNOSIS MODULE

KONG CHEE HONG

A thesis submitted in fulfillment of
the requirements for the award of the Bachelor
of Computer Science

Faculty of Computer Science and Information System
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“What we have to learn to do we learn by doing…” – Aristotle

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**ABSTRAK**

ABSTRACT

NASOM Parent’s Support System – Diagnosis Module is a tool that has similarity to Decision Support System (DSS). This system is introduced to a portal of our UTM’s master student, Puan Aida in order as a suggestion to perform medical monitoring by using this tool. This project is a combination of 3 systems that consists “NASOM Parent’s Support System – Information System Module”, “NASOM Parent’s Support System – Diagnosis Module” and also “NASOM Parent’s Support System – Monitoring Module”. “NASOM Parent’s Support System – Diagnosis Module” is a web based as a purpose to help the users mainly parents to diagnose the probability of the child to be autism. This system is developed using Evolution Prototype methodology. The software’s used in developing this system are consists of ASP.NET which is used as the main programming language and also MSSQL as to manage the system’s database. Besides, Microsoft Visual Studio 2008 is used in order to produce an interactive and user friendly web based system. By developing this project, hopefully the system can smooth the process of obtaining diagnose result for the autism children.
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CHAPTER 1

INTRODUCTION

1.1 Introduction

Until today itself, we are still experiencing lack of medical experts in various fields. Whenever a person goes to clinic or hospital to get treatment, he/she are needs to queue up in a long line in order to get into they turn. To make matter even worse, some are needed to wait for months if they happen to make an appointment with government medical experts. In the field of Special Children Learning disabilities medical experts, the number of specialists is way much lesser than others.

By using the online system, current issue can be solved. There are a lot of similar systems in the web but these systems are not in Malay language. It is necessary to be in Malay language as now we are living in Malaysia and in this country, the language that is understood by everyone else is none other than Malay.
Even if there is a Malay version of online diagnosis and monitoring system for learning disabilities designed for special kids, there are not much of them is user friendly. Fonts, design, layout, medical terms are too focused on medical experts forgetting public users. Therefore, it is a need for this system to be effective yet easily understood as to achieve the goal of user-friendly.

Therefore, a newer version of online diagnosis and monitoring system is needed. A system that is not just able help parents solve their problem but as well as making them easier to use. This newer version of online diagnosis and monitoring system is called **NASOM Parent’s Support System (NPSS)** which contains Diagnosis Module, Monitoring Module and also Information System Module. In this thesis itself, only Diagnosis Module, **NASOM Parent’s Support System- Diagnosis Module** will be included. As for Information System Module and Monitoring Module it will not be included in this thesis. If any information needed from Information Module can refer to **NASOM Parent’s Support System – Information System Module** that is written by Mr. Tong Yong Wei. Any information that needs reference from Monitoring Module can be referring to **NASOM Parent’s Support System- Monitoring Module** that is written by Mr. Tan Wei Chuen.

One might ask why National Autism Society of Malaysia (NASOM) been choose instead of others and the answer for it is because NASOM is a non government organization that provides help and guidance to Autism child in Malaysia. Besides NASOM is also an organization that provides free service to the society which actually matches NPSS purpose as to provide free service to parents. Furthermore, as mentioned above NASOM takes small amount charges when helping the society certainly this will leads to they have no enough funds for advance IT technology.
Figure 1.1 shown below is the main system and the relationship of the 3 sub system of the project.

Figure 1.1: Sub Systems of the NASOM Parent's Support System (NPSS)

1.2 Background of Problem

When their child has health problem, surely parents will seek for medical help. Sadly in Malaysia today, we are still facing the low number of specialists in the field of learning disabilities for special children. Even if a person manages to meet medical experts for the first appointment, but this field of study- learning disabilities, is not a case that should be handling lightly as even a simple cough or fever nowadays is taken into serious medical treatment.
Of course one can seek for private hospitals’ help and treatment but we must realize their help is only for those who have the means. We should not forget there are families that unable to afford the fees for private hospital treatment.

There is also a lot of such system on the web, but not much of them are in Malay language. Elderly parents that did not receive early education during their schooldays of course will face difficulties not using the system itself but have problem also to go through the instruction to access a specific system. Some online diagnosis system does not have a clear message indicating the purpose of the page itself. This may leads to confusion among user.

NASOM website is only providing information but unable to do process such as recording down their child’s progress, diagnose children or even monitor children. With current NASOM website, it has limited information for researcher to do their research regarding of Autism. Although NASOM provide services to society with low rate charges, it still unable to fulfill what parents’ demand that is demand for an online diagnosis and monitoring service. This is because NASOM is lack of funds to possess such technology.

1.3 Project Aim

The aim of the project, based on the problem discussed above, is to develop an NASOM Parent’s Support System that is capable of helping the public, not only specific for medical experts. Besides, the purpose of developing this project is to provide it to NASOM. With this NPSS, it able help parents with special kids to ease their burden of
verifying what case of learning disabilities faced by their child and prescribe a temporary treatment for their child until they meet up with a medical expert.

This project also benefits on financial factor of parents. Nowadays, private medical sector are charging their customer with expensive fee but with this project, it will be free for user, saving a lot of parents’ money. Lastly but not least, this project also focusing on user-friendly system. This system will aim on effective yet easy to understand to achieve the goal of friendly user system. Wording will be Malay and English version and fonts will be big and clear. The overall design will consider on elderly parents for them easily to access the system.

1.4 Project Objectives

To achieve the aim of the project, some objectives have been identified as below:

i. To diagnose the learning disability of special children (Autism)

ii. To educate parents for giving them a understanding of Autism Learning Disability

iii. Provides guidance and advices to parents immediately and helps them to avoid cumbersome red tape.

iv. To interact with parents by using the normal term instead of specialist’s term.
1.5 Project Scope

To ensure the objectives of project can be achieved and implement well, some scopes of the project have been identified as below:

i. The system that is to be developed is a web based system which can use by parents and specialists.

ii. The system is developed based on the study of National Autism Society of Malaysia (NASOM)

iii. The system included 3 parts, such as diagnosis system, monitoring system, and online journal system.

iv. The system is developed to help users (parents) to diagnose and monitoring their children.

v. Specialists can provide their suggestions and advices through the online journal system.

1.6 Importance of Project

The importances of developing the System have been identified and are stated as below:

i. It provides helps to parents immediately and helps them to avoid cumbersome red tape.

ii. It helps parents diagnose and monitoring their children.

iii. It helps parents to make decision on giving treatment on their children.

iv. It uses normal language instead of specialists’ language for better communication between specialists and parents.

v. It comes with Malay language, Bahasa Malaysia also that is understood by everyone since it is mother language in Malaysia.
1.7 Summary

This chapter describes the project introduction and the existing problem with the lack of web based diagnosis system. Besides that, this chapter also describes the objectives of the project, scopes and the importance of the projects as reference for the overall system development process. This project is to develop an online diagnosis and monitoring system. This chapter is important as a guideline and provides understanding of the general picture to develop the complete system.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature review consists of the research aspects of theory and method that will be used in the system development process. The objective of doing literature review is to gather information that is needed in developing a system. Literature review is important for the study and research of the critical aspects that are needed in developing a new system.

This chapter will discuss more on review and research of earlier studies of current available online similar system today. Besides that, this chapter also goes in-depth of gadgets that will be place on the online system. Ultimately, the purpose of this chapter is to discuss current online medical diagnosis system that available on the internet today, Decision Support System (DSS), and Autism learning disability as well as what effects/symptoms it will bring and all necessary data regarding it.
2.2 Study of the Existing Similar System

Figure 2.1: Interface of IAutistic Website (iautistic.com)

Figure 2.2: Interface of NeurologyChannel Website (www.neurologychannel.com)

Figure above are some examples of similar system that we will be building on. Figure 2.1 shows the IAutistic website and Figure 2.2 shows the website of NeurologyChannel. However, some color for their website, their design, their fonts, everything is not suitable for parents or those who fresh to computer. Although the websites offers a lot of tests and information, it is not well arranged leads to user been confused.
Regarding the font, it is too small for user. Elderly adults normally will have problem with their eyesight and small fonts will make their life more difficult as they cannot read it. Next, regarding to the color, as one can see, the figure above website is in black n white which is pretty dull. With only black and white, even there is important message over there, user will just slip it through as they are unnoticed about it. Besides that, is the term been use at the website. The system is not only been use by specialist but also parents. Parents do not understand what all these medical terms are. Furthermore, in this example, there is no user category too. However, in the figure above, that website is just simply a diagnosis system where no extra details given.

2.3 Team Spirit

Teamwork is a team formed by two or more people. Everyone in that specific group has their own ability and with extra abilities, that specific team will merge up them together and work with the guidelines of their own objectives to achieve a shared goal that everyone in that team has the same.

With several individual working together, an excellent and effective teamwork can be achievable and when this happens, the performance can goes beyond individual accomplishments. Therefore, what here trying to stress that is, if all the individuals in a specific group harmonize their contributions and work towards a common goal, an effective and efficient team will be appear.
2.3.1 Benefits of Teamwork

As discussed earlier what the meaning of teamwork is, one might realize the importance of teamwork, and however we will also look into the benefit of teamwork. According to the research of the benefits of teamwork, there are 6 most important benefits. Those 6 of them are as listed as:

- Creativity
- Motivation
- Skills
- Speed
- Sounding Board
- Support

2.3.1.1 Creativity

We all are human with different personality and abilities. By utilizing all these different aspects in a team, a team will be able to generate more variation of ideas and with more variation of ideas, the percentage of creative solution will raised too.
2.3.1.2 Motivation

Nowadays, employees are getting less and less satisfied with their job. Therefore, individuals prefer to choose to work together as a team to achieve a certain goal. As they interacts with each other, this raise up enthusiasm of everyone in that specific team. High enthusiasm leads to a team will put more effort and interest to the project that they were developing. This factor will results in positive impacts on motivation and have higher chance of to success a project.

2.3.1.3 Skills

A person is unable to possess all skills. Every person in this world has their pros and cons. A person maybe is good in coming up creative ideas or another will be good in technical area. Assuming a person weakness in a team is a gap and a person’s extra ability is a filling to fill up gaps. With gaps been filled up, certainly of course this will create a perfect team, a team that able to overcome all obstacles in the process of reaching their objectives.
2.3.1.4 Speed

In a project development life cycle, it consists of Planning, Analysis, Design, Implementation and Support. If one person were to finish all up by all alone, it will obviously take for months. By splitting up tasks among teammates, all work can move toward in parallel direction therefore the time taken to complete the overall task become shorten.

2.3.1.5 Sounding Board

Each individual have their own opinion. If the teammate can come up with a good opinion, they can walk further. In a team situation, other team members can act as a sounding board, allowing us to cut through the options and get on with those most likely to achieve the desired goal.

2.3.1.6 Support

This is also somehow related with creativity. What is going to mention here is, a person idea will have boundaries but however when a person is in a team, he will be able to think more further than a preset boundaries as he know he can rely on his team. Never underestimate the significance of this because it may leads to great ideas.
2.4 Special Children

Special children is a part of Disabled People, that is they cannot be fully independent with their own self and they are unable to live in the community together base on their physicality or mentality from when they born or acquired. Below are the six categories of disabled people that also involve children.

- Hearing disability
- Vision disability
- Physical disability
- Cerebral Palsy
- Learning disability
- The other symptoms will base on the medical diagnosis that covers up the entire disabled problem.

These children need medical treatment, guidance, assist and more attention from the people around them. A special government force is formed to take care of the welfare of the unfortunate children - the Ministry of Women, Family and Community Development. Under this ministry, another department is formed – the Department of Social Welfare Malaysia. They are very sensitive and ready to hear and assist those who needed. They provide shelter and rehabilitation for Department’s target groups, develop the community through the process of changing attitude and increasing capability for self-reliance, create a society with a caring culture and improve the well-being of society through professional social welfare and social development services and strategic sharing of responsibilities.
2.5 Autism Learning Disability

Autism is actually a type of LD as known as learning disabilities. Kids that have this LD will live their life much more different from a normal kid. It is because autism kids normally will find difficulties when communicating with others. Besides, they find themselves hard to express their feeling through words. All this symptoms or effects makes them into introvert and become less sociable. A normal sound level might be nothing for us, but for those kids with autism, it will be an annoyance till the level that one might use their hands to cover up his or her ears. Not only sound though, even a gentle touch will cause them uncomfortable.

Kids that have autism also cannot interpret expression or words correctly like other kids do. Let’s take an example of one person smiling, a normal kid will automatically know that that smiling person is happy because he or she links smile with happy feeling. However, for autism kid, they are unable to make connections between these two links. Not only just for expression, they might not able to link up with words as well. They do not understand what message people are trying to speak up with them. When they are unable to link up correct message with the correct words, certainly they will misuse words to express themselves.

Autism also causes child to act in weird behavior in the sense of repetition. They prefer to stay on a schedule that is always the same. It is because they do not like changes in their life. For example, they might flap their hands continuously, saying certain words over and over again. Another example will be maybe they like to arrange their toys in some sort of arrangement and if the arrangement is been disturbed or not they same, they will get upset.
Besides, someone who has autism also can’t able to prioritize their important tasks. They are unable to determine what they trying to do or neither how much importance for something they are doing. If they unable to prioritize their tasks, they would not be able to determine whether going to school or replying back to someone is important. However, this varies between kids. Some kids may mildly affected causing them to have little trouble in life, but however if one is severely affected, they are certainly going to need a lot of attention.

2.6 Decision Support System (DSS)

Decision Support System (DSS) is an interactive computer-based system or subsystem intended to help decision makers use communications technologies, data, documents, knowledge and/or models to identify and solve problems, complete decision process tasks, and make decisions. Decision Support System is a general term for any computer application that enhances a person or group’s ability to make decisions. Also, Decision Support Systems refers to an academic field of research that involves designing and studying Decision Support Systems in their context of use. In general, Decision Support Systems are a class of computerized information system that supports decision-making activities.
2.6.1 Characteristics and Capabilities of DSS

DSS is closely associated with the terms Online Analytical Processing (OLAP) and Data Warehousing (DW). OLAP refers to querying and accessing on-line database and DW refers to specific technical architectures for storing and accessing large amounts of data. The following are the key characteristics and capabilities of DSS.

- Provide support in semi-structured and unstructured situations.
- Support for various managerial levels.
- Support all phases of the decision-making process.
- Goal is to improve the effectiveness of decision making.

Thus decision makers can make better, more consistent decisions in a timely manner.

2.6.2 DSS Components

These technologies are assembled from four basic components (each with several variations and are typically deployed over the Web).

- Data Management Subsystem
- Models Management Subsystem
- Knowledge Management Subsystem
- User interface

A diagram of the DSS Architecture is shown as in the Figure 2.3 below.
2.6.2.1 The Data Management Subsystem

A data management system (DMS) is a computer program designed to manage a database (a large set of structured data), and run operations on the data requested by numerous clients. The DMS can be interconnected with the corporate data warehouse. Typical examples of DMS use include accounting, human resources and customer support systems.

Some of the capabilities of DMS in a DSS are:

- Captures/extracts data for inclusion in a DSS database.
- Interrelates data from different sources.
- Performs complex data manipulation tasks based on user queries.
2.6.2.2 The Model Management Subsystem

The model base management system (MBMS) is a computer program that includes financial, statistical, management science or other quantitative models that provide the system’s analytical capabilities and appropriate software management. Usually, the models are customized using modeling languages (programming tools). Some of the capabilities of MBMS in a DSS are:

- Allows user to manipulate the models so they can conduct experiments and sensitivity analyses ranging from ‘what-if’ to goal seeking.
- Catalogs and displays the directory of models for use by several individuals in the organization.

2.6.2.3 The Knowledge Management Subsystem

Many unstructured and even semi-structured problems are so complex that their solutions require expertise. This can be provided by an expert system or other intelligent system. Advanced DSS are equipped with a component called a knowledge-based management subsystem that can supply the required expertise for solving some aspects of the problem and provide knowledge that can enhance the operation of the DSS components. Some of the capabilities of KMS in a DSS are:

- Provides expertise in solving complex unstructured and semi-structured problems
- What models to use, how, and interpreting results
- Reasoning, handling uncertainty and learning from data
- Expertise provided by an expert system or other intelligent system (AI techniques)
2.6.2.4 The User Interface (Dialog) Subsystem

User interface is component of a computer system that allows bidirectional communication between the system and its user. User interface of a computer program refers to the graphical, textual and auditory information the program presents to the user, and the control sequences (such as keystrokes with the computer keyboard, movements of the computer mouse, and selections with the touch screen) the user employs to control the program.

2.6.2.5 The User

The person faced with a decision that a Management Support System (MSS) is designed to support is called the user, the manager or the decision maker. MSS has two broad classes of users that are managers and staff specialists. Staff specialists use the system much more frequently than manager and tend to be more detail-oriented. Besides that, a person who called intermediary uses a computer to fulfill requests made by other people such as Staff assistant, Business (system) analyst, and Group DSS Facilitator.

2.7 System Development Life Cycle (SDLC)

Once upon a time, system development consisted of a programmer writing code to solve a problem or automate a procedure. Nowadays, systems are so big and complex
that teams of architects, analysts, programmers, testers and users must work together to create the millions of lines of custom-written code that drive our enterprises. To manage this, system development life cycle (SDLC) models have been created.

The Systems Development Life Cycle (SDLC) is a conceptual model to describe the stage of information system development from an initial feasibility study through maintenance of the completed application. Furthermore, SDLC usually been described as process of creating or altering systems, and the models and methodologies that people use to develop these systems in the field of systems engineering and software engineering.

Several SDLC methodologies have been developed and introduced to guide the processes involved including the waterfall model (the original SDLC method), rapid application development (RAD), joint application development (JAD), the fountain model and the spiral model. Those SDLC does not mean to be used alone they can be a mix of several SDLC resulting in a hybrid methodology.

Systems Development Life Cycle (SDLC) adheres to important phases that are essential for developers, such as planning, analysis, design, implementation and maintenance. The oldest model, waterfall model was originally regarded as "the Systems Development Life Cycle" is a sequence of stages in which the output of each stage becomes the input for the next. Normally these stages follow the same basic steps but many different waterfall methodologies give the steps different names and the number of steps seems to vary between 4 and 7. There is no definitively correct or a prefix Systems Development Life Cycle model, but the steps can be characterized and divided in several steps. Figure 2.4 Shows the model of SDLC and the 5 phases within the model.
Figure 2.4: Model of the Systems Development Life Cycle (www.wikipedia.com)

Project planning – initiate, ensure feasibility, plan schedule, obtain approval for project
Analysis – understand business needs and processing requirements
Design – define solution system based on requirements and analysis decisions
Implementation – construct, test, train users, and install new system
Maintenance – keep system running and improve

2.8 Development Tools and Technology

Different tools and technology are needed in developing a system based on the requirements of the system. It is important to choose the right tools and technology to develop the system. Therefore, this section is to find out the usage and of the development tools and technology.
2.8.1 Microsoft Visual Studio 2008

Microsoft Visual Studio 2008 is used to develop console and graphical user interface applications along with Windows Forms applications, websites, web applications and web services for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework Microsoft Silverlight. The programming languages that are supported by Microsoft Visual Studio 2008 are C or C++ (via Visual C++), VB.NET (via Visual Basic .NET), C# (via Visual C#), XML or XSLT, HTML or XHTML, Javascript and CSS.

Microsoft Visual Studio 2008 was released in year 2007 alongside .NET Framework 3.5. It is focused on development of Windows Vista, 2007 Office system, and Web applications. It supports multi-targeting which lets developers to choose which version of the .NET Framework (out of 2.0, 3.0, 3.5, Silverlight CoreCLR or .NET Compact Framework) the assembly runs on. It also features a XAML based designer, workflow designer, LINQ to SQL designer, XSLT debugger, JavaScript Intellisense support, JavaScript Debugging support, support for UAC manifests, a concurrent build system, among others.

2.8.2 Microsoft SQL Server 2005

Microsoft SQL Server 2005 the successor to Microsoft SQL Server 2000. It is a relational database server where its primary query languages are T-SQL and ANSI SQL. Native support for managing XML data is included in Microsoft SQL Server 2005. An xml data type is defined either to be used as a data type in database columns or as literals
in queries. Microsoft SQL Server 2005 has added some extensions to the T-SQL language to allow the embedding of XQuery queries in T-SQL.

Microsoft SQL Server 2005 is enhanced with new indexing algorithms and better error recovery systems. Furthermore, optimistic concurrency support is added for better performance and partitions on tables and indexes are supported natively. SQL CLR is to allow the integration of Microsoft SQL Server 2005 with the .NET Framework. Microsoft SQL Server 2005 introduced "MARS" (Multiple Active Results Sets), a method of allowing usage of database connections for multiple purposes.

2.8.3 ASP.NET

ASP.NET is a web application framework that allows programmers to build dynamic websites, web applications and web services. It is the successor to Microsoft’s Active Server Pages (ASP) technology. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language.

ASP.NET allows user to create reusable components through the creation of User controls. The applications of ASP.NET are hosted in a web server and are accessed over the stateless HTTP protocol. Programmers are allowed to develop system using an event-driven GUI model instead of the conventional web-scripting environments. ASP.NET has similar metaphors to Microsoft Windows applications such as controls and events. In addition, programmers can develop web pages in VB.NET, C#, J#, Delphi.NET or Chrome.
2.9 Modified Checklist for Autism in Toddlers (M-CHAT)

The Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, & Barton, 1999) is available for clinical, research, and educational purposes. The M-CHAT is validated for screening toddlers between 16 and 30 months of age, to assess risk for autism spectrum disorders (ASD). The M-CHAT can be administered and scored as part of a well-child check-up, and also can be used by specialists or other professionals to assess risk for ASD. The primary goal of the M-CHAT was to maximize sensitivity, meaning to detect as many cases of ASD as possible. Therefore, there is a high false positive rate, meaning that not all children who score at risk for ASD will be diagnosed with ASD. Furthermore, the M-CHAT is a copyrighted instrument, and use of the M-CHAT must follow these guidelines:

i. Reprints/reproductions of the M-CHAT must include the copyright at the bottom (. 1999 Robins, Fein, & Barton). No modifications can be made to items or instructions without permission from the authors.

ii. The M-CHAT must be used in its entirety. There is no evidence that using a subset of items will be valid.

iii. Parties interested in reproducing the M-CHAT in print (e.g., a book or journal article) or electronically (e.g., as part of digital medical records or software packages) must contact Diana Robins to request permission (drobins@gsu.edu).

There are two authorized websites: the M-CHAT and supplemental materials can be downloaded from www.firstsigns.org or from Dr. Robins’ website, at http://www2.gsu.edu/~wwpsy/faculty/robins.htm
2.9.1 Sensitivity, Specificity and Positive Predictive Value (PPV)

Sensitivity and specificity are statistical measures of the performance of a binary classification test. Sensitivity measures the proportion of actual positives which are correctly identified as such (e.g. the percentage of sick people who are identified as having the condition). Specificity measures the proportion of negatives which are correctly identified (e.g. the percentage of healthy people who are identified as not having the condition).

The positive predictive value, or precision rate, or post-test probability of disease, is the proportion of patients with positive test results who are correctly diagnosed. It is the most important measure of a diagnostic method as it reflects the probability that a positive test reflects the underlying condition being tested for. Its value does however depend on the prevalence of the disease, which may vary.

2.10 Summary

This chapter describes the literature review that has been done in order to collect information to develop the Integrated Student Activity Management System. The websites of IAutistic and NeurologyChannel has been studied along with the technology needed to be used. Besides that, Modified Checklist for Autism in Toddlers (MCHAT) had been studied to be a reference as questions for diagnosis module of the system. This literature review is important to gain knowledge in scripting language. Literature review helps to give a better picture on the ways to develop a system that is better than the current system. It helps to identify the resources that are needed in developing the new system.
CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discusses the methodologies involved in developing the NASOM Parent’s Support System – Diagnosis Module. It also discusses the justification of the chosen methodology. A good system will be developed if a suitable methodology is used. The justification of hardware and software are explained in this chapter. In addition, methodology helps to estimate the time and cost needed in developing a system. The Gantt Chart is used to illustrate the project schedule.

Several processes need to go through for a development of a system. The very first step of all is finding out what is the problem domain thus investigating and analyzing it. After successfully identifying a certain problem, a title will be chosen as to represent the problem that been identified. Planning process, scheduling, literature study, choosing method of solving the problem, development phase and writing report all come in next after successfully overcome first step.
3.2 Project Methodology

According to Wikipedia, Methodology can be explained as:

- "the analysis of the principles of methods, rules, and postulates employed by a discipline"
- "the systematic study of methods that are, can be, or have been applied within a discipline"
- "a particular procedure or set of procedures."

Methodology acts as a road map to bring developers to their destination that is producing a product on time yet the quality is at its best. In other meaning, methodology means a sequence of processes that includes procedures, actions, tasks, milestone and activities to create or develop project. It provides a guideline for developer to complete their project in a well arranged and systematic way.

3.2.1 Evolutionary Prototyping

Nowadays, there are several types of methodologies of system development. For example, there are system development life cycle, analysis, prototype and even structured design. Each and every methodology is different and varies from each other. They have their own states or stages to be followed in sequence before achieving their goal.
In Evolutionary Prototyping, there is four phases – Project planning phase, analyzing phase, design phase, and lastly implementation phase. Analyze phase, design phase, and implementation phase are all been execute together. This three phase will keep on been repeat until the whole system is completely been developed as this is to fulfill parents’ requirements on this upcoming system.

A readily system will be let out to user that is parents and specialists to try out. This step is to let user get used to it, try the system firsthand themselves, and to verify every requirements they need is in that system. After all these procedures had been done, users are required to give comments or opinion for enhancing this system so that this is the system that users really requested for. This step too, will be keep on repeating as to make sure prototype that been developed enable to satisfy what user needs and accordingly to their requirements.

3.2.2 Methodology Justification

After much researching for types of methodology, the prototyping approach is more suitable to develop the NASOM Parent’s Support System - Diagnosis Module.

Evolutionary prototyping methodology is able to reduce development costs and time. Missing functionality can be identified easily and early detection of error will certainly save a lot of costs and time during the whole project development.

Next, it also enables the flexibility of design. Evolutionary prototyping methodology will keep on repeating in analyze phase, design phase, and implementation
phase. This is to make sure users’ requirements for the system are been made. Users are also able to add or change requirements without affecting much of the system development.

Therefore, the prototyping approach will be used to develop NASOM Parent’s Support System – Diagnosis Module since it has so many advantages and is suitable in developing this system.

3.3 Methodology of the System Development

There are 5 phases in evolutionary prototyping methodology and the tasks that carried out in each phase will be discussed further.

3.3.1 Project Planning Phase

Project planning phase is the first phase in this system development. The primary objective of the planning phase are to identify the scope of the new system, ensure that the project is feasible, and develop a schedule, resource plan, and budget for the remainder of the project. There are 5 activities that will be identified in the project planning phase:

i. Define the problem.
ii. Produce the project schedule.
iii. Confirm project feasibility.
iv. Staff the project.
v. Launch the project.

The activity for this phase includes the distribution time for completing every specific task and also project’s activity scheduling. For the activities scheduling part will be using Microsoft Project 2003 software to generate a Gantt chart where it will list all the activities and the estimated time span. Gantt chart is to act as a reminder to remind people involved in this project to finish the task at a given time span so that the process of this project will run smoothly. Besides, in this particular project, there should be a judgment on each other talent individually and distribute task accordingly and lastly combination of all modules should be done within the whole team.

3.3.2 Analysis Phase

The primary objective of the analysis phase is to understand and document the business needs and the processing requirements of the new system. Analysis is essentially a discovery process. The key words that drive the activities during analysis are discovery and understanding. Six primary activities are considered part of this phase

i. Gather information.
ii. Define system requirement.
iii. Build prototypes for discovery of requirements.
iv. Prioritize requirements.
v. Generate and evaluate alternatives.
vi. Review recommendations with management.
In this phase, that is analysis phase, research on the problem domain as like the result shown in chapter 2- Literature Review had been done. Several resources for future usage like diagnosis and monitoring booklets from Ministry of Health were gathered. Several related sectors had been called to enquire and confirm the finding too.

### 3.3.3 Design Phase

The objective of the design phase is to design the solution system based on the requirements defines and decisions made during analysis. High-level design consists of developing an architectural structure for the software components, database, user interface, and operating environment. Low-level design entails developing the detailed algorithms and data structures that are required for software development. Seven major activities must be completed during the design phase:

i. Design and integrate the network.

ii. Design the application architecture.

iii. Design the user interfaces.

iv. Design the system interfaces.

v. Design and integrate the database.

vi. Prototype for design details.

vii. Design and integrate the system controls.

In Design Phase, wireframe that is a layout of design that will be use in implementation phase was prepared. Besides, it also acts as a first step to design and improve the user interface. Besides that, Data Flow Diagram (DFD) and Entity-Relationship Diagram (ERD) were produced in this phase too. With all these design, a clearer picture of how this system runs and operates will be viewed.
3.3.4 Implementation Phase

During the implementation phase, the final system is built, tested, and installed. The objective of the activities of this phase is not only to produce a reliable, fully functional information system, but also to ensure that the users are all trained and that the organization is ready to benefit as expected from the use of the system. All the prior activities must come together during this phase to culminate in an operational system. Five major activities make up the implementation phase:

i. Construct software components.
ii. Verify and test.
iii. Convert data.
iv. Train users and document the system.
v. Install the system.

3.3.5 Support Phase

The objective of the support phase is to keep the system running productively during the years following its initial installation. The support phase begins only after the new system has been installed and put into production, and it lasts throughout the productive life of the system. During the support phase, upgrades or enhancements may be carried out to expand the system’s capabilities, and they will require their own development projects. Three major activities occur during the support phase:

i. Maintain the system.
ii. Enhance the system
iii. Support the users
3.4 **Hardware and Software Requirements**

Hardware and software are very important for developing a stable system and that are very crucial as they play an important roles in this project. The correct choice of software and hardware will leads developer able to achieve their goals in their timeline or even faster. Moreover, good selection of software will enable developer to take shorter time to masteries it. Below are the characteristic of the right software to be chosen:

i. The software that will be chosen must be easy to understand.

ii. The software that been used must be friendly user and able to work well along with database.

Hardware that been chosen also should be able to last long and should be able to load a large amount of data in fast and effective performance. One shall remember that faulty hardware will cause loss of time and data. Therefore it is very important in term of choosing software and hardware.

3.4.1 **The Specification of Needed Hardware**

The specification of the hardware have to be explain clearly to avoid any problem occur during the system development. The list of hardware that will be applied in the system development will be shown as Table 3.1:
Table 3.1: Hardware Specification

<table>
<thead>
<tr>
<th>NO.</th>
<th>HARDWARE</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CPU</td>
<td>Intel Core 2 1.0GHz</td>
</tr>
<tr>
<td>2.</td>
<td>RAM Size</td>
<td>At least 2GB</td>
</tr>
<tr>
<td>3.</td>
<td>Hard Disc Capacity</td>
<td>At least 100GB</td>
</tr>
<tr>
<td>4.</td>
<td>Monitor</td>
<td>LCD monitor</td>
</tr>
<tr>
<td>5.</td>
<td>Mouse</td>
<td>USB Mouse</td>
</tr>
<tr>
<td>6.</td>
<td>Keyboard</td>
<td>USB Keyboard</td>
</tr>
</tbody>
</table>

3.4.2 Hardware Justification

Below will be a more detailed explanation of why these hardware been selected for the usage of the system development

i. Processor
A suitable processor such as Intel Core 2 with the speed of 1.0GHz is needed for the system development so that it can be carried out compatibly with the development of the technology now a day.

ii. RAM
The capacity of 2GB is needed to avoid any problem or error that will happen during the usage system when there requires a huge transaction of data been stored and retrieved.
iii. Monitor

LCD monitor is needed as it able to display output in high resolution and much more clearly compared to CRT monitor. Besides long usage of CRT monitor will definitely bring bad effects to developers in term of health.

iv. Mouse

Mouse is used to symbolize developer hand in term of executing and pointer to choose selection

v. Keyboard

Keyboard is the tool used for input of data and also for the development of the system such as typing in codes to communicate with the computer.

3.4.3 The Specification of Needed Software

The software that will be use during the system development is listed as Table 3.2.

Table 3.2: Software Specification

<table>
<thead>
<tr>
<th>NO.</th>
<th>SPECIFICATION</th>
<th>SOFTWARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>System Software</td>
<td>Microsoft Windows XP SP2 (Minimum requirement)</td>
</tr>
<tr>
<td>2.</td>
<td>Database</td>
<td>MS SQL Server 2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASP.Net Visual Basic (Language)</td>
</tr>
<tr>
<td>4.</td>
<td>Project Management</td>
<td>Microsoft Project 2003</td>
</tr>
</tbody>
</table>
3.4.4 Software Justification

Below is the explanation for the software specification that needs to be used to develop the system.

i. System Software

System software is used as the operating platform for the implementation of this system.

ii. Database

Database is a collection of data or records that been grouped together into a common pool that able to provides information for one or more users.

iii. Programming Language

Programming language is known as computer language designed to communicate with computer. It is also known as mode of human communication with the machine.

iv. Project Management

Project management includes planning, organizing and managing resource in a disciplined manner to achieve successful completion of project objectives.

3.5 Work Planning/Gantt Chart

Gantt chart is a type of bar chart that illustrates a project schedule that follows the fixed time period. It will illustrate the start and finish dates of the terminal elements and summary element of a project. Terminal elements and summary elements comprise
the work breakdown structure of the project. The Gantt chart for this project will be shown in APPENDIX A1.

3.6 Summary

Overall, this chapter tells about the planning work should be done to obtain an effective system with selection of appropriate methodology. Development system should have the specifications of hardware and software needs to be used to meet the preferences of the user system. In choosing the appropriate methodology, the development process and system will run smoothly through each phases and activities.
CHAPTER 4

ANALYSIS AND DESIGN

4.1 Introduction

This chapter discussing what will be developed in the area of process, database, module and interface. However, user’s requirements must be obtained by study of current organization website. Thus, after knowing what user needs from current website, planning for process design, module design, database design, input design, and output design will be implemented to develop a new system.
4.2 Background and Organization Structure

Offering Life-Long Services to People with Autism, that is what National Autism Society of Malaysia (NASOM) motto. NASOM, as a non-profit organization, was registered on 3rd March 1987 as Malaysia charitable organization. It aims to provide information, helps and offers care plus protection for people with autism and their family members. In NASOM, it is formed by a group of parents and professionals which is more than 100 members all together. Until today itself, NASOM is all over Malaysia, covering mostly every state.

NASOM's Vision
To become an efficient and effective organization that provides services, strength and sanctuary for people with autism.

NASOM’s Mission
To advocate for the rights of people with autism and in doing so provide opportunities for them to learn and lead a productive and fulfilling life.

NASOM’s Objectives
- To identify and promote the treatment, education, welfare and acceptance of people with autism
- To watch over and protect the people with autism
- To provide assistance and advice to families of people with autism
- To be a useful resource in the study, research and development of methodologies, therapies and treatment of autism and related disorders
NASOM’s Service

NASOM offers services through several of services and programs. Their programs are results based oriented and focus on acquisition of skills and changes in behavior. Their services are divided into 3 categories as listed at below:

- Assessment and diagnosis
- Early intervention
- Vocational training

The Figure 4.1 shows the organization chart of the National Autism Society of Malaysia (NASOM).

Figure 4.1: Organization Chart of NASOM (http://www.nasom.com.my)
4.2.1 Weaknesses of the Organization System

Since the study is based on the NASOM Parent’s Support System for National Autism Society of Malaysia known as NASOM, thus NASOM website that is www.nasom.com.my as current website is available for this section.

![Figure 4.2: Current Website of NASOM (http://www.nasom.com.my)](image)

This is the homepage of NASOM. As mentioned earlier in Chapter 2, a successful web contains a navigator bar however in NASOM website it is clear than they do not have any navigator bar either on top of the page or either at the side of their page. This will lead their user hard to find what actually they are actually looking for. Besides, it will also be hard for user to search for information they wanted. In other words, navigator bar acts as and map. Without that, user may not be able to use the system comfortably and ends up been confused and annoyed.

Secondly, their website too, there is too little information regarding treatment and autism. A website regarding autism should have ample information so that user may able to find and know much more regarding autism. Lack of information leads bad
impression to user as for user knows they will not get any useful information in they were to visit this website again.

Moreover, some links and functions in their website are also not working. For example, their language links. When Malay language is selected, their website still displays information in English. They should remember that not everyone in Malaysia knows English language well. Function that unable to be use will leads user unable to browse through that website smoothly as they do not know how to read well.

4.2.2 Suggested Strength for the Organization System

When things are well arranged, it’s certainly makes the user life easier when surfing through the website. For example, like Figure 4.3, everything is well arranged.

Figure 4.3: Example of effective website (kidshealth.org)
For both parents and specialists, the interface will be not too complex, but rich of information and helps, and of course, big and clear fonts. For specialists, it will be some sort same like parents, however will extra functions added in.

It is true that the international language is English however there are not everyone in Malaysia knows English. Until today itself, most of the online diagnosis and monitoring system are in English language. A parent that does not know well in English will face difficulties in using this particular system. Therefore, it is very important for this system to be implements in both languages that is English and Malay.

### 4.3 System Design

System design includes all design aspect that is Process Design, Database Design, Module Design and Interface Design. The purpose to have a system design is to define how actually this system will be implemented. System Design able to gives developers a clearer picture of what they are doing before starting their project. Therefore, with system design readied, the development of new system will certainly easy.
4.3.1 Process Design

Processes involved in this system are defined in Process Design. This step needs to be identified and understood as it acts as a guidance to developers on what they are going to build. Data flow Diagram (DFD) is used to show the process design of this system. As shown in the Context Diagram shown in APPENDIX B1 and Diagram 0 shown in the Appendix B2, there are 5 functions in this system that is Login, Diagnosis, Monitoring, Publishing Result and lastly Online Journal. As for data, there will be 7 tables as follows:

- **User’s information**: Information regarding parents and their children.
- **Specialist’s Information**: Information regarding doctors and their related personal details.
- **Children medical report**: Information and a full report of children that been diagnosis and monitored by NASOM Parent’s Support System.
- **Growth Observation**: A full observation combining with medical report, written by parents of their child growth rate. Specialists will drop down their expert suggestion on how their children progress.
- **Diagnosis tools**: A collection of questions that able to detect child learning disabilities and how serious it was.
- **Monitoring tools**: A collection of questions and suggestions to give the correct treatment to an autism child.
- **Item Gallery**: A collection of item details shared to the system by user to share it to others.

The lower level of the DFD which is the Diagram 1 will be shown in APPENDIX B3-APPENDIX B8.
4.3.2 Module Design

There are 2 main modules in NASOM Parent’s Support System. The modules are:

- **Parents Module**
  
  In Parents Module, there are 6 sub modules that are registration module, diagnosis module, monitoring module, viewing result module, item gallery module and lastly journal module. To use the system, parents are required to register themselves in registration module. After successfully registered, they are able to move on to other module. Diagnosis module is where parents are required to input information regarding their child to check if their child has autism and if there is autism, also able to detect how serious it was. Next is regarding monitoring module. In this module, suggestion and treatment according to child age will be shown to parents however parents, similar to diagnosis module, they also are required to input certain information just like child age and their child’s behavior. Besides, there is also viewing result module; parents are able to view their child condition after going through diagnosis and monitoring module. Next, it will be Item Gallery module where users can upload items that they want to share or else they can search for items within the system that they desire. Lastly will be Journal Module where parents are able to write their child condition daily. They are able to write their child’s growth progress according to date. It works similar to blogs.

- **Specialists Module**

  In Specialist Module, there are 2 sub modules that are registration module and Journal module involved. In registration module, before specialists are able to give their opinions or suggestion, they are required too to register through the system by sending a form with necessary information to system administrator for verification purposes. After being verified, specialists themselves are able to view child profile which contains written daily journal, diagnosis and monitoring report and give their expert suggestion.
4.3.3 Database Design

Database design is all about designing and producing a data model of a database. All the data in database will be linked thus accessing data will be easier. Database itself is a guide for developer to manage and maintain existing entities in this system. Entities itself, will communicate with each other through various process. All the database design of the system will be shown in APPENDIX E1.

4.3.4 Interface Design

Interface is for the interaction between users with the system. The interface design has to be user friendly where user can access the information easily. A good interface design helps to capture the interest of users while using the system. APPENDIX D1 is the proposed interface design and will be improved in the future.

4.3.5 Input Design

This interface is about input design. This interface is one of the input interface that is parents are required to insert their child particular details into here for processing purposes. APPENDIX D2 shows one of the examples of input interface design
4.3.6 Output Design

This output interface is more to result of the system. It acts as a medium between system and parents to display their outcomes. The data been displayed on this page mostly is retrieved from database. APPENDIX D3 shows one of the examples of output design.

4.4 Summary

This chapter describes the initial design of the system that is going to be developed. Diagrams such as DFD and ERD are used to model the system. Problems will not arise during the system development phase since the processes has been identified in this chapter.
CHAPTER 5

SYSTEM IMPLEMENTATION

5.1 Introduction

This chapter will discuss the implementation of the NASOM Parent’s Support System – Diagnosis Module. Installation of hardware and software will be discussed in this chapter. This chapter will also describe the activities involved in system development. Activities involves including interface development, database system development and programming code development.

5.2 Installation of Required Software

Software used to implement NASOM Parent’s Support System - Diagnosis Module includes Windows XP Service pack 2 as the minimum requirement for
operating system, Visual Studio 2008 and Microsoft Project 2003. Microsoft Visuals Studio 2008 comes with Microsoft SQL 2005. This is the main software that is used to develop the whole system. Microsoft SQL 2005 is used for managing system database. Finally, Microsoft Project 2003 is used to do the planning and generate Gantt chart for this project.

### 5.3 System Development

Activities involved in the development of NASOM Parent’s Support System - Diagnosis Module including database development, interface development and programming code development.

#### 5.3.1 Database Development

Environment Microsoft Visual Studio 2008 (VS2008) supports almost all types of DBMS (Database Management System). There is a DBMS, Microsoft SQL Server 2005 is comes with VS2008. Once successfully installed VS2008, users can generate a database of Microsoft SQL Server 2005 with the following steps.

1. On the Solution Server, right-click the App_Data SQL Server database and add new ones.
2. Enter the name of the database, and then click OK.
iii. Produced a new database will be displayed in the Data Connection in the Server Solution. Entities can be produced in the Table.

5.3.2 Programming Code Development

In this section, coding extracted from the main functions will be discussed. The coding of NASOM Parent’s Support System - Diagnosis Module is developed using ASP.NET Visual Basic and Microsoft Visual Studio 2008 is the software for writing programming code. Following are the snapshots of the coding of few main functions of the system.

5.3.2.1 Diagnosis Tool

This is one of the main functions of the system. This page is for the logged in user to diagnose autism spectrum disorder for their children. In this section, programming code about connecting to database (retrieve data) and generate dynamic ASP controls are included. The snapshot below shows a part of coding of the diagnosis tool.
Protected Sub Page_Load(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me.Load

Using myConnection As New SqlConnection(ConfigurationManager.ConnectionStrings("SeanConnectionString").ConnectionString)

    Const SQL As String = "SELECT [QuestionM] FROM [Questions]"
    Dim myCommand As New SqlCommand(SQL, myConnection)

    myConnection.Open()

    Dim myReader As SqlDataReader = myCommand.ExecuteReader

    Dim table As New Table()
    table.ID = "Table1"
    Placeholder1.Controls.Add(table)
    Dim i As Integer = 0

    While myReader.Read

        i = i + 1

        Dim row As New TableRow
        Dim row2 As New TableRow
        Dim row3 As New TableRow
        Dim cell1 As New TableCell()
        Dim cell2 As New TableCell()
        Dim cell3 As New TableCell()
        Dim cell4 As New TableCell()
        Dim cell5 As New TableCell()
        Dim cell6 As New TableCell()
        Dim rdb As New RadioButton()
        Dim rdbo As New RadioButton()
        Dim lbl As New Label()
        Dim lbls As New Label()

        cell3.Style("vertical-align") = "text-top"

        lbl.ID = "lbl" + i.ToString
        lbl.Text = myReader("QuestionM").ToString
        lbls.ID = "lbls" + i.ToString
        lbls.Text = i.ToString + "."

        cell3.Controls.Add(lbls)
        row.Cells.Add(cell3)
        cell.ColumnSpan = 2
        cell.Controls.Add(lbl)
        row.Cells.Add(cell)
        table.Rows.Add(row)

        row2.Cells.Add(cell4)
cell2.Width = 100

rdb.ID = "rdb" + i.ToString
rdb.Text = "Ya"
rdb.GroupName = "group" + i.ToString
rdb.Checked = True
cell2.Controls.Add(rdb)
row2.Cells.Add(cell2)

rdbs.ID = "rdbs" + i.ToString
rdbs.Text = "Tidak"
rdb.GroupName = "group" + i.ToString
cell5.Controls.Add(rdbs)
row2.Cells.Add(cell5)
table.Rows.Add(row2)

cell6.Height = 50
row3.Cells.Add(cell6)
table.Rows.Add(row3)

End While

Label1.Text = i.ToString

myReader.Close()
myConnection.Close()

End Using

Figure 5.1: Coding of Generating Diagnosis Tool
5.3.2.2 Display Result of Diagnosis

In this section, the coding of calculating and displaying the result of diagnosis will be revealed. The snapshot below shows a part of coding of the result calculating and displaying.

```vbnet
Protected Sub Page_Load(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me.Load
    Dim count As Integer = 0
    Dim result As Double
    Dim txt As String
    Dim txts As String
    Dim i As Integer = 1
    Dim answer(23) As String
    Dim question As String
    Dim username As String = Page.User.Identity.Name

    txt = "rdb" + i.ToString
    txts = "rdbs" + i.ToString
    Label6.Text = Session("ChildID")

    Using myConnection As New SqlConnection(ConfigurationManager.ConnectionStrings("SeanConnectionString").ConnectionString)
        Const SQL As String = "SELECT [QuestionM],[AnswerM] FROM [Questions]"
        Dim myCommand As New SqlCommand(SQL, myConnection)
        myConnection.Open()
        Dim myReader As SqlDataReader = myCommand.ExecuteReader
        Dim ph As ContentPlaceHolder = CType(PreviousPage.Master.FindControl("ContentPlaceholder1"), ContentPlaceHolder)
        Dim ch As AjaxControlToolkit.TabContainer = CType(ph.FindControl("TabContainer1"), AjaxControlToolkit.TabContainer)
        Dim ch2 As AjaxControlToolkit.TabPanel = CType(ch.FindControl("TabPanel1"), AjaxControlToolkit.TabPanel)
        Dim ch3 As Placeholder = CType(ch2.FindControl("Placeholder1"), Placeholder)

        While myReader.Read
            txt = "rdb" + i.ToString
            txts = "rdbs" + i.ToString
            Dim k As String = myReader("AnswerM").ToString
            If CType(ch3.FindControl(txt), RadioButton).Checked And CType(ch3.FindControl(txt), RadioButton).Text = k Then
                count = count + 1
            End If
        End While
    End Using
End Sub
```
If CType(ch3.FindControl(txts), RadioButton).Checked And CType(ch3.FindControl(txts), RadioButton).Text = k Then
    count = count + 1
End If

If CType(ch3.FindControl(txt), RadioButton).Checked Then
    answer(i) = CType(ch3.FindControl(txt), RadioButton).Text
End If

If CType(ch3.FindControl(txts), RadioButton).Checked Then
    answer(i) = CType(ch3.FindControl(txts), RadioButton).Text
End If

i = i + 1
End While

result = (count / 23)
result = result * 100
result = Format(Convert.ToDouble(result), "####")
Label1.Text = result.ToString + "%"

If result <= 30 Then
ElseIf result >= 30 Then
ElseIf result >= 50 Then
    Label2.Text = "Ujian anda telah menunjukkan anak anda mungkin memiliki beberapa penanda Autism Spectrum Disorder yang kuku. Sila berjumpa dengan doktor sebaik yang mungkin."
End If

myReader.Close()
myConnection.Close()

Using myConnection As New SqlConnection(ConfigurationManager.ConnectionStrings("SeanConnectionString").ConnectionString)
Dim SQL As String = "SELECT * FROM [PPV] WHERE [Failed] = " + count.ToString + ""
Dim myCommand As New SqlCommand(SQL, myConnection)
myConnection.Open()
Dim myReader As SqlDataReader = myCommand.ExecuteReader

While myReader.Read

    Label3.Text = myReader("Sensitivity").ToString
    Label4.Text = myReader("Specificity").ToString
    Label5.Text = myReader("PPV").ToString
End Using
End While

Label1.Text = result.ToString + “%”

myReader.Close()
myConnection.Close()

End Using

**Figure 5.2:** Coding of Calculating and Displaying Result

### 5.3.2.3 Retrieve from Database, Update and Insert Data to Database

In this section, the function of retrieve data from database, updating data and insert new data into database will be discussed. The coding of these functions is shown by the snapshots below.

```vbnet
Using myConnection As New
SqlConnection(ConfigurationManager.ConnectionStrings("SeanConnectionString").ConnectionString)
Dim currentdate As String
Dim currentmonth As String
Dim currentyear As String

currentmonth = MonthName(Month(Now))
currentyear = Year(Now)
currentdate = DateValue(Now)

myConnection.Open()
Dim SQL As String = “Insert into [DiagnosisRecord] values (@Question1, @Question2, @Question3, @Question4, @Question5, @Question6,” + _
"@Question7, @Question8, @Question9, @Question10, @Question11, @Question12, @Question13, @Question14, @Question15, @Question16, @Question17, @Question18, @Question19, @Question20, @Question21, @Question22, @Question23, @ChildID, @Username, @Percentage, @Year, @Month, @Date)”
Dim myCommand As New SqlCommand(SQL, myConnection)

For i = 1 To 23
```
question = "@Question" + i.ToString

If answer(i) = "Ya" Then
    answer(i) = "Yes"
End If

If answer(i) = "Tidak" Then
    answer(i) = "No"
End If

myCommand.Parameters.AddWithValue(question, answer(i))
Next

myCommand.Parameters.AddWithValue("@ChildID", Session("childID"))
myCommand.Parameters.AddWithValue("@Username", username)
myCommand.Parameters.AddWithValue("@Percentage", Label1.Text)
myCommand.Parameters.AddWithValue("@Date", currentdate)
myCommand.Parameters.AddWithValue("@Month", currentmonth)
myCommand.Parameters.AddWithValue("@Year", currentyear)
myCommand.ExecuteNonQuery()
myConnection.Close()
End Using

**Figure 5.3:** Coding of Connecting to Database and Insert New Data

For i = 1 To 23
Using myConnection As New SqlConnection(ConfigurationManager.ConnectionStrings("SeanConnectionString").ConnectionString)
    myConnection.Open()
    Dim SQL(23) As String
    Dim SQL2(23) As String

    SQL(i) = "Update [CountReport] SET Yes=@Yes,No=@No where Question = 'Q" + i.ToString + "'

    Dim command As String
    command = SQL(i)

    Dim myCommand As New SqlCommand(command, myConnection)
    myCommand.Parameters.AddWithValue("@Yes", countYes(i))
    myCommand.Parameters.AddWithValue("@No", countNo(i))

    myCommand.ExecuteNonQuery()
    myConnection.Close()
End Using
Next

**Figure 5.4:** Coding of Connecting to Database and Update Data
Using myConnection As New
SqlConnection(ConfigurationManager.ConnectionStrings("SeanConnectionString").ConnectionString)

Dim currentdate As String
Dim currentmonth As String
Dim currentyear As String

currentmonth = MonthName(Month(Now))
currentyear = Year(Now)
currentdate = DateValue(Now)

myConnection.Open()

Dim testSQL As String = "SELECT [Date] FROM [DiagnosisRecord] where [Date]=" + "'" + currentdate + "'" + "and [Username]=" + "'" + username + "'" + "and [ChildID]=" + "'" + Session("childID") + "'"
Dim myCommand As New SqlCommand(testSQL, myConnection)
Dim myReader As SqlDataReader = myCommand.ExecuteReader

If myReader.Read Then
decision = 1
Else
decision = 2
End If

myReader.Close()
myConnection.Close()

End Using

Figure 5.5: Coding of Connecting to Database and Retrieve Data from Database

5.3.2.4 Generate Microsoft Report Viewer

In order to generate a report with a graphical view, microsoft report viewer has been used. The snapshot below shows a part of coding of generating the microsoft report viewer.
Figure 5.6: Coding to Generate Microsoft Report Viewer
5.4 Summary

This chapter describes the implementation of NASOM Parent’s Support System - Diagnosis Module during the development phase. Implementation can be described as the realization system from the design and analysis phases. The development of database, interface and program are also discussed in this chapter. The developed database is not only for storing data but also retrieving and manipulating the data to produce output that are useful to the users.
CHAPTER 6

SYSTEM TESTING AND EVALUATION

6.1 Introduction

This chapter discusses about the system testing phase and strategy of the NASOM Parent’s Support System – Diagnosis Module. System testing plays an important role in ensuring the system meets the user specifications and requirements and free of any errors. The error rate in the system is minimized with the help of this testing phase. Various kinds of testing will be carried out to evaluate the system to make sure that it is working properly and ready to be used. The testing is done with black box testing, interface testing and requirement-based testing.
6.2 Black Box Testing

Black box testing is also known as functional testing or behavioral testing. Black box testing is focuses on determining whether or not the system has fulfilled the system specifications. In order to implement black box testing strategy, tester needs to know exactly the system specifications and as the user, should know how the system should behave in response to particular action. Black box testing can helps to detect some errors as below:

i. Incorrect or missing function
ii. Error in interface
iii. Error at the beginning and ending of the system
iv. Error when connect to database

In other word, black box testing can be defined as the input testing and output testing for the system. Input testing is done to ensure the data saved in database is correct to avoid error during data output. Output testing is done to display the information input into the system during input testing.

Figure 6.1: Black Box Testing
Input testing is done to make sure that data entered is valid, consistent, and can produce correct and accuracy output. Therefore, a few messages will be displayed based on the functions. Table 6.1 shows the Unit Test on User Input Forms.

**Table 6.1: Unit Test on User Input Forms**

<table>
<thead>
<tr>
<th>Input</th>
<th>Expected Output</th>
<th>Real Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert new data all required fields</td>
<td>Data inserted successfully</td>
<td>OK</td>
</tr>
<tr>
<td>Blank fields or incomplete fields</td>
<td>Warning message indicates exact location of the blank field</td>
<td>OK</td>
</tr>
<tr>
<td>Update existing data</td>
<td>Data updated successfully</td>
<td>OK</td>
</tr>
</tbody>
</table>

### 6.3 Interface Testing

Objectives of interface testing are to detect faults due to interface errors or invalid assumptions about interfaces. Interface testing is particularly important for object-oriented development as objects are defined by their interfaces. Interface errors can be categorized as below:
i. Interface misuse
   - A calling component calls another component and makes an error in its use of its interface such as parameters in the wrong order.

ii. Interface misunderstanding
    - A calling component embeds assumptions about the behaviour of the called component which are incorrect.

iii. Timing errors
    - The called and the calling component operate at different speeds and out-of-date information is accessed.

Table 6.2: Unit Test on User Interface

<table>
<thead>
<tr>
<th>Input</th>
<th>Expected Output</th>
<th>Real Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click on all buttons</td>
<td>All buttons react properly</td>
<td>OK</td>
</tr>
<tr>
<td>Pass Parameters</td>
<td>Get the parameters correctly from other pages</td>
<td>OK</td>
</tr>
<tr>
<td>News and information posted</td>
<td>Updated data</td>
<td>OK</td>
</tr>
</tbody>
</table>
6.4 Requirement-based Testing

General principle of requirements engineering is that requirements should be testable. Requirements-based testing is a validation testing technique where you consider each requirement and derive a set of tests for that requirement. This test can be considered as a process of evaluating a system or component during or at the end of development process to determine whether it satisfies specified requirements. All requirements have been proven satisfied after apply requirement-based testing on the system.

6.5 Summary

This chapter has discussed the testing activities conducted to test the NASOM Parent’s Support System – Diagnosis Module and the system has successfully achieved the required result after going through all the testing. There are no errors in the system during the testing. The testing that were performed are black box testing, interface testing and also the requirement-based testing.
CHAPTER 7

CONCLUSION

7.1 Introduction

Conclusion is the final part of this project. The main purpose of development of the NASOM Parent’s Support System – Diagnosis Module is to assist the parents having online knowledge and advice about autism instantly. The new system will help the users (mostly parents) to gain information and advice about autism without wasting time for long queuing to seek for doctor advice. The parents are able to diagnose and monitor their children’s problem and growth’s status.
7.2 Achievement

A well design system should have an excellent performance in every aspect, such as professional interface, comfort outlook, and also provide excellent services to the user. While analyze and design the system, it teaches and guides how to have a proper way to develop a system. During analyze and design phase, information was collected through interviews, observation, and research for this project. Information collection activities were carried out by visiting some of the clinic and hospital that nearby UTM. The objective and scope of the project where successfully identified during the information collection activities.

During the implementation phase, the system was developed by various type of coding design method after the discovery of VB.NET. While facing logical and functional design problems, different type of coding structure method should be implemented and there is a very good progress in my programming skill.

The knowledge and technology that is needed in developing the new system was identified during literature review. The methodology that is going to be used to develop the system is successfully identified too. A good and effective system will be developed with all these information. In addition, I have learnt that time management is the most important and crucial part that will lead the system to be successful or to be a bad evaluated system.
7.3 Challenge

During analyze and design phase, there were some challenges while completing this project. The challenges where identified and show below:

i. As it is a medical system, some of the medical term is so hard to understand and have to find out all the information about it.

ii. As this is a single system with 3 major modules, it need extremely perfect teamwork to cooperate and complete the project.

iii. There are no references for development of the new system as the new system can say that a total new system in the market.

iv. While designing the DFD, ERD and database, there are difficulties because of the combination of the 3 modules. There must have a perfect combination with the 3 design to produce an excellence system.

7.4 Expectation

To make the system even more valuable, the expectation for this project is to provide excellence services and correct information to the users as this is a medical support system. The system meets the user requirements and also achieves the objectives of this project that were set earlier.

Furthermore, new functions and services will be added in order to enhance the system quality in future.
7.5 Lesson Learned

During the development phases of NPSS, several lessons have been learned as per listed below:

i. Working as a team bringing the project towards success.

ii. Have research on how to develop an attractive user interface as well as learning and applying latest technologies in this project.

iii. Major improvement in programming skill.

iv. Teamwork has better efficiency compare to doing a task alone.

v. Sharing knowledge with others not only helping others but also self helping to strengthen the knowledge in memory.

vi. Time management is the most important and crucial part that will lead the system to be successful.

7.6 Summary

In conclusion, this chapter describes the results from the overall the project. The achievement of the project, challenges that faced by the developers, expectation of the project were all explained and presented in this chapter. With the teamwork that acquire by the developers, possibility of successfulness will be high. This will able to carry out the new system to the real world.


http://www2.gsu.edu/~psydlr/Diana_L._Robins,_Ph.D..html

http://autism.lovetoknow.com/Autism_Symptoms_Checklist

The National Autism Society of Malaysia (NASOM) (Retrieved on 5 August 2009)
http://www.nasom.com.my

KidsHealth from Nemours. (Retrieved on 5 August 2009)
http://kidshealth.org/kid

http://humanresources.about.com/od/involvementteams/a/team_culture.html
APPENDIX A1

Gantt Chart
APPENDIX B1

Context Diagram of NASOM Parent’s Support System
APPENDIX B2

Diagram 0 of NASOM Parent’s Support System
APPENDIX B3

DFD Fragment for Login process
APPENDIX B4

DFD Fragment for Diagnosis Process
APPENDIX B5

DFD Fragment for Publishing Result Process

4.1 Result and report processing
4.2 Showing screen of desired output
Desired output of parents
Children medical report
User information
Anual report
Medical suggestion and advice
User profile
Parents
Specialist
Anual report
APPENDIX B6

DFD Fragment for Monitoring Process
APPENDIX B7

DFD Fragment for Online Journal Process

Edraw Trial Version

Parents

Information of children

5.1
Showing screen of online journal

Kid daily observation

Specialist feedback

Parents' journal

Children growth observation

Specialist feedback

Previous journal

5.3
Studying kid daily observation

Kid daily observation report

Specialist

Specialist advices
APPENDIX B8

DFD Fragment for Collect Item Information Process

6.1 Storing and uploading item information and picture
6.2 Searching item from item gallery

Parents

picture and information of item
arranged item information

item gallery

Specialist

picture and information of item
item desired item information
APPENDIX C1

ERD of NASOM Parent’s Support System
APPENDIX D1

Interface Design

Seeking for medical expert help regarding of your kids? Or are you looking on information of autism for the purpose of research? Look no further as in this web system, we provide services that almost similar to doctors. With our well researched questions and solution, this system provides a good support to self diagnose your child.

This system itself contains two major parts that are:
APPENDIX D2

Example of Input Design

---

### Modified Checklist for Autism in Toddlers (M-CHAT)

**Date:** 3/23/2010  **Child ID:** 123456  **Child Name:** vincent

<table>
<thead>
<tr>
<th>English</th>
<th>Bahasa Malayu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does your child enjoy being swung, bounced on your knee, etc.?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. Does your child take an interest in other children?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Does your child like climbing on things, such as up stairs?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
APPENDIX D3

Example of Output Design

The results for vincent of this quiz have been calculated and are presented below:

83%

Your test has indicated that your child possessed some behaviors that may be Indicative of Autism Spectrum Disorder. Please follow up with your Pediatrician at your earliest convenience.

Sensitivity for this result is : 0.011
Specificity for this result is : 1.000
Positive Prediction Value (PPV) for this result is : 1.000

Please Click Here To Know More About PPV, Specificity And Sensitivity

* Not all children who fail the checklist will meet criteria for a diagnosis on the autism spectrum. However, children who fail the checklist should be evaluated in more depth by the physician or referred for a developmental evaluation with a specialist.
APPENDIX E1

Database Design

UserProfile - Primary Key (ChildIcno)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChildName</td>
<td>nchar</td>
<td>20</td>
<td>Children name</td>
</tr>
<tr>
<td>ChildIcno</td>
<td>nchar</td>
<td>20</td>
<td>Children identification number</td>
</tr>
<tr>
<td>ChildAge</td>
<td>nchar</td>
<td>10</td>
<td>Children age</td>
</tr>
<tr>
<td>ChildBirthday</td>
<td>nchar</td>
<td>150</td>
<td>Children Birth date</td>
</tr>
<tr>
<td>ChildGender</td>
<td>nchar</td>
<td>100</td>
<td>Gender of the Children</td>
</tr>
<tr>
<td>ChildRelation</td>
<td>nchar</td>
<td>300</td>
<td>Relation of Children with user</td>
</tr>
<tr>
<td>MotherName</td>
<td>nchar</td>
<td>100</td>
<td>Child’s mother name</td>
</tr>
<tr>
<td>MotherAddress</td>
<td>nchar</td>
<td>200</td>
<td>Child’s mother address</td>
</tr>
<tr>
<td>MotherEmail</td>
<td>nchar</td>
<td>100</td>
<td>Child’s mother email address</td>
</tr>
<tr>
<td>MotherHomePhone</td>
<td>nchar</td>
<td>200</td>
<td>Child’s mother home phone number</td>
</tr>
<tr>
<td>MotherCellPhone</td>
<td>nchar</td>
<td>200</td>
<td>Child’s mother cell phone number</td>
</tr>
<tr>
<td>MotherOccupation</td>
<td>nchar</td>
<td>200</td>
<td>Child’s mother occupation</td>
</tr>
<tr>
<td>FatherName</td>
<td>nchar</td>
<td>100</td>
<td>Child’s father name</td>
</tr>
<tr>
<td>FatherAddress</td>
<td>nchar</td>
<td>200</td>
<td>Child’s father address</td>
</tr>
<tr>
<td>FatherEmail</td>
<td>nchar</td>
<td>100</td>
<td>Child’s father email address</td>
</tr>
<tr>
<td>FatherHomePhone</td>
<td>nchar</td>
<td>200</td>
<td>Child’s father home phone number</td>
</tr>
<tr>
<td>FatherCellPhone</td>
<td>nchar</td>
<td>200</td>
<td>Child’s father cell phone number</td>
</tr>
<tr>
<td>FatherOccupation</td>
<td>nchar</td>
<td>150</td>
<td>Child’s father occupation</td>
</tr>
<tr>
<td>MaritalStatus</td>
<td>nchar</td>
<td>100</td>
<td>Child’s parents marital status</td>
</tr>
<tr>
<td>Username</td>
<td>nchar</td>
<td>100</td>
<td>Person who registered this child</td>
</tr>
</tbody>
</table>
### item - Primary Key (itemnameuser)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>itemname</td>
<td>nchar</td>
<td>100</td>
<td>Item name</td>
</tr>
<tr>
<td>itemcategory</td>
<td>nchar</td>
<td>100</td>
<td>Category of item</td>
</tr>
<tr>
<td>itemdescription</td>
<td>nchar</td>
<td>100</td>
<td>Item description</td>
</tr>
<tr>
<td>itemprice</td>
<td>nchar</td>
<td>100</td>
<td>Price of item</td>
</tr>
<tr>
<td>itemwhere</td>
<td>nchar</td>
<td>100</td>
<td>Location of item can be obtained</td>
</tr>
<tr>
<td>itemowner</td>
<td>nchar</td>
<td>100</td>
<td>Owner of the item</td>
</tr>
<tr>
<td>itemcontactphone</td>
<td>nchar</td>
<td>100</td>
<td>Item owner contact phone number</td>
</tr>
<tr>
<td>itemcontactemail</td>
<td>nchar</td>
<td>100</td>
<td>Item owner email address</td>
</tr>
<tr>
<td>itemsell</td>
<td>nchar</td>
<td>100</td>
<td>Indicates if user are selling this item</td>
</tr>
<tr>
<td>username</td>
<td>nchar</td>
<td>100</td>
<td>Person who shared the item</td>
</tr>
<tr>
<td>itempicturelink</td>
<td>nchar</td>
<td>100</td>
<td>Address link to obtain the item picture</td>
</tr>
<tr>
<td>itemnameuser</td>
<td>nchar</td>
<td>100</td>
<td>Combination of item name and user to form a string for identification purposes</td>
</tr>
</tbody>
</table>

### itemcomment - Primary Key (id)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>itemid</td>
<td>nchar</td>
<td>100</td>
<td>Item identification for item</td>
</tr>
<tr>
<td>comment</td>
<td>nchar</td>
<td>100</td>
<td>Item’s comment</td>
</tr>
<tr>
<td>username</td>
<td>nchar</td>
<td>100</td>
<td>Person who commented the item</td>
</tr>
<tr>
<td>date</td>
<td>nchar</td>
<td>100</td>
<td>Date of comment</td>
</tr>
<tr>
<td>id</td>
<td>int</td>
<td>100</td>
<td>Unique number for each comment</td>
</tr>
</tbody>
</table>

### usercomment - Primary Key (ChildIcno)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChildIcno</td>
<td>nchar</td>
<td>100</td>
<td>Children identification number</td>
</tr>
<tr>
<td>comment</td>
<td>nchar</td>
<td>100</td>
<td>Profile’s comment</td>
</tr>
<tr>
<td>username</td>
<td>nchar</td>
<td>100</td>
<td>Person who commented the profile</td>
</tr>
<tr>
<td>date</td>
<td>nchar</td>
<td>100</td>
<td>Date of comment</td>
</tr>
<tr>
<td>id</td>
<td>int</td>
<td>100</td>
<td>Unique number for each comment</td>
</tr>
</tbody>
</table>
### Registor - Primary Key (NationalID)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>username</td>
<td>nchar</td>
<td>100</td>
<td>Username of the person who register</td>
</tr>
<tr>
<td>name</td>
<td>nchar</td>
<td>100</td>
<td>Name of the person who register</td>
</tr>
<tr>
<td>country</td>
<td>nchar</td>
<td>100</td>
<td>Country of the person who register</td>
</tr>
<tr>
<td>NationalID</td>
<td>nchar</td>
<td>100</td>
<td>National Identification number of the registered person</td>
</tr>
<tr>
<td>DOB</td>
<td>nchar</td>
<td>100</td>
<td>Date of Birth of the registered person</td>
</tr>
<tr>
<td>Gender</td>
<td>nchar</td>
<td>100</td>
<td>The registered person gender</td>
</tr>
<tr>
<td>email</td>
<td>nchar</td>
<td>100</td>
<td>Email address of the registered person</td>
</tr>
</tbody>
</table>

### CountReport - Primary Key (Question)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>varchar</td>
<td>50</td>
<td>Diagnosis questions from 1 to 23</td>
</tr>
<tr>
<td>Yes</td>
<td>int</td>
<td>-</td>
<td>Count of the “yes” answer by users</td>
</tr>
<tr>
<td>No</td>
<td>int</td>
<td>-</td>
<td>Count of the “no” answer by users</td>
</tr>
</tbody>
</table>

### PPV - Primary Key (Failed)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed</td>
<td>int</td>
<td>-</td>
<td>Total number of questions failed</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>varchar</td>
<td>50</td>
<td>The sensitivity of the test</td>
</tr>
<tr>
<td>Specificity</td>
<td>varchar</td>
<td>50</td>
<td>The specificity of the test</td>
</tr>
<tr>
<td>PPV</td>
<td>varchar</td>
<td>50</td>
<td>The positive predictive value of the test</td>
</tr>
</tbody>
</table>

### DiagnosisQuestions - Primary Key (QuestionID)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuestionID</td>
<td>int</td>
<td>-</td>
<td>Identity number for each question</td>
</tr>
<tr>
<td>QuestionM</td>
<td>varchar</td>
<td>Max</td>
<td>Diagnosis question in Malay language</td>
</tr>
<tr>
<td>AnswerM</td>
<td>varchar</td>
<td>50</td>
<td>Diagnosis answer in Malay language</td>
</tr>
<tr>
<td>QuestionE</td>
<td>varchar</td>
<td>Max</td>
<td>Diagnosis question in English language</td>
</tr>
<tr>
<td>AnswerE</td>
<td>varchar</td>
<td>50</td>
<td>Diagnosis answer in English language</td>
</tr>
</tbody>
</table>
Monitor - Primary Key (id)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Int</td>
<td>-</td>
<td>Identity number for each question</td>
</tr>
<tr>
<td>question</td>
<td>Varchar</td>
<td>Max</td>
<td>Question of the monitoring system</td>
</tr>
<tr>
<td>age</td>
<td>Int</td>
<td>-</td>
<td>Age of the child</td>
</tr>
<tr>
<td>area</td>
<td>varchar</td>
<td>50</td>
<td>Aspect of the development</td>
</tr>
</tbody>
</table>

Solution - Primary Key (id)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Int</td>
<td>-</td>
<td>Identity for each solution</td>
</tr>
<tr>
<td>solution</td>
<td>Varchar</td>
<td>Max</td>
<td>Solution for each aspect</td>
</tr>
<tr>
<td>age</td>
<td>Int</td>
<td>-</td>
<td>Age of the child</td>
</tr>
<tr>
<td>area</td>
<td>varchar</td>
<td>50</td>
<td>Aspect of the development</td>
</tr>
</tbody>
</table>

Result - Primary Key (id)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Varchar</td>
<td>50</td>
<td>Name of the child</td>
</tr>
<tr>
<td>id</td>
<td>varchar</td>
<td>50</td>
<td>Identity number of the child</td>
</tr>
<tr>
<td>age</td>
<td>Int</td>
<td>-</td>
<td>Age of the child</td>
</tr>
<tr>
<td>percentage</td>
<td>Int</td>
<td>-</td>
<td>% result of the child</td>
</tr>
<tr>
<td>day</td>
<td>Varchar</td>
<td>50</td>
<td>Date of the day</td>
</tr>
<tr>
<td>month</td>
<td>Varchar</td>
<td>50</td>
<td>Month of the year</td>
</tr>
<tr>
<td>year</td>
<td>varchar</td>
<td>50</td>
<td>Value of the year</td>
</tr>
</tbody>
</table>
### DiagnosisRecord - Primary Key (ChildID)

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
<th>Size</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question1</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question2</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question3</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question4</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question5</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question6</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question7</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question8</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question9</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question10</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question11</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question12</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question13</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question14</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question15</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question16</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question17</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question18</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question19</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question20</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question21</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question22</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>Question23</td>
<td>varchar</td>
<td>50</td>
<td>Question of the diagnosis system</td>
</tr>
<tr>
<td>ChildID</td>
<td>varchar</td>
<td>50</td>
<td>Identity number of the child</td>
</tr>
<tr>
<td>Username</td>
<td>varchar</td>
<td>50</td>
<td>Person who registered this child</td>
</tr>
<tr>
<td>Percentage</td>
<td>varchar</td>
<td>50</td>
<td>Result of the diagnosis</td>
</tr>
<tr>
<td>Year</td>
<td>varchar</td>
<td>50</td>
<td>Current year</td>
</tr>
<tr>
<td>Month</td>
<td>varchar</td>
<td>50</td>
<td>Current month</td>
</tr>
<tr>
<td>Date</td>
<td>varchar</td>
<td>50</td>
<td>Current date</td>
</tr>
</tbody>
</table>
APPENDIX F1

User Manual
The Login Process

1. The Login control is located at the system homepage. It is shown like the figure below.

Figure F1: Login Control

2. After entering the correct combination of User ID and Password, the side navigator will change just like the figure below.

Figure F2: Successful Login Control
3. If this is the first time a user login via this system, he or she will be redirect to a page where they need to fill up their personal details.

![Profile Update Image]

**Figure F3:** Personal Information Form

4. Keep note that in this page, it is necessary to fill up Name, Country, National Identity Number and also personal email address. After finish fill up and press on Submit, user will be redirected to the homepage of the system.

5. If user is not the first time login through this system, then he or she do not need to proceed with step 3 and step 4 and will be directed straight to homepage.
Diagnosis Tool

1. After user logged into the system, click the “Diagnosis” button which located at the NPSS Tools navigator.

![NPSS tools Navigator](image)

**Figure F4:** NPSS tools Navigator

2. The welcome page will be shown and user can read through about the introduction of M-CHAT Diagnosis Tool. Click the “Start” button to start the diagnosis test.

![Welcome Page of M-CHAT Diagnosis Tool](image)

**Figure F5:** Welcome Page of M-CHAT Diagnosis Tool
3. The figure shown below is the option to choose which child should take the diagnosis test. Choose the IC No of the child and click the “Choose/Pilih” button to next step.

![Figure F6: Select Child IC No for Diagnosis Test](image)

4. There are 2 tab, English and Malay language version for the M-CHAT Questions. The User could choose any 1 of the prefer language for the diagnosis test.

![Figure F7: English Version Tab for M-CHAT](image)
The following instruction will be introduce the user manual regarding to English version of M-CHAT Tool. The difference between English version and Malay version will be discussed in the end of the user manual.

5. For the accuracy of the test, all questions are required to be answer by user. If there is any blank input for the question, a message box will be prompt out with an error message to inform the blank fields needed to be filled.
6. After finish answer all questions, click the “submit” button proceed to the next step or click “Reset” button to reset all the answer of the questions.

7. After user submits the answers, the result will be calculated and the percentage of the child is autism spectrum disorder will be shown in result page. Besides that, there is some suggestion to the user in order to help the user make decision. Last, the result page will shows about the sensitivity, specificity and also the positive predictive value for the result. Click “Next” button proceed to next step.

**Figure F10: Submit and Reset Button of M-CHAT Tool**

**Figure F11: Result Page of M-CHAT Tool**
8. If user intends to keep the result as a reference, user may send the result as mail type to their registered e-mail by click the “Mail Type” button. User also can send the result as PDF file attachment to their registered e-mail by click the “PDF File Type” button. If user not intends to keep any result in their email, they can just back to main page by click the “Back To Main Page” button.

Figure F12: Page Allow User to Send Result as Mail

The difference between the English and Malay version is only the language. Others such as functions or calculation of result are totally same. So, there are send e-mail and show result pages in Malay version too.
View Report

1. After user logged into the system, click the “Diagnosis” button which located at the NPSS Tools navigator.

![NPSS Tools Navigator](image)

Figure F13: NPSS tools Navigator

2. The page below will be shown and user can choose the type of report they wish to view

![Report Selection Page](image)

Figure F14: Report Selection Page
3. For example, user choose the annual report of diagnosis from the report selection page, then the report will come out as below after user choose the year for the report. User also can click on the cylinder bar to drill through a more specific report. User can click the “Back To Report Selection Page” button to get back to report selection page.

**Figure F15:** Annual Report of Diagnosis module