CERTIFICATION OF APPROVAL

Agent-based FAQ

by

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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.

SITI SALWA ABDUL AZIZ

ABSTRACT

Technology and websites brings the world another alternatives in conveying information through the global network, the Internet. A web page that adopts agent-based concepts is able to help its users in delivering or obtaining information regarding companies' information, products and services, knowledge or other means of information through websites. The idea of this project is to develop an Agent-based FAQ and also to compare an Agent-based FAQ with the Traditional FAQ. A well structured Agent-based FAQ will allure potential websites users to use FAQ more often to ask questions in order to clarify ambiguous or misunderstanding and to further request information regarding a websites. A survey was conducted in seeking feedback from websites users regarding Agent-based FAQ and Traditional FAQ. Using the Rapid Application Development-based methodology, this project was developed iteratively by adopting the Phased Development. The relevancy of this project was supported by the information gathered from various acknowledge articles, journals, and researched done. This report includes brief details regarding the development tools and languages that support the development of the agent software and comparison of each. The selected language to develop the agent is the open source AIML using Program D as the Java AIML interpreters, and included in this report information of AIML concept and syntax and working with AIML file(s). This report also explains how the AIML file(s) is being organized and stored using Knowledge Warehouse concept. Also include step by step in downloading, installing, configuring, and running Program D and the required application, such as Apache Tomcat Web Server and Java RunTime Environment (JRE), for Program D to works. In conclusion this report includes future enhancement and project continuation, and the related references.

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CHAPTER 1
INTRODUCTION

This chapter describes the main information regarding the project. Include are; project background of study, project problem statement, project objective and scope of study.

1.1. Background of Study

With the advancement of technology, particularly the Internet, the world has discovered a new path of opportunities, switching the traditional-information delivering into a better far superior in terms of efficiency, productivity, profitability and competitiveness. The internet has made it known as one of easy and fast way in disseminate and delivering knowledge and information because its ability to reach every corner of the world [32]. Therefore it is important for website developers to embrace the methods and trends to ease the website users in fulfilling their needs and thirst for knowledge and information. Although sometimes a website seem to have a perfect content, but somehow website users are characterized by a different attitude with expectations that sites will provide all the information they need [32] and the way that easy for them to see. This is where Frequently Asked Question or FAQ comes in handy. FAQ does not change the core interaction between websites users and a websites' owner maybe, but it is to change the mindset of how to go about gaining information and knowledge through an efficient and convenient manner.

This project is to develop an agent that offers website developer another alternative rather than the traditional approaches of FAQ. This project will study the elements of human-computer interaction and knowledge warehouse. An excellent FAQ in a website will benefit party who uses website to disseminate knowledge and website users. Website developers are able to deliver satisfactory information to the online users in an

easy and efficient way, while online users are able to get answers for their specific question at their own convenient.

1.2. Problem Statement

In this section consist of the project problem identification and the significant of the project.

1.2.1. Problem Identification

For the explanation below, please refer to Figure 1

- Based on a survey conducted involving 29 participants, shows that only 44.83% which equivalent to 13 of internet users used FAQ to ask question.
- Internet has been a widely used medium in information delivering to its user, however referring to the survey the percentage of people not using the FAQ is higher compared to people using the FAQ.

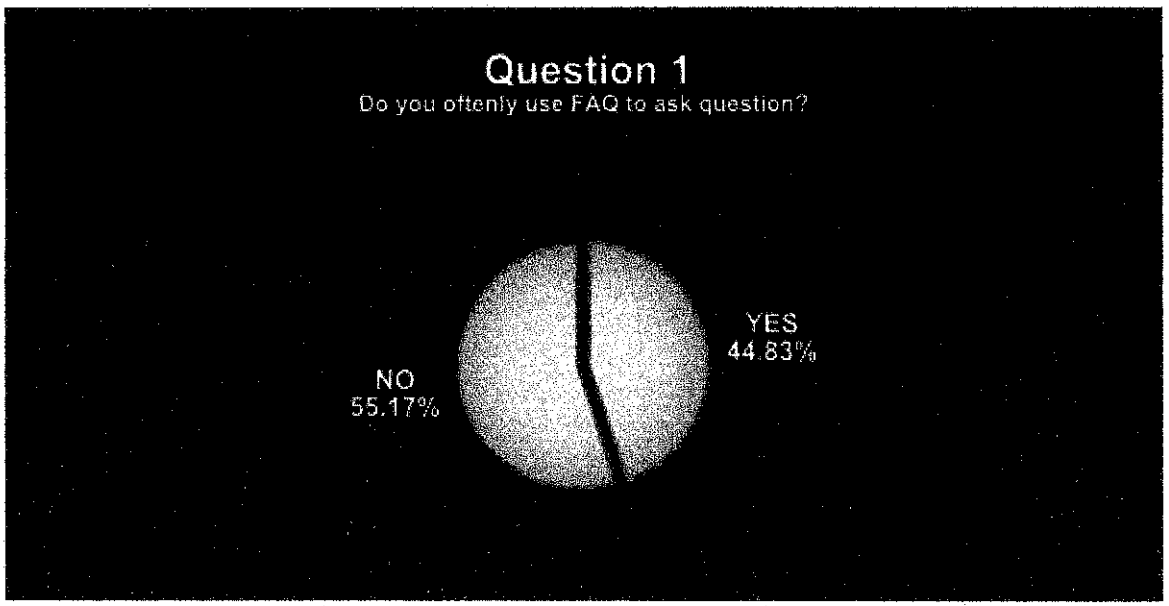


Figure 1 – Pie Chart
Result from Survey Conducted - Question 1

1.2.2. Significant of the Project

This project studied the approach of agent-based FAQ for online user that need to use FAQ to ask question regarding the visited website.

- Agent-based application is now progressively evolving and surfacing in technologies that helps and assists its user in many areas of internet use.
- Studied to what extend does an agent-based FAQ will increase internet users' familiarity in using FAQ in a website, which can be applied to enhance the usability of websites.
- The use of agent-based FAQ makes it possible for websites' owner to depend on its websites to convey information regarding the company, product or services or even for other means of purpose such as education, medication, entertainment and more.
- Knowledge Warehouse in which to organize and manage the agent's knowledge.

1.3. Objective and Scope of Study

Include in this section are; project objectives, scope of study, the relevancy of project, and feasibility of the project within the scope and time frame.

1.3.1. Project Objectives

The objectives of this project are as follow;

- To design an agent-based FAQ
- To compare agent-based FAQ with the traditional FAQ.
- To design an agent that has a specialized knowledge area.
- To develop a web page that integrates with agent.
- To study the tools and language needed to develop agent.
- To research regarding Knowledge Warehouse in which to organize and manage the agent's knowledge.

1.3.2. Scope of Study

The project scopes of study are as follow;

- Designing an agent-based FAQ
- Comparison between agent-based FAQ and traditional FAQ.
- Developing agent in one specialize area or knowledge.
- Developing agent and learn its associated tool and language.
- Developing a web page that integrates with agent software.
- Research regarding Knowledge Warehouse.

1.3.3. The Relevancy of Project

The relevancies of the project are;

- Agent-based is perceived to be acknowledging by the world to be one of the technologies that help, assist and ease human activities [3].
- Many fields such as corporate company, education, entertainment, and communication include FAQ in their websites. FAQ is one of the alternatives for internet users to ask question without having to contact via telephone, fax or e-mail.
- Based on the survey conducted (referring to Figure 1), the percentage of internet users using FAQ is 44.83% out of the survey sample, which almost reach up to half of the total (29 participants). This shows that FAQ element is also important for a website.

1.3.4. Feasibility of the Project within the Scope and Time Frame

It is important to identify the opportunities and limitation of this project in deciding whether the project is possible or not possible to continue. Feasibility analysis is described within the explained scope of study and the given one year period of development. To delineate and explicate feasibility of this project, the below area is focused.

Technical Feasibility

- This area of feasibility is to assess the technical knowledge and familiarity in designing and developing agent and web page.
- Less familiarity of the scope or technology will generate more risk and imperil the completion of this project with the allocated time frame.
- Since the web page will be developed using a familiar language such as Markup Language, therefore this project is possible to proceed and to be completed in timely manner.
- However the limitation of the technical area is the technology used in designing and developing an agent.

CHAPTER 2
LITERATURE REVIEW AND THEORY

This chapter consist all the supporting information that supports the whole ideas and explanation.

2.1. Supporting Information

- **What is Agent?**

The concept of an agent can be traced back to Hewitt's Actor Model (Hewitt, 1977); agent is perceived as self-contained, interactive and concurrently-executing object, possessing internal state and communication capability [1].

Other definition of agent which also describe the characteristic belong to an agent [2] are;

- persistence (code is not executed on demand but runs continuously and decides for itself when it should perform some activity)
- autonomy (agents have capabilities of task selection, prioritization, goal-directed behaviors, decision-making without human intervention)
- social ability (agents are able to engage other components through some sort of communication and coordination, they may collaborate on a task)
- reactivity (agents perceive the context in which they operate and react to it appropriately).

- **Agent or chatbots in future?**

For most chatbots - those with fixed rules and a finite, controlled set of things to say - the future is all about being 'useful' - helping people find information, navigate a site, and perhaps even offering limited advice. [3]

- **Agent Design Issue**

Some of the design issues [4] that need to consider in the development of agent-based systems include few question of "how" and "what".

- how tasks are scheduled and how synchronization of tasks is achieved
- how tasks are prioritized by agents
- how agents can collaborate, or recruit resources
- how agents can be re-instantiated in different environments, and how their internal state can be stored
- how the environment will be probed and how a change of environment leads to behavioral changes of the agents
- how messaging and communication can be achieved
- what hierarchies of agents are useful (e.g. task execution agents, scheduling agents, resource providers)

- **Example diagram of basic reflex of intelligent agent (Simple Agent Architecture)**

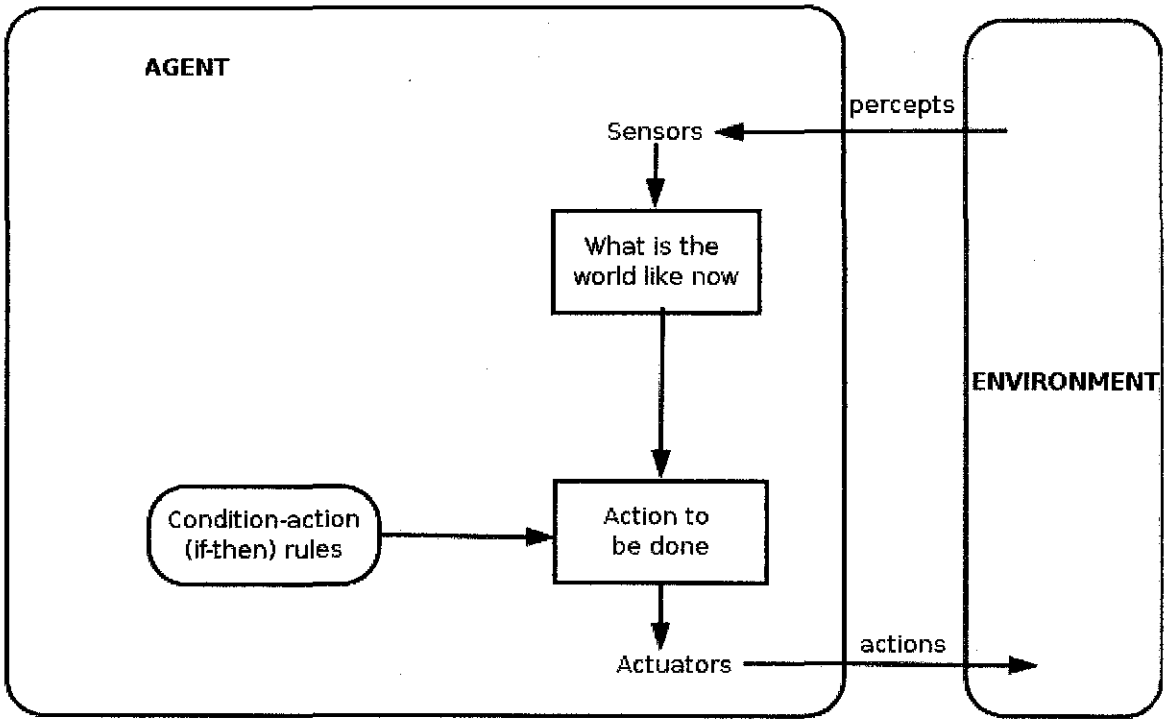


Figure 2 Intelligent Agent Simple Reflex
Taken from Wikipedia, Intelligent Agent – Simple Reflex [5]

- **What is FAQ?**

FAQ is an abbreviation of Frequently Asked Question. FAQ list is a set or compilation questions and answers pertaining to certain topic. The concept of a FAQ has become fairly familiar online in modern development. This can be seen in entertainment such as videogames where GamesFAQ has detailed descriptions of game play, including tips, secrets, and beginning-to-end guidance [6].

- **Purpose or Importance of FAQ?**

The purpose is to avoid from answering repeatedly of the same question. According to Usernomics [7],

"We often get questions regarding our various disciplines. The purpose of this FAQ (Frequently Asked Questions) is to answer some of these questions. The objective is to clarify terms and concepts that are frequently encountered and often misunderstood."

"The FAQ section on most sites is a busy and useful place to go to learn more about the site and possibly the products being sold there. In this site, which is non-commercial, it is used in a different way. It is used, as usual, to answer questions about the site, but more important to answer questions about Mysticism. It is an ideal way to cover a large area of information, in a condensed form [8]."

- **Most Common Types of FAQ Approach**

The most frequently seen approaches of FAQ are;

1. Link type question-to-answer
   Description: This FAQ is designed to be a link. User will need to click on the question link to be directed to the answers. In this report, Linkage FAQ is used to represent this type of approach.

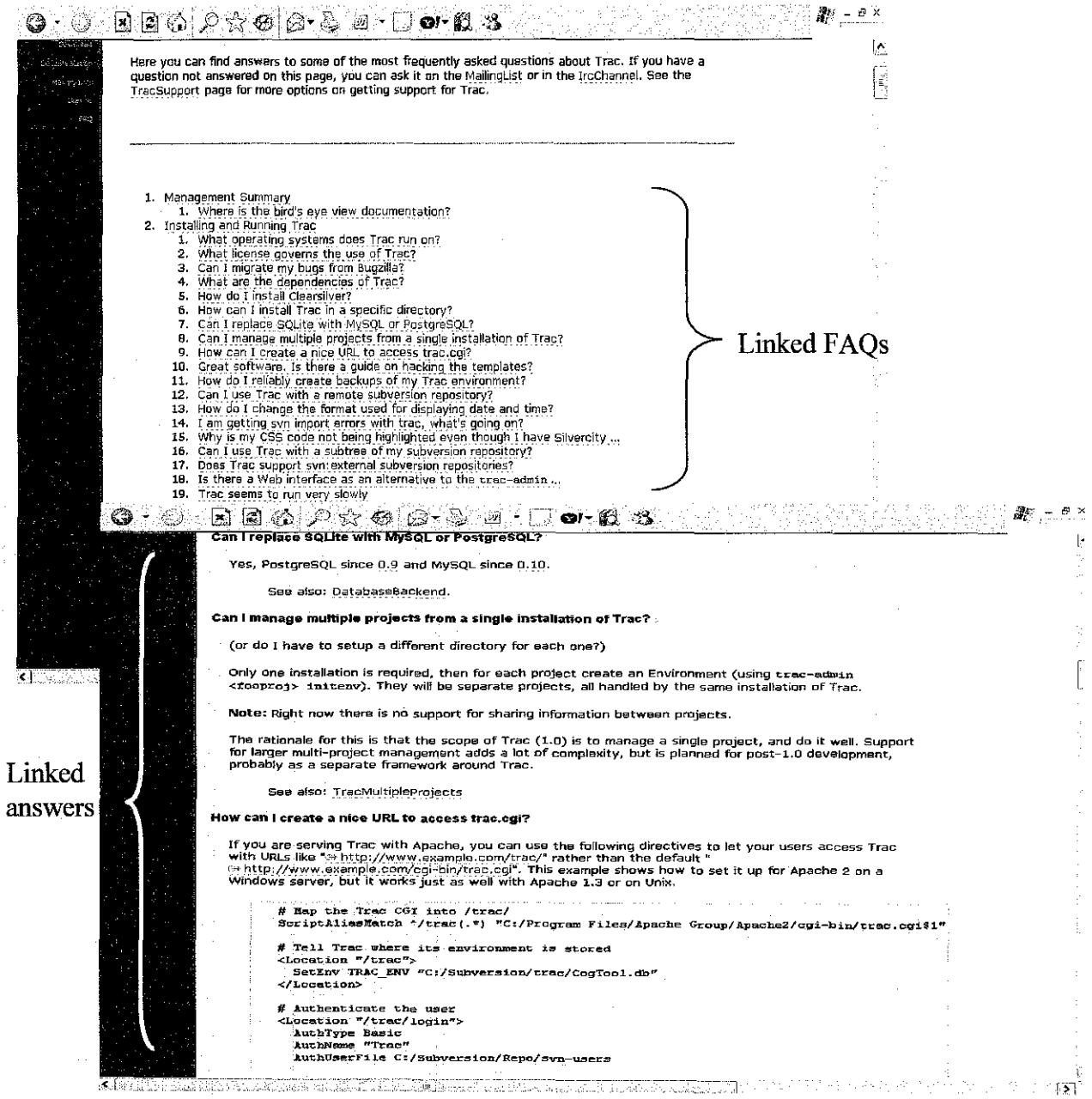


Figure 3 Example of Linkage FAQ

2. Top down question-to-answer

Description: This FAQ approach list and display all the questions and answers from top to bottom. User will need to go through from top to bottom to look for intended question. In this report, Top-down FAQ is used to represent this type of approach.

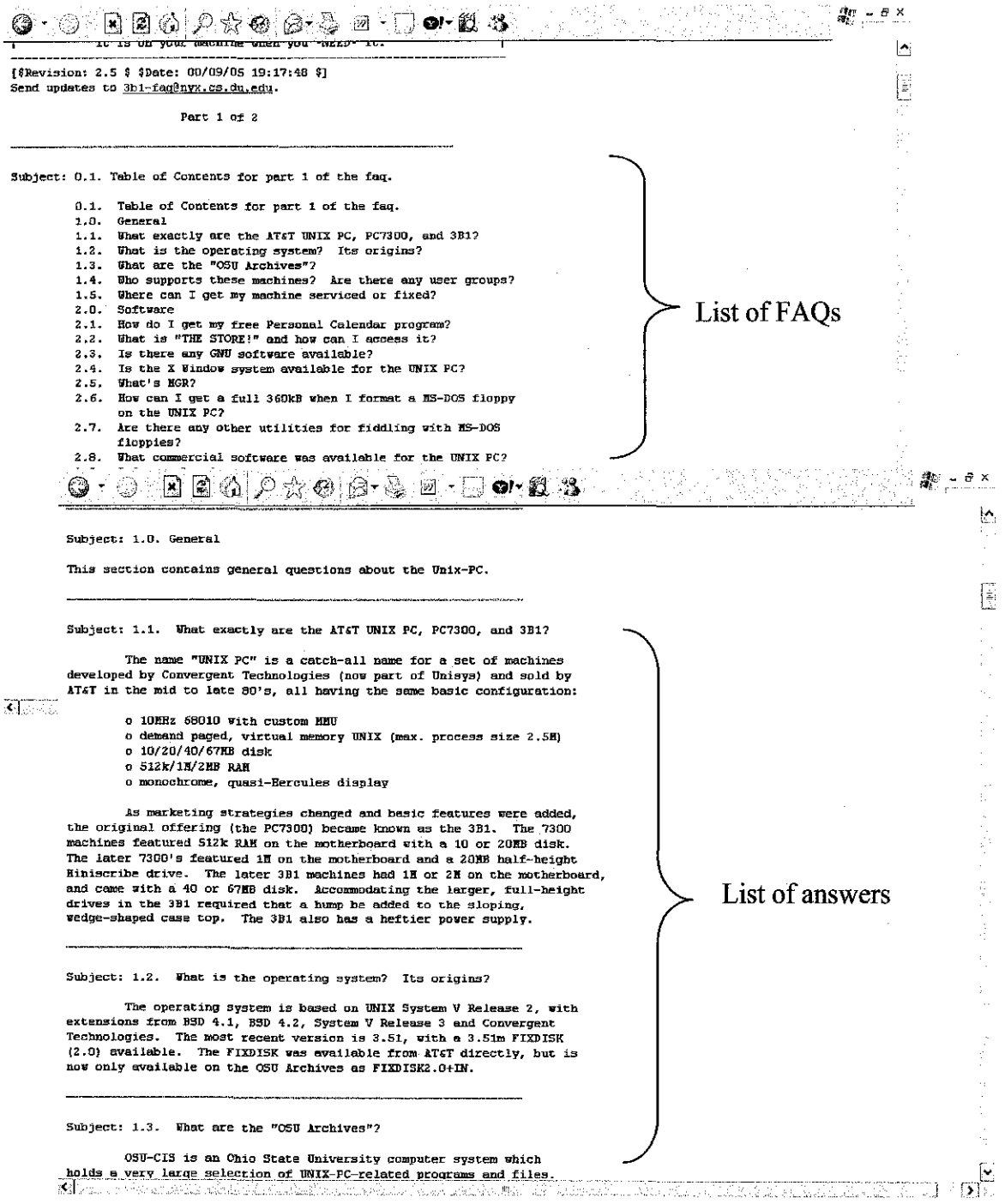


Figure 4 Example of Top-down FAQ

The suggested improve approach is;

3. Agent-based FAQ

   Description: This approach will use the advantage of agentbot. This approach allows user to ask by typing in the intended question, and directly get the answer for it. In this report, Directly Ask FAQ is used to address this type of approach.

- **What is knowledge?**

Knowledge may be thought of as information in use, or the set of rules and relationships that enable value added, skilled performance. It is a higher level aggregation and interpretation of information and data. Knowledge may consist of work procedures and processes, precedents, details and conceptual relationships between topics in a domain [23]. Knowledge is often represented in the form of an expert's rules [24]. Another interpretation of knowledge is that knowledge is generated when information is combined with context and experience [25].

- **What is Repository?**

A repository is a central place where data is stored and maintained. A repository can be a place where multiple databases or files are located for distribution over a network, or a repository can be a location that is directly accessible to the user without having to travel across a network [26].

- **What is Data Warehouse?**

A data warehouse is a repository of an organization's data, where the informational assets of the organization are stored and managed, to support various activities such as queries[27]. The data warehouse need not to be a relational database and data can physically reside on any number of computers, as it must be organized to hold information in a structure that best supports not only ad hoc queries, reporting and

sophisticated decision support analysis, but also advanced analysis techniques, like data mining [27][28] and for decision makers to get at the data they need [29].

- **What is Knowledge Warehouse?**

In a journal entitled The Knowledge Warehouse: Reusing Knowledge Components, knowledge warehouse consists of knowledge components (KCs) that are defined as the smallest level in which knowledge can be decomposed. Knowledge warehouse is also parallel to the concepts of data warehouse, and can also be called a data repository [28] [30]. A major economic benefit of any database lies in storing information once, in a form that is accessible by other systems that need it [28].

- **What is ad hoc querying?**

As mentioned earlier data warehouse is organize in a way that supports ad hoc query. Literally, ad hoc means "for this [purpose]" that signify a solution that has been tailored to a specific purpose [31]. Therefore ad hoc query may also be interpreted as question for a specific purpose.

- **Tools for Developing Agent**

Development Tools or Language

AI	Description	Price
Jabberwacky [9]	- Not an Artificial Life model, nor a Markov Chain, nor a Neural Net, nor a Fuzzy Logic system, or any other single recognized AI technique. - It is a complex, layered set of heuristics that produce results through analyses of conversational context, and positive feedback. - The approach is data-centric, probabilistic and statistical, yet at the same time distinctly chaotic in nature, tiny differences in context can make huge differences, as is true of human life.	$30 yearly
ALICE Artificial Intelligent [10]	- AIML (Artificial Intelligence Markup Language) is an XML-compliant language that is easy to learn, and makes it possible to begin customizing an Alicebot or creating one from scratch within minutes. - Presently possible with HTML and XML - AIML has been designed for ease of implementation, ease of use by newcomers, and for interoperability with XML and XML derivatives such as XHTML.	Free/Open Source
Extempo [11]	- Extempo offers the products to enable to create Expert Character™ solutions for training needs. - Patented Expert Character™ technology is the result of many years of experience in researching, developing, and deploying character-based solutions for e-learning and related applications. - Authoring and Analysis tools puts custom Expert Character™ development within the reach of the learning professional.	Not Mentioned

Development Tools or Language (continue)

AI	Description	Price
Corby [12]	- Corby is an intelligent conversation robot that simulates human verbal behaviour. - It is based on a very simple stimulus-response model. - The stimulus consists in a statement provided by the user, which causes Corby to provide an appropriate response.	Freeware
Botizen [10]	- BOTizen Live Chat is a live chat and real-time live monitoring software package that allows online businesses to proactively interact with website visitors. - It offers instantaneous help to your website visitors when they need it the most.	Not Mentioned
Stauri FAQtaur	- Stauri FAQtaur is a development tool to create an interactive software agent that can be programmed to automatically respond to questions by querying a pre-established questions and answers database. The conversational nature can make interacting with the agent informative, interesting and entertaining.	Normal Price : $59.95 Introductory Price : $39.95
Network Query Language(TM) technology	- Network Query Language(TM) technology is a scripting language designed to simplify the creation of agents, bots and Web applications.	Professional Edition:$1,500 Standard: $295

Table 1 Development Tools or Language

Comparison of AI Development Tools or Language

AI	Notes
Jabberwacky [9]	- Expensive

ALICE Artificial Intelligent [10][13]	- Provides open source interpreter
	- Easy learning language
	- Open source language
	- Compatible with XML an HTML
	- The design goals for AIML are:
	  - AIML shall be easy for people to learn.
	  - AIML shall encode the minimal concept set necessary to enable a stimulus-response knowledge system modeled on that of the original A.L.I.C.E.
	  - AIML shall be compatible with XML.
	  - It shall be easy to write programs that process AIML documents.
	  - AIML objects should be human-legible and reasonably clear.
	  - The design of AIML shall be formal and concise.
	  - AIML shall not incorporate dependencies upon any other language.

Extempo [11]	- For professional use
Corby [12]	- Learning in Corby takes a very long time - Therefore a serious user of Corby should consider leaving the application always running. - This consumes CPU resources - Does not include a knowledge base - Freeware
Botizen [10]	- For corporate use
Stauri FAQtaur	- Expensive
Network Query Language(TM) technology	- Expensive

Table 2 Comparison of AI Development Tools or Language

Therefore, based on the AI development tools and languages listed above, this project will adopt ALICE Artificial Intelligent Approach or AIML language to develop the agent for this project.

Requirements of AIML Language

The AIML include three open source free software products [10].

1. The specification of the AIML language itself.
2. Various free software interpreters that implement.
3. The contents of the ALICE brain written in AIML (and other free AIML sets that exist).

Free Software Interpreters

Software Interpreters	Language	Description
Pandorabots.com [14]	Lisp	Pandorabots.com is a software robot hosting service. - From any browser, client may create and publish their own robots to anyone via the web. - Pandorabots technology yields one of the fastest bots available on the Internet. - The bots are based on AIML entirely from the work of Dr. Richard Wallace and the A.L.I.C.E. and AIML free software community. - This site offers perhaps the most convenient way to get started publishing a bot.

Free Software Interpreters (continue)

Software Interpreters	Language	Description
Chatterbean [14]	Java	ChatterBean is an AIML interpreter (also known as "Alicebot") written in pure Java. Its ultimate objectives are: - fully compliant to the current (1.0.1) AIML standard - simple, easily customizable, JavaBeans-compliant plug-in architecture - self-contained, a ChatterBean release should compile and run on any machine with an appropriate version of the JDK installed, regardless of operating system and without depend on anything not provided in the distribution package itself - rely on the Java API for writing concise code, easy to understand and modify; - provide thorough API documentation through the Javadoc tool - robust set of tests, "white box" and "black box" - controllable application framework. - limited set of features.
Program E [14]	PHP	Program E is a platform for running artificial intelligence robots. - It is written in PHP and uses MySQL for its backend database. - Program E runs bots that are written in Artificial Intelligence Markup Language or AIML. - Supports HTML, FLASH, XML-R
Program# [14]	.NET	Program#, an AIML interpreter in .Net, under the GNU GPL. - It was developed using the 1.1 version of .NET - I'm also pleased to say that it works with Mono (tested with v1.0.5). Integrate into Windows Forms applications, Windows services and Web services.

Software Interpreters	Language	Description
Program D [15]	Java	- most widely used free/open source AIML bot platform - feature-complete, best-tested implementation of the current AIML specification - supports unlimited multiple bots in a single server instance - open-ended architecture for interacting via any interface - standard release provides a J2EE web application implementation that can be deployed as a .war file - includes an automated testing framework for testing knowledge bases - packaged with an AIML Test Suite that verifies that the program itself complies to the AIML specification - implemented in Java, and uses many features of the latest JDK to provide optimum code reliability
Libaiml [16]	C++	- libaiml is an AIML interpreter fully written in C++ from scratch oriented towards Linux systems.

Table 3 Free Software Interpreters

Comparison of Software Interpreters

(The familiarity of the language for each software interpreters is rated using either one of stated range: 1 = Not familiar, 2 = Familiar, 3 = Too Familiar.
The learnability of the language for each software interpreters is rated using either one of stated range: 1 = Hard, 2 = Medium, 3 = Easy.)

Software Interpreters	Familiarity of Language	Learnability	Notes
Pandorabots.com [14]	1	-	- Pandorabots.com is a web hosting for agent. - Suitable for novices and expert users to create a chatterbot. - Only requires for knowledge on AIML language either minimal or advanced depending on the user. - Does not have to learn the Lisp language to create a chatter bot. - Can be run on any web browser. - Implements on any operating system
Chatterbean [14]	2	2	- Requires developer to learn Java Language - Requires for installation of JDK - Implements on any operating system
ProgramE [14][17]	2	2	- Requires developer to learn PHP Language - Implements on any operating system

Software Interpreters	Familiarity of Language	Learnability	Notes
Program# [14]	2	2	- Requires developer to learn .NET
Program D [15]	2	2	- Requires developer to learn Java Language - Requires for installation of JDK - Implements on any operating system
Libaiml [16]	2	2	- Requires developer to learn C++ Language - But runs on Linux operating system only.

Table 4 Comparison of Software Interpreters

Therefore, so far Pandorabots.com is used as the AIML interpreters for developing the agent in version 1. The rationales are;

- Regardless of which AIML interpreters is used, the backend language to create the agent intelligence is AIML.
- Since the aim and purpose of delivering version 1 is to learn how to add knowledge to the agent knowledge web using AIML.
- Pandorabots.com allows both novice and advance user to learn the AIML.
- Pandorabots.com allows advance user to have their own custom .aiml to be added or used instead of using what have been create by Pandorabots.com
- Pandorabots.com provides an easy web hosting for the agent.
- It is time saving as Pandorbots.com does not requires the user to learn the Lisp language. Advance user only need to code for the .aiml (used for agent knowledge web) and .html (used for user interface), and no need to worry on how to integrates of both .aiml and .html.

- Pandorabots.com provides step-by-step guides in hosting agent and includes avatar sample to be used.

AIML Interpreter for Latter Version of Agent Development – Program D

As mentioned earlier, Pandorabots.com is being used for earlier development of version 1 with the main purpose to assist learning of AIML. However for the latter development of agent, Program D [15] is used instead. Below is information regarding the version of Program D is being used.

PROGRAM D	
Latest Release	4.6 on 12 March 2006
Downloadable	http://www.aitools.org/Downloads#Program_D
Maintainer	Noel Bush (mailto:noel@aitools.org)

Table 5 Program D

Steps starting from installation, configuration, and using Program D will be explained in Chapter 5 Technical Information and Configuration.

- **Advantages of RAD methodology and iterative development**

"Iteration allows for effectiveness and self-correction. Studies have shown that human beings almost never perform a complex task correctly the first time. However, people are extremely good at making an adequate beginning and then making many small refinements and improvements." [18]

"...Rapid Application Development has two primary advantages: increased speed of development and increased quality." [19]

"The advantages of RAD methodology include greater flexibility for scope changes, being able to identify limitations earlier in the development process and to deliver partial functionality sooner ..." [20]

CHAPTER 3
METHODOLOGY / PROJECT WORK

3.1. Methodology

The methodology that adopted is the Rapid Application Development (RAD). RAD-based methodology is applicable to a system or project that has time constraint as the project limitation. This methodology compresses the analysis, design, build, and test phases into a series of short, iterative development cycles. Iteration allows for effectiveness and self-correction. Figure 5 in the next page shows the initial Phased Development in RAD [21].

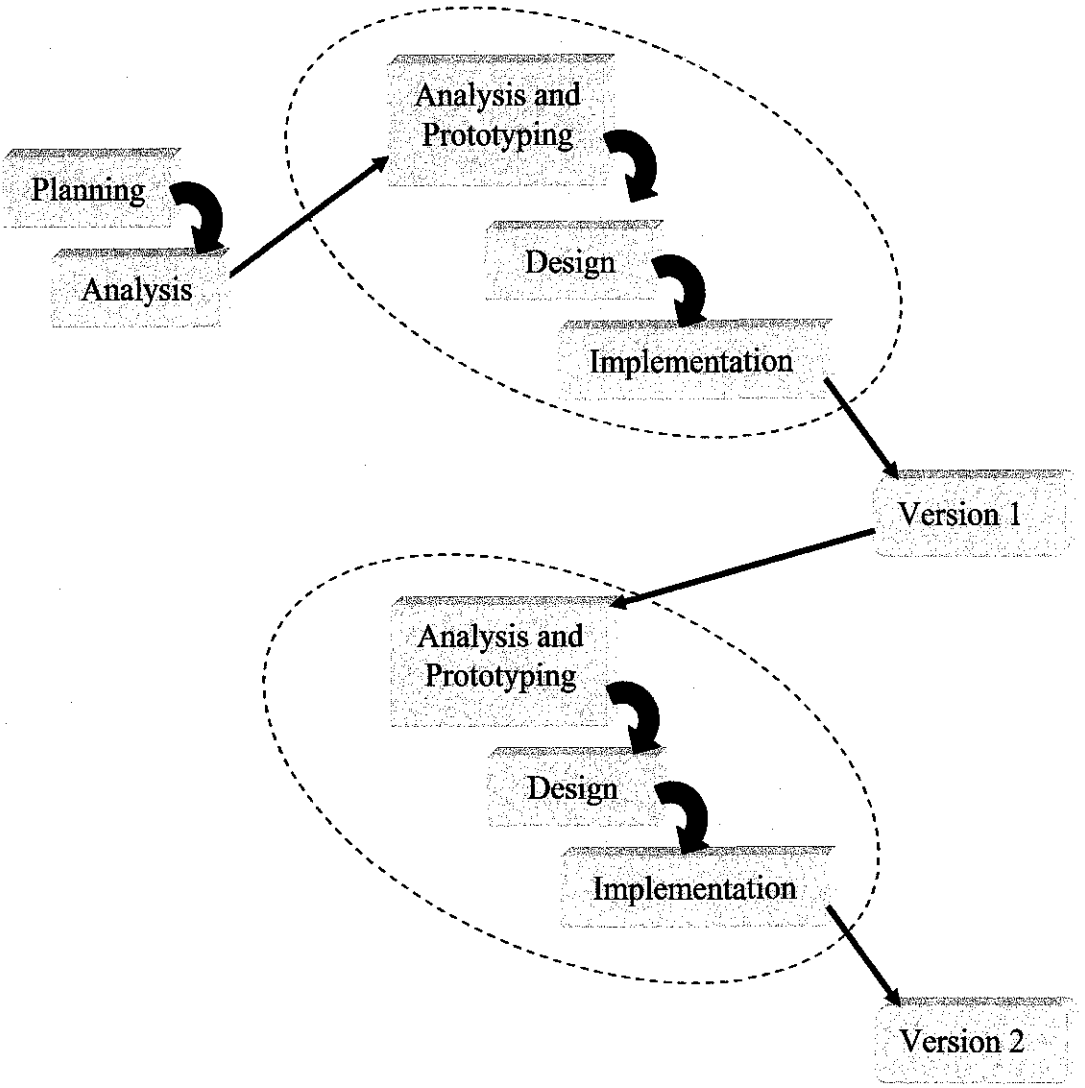


Figure 5 Phased Development
Taken from System Analysis & Design [21]

Referring to the initial phased development, this project will use the modified RAD-based methodology which is shown in Figure 6 based on the needs of this project.

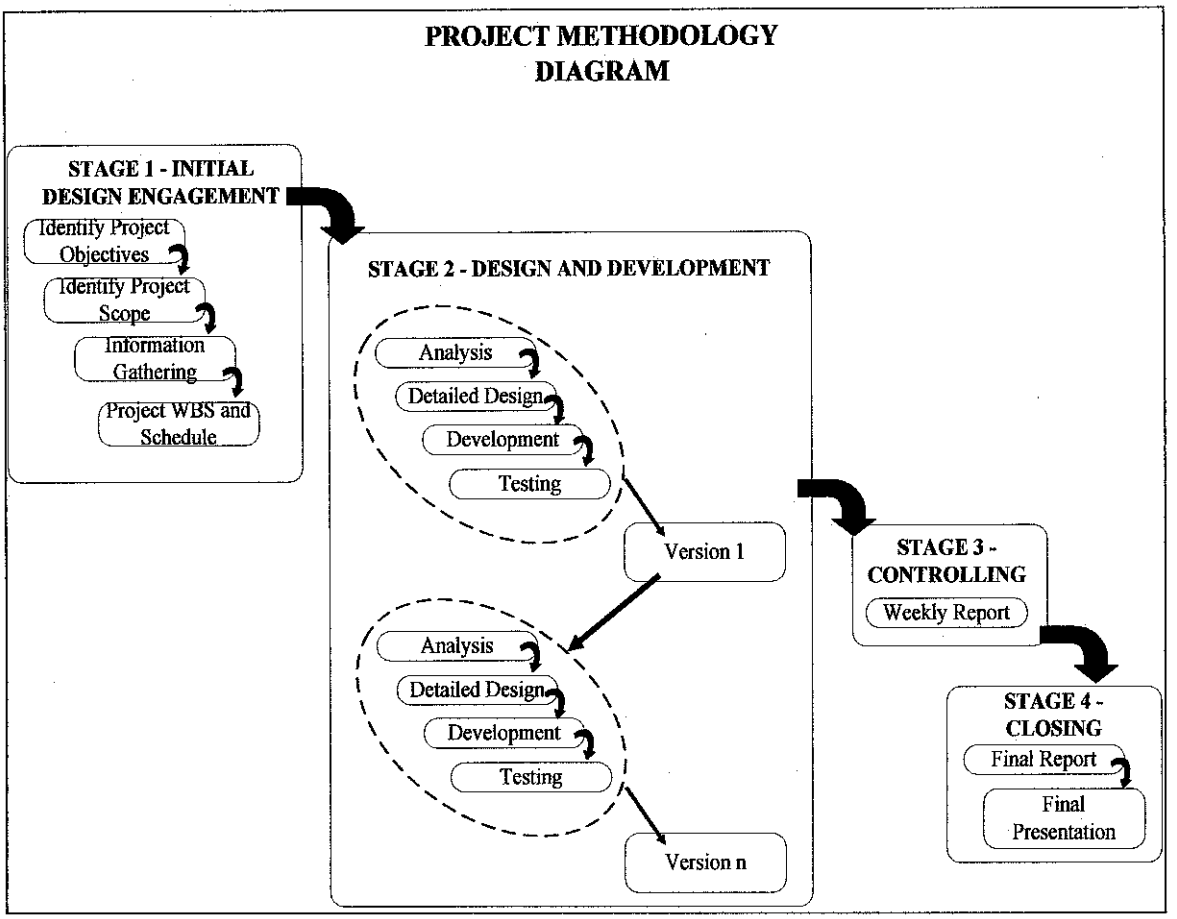


Figure 6 Project Methodology Diagram

Adapted from Phased Development (System Analysis & Design [21])

3.1.1. Stage 1 – Initial Design Engagement

Initial Design Engagement, IDE in the stage 1 is where brainstorming of the project is being done. The steps in this stage are further explained in the next page.

- ***Identify Project Objectives***

It is important to identify objectives of a project, where it is the target for the project in completion stage. A project is evaluated either or not has achieve the targeted objectives. As for this project, its objectives has been identified and discussed earlier in Chapter 1 of this report.

- ***Identify Project Scope***

The following step is identifying scope of project. Project scope is also important as project objectives, where if project scope is not properly defined or vague, developer might face scope creep. In this project the scope creep is where the initial scope will grow over time. Therefore to avoid this, the project scope was identified and justified clearly to avoid problems and risks during and toward the end of project life cycle. This project scope has been defined earlier in Chapter 1 of this report.

- ***Information Gathering***

To understand on how about to complete this project, all necessary data and information were gathered and collected. Method implemented for data collection and information gathering was by reviewing certified journals and articles from Internet and books.

3.1.2. Stage 2 – Design and Development

This is the phase where the product was actually being developed. The approach of RAD that is implemented was the Phased Development. The Phased Development-based methodology breaks the overall project into a series of version that are developed sequentially. The project starts step by step, where the version 1 had the minimal specification. The analysis phase of version 1 leads to detailed design and development followed by testing. Once the version 1 was implemented, work began on version 2. Additional analysis and new ideas was added. This process continues until the project was completed.

3.1.3. Stage 3 – Controlling

The output of this stage is the weekly report/logbook to be submitted to associate supervisor in monitoring progress of this project.

3.1.4. Stage 4 – Closing

This is the final stage where a complete product is delivered and presented.

3.2. Tool

3.2.1. Development tool

- Macromedia DreamWeaver
- Program D (Java AIML Interpreters)

3.2.2. Hardware

- Personal Computer

3.2.3. Development Language

- HTML (to create website)
- XML Language and AIML Language (to create agent)
- Java

3.3. Product Interface: Agent-based FAQ (Directly Ask FAQ)

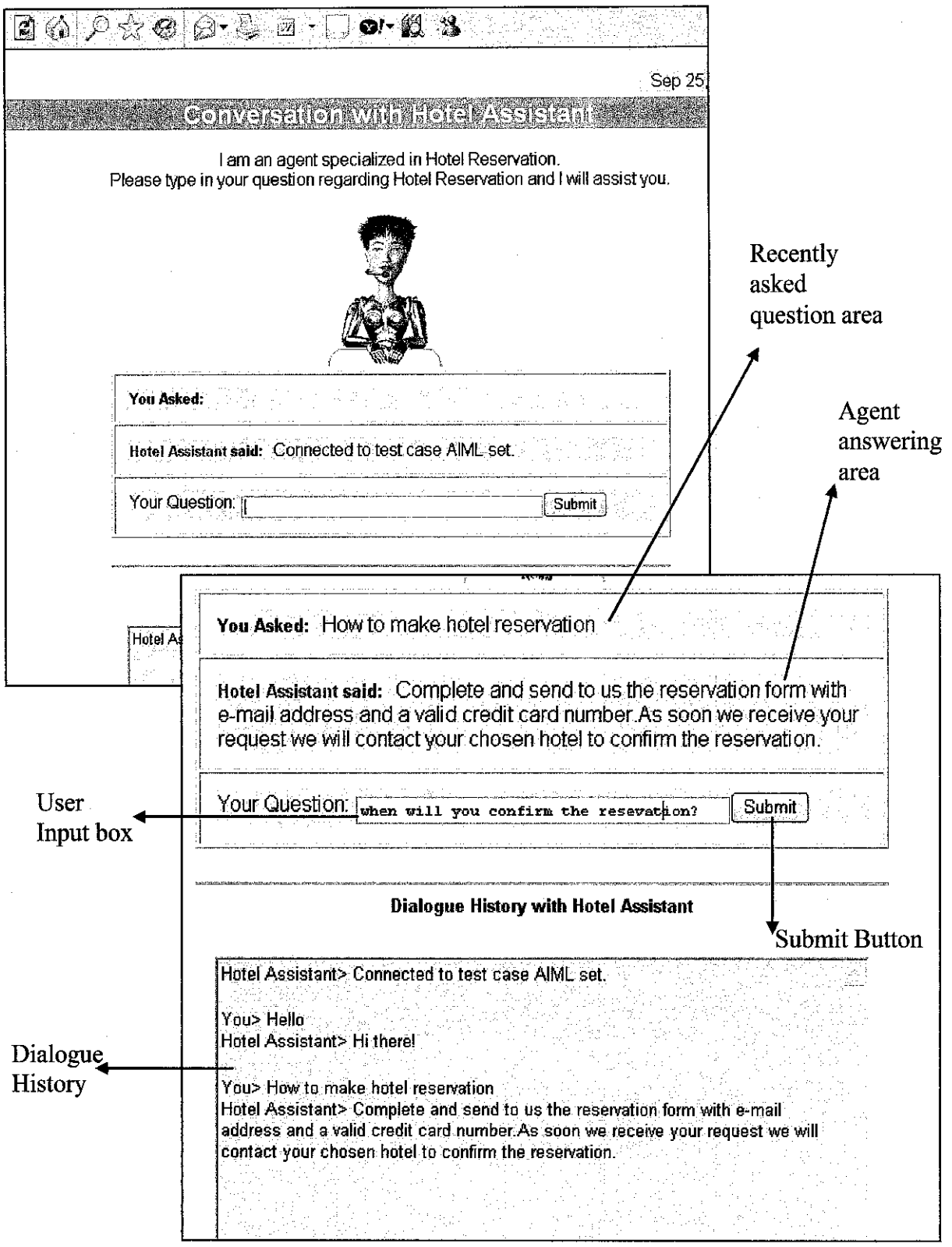


Figure 7 Agent-based FAQ Interface (Directly Ask FAQ)

Interface Description

Element	Description
User Input box	In the input box, user will type in question to be addressed to the agent
Dialogue History	Display all the conversation user has with agent. This scroll-down text area is set to read only.
Recently asked question area	Display the recently asked question by user.
Agent answering area	Display answers for recently asked question.
Submit Button	User click on the button to submit question to agent. This question is displayed at Recently asked question area and its answer is displayed at Agent answering area.

Table 6 Interface Description

Relevancy of Interface Design

- **Bigger is better**

  To read text on computer screens is hard, therefore choose appropriate font size. Bigger font size gives better experience in reading. According to Roger Black [33], "If you really want someone to notice your page, make it easy to read."

- **Color your world sparingly**

  White is the best background with black holds the highest contrast to white, so it is the choice for font type set on a white background. The most importance is to make sure the font type contrasts well with the background, avoid the temptation to play with exotic color schemes [33], and keep backgrounds simple and muted [35].

- **Faster beats fancier**

  Interface uses Ajax capabilities requiring no page refresh between input sent to the agent, and answers retrieval. Provide faster page uploading to gives more pleasing user experience and avoid one of the possibilities for website users to leave the site and never come back[33].

- **Content is king.**

  According to Roger Black [33], "In magazines or in Web sites, people skim and surf. If you don't give them something quickly, they absorb nothing". With an answer-focused FAQ, website user will find their answers easily [33].

- **Small bytes go down easier**

  The Agent-based FAQ page requires minimal scrolling down. A short page makes a webpage more appealing [33] [36].

- **Reduce short-term memory load**

  According Shneiderman's 8 Golden Rules [34] that the user need not to be burdened to memorize, therefore memory load is reduced by having Dialogue History where user may refer to the question previously asked.

- **Group information logically** (interaction and history)

  The user-agent interaction and the dialogue history are separated with a horizontal line and white space [35].

- **Density**

  The best computer interfaces will not distract the learner with an overwhelming array of images, icons, text objects, or features. "Less is more" according to a web design site [36].

3.4. Knowledge Specialized Agent

As mentioned earlier, this agent is specialized in one area of knowledge. In comparing the Agent-based FAQ and traditional-based FAQ, this project focused on Hotel Reservation FAQ. The product of this project is agent that concentrates in frequently asked question regarding hotel reservation. Therefore here is the list of knowledge that the developed agent has;

- Knowledge on Hotel Reservation
    1. Making an Hotel Reservation
    2. Miscellaneous
    3. Price & Payment
    4. Confirm Reservation
    5. Other Than Online Reservation
- Knowledge on Salutation or Greetings (include in appendix is the sample code of knowledge on salutation)

Further explanations regarding the agent's knowledge can be referred in Chapter 5 under section Agent Knowledge Warehouse/Repository and Agent Learning Directive in Program D.

CHAPTER 4

RESULTS AND DISCUSSION

Include in this chapter are; System Architecture, Comparison between Agent-based FAQ with Traditional FAQ, Survey result, and Testing and Result conducted on FAQ Approach.

4.1. System Architecture

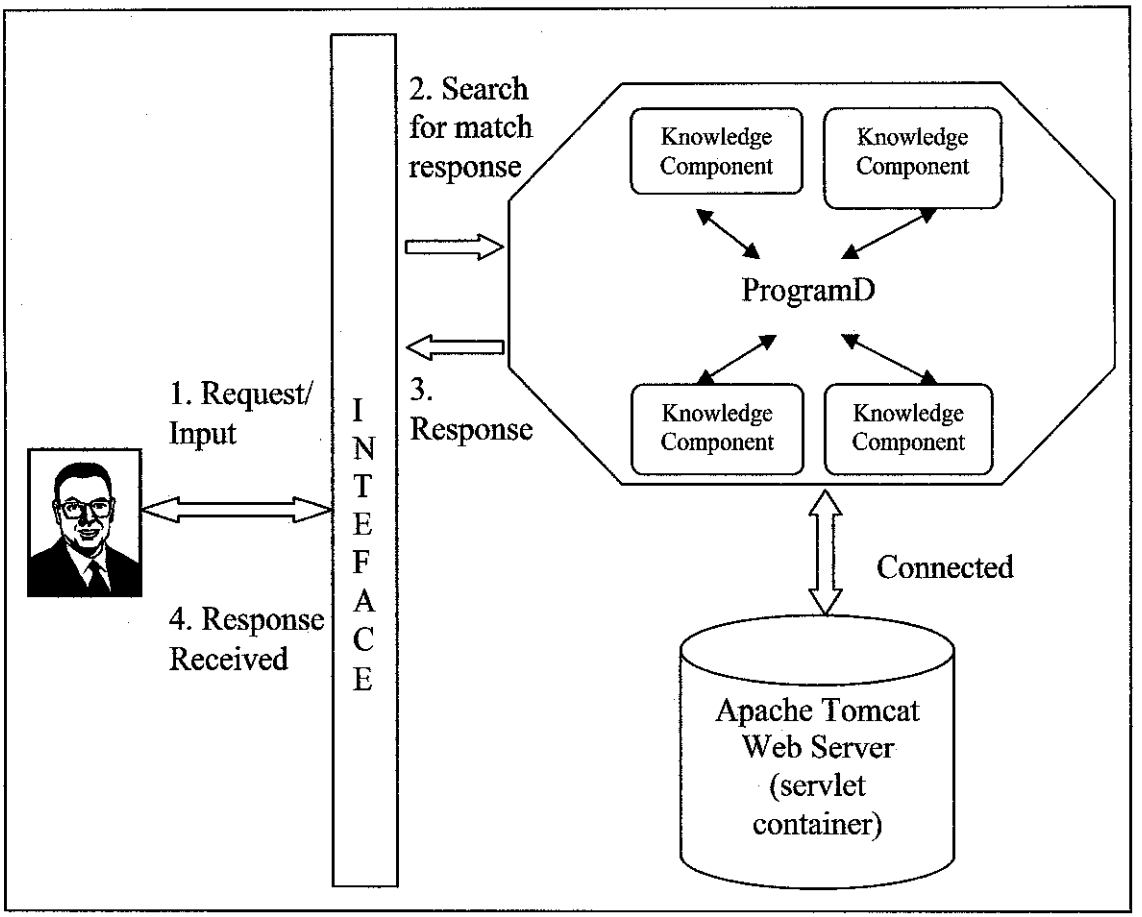


Figure 8 System Architecture

Program D is a Java AIML interpreter and since this project is a web-based application then Program D requires a web application server to runs. For this project Apache Tomcat 5.5 is used. Apache Tomcat serves as java servlet container that is used in the official Reference Implementation for the Java Servlet and JavaServer Pages technologies. Apache Tomcat also acts as a deployer for Program D where developer will interact through Tomcat Web Application Manager.

Knowledge component in Figure 8 refers to the AIML file that was created and organized in Program D. Program D that contains all AIML files acts as an AIML interpreter and will processed all the loaded AIML files in its directory. In other words, the knowledge components are where the agent knowledge resides. Further explanation of the AIML files or the knowledge components is included in the next Chapter 5 Technical and Configuration, in section Agent Knowledge Warehouse/Repository and Agent Learning Directive in Program D.

Below details is to briefly explain on how the agent will work based on the Figure 8 – System Architecture.

1. Client with specific task and goals will send request/input in question form to the agent through a user interface. The request/input is needed in completing the client's task or to achieve goals.

2. Through the interface, Program D as the AIML interpreter will search for the matched response to the request/input.

After the matched response is found, then it response back to the client's question.

4.2. Comparison between Agent-based FAQ with Traditional FAQ

Comparison of the Three Types of FAQ Approaches

Element/Issue	Linkage FAQ	Top-down FAQ	Directly Ask FAQ
Page Length	Depending on how many FAQs are listed. The longer the list, the lengthy the page will be.	Depending on how many FAQs and its subsequent answers are listed. The longer the list, the lengthy the page will be.	Only answer to the requested question is displayed.
Time Consuming	Depending on the listed FAQs. The longer the FAQs list, more time is needed to go through the listed FAQs.	Depending on the listed FAQs and its subsequent answers. The longer the FAQs list, more time is needed to go through the listed FAQs and its subsequent answers.	Answer to question is directly displayed upon asking. No time needed to go through a long list FAQ.
Answer-focus (easy to find answers)	Usually the adjacent answers in the FAQs list are displayed too depending on the length of the requested answer.	All answers are displayed from top to bottom.	Only answer to the requested question is displayed. Therefore focus is only to the displayed answers.
Pleasant looking page	Depending on how many FAQs are listed. If there are many FAQs, the page will be lengthy and stuffed with text.	Depending on how many FAQs and its subsequent answers are listed. If there are many FAQs, the page will be lengthy and stuffed with text from top to bottom.	Page is not stuffed with text as only the answer for the requested question is displayed.

Table 7 Comparison of the Three Types of FAQ Approaches

4.3. Survey Result

This survey is conducted to evaluate user acceptance of the three types of FAQ approach; Linkage FAQ, Top-down FAQ and Directly Ask FAQ. This survey has been carried out online and successfully collected 29 participants. Include in the appendices is the survey question. The results are as follow;

- **Do you oftenly use FAQ to ask question?**

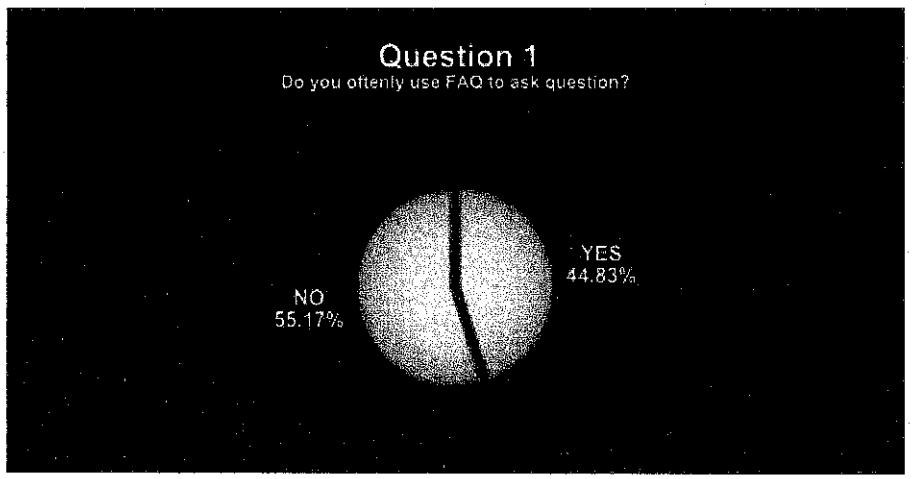


Figure 9 Pie Chart
Result from Survey Conducted - Question 1

This shows that 44.83% or equivalent to 13 participants uses FAQ to ask question. The percentage is almost up to half of the total number of participant, which means that FAQ is also an important element in a website.

- **How do you like the FAQ approach? Please rate accordingly.**

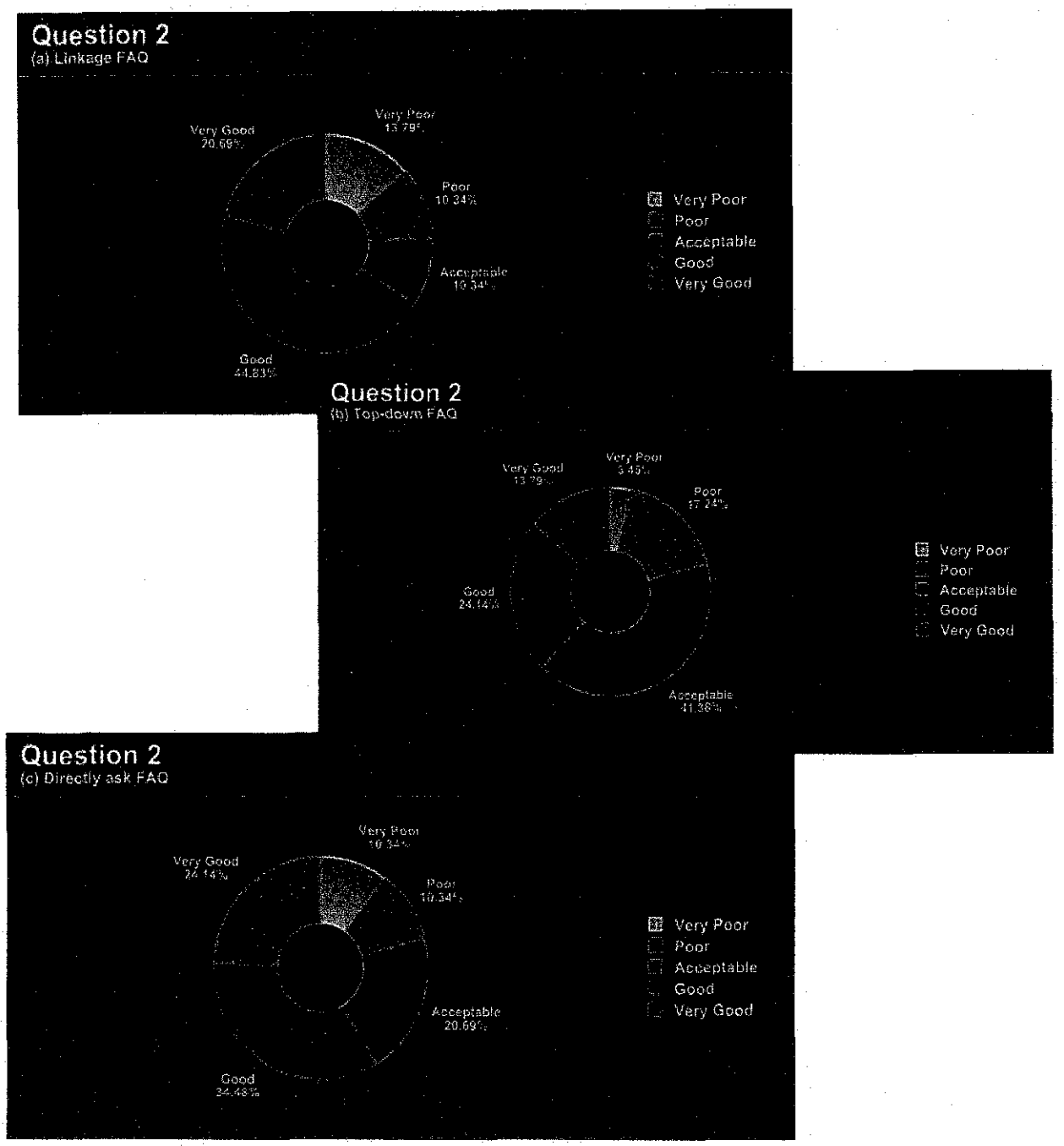


Figure 10 Pie Chart
Result from Survey Conducted - Question 2

Directly Ask and Linkage approach gained high percentage as very good with 24.14% (7 participants) and 20.69% (6 participants) accordingly. While 13 (44.83%) and 10 (34.48%) participants rated Linkage and Directly Ask approach as good, accordingly.

However, the average score for Directly Ask FAQ rated as the highest with 70.40% compared to Linkage FAQ and Top-down FAQ with 69.60% and 65.60%, accordingly.

- **Which type of FAQ approach is the easiest? Please rate accordingly.**

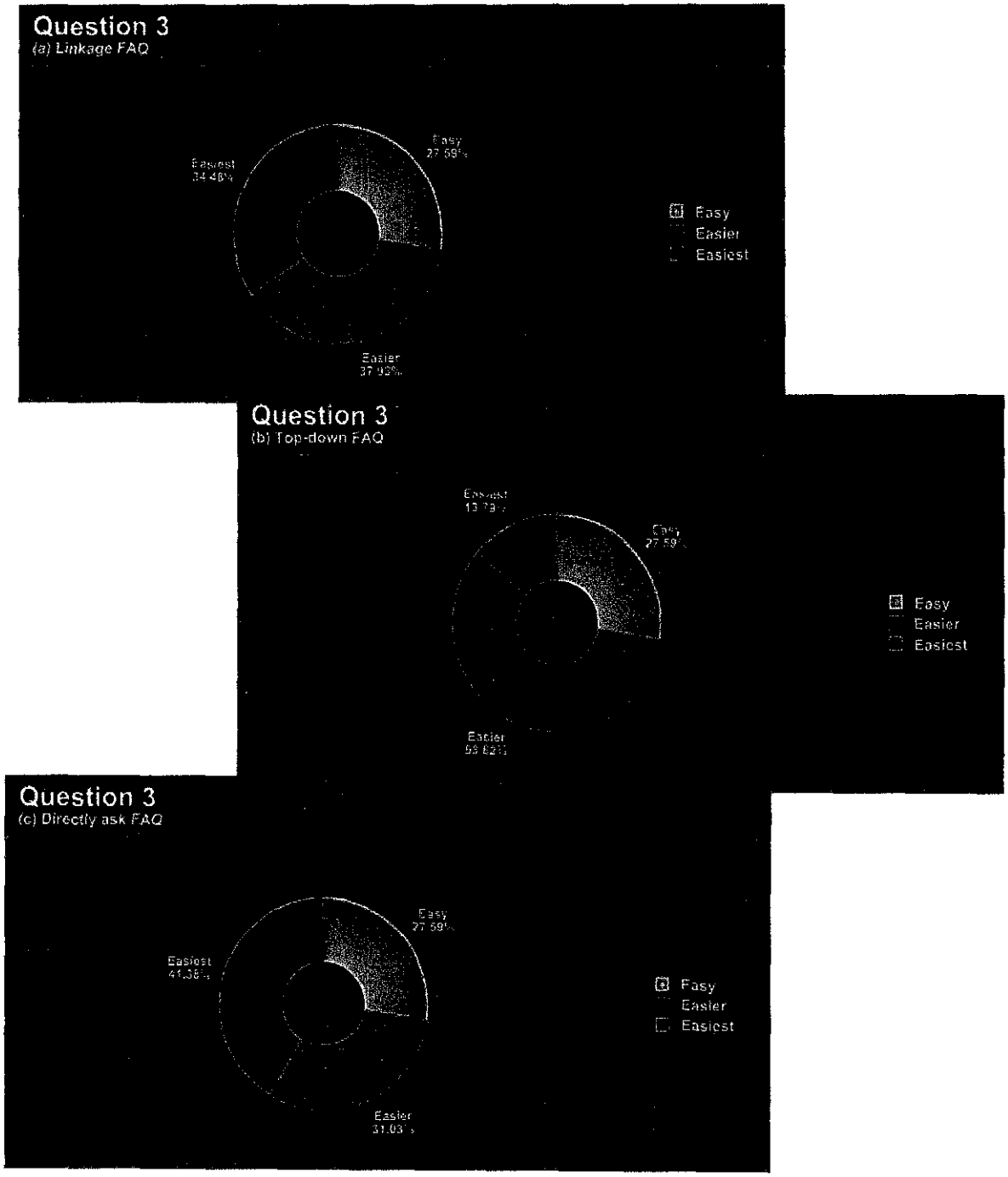


Figure 11 Pie Chart
Result from Survey Conducted - Question 3

Directly Ask FAQ is rated as the easiest approach for FAQ with the highest percentage of 42.38% (12 participants) followed by Linkage FAQ with 34.48% (10 participants) and Top-down FAQ with 13.79% (4 participants).

- **Which FAQ approach do you think is the fastest way to get an answer? Please rate in the range of 1-3.**

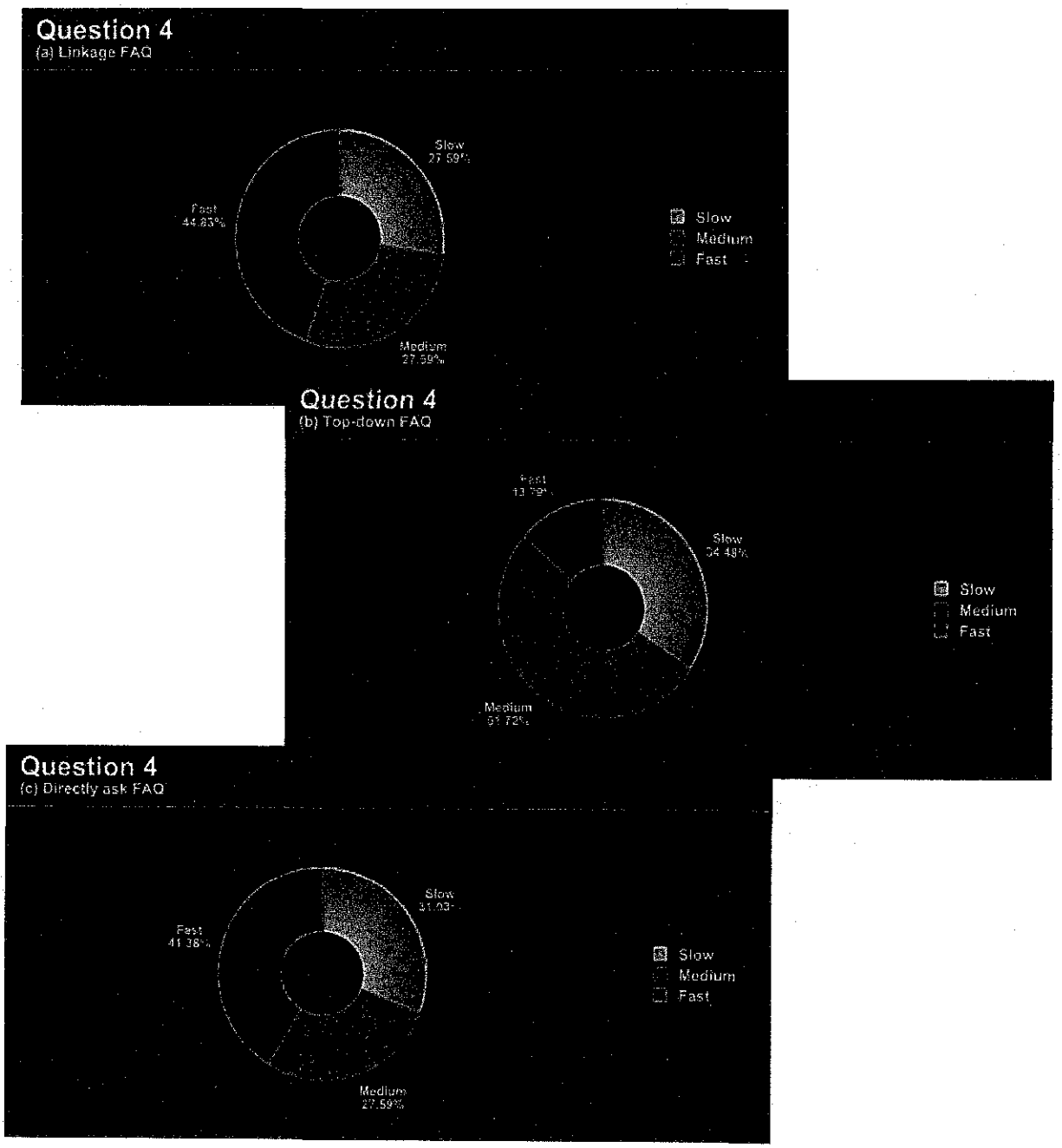


Figure 12 Pie Chart
Result from Survey Conducted - Question 4

Linkage FAQ with 44.83% is higher by one participant compared to Directly Ask FAQ with 41.83% (12 participants).

- **What do you think the appearance of each FAQ approach? Rate in the range of 1-3.**

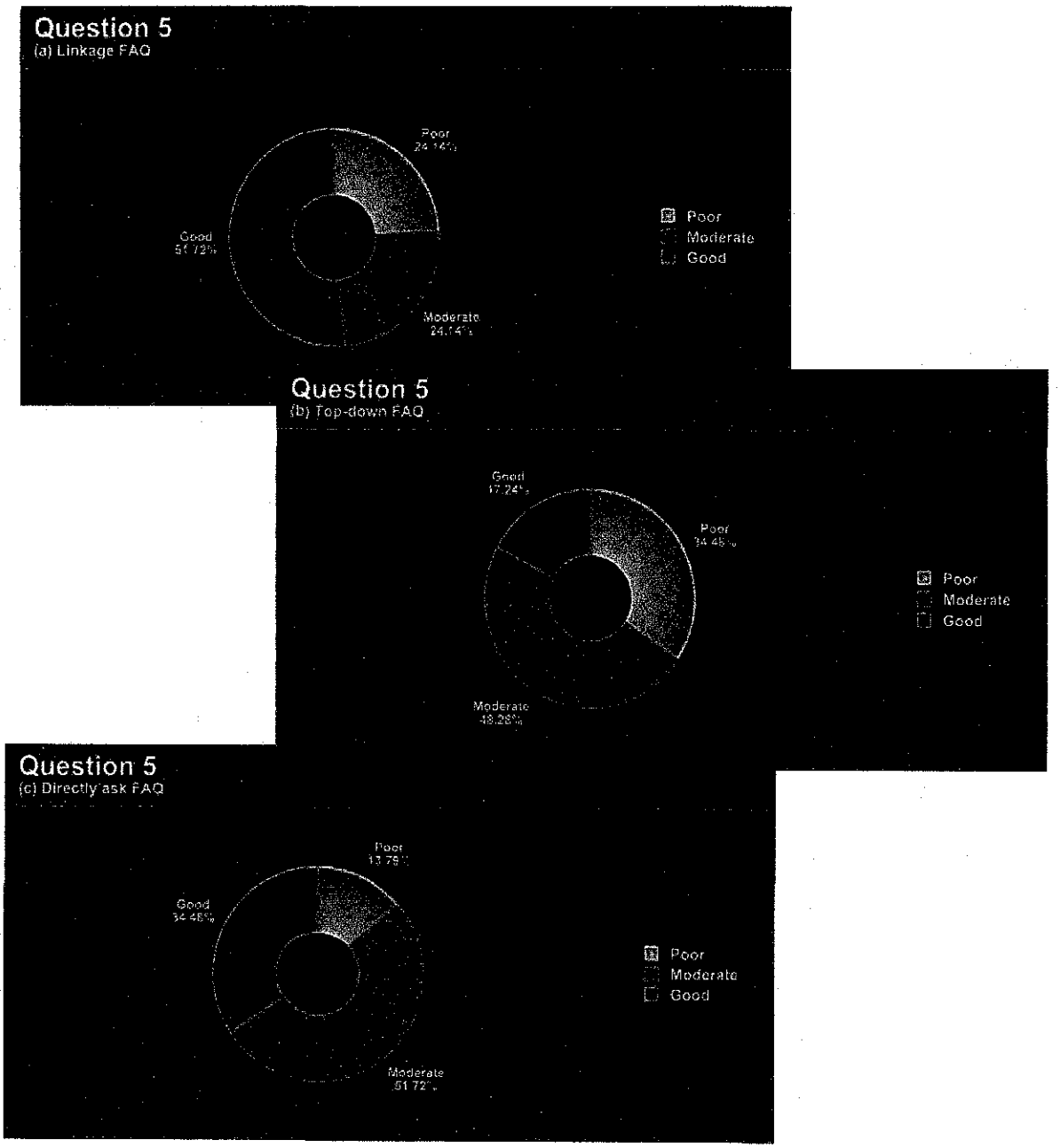


Figure 13 Pie Chart
Result from Survey Conducted - Question 5

Although Directly Ask approach is rated as the second good approach with 34.48% compared to Linkage FAQ with 51.72%, it has the lowest poor rating compared to other approaches with 13.79%, and with the highest moderate rating with 51.72%.

- **Which FAQ approach is most effective?**

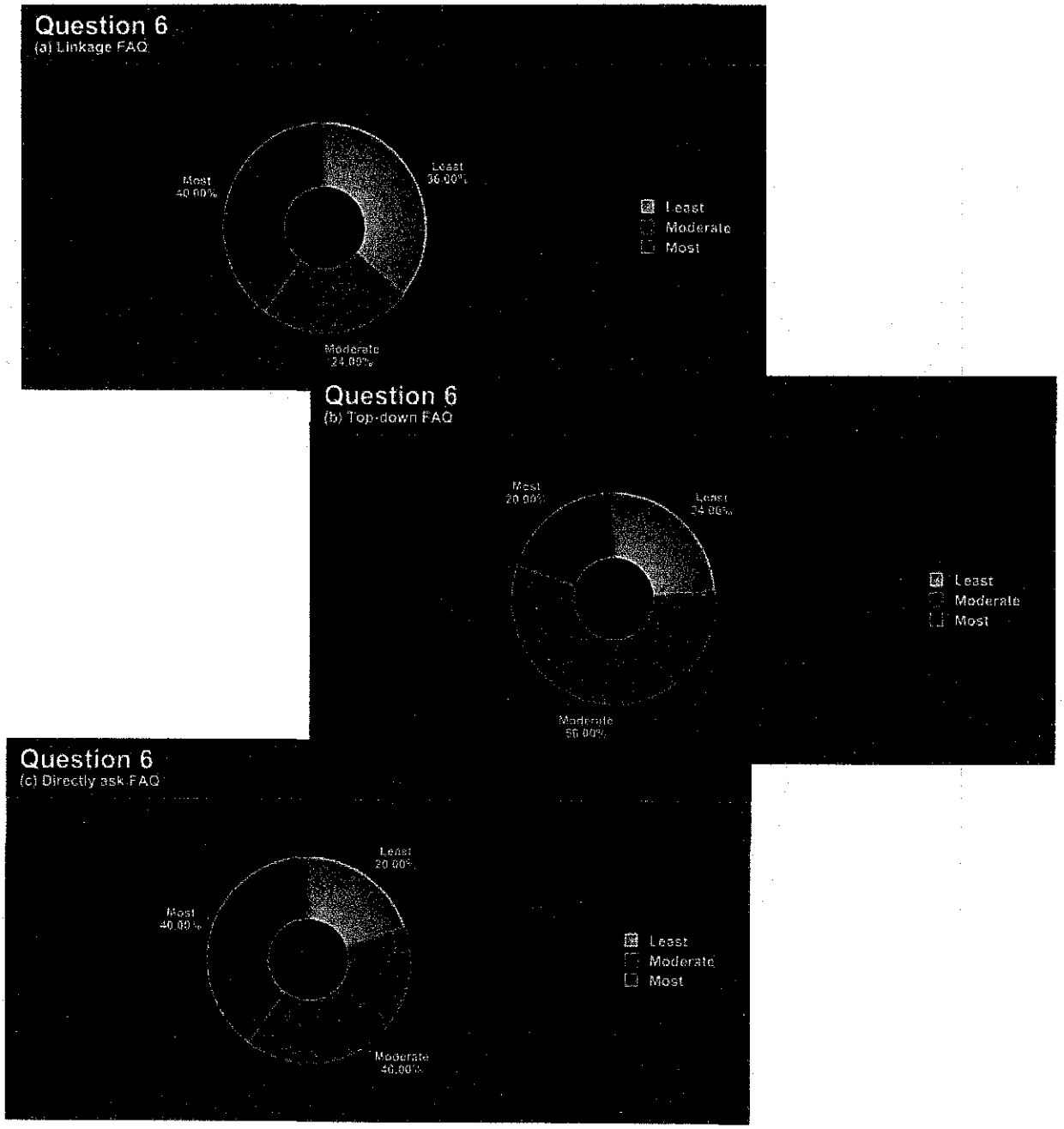


Figure 14 Pie Chart
Result from Survey Conducted - Question 6

Both Directly Ask FAQ and Linkage FAQ are rated as the most effective approach with equal percentage of 40.00%. Directly Ask FAQ has the lowest least with only 20.00% followed by Top-down FAQ with 24.00% and Linkage FAQ with 36.00%.

- **How do you like the answer (text) will be? Please rate accordingly.**

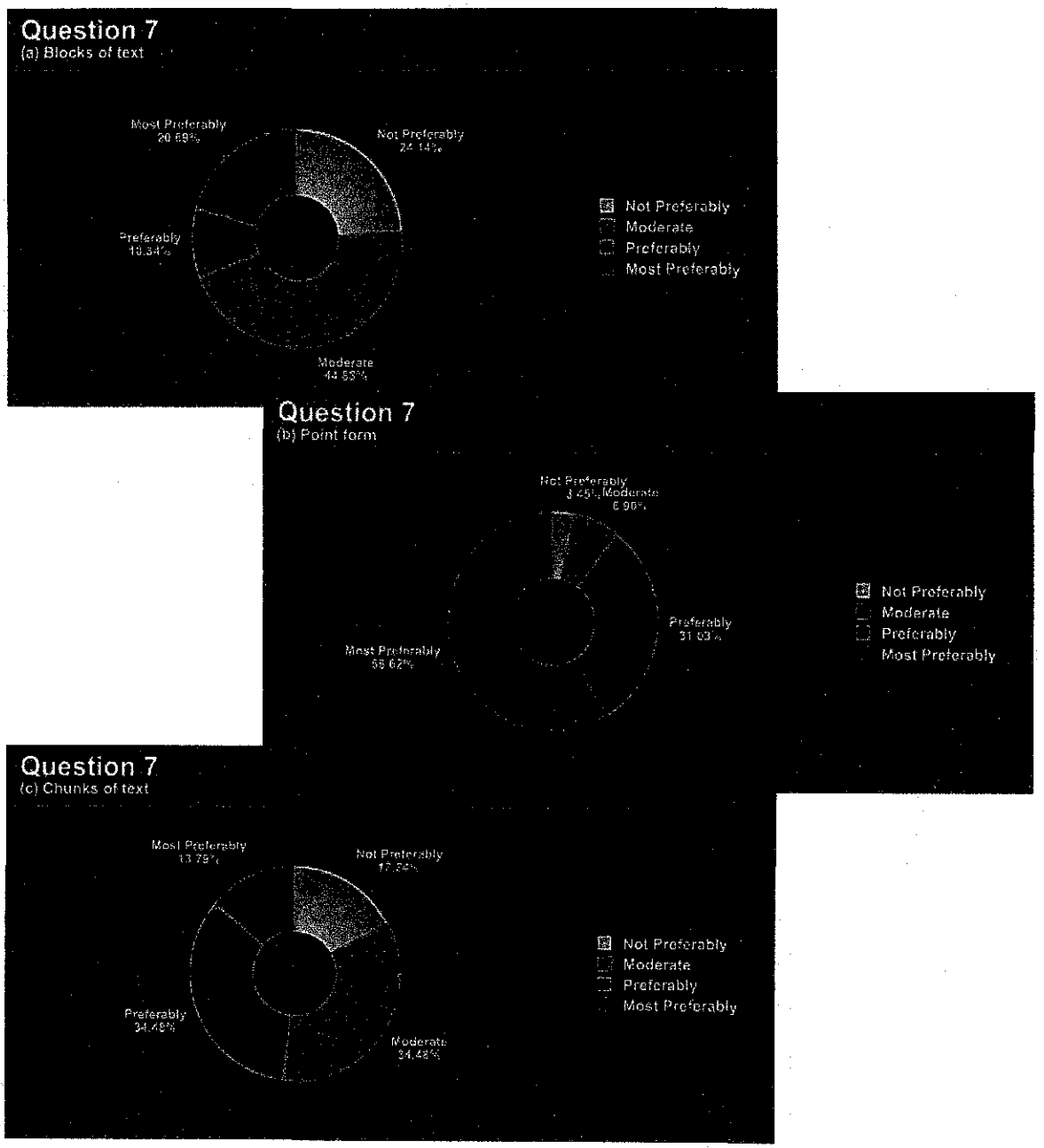


Figure 15 Pie Chart
Result from Survey Conducted - Question 7

58.62% or 17 participants most preferred answers to be in point form followed by blocks of text with 20.69% and chunks of text with 13.79%. However 34.48% (10 participants) preferred answer to be in chunks of text followed by point form with 31.03% and blocks of text with 10.34%.

- **Do you think Directly Ask FAQ is convenient?**

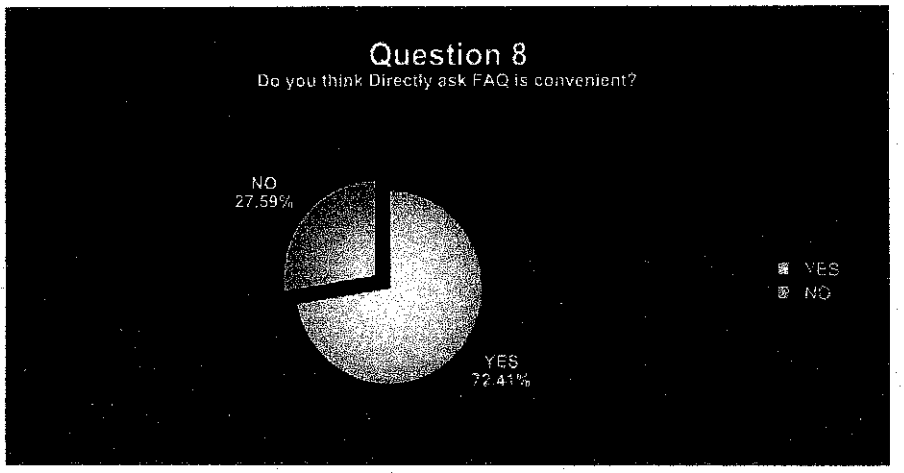


Figure 16 Pie Chart
Result from Survey Conducted - Question 8

72.4% (21 participants) conclude that Directly Ask FAQ is convenient to satisfy their need, compare to only 27.59% (8 participants) who concluded that it is inconvenient.

Directly Ask FAQ has the highest average score in three elements which are;

- How do you like the FAQ approach?
- Which type of FAQ approach is the easiest?
- Which FAQ approach is most effective?

and second higher for the elements of

- Which FAQ approach do you think is the fastest way to get an answer?
- What do you think the appearance of each FAQ approach?

In conclusion, the feedback received from this survey shows that the internet users favor the Directly Ask FAQ approach and it is convincing to be implemented.

4.4. Testing and Result

This subsection explained the type of test conducted followed by the test result. I conducted two type of testing which are black box testing and acceptance test.

4.4.1. Black box testing

Black box testing was done by me to check how well the prototype meets the project objectives. Purpose of this testing was to find missing and incorrect function. What I did was exercising the prototype with the input for which the expected output was known. This testing was conducted consistently throughout the product development.

4.4.2. Acceptance Test

Another testing was acceptance test. Purpose of this test was to have the completed Agent-based FAQ prototype to be tested by end users. The prototype was validated with the user expectation and to determine whether it is ready to deploy. Method used was observation, note taking, and acceptance test survey. The three methods used was to identify level of difficulties, confusions, dissatisfactions, etc. that users experience while interacting with Agent-based FAQ prototype. The sample of acceptance test survey is included in the appendices for reference.

4.4.3. Test Result

This result is mainly regarding the acceptance test conducted upon the Agent-based FAQ.

Criteria Based on Agent-based FAQ

Table below shows the results of the test pertaining to the criteria of the prototype.

User/Tester	Criteria					
	Easy to use	Communicative	Easier to get specific answer	Attract in using FAQ more often	Improve customer service	Number of irrelevant answer/number of question asked
User 1	Y	Y	N	Y	Y	14/21
User 2	Y	Y	Y	Y	Y	11/12
User 3	Y	Y	Y	Y	Y	9/13
User 4	Y	Y	N	Y	Y	9/20
User 5	Y	Y	Y	Y	Y	5/15
User 6	Y	Y	Y	N	Y	6/11
User 7	Y	Y	Y	Y	Y	14/17

Table 8 Criteria Based on Agent-based FAQ

Legend: Yes: Y, No: N

In conclusion, based on table 8 shows that the Agent-based FAQ approach is,

- Easy to use
- Communicative and interesting
- Easier in getting specific answers
- Attract people to use FAQ more frequent
- Improve Customer service on website

Comments and recommendation for Agent-based FAQ

Table below illustrates the comments and recommendation by the users after experiencing the prototype.

User/Tester	Future Recommendation		Comments
	Incorporate with voice	Agent make reservation on behalf of user	
User 1	Preferred	Most Preferred	
User 2	Not Preferred	Preferred	• This approach should be implemented on lengthy FAQ.
User 3	Moderate	Moderate	
User 4	Not Preferred	Most Preferred	• Interesting and easy to use. • Interface should be more interesting
User 5	Not Preferred	Moderate	• Make it have more knowledgble and understand users' question
User 6	Most Preferred	Preferred	• Enhance as is function with direct answer • Make it more interactive
User 7	Preferred	Most Preferred	• Make it able to answer more questions

Table 9 Comments and recommendation for Agent-based FAQ

In conclusion, based on the users' comments this Agent-based FAQ,

- Should be implemented on lengthy FAQ
- Enhance traditional FAQ with direct answer
- Should be To be more knowledgeable
- Should have more attractive interface

Future recommendation for Agent-based FAQ

From the survey it is concluded that;

- Mostly does not prefer to have Agent-based FAQ that incorporate with voice
- A positive feedback to have the agent to make reservation on behalf of the user

Reason of not or seldom using the FAQ

Include in this survey is to identify the reason why website users seldom or not using the FAQ function.

Reason / User	User 1	User 2	User 3	User 4	User 6	Total Weight
Time consuming	1	5	2	1	3	12
Useless	6	6	6	5	5	28
Nothing to ask	4	2	1	6	4	17
Hard to get answers	2	4	3	3	1	13
I usually e-mail/ contact the person in charge	3	3	4	2	6	18
Leave and switch to other website that provide better information	5	1	5	4	2	17

Table 10 Reason of not or seldom using the FAQ

(Reasons are rated from the range of 1 (most likely) until 6 (least likely))

Therefore from the total weight calculated the most likely reasons to the least likely reasons are as follow (below reason are organize from the most to the least likely);

- Time consuming
- Hard to get answers
- Nothing to ask and leave and switch to other website that provide better information
- I usually e-mail/ contact the person in charge
- Useless

Include in this survey also is to see the importance of FAQ for the website users, which are;

- To get help or information
- To clarify ambiguous or understanding
- To help novice user
- To get information without needing to read all from a page

Benefits of Agent-based FAQ

Based on the overall results of the acceptance test, it can be concluded that the Agent-based FAQ gives positive result with the advantage of;

Layout

- No lengthy page
- Less scrolling on the window page
- Less text on page

Functionality

- Less time consuming
- Focus and Direct answer
- Eliminate unnecessary information
- Easy in to get answer

Other(s)

- To avoid losing potential customer

CHAPTER 5
TECHNICAL INFORMATION AND CONFIGURATION

Include in this chapter are solely on technical and configuration of the development tools and language used.

5.1. Technical and Configuration

In the first part of this section is an introduction of AIML concepts and syntax that was used to code for the agent's knowledge or the knowledge components. This is followed by steps to download, install, configure, and run program D. The subsequent section will be on downloading AIML sets, agent knowledge warehouse/repository, agent learning directives and loading and adding AIML file in Program D.

5.1.1. Introduction to AIML Language

The items between < and > are called AIML tags or elements. Each AIML tag has an opening tag and a closing tag of the form:

```
<SOMETAG>      //information      </SOMETAG>
```

So, for example

```
<aiml version="1.0">     //information     </aiml>
```

AIML Syntax

Below is the basic and simple AIML syntax and structure.

```
<?xml version="1.0" encoding="UTF-8"?>
<aiml version="1.0">

  <category>
    <pattern>    //Human queries          </pattern>
    <template>   //Robot's response       </template>
  </category>

  <category>
    <pattern>    //Human queries          </pattern>
    <template>   //Robot's response       </template>
  </category>
    ...
    ...

</aiml>
```

Figure 17 Basic AIML syntax

Below is the example of conversation between human and robot, where the following diagram is the conversation converted respectively to AIML.

Human: Hello, my name is Doubly Aimless

Robot: Hello Mr. Aimless or is it Dr. Aimless?

Human: I am a profound doubter of Alice

Robot: Why do you doubt Alice?

Human: Because, for me, AIML technology can do little beyond being a platform to display witticisms

Robot: Ok.

Figure 18 Example of human-robot conversation

```
<?xml version="1.0" encoding="UTF-8"?>
<aiml version="1.0">
    <category>
          <pattern>
                Hello, my name is Doubly Aimless
          </pattern>
          <template>
                Hello Mr. Aimless or is it Dr. Aimless?
          </template>
    </category>
    <category>
          <pattern>
                I am a profound doubter of Alice
          </pattern>
          <template>
                Why do you doubt Alice?
          </template>
    </category>
    <category>
          <pattern>
                Because, for me, AIML technology can do
                little beyond being a platform to
                display witticisms
          </pattern>
          <template> Ok. </template>
    </category>
</aiml>
```

Figure 19 Converted human-robot conversations to AIML

Main Unit in AIML Syntax and its Description

Syntax	< category > ... < / category >
Description	A specific question (pattern) can be visualized as a kind of path (consisting of a link represents by the words and nodes represented by spaces between the words) beginning at the center of the Knowledge Web and built up by a series of links and nodes, and that finally terminates in a Response Template. The specific path through the Knowledge Web along with the (Response) Template is called a Category.
Example	<category> <pattern> Hello, my name is Doubly Aimless </pattern> <template> Hello Mr. Aimless or is it Dr. Aimless? </template> </category>

Syntax	< pattern > ... < / pattern >
Description	Specifically to code for human input or request.
Example	<pattern> Hello, my name is Doubly Aimless </pattern>

Syntax	< template >... < / template >
Description	Specifically to code for computer response.
Example	<template> Hello Mr. Aimless or is it Dr. Aimless? </template>

Syntax	< random > ... < / random >
Description	Its purpose is random selection of one of a set of list items.
Example	<random> - A - B - C </random>

Syntax	< li > ... < / li >
Description	List of items.
Example	- A - B - C

Syntax	< srai > ... < / srai >
Description	The text between the tags should be sent recursively to the pattern matcher and the result interpreted. It allows having the same answer (computer response in template) for different type of user input (pattern) but with similar meaning.
Example	<category> <pattern> Linux</pattern> <template>Linux is a good OS</template> </category> <category> <pattern> What is Linux</pattern> <template><srai>Linux</srai></template> </category> <category> <pattern> What Linux is </pattern> <template><srai>Linux</srai></template> </category> "<srai>Linux</srai>" will find the matcher of "Linux" and replace the template.

Syntax	< / star>
Description	Indicates the input text fragment matching the pattern '*'. Therefore if "*" referring to Linux, then "</star>" will also hold the variable "Linux".
Example	<category> <pattern>*</pattern> <template></star></template> </category>

Syntax	< that > ... < / that >
Description	Using <THAT> the robot is capable of remembering what it said in the previous interaction and makes the conversation more meaningful.
Example	Robot: Do not ask me any more questions please. Client: WHY Robot: Because I would rather talk about you. <category> <pattern>WHY</pattern> <that> DO NOT ASK ME ANY MORE QUESTIONS PLEASE </that> <template> Because I would rather talk about you. </template> </category>

Syntax	<topic>
Description	To group together categories.
Example	<topic name="LOVE"> <category> <pattern>*</pattern> <template> <random> - How much do you love me? - Why don't you ever show me you love me? - Why is it so difficult for you to show affection? - Your coldness chills me to the bone </random> </template> </category> </topic>

5.1.2. Download, Install, Configure, and Run Program D

Preparation

This part will explain step by step from downloading, installing, configuring, and running the Program D and any other required application [22].

1. Download Program D
   - There are many choices in which Program D is selected, based on the user's need. Since this project is to enable web user to talk or interact with the agent through a web page, therefore the Program D "webapp" is downloaded. The distribution is available at http://www.aitools.org/Downloads#Program_D. Download the distribution under Web Application (.war file), either the zip or tar.bz2.

2. Download Web Application Server
   - There are three types of available web application server, which are Tomcat, JBoss, and Jetty. For this project I choose Tomcat or Apache Tomcat.
   - Download the latest version of Apache Tomcat, which is Apache Tomcat 5.X.
   - The version is available at http://tomcat.apache.org/download-55.cgi
   - For this project the Apache Tomcat 5.517 Binary Distribution is downloaded.

3. Download and Install Java Runtime (or SDK)
   - Download and install a Java 2 version 1.5 compatible JVM. Examples are the Sun JRE (Java Runtime Edition) or SDK (Software Development Kit). Preferably the JRE than the SDK (16MB as compared to 44MB). SDK is needed if to rebuild the program, or want to develop own Java programs.
   - The JRE distribution is available at http://java.sun.com/j2se/1.5.0/download.jsp
   - If the JRE is already installed before this, check its version. Preferably to use Update 6 or later releases ("1.5.0_06").
   - To check, go to Start > Run > cmd and type java –version

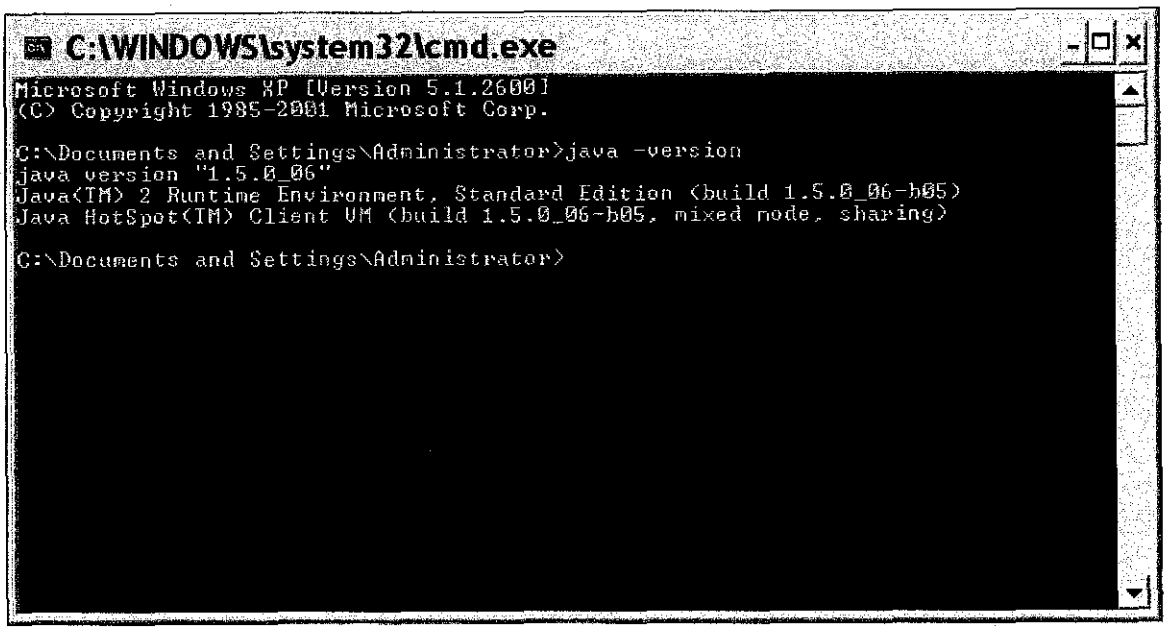


Figure 20 Command Prompt Showing the Installed Java Version

Unzip/Untar Downloaded Program D

Unzip/untar the Program D download in a convenient location. The root directory for Windows can be (C:\, perhaps). The unzipping/untarring process will create a directory called ProgramD that will contain all the program files.

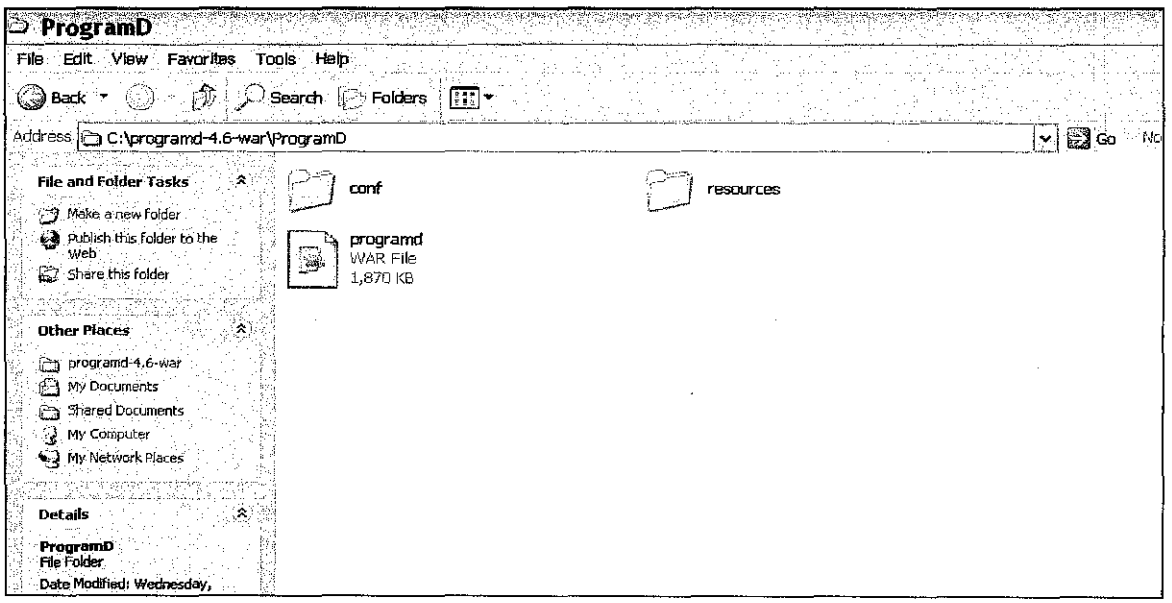


Figure 21 Program Files contained in Program D

Install Binary Distribution of Apache Tomcat 5.5.17

Include in the binary distribution, is the executable Windows installer. Run the .exe. Once the installation of the Apache Tomcat is complete, a folder \var is created.

Configuration and Deployment

Program D can be deployed as a .war file to a J2EE web application server. For the programd-4.6-war.tar.bz2 (or .zip) file, it contains;

- A ready-to-go .war file
- Two other directories, conf and resources, that need to be placed on your application server's file system.

The conf directory contains configuration files needed to run Program D. These could be included directly in the .war file, but for your convenience, they are provided separately so you do not need to recreate the .war file. (The web.xml file included in the .war file expects to find this directory at /var/programd/conf/core.xml. If you are unable to place the directory there, or do not wish to, you must recreate the .war file.) The resources directory is only a subset of the full resources directory from the source download, and contains only the test AIML. You do not, of course, need to use it if you are providing your own AIML. It is referenced by conf/bots.xml. What you need to do is;

- Copy the conf and resources directories to /var/programd, and

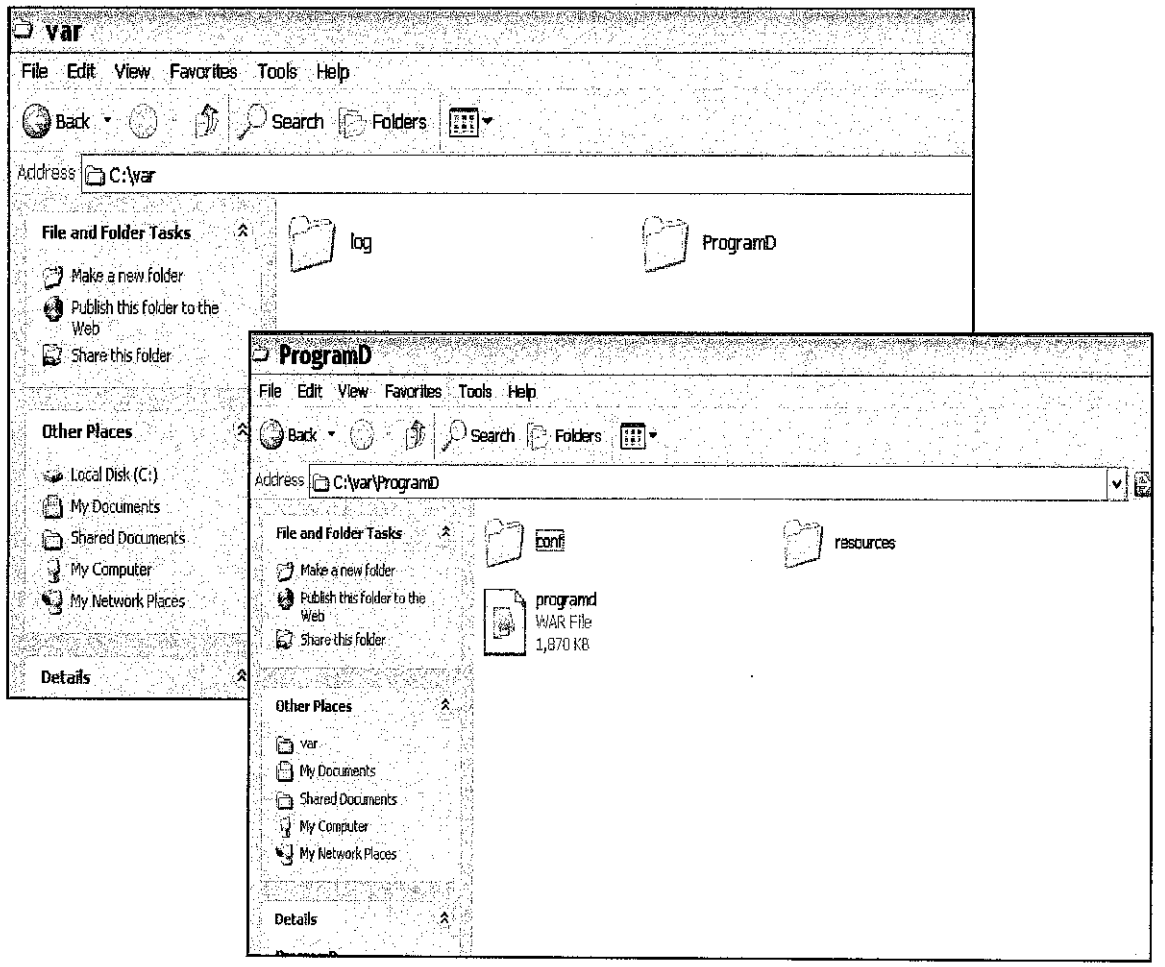


Figure 22 Directories conf and resources are copied to \var\ProgramD\

- Upload the .war file using the Tomcat manager application. To open Tomcat manager application, Start > All Programs > Apache Tomcat 5.5 > Tomcat Manager.

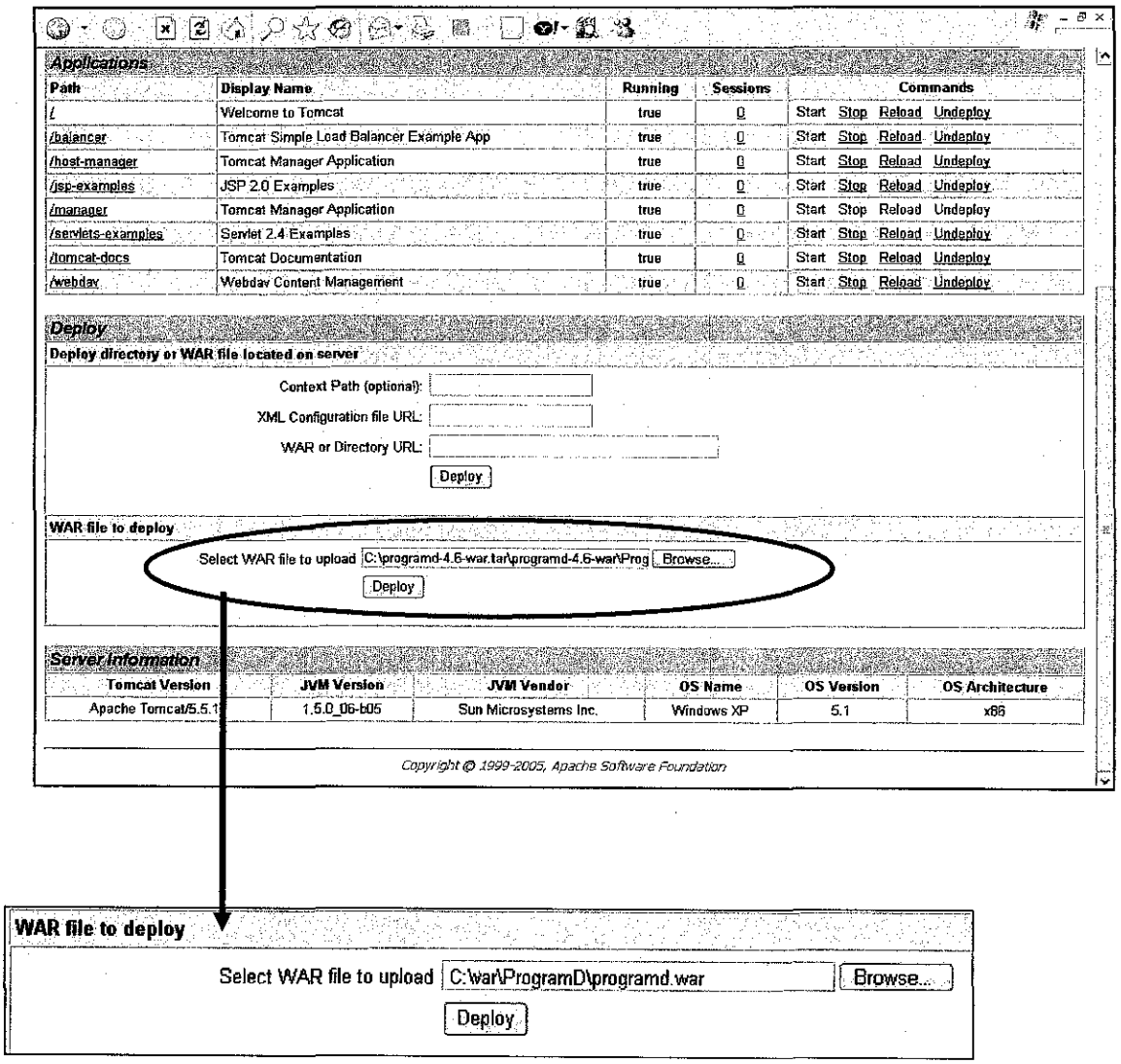
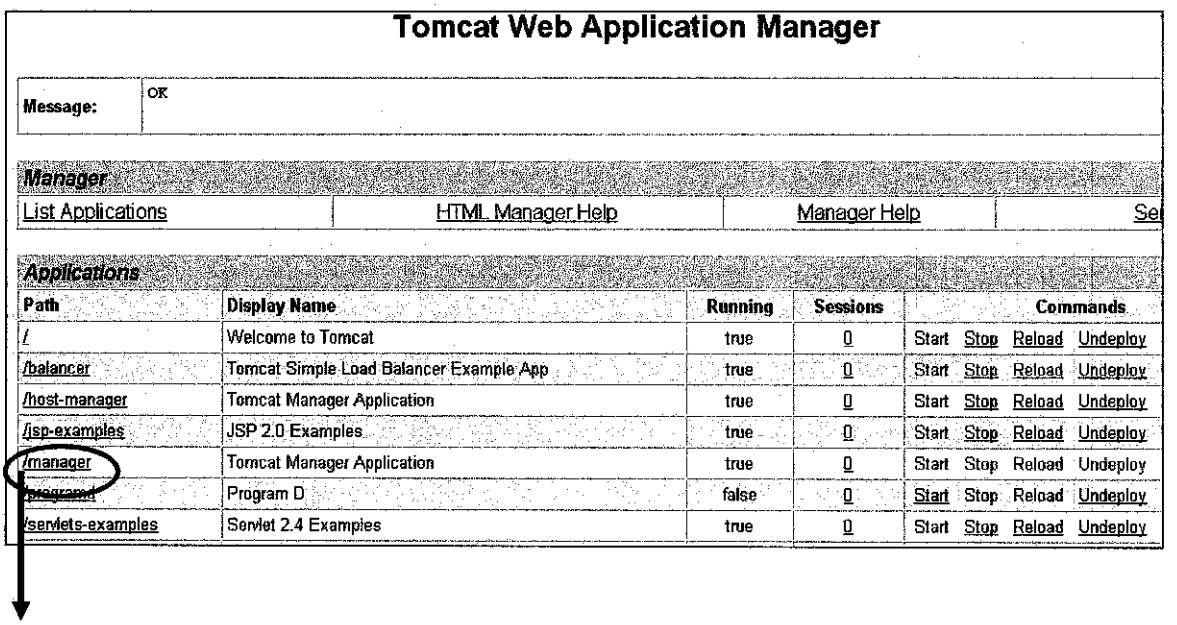


Figure 23 Using Tomcat Manager to upload .war file

Successful Deployment

If deployment is successful, a programd link and a message are displayed as shown below;



Tomcat Web Application Manager

Message:	OK

Manager

List Applications	HTML Manager Help	Manager Help	Se

Applications

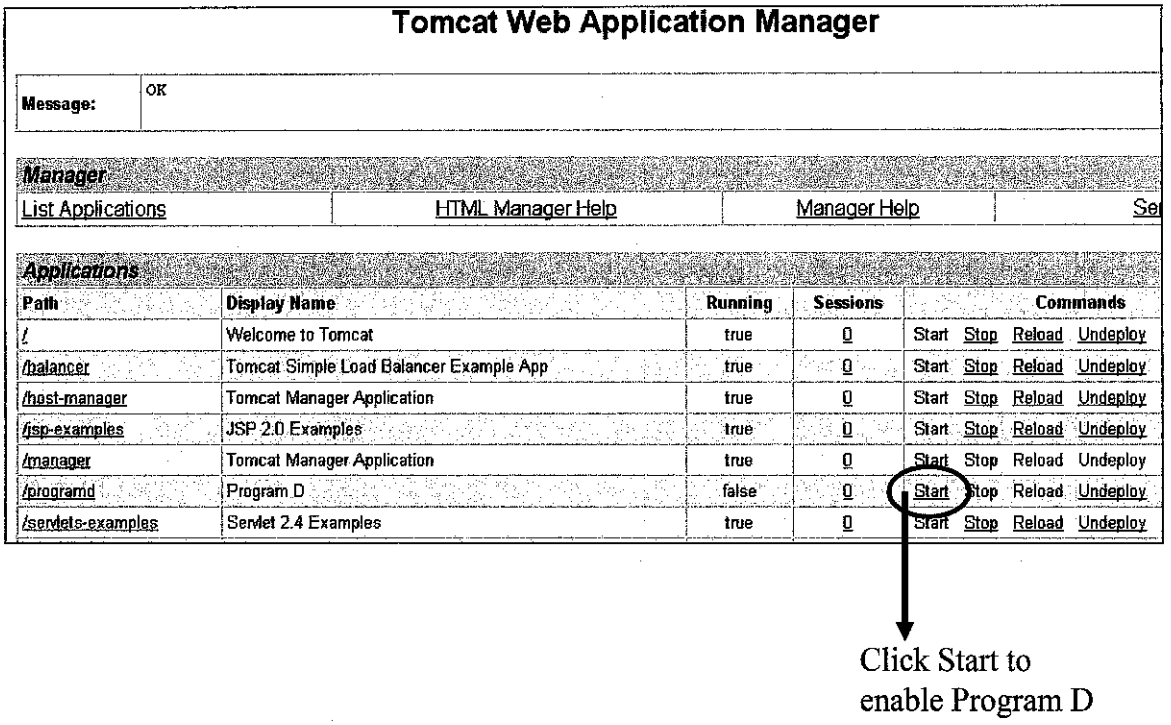
Path	Display Name	Running	Sessions	Commands
/	Welcome to Tomcat	true	0	Start Stop Reload Undeploy
/balancer	Tomcat Simple Load Balancer Example App	true	0	Start Stop Reload Undeploy
/host-manager	Tomcat Manager Application	true	0	Start Stop Reload Undeploy
/jsp-examples	JSP 2.0 Examples	true	0	Start Stop Reload Undeploy
/manager	Tomcat Manager Application	true	0	Start Stop Reload Undeploy
/programd	Program D	false	0	Start Stop Reload Undeploy
/servlets-examples	Servlet 2.4 Examples	true	0	Start Stop Reload Undeploy

Program D is uploaded

Figure 24 Successful Deployment of .war file

Running Program D From Web Server

In using Tomcat' web application manager to start the application is by clicking the "Start" link.



Tomcat Web Application Manager

Message:	OK

Manager

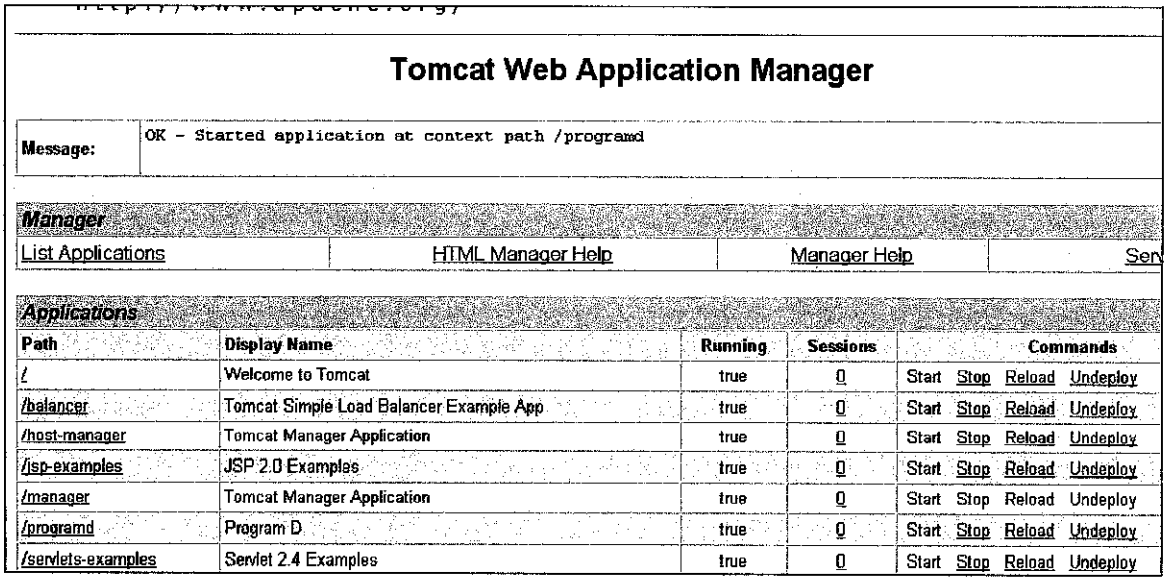
List Applications | HTML Manager Help | Manager Help | Se

Applications

Path	Display Name	Running	Sessions	Commands
/	Welcome to Tomcat	true	0	Start Stop Reload Undeploy
/balancer	Tomcat Simple Load Balancer Example App	true	0	Start Stop Reload Undeploy
/host-manager	Tomcat Manager Application	true	0	Start Stop Reload Undeploy
/jsp-examples	JSP 2.0 Examples	true	0	Start Stop Reload Undeploy
/manager	Tomcat Manager Application	true	0	Start Stop Reload Undeploy
/programd	Program D	false	0	Start Stop Reload Undeploy
/servlets-examples	Servlet 2.4 Examples	true	0	Start Stop Reload Undeploy

Figure 25 Running Program D from web server

Figure below shows that Program D is started and ready to be used.



Tomcat Web Application Manager

Message:	OK - Started application at context path /programd

Manager

List Applications | HTML Manager Help | Manager Help | Ser

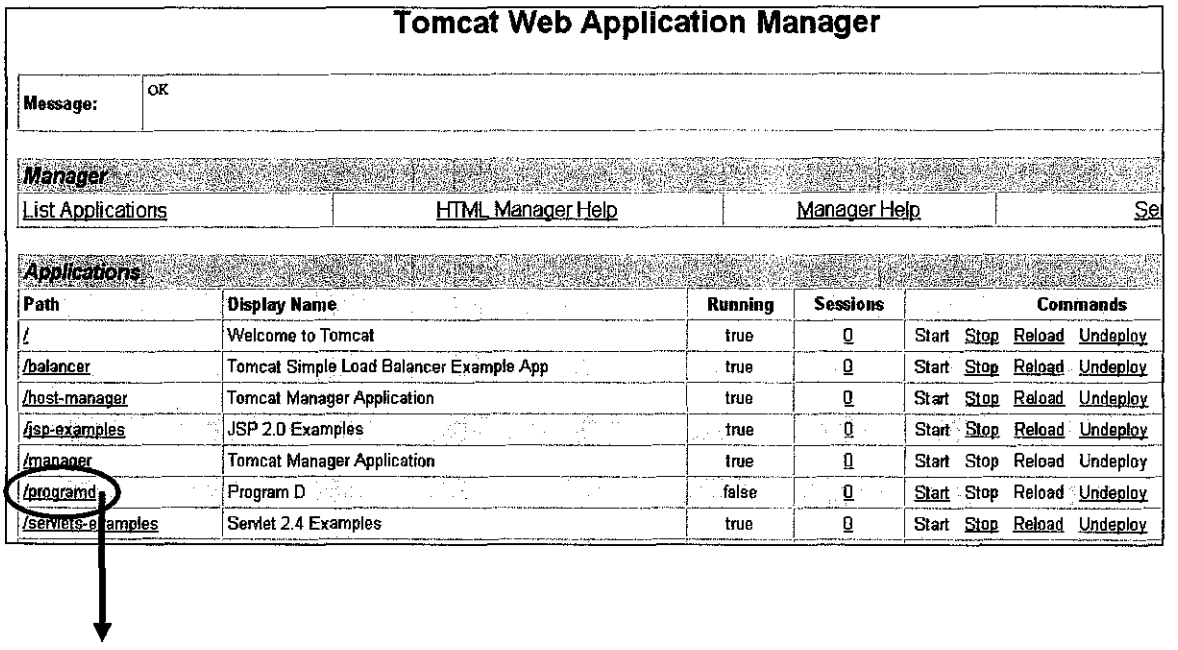
Applications

Path	Display Name	Running	Sessions	Commands
/	Welcome to Tomcat	true	0	Start Stop Reload Undeploy
/balancer	Tomcat Simple Load Balancer Example App	true	0	Start Stop Reload Undeploy
/host-manager	Tomcat Manager Application	true	0	Start Stop Reload Undeploy
/jsp-examples	JSP 2.0 Examples	true	0	Start Stop Reload Undeploy
/manager	Tomcat Manager Application	true	0	Start Stop Reload Undeploy
/programd	Program D	true	0	Start Stop Reload Undeploy
/servlets-examples	Servlet 2.4 Examples	true	0	Start Stop Reload Undeploy

Figure 26 Program D is ready to be used.

Interacting With Program D

To interact with Program D through a default web interface, click on programd link. Here several of test input can be tested.



Click programd to test several input

Figure 27 To Interact With Program D

After clicking the link, a default web interface is displayed as shown below.

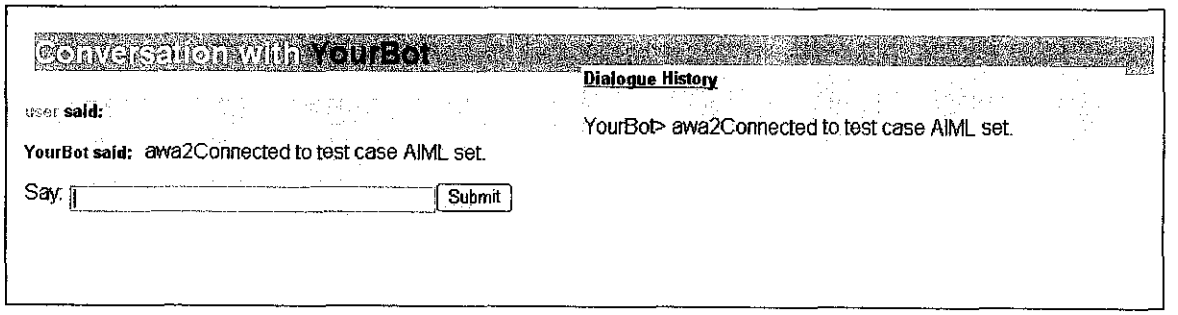


Figure 28 Default Web Interface

Examples of Test Input

Input: TESTDISPLAYSET

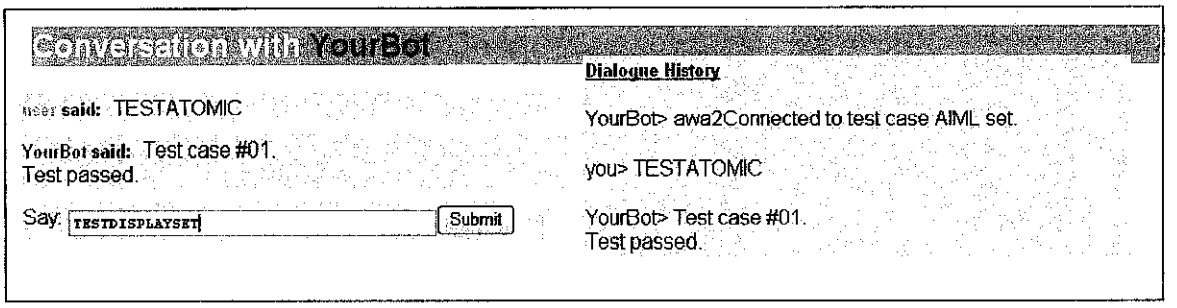


Figure 29 Example of Test Input

Output: Test case #02.

Test passed.

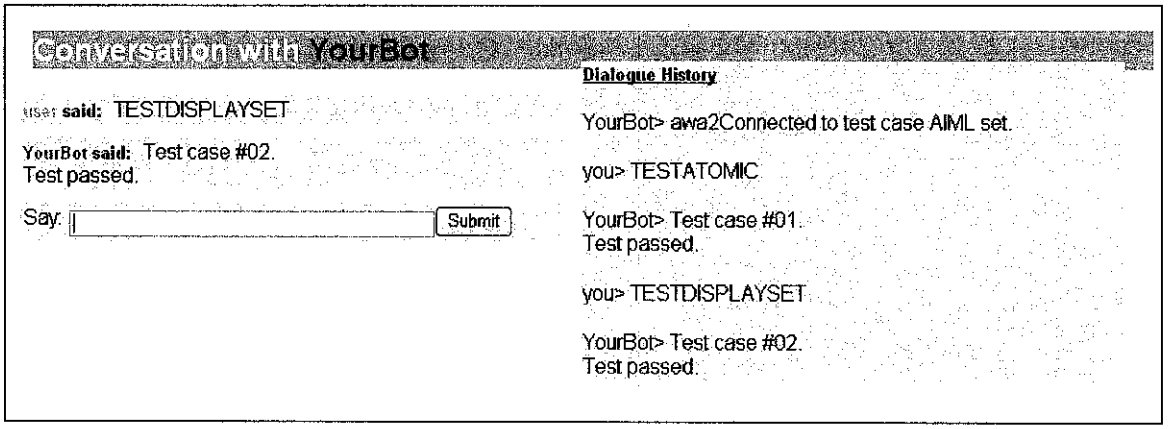


Figure 30 Example of Test Input

The Program D download includes a test suite for verifying AIML compatibility, to check that installation is working. Above is one of the inputs in the test suite. The AIML file of the test suite is located at C:\var\ProgramD\resources\testing\AIML.aiml.

5.1.3. Download Free AIML

Free download of AIML set is available at http://www.aitools.org/Free_AIML_sets.

5.1.4. Agent Knowledge Warehouse/Repository

Each elements of above topic; Agent, Knowledge, Repository, and warehouse has been defined in Chapter 2 Literature Review and Theory. However, again this section will recap the meaning of each of them. Agent is defined as self-contained, interactive and has communication capability which in current technology its future is relating to helping people find information, and perhaps offering limited advice. Knowledge in the other hand is generated when information is combined with context and experience, and may thought of as information in use. Data, information, and knowledge may be stored and maintained in central place such as databases, files or a location that we refer as data repository or knowledge warehouse. Knowledge warehouse consists of knowledge components (KCs) that are defined as the smallest level in which knowledge can be decomposed.

For this project, the agent's knowledge is developed, stored, organized, and processed in a location or a folder named "hotelReservation" that has the directory of "...var\ProgramD\resources\hotelReservation". In other words, this folder "hotelReservation" is the agent knowledge warehouse consists of AIML files as the knowledge components.

Agent-based FAQ, serve the purpose like any other traditional-based FAQ, which is to provide answers to the frequently asked question by website users, however the product of the agent will focus on the knowledge regarding hotel reservation.

Figure 31 describes the agent knowledge warehouse and the knowledge components in a diagram.

Knowledge : Hotel Reservation

Knowledge Warehouse: Folder name "hotelReservation" in directory "...var\ProgramD\resources\ hotelReservation".

Main Knowledge Component, KC (s) :

- Making an Hotel Reservation
- Miscellaneous
- Price & Payment
- Confirm Reservation
- Other Than Online Reservation

Related Knowledge Component, KC (s) :

- Salutations

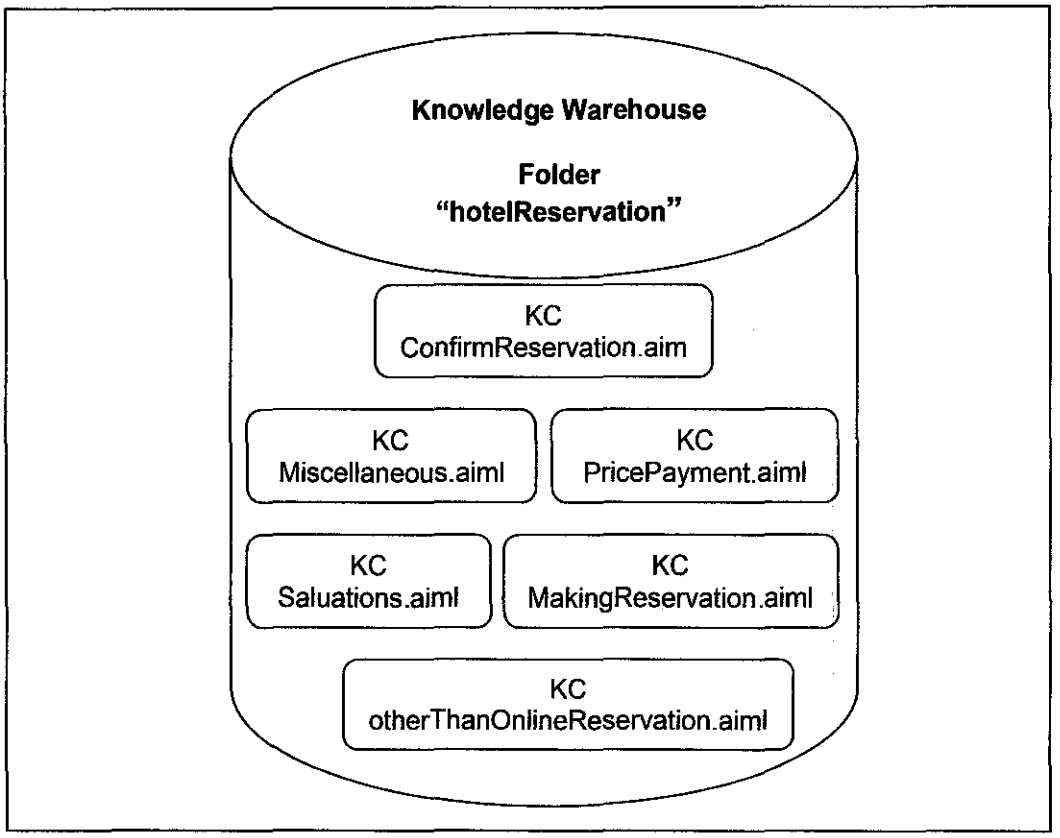


Figure 31 Agent Knowledge Warehouse

5.1.5. Agent Learning Directive in Program D

The knowledge of agent is hard coded using AIML and stored as .aiml file, which can also be referred as knowledge component. Each .aiml file may contain a single topic or more. For example, salutation.aiml contains only salutation, while geography.aiml contains knowledge only on geography. However one .aiml file may also contains more than one topic. For example knowledge regarding salutation and geography can be combined and stored in one .aiml file, such as knowledge.aiml.

It is up to the developer on how to organize the knowledge of agent. The knowledge of agent is what that contains inside the .aiml file, such as salutation.aiml and geography.aiml or knowledge.aiml. In using Program D,

```
<learn> ... </learn>
```

learn directive is used to call the .aiml files or knowledge components, such as salutation.aiml and geography.aiml or knowledge.aiml.

With this learn directive, Program D knows where to locate and load the knowledge components or .aiml files. The following subsection explains how to use learn directive to load .aiml file.

5.1.6. Loading and Adding AIML File

Learn directive function is processed immediately upon startup of Program D. To specify a new .aiml file to load, open the bots.xml in the ProgramD\conf directory.

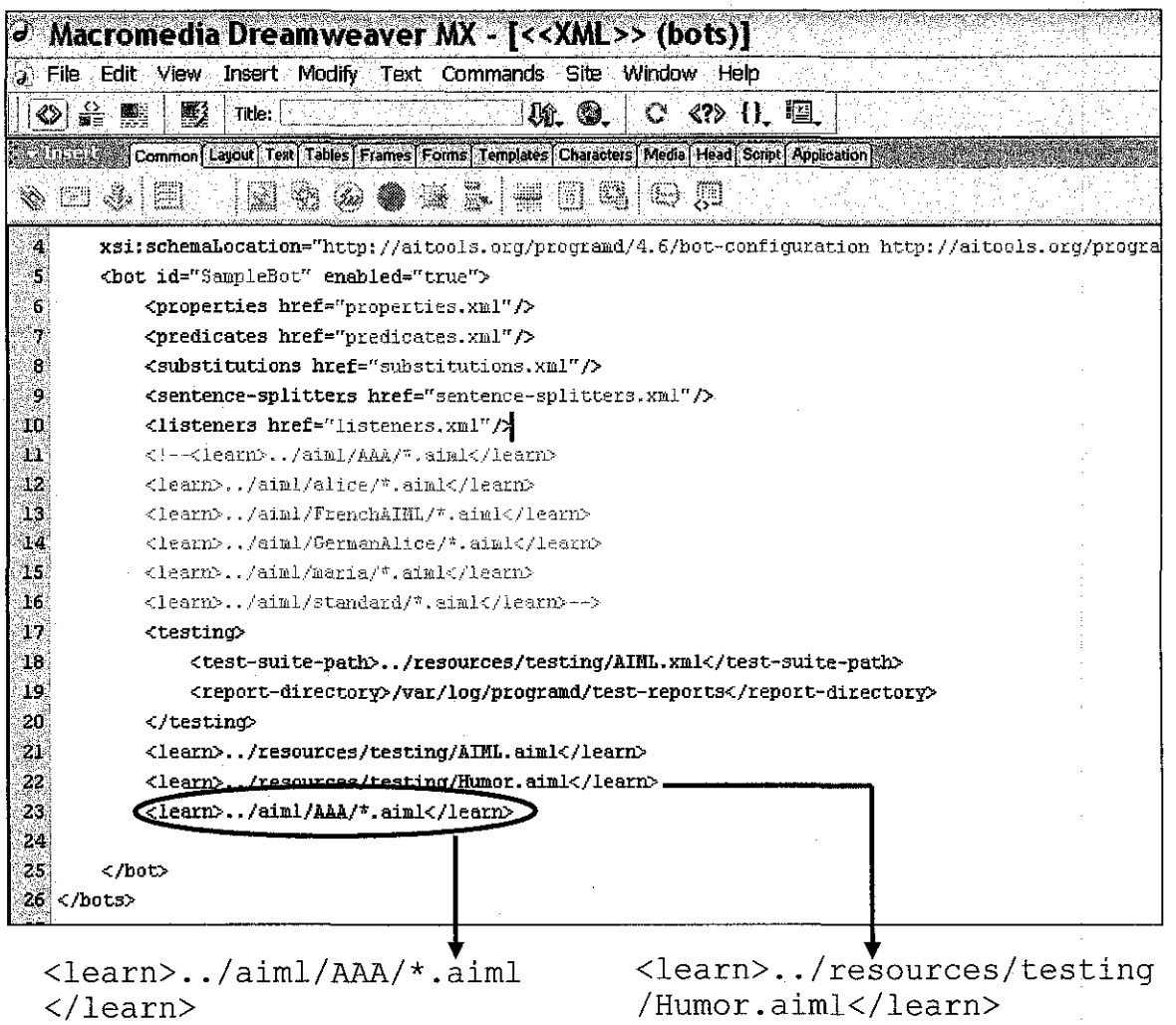


Figure 32 Adding .aiml File Using Learn Directives

There are two ways in specifying the .aiml file to load. First is using "glob"-like or "*" wildcard and second is to directly specify the filename. Further explanation is as follow;

- ***Using "glob"-like or "*" wildcard***

```
<learn>../aiml/AAA/*.aiml</learn>
```

The example shown above is using a "glob"-like or "*" wildcard patterns for specifying files to load. The path specification is relative to the current file, so this indicates that within a directory reached by going one level up (to the main PROGRAMD directory), and then into a directory called aiml, and from there into a subdirectory called AAA, the program loaded all files that end in .aiml. Meaning more than one AIML files are loaded.

- ***Directly specify the filename***

```
<learn>../resources/testing/Humor.aiml</learn>
```

As for the above example, Program D will load the Humor.aiml file located in the subdirectory testing. Using this way, only the specified AIML file is loaded.

To load more than one AIML file is to use multiple learn directives. For example, to load salutation.aiml and geography.aiml, these two learn directives must be included in bots.xml

```
<learn>../resources/testing/salutation.aiml</learn>
<learn>../resources/testing/geography.aiml </learn>
```

In conclusion, either both mentioned alternatives, it serve the same purpose in loading and adding AIML file. After the .aiml files have been loaded, it can be tested by interacting with Program D as explained earlier.

CHAPTER 6
CONCLUSION AND RECOMMENDATION

6.1. Relevancy to the Objectives

Therefore in conclusion, as the project title implies "Agent-based FAQ" is to give website developers to have other alternative than the traditional-based FAQ in answering question regarding their website, products or services, and information. Agent-based FAQ received a positive feedback from website users that were involved in the acceptance test. Agent-based FAQ offered many advantages such as less time consuming, eliminate unnecessary information, easier in getting answer, and avoid losing potential web customer. The study of the elements and characteristics of human-computer interaction of page design enhanced the reliability of this project. The agent software was developed using AIML, extended language of XML that uses Program D as the AIML interpreters, while the user interface was developed using HTML. This project was created version by version, where the first version will have the most minimal specification and was added towards the end of development process.

6.2. Suggested Future Work for Expansion and Continuation

For future enhancement, the agent can be incorporate with voice and emotion while communicating with user (Multimodal interaction). This project is based on single-agent software which later can span its capability by communicating and interacting with other agents or also called as multi-agent software using middleware agent software. It is also recommended by the user from the survey conducted that in the future the agent should be able to perform job on behalf of user in making hotel reservation.

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APPENDICES

APPENDIX 1

Free Online Survey On FAQ Approach

SurveyMS.com

This survey is conducted to gather information regarding the FAQ layout and design that users find it most convinient. The information gathered will be used for final year project which is to enhance the FAQ layout and design to ease website users.

Instruction: Please kindly go to each links to see example of each FAQ approach before comparing and answering the questions below.

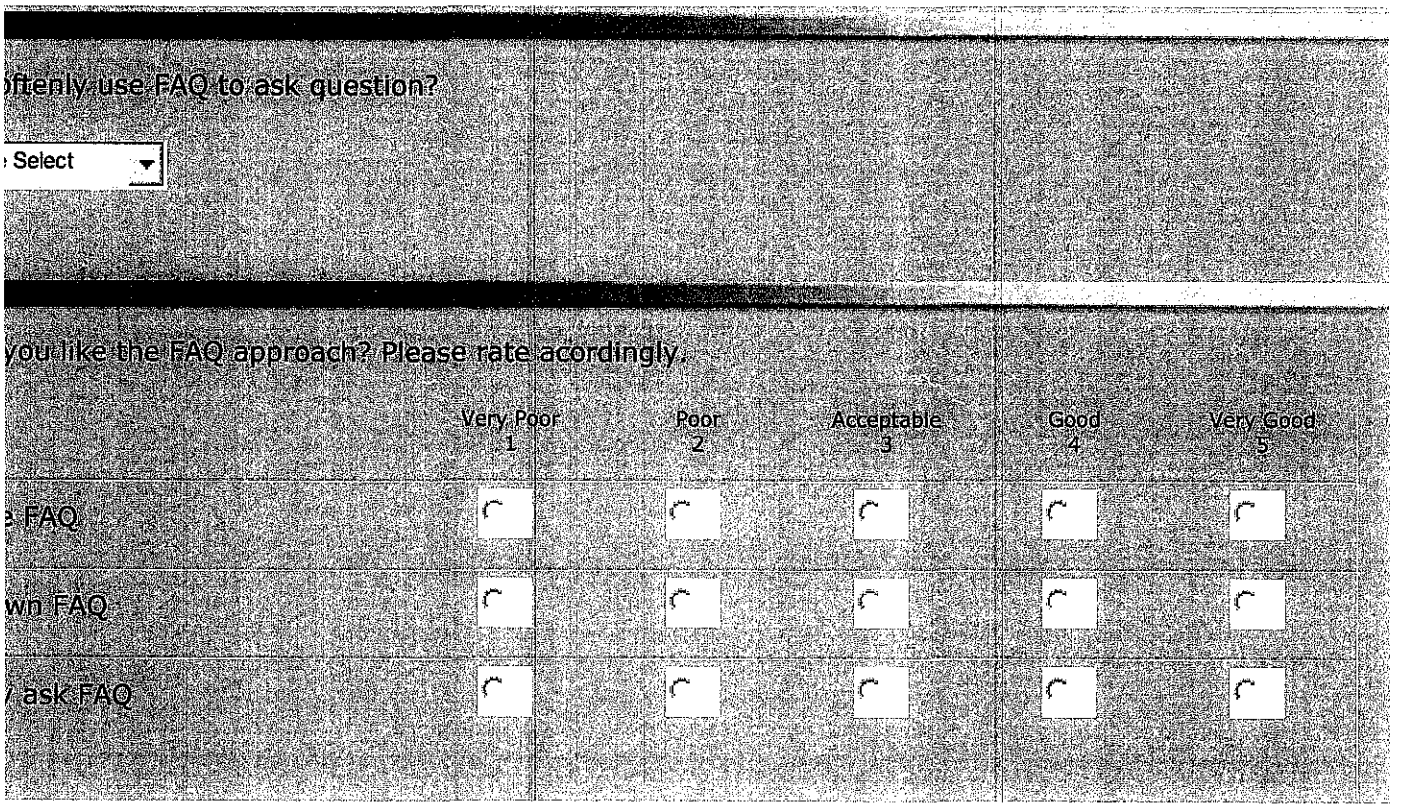
1. Linkage FAQ: Click on the question link and it will direct you to the answer.

   Click here to see Linkage Faqs
2. Top-down FAQ: Questions and answers will be displayed accordingly in top-down approach.

   Click here to see Top-down FAQ

3. Directly ask FAQ. User type in question, and answer will be displayed.

   Click here to see Directly ask FAQ



rpe of FAQ approach is the easiest. Please rate accordingly.

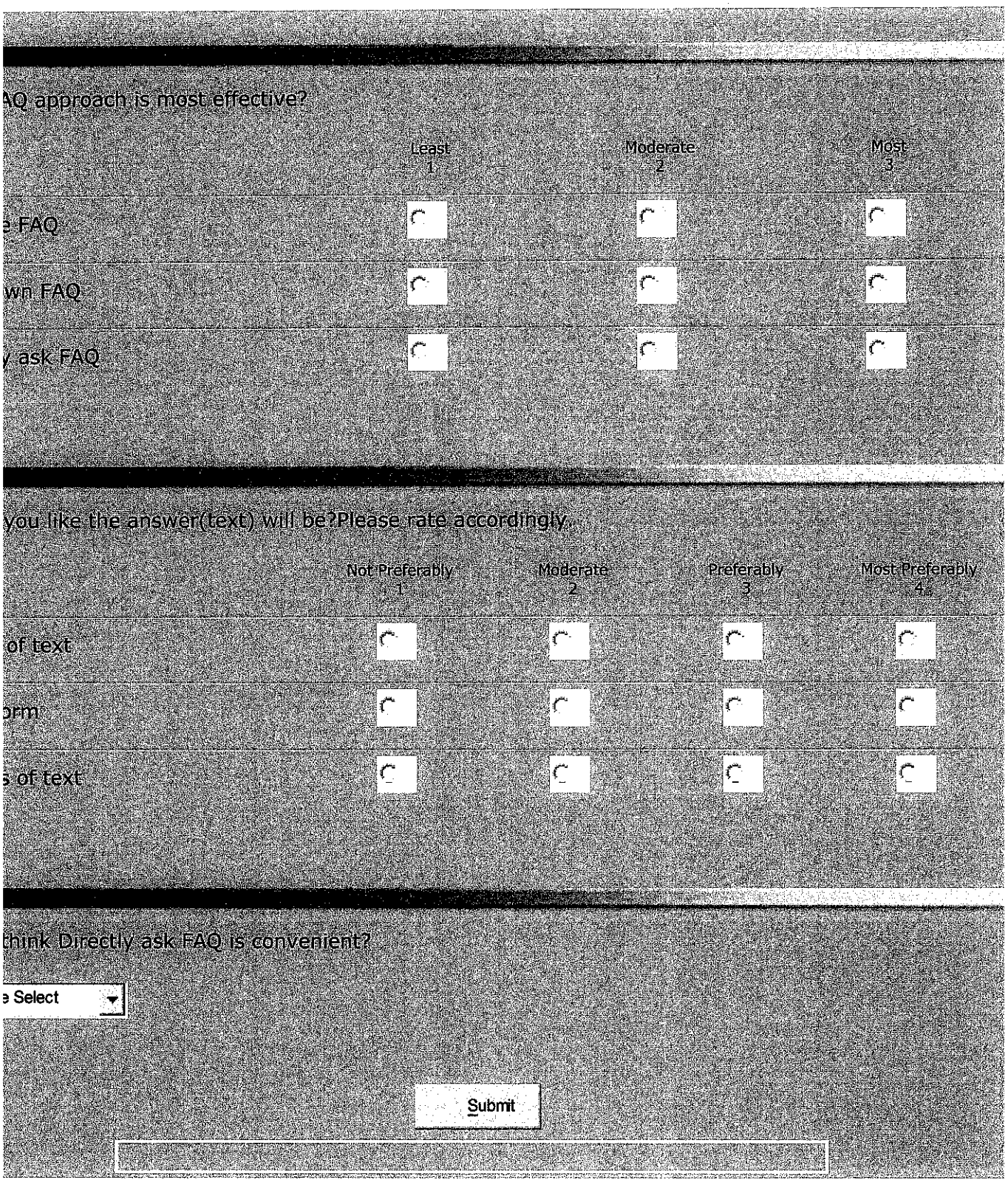
	Easy 1	Easier 2	Easiest 3
e FAQ			
wn FAQ			
y ask FAQ			

ppraoch do you think is the fastest way to get an answer?Please rate in the range of 1-3

	Slow 1	Medium 2	Fast 3
e FAQ			
own FAQ			
y ask FAQ			

o you think the appearance of each FAQ appraoch?Rate in the range of 1-3

	Poor 1	Moderate 2	Good 3
ue FAQ			
own FAQ			
ly ask FAQ			



Click Here to Conduct Your Own Survey

APPENDIX 2

Agent-based FAQ Prototype

Purpose: To conduct testing for Agent-based FAQ prototype.

Instructions: Assuming that you are a tourist and uses the internet to surf for hotel to accommodate you. Assuming also that you have questions regarding the below matters and uses the prototype to get answers (regarding ***Making Reservation, Miscellaneous, and Price and Payment).***

Making Reservation

1. Making hotel reservation.
   (How to make hotel reservation?)

2. When will get the confirm reservation.
   (when will i get the confirmation?)

3. Other than online reservation (Reservation by phone or fax)
   (can i make reservation through phone?)

4. Operating Time
   (at what time reservation can be made?)

5. Required information for reservation
   (what are the required information for reservation?)

Miscellaneous

6. Contact number for help
7. Cater food for vegetarian customer
8. Check in and check out time

Price and Payment

9. Rates
10. Price
11. Changes in price
12. Type of credit card accepted
13. Problem with credit card

Thank you for your cooperation.

Survey on Agent-Based FAQ

This survey is conducted to collect user feedback after using a prototype of Agent-based FAQ.
First part contains general questions regarding FAQ and as for the latter part of survey question is pertaining to the prototype and its future recommendation.

General Question *(Most questions require you to tick your answer except for Question 2 and Question 4)*

1) Have you ever use FAQ?

☐ Yes (Skip Question 2)

☐ No (Skip Question 3 and 4)

2) If for Question 1 your answer is No, rate your reason why from the range of 1(most likely) until 6 (least likely).

Time consuming	☐
Useless	☐
Nothing to ask	☐
Hard to get answers	☐
I usually email/contact the person in charge	☐
Leave and switch to other website that provide better information	☐

3) If for Question 1 your answer is Yes, how often you use the FAQ?

Seldom	☐	
Moderate	☐	(Skip Question 4)
Frequently	☐	(Skip Question 4)

4) If for Question 3 your answer is Seldom, rate your reason why from the range of 1(most likely) until 6 (least likely).

Time consuming	☐
Useless	☐
Nothing to ask	☐
Hard to get answers	☐
I usually email/contact the person in charge	☐
Leave and switch to other website that provide better information	☐

5) Do you like lengthy FAQ page that needs scrolling down the page?

☐ Yes

☐ No (Please specify why?) _____

6) Do you prefer FAQ page that redirect you to another link for an answer?

☐ Yes

☐ No (Please specify why?) _____

7) Do you perceive FAQ as a must-have function in website to ease website users?

☐ Yes (Please specify why?) _____

☐ No (Please specify why?) _____

Based on the Agent-based FAQ prototype

8) Do you find this Agent-based FAQ is easy to use?

☐ Yes

☐ No (Please specify why?) _____

9) Do you find this Agent-based FAQ is communicative?

☐ Yes

☐ No (Please specify why?) _____

10) Do you find this Agent-based FAQ is easier in getting specific answer?

☐ Yes

☐ No (Please specify why?) _____

11) If Agent-based FAQ approach is widely implemented in websites, will you use FAQ more often?

☐ Yes

☐ No (Please specify why?) _____

12) Do you think Agent-based FAQ will improve customer service for website user?

☐ Yes

☐ No (Please specify why?) _____

Based on Future Recommendation of the Agent-based FAQ prototype

13) How would you like if Agent-based FAQ able to answer your question both through speech (incorporate with voice) and text?

☐ Not preferred
☐ Moderate
☐ Preferred
☐ Most Preferred

14) How would you like if Agent-based FAQ able to do the reservation for you?

☐ Not preferred
☐ Moderate
☐ Preferred
☐ Most Preferred

APPENDIX 3

Snippets code of MakingReservation.AIML

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<aiml version="1.0.1" xmlns="http://alicebot.org/2001/AIML-1.0.1"
    xmlns:html="http://www.w3.org/1999/xhtml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://alicebot.org/2001/AIML-1.0.1
http://aitools.org/aiml/schema/AIML.xsd">

<!-- This file contains information in making reservation -->

<!-- 1st question:How do I reserve my hotel room ?
Making an online reservation is easy. Just complete the reservation form making
sure that you have given us your e-mail address and a valid credit card number,
then send it us. As soon we receive your request we will contact your chosen
hotel to confirm the reservation. It is our policy to reply to all request
within 24 hours.<think><set name="topic">Reservation</set></think>
-->

<category>
      <pattern>Reservation</pattern>
      <template>Complete and send to us the reservation form with e-mail
address and a valid credit card number. As soon we receive your request we will
contact your chosen hotel to confirm the reservation.
      </template>
</category>

<category>   <pattern>MAKING Reservation</pattern>
      <template><srai>Reservation</srai>      </template></category>
<category>   <pattern>MAKING * Reservation</pattern>
      <template><srai>Reservation</srai>      </template></category>
<category>   <pattern>How Reservation</pattern>
      <template><srai>Reservation</srai>      </template></category>
<category>   <pattern>How * Reservation</pattern>
      <template><srai>Reservation</srai>      </template></category>
<category>   <pattern>* How * Reservation</pattern>
      <template><srai>Reservation</srai>      </template></category>

<category>   <pattern>reserve room</pattern>
      <template><srai>Reservation</srai></template></category>
<category>   <pattern>HOW * reserve room</pattern>
      <template><srai>Reservation</srai></template></category>
<category>   <pattern>* HOW * reserve room</pattern>
      <template><srai>Reservation</srai></template></category>
<category>   <pattern>Reserve</pattern>
      <template><srai>Reservation</srai></template></category>
<category>   <pattern>_ Reserve</pattern>
      <template><srai>Reservation</srai></template></category>

<category>   <pattern>BOOKING room</pattern>
      <template><srai>Reservation</srai></template></category>
<category>   <pattern>_ BOOKING room</pattern>
      <template><srai>Reservation</srai></template></category>
<category>   <pattern>BOOKING room _</pattern>
      <template><srai>Reservation</srai></template></category>

</aiml>
```

APPENDIX 4

Snippets code of ConfirmReservation.AIML

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<aiml version="1.0.1" xmlns="http://alicebot.org/2001/AIML-1.0.1"
    xmlns:html="http://www.w3.org/1999/xhtml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://alicebot.org/2001/AIML-1.0.1
http://aitools.org/aiml/schema/AIML.xsd">

<!-- This file contains information in making reservation -->

<!-- As soon we receive your request we will contact your chosen hotel to
confirm the reservation. It is our policy to reply to all request within 24
hours.-->


<category>
      <pattern>POLICY</pattern><template>It is our policy to reply to all
request within 24 hours.</template>
</category>
<category>
      <pattern>confirm</pattern>
      <that>As soon we receive your request we will contact your chosen hotel
to confirm the reservation</that>
      <template><srai>POLICY</srai></template>
</category>
<category>
      <pattern>_ confirm</pattern>
      <that>As soon we receive your request we will contact your chosen hotel
to confirm the reservation</that>
      <template><srai>POLICY</srai></template>
</category>
<category>
      <pattern>confirmation</pattern>
      <that>As soon we receive your request we will contact your chosen hotel
to confirm the reservation</that>
      <template><srai>POLICY</srai></template>
</category>
<category>
      <pattern>_ confirmation</pattern>
      <that>As soon we receive your request we will contact your chosen hotel
to confirm the reservation</that>
      <template><srai>POLICY</srai></template>
</category>
<category>
      <pattern>confirmation _</pattern>
      <that>As soon we receive your request we will contact your chosen hotel
to confirm the reservation</that>
      <template><srai>POLICY</srai></template>
</category>

</aiml>
```

APPENDIX 5

Snippets code of otherThanOnlineReservation.aiml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<aiml version="1.0.1" xmlns="http://alicebot.org/2001/AIML-1.0.1"
    xmlns:html="http://www.w3.org/1999/xhtml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://alicebot.org/2001/AIML-1.0.1
http://aitools.org/aiml/schema/AIML.xsd">


<!--
I don't want to make a reservation online, what can I do ?
You can :
-Reserve by fax : You can send us a fax using our form at the following numbers
: +603-9133-4195
-Reservation by phone : (+603) 9133-2000 : Our call Centre.
Malaysia Office
9.30 am. - 6.00 pm. (Mon-Fri)
9.30 am. - 01.00 pm. (Sat)
Our multilingual team is highly trained and skilled to provide you the best
service concerning your reservation enquiries. Please make sure you have all
those following information, they will be asked to you by our representatives :
Hotel(s), location, Country
Arrival and departure date
Room(s) type(s)
Number of adults and children
Any specific room preferences you may have
Your phone number, E-mail address
and/or fax number ( including country and area code )
Your full credit card information.

-->

<category>
      <pattern>Reservation by phone</pattern>
      <template>Call our centre at the following numbers : (+603) 9133-
2000.<html:br/>
      <!-- <think><set name="Reservation">Reservation by phone</set></think>
    <get name="Reservation"/> -->
      Do you want to know our operating time before calling our
centre?</template>
</category>

<category><pattern>* Reservation by phone</pattern><template><srai>Reservation
by phone</srai></template></category>
<category><pattern>Reservation by phone *</pattern><template><srai>Reservation
by phone</srai></template></category>
<category><pattern>* Reservation by phone
*</pattern><template><srai>Reservation by phone</srai></template></category>
<category><pattern>* Reservation * phone</pattern><template><srai>Reservation
by phone</srai></template></category>
<category><pattern>Reservation * phone *</pattern><template><srai>Reservation
by phone</srai></template></category>
<category><pattern>* Reservation * phone *</pattern><template><srai>Reservation
by phone</srai></template></category>
<category><pattern>Phone reservation</pattern><template><srai>Reservation by
phone</srai></template></category>
<category><pattern>* Booking by phone</pattern><template><srai>Reservation by
phone</srai></template></category>
```

```
<category><pattern>Booking by phone *</pattern><template><srai>Reservation by
phone</srai></template></category>
<category><pattern>* Booking by phone *</pattern><template><srai>Reservation by
phone</srai></template></category>
<category><pattern>* Booking * phone</pattern><template><srai>Reservation by
phone</srai></template></category>
<category>
      <pattern>Reservation by fax</pattern>
      <template>Send us fax using our form at the following numbers      :
+603-9133-4195.<html:br/>
      <!-- <think><set name="Reservation">Reservation by fax</set></think>
    <get name="Reservation"/> -->
      Do you want to know the information needed for reservation?</template>
</category>

<category><pattern>* Booking by fax</pattern><template><srai>Reservation by
fax</srai></template></category>
<category><pattern>Booking by fax *</pattern><template><srai>Reservation by
fax</srai></template></category>
<category><pattern>* Booking by fax *</pattern><template><srai>Reservation by
fax</srai></template></category>
<category><pattern>fax and phone
reservation</pattern><template><srai>Reservation by
fax</srai><html:br/><srai>Reservation by phone</srai></template></category>
<category><pattern>reservation * fax and
phone</pattern><template><srai>Reservation by
fax</srai><html:br/><srai>Reservation by phone</srai></template></category>
<category><pattern>fax and phone *
reservation</pattern><template><srai>Reservation by
fax</srai><html:br/><srai>Reservation by phone</srai></template></category>
<category><pattern>phone and fax
reservation</pattern><template><srai>Reservation by
fax</srai><html:br/><srai>Reservation by phone</srai></template></category>
<category>
      <pattern>Operating time</pattern>
      <template>This is for Malaysia Office only
            <html:br/>
            1) 9.30 am. - 6.00 pm. (Mon-Fri)<html:br/>
            2) 9.30 am. - 01.00 pm. (Sat)<html:br/>
            Do you want to know the information needed for reservation?
      </template>
</category>

<category>   <pattern>* TIME RESERVATION *</pattern> <template><srai>Operating
time</srai></template></category>
<category>   <pattern>* TIME * RESERVATION *</pattern>
      <template><srai>Operating time</srai></template></category>
<category>   <pattern>TIME * RESERVATION</pattern>   <template><srai>Operating
time</srai></template></category>
<category>   <pattern>TIME * RESERVATION *</pattern> <template><srai>Operating
time</srai></template></category>
<category>
      <pattern>_ operate</pattern>
      <that>Do you want to know our operating time before calling our
centre</that>
      <template><srai>Operating time</srai></template>
</category>
<category>
      <pattern>operate _</pattern>
      <that>Do you want to know our operating time before calling our
centre</that>
      <template><srai>Operating time</srai></template>
</category>
```

```
category>
      <pattern>_ working time</pattern>
      <template><srai>Operating time</srai><html:br/>Do you want to know the
information needed for reservation?</template>
</category>
<category>
      <pattern>working time _</pattern>
      <template><srai>Operating time</srai><html:br/>Do you want to know the
information needed for reservation?</template
</category> <category><pattern>* fax OR phone *
reservation</pattern><template><srai>Other than online
reservation</srai></template></category>
<category><pattern>phone OR fax reservation</pattern><template><srai>Other than
online reservation</srai></template></category>
<category><pattern>reservation * phone OR fax</pattern><template><srai>Other
than online reservation</srai></template></category>
<category><pattern>phone OR fax * reservation</pattern><template><srai>Other
than online reservation</srai></template></category>
<category><pattern>* phone OR fax reservation</pattern><template><srai>Other
than online reservation</srai></template></category>
<category><pattern>* reservation * phone OR fax</pattern><template><srai>Other
than online reservation</srai></template></category>
<category><pattern>* phone OR fax * reservation</pattern><template><srai>Other
than online reservation</srai></template></category>

</aiml>
```

APPENDIX 6

Snippets code of PricePayment.aiml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<aiml version="1.0.1" xmlns="http://alicebot.org/2001/AIML-1.0.1"
    xmlns:html="http://www.w3.org/1999/xhtml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://alicebot.org/2001/AIML-1.0.1
http://aitools.org/aiml/schema/AIML.xsd">


<!--   Are the rates on your site per person or per room per night ?
  The quoted room rate is per room per night. The rate will reflect the number
of persons you entered on the Search Form. It is for one person if you selected
one person and it's for two people if you selected two people.
 -->
<category>
       <pattern>Rates</pattern>
       <template>The quoted room rate is per room per night.<html:br/>The rate
will reflect the number of persons you entered on the Search Form.
       <html:br/>It is for one person if you selected one person and it's for
two people if you selected two people.</template>
</category>

<category><pattern>*
Rates</pattern><template><srai>Rates</srai></template></category>
<category><pattern>Rates
*</pattern><template><srai>Rates</srai></template></category>
<category><pattern>* Rates
*</pattern><template><srai>Rates</srai></template></category>


<!--   Why is the price different to when I last checked ?
  Apart from changes that may be made to reflect market conditions, the prices
are shown in the currency requested by the user and these are subject to
currency fluctuations.
  Therefore there may be slight variations in price on a daily basis that will
reflect any movement in the currency exchange levels.
  Once a booking has been created however, the currency exchange rate for that
booking is fixed as those at the booking creation date, even if further items
are added to the booking.
  Most importantly, the prices include service charges, local taxes and in many
cases breakfast.
 -->
<category>
       <pattern>Price</pattern>
       <template>The prices include service charges, local taxes and in many
cases breakfast.</template>
</category>

<category><pattern>WHAT * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHAT * THE PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHAT * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL * THE PRICE
RATES</pattern><template><srai>Price</srai></template></category>
```

```
<category><pattern>TELL * THE PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>MAY * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>MAY * THE PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>MAY * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>CAN * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>CAN * THE PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>CAN * THE
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHAT *
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHAT * PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHAT * PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL *
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL * PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL * PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>MAY *
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>MAY * PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>MAY * PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>CAN *
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>CAN * PRICE
RATES</pattern><template><srai>Price</srai></template></category>
<category><pattern>CAN * PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>HOW
MUCH</pattern><template><srai>Price</srai></template></category>
<category><pattern>HOW MUCH
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>HOW MUCH *
PAY</pattern><template><srai>Price</srai></template></category>
<category><pattern>HOW MUCH *
COST</pattern><template><srai>Price</srai></template></category>
<category><pattern>* HIGHEST PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>* HIGHEST PRICE RATES
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>_
PRICE</pattern><template><srai>Price</srai></template></category>
<category><pattern>PRICE
_</pattern><template><srai>Price</srai></template></category>

<category>
      <pattern>Price Different</pattern>
      <template>Apart from changes that may be made to reflect market
conditions, the prices are shown in the currency requested by the user and
these are subject to currency fluctuations.<html:br/> Do you like to know
more?</template>
</category>
```

```
<category>
      <pattern>Price Different2</pattern>
      <template>Therefore there may be slight variations in price on a daily
basis that will reflect any movement in the currency exchange levels.
<html:br/> Do you want me to continue?</template>
</category>

<category>
      <pattern>Price Different3</pattern>
      <template>Once a booking has been created however, the currency exchange
rate for that booking is fixed as those at the booking creation date, even if
further items are added to the booking. <html:br/></template>
</category>

<category><pattern>WHY * PRICE DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY * PRICE RATES DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY * PRICE * DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY * PRICE * DIFFERENT *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY THE PRICE * DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY THE PRICE * DIFFERENT *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY * DIFFERENT * PRICE</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>WHY * DIFFERENT * PRICE *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL * PRICE DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL * PRICE RATES DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL * PRICE * DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL * PRICE * DIFFERENT *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL THE PRICE * DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL THE PRICE * DIFFERENT *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL * DIFFERENT * PRICE</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>TELL * DIFFERENT * PRICE *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>THE PRICE * DIFFERENT</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>THE PRICE * DIFFERENT *</pattern><template><srai>Price
Different</srai></template></category>
<category><pattern>* THE PRICE *
CHANGE</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHY * PRICE
CHANGES</pattern><template><srai>Price</srai></template></category>
<category><pattern>WHY * PRICE CHANGES
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL * PRICE
CHANGES</pattern><template><srai>Price</srai></template></category>
<category><pattern>TELL * PRICE CHANGES
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>* CHANGES *
PRICE</pattern><template><srai>Price</srai></template></category>
```

```
<category><pattern>* CHANGES * PRICE
*</pattern><template><srai>Price</srai></template></category>
<category><pattern>Yes</pattern><that>Do you like to know
more</that><template><srai>Price
Different2</srai><html:br/></template></category>
<category><pattern>* Yes</pattern><that>Do you like to know
more</that><template><srai>Price
Different2</srai><html:br/></template></category>
<category><pattern>Yes *</pattern><that>Do you like to know
more</that><template><srai>Price
Different2</srai><html:br/></template></category>
<category><pattern>_ Yes _</pattern><that>Do you like to know
more</that><template><srai>Price
Different2</srai><html:br/></template></category>
<category><pattern>NO</pattern><that>Do you like to know
more</that><template>Ok then do you have anything else to ask regarding your
reservation?</template></category>
<category><pattern>* NO</pattern><that>Do you like to know
more</that><template>Ok then do you have anything else to ask regarding your
reservation?</template></category>
<category><pattern>NO *</pattern><that>Do you like to know
more</that><template>Ok then do you have anything else to ask regarding your
reservation?</template></category>
<category><pattern>_ NO _</pattern><that>Do you like to know
more</that><template>Ok then do you have anything else to ask regarding your
reservation?</template></category>
<category><pattern>Yes</pattern><that>Do you want me to
continue</that><template><srai>Price
Different3</srai><html:br/></template></category>
<category><pattern>* Yes</pattern><that>Do you want me to
continue</that><template><srai>Price
Different3</srai><html:br/></template></category>
<category><pattern>Yes *</pattern><that>Do you want me to
continue</that><template><srai>Price
Different3</srai><html:br/></template></category>
<category><pattern>_ Yes _</pattern><that>Do you want me to
continue</that><template><srai>Price
Different3</srai><html:br/></template></category>
<category><pattern>Continue</pattern><that>Do you want me to
continue</that><template><srai>Price
Different3</srai><html:br/></template></category>
<category><pattern>No</pattern><that>Do you want me to
continue</that><template>Ok then do you have anything else to ask regarding
your reservation?</template></category>
<category><pattern>* NO</pattern><that>Do you want me to
continue</that><template>Ok then do you have anything else to ask regarding
your reservation?</template></category>
<category><pattern>No *</pattern><that>Do you want me to
continue</that><template>Ok then do you have anything else to ask regarding
your reservation?</template></category>
<category><pattern>_ No _</pattern><that>Do you want me to
continue</that><template>Ok then do you have anything else to ask regarding
your reservation?</template></category>

<!-- What credit / debit cards are accepted ?
  We currently accept the Visa, MasterCard  -->
<category>
      <pattern>Credit card</pattern>
      <template>We currently accept the Visa, and MasterCard</template>
</category>
<category><pattern>* credit card * accept</pattern><template><srai>Credit
card</srai></template></category>
```

```
<category><pattern>* accept credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* pay * credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* payment * credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>payment * credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* payment * credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* credit card * payment</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* credit card * pay</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* pay * credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* use credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* ACCEPT MASTERCARD</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* ACCEPT VISA</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* ACCEPT VISA * MASTERCARD</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* VISA * MASTERCARD</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* VISA * MASTERCARD *</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* TYPE OF credit card</pattern><template><srai>Credit
card</srai></template></category>
<category><pattern>* TYPE OF credit card *</pattern><template><srai>Credit
card</srai></template></category>

<!--  My credit card number is correct, but it is not accepted. Why ?
  There are a few possibilities:
Your card type is not accepted at the hotel.
The card expiration date precedes the reservation date.
You have reached your credit limit.
There is a computer error. -->
<category>
      <pattern>Credit Card Problem</pattern>
      <template>There are a few possibilities, please check one of these
following:<html:br/>
       1. <srai>Credit card</srai><html:br/>
       2. The card expiration date precedes the reservation date.<html:br/>
       3. You have reached your credit limit.<html:br/>
       4. There is a computer error.<html:br/>
       5. Invalid credit card number.
      </template>
</category>

<category><pattern>* credit card * not accepted</pattern><template><srai>Credit
card Problem</srai></template></category>
<category><pattern>credit card * not accepted</pattern><template><srai>Credit
card Problem</srai></template></category>
<category><pattern>* credit card * not accepted
*</pattern><template><srai>Credit card Problem</srai></template></category>
<category><pattern>credit card * not accepted *</pattern><template><srai>Credit
card Problem</srai></template></category>
<category><pattern>* credit card * not accepted
*</pattern><template><srai>Credit card Problem</srai></template></category>
<category><pattern>* problem * credit card</pattern><template><srai>Credit card
Problem</srai></template></category>
```

```
<category><pattern>problem * credit card</pattern><template><srai>Credit card
Problem</srai></template></category>
<category><pattern>* problem * credit card *</pattern><template><srai>Credit
card Problem</srai></template></category>
<category><pattern>* credit card problem</pattern><template><srai>Credit card
Problem</srai></template></category>
<category><pattern>* credit card problem *</pattern><template><srai>Credit card
Problem</srai></template></category>
<category><pattern>* credit card problem * call</pattern><template><srai>Credit
card Problem</srai><html:br/><srai>help</srai></template></category>


</aiml>
```

APPENDIX 7

Snippets code of Miscellaneous.aiml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<aiml version="1.0.1" xmlns="http://alicebot.org/2001/AIML-1.0.1"
    xmlns:html="http://www.w3.org/1999/xhtml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://alicebot.org/2001/AIML-1.0.1
http://aitools.org/aiml/schema/AIML.xsd">

<!-- This file contains miscellaneous information  -->

<!--Who do I contact if I need help ?
You can call us at (+603) 78054380, we are available from Monday to Saturday, 9
a.m to 7 p.m (GMT+8). -->

<category>
       <pattern>HELP</pattern>
       <template>You can call us at(+603) 78054380, we are available from Monday
to Saturday, 9 a.m to 7 p.m (GMT+8).</template>
</category>
<category><pattern>_
help</pattern><template><srai>help</srai></template></category>
<category><pattern>help
_</pattern><template><srai>help</srai></template></category>
<category><pattern>_ help
_</pattern><template><srai>help</srai></template></category>
<category><pattern>call</pattern><template><srai>help</srai></template></catego
ry>
<category><pattern>_
call</pattern><template><srai>help</srai></template></category>
<category><pattern>call
_</pattern><template><srai>help</srai></template></category>
<category><pattern>* call *
ASSISTANCE</pattern><template><srai>help</srai></template></category>
<category><pattern>* call * ASSIST
*</pattern><template><srai>help</srai></template></category>
<category><pattern>_ call
_</pattern><template><srai>help</srai></template></category>
<category><pattern>contact</pattern><template><srai>help</srai></template></cat
egory>
<category><pattern>_
contact</pattern><template><srai>help</srai></template></category>
<category><pattern>contact
_</pattern><template><srai>help</srai></template></category>
<category><pattern>_ contact
_</pattern><template><srai>help</srai></template></category>
<category><pattern>_
ASSISTANCE</pattern><template><srai>help</srai></template></category>
<category><pattern>ASSISTANCE
_</pattern><template><srai>help</srai></template></category>
<category><pattern>_ ASSISTANCE
_</pattern><template><srai>help</srai></template></category>
<category><pattern>* contact *
ASISSTANCE</pattern><template><srai>help</srai></template></category>
<category><pattern>* contact * ASISST
*</pattern><template><srai>help</srai></template></category>
<category><pattern>_
ASSISTANCE</pattern><template><srai>help</srai></template></category>
<category><pattern>ASSISTANCE
_</pattern><template><srai>help</srai></template></category>
```

```
<category><pattern>_ ASSISTANCE
_</pattern><template><srai>help</srai></template></category>

<!-- Can I have vegetarian food ?
Just select your preference on the special request part of the reservation
form. -->

<category>
      <pattern>VEGETARIAN</pattern>
      <template>Just select your preference on the special request part of the
reservation form.</template>
</category>
<category><pattern>_
VEGETARIAN</pattern><template><srai>VEGETARIAN</srai></template></category>
<category><pattern>VEGETARIAN
_</pattern><template><srai>VEGETARIAN</srai></template></category>
<category><pattern>_ VEGETARIAN
_</pattern><template><srai>VEGETARIAN</srai></template></category>

<!-- What are the check in and check out times ?
Normal policy of hotels displayed on our web site is for check in time from
2:00 PM (14:00 hrs.) and the check out time before Noon (12:00 hrs.) -->

<category>
      <pattern>CHECK IN</pattern>
      <template>Normal policy of hotels displayed on our web site is for
<html:br/>
      1. check in time is from 2:00 PM (14:00 hrs.)<html:br/>
      2. check out time is before Noon (12:00 hrs.)</template>
</category>
<category><pattern>CHECK IN</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>_ CHECK IN</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>CHECK IN _</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>_ CHECK IN _</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>CHECK OUT</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>_ CHECK OUT</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>CHECK OUT _</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>* CHECK OUT *</pattern><template><srai>CHECK
IN</srai></template></category>
<category><pattern>* CHECK IN AND CHECK OUT *</pattern><template><srai>CHECK
IN</srai></template></category>

</aiml>
```

APPENDIX 8

Snippets code of Salutation.aiml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<aiml version="1.0.1" xmlns="http://alicebot.org/2001/AIML-1.0.1"
    xmlns:html="http://www.w3.org/1999/xhtml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://alicebot.org/2001/AIML-1.0.1
http://aitools.org/aiml/schema/AIML.xsd">

<category><pattern>HELLO</pattern><template>Hi there!</template>What is your
name?</category>
<category><pattern>MORNING</pattern><template><srai>good
morning</srai></template></category>
<category><pattern>HELOO *</pattern><template><srai>hello
<star/></srai></template></category>
<category><pattern>HOWDIE *</pattern><template><srai>hello</srai><sr/>
</template></category>
<category><pattern>HALO</pattern><template><srai>hello</srai></template></categ
ory>
<category><pattern>HELLOW</pattern><template><srai>hello</srai></template></cat
egory>
<category><pattern>HELO</pattern><template><srai>hello</srai></template></categ
ory>
<category><pattern>HEY
THERE</pattern><template><srai>hello</srai></template></category>
<category><pattern>HIYA</pattern><template><srai>hello</srai></template></categ
ory>
<category><pattern>HOI</pattern><template><srai>hello</srai></template></catego
ry>
<category><pattern>HOWDY</pattern><template><srai>hello</srai></template></cate
gory>
<category><pattern>HULLO</pattern><template><srai>hello</srai></template></cate
gory>
<category><pattern>MOOSHI
MOOSHI</pattern><template><srai>hello</srai></template></category>
<category><pattern>GTG</pattern><template><srai>bye
</srai></template></category>
<category><pattern>NIGHTY *</pattern><template><srai>bye
</srai></template></category>
<category><pattern>ADIOS
*</pattern><template><srai>bye</srai></template></category>
<category><pattern>ADIOS</pattern><template><srai>bye</srai></template></catego
ry>
<category><pattern>AUREVOIR</pattern><template><srai>bye</srai></template></cat
egory>
<category><pattern>BUHBYE</pattern><template><srai>bye</srai></template></categ
ory>
<category><pattern>BY
BY</pattern><template><srai>bye</srai></template></category>
<category><pattern>BYE
*</pattern><template><srai>bye</srai></template></category>
<category><pattern>BYE BYE
*</pattern><template><srai>bye</srai></template></category>
<category><pattern>BYE
BYE</pattern><template><srai>bye</srai></template></category>
<category><pattern>BYEBYE
*</pattern><template><srai>bye</srai></template></category>
<category><pattern>BYEBYE</pattern><template><srai>bye</srai></template></categ
ory>
```

```
<category><pattern>CHEERS</pattern><template><srai>bye</srai></template></categ
ory>
<category><pattern>CYA
*</pattern><template><srai>bye</srai></template></category>
<category><pattern>Hello</pattern><template><random>
              <li>Hye there</li>
              <li>Hi</li>
              <li>Hye</li>
              <li>Hi there!</li>
              <li>Hello</li>
       </random>What is your name?</template></category>
<category><pattern>*</pattern><that>WHAT IS YOUR NAME</that><template><random>
        <li>Nice to meet you
        <set name="name"><person/></set>
        <get name="name" /></li>
        <li>Glad to talk to you
        <set name="name"><person/></set>
        <get name="name" /></li>
       </random></template></category>
<category><pattern>YOU ARE WELCOME</pattern><template><random><li>The pleasure
was all mine.</li><li>Don't mention it.</li><li>Polite people are
nice.</li></random></template></category>
<category><pattern>YOUR WELCOME</pattern><template>I think you mean "you are
welcome".</template></category>
<category><pattern>YOUR WELCOME *</pattern><template>
<srai>YOU ARE WELCOME</srai></template></category>

</aiml>
```