TecWiser, an Academic Advisory System

by

Parvindran A/L Maratha
14315

A project dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
Information Communication Technology

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CERTIFICATION OF APPROVAL

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Approved by,

_____
(DR. LUKHMAN BIN AB. RAHIM)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
January 2014

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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PARVINDRAN A/L MARATHA

ABSTRACT

The transition phase from secondary school to higher education institutions is crucial for all students as they have to make excellent decision about what they wanted to do in the future. They have to decide what major courses that they have to pursue that are associated with career choices. This is due to the wrong choice of courses possesses significant impact on their future career. Besides, it is important for them to make a right choice of subject area based on their interest if they do not want to waste time and money on subjects that they have least interest. Therefore, an online academic advisory tool is needed especially for secondary school students to advice on possible courses to take. However, the system function will be narrowed down by only focusing one major area of study, which is Information Technology (IT). The system will help students to identify and test their aptitude in IT field and also help to suggest them the courses that they can pursue based on their interested program. If the student has interest in developing software development program, the system will list down the courses which associated with their interested program. Besides, if the students do not clearly understand what each program that are listed in the system is all about, the system will assist them with clear explanation regarding the program. Besides, the system will promote available online learning tools that the students can endeavor before they get into higher education institution. The system will be developed using development methodology based on Evolutionary Prototyping. This system will be further enhanced if it is necessary to meet the objective of this project.

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CHAPTER 1

INTRODUCTION

1.0 Background of Study

The Malaysian Education System comprises of education beginning from pre-school to university level. The revolution from secondary school to higher level institutions considered as an important moment of every student's life as they will be less dependence on others and try to be more matured. This is considered as a critical phase because the students will decide about what they are going to do after they have graduated from secondary school. As well, the secondary school education also plays an important role. Its prepare students to get ready enter this challenging phase. Besides, quality secondary education that provides for the broadest possible range of abilities, interests and backgrounds is significant for their overall development.

However, this can be an issue if students themselves struggle to make the right decision about their future. As a result, guidance service were introduced as appropriate educational service (MOE, Malaysia, 1968) in secondary schools to cater this issue by assisting students in making intelligent decisions and effectuate capability. On a general note, the responsibility of guidance service is to provide counselling to students including handle cases of social psychological problems, career problems and educational problems. They ensure that students received enough guidance on making the right choices about their future field of study.

Apart from that, after graduating from secondary schools and if they have chosen to further their study, they also have to make decisions on higher education institution. However, there is a tendency for students to choose the wrong institution due to not having a clear vision of their future. Besides, certain higher education institution management conduct aptitude test as an entrance exam to students to measure student's skill and help the management to evaluate how ready students for higher education.

Nevertheless, the Higher Education Statistics Authority (HESA) stated that 8.6 percent of students in the year from 2009 to 2010 withdrew from higher education institutions in

their first year up from 7.9 percent the year before [1]. One of the reason for this drop-out rates is poor decisions on the fields of studies due to not having a clear vision of their future [4]. It shows that there are a few limitations in the current strategy of helping students to decide their future. This paper will further discuss on the possible solutions for this problem which is my project.

1.1 Problem Statement

It is common among many secondary school students to be uncertain with what they want to do after they graduated from their secondary school. Furthermore, many students change their mind after they have enrolled into some courses. It is important for them to make a right choice of subject area based on their interest if they do not want to waste plenty of time and money on subjects that they have least interest. Besides, making the wrong choices in course enrolment possesses significant impact on their future career. It is an undeniable fact that students who choose to study in subject area that they have much interest shows higher performance and score well [2]. Not surprisingly, those who are enrolled in a program in which they are not well suited are delivering poor performance.

Even though guidance service is almost implemented in all secondary schools to assist students in making decisions but students are still making poor decisions of the field of study [3]. This is due to in some secondary schools facing shortage of trained counsellor and lack of proper facilities. Besides, in some secondary schools, the counselor also has to perform teaching duties and much of the guidance service had to be rendered during after school hours [3]. Moreover, the biggest problem is that secondary schools does not practice culture of impartial counselling and the guidance service is provided by placing their own interest at the centre [3]. It is also not a simple task for the counsellor to handle students that are having problem in making choices about their future and the students themselves need to take responsibility.

Furthermore, there is no either academic or career aptitude test conducted among secondary school students to suggest potential field of interested areas. Conducting career

aptitude test to students graduating from secondary school will help to identify the field of study suitable for them.

1.2 Objectives & Scope of Study

The project primary aim is to develop a web based system to guide and help students to make a decision about their future. Apart from this, the other sub-objectives are:

i. To measure students attitudes towards IT field of study
ii. To help suggest courses to students that they can pursue on based on their interested program within the IT field such as Software Development, Multimedia, Computer Networking, Database Management
iii. To provide description about each suggested course and how it plays important role in related IT development projects.

1.3 Feasibility and relevancy of the Project

Many useful and reliable online systems are developed as web based because of the advantage that the system can receive and provide to users for being as a web application. A web application require zero install but we only need to upload the website files in Web Server in order to allow users to access the website. Besides, website allow users to access it from anywhere and anytime without any restrictions. Apart from that, nowadays, website also accessible from any smart phones and tablets. Therefore 'TecWiser' will be a web based system. Apart from that, secondary school students prefer interactive website, therefore, a study on creating interactive graphical website must be done. In order to successfully develop 'TecWiser', a lot of important element need to put into consideration such as requirements, architectural diagrams and UML diagrams. The time allocated for developing the system is about a year which is very flexible yet tough as the project management plan should be follow accordingly.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In the process of developing "TecWiser", an online academic advisory system for school students to decide on the courses to take when entering universities, various research studies are carried out in order to develop an excellent system.

2.1 'Decided' and 'Undecided' Students

It is an extensively believed theory that students in the higher education with a declared major have less risk for attrition than the students who not yet decide about the courses that they would like to take when entering universities [4]. [5] presumed that there are some reasons for some students to be undecided about their major. This includes, the students having various interests and are attracted to numerous fields of study or they may be an insightful thinkers in which they normally prefer to collect sufficient information before making any decisions [5]. In a research conducted over 20, 000 students from 6 secondary schools, it revealed the theory that students who exhibit good academic performance expected to keep on to graduation than decided students [6]. On the other hand, some research findings raised a flawed overgeneralization for students being undecided associates with being at risk which subsequently indicate that prolonged uncertainty about their future field of study is empirically connected with augmented jeopardy for attrition [7]. Nevertheless, the deduction that made on undecided students as uncertain students and likely to decisional, adjournment is unsupported [4]. There are few reasons that we can consider that causes students to be undecided such as lack of goal orientation or procrastination. Thus, they will enter their higher education at several level of undecidedness. Actually, these students may be in a cyclical process (initially they will make a decision and then return to undecidedness due to uncertainty). Influence by others and not enough information, anxiety, and parental pressure [8] are factors that influence student's decisions. Moreover, [4] raised a fact that 75% of all students entering higher

institutions are in fact unsure about their future plans, and another half portion of all students with stated majors are “prematurely decided” majors who will sooner or later will change their minds [4]. So, these undecided students need an appropriate medium to assist and guide them to decide their major course based on their interest.

2.1.1 Endorse Early Academic and Career Planning

Before registering for any courses the students at least need to seek an academic advisor. Allowing students to make their own educational plan and to pick field of study related to shaped plan, without seeking for academic advising process, can cause potential impact to students in future. This impact includes, students might face greater risk for attrition due to unfitting college major selection [4] and deferments in graduation time because the students need to pursue and complete extra courses requisite by the newly chosen major [4].

2.1.2 Implementation of Career Development Interventions in Secondary School

Few research about retention suggests that degree completion of a student depend on their commitment to educational and career aims [9]. Besides, if students generate a feasible plan for pinpointing their major fields of study and associated career options that is well-matched with their skills, aspiration and core values, then their level of gratification with their higher educational institutions should increase. [10] expected that in future the major change in career development need to take place in assisting transition students from high school to post-secondary education. He also stressed that, the exploration about career should be initiated in primary school and continues through high school and beyond [10]. His view is supported by [11] who agreed that inculcating career management skills among students should be started from primary, secondary and postsecondary education programs and continues into adulthood. Students also need to put their own effort to discover their interest in order to make the career choice more meaningful to them.

2.2 Information Technology Aptitude Test

Some students have wrong thought in their mind that having good experience in playing computer games and using word processing packages as an indicators of a high aptitudes towards Information Technology field. The students require a reliable aptitude test to assist them in measuring their potential and cognitive fit in IT field. The primary objective of the aptitude test for the graduating secondary school students is to measure their cognitive skills levels that necessary to succeed in the domain of their interest [25]. Thus, 'TecWiser', the academic advisory system will be designed to provide IT aptitude test for students to test their degree of readiness to learn and perform well in the IT domain of interest. On the other hand, the graduating secondary school students are preferable candidates for this IT aptitude test. Therefore, the questions for aptitude test will be standardized to the secondary school level with the assistance from counsellors from secondary schools and some online resources.

2.3 Program Based IT Courses

Basically, most of the students at the secondary schools eventually encounter computers and receive some exposure to few basic knowledge about computer hardware, software, languages, networks, and their influence in the modern world. However, the confusion arises among students when trying to distinguish the courses that they have to pursue to deepen their knowledge and interest in specific topics in IT field [28]. Thus, [27] and Faculty of Information and Communication Technology of Universiti Teknikal Malaysia Melaka (UTeM), proposed few programs that could populate IT courses and that will naturally address diverse student interests and specific faculty expertise [27]. Here are the programs that could populate such a course [27].

i. <u>Software Development</u>

   If the students interested in software development, they need to be prepared with essential knowledge and expert skills in engineering and software. They also will be exposed to some important skills that include the ability to collect requirements,

develop, design complex systems, maintain, test, control software quality and manage software projects.

ii. Interactive Media/Multimedia

Students who are interested in the development and management of computer games, mobile applications, interactive websites, and animation and computer graphics can choose this program.

iii. Database Management

Students who prefer to be specialize in e-business and knowledge management can select this program to further their interest. They also will be exposed to some important skills that include the ability to collect requirements, develop, manage and maintain database system.

iv. Computer Networking

Students who like to exhibit networking administration skills related to server operating systems, network security, and directory services administration can choose this program.

2.4 Online Valuable Tools for Academic Advising

There is tremendous overlap between career counselling and academic advising. An academic adviser frequently serves as the first line assistance for students to decide a field of study. [12] proposes that due to students often associate their major courses with career choices, the academic adviser need to have sufficient basic knowledge of careers to help students to decide about future career related to their major field of study [12]. A novice adviser with inadequate career-advising experience must enrich knowledge about the services offered to become comfortable with career advising.

2.4.1 Psychometric Resources

In order to assist students to narrow down possible career choices, there are many online psychometric tools available to help them anytime and anywhere. In many cases, the career test is administrated by career counsellors. Though, it can also be more supportive for the academic adviser if they put effort to familiarize with psychometric tools used by the career center. Students should discern that these online psychometric tools only provide information about themselves and the world of work but it will not select a major or career for them. It is important to explain students that these online tools can only assist them along their decision making journey [6].

A few online psychometric career tools include

I. SIGI-PLUS

Figure 1: SIGI-PLUS

A computerized career planning software which will recommend a path well-matched to the user's specific needs [13]. The system allow users to take career aptitude test to identify their related occupations [13]. The system also provides education requirement described along with the major work tasks of chosen occupation. Besides, the system only designed to serve generally all people who is having difficulty in making future plans. It means they not really focus On the other hand, there is no online aptitude test will be carried out through the system especially for students as a medium to identify their interested major field of study. Finally, the users need to purchase this software in order to fully experience its benefits.

II. Strong Interest Inventory ® (SII)

Figure 2: Strong Interest Inventory ® (SII)

It is a self-support questionnaire used to measure and define people's interest in a wide-range of career choices, work and leisure activities and major courses related to the selected career [14]. The system will give the users result based on the answered questionnaire. However, only trained counsellors can help them to understand their scores [14]. Besides, it does not suggest what career the users should choose but it does indicates people that share common interest who are satisfied in their career fields [14].

2.5 Non-Functional Requirements of an Online Advisory Tool

Non-functional requirements (NFR) are regarded as quality attributes in traditional software development which impose great challenges on the software development process [15]. Both traditional and service oriented development have proved that non-functional requirements playing an important role as architectural drivers in development process [15]. There is still no common definition given to the term non-functional requirements although this word has been used broadly in both academia and industry environment [16]. Generally, non-functional requirements considered requirements which are not explicitly concerned with the functionality of a system. These non-functional requirements define overall qualities of the system under development [17]. According to [15], a service oriented system must have the following non-functional-requirements such as usability, reliability, performance, safety, security, interoperability, availability, extensibility, testability and modifiability [15]. The online advisory tools are considered as a service based oriented system. Thus, these tools must have the specified list of quality attributes.

2.5.1 Availability

Nowadays software system playing an important role in consumers' everyday life. These systems are dispersed to diverse platforms over wired or wireless network. Besides, these distributed systems are software-based, habitually most of them comprises of service architectures and provides variety of services to the users [23]. In order to achieve user satisfaction, it is necessary for any systems to exhibit higher reliability and availability by perform effectively without any interludes. According to [19], availability is a service attribute, which concerns about accessibility of the system after receiving requests from users [19]. A web based service associated method is widely used in order to improve the system integration and interaction. Web services' availability in distributed and dynamic environment are considered as one of the important attributes for service oriented system [20]. This is because the availability attributes in service oriented system will help ensuring information interchange over network connection between two parties in crucial situations [20] [23].

Apart from that, there are two main concepts for availability such as likelihood of system available to users when needed and reliability [21] [23]. Reliability and availability are elements of dependability, the capability to provide services that can arguably be trusted [24]. As a web based service oriented system, it is significant for the online academic advisory tools to provide its service to end user at preferred time and venue. Thus, the most vital non-functional requirement the system should possess is availability. There are several measures need to be considered to ensure that this system development process mainly focus on availability of the system. Each of the stakeholders including end users, maintainers, and designers might have contradictory requirements for the value of reliability and availability as well as differing definitions and conception about these attributes [23]. Thus, a global perspective approach need to be carried out towards reliability and availability of a system by initiating with process of gathering and documenting stakeholders' requirements [23]. Besides, there is a tendency where these requirements will conflict to each other and thus, a negotiation must be required.

A software architecture is basically used to describe a system as a whole. A service oriented architecture comprises of numerous services which interconnect with each other

by passing data and coordinate activity with two or more services. Besides, the architecture modeling has a close relationship with analysis of the architecture because the analysis of the architecture is only possible if the architecture is denoted in a way that enables the analysis [23]. Besides, it is possible to avoid the excess consumption of time and resources if there is analysis about reliability and availability conducted before implementation of the system. Consequently, the analysis approach must allow the collected reliability and availability requirements to be included into the architectural decisions [23]. Thus, this will help to determine how specified reliability and availability requirements are addressed in the architectural model.

Quality of service (QoS) is defined as the capability of a web service to react to expected requests and to accomplish them at the level corresponding with communal expectations of both its provider and its customers [22]. Constant service availability is one of the factors that pinpoint customer expectation as they possess impact upon service provision. Conventionally, the components such as system, network and other IT infrastructure that help to maintain the availability of services at a requisite level of performance under all access and load conditions can be used to measure QoS. Thus, there are a few steps that can be carried out in order to identify the probability that the system will be functioning properly when needed. The steps included identifying system's response when a failure occurs and how long it takes to recognize and recover from malfunction [22].

Besides, a system capabilities can be identified by creating use cases. Use cases are defined with a Use Case Diagram (USD) used to explain about functionality of a system, its related scenarios, external users (actors), and a detailed explanation on how exterior entities (actors) communicate with the system [23]. The use cases generally emphasis on runtime behavior with the stakeholder as the user to identify any defects in the system in terms of reliability and availability attributes. Besides, the scenarios include other relations with the system which demonstrate the types of activities that the system must support, and the kinds of changes that are expected to be made to the system [23]. Thus, through this method, the availability of the system can be tested.

2.5.2 Web Server Redundancy

Web servers consist of hardware or software which will aids to deliver web content that can be accesses through the internet. The web servers will allow users to access websites from anywhere and anytime. However, there are possibility for the web server to crash resulting from hardware failure, denial of service attack (DOS), overloaded server and power failure. Besides, this will cause website contents which are stored in that server to be inaccessible by respective users. Thus, it will affect availability attributes of the websites. As a web based system, it is significant for the TecWiser to provide its service to end user at preferred time and venue. Thus, the most vital non-functional requirement the system should possess is availability. The most efficient tactic to improve the availability of the system is active redundancy [29]. TecWiser will be use active redundancy tactic to achieve availability. Active redundancy is often used in client/server configuration, such as web server, where quick responses are necessary even when fault occurs. For example, if TecWiser website fails to open by the primary web server, the website will still can be accessible from a secondary web server with the same URL with different IP address. This is the process called Server Mirroring [30] in which the process requires two separate servers of parallel specification such as master web server that is responsible for delivering the web contents while the slave web server will be a mirror of the master web server. The slave server will take the role of master web server only when the master web server suffers downtime due to network problem or power failure. When the master web server experience downtime, all the request that are sent to the master web server will be forwarded to the secondary web server to execute the role of the master web server upon the notification of downtime of the master web server. Besides, the IP address of the secondary web server will be bind with the master web server [30]. When master web server back to normal, the slave web server can go back to acting as a back-up server. The diagram below shows clear depiction of how slave web server take role of master web server suffers downtime.

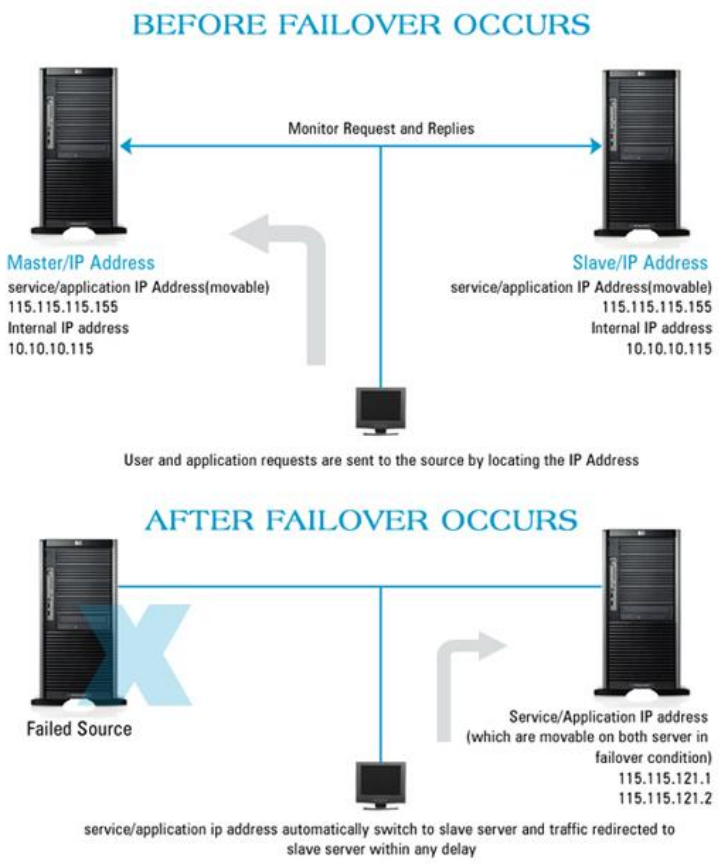

Figure 3: Web Server Mirroring

2.5.3 Website Load Times

It is important for website to load faster. There are some statistics indicate that average mobile phone users will be easily frustrated if a website does not load within 3 seconds, GOOGLE also place a major concern at page speed for search engine ranking and 75% of internet users will not return to a website which load more than 4 seconds [31]. All this facts indicate that website load time is a major concern nowadays. Therefore, TecWiser will place a foremost concern on making it to be accessible much faster. This will increase the availability of the website as the users can access to it even at slower internet connection. However, the website only focus on allowing users to access to the aptitude test at slower internet connection. The aptitude test developed using complex Cascading

Style Sheet (CSS), Javascript, jQuery and PHP. Therefore, strong internet connection is required to display and process the questions. However, the load time of these aptitude test webpage can be reduced if low resolution images are used and reduce the style used to develop the questions. Besides, TecWiser website also has the ability to automatically detect the speed of the internet. If the internet speed is slow, then the website will give option to users to access a basic webpage with less images and styles.

CHAPTER 3

METHODOLOGY

3.0 Introduction

It is important to achieve the objectives of this project within allotted period. Consequently, in order to complete the project within the timeframe, a fitting preparation and scheduling is needed. This is because the outcome of a project largely depend on the how the planning and scheduling executed. Apart from that, development methodology, process flow and tools required for this project will be discussed in this chapter.

3.1 Development Methodology

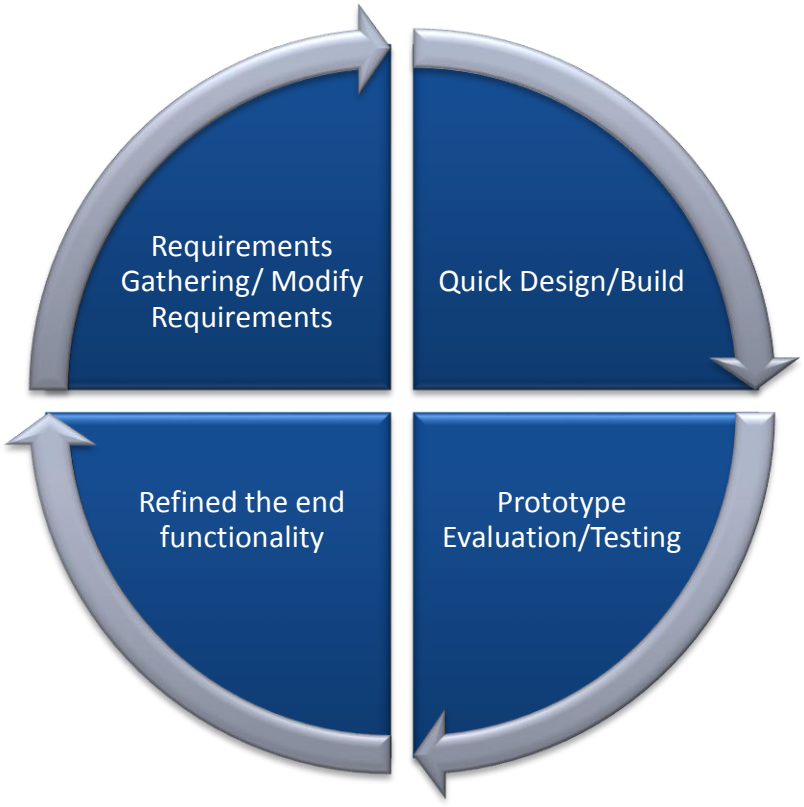

Figure 4: Evolutionary Prototyping Methodology

In order for quicker delivery of the 'TecWiser", online academic advisory system, evolutionary prototyping methodology will be used. Evolutionary prototypes will be constructed from basic requirements collected from end-users. An early prototype developed from user requirements is presented to the user for evaluation. Then, the prototype will be modified based on the feedback until the user is satisfied. Most evolutionary prototyping actions begin by prototyping the user interface and then enhancing prototype with more functions until the system is completed. However, prototyping can start with any high-risk area. Evolutionary prototyping model includes four main phases. Firstly, iterative analysis will be performed. After that, a working prototype will be designed, and then followed by verification of the working prototype. Finally the final product will be released. The cycle will be continued until the system is completed.

During the requirement gathering phase, brainstorming for ideas are needed. Though we may not be able to know all the requirements since it is a continuous process, we should be able to identify the basic things needed for this system to work. Since, secondary school students will be the end-user of this system, a set requirements will be gathered from them using personal interview and survey. Interviewing the students and school counselors will help to identify what students expect from this system, what are the beneficial components can be included in the system and how it should help them in selecting the right major for their higher education. These requirements are essential as it will help to develop an effective academic advisory tool. On the other hand, a survey will be carried out among secondary school counsellors to test the theory of students feeling difficulty and stressed in making their own educational plan by choosing the right major course. Besides, there will be collaboration with Student Support Service Department (SSSD) in University Teknologi PETRONAS (UTP) to get advice on the way of standardizing aptitude test to the level of secondary school students.

In the quick design phase, a prototype will be developed based on the requirements gathered. . The "TecWiser", academic advisory system will be developed as a web based system. Hence, excellent internet programming skills are required to build this system.

As the end users are secondary school students, they mostly prefer interactive website to gain their attention.

After that, prototype evaluation and testing will be carried out. Verification and validation of prototype will be performed in this phase. Verification and validation are the procedure of confirming that the prototype meets the requirements. Verification checks that the prototype correctly imitate the requirements detailed for the system developers, ensuring that 'you built it right'. Validation checks that the product, as provided, will fulfill its intended use, ensuring that 'you built the right thing'. The verification and validation of the system will be performed by Secondary School counsellors to test the system effectiveness. Testing will be conducted to ensure that the system free from any faultiness.

After developing the initial prototype, the system will be given to a selected number of secondary school students to confirm that the prototype properly reflect the requirement specified and shows positive response to testers. The system will also be tested in terms of effectiveness in assisting students. If errors are detected in the prototype, further iterations will be carried out until it fulfill all system requirements.

3.2 Process Flow

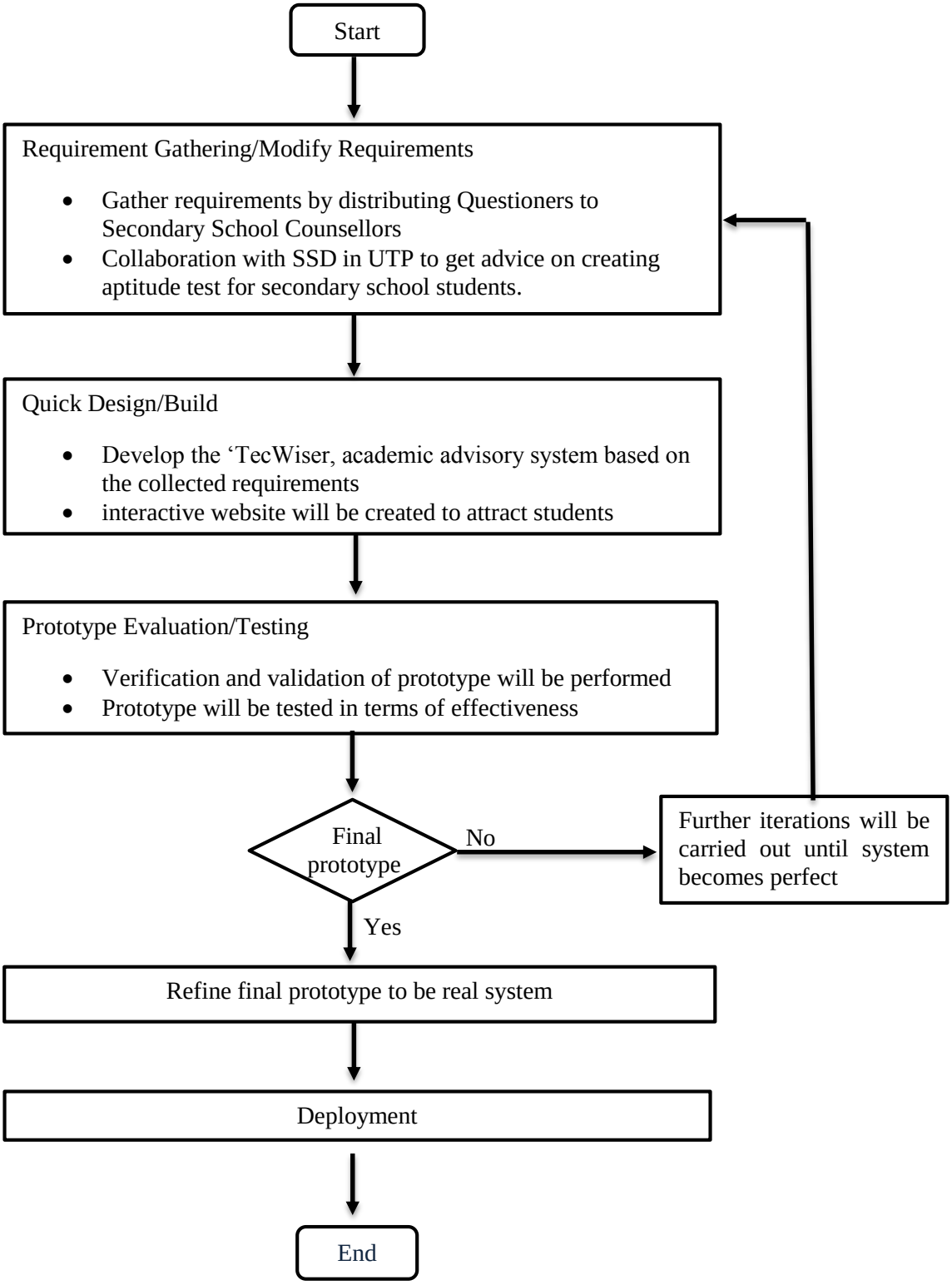

Figure 5: Process Flow of 'TecWiser'

3.3 Project Activities and Key Milestones

PROJECT ACTIVITIES	MILESTONE
Collecting User Requirements through distributing questionnaires to schools counselors	26 October 2013
Analyzing and comparing available online academic advisory	30 October 2013
Create SWOT analysis for the 'TecWiser' system	20 November 2013
Create prototype based on requirements	23 January 2014
Deployment of approved system	20 February 2014

Table 1: Project Activities and Key Milestones

3.4 Gantt Chart

Project Title: 'TecWiser", AN ACADEMIC ADVISORY SYSTEM								
Project Tasks	**Project**							
	2013			***2014***				
	Oct	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*
Project Title Selection								
Requirement Gathering								
• Interview with Counsellors • Analysis of Existing Academic Advisory System (SIGI-PLUS, Strong Interest Inventory)								
Iteration 1								
Design Stage • Basic Diagrams • Build Prototype Implementation Stage Testing Stage Evaluation Stage • Evaluated by Secondary School Counsellors and students								
Iteration 2								
Review Requirements Design Stage • Review Requirements and Evolve Prototype Implementation Stage Testing Stage Evaluation Stage • Evaluated by Secondary School Counsellors and students								
Deployment								
Evaluation of the Project								
Create Require Documents for Projects								

Table 2: Gantt chart

3.5 Software/Tools

No	Software/Tool	Function
i.	Adobe Photoshop	To design the website
ii.	Notepad++	To write and modify programming codes
iii.	Bootstrap	To provide stylish typography, forms, buttons, tables, grids, and navigation for website
iv.	XAMPP	To test website without any access to the internet
v.	Microsoft Word	To write report

Table 3: Software/Tools

CHAPTER 4

RESULT AND DISCUSSION

4.0 Introduction

The requirements are collected to ensure that the developed system meet the needs of the secondary school students. Besides, the collected information is analyzed thoroughly because the slightest faults in the information can impact students' future. Thus, the information is collected from various resources such as secondary school counsellors, online resources, Malaysian Universities that offer technology education and research books.

4.1 Questionnaire Result

A set of questionnaires is prepared for secondary school counsellors to answer in order to proof the hypothesis of graduated secondary school students are struggling to make choices about their future field of study. The questioners were distributed to few secondary school counsellors through email.

The outcomes of the questionnaire

Number of Respondents: 3

Counsellors	Educational Institution	Counselling Experience (Range)
Ms Nasrin Ibrahim	Maktab Rendah Sains Mara (MRSM) Muar	6-10
Ms Roshaila bt. Noor	SMK Bandar Putra, Kulai, Johor	0-5
Ms Hiew Yeat Li	SMK Sultan Ibrahim, Kulai, Johor	0-5

Table 4: Respondents Details

1. Do you agree that many graduated secondary school students are struggling to make choices about their future field of study?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor					**X**
Ms Hiew Yeat Li					**X**

Table 5: Respondents Response for Question 1

2. Poor choice of future field of study or enrolled to least interested major course can impact students in the following way:

I. Waste of time

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor				**X**	
Ms Hiew Yeat Li				**X**	

Table 6: Respondents Response for Question 2 (I)

II. Waste of money

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor				**X**	
Ms Hiew Yeat Li				**X**	

Table 7: Respondents Response for Question 2(II)

III. Delivering Poor Performance in Study

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor				**X**	
Ms Hiew Yeat Li			**X**		

Table 8: Respondents Response for Question 2(III)

IV. Dropout from learning institution

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim		**X**			
Ms Roshaila bt. Noor			**X**		
Ms Hiew Yeat Li		**X**			

Table 9: Respondents Response for Question 2(IV)

3. Do you agree that it is easy to identify students with difficulty in making choices about their future field of study?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor				**X**	
Ms Hiew Yeat Li				**X**	

Table 10: Respondents Response for Question 3

4. Do you agree that some students are not really utilizing the counseling system provided in the school to clear their doubts about their future field of study?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor				**X**	
Ms Hiew Yeat Li				**X**	

Table 11: Respondents Response for Question 4

5. Do you agree that it is hard to manage if there is a large quantity of students who are having difficulty in making choices about their future field of study?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim	**X**				
Ms Roshaila bt. Noor	**X**				
Ms Hiew Yeat Li		**X**			

Table 12: Respondents Response for Question 5

6. Do you agree that development of an online academic advisory system would assist you handle large quantities of indecision students?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor					**X**
Ms Hiew Yeat Li					**X**

Table 13: Respondents Response for Question 6

7. Do you agree that providing career/ academic aptitude test to students will help them to identify their interested major course of study?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor					**X**
Ms Hiew Yeat Li					**X**

Table 14: Respondents Response for Question 7

8. Do you agree that it reliable and effective if the online academic advisory tool equipped with career/career aptitude test to identify students' interested major course of study?

Counsellors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ms Nasrin Ibrahim				**X**	
Ms Roshaila bt. Noor				**X**	
Ms Hiew Yeat Li				**X**	

Table 15: Respondents Response for Question 8

9. Do you have conducted any aptitude test to students especially to identify their skills in Information Technology?

Counsellors	Yes	No
Ms Nasrin Ibrahim	**X**	
Ms Roshaila bt. Noor		**X**
Ms Hiew Yeat Li		**X**

Table 16: Respondents Response for Question 9

10. Do you ever promoted any online academic advisory tool to their students?

Counsellors	Yes	No
Ms Nasrin Ibrahim	**X**	
Ms Roshaila bt. Noor	**X**	
Ms Hiew Yeat Li	**X**	

Table 17: Respondents Response for Question 10

Based on the responses from counsellors, we can conclude that all of them highly support and encourage the development of 'TecWiser' system. They also agreed that graduated secondary school students are struggling to make right decision about their future field of study. The sample of the questionnaire can find in **Appendix 8**.

4.2 Available Online Learning Tools

The TecWiser will be an excellent medium to promote available online learning tools. Table below contains list of well informative online tool that provide excellent tutorials for beginners to prepare for the IT field of study.

Online Learning Tools	**Tutorials Offered**
W3schools.com	HTML, CSS, JavaScript, jQuery, SQL and PHP
Codecademy	HTML, CSS, JavaScript, jQuery, SQL, PHP, Python, Ruby
HTML.net	HTML, CSS, JavaScript, jQuery, SQL, PHP, python, Ruby, ASP.net
Code Avengers	HTML, CSS, JavaScript, mobile applications
HTML Dog	HTML, CSS, JavaScript
Learn Java	Java
cplusplus	C++
Bootstrap	HTML, CSS, JavaScript
Sencha Touch	Mobile Application Development
Phonegap	Mobile Application Development

Table 18: List of Available Online Learning Tools

4.3 Aptitude Test Questions

Moreover, the 'TecWiser' system also equipped with an IT aptitude test which will help to identify users' aptitude towards IT field. Thus, a set of IT aptitude test is developed using available online resources. On the other hand, this aptitude test consists of questions that will examine candidate numerical, logical, non-verbal reasoning skills and also their general knowledge about IT. However, the primary candidates for this aptitude test will be secondary school students. Thus, the prepared aptitude test questions are given to counsellors to verify the quality and standard of the questions whether its level is parallel to secondary school students' effectiveness and logicality. Ms Nasrin and Ms Roshaila bt. Noor, agreed that the questions are good enough to be tested with secondary school students. The sample aptitude test is attached in A**ppendix 9**.

4.4 Categorization of IT Courses.

Apart from that, the system will also suggest IT courses to the students based on the programs selected by them. The source of information about course details are collected from three different universities in Malaysia such as Universiti Teknologi PETRONAS, International Islamic Universiti Malaysia (IIUM) and Universiti Teknikal Malaysia (UTeM) which offer technology education. The courses gathered from these universities are categorized into 4 distinct programs such as software development, Interactive Media/Multimedia, Computer Networking and Database Management. Besides, there are some core courses that listed down below which are compulsory for all students that wish to pursue IT as their major field of study. The courses are analyzed thoroughly by recognizing the similar courses offer by all three universities as higher priority courses and similar courses offer by only two universities as medium priority courses and remaining non-similar courses as low priority courses. Besides, find clear breakdown of courses can be found in **Appendix 4, Appendix 5, Appendix 6 and Appendix 7**. The table below displays the final outcomes of course analysis process.

'TecWiser' Course Details	
Core Courses	**Higher Priority Level**
	i. Discrete Mathematics ii. Structured Programming iii. Computer Organization iv. Web application Development v. Operating System vi. Object-oriented Programming
	Medium Priority Level
	vii. Data and information Management viii. Data Communication and Networking ix. System Analysis and Design x. Statistic and Probability xi. Software Engineering xii. IT Project Management xiii. Database Systems xiv. Data Structure and Algorithm xv. Multimedia System
Software Development	**Higher Priority Level**
	i. Software testing and Quality Assurance ii. Algorithm and Data Structure iii. Human Computer Interaction iv. Software Design and Architecture v. Requirements Engineering
	Medium Priority Level
	vi. Artificial Intelligence vii. Embedded System viii. Network Security
Interactive Media/Multimedia	**Higher Priority Level**
	i. Human Computer Interaction ii. Computer Graphics and Animation iii. Virtual Reality and Augmented Reality
	Low Priority Level
	iv. Information Technology Security v. Artificial Intelligence vi. Computer Games Development vii. Mobile Computing
Computer Networking	**Higher Priority Level**
	i. Network and System Administration ii. Wireless Communication and Network
	Low Priority Level
	iii. Network Analysis and Design iv. Network Project Management

	v.	Multimedia Networking
	vi.	IT and Network Security
	vii.	Network Programming
Database Management	**Higher Priority Level**	
	i.	Data Mining and Warehousing
	ii.	Database Administration
	iii.	IS Strategy and Planning
	iv.	Knowledge Management System
	Low Priority Level	
	v.	Knowledge Management System
	vi.	Information Technology Security
	vii.	IS Strategy and Planning
	viii.	Knowledge Management System
	ix.	Enterprise Architecture
	x.	Enterprise Information System Development
	xi.	Enterprise Data Management and Analysis

Table 19: Categorization of Courses into Programs for 'TecWiser'

4.5 SWOT Analysis of 'TecWiser' System

Internal Factors

Strengths

i. Availability of service
ii. Standardized aptitude test for secondary school students
iii. Web-based system
iv. Provide list of available online learning tools
v. Free and fast installation

Weakness

i. Only focuses on IT field
ii. Career information is not provided
iii. Developed only for secondary school students
iv. Do not provide information about higher learning institutions

External Factors

Opportunities

i. New programs for selection
ii. Introduction of new IT courses in future
iii. Introduction of new online learning tools
iv. Adjustment to regulatory compliance
v. System upgrade to mobile app

Threat

i. Adverse events may occur as a result of shortcomings of users
ii. Human threats (hackers)
iii. Natural and environmental threats (i.e. flood, fire)
iv. Technology failures (i.e. Network Congestion, System, Crashing)

4.6 Requirements Analysis

4.6.1 UML Diagrams

The main objective of requirement analysis to find a clear and detailed understanding of the project needs and provides foundation for the 'TecWiser'. Besides, the quality of the final product of this project depend on the effectiveness of the requirement analysis. The requirements for this project which are collected during requirement gathering phase converted into set of UML diagrams to provide clear vision to both the developer and the stakeholders.

The Use Case Diagram for 'TecWiser' can be found in **Appendix 1**. The use case diagram explains about how a user can interact with the 'TecWiser' system. The user can take IT aptitude test, view available IT program list and online learning tools through the system. The Activity Diagram for 'TecWiser' can be found in **Appendix 2**. Once the user successfully completed the IT aptitude test then they either can view their marks displayed on the system or they can send their result to their email address for their future reference. Apart from that, user also can explore more about particular IT program if they click on 'programs' navigation link displayed in the system. The system will provide detailed description about courses that associated with the selected IT program. The system also provides way for user to explore and learn more about particular course by redirecting users to website where user can learn and understand more about the course. The final functionality of the system is view online learning tools which will aid user to prepare themselves before getting into higher education. For example, user can get basic knowledge about programming languages before entering higher institution to further their studies.

4.6.2 System Architecture

The system architecture will be used to develop 'TecWiser' is Client-Server. Client-Server can simply referred as two layer virtual machine which interconnected with network connection. This type of system architecture all multiple users access to system.

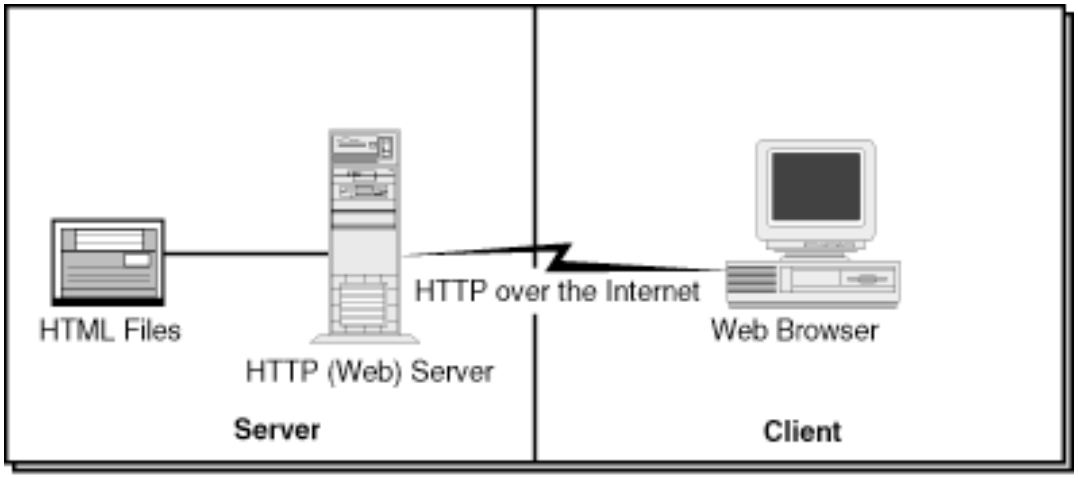

Figure 6: Client-Server System Architecture of 'TecWiser'

Diagram 6 shows the how the client-server system architecture implemented in 'TecWiser' system. The network protocol used is HTTP. The user can access to the website through any browsers. However, there are some limitations that can happen only when the network bandwidths limited and many users access to the system at same time. The Webserver should be powerful enough to support the request from the clients. To counter this issue another design created to increase the availability of the system which will be explained in details in the next section **4.6.3 Availability Tactics.**

4.6.3 Availability Tactics

There are two types of availability tactics included in the system to maximize its availability which are Fault detection and Fault Recovery. The fault detection implemented by using process monitor technique. The process monitor technique used to detect the internet speed and respond accordingly. The fault recovery implemented using shadow operation technique which will allow user to access to light weight website when the system detected low internet speed. The light weight website referred to a website with less images, styles which can be loaded much faster. However, this two type of availability tactics only implemented in IT aptitude test webpage because of its necessity. One can find about stipulation of availability tactics in activity diagram found in **Appendix 3.**

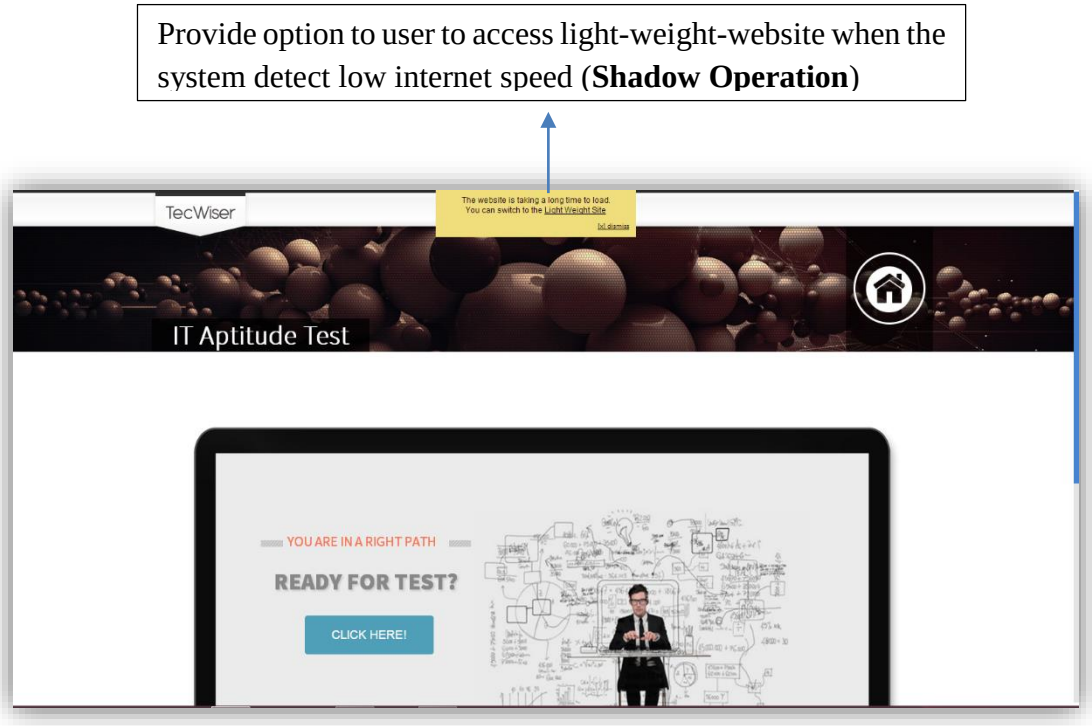

Figure 7: Normal Website

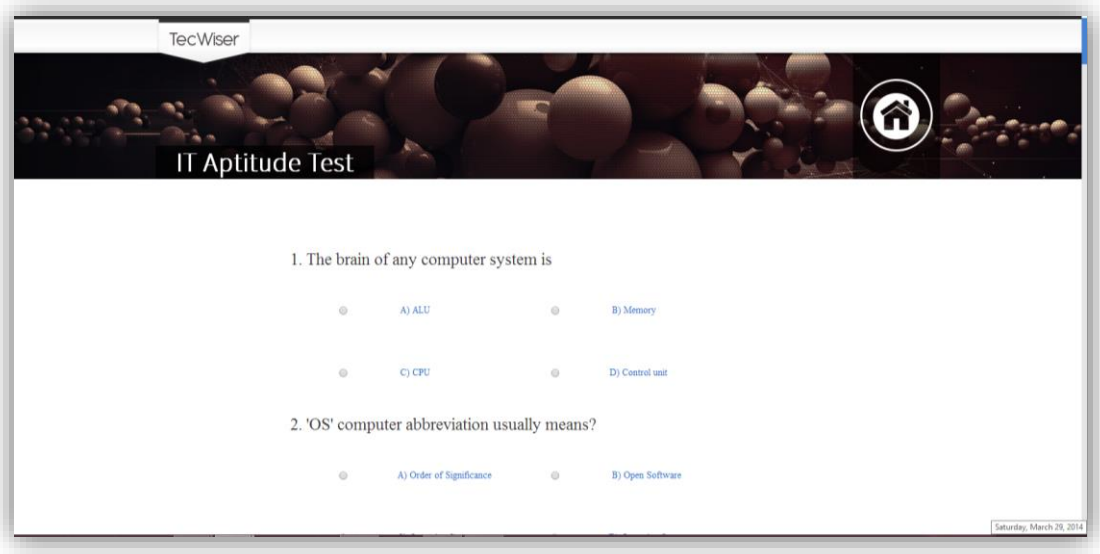

Figure 8: Light Weight Website

4.7 Prototype

The prototype of the system is created as an initial system design before the final system is being implemented. The prototype of this project is designed, created, reviewed and modified for numerous times to make sure it meets the needs of end-users and achieve the desired objectives of this project.

I. HOME page

As the welcome page of TecWiser system.

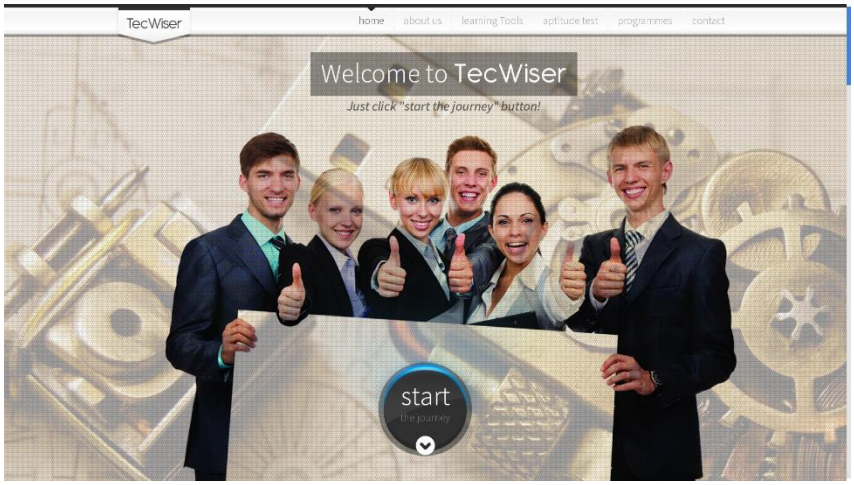

Figure 9: Home Page

II. ABOUT US page

Briefly explain what TecWiser system is all about

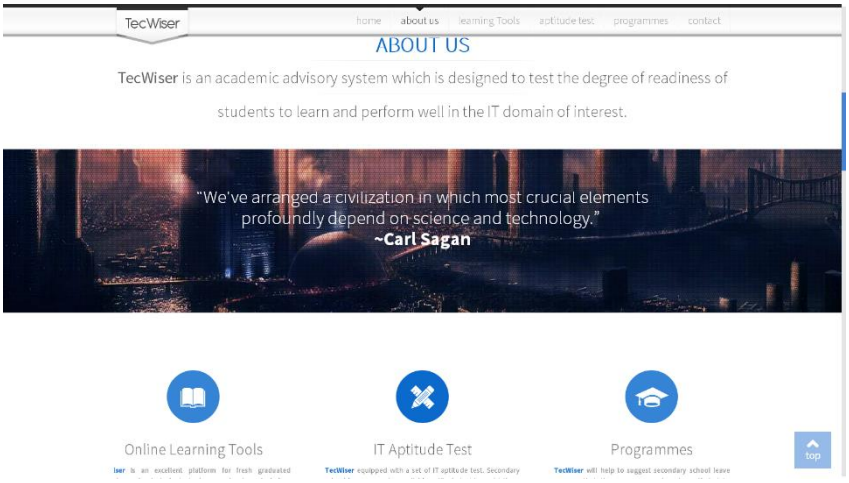

Figure 10: About Us

III. ONLINE LEARNING TOOLS page

This page will provide list of available online learning tools for beginners who like explore and learn programming languages

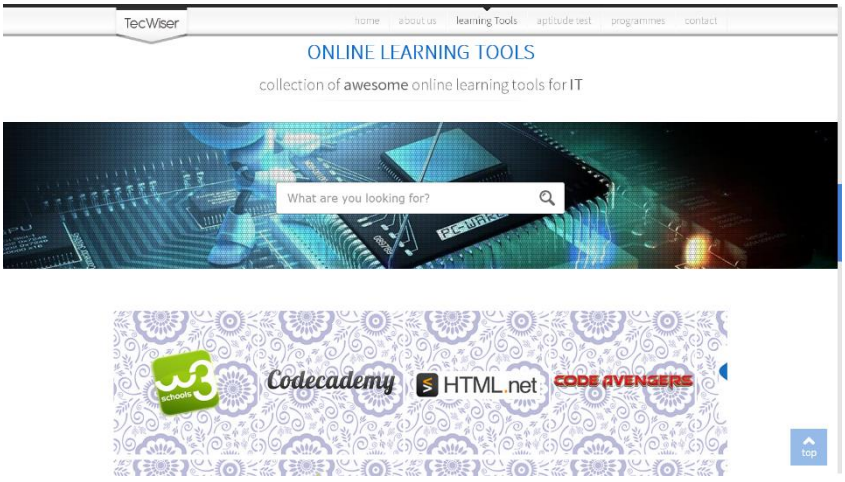

Figure 11: Online Learning Tools

IV. Aptitude Test Portal page

This page will be a portal for users who like to take IT aptitude test. The user require to click the button ‘Take Aptitude Test’ to sit for aptitude test.

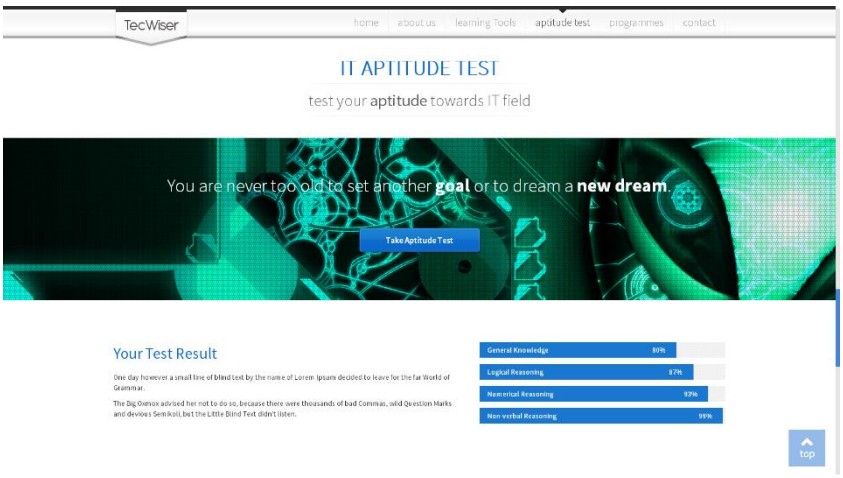

Figure 12: Aptitude Test Portal

V. Aptitude Test page

When user clicked the button as explained at the diagram blab la, the user will be redirected to this page to take their aptitude test.

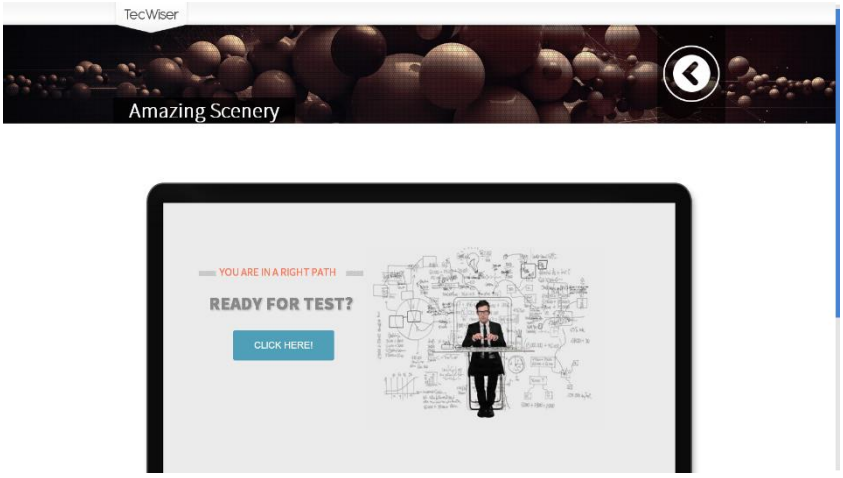

Figure 13: IT Aptitude Test Page

VI. IT Program page

When user clicked the button as explained at the diagram blab la, the user will be redirected to this page to take their aptitude test.

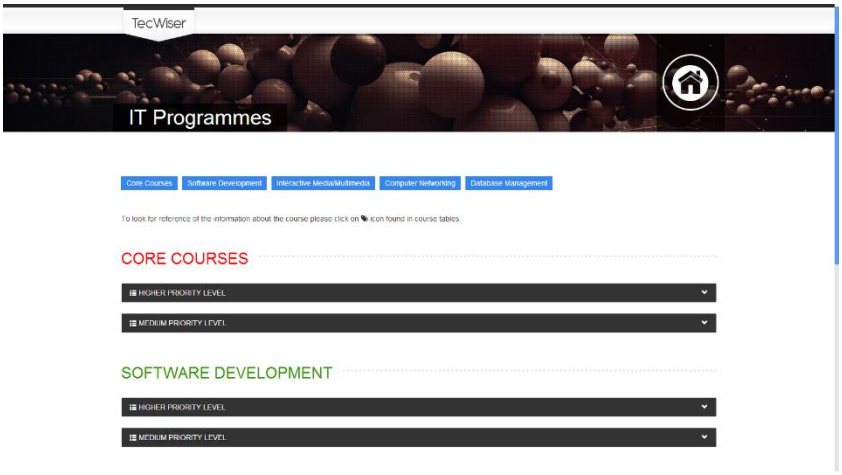

Figure 14: IT Program Page

4.8 Availability Testing

A dynamic testing conducted to make sure the availability techniques implemented in the system working perfectly. Around 25 respondent chosen to carry out this test. Besides, all this respondent including LAN and broadband users to ensure that this website can be accessible from different internet speed. The graph below is the result of the availability dynamic testing.

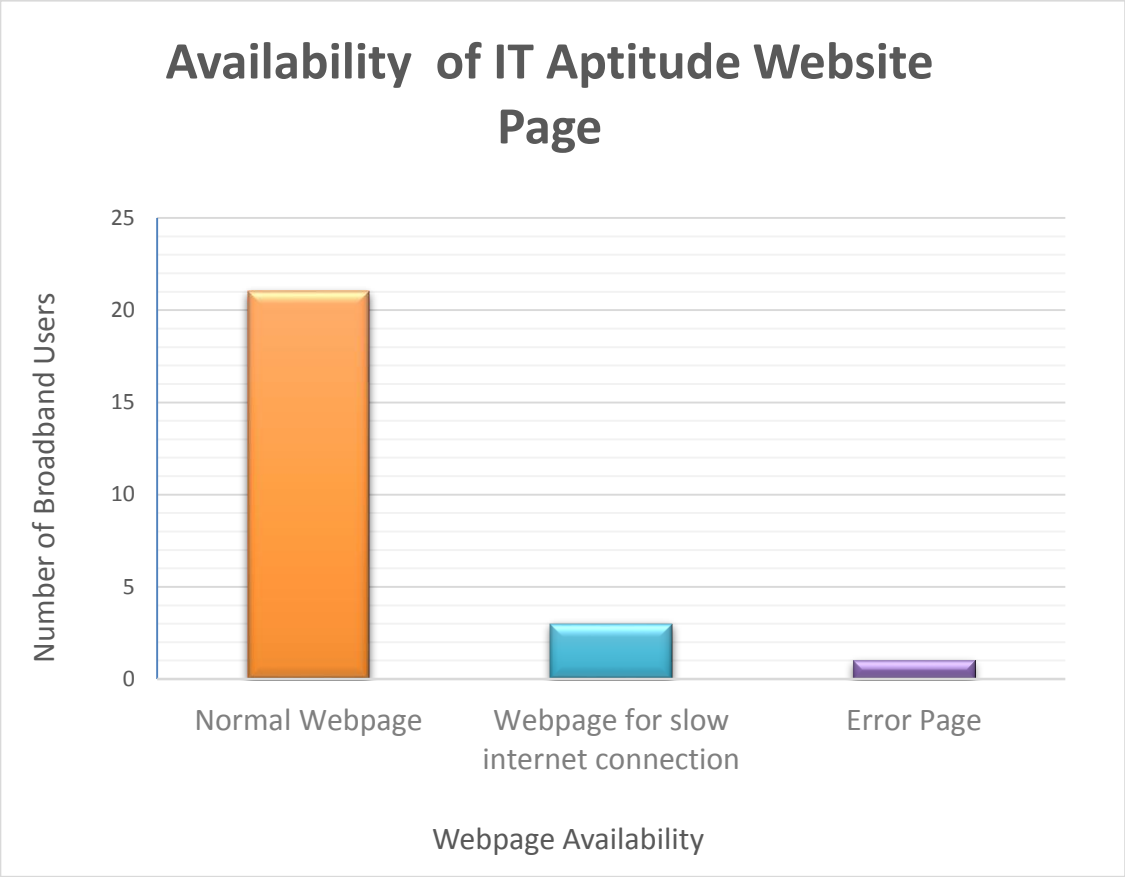

Figure 15: IT Aptitude Test Webpage Availability Testing

Based on the graph above, it was concluded that, 21 out of 25 respondents can access to website at normal internet speed. However, only three respondent can access to light website of IT aptitude test webpage at slow internet connection. Remaining one respondent could not access to the website due at extremely low internet connection. The graph also shows that this implemented technique successfully increase the availability of the system by 96%.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Conclusion and Recommendation

The idea of developing 'TecWiser', the academic advisory system is to assist students to identify theirs aptitude towards IT field. Besides, if the students realized that, they have the skills to perform well in IT field, they can exploit the system to select their favorite IT program which includes software development, computer networking, multimedia and database management and spot the courses that required to be excellent in their interested program. The system also will promote available online learning tools that the students can endeavor before they get into higher education institution. Therefore, the system will be an excellent platform for fresh graduated secondary school students to learn and get ready before entering higher learning institutions It is necessary to collect requirements about type of aptitude test, categorization of IT courses and course details since it is strong foundation for the system. Through this project the system function is narrowed by only focusing one major area of study, which is Information technology (IT). In future the function of the system can expended where the students no need to rely on available online learning tools. The system can equip with its own learning tools which specially prepared for secondary school students. Besides, the system also can be upgraded into a mobile app to increase the availability of the system.

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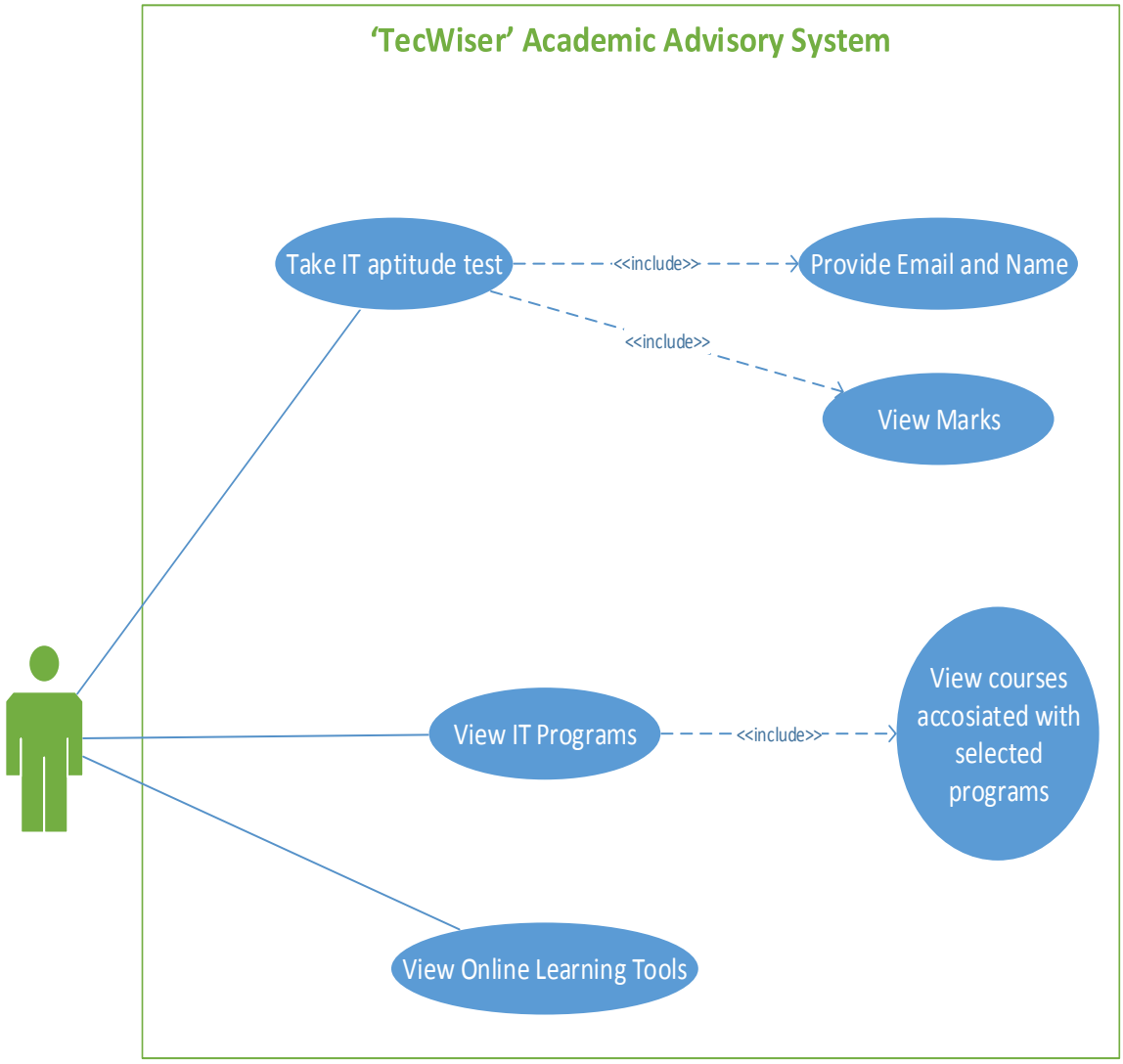
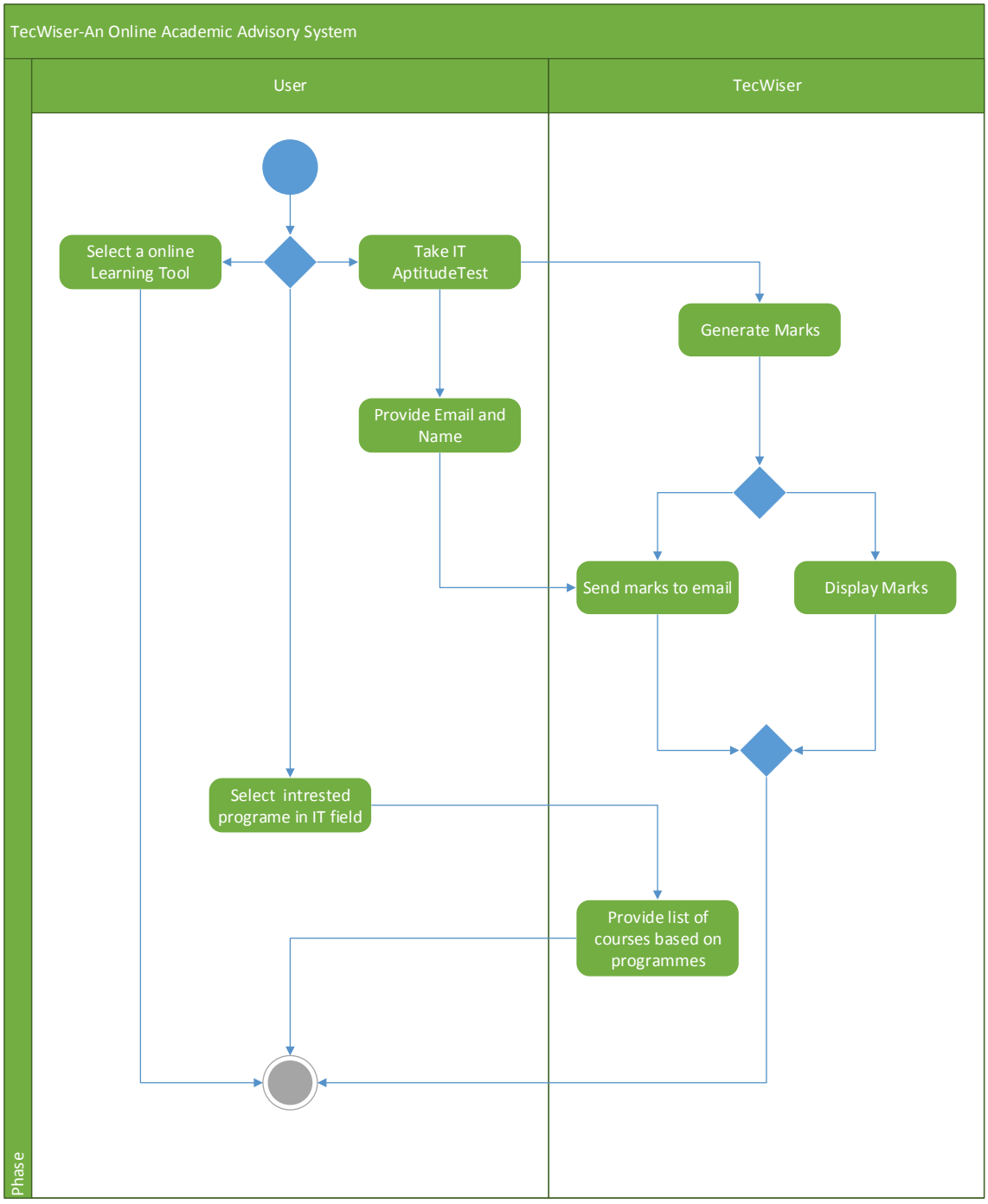
APPENDICES

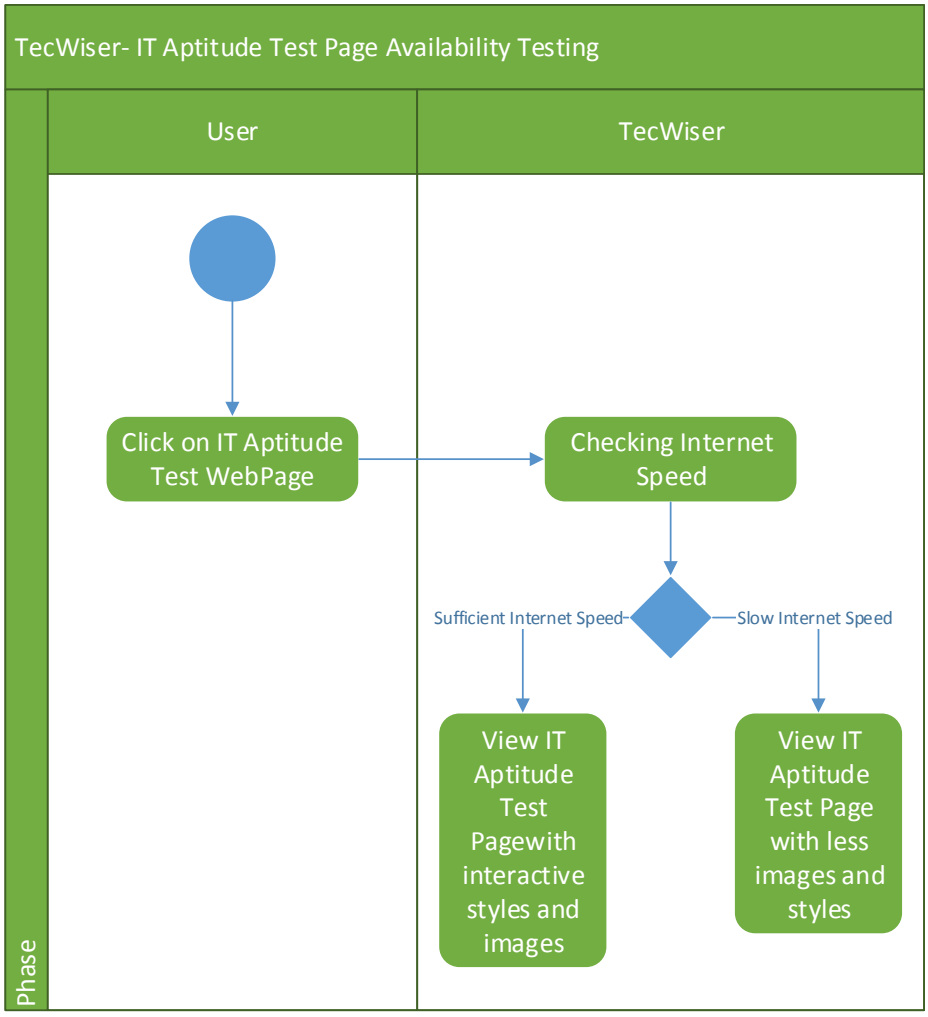
Appendix (1): Use Case Diagram of 'TecWiser'



Appendix (2): Activity Diagram of 'TecWiser'



Appendix (3): Activity Diagram of Shadow Operation and Process Monitor



Appendix (4): List of IT courses offered by UTP, IIUM and UTeM

UNIVERSITI TEKNOLOGI PETRONAS (UTP)	INTERNATIONAL ISLAMIC UNIVERSITI MALAYSIA (IIUM)	UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)
Core Subjects		
• Discrete Mathematics • Structured Programming • Computer Organization • Data and information Management • Web application Development • Data Communication and Networking • System Analysis and Design • Operating System • Object-oriented Programming • Statistics and Empirical Method • Corporate Ethics • Software Engineering • Small Business and Entrepreneurship • IT Project Management	• Financial Accounting Fundamentals • Elements of Programming • Database Systems • Object Oriented Programming • Introduction to Computer Organization • Discrete Mathematics • Calculus • Principles and Practice of Management • System Analysis and Design • ICT & Islam • Data Structure and Algorithm • Multimedia Technology • Web programming • Information Retrieval Technologies • Management of Information System • Data Communication in Business • Information Security • Foundation of Quantitative Analysis • E-commerce • Operating Systems • Human Computer Interaction • Project Management in IT • Cyber Law and Ethics	• Mathematics for Computer Science • Statistic and Probability • Programming Technique • Data Structure and Algorithm • System Development • Database • Object Oriented Programming • Software Engineering • Computer Organization and Architecture • Operating System • Data Communication and Networking • Internet Technology • Multimedia System • Web Application Development • Artificial Intelligence
Software Development		
• Algorithm and Data Structure	• Introduction to Mathematical Statistics	• Software Requirement Engineering

• Human Computer Interaction • Network Security • Wireless Technology • Artificial Intelligence • Software Design and Architecture • Software testing and Quality Assurance • Embedded System	• Software Engineering • Software Quality Assurance • Requirements Engineering • Software Testing	• Database Design • Software Architecture and Design • Software Testing and Quality Assurance • Software Project Management • Algorithm Analysis • Human Computer Interaction
Interactive Media/ Multimedia		
• Algorithm and Data Structure • Human Computer Interaction • Network Security • Wireless Technology • Artificial Intelligence • Multimedia Programming • Computer Graphics and Animation • Virtual Reality and Augmented Reality	• Data and Animation Technique • Creative Design Technique	• Interactive Media Authoring • Digital Audio and Video Technology • Computer Animation • Human Computer Interaction • Interactive media Project Management • Computer Graphics Interactive • Virtual reality Technology • Information Technology Security • Computer Games Development • Software Requirement and Design
Computer Networking		
	• Calculus • Network and System Administration • Advanced Networks • Network Programming • Wireless Communication and Network	• Local Area Network • Wide Area Network • Network Analysis and Design • Network Administration and Management • Network Project Management • Multimedia Networking • IT and Network Security • TCP/IP programing • IT and Network Security • TCP/IP programing • Wireless Network & Mobile Computing

Database Management		
Management and Organizational Behavior Business Accounting Principles of Finance Economics Principles of Marketing IS Strategy and Planning Database Administration Data Mining and Knowledge Discovery Knowledge Management System Fundamental of Knowledge Management Enterprise Architecture Enterprise Information System Development Enterprise Data Management and Analysis	Data Mining Advanced Database Information Resource & Strategy Management	Database Design Database Administration Data Mining and Warehousing Multimedia Database Information Technology and Database Security Software Requirement and Design Software Project Management Database Programming

Same Courses Offered by all three universities

Same Courses offered in two universities

Course only offered in one university

Appendix (5): List of similar IT courses offered by UTP, IIUM and UTeM

UNIVERSITI TEKNOLOGI PETRONAS (UTP)	INTERNATIONAL ISLAMIC UNIVERSITI MALAYSIA (IIUM)	UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)
Similar Core Courses		
Discrete Mathematics Structured Programming Computer Organization Web application Development Operating System Object-oriented Programming	Elements of Programming Object Oriented Programming Introduction to Computer Organization Discrete Mathematics Web programming Operating Systems	Mathematics for Computer Science Programming Technique Object Oriented Programming Computer Organization and Architecture Operating System Web Application Development
Similar Software Development Courses		
Software testing and Quality Assurance	Software Quality Assurance Software Testing	Software Testing and Quality Assurance
Similar Data Management Courses		
Data Mining and Knowledge Discovery	Data Mining	Data Mining and Warehousing

Appendix (6): List of similar IT courses offered by either UTP, IIUM or UTeM

UNIVERSITI TEKNOLOGI PETRONAS (UTP)	INTERNATIONAL ISLAMIC UNIVERSITI MALAYSIA (IIUM)	UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)
Core Courses among		
• Data and information Management • Data Communication and Networking • System Analysis and Design • Statistics and Empirical Method • Software Engineering • IT Project Management	• Database Systems • System Analysis and Design • Data Structure and Algorithm • Multimedia Technology • Management of Information System • Project Management in IT	• Statistic and Probability • Data Structure and Algorithm • Database • Software Engineering • Data Communication and Networking • Multimedia System
Software Development		
• Algorithm and Data Structure • Human Computer Interaction • Software Design and Architecture	• Requirements Engineering	• Software Requirement Engineering • Software Architecture and Design • Algorithm Analysis • Human Computer Interaction
Interactive Media/ Multimedia		
• Human Computer Interaction • Network Security • Computer Graphics and Animation • Virtual Reality and Augmented Reality	• Data and Animation Technique	• Computer Animation • Human Computer Interaction • Computer Graphics Interactive • Virtual reality Technology • Information Technology Security
Computer Networking		
	• Network and System Administration • Wireless Communication and Network	• Network Administration and Management • Wireless Network & Mobile Computing

Database Management		
IS Strategy and Planning Database Administration Knowledge Management System	Information Resource & Strategy Management	Database Administration Software Project Management

Appendix (7): List of non-similar IT courses offered by either UTP, IIUM or UTeM

UNIVERSITI TEKNOLOGI PETRONAS (UTP)	INTERNATIONAL ISLAMIC UNIVERSITI MALAYSIA (IIUM)	UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)
Core Subjects		
▪ Corporate Ethics ▪ Small Business and Entrepreneurship	▪ Financial Accounting Fundamentals ▪ Calculus ▪ Principles and Practice of Management ▪ ICT & Islam ▪ Information Retrieval Technologies ▪ Data Communication in Business ▪ Information Security ▪ Foundation of Quantitative Analysis ▪ E-commerce ▪ Human Computer Interaction ▪ Cyber Law and Ethics	▪ System Development ▪ Internet Technology ▪ Artificial Intelligence
Software Development		
▪ Network Security ▪ Wireless Technology ▪ Artificial Intelligence ▪ Embedded System	▪ Introduction to Mathematical Statistics ▪ Software Engineering ▪	▪ Database Design ▪ Software Project Management ▪
Interactive Media/ Multimedia		
▪ Algorithm and Data Structure ▪ Wireless Technology ▪ Artificial Intelligence ▪ Multimedia Programming ▪	▪ Creative Design Technique	▪ Interactive Media Authoring ▪ Digital Audio and Video Technology ▪ Interactive media Project Management ▪ Computer Games Development ▪ Software Requirement and Design

Computer Networking		
	• Calculus • Advanced Networks • Network Programming	• Local Area Network • Wide Area Network • Network Analysis and Design • Network Project Management • Multimedia Networking • IT and Network Security • TCP/IP programing • IT and Network Security • TCP/IP programing
Database Management		
• Management and Organizational Behavior • Business Accounting • Principles of Finance • Economics • Principles of Marketing • Enterprise Architecture • Enterprise Information System Development • Enterprise Data Management and Analysis	• Advanced Database	• Database Design • Multimedia Database • Information Technology and Database Security • Software Requirement and Design • Database Programming

Appendix (8): Questioners for Counsellors

RESERCH OVERVIEW

Title of the Study:	"TecWiser" the online academic advisory tool
Supervisor:	Dr. Lukman Bin AB Rahim, Lecturer, Computer and Information Sciences Department, Universiti Teknologi PETRONAS, Email: lukmanrahim@petronas.com.my Phone Number : 605-368 7479
Supervisee:	Mr. Parvindran A/L Maratha Undergraduate Student, Information and Communication Technology, Universiti Teknologi PETRONAS, Email: parvindran@gmail.com Phone Number: 6017-7753265
Purpose:	The purpose of this study is to analyze about the uncertainty among students with what they want to do after they graduated from their secondary school and to identify feasible solution for this problem. Furthermore, we would like to identify a way to outline aptitude test to the level of secondary school students. This information is required to develop an online academic advisory tool to assist them to choose a major course of study.
Abstract:	The transition phase from secondary school to higher education institutions is crucial for all students as they have to make excellent decision about what they wanted to do in the future.

	They have to decide what major courses that they have to pursue that are associated with career choices. This is due to the wrong choice of courses possesses significant impact on their future career. Besides, it is important for them to make a right choice of subject area based on their interest if they do not want to waste time and money on subjects that they have least interest. Therefore, an online academic advisory tool is needed especially for secondary school students to advice on possible courses to take. However, the system function will be narrowed down by only focusing one major area of study, which is Information Technology (IT). The system will help students to identify and test their interest in IT field using aptitude test and suggest them the courses that they can pursue based on their interest. If the student has interest in developing web applications, the system will list down the courses associated with their interest. Besides, the system will promote available online learning tools that the students can endeavor before they get into higher education institution. This system will be further enhanced if it is necessary to meet the objective of this project.
Procedures:	Questionnaires are prepared for you to answer. Besides, a list of aptitude test questions is attached together with this letter for your verification and validation. The verification and validation of aptitude test questions in terms of its effectiveness, suitability and appropriateness to graduating secondary school students.
Questions:	If you have any questions, please contact Mr Parvindran at the phone extension or email address above

QUESTIONNAIRE FOR THE COUNSELLOR

Name:

Educational Institution:

Please respond by completing the form accordingly. Please place an "**X**" in the blocks where applicable.

Questions:

1. How many years of counseling experience do you have at a learning institution?

0-5	6-10	11-15	16-20	>20

2. Do you agree that many graduated secondary school students are struggling to make choices about their future field of study?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. Poor choice of future field of study or enrolled to least interested major course can impact students in the following way:

I. Waste of time

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

II. Waste of money

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

III. Delivering Poor Performance in Study

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

IV. Dropout from learning institution

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

V. If you think of any other impacts, you may list its down at the provided space and please rank these impacts as

_____
_____
_____
_____
_____

4. Do you agree that it is easy to identify students with difficulty in making choices about their future field of study?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. Do you agree that some students are not really utilizing the counseling system provided in the school to clear their doubts about their future field of study?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6. Do you agree that it is hard to manage if there is a large quantity of students who are having difficulty in making choices about their future field of study?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. Do you agree that development of an online academic advisory system would assist you handle large quantities of indecision students?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. Do you agree that providing career/ academic aptitude test to students will help them to identify their interested major course of study?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. Do you agree that it reliable and effective if the online academic advisory tool equipped with career/career aptitude test to identify students' interested major course of study?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. Do you have conducted any aptitude test to students especially to identify their skills in Information Technology? If yes kindly attached the copy of the test

Yes	No

11. Do you ever promoted any online academic advisory tool to their students?

Yes	No

If yes, please specify.

Thank you for taking the time to answer this questionnaire.

Appendix (9): IT Aptitude Test Questions for Counsellors

Sample Aptitude Test

Basically, students who have high interest in IT field of study will or should have skills such as numerical reasoning, logical reasoning and non-verbal reasoning. Furthermore, the test questions are generated to test their skills whether it correlates to IT skills.

Please help to verify each test questions whether its level is parallel to secondary school students, effectiveness, and logicality. Feel free to modify, comment and add new test questions. If the questions meet those criteria, then place an "✓" in the blocks where applicable.

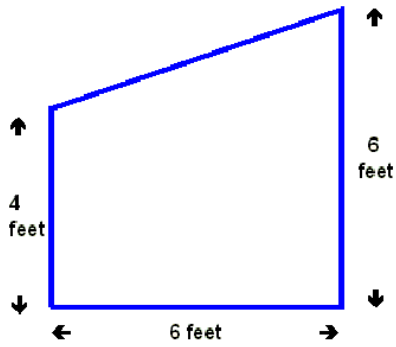
Numerical Reasoning

1. Grace thought of a number, added 7, multiplied by 3, took away 5 and divided by 4 to give an answer of 7.

What was her starting number?

Answer: 4

Comments/Modify



A shed has a side wall of the dimensions shown. Calculate the area of the wall in square feet.

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2. A shed has a side wall of the dimensions shown. Calculate the area of the wall in square feet.

Answer: 30 sq. feet

Comments/Modify

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3. A car left Canterbury at 7.12 am and arrived in Birmingham, 180 miles distant at 10.57 am. What was its average speed in miles per hour?

Solution:

Time taken = 3 hours 45m = 3.75 hours (15/4 hours if you prefer fractions).

Speed = distance / time taken = 180 / 3.75 = **48 mph**

Comments/Modify

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4. You get a wage increase of 4% plus an extra $5 per week. Your present wages are $250 per week. What will your new wage be?

Solution:

Present wage = 250

4% of 250 = 4 x 2.5 = $10

Therefore new wage = 250 + 10 + 5 = **$265**

Comments/Modify

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5. What is the missing number? 56 / 7 =? - 5

56/7 = 8

Therefore 8 =? - 5

8 = **13** – 5

Comments/Modify

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6. A cube has a volume of 8 cubic meters. If each side is doubled in length what will its new volume be in cubic meters?

Solution:

Volume = length x width x height

8 = l x w x h but l, w and h are all equal as it is a cube

Therefore l = w = h = 2m

If each side is doubled in length l = w = h = 4m

Therefore new volume = 4 x 4 x 4 = **64 cubic meters**

Or if you prefer the quicker method. If each side is doubled in length then the new volume must be 2 to the power 3 bigger = 8 x 8 = **64**

Comments/Modify

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7. A driver drives 8 km South then 6 km W. and 2 km S. again. She then drives 3 km E. to avoid a traffic jam before driving 6 km N. How many kilometers is she from her starting point?

Total distance driven South = 8 + 2 - 6 km = 4 km

Total Distance driven West = 6 - 3 km = 3 km

this makes a right angled triangle where the distance from her starting point is the hypotenuse.

Using Pythagoras Theorem: "In any right triangle, the area of the square whose side is the hypotenuse (is equal to the sum of the areas of the squares of the other two sides"

4 squared + 3 squared = hypotenuse squared

16 + 9 = 25 = hypotenuse squared

Therefore hypotenuse (distance from starting point) = square root of 25 = **5km**

Or a simpler method is to see that the distances make a 3, 4, 5 triangle so the distance from start is 5 km

Comments/Modify

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8. What is the missing number? 20 / 0.8 =?

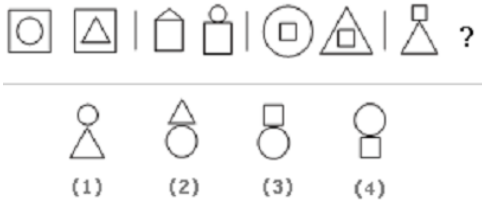
Solution:

20 / 0.8 = **25** (NOT 16: try it on a calculator if you don't believe it. Dividing by a fraction always gives a larger number)

Comments/Modify

Logical Reasoning & Non-Verbal Reasoning

1. Look carefully at the sequence of symbols to find the pattern. Select correct pattern



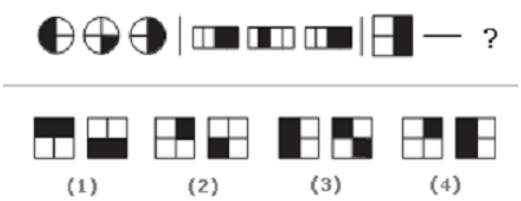
A. 1 B. 2 C. 3 D. 4

Answer: C

All four segments use the same figures: two squares, one circle, and one triangle. In the first segment, the squares are on the outside of the circle and triangle. In the second segment, the squares are below the other two. In the third segment, the squares on are the inside. In the fourth segment, the squares are above the triangle and circle.

Comments/Modify

2.



A. 1 B. 2 C. 3 D. 4

Answer: D

In each of the segments, the figures alternate between one-half and one-fourth shaded.

Comments/Modify

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3. Translate from an imaginary language into English. Then, look for the word elements that appear both on the list and in the answer choices.

Here are some words translated from an artificial language.
malgauper means peach cobbler
malgaport means peach juice
moggagrop means apple jelly
Which word could mean "apple juice"?

A. moggaport B. malgaauper C. gropport D. moggagrop

Answer: A

Malga means peach; uper means cobbler; port means juice; mogga means apple; and grop means jelly. Therefore, moggaport means apple juice.

Comments/Modify

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4. Each problem consists of three statements. Based on the first two statements, the third statement may be true, false, or uncertain.

Joe is younger than Kathy.

Mark was born after Joe.

Kathy is older than Mark.

If the first two statements are true, the third statement is

A. true B. False C. uncertain

Answer: A

Joe is younger than Kathy and older than Mark, so Mark must be younger than Kathy.

Comments/Modify

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4. Mara runs faster than Gail.
Lily runs faster than Mara.
Gail runs faster than Lily.
If the first two statements are true, the third statement is

A. true B. False C. uncertain

Answer: B

We know from the first two statements that Lily runs fastest. Therefore, the third statement must be false

Comments/Modify

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5. Read the question carefully and choose the correct answer

Four defensive football players are chasing the opposing wide receiver, who has the ball. Calvin is directly behind the ball carrier. Jenkins and Burton are side by side behind Calvin. Zeller is behind Jenkins and Burton. Calvin tries for the tackle but misses and falls. Burton trips. Which defensive player tackles the receiver?

A. Burton B. Zeller C. Jenkins D.Calvin

Answer: C

After all the switching was done, Jenkins was directly behind the receiver. Calvin and Burton had fallen. Zeller remained in the rear.

Comments/Modify

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6. Four people witnessed a mugging. Each gave a different description of the mugger. Which description is probably right?

A. He was average height, thin, and middle-aged

B. He was tall, thin, and middle-aged

C. He was tall, thin, and young

D. He was tall, of average weight, and middle-aged

Answer: B

Tall, thin, and middle-aged are the elements of the description repeated most often and are therefore the most likely to be accurate.

Comments/Modify

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7. At the baseball game, Henry was sitting in seat 253. Marla was sitting to the right of Henry in seat 254. In the seat to the left of Henry was George. Inez was sitting to the left of George. Which seat is Inez sitting in?

A. 251 B. 254 C. 255 D. 256

Answer: A

If George is sitting at Henry's left, George's seat is 252. The next seat to the left, then, is 251.

Comments/Modify

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8. The logic problems in this set present you with three true statements: Fact 1, Fact 2, and Fact 3. Then, you are given three more statements (labeled I, II, and III), and you must determine which of these, if any, is also a fact. One or two of the statements could be true; all of the statements could be true; or none of the statements could be true. Choose your answer based solely on the information given in the first three facts.

Fact 1: All dogs like to run.

Fact 2: Some dogs like to swim.

Fact 3: Some dogs look like their masters.

If the first three statements are facts, which of the following statements must also be a fact?

I: All dogs who like to swim look like their masters.

II: Dogs who like to swim also like to run.

III: Dogs who like to run do not look like their masters.

A. I only

B. II only

C. II and III only

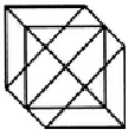
D. None of the statement is a known fact

Answer: B

Statement II is the only true statement. Since all dogs like to run, then the ones who like to swim also like to run. There is no support for statement I or statement III.

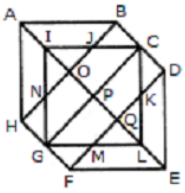
Comments/Modify

9. Find the number of triangles in the given figure.



A. 18 B. 20 C. 24 D. 27

Answer: C



The simplest triangles are IJO, BCJ, CDK, KQL, MLQ, GFM, GHN and NIO i.e. 8 in number.

The triangles composed of two components each are ABO, AHO, NIJ, IGP, ICP, DEQ, FEQ, KLM, LCP and LGP i.e.10 in number.

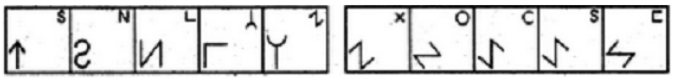
The triangles composed of four components each are HAB, DEF, LGI, GIC, ICL and GLC i.e. 6 in number.

Total number of triangles in the figure = 8 + 10 + 6 = 24.

Comments/Modify

10. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures: Answer Figures:



(A) (B) (C) (D) (E) (1) (2) (3) (4) (5)

A. 1 B. 2 C. 3 D. 4 E. 5

Answer: C

In each step, element at the upper-right position gets enlarged, inverts vertically and reaches the lower-left corner; the existing element at the lower-left position, is lost and a new small element appears at the upper-right position.

Comments/Modify

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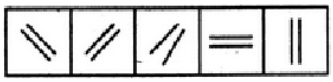
11. Choose the figures which is different from the rest.



(1) (2) (3) (4) (5)

A. 1 B. 2 C. 3 D. 4 E. 5

Answer: C

In all other figures, the two line segments are parallel to each other.

Comments/Modify

_____

_____

General Questions:

1. The brain of any computer system is

A. ALU

B. Memory

C. CPU

D. Control unit

Answer: C

Comments/Modify

_____

_____

2. 'OS' computer abbreviation usually means?

A. Order of Significance

B. Open Software

C. Operating System

D. Optical Sensor

Answer: C

Comments/Modify

_____

_____

3. What do we call a collection of two or more computers that are located within a limited distance of each other and that are connected to each other directly or indirectly?

A. Inernet

B. Interanet

C. Local Area Network

D. Wide Area Network

Answer: A

Comments/Modify

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_____

4. What does AC and DC stand for in the electrical field?

A. Alternating Current and Direct Current

B. A Rock Band from Australia

C. Average Current and Discharged Capacitor

D. Atlantic City and District of Columbia

Answer: A

Comments/Modify

_____

_____

4. http://www.indiabix.com - is an example of what?

A. A URL

B. An access code

C. A directory

D. A server

Answer: A

Comments/Modify

_____

_____

5. What's a web browser?

A. A kind of spider

B. A computer that stores WWW files

C. A person who likes to look at websites

D. A software program that allows you to access sites on the World Wide Web

Answer: D

Comments/Modify

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