Online Expert System for forming Project Team

by

Nurul Amira Ismail

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information System)

JUNE 2006

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CERTIFICATION OF APPROVAL

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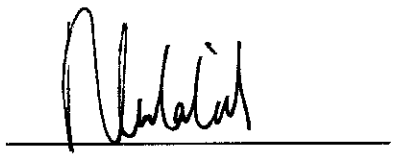
Approved by,



(Mr. Khairul Shafee Bin Kalid)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
JUNE 2006

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 reference and acknowledgements, and that the original work contained herein has not been undertaken or done by unspecified sources or persons.

NURUL AMIRA ISMAIL

ABSTRACT

This report was about the research on how the information and communication technologies (ICT) and the development of tools can help students in higher education learn through communication and collaboration with other learners. The objective of the study was to assist IT/IS students in forming a project team according to their roles and proficiency based on their interest in order to match students ability with the skills needed in a project team. This report provides some theories which are related to the set of skills and guidelines on how to build a project team as well as other requirements in forming a team. By providing example of relevant subjects, it helps to create better view in understanding project team needs. Other than that, this report also includes a sample of merely similar project done by other university but with different approach. These findings can be adapted in the implementation phase of this project.

An online expert system such as this particular system is the alternative method in helping students to form a better project team. All of these findings were found through online research, decision support system book as well as from the information resource center. The results and discussion shows the effectiveness of both methods which are the conventional system and the online expert system. In conclusion, identifying students' capabilities and interest is important so that the selection of team members can be done smoothly and accurately. However, without a well-defined set of skills for each team member's roles, the selection may be difficult and the results may not be as encouraging as people always expected a project team to be. Best selection of team members makes best productivity from the team as well. Furthermore with the combination of other elements such as responsibility, commitment, proficiency and so on will help in gaining team trust and lead towards team effectiveness.

ACKNOWLEDGEMENTS

In the name of ALLAH the most merciful.

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CHAPTER 1
INTRODUCTION

1.1. Background of Study

This system is an online expert system which helps in assisting students in forming a project team based on required criteria of an ideal project team. An expert system is a system that employs human knowledge captured in a program to solve problems that normally require human expertise. In this case, it is the project team formation. The main concern of this study is the formation of project team among students in higher education.

Usually, students would prefer to choose their team members among their next of kin. This is because it is easier and consume less time instead of browsing through the whole class of students to search for a team member. Besides, selecting team members among cliques are more convenient as they already familiarized with the characters of each member of the clique. Moreover, it is easier if the team members are among cliques with well-defined skill and proficiency to be allocated for the suitable team roles. However, it is difficult to identify student's capability since sometimes their interests are inconsistent with their capabilities of working as the required team role.

Thus, a clear justification of team roles requirement need to be identified to match with the available skill and proficiency of the students. A good formation of project team depends on criteria in which the team members have in order to contribute to the project development.

1.2. Problem Statement

1.2.1. Problem Identification

Project related to Information Technology (IT) within any institution usually done in number of teams which basically required technical skills, writing skills, communication skills, etc. among the team members. Usually, in performing any team, students would prefer choosing the team members among their clique. It is an advantage for a team if the clique consists of students with diverse skills since any project can be run as they can contribute their knowledge and skills as well as discuss among themselves based on the related topic during the application of the theory.

However, it is quite an unfortunate for a team which does not have all of the skills needed in order to perform the project assigned by the lecturer. Lack of essential skills may lead to several problems like incomplete system, incompetent reports, or even dysfunctional group.

1.2.2. Significance of Project

There are two techniques which can be used to form a project team namely the conventional method or through the online expert system.

Typically, students will use the conventional methods where all of the team members are selected among their colleagues, whom the knowledge and skills which they have are uncertain. Another way is by using the online expert system where all of the knowledge and skills needed are pre-specified on the website to guide them in selecting their team members. From this system, knowledge and skills of each student are identified and tasks of the project can be allocated based on the given facts.

1.3. Objectives and Scope of Study

1.3.1. Objectives

The objectives of this project are:

- To analyze background of study and overall picture of the system through identification of problem statements and research on skills required in a project team through studies by the academicians around the world
- To design a system workflow through algorithms, flowcharts, rules and other system design tools in order to make the system procedure run smoothly for the development phase of the project.
- To develop a system which will match students interest with the skills needed in a project team and assist them in forming a project team according to their roles and proficiency in order to help in enhancing students performance and skills throughout the project implementation as well as to help in achieving objectives of a project team effectively
- Overall this project was initiated with the goal of assisting IT/IS students in forming a project team according to their roles and proficiency based on their interest in order to match students ability with the skills needed in a project team.

1.3.2. Scope of Study

Basically, the project focuses on providing an efficient system for students of Universiti Teknologi PETRONAS (UTP) to form a project team specifically for courses related to Information Technology (IT) and Information System (IS) programs which concern with the system development class such as Software Engineering, Geographical Information System, Business Application Programming II, Visual Programming, and Computer Project Management. The scope covers the employment of the Information Communication & Technology in collaboration with the expert system in making decision on selecting project team members in higher education. Technically, there are researches on rule-based expert system and project management team. Furthermore, all gathered data and findings will be presented through the system design tools along with the explanations.

CHAPTER 2
LITERATURE REVIEW AND THEORY

2.1. Building a Project Team

In any project we need to get the right team together in order to deliver a successful result. Findings suggest that two contextual factors, team size and the professional experience of team members moderate the relationship between participation and performance. In small teams that consist of experienced members, participation is strongly associated with team performance. Also, in large teams that consist of relatively inexperienced members, participation is significantly related to team performance (Woo Young Choong, 1994).

There are many theories related to formation of a project team such as the Tuckman's Model, Belbin's Team Roles Theory and so on. All of these theories have been adapted in many organizations to perform development teams mainly to proceed with the particular projects (Peter Klaus Schoenhoff, 2001).

2.1.1. Software Engineering Project in Higher Education

However since the scope of this study is more on students in higher education, the research has been narrowed down to some applications which also has been applied in the higher institution.

Birgit Demuth (2001) mentioned that generally, for the early stage of an IT/IS undergrad, they will be introduced with the programming subjects and prepared for the subsequent software engineering courses. The students are taught (among other things) structured programming and verification techniques, sorting algorithms and data structures. The course emphasizes techniques of object-oriented software development including object-oriented analysis (OOA) and

design (OOD) with the Unified Modeling Language (UML), Java-based implementation and design patterns. Commonly, students will go through some steps once committed in a project:

- Initially the students establish a project team with roles (e.g. team leader, secretary, technician, etc) and rules (style guide and management of project documents – more general project conventions, regular dates for project meetings, etc) which are appropriate for a higher number of project members.
- Creates a product description which is signed by the customer. This document is used for evaluation of the results at the end of the course.
- Analyze a complex system and coordinate the analysis work of several project members.
- Focused on the architecture design. This includes the choice of appropriate technologies (e.g. Java Server Pages, Enterprise Java Beans) and software (e.g. Tomcat, JBOSS) used for software development in the project course.
- And finally the software has to be implemented and tested.

The complex project course ends with a public oral presentation of the results. The students also hand over documents like project code, project documentation and an application manual.

Towards the end of the program, the students have completed most of the theoretical lectures. Additionally, they have acquired practical experience in software development by several practical courses, including the basic project course. Most of the students have also acquired practical skills in short industrial projects. Overall, the students should have high skills in carrying small projects supervised by professionals.

However, there are some lines which have brought a project turned down. Apart from the error of coding, students tend to take for granted on the reports and documentation part. This may cause by indistinct project requirements or lack of understanding on how to make analysis and design for a project. Clear line of

reporting is needed and from here, it is known that documentation is very much important as programming itself. A person with good analytical thinking is also needed in order to analyze and ensure the project is within the essential framework. Despite the entire technical requirement for a team, the author also stressed on the importance of team work.

Carolynn Y. Nicholson (2000) mentioned that it is important to document the structure of our project team at the outset. We may want to create a simple diagram that provides an overview of our project team members and communication flows. Then, create a separate table describing each of these roles, the names of those assigned and key contact numbers. This helps ensure everyone is clear about who is involved, what their responsibilities are, and how they may be contacted. Creating this kind of documentation will not take long and will pay off throughout the project: clear roles and responsibilities make it easier for people to work together.

2.2. Project Management System in General Applications

Throughout the research, there are a number of applications which are close to the concept of this expert system. However, there are several elements which distinguish these applications. Those applications are mostly developed by the academicians of the higher institutions from around the world. Though some of them are not exactly categorized as an application, the values obtained from it are very useful in guiding the development of this system.

2.2.1. Student Online Project Planning and Tracking System (SOPPTS)

Jeff Zhang (2003) has collaborated to build a system called *Student Online Project Planning and Tracking System (SOPPTS)*. The system was meant to enhance the communication avenues and the project planning/tracking requirements of student projects for the Ball State University (BSU) software engineering classes. This paper presents the design and assessment of this tool.

SOPPTS has been designed and field-tested to provide real-time feedback from faculty on student project progress, to offer online guidance for project planning and to produce automated tracking of student projects.

SOPPTS has chosen Microsoft Access 2000 as the Database Management System (DBMS), and Internet Information Server (IIS) and Active Server Pages (ASP) were selected as the server-based technology. Compared to *Online Expert System for Forming a Project Team,* SOPPTS approach of selecting team members is the responsibility of the faculty mentors. All of the team plans and their progress must be able to be viewed by the faculty. Furthermore the scope is bigger whereby SOPPTS includes templates for class project deliverables and approximate due dates based on the student project schedule.

The tool assessment included interviews of both students at the undergraduate and graduate level and faculty. The interview was a set of specific questions chosen to document each participant's experience and impressions of utilizing SOPPTS. Data evaluation consisted of compiling the reoccurring themes during the interview process. The major themes that emerged are the increased efficiency in developing, recording and tracking of student project plans, the visibility and immediate accessibility of this information and the improved and timely communication among the student team members, faculty and client partners (Jeff Zhang, 2003).

The system is available at http://www.cs.bsu.edu/gwen/soppts/

2.2.2. An Agent To Support Student Teams Working Online

Janice Whatley (2003) has built an application of software agents which described, aimed at supporting students working on team projects in the online situation. Online teamwork is problematical for a number of reasons, such as getting acquainted with team members, communications between members and

knowing what progress has been made on the project. Therefore, this system has made available of software agents to help in solving the problem.

Unlike the Online Expert System for forming Project Team, these agents have the ability to monitor progress and offer advice by operating in the background to act autonomously when the need arises. Within this system, an agent prototype has been developed to perform a limited set of functions to support students, and the results of a trial carried out using teams working on projects are discussed.

Another value that distinguished this system with the Online Expert System for forming Project Team is that students working face to face introduce themselves to other members of their team and they tell them verbally what their abilities and preferences are instead of using the expert system to identify the students' proficiency.

As the results, this system was tested with seven teams working on projects in systems development, as part of their undergraduate program. Afterwards, some questionnaires regarding the usefulness of the system to the students are being distributed and feedbacks are obtained. Evaluation of the prototype has shown that the concept of an agent for supporting learning tasks is largely acceptable for students and tutors. There is considerable potential for agent systems to help students in their learning, particularly agents to help with team working when the students are widely dispersed.

2.2.3. Quantum Leaps in Blended Learning: an Online Project for Physics Students

Kate Wilson and Paula Newitt (2005) studied the experiences of a group of students in a second year quantum mechanics course has been done as they undertook a short project to develop a web site. Typically, 'blended learning' is used to refer to the provision of a mixture of face-to-face and online learning and assessment activities by the teachers of a course. In this case, it was the students themselves who were engaged in developing online resources to be shared amongst the class, and beyond.

The students worked in small groups to develop web sites introducing some aspect of quantum physics to a wide audience. The differences about this project with the online expert system is that the project required students to find their own topic (unlike this online system where team leader has the major responsibility to decide on the topic), form their own groups, determine what would be on the web site, and agree on how they would go about creating it. Since most students did not have previous experience in web design, and group members had to attend external tutorials to gain the necessary skills. The assignment was monitored through reflective diaries, focus groups and observation of online discussions.

In the end, the students found value in the assignment well beyond the developed understanding of an area of physics. They learnt useful skills in information and communication technology, including web design; they developed a stronger sense of community within their class and a stronger sense of identification and community with professional practitioners within the discipline, including their lecturers.

CHAPTER 3
METHODOLOGY/PROJECT WORK

3.1. Procedure Identification

As for this project, the development methodology used is **evolutionary development** method which basically based on the idea of developing an initial implementation, getting feedback from users and refines the system through many versions until a satisfactory system has been developed. Development and validation activities will be carried out concurrently with rapid feedback across these activities.

3.1.1. Evolutionary Development

Evolutionary development has 4 stages; outline description, specification, development and validation. Also at the final 3 stages, prototype development was done concurrently with the other 3 activities.

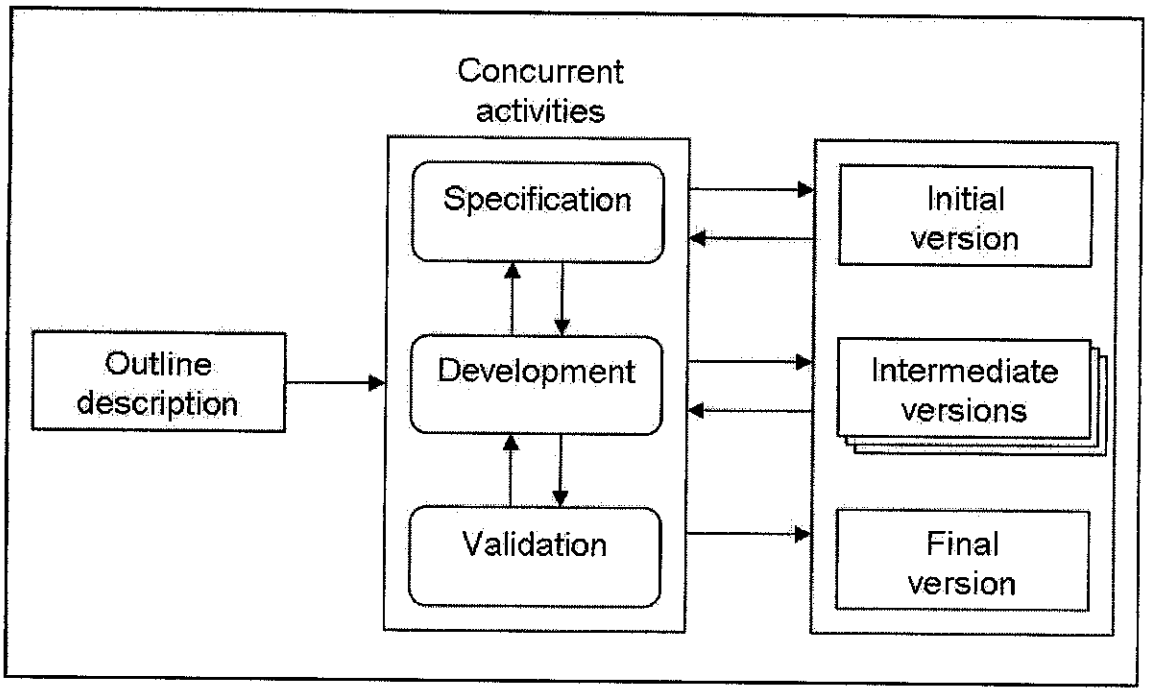

Figure 3.1: Evolutionary Development

- **Outline Description**

Outline description stage was an initial stage of overall development of the project. During this phase, several discussions were carried out between the author and the supervisor about the overall picture of the system so that the basic requirements in the expert system were not left out.

The main problems were to be identified at this stage. The author will list down what area of knowledge need to be capture for the expert system from the supervisor. The supervisor identified the problem area, solution steps and decides whether the knowledge is crucial for the system or not. . Preliminary requirement analysis was produced as a guideline of the project. The tool that used for the development of the project was selected in this stage.

- **Specification**

Specification phase was a stage where results from discussion during outline description were made more specific and detail. Full knowledge acquisition steps were performed after outline description stage as it was the continuation of the discussion with the supervisor. Furthermore, comprehensive research on the study of the basic concept of the artificial intelligence's field, comparison between the conventional system and the expert system, the structure, the application of expert systems on the web and so on has been done. Besides, the requirements needed in forming a team as well as several issues related with project team has been done through online and several relevant books and journals.

Also in this phase, the author designed the flowchart of the system for the preparation to start prototyping development stage. Flowchart served as a medium to plan and structure the system before the actual prototyping/development stage occur.

- **Development**

In the middle of the stage is the actual programming started. Here, the appropriate software and hardware tools as mentioned below are being applied in order to facilitate the project development process. Using rules which have been prepared together with the supervisor, each part of the system was incrementally developed and referred back to him for feedbacks. This development stage was a task of the author and the supervisor just act as evaluator to the overall process. The result of this phase was intermediate version of prototype system as it still needs to be refined and validate until complete before being called as final system.

Whenever the author felt the system was missing important requirement, the project can always go back to the specification stage to check back on the requirement and improve any area that need improvement. Evolutionary development is a very flexible methodology thus allows the project to be reassessed.

- **Validation**

Validation stage was the final phase of the overall project whereby prototype from development stage was evaluate and check by both supervisor and the author to make sure all requirement for the project had been fulfilled. The outcome of this stage was the final version of the prototype or can be called as complete expert system for this project. This stage also allows flexibility between 2 phases (development and validation). It was going back and forth of these 2 phases until the project was completed.

Here the system used by a group of students to take notes on their response on which system is applicable for them; the conventional way or through online expert system (please refer to section 4.3 for the evaluation results).

A conventional system of forming a project team refers to the process of selecting team members of a project team by randomly choose them among the nearest colleagues. Usually the team members are selected within cliques since they have known each other better. While the online expert system helps in contributing the same solution for problem area by utilizing the technology of expert system.

Thus, on March 2006 a group of students which majority of them is from year 5 semester 1, taking Geographical Information System (GIS) course has been chosen to help in the evaluation on the effectiveness of the online expert system in comparison with the conventional system. This course has been chosen as it involves project related to the system development integrated with GIS applications by project team. These students are divided into 2 groups in which 1 group formed their project teams using the online expert system and the other group used the conventional system. In each group, they are divided into two teams to evaluate the team effectiveness within the same method. Table below shows the team distribution throughout the evaluation.

Group A (expert system)		Group B (conventional system)	
Team 1	Team 2	Team 3	Team 4
Student K	Student P	Student V	Student D
Student L	Student Q	Student W	Student E
Student M	Student R	Student X	Student F
Student N	Student S	Student Y	Student G
Student O	Student T	Student Z	Student H

Table 3.1: Students distribution for methods evaluation

During the validation stage, these students were asked to form their project team according to their respective group methods. For Group A (expert system), there are 10 students working with the expert system to form 2 project teams (Team 1 and Team 2). Initially 2 students among the 10 were

selected by the lecturer as the team leaders of each team as regard to their potential area. The other 8 students in the group were guided to use the expert system to fill in their academic background whereby sets of questionnaire have to be answered in order for the system to calculate their average score and determine in which team they are belong to. The team leaders were guided as well to use the expert system in order to select their team members according to the preferred role criteria along with the rate of commitment and proficiency. The results of the role matching process were then displayed and both of the teams met together to proceed on their next tasks for their project.

As for the group which used the conventional system, they were also divided into 2 teams (Team 3 and Team 4). These students were divided into separate teams in order to evaluate on the effectiveness of the team (what makes the team successful in comparison with the other team using the same method?).

Finally, the results of this experiment were found whereby at the end of the project period, they were given sets of questionnaires to evaluate on the effectiveness of each project team. The evaluation results are discussed in the results and discussion section (please refer to section 4.3) and the documentation is being prepared to conclude on the overall research and experiment, which is basically to know which method can be applied to assist the student to form a project team, whether through the online expert system or just by using the conventional way.

3.2. Tools

After several analyses and testing of tools, the author has decided on using the ASP.Net framework with the integration of the Microsoft Developer Network (MSDN) as the platform for the development of the system.

3.2.1. Hardware

The hardware used for the development of the system is a personal computer with Microsoft SQL server installed in it as well as the following specifications:

- CPU with processing speed at least 1.5GHz
- 256MB RAM
- 20GB of hard disk storage
- 15" monitor
- Standard motherboard, speaker, keyboard and mouse.
- Floppy drive, Optical drive, USB port

CHAPTER 4
RESULTS AND DISCUSSION

4.1. Research results

As stated before, an IT/IS related project team should contains well defined roles in each of the team member. The findings of the team members' skill sets are analyzed to be adapted in the selection of team members system.

4.1.1. Skill sets for team members

According to IT/IS program in UTP, students taking these programs should be able to acclimatize in programming courses, system development courses, computer related courses, management courses, financial management courses, language courses and other related courses. Thus, as for this system, these courses have been taken into consideration and will be applied into the skill sets requirement of a project team. A team member with roles as shown in Table 4.1 should have at least one or two major skills in the related courses. To make them more comprehensive, the roles are divided into two categories namely the technical and business category. These categories are divided into several major roles which are not necessarily being carried by only one team member.

Role Category	Role	Minimum Requirements
Technical	Programmer	• Programming I (C Programming) • Introduction to C++ Programming • Data Structure • Visual Programming (Visual Basic) • Internet Programming (XHTML, PHP, JavaScript) • Object Oriented Programming (Java Programming) • Business Application Programming I/II (SAP R/3) • Website Development and Programming (XHTML, PHP, JavaScript, Macromedia Dreamweaver MX) • Interactive Multimedia Interactions (Macromedia Director MX) • Computer Network Management (MAX Enterprise) • Computer Graphics (OpenGL using C++) • Computer Vision and Image Processing (MATLAB 6.5.1) • Network Multimedia Systems (Microsoft Windows Server 2000)
	System Analyst	• Systems Analysis and Design (System Architect) • Database Systems (Oracle) • Management Information System • Operating System and LINUX (Red hat) • Data Communications • Software Engineering (System Architecture) • Decision Support Systems • Knowledge Management (Protégé) • Geographical Information Systems (Autodesk Map 3D)
Business	Report Writer	• Technical & Professional Writing • Computer Project Management
	Presenter	• Professional Communication Skills

Table 4.1: Minimum requirements for roles of IT/IS project team in UTP

4.1.2. Sets of questionnaires

Since the objective of this system is to assist IT/IS students in forming a project team according to their roles and proficiency based on their interest in order to match students ability with the skills needed in a project team, four (4) sets of questionnaires have been produced according to the roles of IT/IS project team in UTP. These set of questionnaires consist of three (3) questions for each roles. For instance, there are 3 questions related to the programmer role. These questions will be answered by the normal students in order for the system to do the matching calculation. Please refer to Appendix I for the academic background sets of questionnaires.

4.2. Online Expert System for Forming a Project Team

Based on the research findings, an online expert system will be built for forming a project team in order to assist students in project development. However, this system approach differs from the other existing system approach whereby the main focus is more on the selection of an IT/IS project team members.

4.2.1. Context Diagram

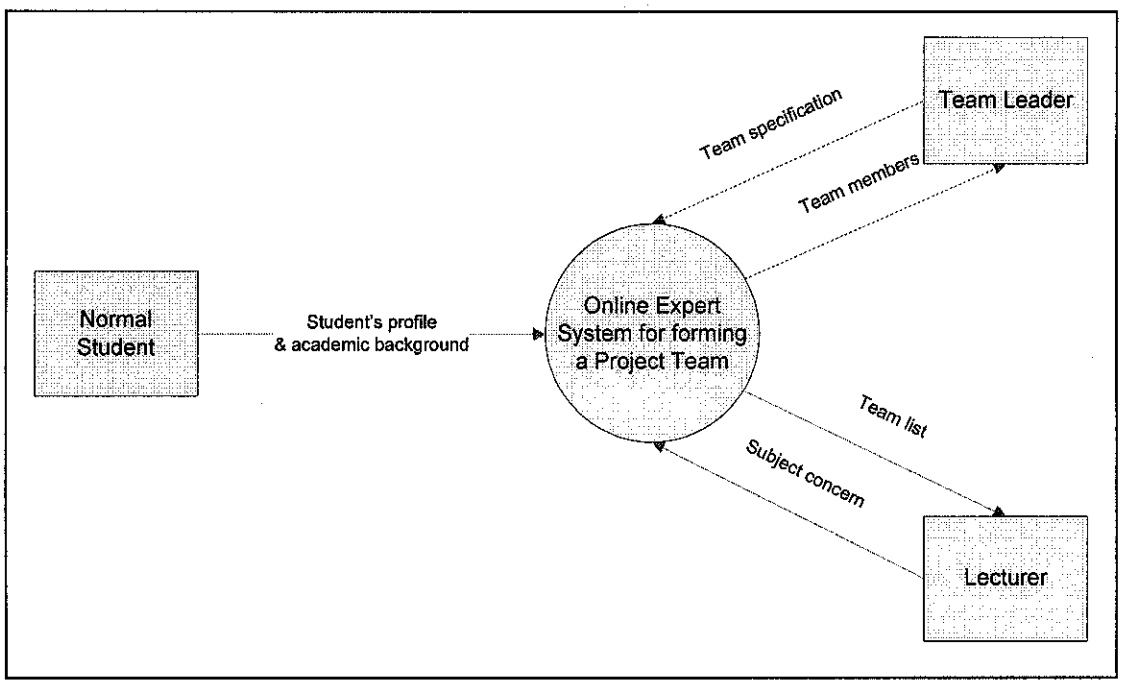

Figure 4.1: Context diagram of the online expert system for forming a project team

The above context diagram represents the online expert system for forming a project team as a whole. There are three entities involves in the system namely the normal student, the team leader and the lecturer. All of them are interconnected through input and output linked with the system.

The expert system receives input from normal student whereby information about student's profile and academic profile are being transmitted. There is also information being transmit from the team leader assigned by the lecturer according to the potential proficiency. The team leader will specify the team specification such as team name, measurement of team members and so on to the system.

After calculation of scores and role matching process, the results of team members are being notified to the team leader while the lecturer will obtain the list of project team according to the subject concern.

4.2.2. System architecture

Online expert system for forming a project team basically consists of five (5) main component in the system architecture namely the user interface engine, system engines, data resources, system management and delivery platform (see Figure 4.1). All of these components are interconnected with each other mainly using the input given by the users which are the normal students, the team leader and the lecturer.

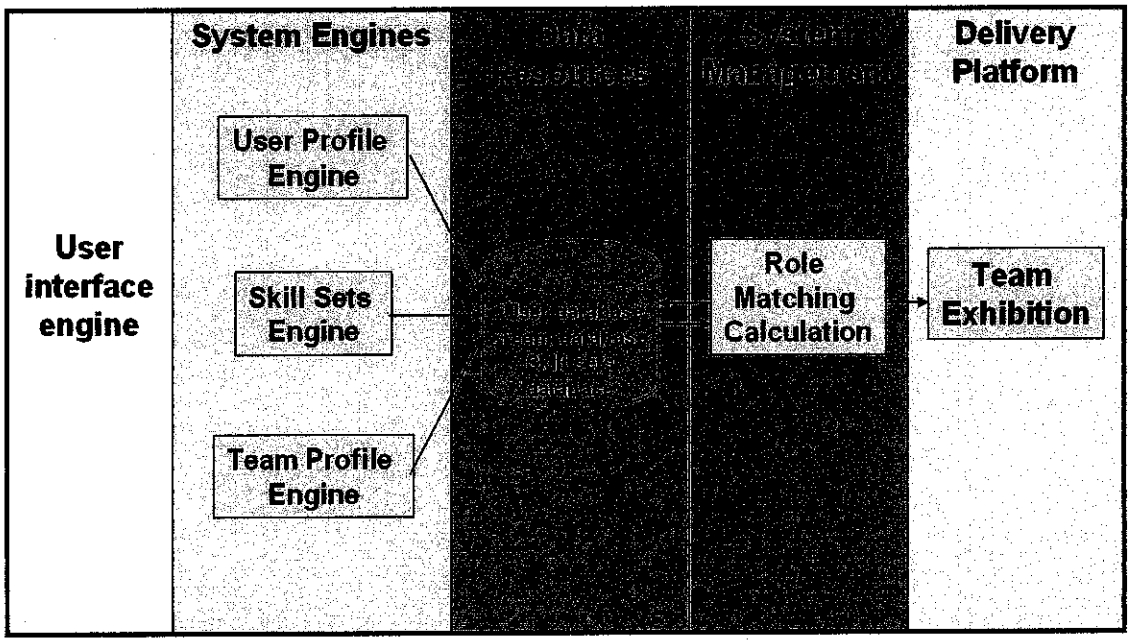

Figure 4.2: System architecture for the online expert system for forming a project team

The User Interface engine (UIE) is responsible for the dialogue between the users and the system. Thus, UIE allows users to interact with system engine in order to obtain or provide information. When interacting with users, UIE establishes relevant background knowledge and guide users for the next task in the system engine.

The User Profile engine is responsible for creating and maintaining users' profiles mainly the normal student's profile. The Skill Sets engine acquires the user's skills through the provided questionnaires. While the Team Profile engine is responsible for creating and maintaining project team's profile.

Data related to these engines are stored in the system data resources which comprise the following databases:

- User database
- Team database
- Skill sets database

Role matching calculation will be done within the system management where the scores obtain from the skill sets database are accumulated and matched with the requirement of team members by the team leader. This is the critical part as here the system plays it major role as the expert system to calculate and match results simultaneously. The matching system is done through the if-then-else algorithm which helps in determining the best match team members for the project team. The algorithm is illustrated in the next section (***4.2.3.4 Selection of team members***).

In the end, the results will be exhibited in the delivery platform whereby the team leader is informed about the project team accordingly right after the team specification. As for the lecturer, he/she will be informed according to the specific subject taught by them.

4.2.3. Business process

System flow of the system has been defined for better understanding by gradually explain on the selection of team leader by the lecturer, normal student's profile and academic background entries as well as project team specification by the team leader. Then the system flow proceeds with the selection of project team members and lastly retrieval of team members.

4.2.3.1.Selection of team leader

Initially, team leader will be selected among the students taking subject particularly from IT/IS courses. The team leaders are selected by the lecturer based on their performance of previous related subjects. For instance, if the lecturer were to select a team leader from Business Application Programming II subject, he/she would refer the student's performance of Business Application Programming I subject. Apart from that, the lecturer would also select them by evaluating their potential performance during the semester or also by doing other fair methods.

4.2.3.2.Normal student's profile and academic background entries

The flowchart in Figure 4.3 shows the next step of the system flow. Once the normal students open the web page of the online expert system, they would have to fills in their basic profile such as name, ID, course of the project, email and phone number (see Figure 4.4). The term "normal student" is used in order to differentiate between the selected team leaders with the rest of the students. After that, they would have to answer some questionnaires related to the academic background such as programming, system analysis, report writing and presentation (see Figure 4.5). After confirmation of those details, the responses/answers are then need to be submitted in order for the expert system to process the information.

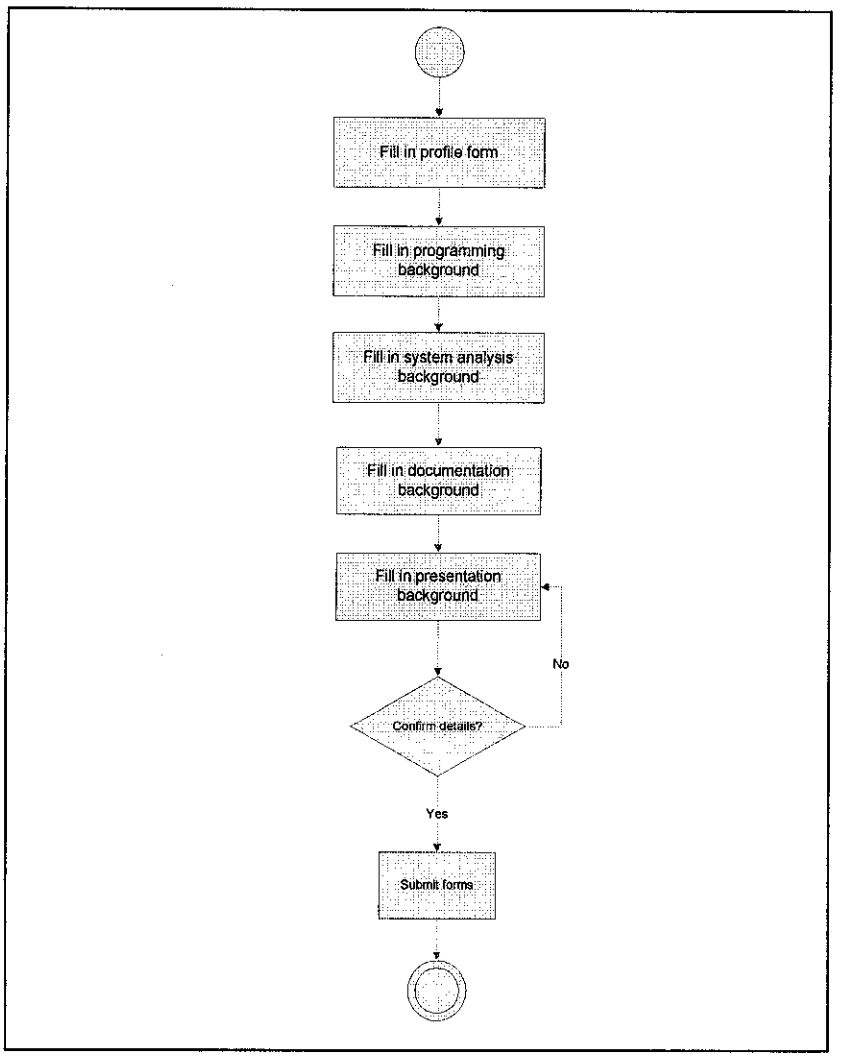

Figure 4.3: Flowchart for normal students to create profile and academic background

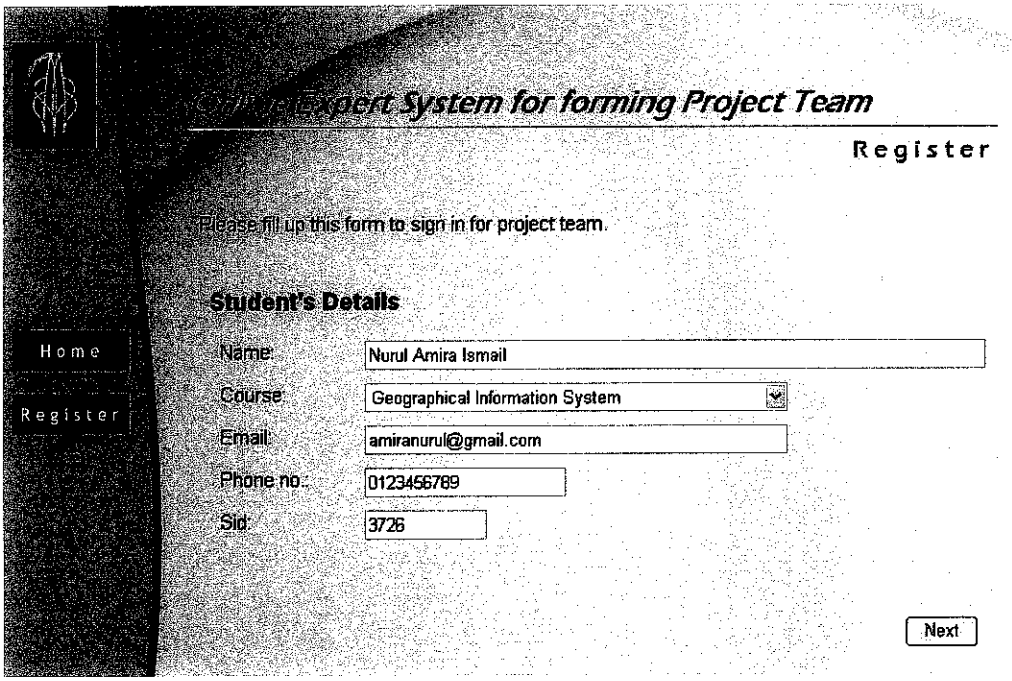

Figure 4.4: Screen shot of registration page for normal student's details

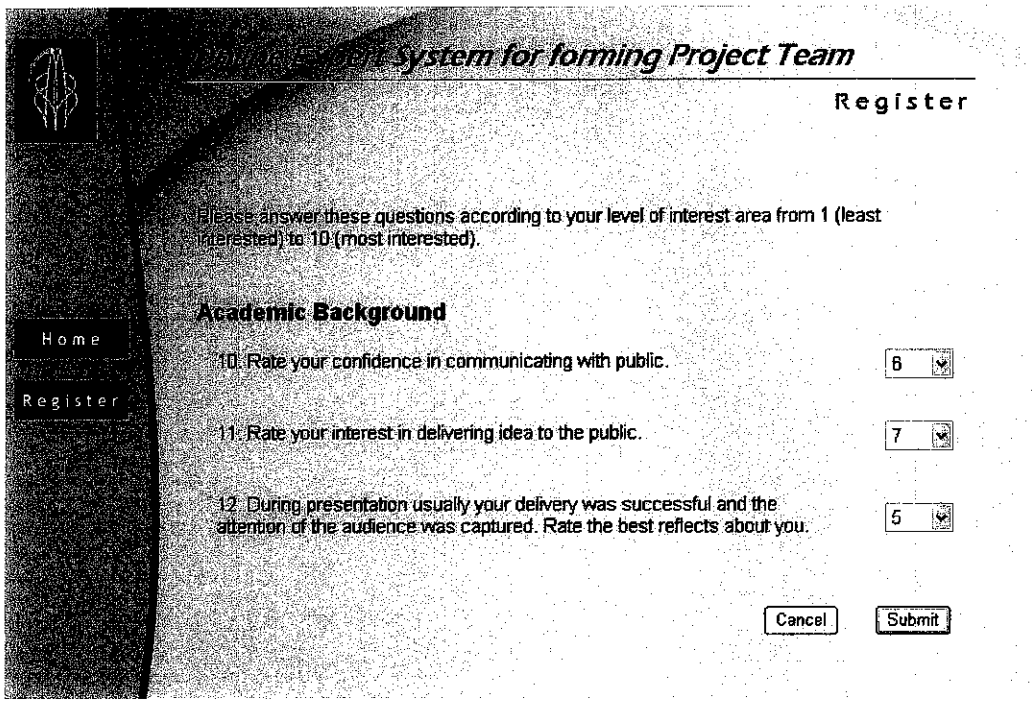

Figure 4.5: Screen shot of registration page for normal student's academic background

4.2.3.3.Project team specification by the team leader

The process of project team specification by the team leader is based on Figure 4.6 below.

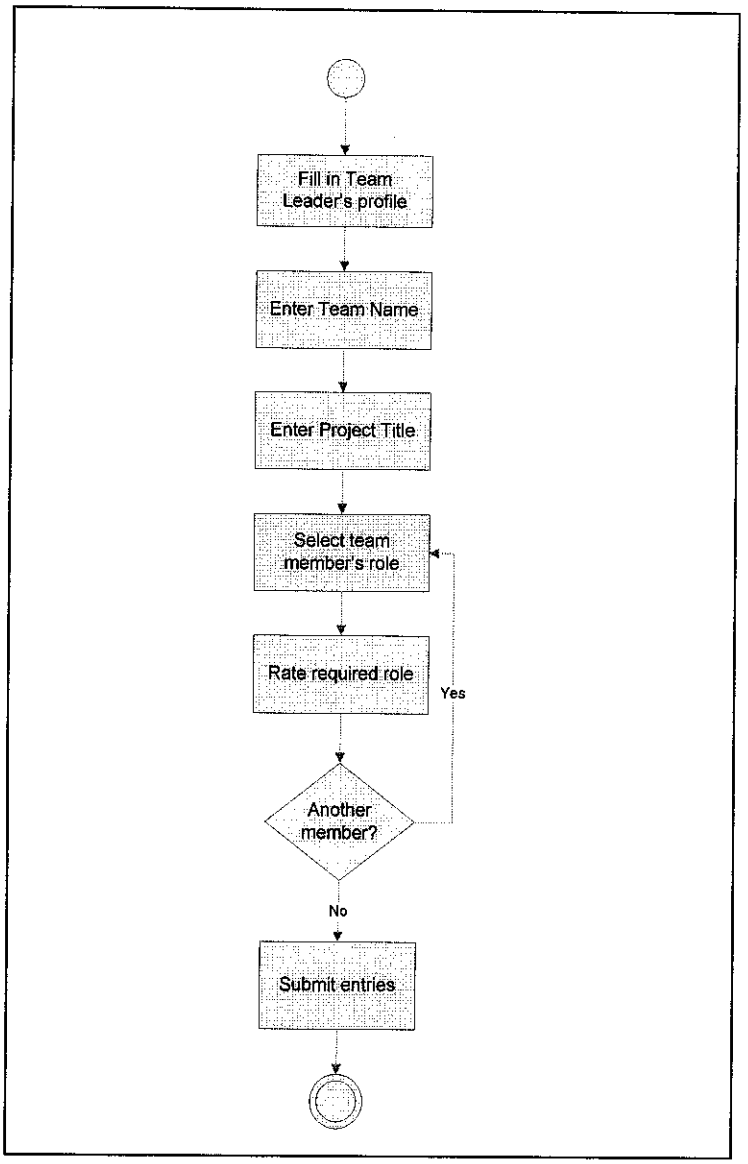

Figure 4.6: Flowchart of the project team specification by the team leader

On a certain particular date, the lecturer would allow the team leaders to specify the team criteria through the online expert system. Once open the web page, the team leader would have to enter their name, student id and course of the project as well as the team name and project title (see Figure 4.7).

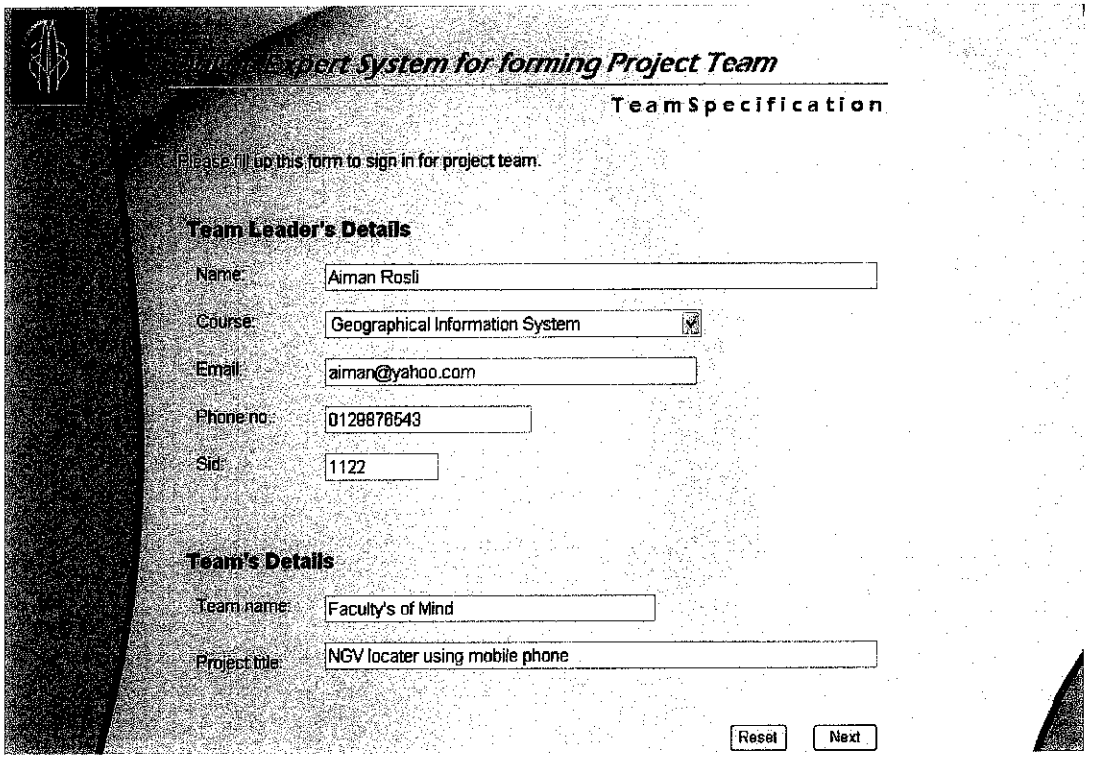

Figure 4.7: Screen shot of team specification page for team leader's details and team's details

At this point, a team leader plays a major role since they have to decide on the team name and project title by themselves. However in some cases, the project titles are listed by the lecturer to be chosen and team leader might also ask for the lecturer's guide in choosing the best project title.

After that, he/she would have to specify each individual team role along with the preferred rating. The rating indicates student's proficiency for certain roles (1 = least proficient until 10 = most proficient). For instance, if the team leader needs a member with high commitment and proficiency in programming for the team, the team leader would specify a high rated role of programmer (see Figure 4.8).

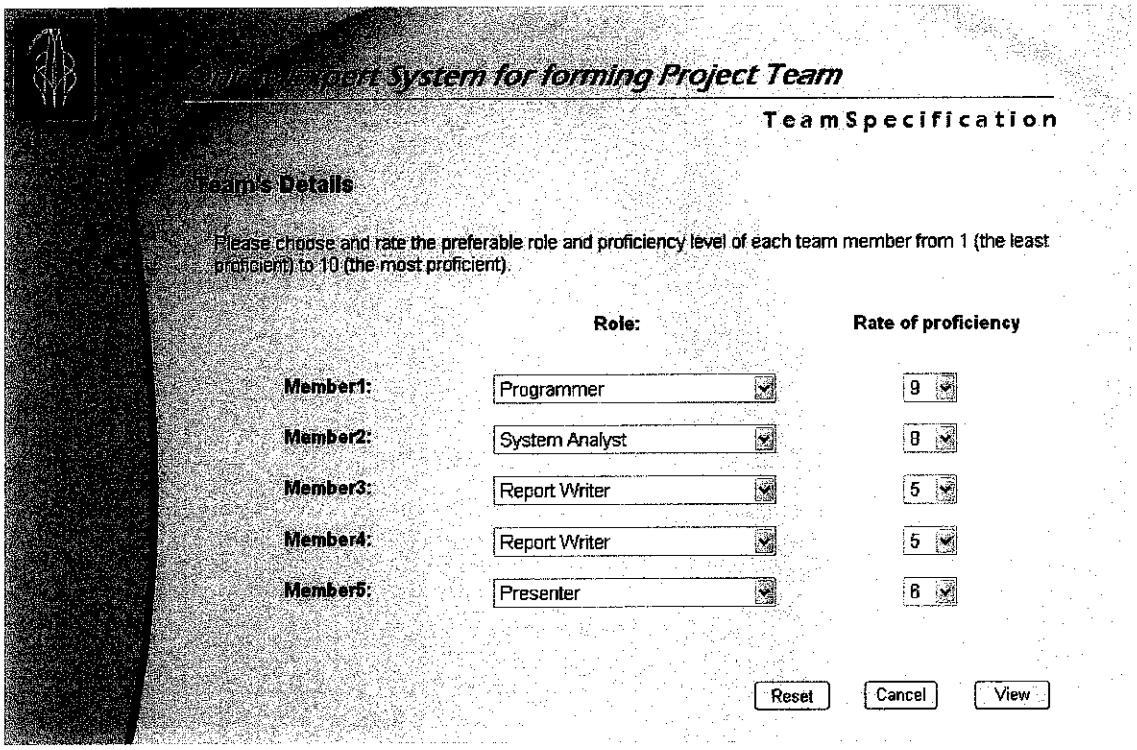

Figure 4.8: Screen shot of team specification page for preferable team members' role and rate of proficiency

The process continues until the last number of specified member. Note that the maximum number of team member selected is limited up to 5 students only since according to the observation on the number of team members, each IT/IS project team is usually around 5 to 6 members which is including the team leader.

After that, the entries should be submitted in order for the expert system to process the information in selecting the team members.

4.2.3.4.Selection of team members

The selection of team members are described based on Figure 4.9 below.

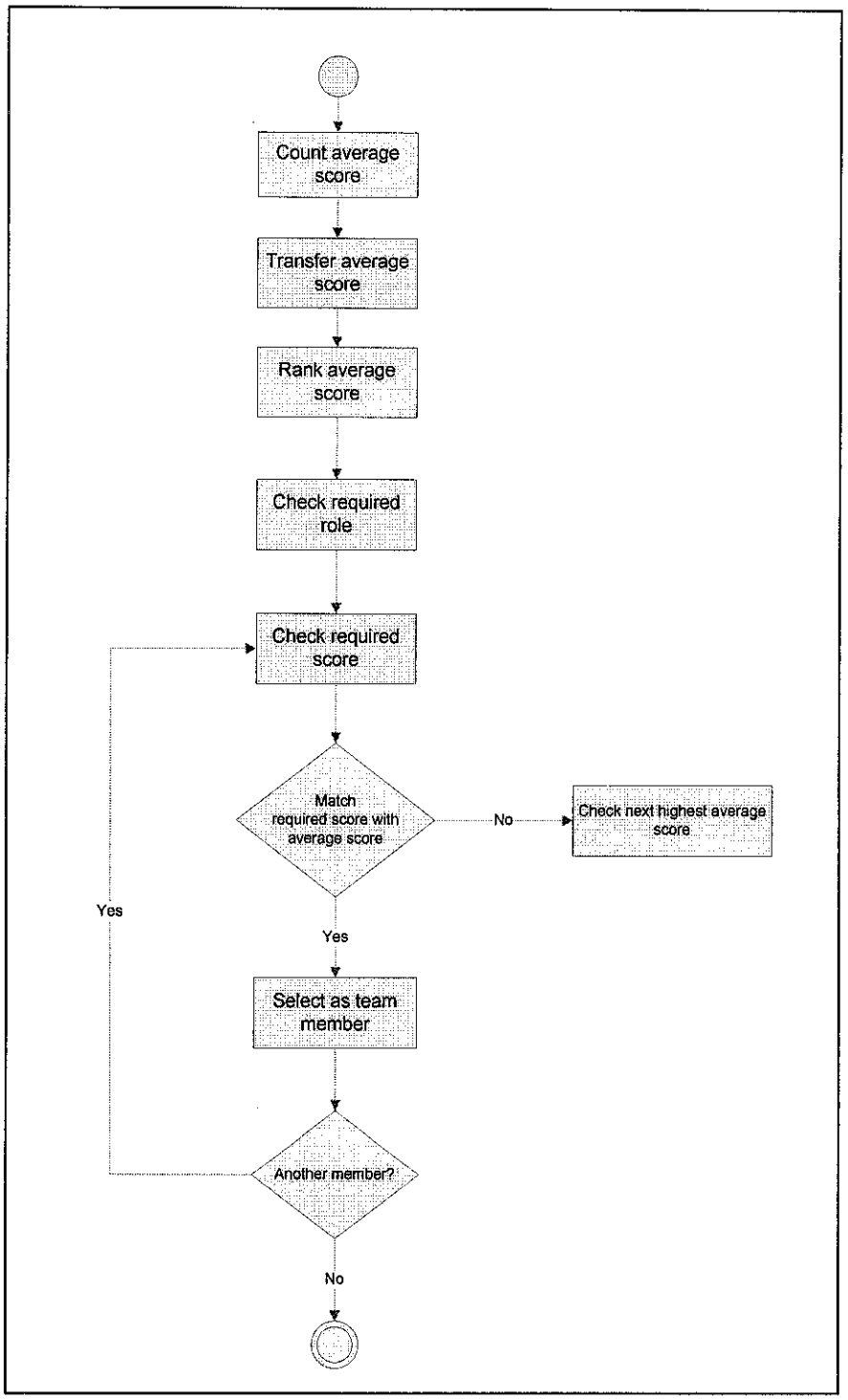

Figure 4.9: Flowchart of team member's selection by the system

The flowchart from Figure 4.9 shows that the selection process starts from checking the scores of the normal student's questionnaire. This process is handled within the system management component of the system architecture. As mention previously, the questionnaire consists of four (4) sets of questions according to roles. The system will count each of the question set and come out with the average scores as shown below

$$Avg\_score = (Q1 + Q2 + Q3) / 3$$

$$*Q = question$$

After that, the average scores will be transferred to each role table (table programmer, table system analyst, table report writer and table presenter). From each of the table, the system will rank the scores from the highest to the lowest. For instance, if the student gets 7 as the average score for programming set of question, the score will be transferred to the table programmer to be ranked afterwards. Figure 4.10 shows how the students' score being ranked by the system given score1 is the initial average score for each role table.

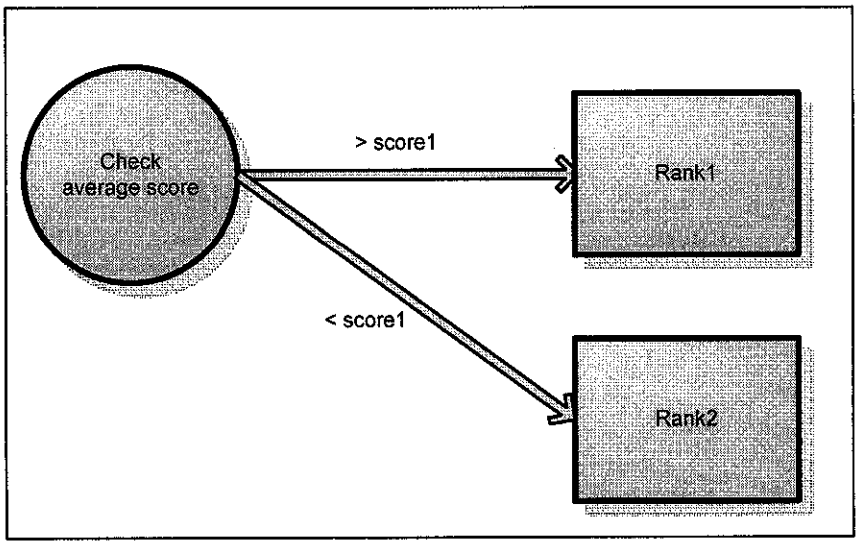

Figure 4.10: Tree diagram for ranking process

From this diagram, the process will be done through the if-then-else rule as below.

if *avg_score > score1* ***then***
    avg_score = rank1
else
    avg_score = rank2
end if

For instance, after student A has submitted the form and questionnaire, the system will accumulate his average score for each set of the question. All of the average scores are then transferred to each table in the database according to each role to be ranked. If student A gets 9 out 10 for his programming average score, he will be ranked for first place. However, if there is another student with higher average score, then student A will be ranked at the second place.

Subsequently, matching system will be done whereby the system will match the scores of each role with the requirement by the team leader. Overall the role matching process is done through the searching algorithm as depicted below:

Loop

Group the students into groupings.

The name of the group is based on the score.

End loop

Perform role matching function

If** required score matches average score **then

Perform selection of team members

Else If** required score does not match average score **then

Minus 1 from required average score

Perform role matching function

End if

End if

A team member will be selected according to team leader specification from the previous session. If the team leader selected TeamMember1 should be a programmer, the system will check the list of programmer candidates in the Programmer table. The selection of this programmer depends on the matching number of the candidate's average score with the rate specified by the team leader. Once a match found, the candidate will be selected as the team's programmer. If there is no match found in the Programmer table, then the system will select the next top high score within the list. This process is applied to the next roles specified by the team leader.

For instance, if team leader X has required a team member with high commitment and proficiency in programming (let's say team leader X has rated 9 for the programmer of the team), student A, who has the average score of 9, will be selected as the programmer of the team after the matching process has completed. If there is no student with the average score of 9 in the table, as required by the team leader, the system will select student with the next top high score (e.g. average score of 8) as the team's programmer. If

there is another member needs to be evaluated, then the system will continue looping the selection process. Otherwise, the selection process has come to an end. To avoid redundancy, once the student has been selected for a team, his/her scores for another role in other tables will be eliminated.

4.2.3.5.Retrieval of team members

Finally, the team leader can get the list of team members after the system process has been done which is right after the team leader click the View button (see Figure 4.11).

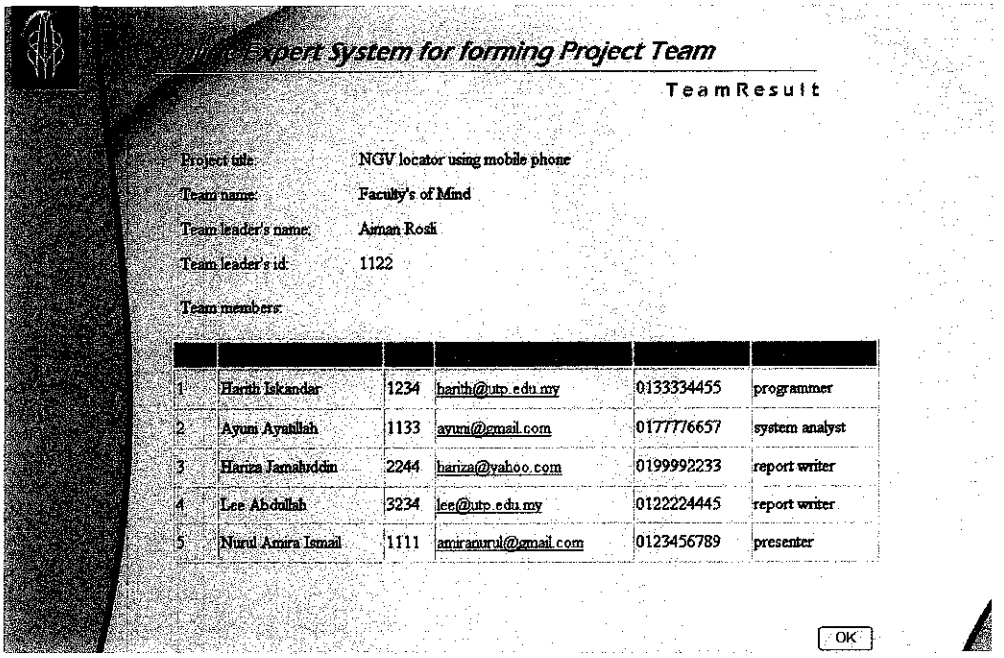

Figure 4.11: Screen shot of team result page showing the project team details after team specification by the leader

As for the lecturer, they will only have to log in and select their respective courses to view the list number of students according to the specific teams (see Figure 4.12).

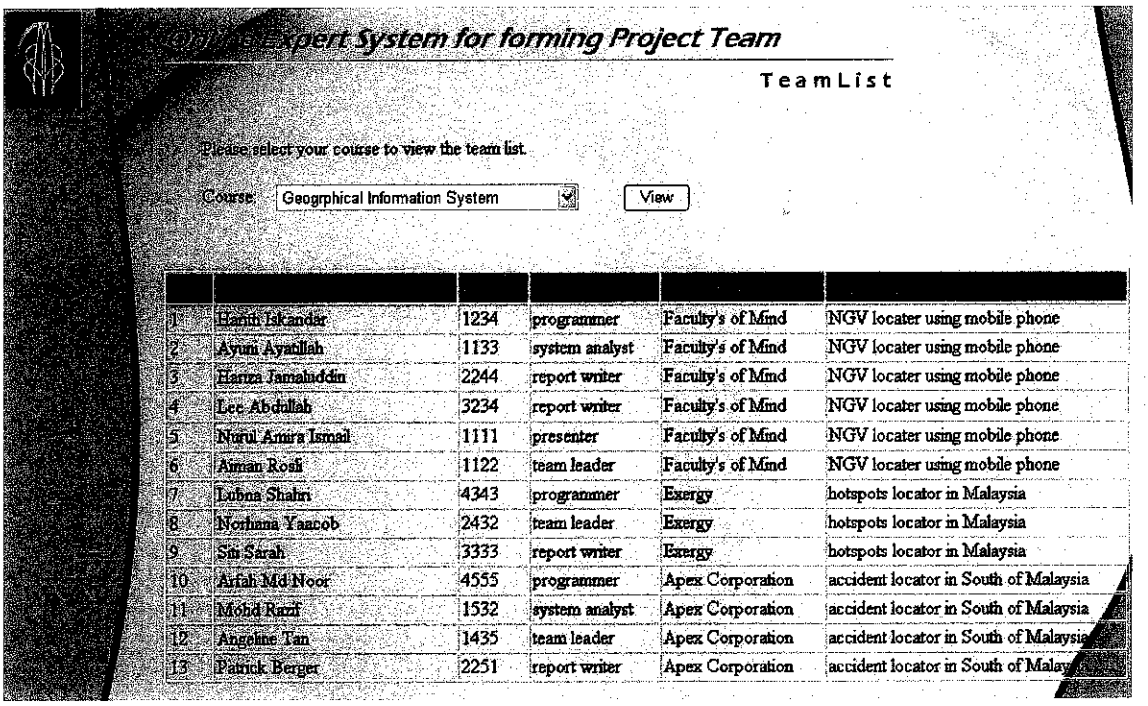

Figure 4.12: Screen shot of team list page from lecturer module showing the list of students according to project team

Then the student will be informed in which team they should be joining and project plan among the team itself may be taken into consideration afterwards. With the students' details which come along during the notification, the project team members can contact each others easily. Perhaps with the cooperation and teamwork by each member will ensure the successfulness of the particular project throughout the semester.

4.3. The evaluation of methods comparison: Online expert system vs. conventional system

As part of the validation stage of this project, an evaluation in determining the most applicable system to use in forming a project team has been conducted among the project development students. Students of Geographical Information System course which have been selected in the testing were given a set of questionnaire to evaluate the effectiveness of using both methods throughout their project period. This questionnaire, which has been distributed on the submission of project work (4th of May 2006), is divided into 2

sections namely team trust and team effectiveness. There are 14 questions of team trust and 6 questions of team effectiveness to be answered. Please refer to ***Appendix II*** for the evaluation questionnaire.

4.3.1. The result on team evaluation

As a result, it was found that Team 2 and Team 3 have succeeded in the project whereby both of them reached the highest level of team trust and team effectiveness. These 2 criteria were implemented in determining the most applicable system to use in forming a project team. Team trust determines the team members' interest, responsibility, commitment and proficiency throughout the project life cycle. While team effectiveness shows the overall performance of the project team remarked by the team members themselves as well as their level of satisfaction working within the team. The result shows each team final project outcome. Below are the graphical results illustrated in table and graphs of team trust, team effectiveness and team performance which is their project score marked by the lecturer.

		Team trust (average score)	Team effectiveness (average score)	Team performance (out of 25 marks)
Group A	Team 1	40.6	17.2	8
	Team 2	49.6	22.8	14
Total		90.2	40	22
Group B	Team 3	45.2	20	10
	Team 4	35.8	13.6	6
Total		81	33.6	16

Table 4.2: Results of each evaluation team according to team trust, team effectiveness and team performance

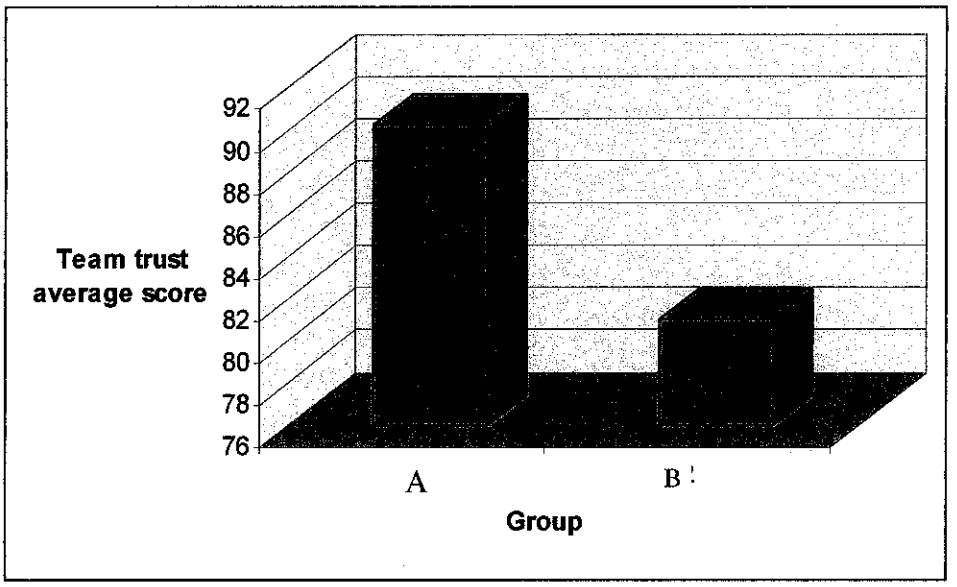

Figure 4.13: Comparison in term of team trust between using the online expert system and the conventional system for forming project development team

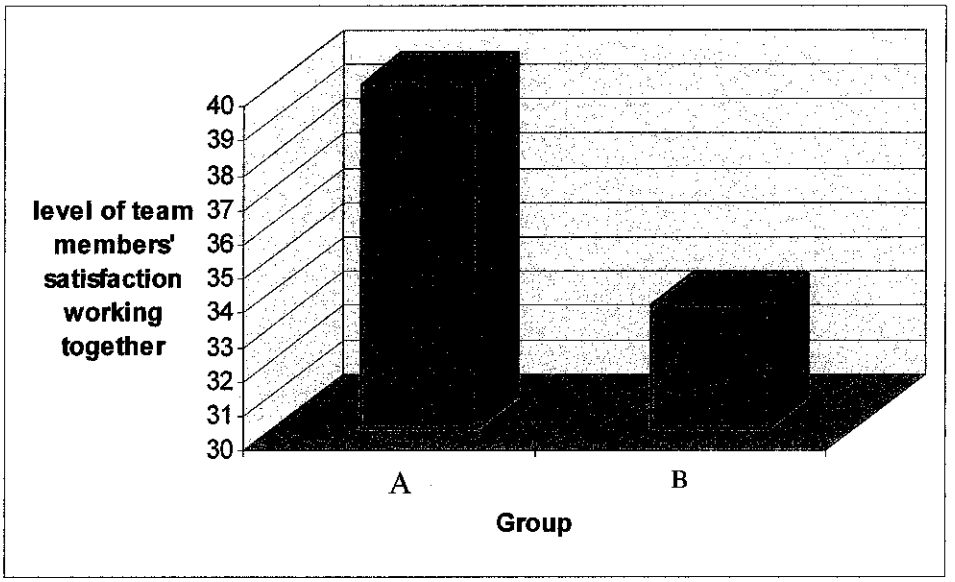

Figure 4.14: Comparison in term of team effectiveness between using the online expert system and the conventional system for forming project development team

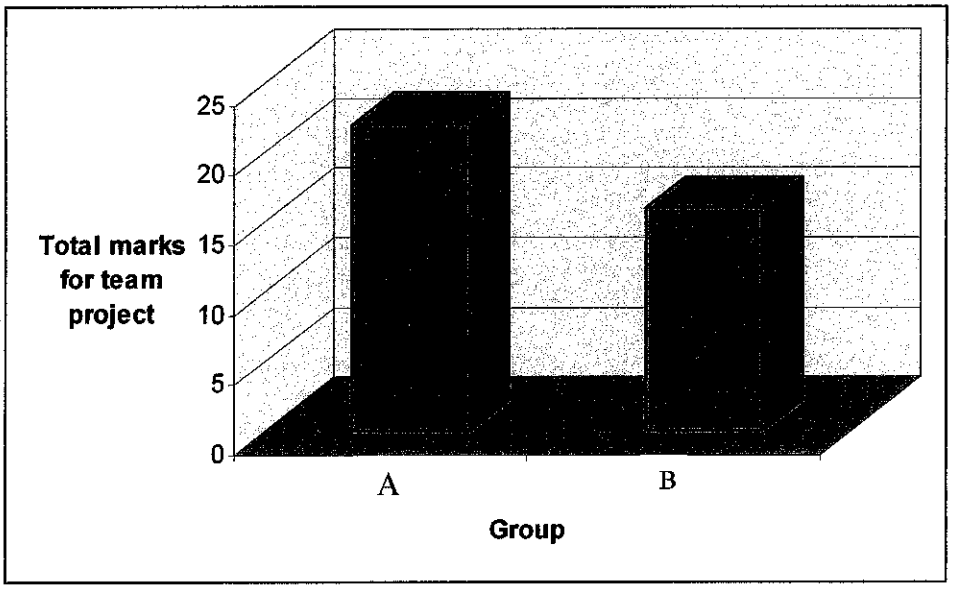

Figure 4.15: Comparison in term of team performance between using the online expert system and the conventional system for forming project development team

As depicted in the table and graphs, it was found that Group A which used the expert system has the highest level of team trust and effectiveness with total of average score of 90.2 while Group B's average score is 81. Group B only gained 33.6 for its team effectiveness and total of 16 marks for their team project. Group A has 40 for its team effectiveness and 22 for their project team performance. For details of system evaluation scores, please refer to ***Appendix III***. Next section is the discussion of further explanation on the analysis.

4.3.2. Discussion on the factors contributing to the team results

As for the research on the factors which contributed to the success and failure, each team was interviewed and observed directly and indirectly throughout the experiment period, which is from the beginning of selecting the team members, the corporation and contribution of works and ideas, the way each team member handled each team role and responsibilities until the evaluation of team by each of team members.

In point of fact, the factor which contributed to Team 1's failure as a team was identified from the first stage which is the act of taking things for granted. During the evaluation of self-interest in the academic background process using the expert system, some of the students were not seriously rated their interest according to their own actual rating. This act led the expert system calculated the scores and miss-role them for the inappropriate role. For instance, one of the students has not seriously evaluated his self-interest in the academic background in searching for the best role which will fit him afterwards has ended him up as the programmer of the team in which unfortunately not his interest area. The missed-role has led him to lose of commitment since he has no interest and even more capability in the programming area. Throughout the project period, the team has faced several difficulties particularly in the technical area since they were lack of members whom has the interest and capability in the programming area. Due to this internal conflict, the team has lost trust and became ineffective which resulted to them to get low marks in the project.

Unlike Team 2 which has succeeded as an effective team, it was observed that they have well-incorporated among each other with good communication and participation from each team member. With the high level of interest of each team members towards their roles and responsibility attained from the expert system, they managed to give their fullest commitment and contribute well towards achieving the team's objective. By taking each responsibility professionally and gained trust from each other, they finally have come out as the most effective team from the other 4 and the result of their project was also excellent.

Although the level of proficiency was not at the highest level, things also going well with Team 3 as they manage to encourage teamwork among themselves throughout the project phases. Since they selected their team members from their own colleague who has well-blended for long time, they already familiar with each character, interest and capability of each team member. It was an advantage for the team as they have the adequate and efficient team members according to

required role. Thus they divided their roles and distributed their tasks accordingly. Communication has not been they problem for them since they are in a clique. They also have put the highest commitment and gain trust from each other which led them to be an effective team. One factor which has contributed them to be slight lower of team evaluation score was the perspective of team. Since they have been a clique and only mix around among each other, their idea and perspective as well as skills are limited within the group. It was and advantage for Team 2 as they have different idea, perspective and skills since they were not belong to the same clique. This factor has made Team 2 as more advanced than the other team.

Team 4 was selected randomly using the conventional system whereby the team members were not belong to any clique. The factor which contributed towards their failure as a team was the attitude of certain members in contributing work and idea throughout the project phases. Furthermore, the distribution of tasks was also done inappropriately whereby major task was allocated to the member who was not sufficiently expert and involved in the area. In term of participation, only minority number of members who are serious in completing the project. Thus, it affects the team evaluation whereby they failed to gain trust from each member and in the end, the team was found ineffective as the result of their project was also low in marks.

Therefore, by looking at the results Group A (students using the expert system), it was found that the effectiveness of the system approach depends on the seriousness of the students themselves and how accurate they evaluate their self-interest during the rating process. It is important for the students to know and be familiar with their area of interest so that the system can make calculation accurately for allocating the right role. The central tendency during the rating process also makes the system tend to allocate the students in the same group of role making the other set of roles are lack of qualified candidates.

Consistent with the objective of this project which is to assist IT/IS students in forming a project team according to their roles and proficiency based on their interest in order to match students ability with the skills needed in a project team, it was learnt that even though the students do not have the skills and capability in certain area, with adequate of interest makes them have the courage to strive for better skill and give their fullest commitment in contributing for the project team. Furthermore, with sufficient commitment, responsibility, contribution, proficiency and interest from each of team member, the team will gain more trust and end up as an effective team.

By looking at Group B (students using the conventional system), it was found that this approach of forming a project team depends on how well a team communicates and cooperates among themselves. These elements are important in ensuring effectiveness of a project team.

However, this approach does not help much in making a project team completes with efficient sources. This means by selecting team members randomly does not assure that the team will have sufficient role in order to complete a project. Team 3 is considered as lucky since they have sufficient team members with required roles. However, this kind of team is rare and hard to find since the distribution of skills and interests of each students are not the same.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

In conclusion, there are many theories related to the concept of forming an effective and successful project team. Most of them focus more on forming project team in the industries. Yet there are still a number of theories which can suitably apply in the project which the focal point is more to the higher education. Apart from that, there is also a system which has merely similar idea with this project but came about with different approach. As far as the research is concern, there is no system which has the exact similar concept of this project yet.

Identifying students' capabilities and interest is important so that the selection of team members can be done smoothly and accurately. However, without a well-defined set of skills for each team member's roles, the selection may be difficult and the results may not be as encouraging as people always expected a project team to be. Best selection of team members makes best productivity from the team as well. Furthermore with the combination of other elements such as responsibility, commitment, proficiency and so on will help in gaining team trust and lead towards team effectiveness.

The context diagram, system architecture, decision tree diagrams, flowcharts, etc. help in understanding the sequences and the overall flow of the system. However, certain criteria have to be improved in order to assist in developing the system for the next project phases. Perhaps, with the competency of the system to provide a tracking system which assists students in tracking their progress development of the project timeline may help much in contributing benefits in ensuring the success of the project team towards the end.

Overall, throughout the system evaluation, it was found that the online expert system is better in encouraging trustworthy among students or project team members and proven more effective in supporting team members to work cooperatively than the conventional system. The system effectiveness was found reliable providing certain factors such as seriousness of students in rating their area of interest, level of commitment, team cooperation and participation and so on are considered.

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APPENDICES

APPENDIX I

Sets of questionnaires to determine student's roles
in the project team

Technical	Programmer	1. How do you rate your interest in producing logical statements? 2. Rate your interest in evaluating complex instructions, manipulating data, and utilizing table look-up to solve problems. 3. How concerns are you in debugging program and removing errors?
	System Analyst	1. How do you like working in seeing things as a system, analyzing and solving problems? 2. Rate your interest in describing any particular system in terms of input, output, boundary, component, relationships, etc. 3. How well is your understanding towards technical things such as how computers, data networks, databases, operating systems, etc. working together, as well as their potentials and limitations?
Business	Report Writer	1. Rate your concern towards organized materials and documentations. 2. How well do you know about the flow of project report such as abstract, introduction, technical details, results and discussion and so on? 3. During writing report, do you usually distinguish your own work from others by making references? Rate your concern towards this matter.
	Presenter	1. Rate your confidence in communicating with public. 2. Rate your interest in delivering idea to the public. 3. During presentation usually your delivery was successful and the attention of the audience was captured. Rate the best reflects about you.

Table AI-1: Sets of questionnaires to determine student's roles in the project team

APPENDIX II

Evaluation Questionnaire

Online expert system vs. the conventional system

The questionnaire is to evaluate the best method to be applied to form a project development team whether the online expert system or the conventional system (manually chose team members). This questionnaire is divided into 2 sections namely team trust and team effectiveness. There are 14 questions of team trust and 6 questions of team effectiveness to be answered.

TEAM TRUST

Questions 1 – 14 ask you for information about the level of trust between the team members.

1. My team members have high level of knowledge related to the project concept.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

2. My team members can be counted on to do what they say they will do.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

3. My team members have high skills and ability.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

4. My team members all do their share of the work because in a project team, members divide and share the work among each other.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

5. My team members submit deliverables on time because it is known that a delay in completion will have a negative effect on their evaluation.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

6. From participation and contribution of work and idea, I believe that my team members are excited about our work.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

7. From participation and quality of work, I believe my team members are serious about our work.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

8. The team members have taken their responsibilities professionally.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

9. My team members are humorous and enthusiastic, and seem excited about working together.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

10. The team members are dependable because soon after the initial meeting, our communication focused on how we will tackle our work.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

11. My team members seem organized and hence can be depended on.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

12. My team members' goal is to do a good job.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

13. My team members' goal is to get a good performance evaluation.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

14. My team members' goal is to gain valuable experience.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

TEAM EFFECTIVENESS

Questions 15 – 20 ask you for information about the overall performance of your project team and the level of satisfaction of the team members.

15. In the past, the team has been effective in reaching its goals.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

16. When the team completes its work, it is generally on time.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

17. There is respect for individuals in the team.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

18. I feel the members of the team value my input.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

19. Team member morale is high in the team.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

20. I enjoy being a member of this team.

Strongly agree	Agree	Disagree	Strongly disagree
O	O	O	O

APPENDIX III

Result of evaluation questionnaire

Team	respondent	Team Trust														Total	Team Effectiveness						Total
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	score	Q15	Q16	Q17	Q18	Q19	Q20	score
Team 1	1	3	3	3	3	2	2	3	3	3	3	3	4	4	3	42	2	3	3	3	3	3	17
	2	3	3	3	3	3	3	3	2	4	2	3	3	3	4	42	2	3	4	3	2	3	17
	3	3	2	3	2	3	3	2	3	2	3	3	3	3	3	38	2	2	3	3	3	4	17
	4	2	3	2	3	3	3	3	3	4	3	3	3	3	2	40	3	3	4	3	2	3	18
	5	3	3	2	3	2	2	3	3	3	3	3	4	4	3	41	2	3	3	3	3	3	17
												Average score				40.6			Average score				17.2
Team 2	6	3	3	4	4	3	3	3	3	4	4	3	3	3	4	47	4	4	3	4	3	4	22
	7	4	4	3	3	4	4	4	3	4	4	3	4	4	4	52	4	4	4	4	3	4	23
	8	4	4	3	4	4	3	4	3	4	4	3	4	4	3	51	4	3	4	4	4	4	23
	9	3	4	3	3	4	3	3	4	4	4	4	4	3	4	50	4	4	3	4	4	4	23
	10	4	3	4	3	3	3	4	3	4	4	3	4	3	3	48	3	4	4	4	4	4	23
												Average score				49.6			Average score				22.8
Team 3	11	2	3	3	4	3	3	3	3	4	4	3	3	3	4	45	4	4	3	4	3	4	22
	12	3	4	3	3	3	4	3	3	3	4	3	3	3	4	46	3	3	4	3	3	2	18
	13	3	4	3	3	3	3	4	3	3	3	3	3	4	3	45	4	3	2	3	4	4	20
	14	3	3	3	3	4	3	3	4	2	2	4	4	3	3	44	3	3	2	4	3	3	18
	15	4	3	3	3	3	3	4	3	4	4	3	3	3	3	46	3	4	4	4	4	3	22
												Average score				45.2			Average score				20
Team 4	16	2	1	3	3	3	3	3	3	3	3	3	2	3	3	38	2	3	3	3	3	3	17
	17	3	3	3	1	2	3	3	3	2	3	3	3	2	3	37	1	2	3	3	1	2	12
	18	3	2	1	2	2	3	2	3	3	1	3	2	3	2	32	2	3	2	2	2	2	13
	19	2	3	3	2	1	3	3	3	2	2	3	1	2	3	33	2	2	2	3	1	2	12
	20	1	3	3	3	3	3	3	2	3	3	3	3	3	3	39	2	1	3	3	3	2	14
	Mean score	2.9	3.1	2.9	2.9	2.9	3	3.2	3	3.3	3.2	3.1	3.2	3.2	3.2		2.8	3.1	3.2	3.4	2.9	3.2	
												Average score				35.8			Average score				13.6

Strongly agree	4	Disagree	2
Agree	3	Strongly disagree	1

Table AIII-1: Result of evaluation questionnaire

APPENDIX IV

User Manual

1. Normal Student

Home page

In order to sign in for a project team, you must register your details and academic background through the online expert system form. First, when you enter the home page, there will be some introduction on the online expert system and instruction on using the system.

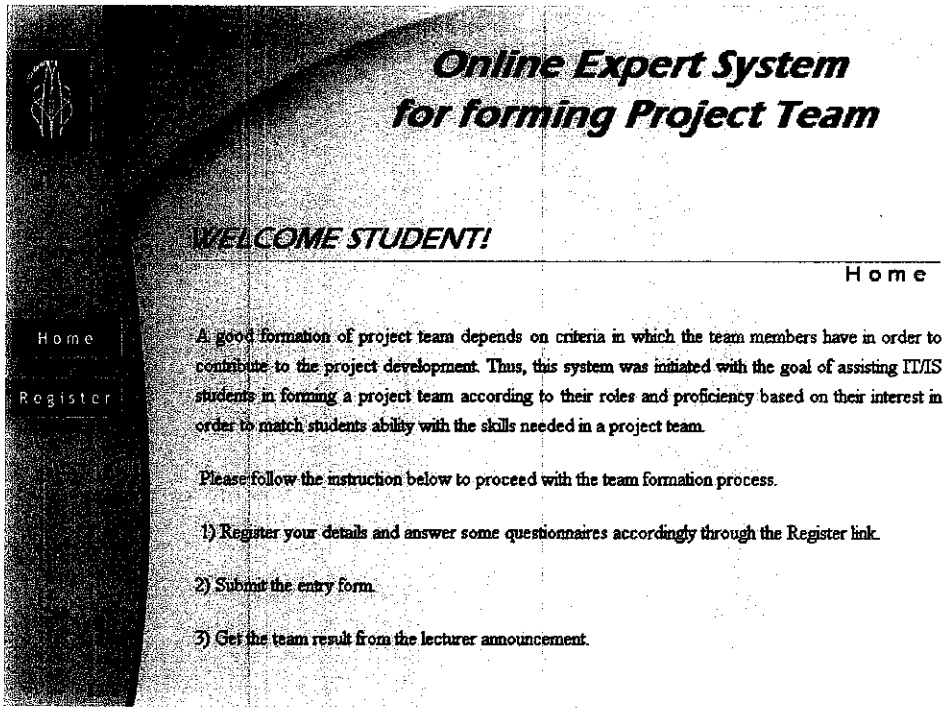

Figure AIV-1.1: Screen shot of the online expert system homepage

At the left side of the page are 2 links which are Home and Register. Home link will leads you to the home page which is the initial page while Register link will take you to the register page where you should sign in for the project team. The UTP logo at the top left of the page has the link to the UTP's official website (http://www.utp.edu.my).

Student's details

1. Once you click on the Register link, you will be taken to the register page as shown below.

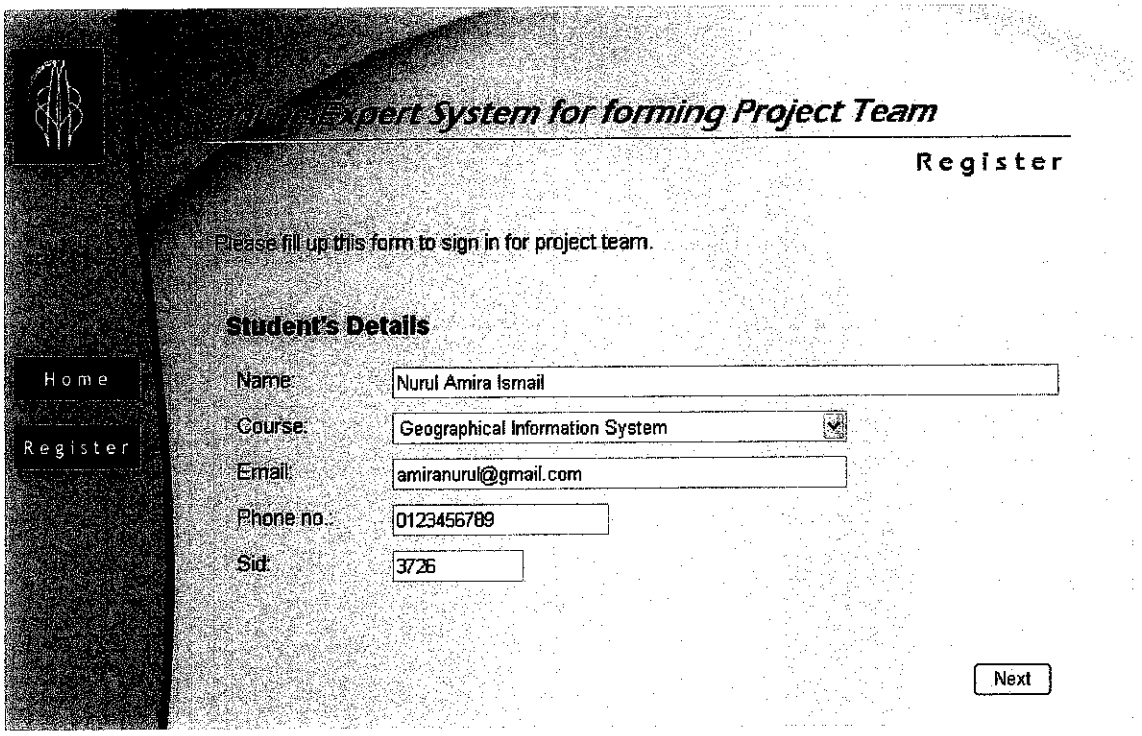

Figure AIV-1.2: Screen shot of register page for normal student's details

2. In this form, you are required to fill in your details such as name, course in which the project is concerned, email address, phone number and student id.
3. Click button Next to proceed to the next section of the form which is the academic background.

Academic Background

1. Once you enter the next page, you are required to select the best rating which are most likely represents your interest towards certain area according to the questions given. The rate would be from the scale of 1 (least interested) to 10 (most interested).
2. There are 12 questions all together. Each number of pages consists of 3 questions to be answered.

3. Once you finished rating, click button Next to proceed with the next questions.

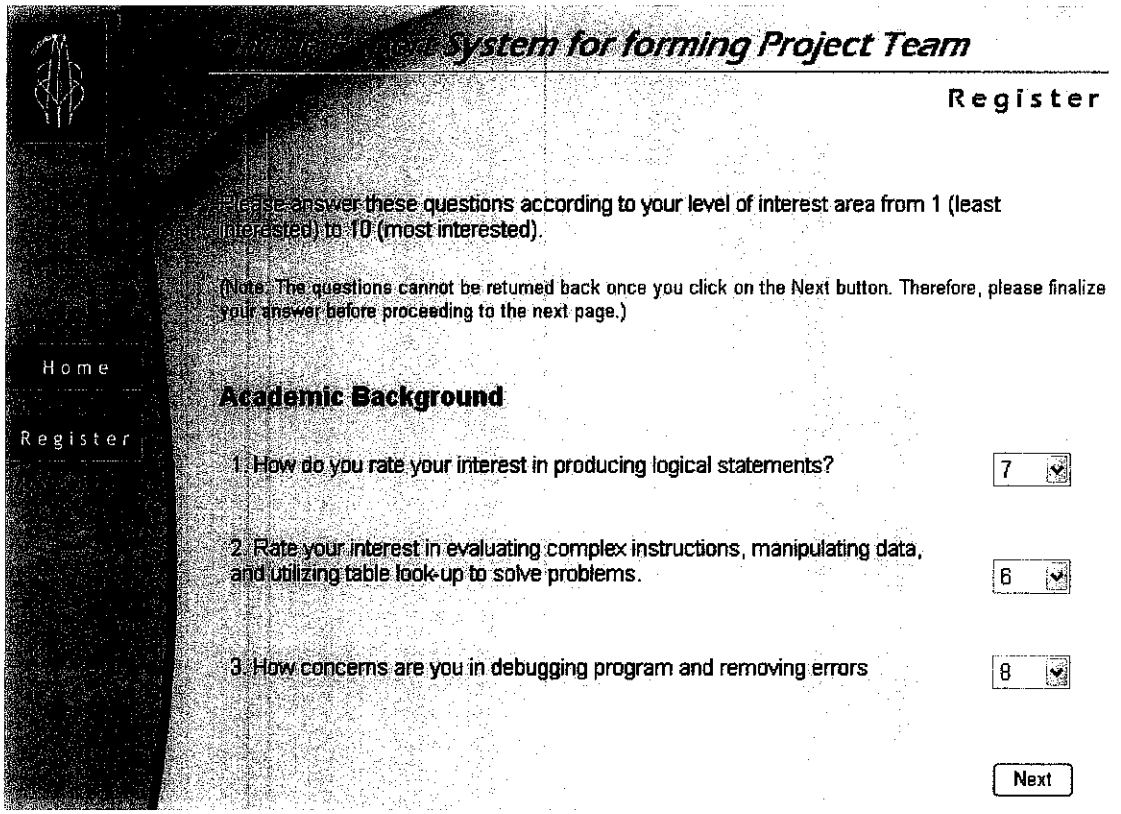

Figure AIV-1.3: Screen shot of register page for normal student's academic background

(Note: The questions cannot be returned back once you click on the Next button. Therefore, please finalize your answer before proceeding to the next page.)

4. Continue to the next page until you reach at the 10^{th} to 12^{th} questions.
5. After you finish answering the questions, please click Submit button to so that the system can process your information appropriately.

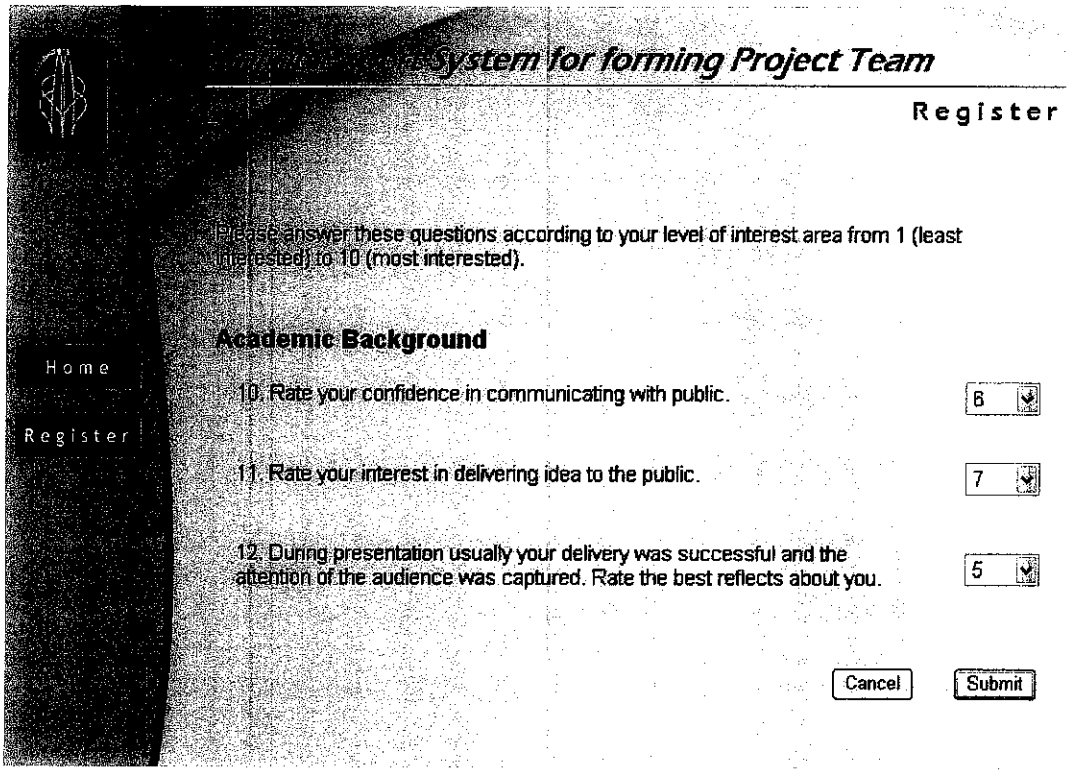

Figure AIV-1.4: Screen shot of the last page for register page

6. Otherwise click the Cancel button where it will lead you back to the home page.

2. Team Leader

The Responsibilities

In this system, team leader plays the major role since there are a number of responsibilities to be carried out throughout the process. A team leader is not only responsible for selecting the team members but also registering the team name as well as the project title. Besides, a team leader also must be familiar with his/her capability since they do not have to register for themselves in the academic background page like the normal students. This is because their selection as a team leader has shown their capability and potential observed by the lecturer.

Login page

1. First, once you enter the webpage, you are required to log in using a given id.

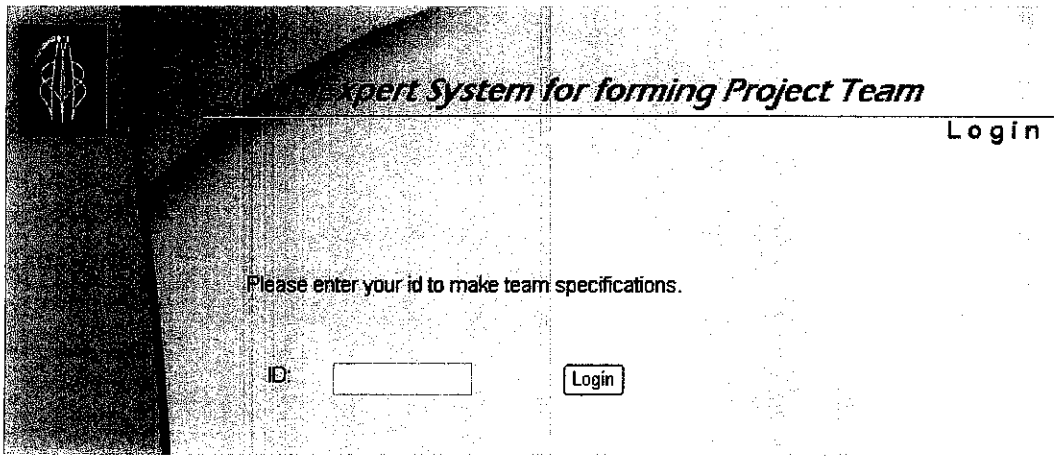

Figure AIV-2.1: Screen shot of the team leader's login page

2. After entering the id, click on the Login button.

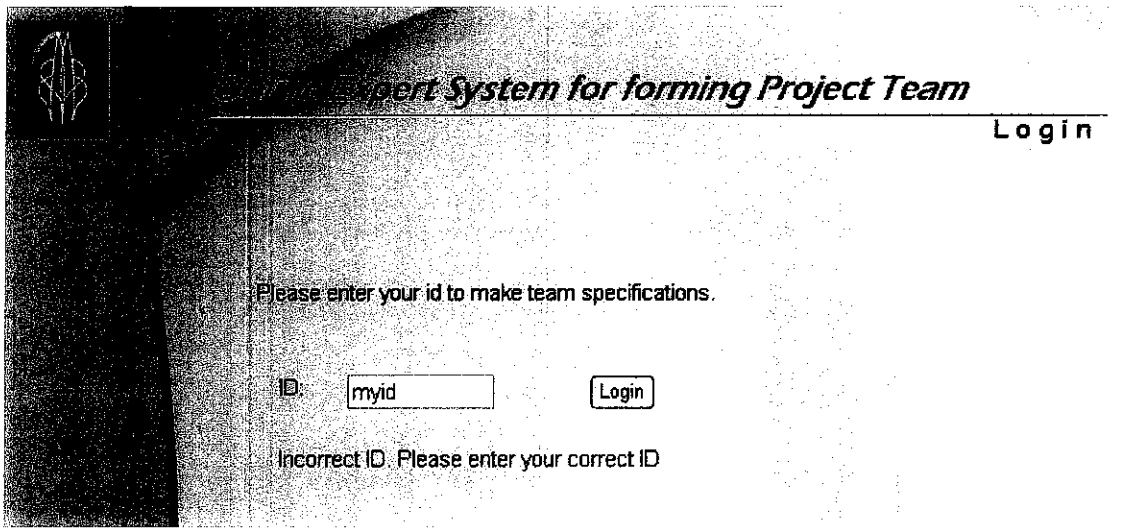

Figure AIV-2.2: Screen shot of the team leader's login page for incorrect id

3. If the id is incorrect, an error message will appear asking for the right id again.
4. After entering the right id, click on the Login button.

Team specification page

The Login button will lead you to the team specification page.

1. First, please enter your details such as name, student id and course of project concerned.
2. Then enter your team name and project title.

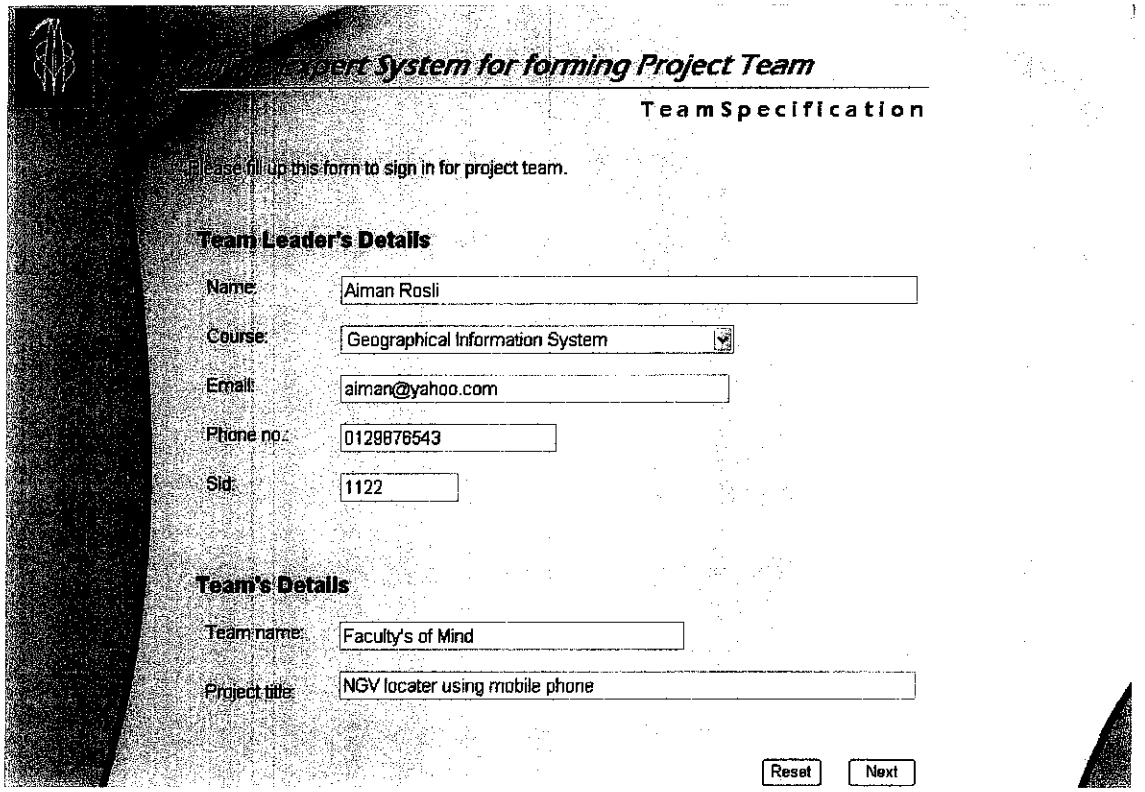

Figure AIV-2.3: Screen shot of the team specification page for team leader's details and team's details

3. After that, please choose and rate the preferable role and proficiency level of each team member from 1 (the least proficient) to 10 (the most proficient). (Note that the maximum number of team members selected is limited up to 5 students only.)

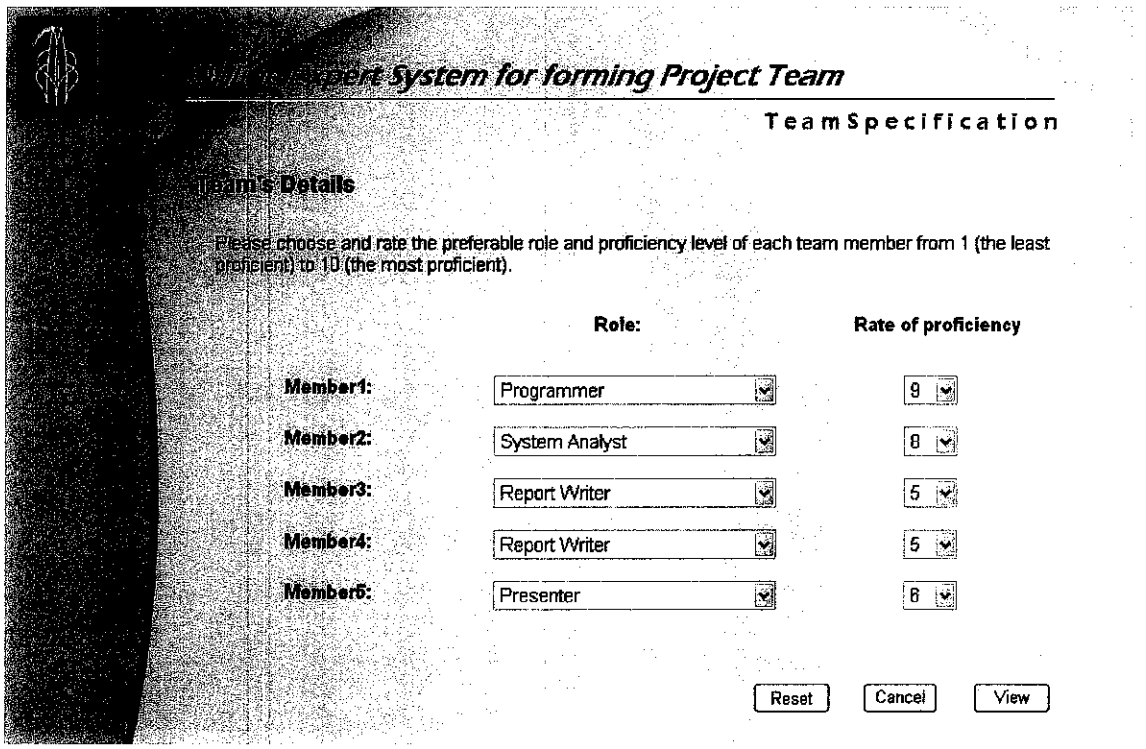

Figure AIV-2.4: Screen shot of the team specification according to preferable role and rate of proficiency by the team leader

4. Click the View button after finish with all team specification to view the team result.
5. Reset button will clear the whole form.
6. Cancel button will lead you back to the team leader's login page.

Team result page

1. Finally a list of team specification's result will be shown right after the team leader click the View button.
2. Click OK button will lead user to login page.

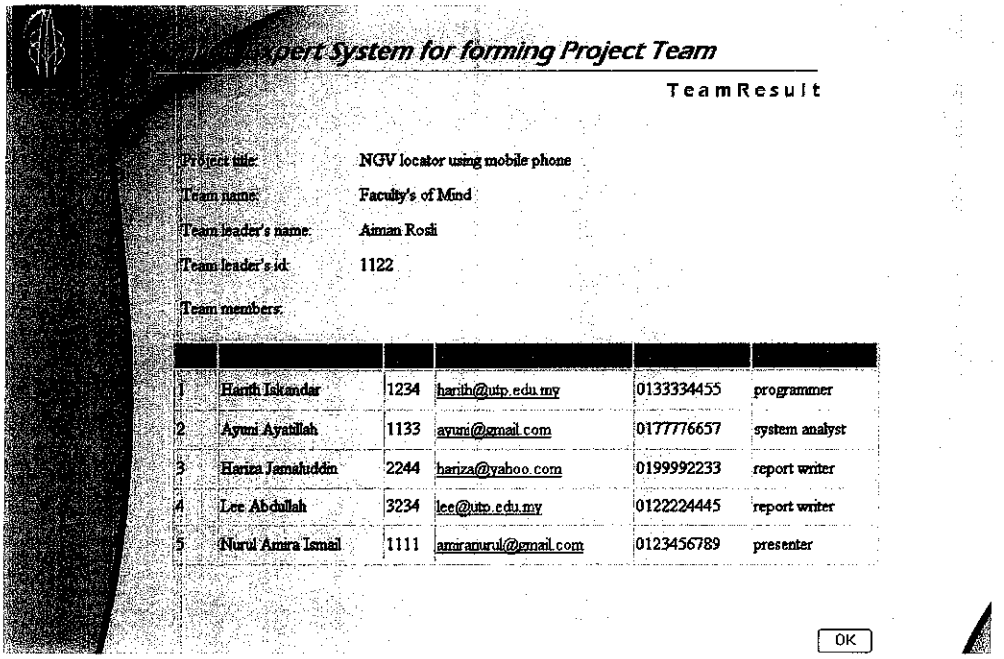

Figure AIV-2.5: Screen shot of the team result page

3. Lecturer

The Responsibilities

In this system, a lecturer should appoint a number of students as the team leaders for the project teams. They may appoint them based on their potential or other relevant reasons. Besides, they may also guide these team leaders in managing the project team well through several ways such as list out the project title so that the team leaders will still on track and so on.

Login page

1. First, once you enter the webpage, you are required to log in using the staff id.

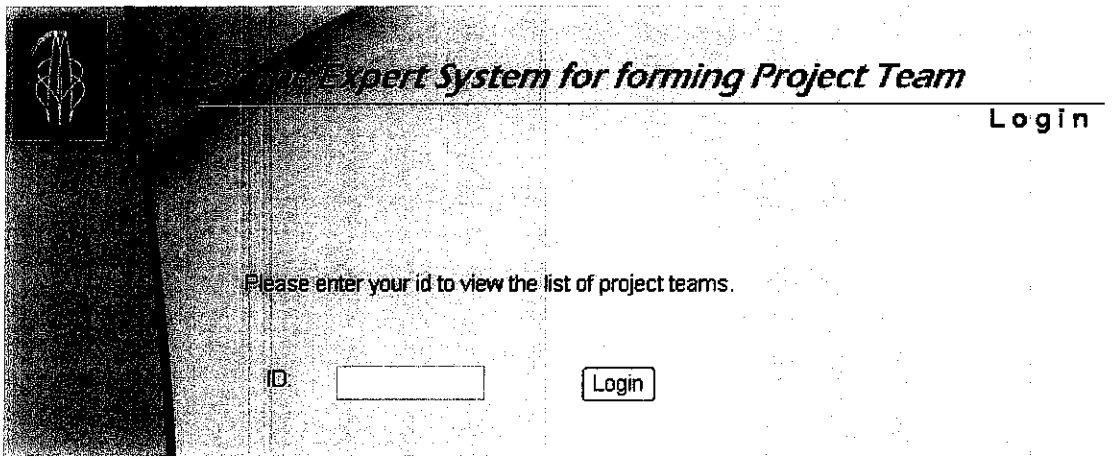

Figure AIV-3.1: Screen shot of the lecturer's login page

2. After entering the id, click on the Login button.

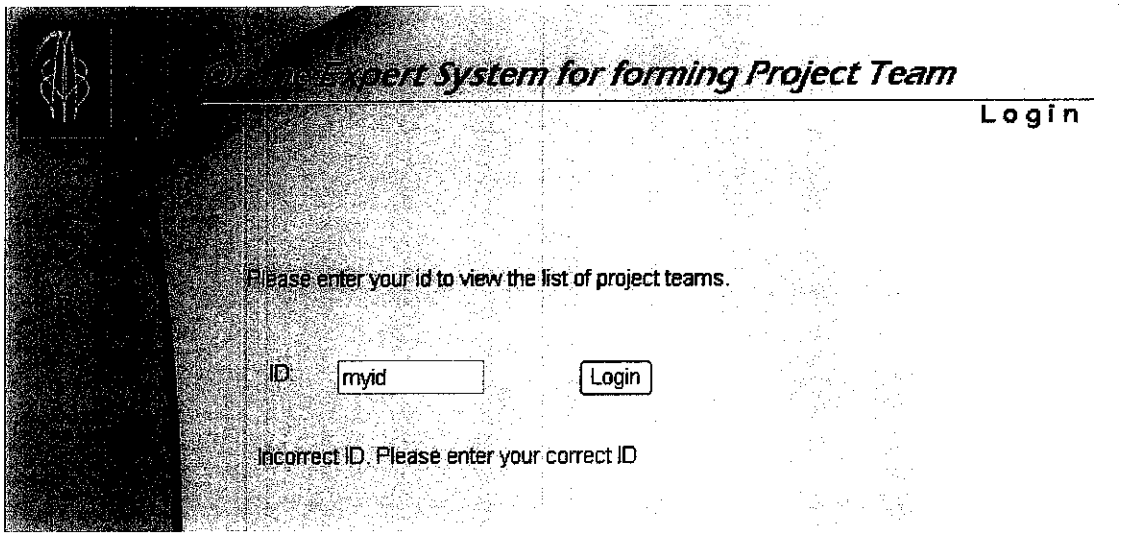

Figure AIV-3.2: Screen shot of the lecturer's login page for incorrect id

3. If the id is incorrect, an error message will appear asking for the right id again. After entering the right id, click on the Login button

Team list page

The login page will lead you to the team list page.

1. Choose the course which concerned your project.
2. Click view button. A list of team details are shown according to their respective team.

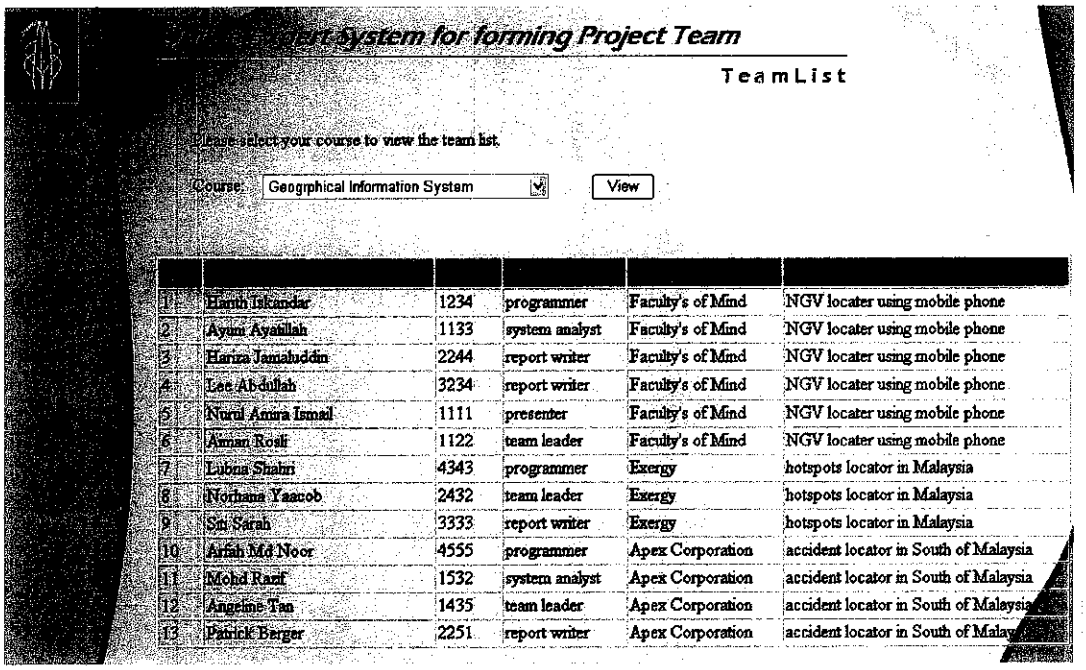

Figure AIV-2.3: Screen shot of team list page from lecturer module showing the list of students according to project team

APPENDIX V

Developer Manual

1. Tools

The online expert system for forming project team used several software and hardware for its development phase.

a. Software

Primarily the software used is the Microsoft Developer Network (MSDN) particularly the Microsoft Visual Studio .NET 2003 since it provides the stand for the integration of several languages into one platform and helps the developer by providing ready-made and customized interface components instead of using codes. As for the language, this system used the ASP.NET framework to integrate with the Visual Basic.NET. Furthermore, this system requires ASP.NET to work with the Internet Information Services (IIS) in order to manage IIS, the web server for Internet and intranet web sites.

Another tool which has indirectly involved during the project development is the Adobe Photoshop 7.0 whereby it was used to edit some images to be included in the webpage.

b. Hardware

The hardware used for the development of the system is a personal computer with Microsoft SQL server installed in it as well as the following specifications:

- CPU with processing speed at least 1.5GHz
- 256MB RAM
- 20GB of hard disk storage
- 15" monitor
- Standard motherboard, speaker, keyboard and mouse.
- Floppy drive, Optical drive, USB port

2. Database

This system used Microsoft SQL Server 2000 as the database to store data and help in implementing the add, delete and update functions. This database consists of several tables which require several inputs from the users. The name of the database is called dbStudents.

Tables, fields and technical attributes

The tables used in the database are tblStudentDetails, tblProgrammer, tblSystemAnalys, tblReportWriter, tblPresenter, tblTeamSpecs and tblRole. Below is the table describing each of the tables used in the dbStudents database.

No.	Table Name	Field Name	Data Type	Length	Remarks
1	tblStudentDetails	sid	char	10	student's id
		sname	char	50	student's name
		course	char	100	course of project concerned
		email	char	50	student's email
		phone	char	10	student's phone number
		role	char	50	role entitled to the student
		project_title	char	100	project title for student's project team
		team_name	char	60	name of student's project team
2	tblProgrammer, tblSystemAnalyst, tblReportWriter, tblPresenter	sid	char	10	student's id
		avg_score	int	4	student's average score from questionnaire
		available	char	5	to check availability of student - yes: available to be selected for a team - no: already selected for a team
3	tblTeamSpecs	lid		10	team leader's student id
		lname		50	team leader's name
		course		100	course of project concerned
		email		50	team leader's email
		phone		10	team leader's phone number
		role		50	role: team leader
		project_title		100	project title of the team
		team_name		60	name of the project team

Table AV-2.1: Table of description for tables used in the dbStudents database

3. Screens

This system has several screens mainly divided into 3 modules which are the normal students' module, the team leader module and the lecturer module. Each module consists of a number of screens to guide user to interact with the system.

a. Normal Students' Module

Basically, there are 6 screens included in this module namely home, register, programmerquest, systemanalystquest, reportwriterquest and presenterquest. All of the *role*quest screens are actually representing sets of questionnaires of each role. Below are the screen shots and description of each screen used in the normal students' module:

Homepage

Below are the descriptions of each screen component in the homepage screen:

No.	Component	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Home link	▪ Located at the left side of the webpage ▪ Link user to the initial webpage which the homepage
3	Register link	▪ Located at the left side of the webpage, below Home link ▪ Link user to the register page for user to make registration of their details and academic background
4	Main window	▪ Provides information and instructions for user to guide them in using the system

able AV-3.1: Table of description for screen components in normal students' module homepage

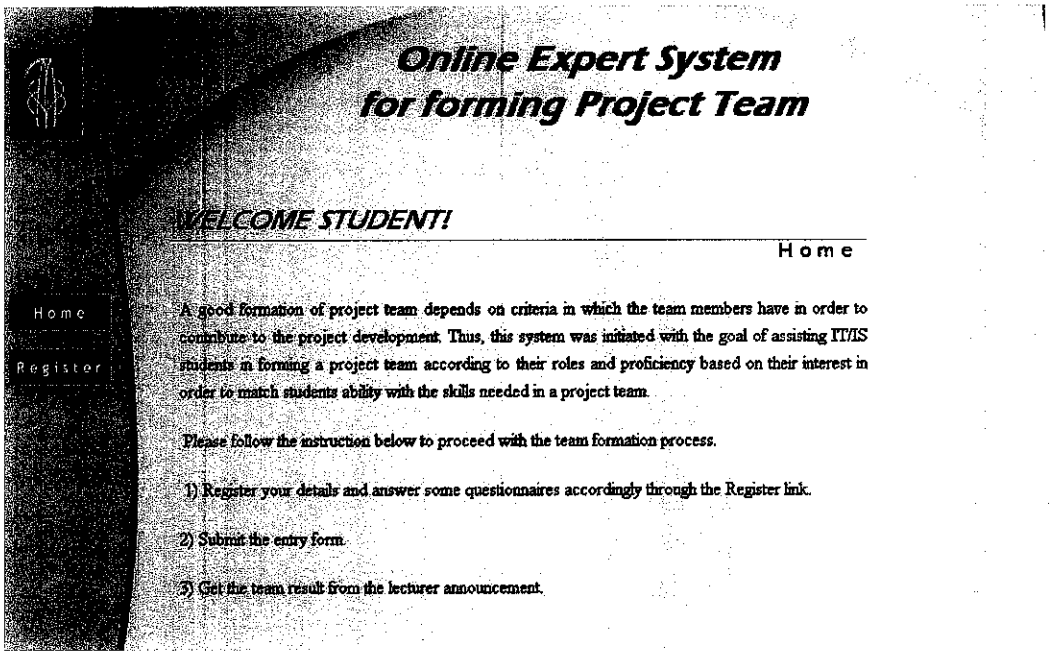

Figure AV-3.1: Screen shot of the online expert system homepage

Student's details

Below are the descriptions of each screen component in the register screen:

No.	Component	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Home link	▪ Located at the left side of the webpage ▪ Link user to the initial webpage which the homepage
3	Register link	▪ Located at the left side of the webpage, below Home link ▪ Link user to the register page for user to make registration of their details and academic background
4	Main window	▪ Provides information and instructions for user to guide them in using the system ▪ Provide input components for student's details

5	Next button	▪ Leads user to the next page which is the academic background page
6	Reset button	▪ Clear out the whole form

Table AV-3.2: Table of description for screen components in normal students' module register page

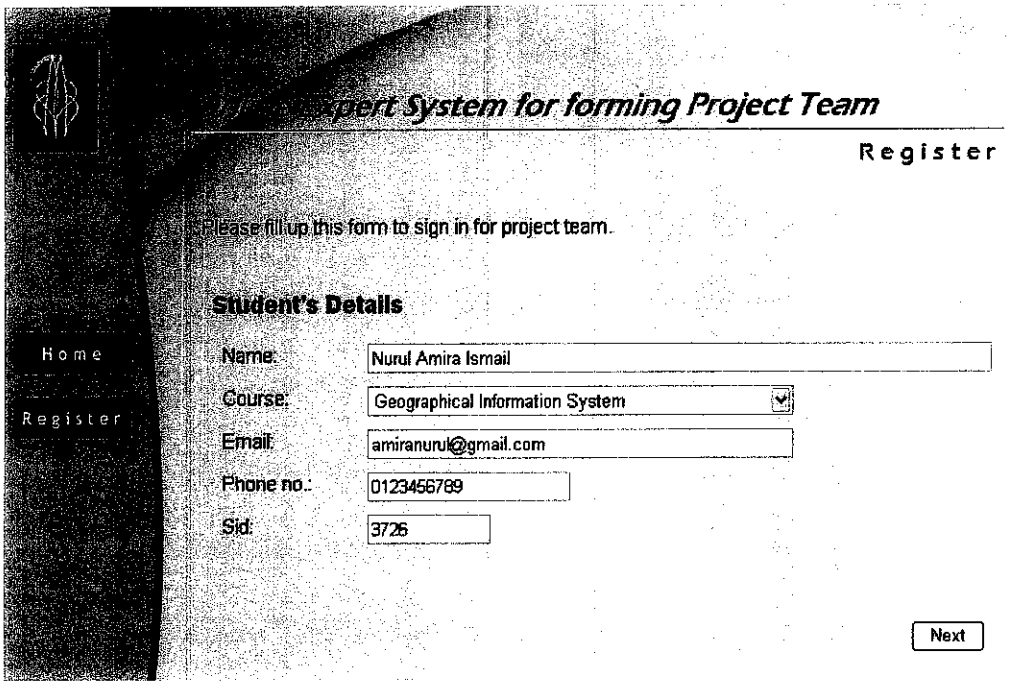

Figure AV-3.2: Screen shot of register page for normal student's details

Academic Background

Below are the descriptions of each screen component in the programmerquest screen:

No.	Component	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Home link	▪ Located at the left side of the webpage ▪ Link user to the initial webpage which the homepage
3	Register link	▪ Located at the left side of the webpage, below Home link ▪ Link user to the register page for user to make registration of their details and academic background
4	Main window	▪ Provides information and instructions for user to guide them in using the system ▪ Provide input components particularly combo boxes for user to select their rating of interest and proficiency from 1 (least interested) to 10 (most interested).
5	Next button	▪ Leads user to the next page which is the academic background page ▪ This system cannot be returned back to the previous page. Therefore, user must finalize their answer before clicking on the next button.

Table AV-3.3: Table of description for programmerquest screen components in the academic background of register page in the normal students' module

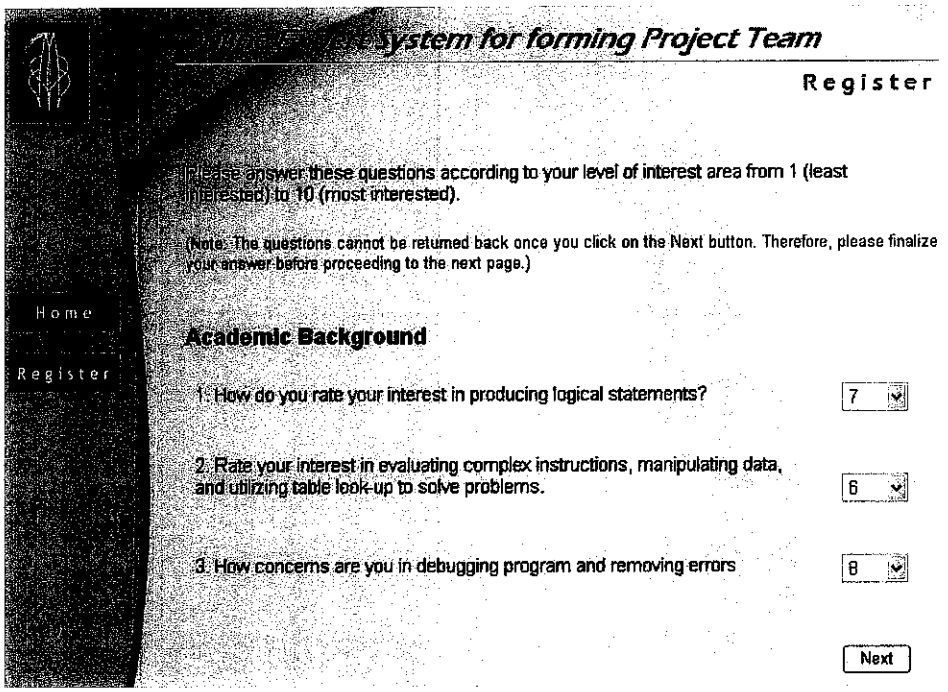

Figure AV-3.3: Screen shot of programmerquest screen for academic background questionnaires from register page in the normal students' module

The screen from Figure 3.3 applies the same for systemanalystquest and reportwriterquest screens accept for different set of questions as provided in the Appendix I.

For presenterquest screen, there are some differences from the other screens since it is the last page of the module.

No.	Components	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Home link	▪ Located at the left side of the webpage ▪ Link user to the initial webpage which the homepage
3	Register link	▪ Located at the left side of the webpage, below Home link ▪ Link user to the register page for user to make

		registration of their details and academic background
4	Main window	▪ Provides information and instructions for user to guide them in using the system ▪ Provide input components particularly combo boxes for user to select their rating of interest and proficiency from 1 (least interested) to 10 (most interested).
5	Cancel button	▪ Leads user back to the homepage
6	Submit button	▪ Allows user to submit their registration form for the system to process

Table AV-3.4: Table of description for presenterquest screen components in the academic background of register page in the normal students' module

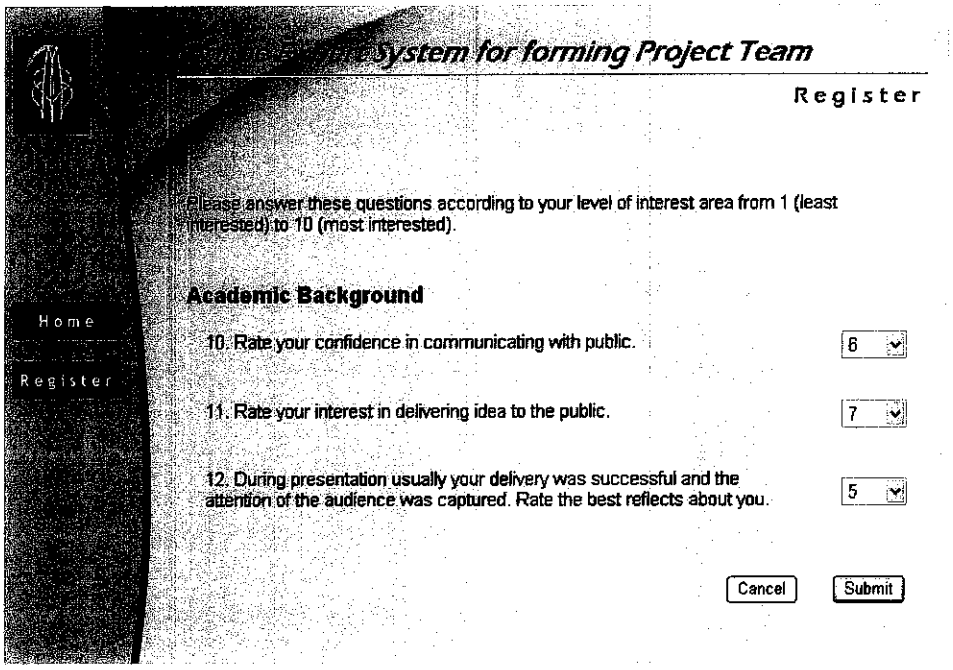

Figure AV-3.4: Screen shot of presenterquest screen for academic background questionnaires from register page in the normal students' module

b. Team Leader Module

Basically, there are 3 screens included in the team leader module namely leaderlogin, leader and teamresult screens. Each of the screens has its own function and description.

Loginpage

In this page team leader are required to enter their given id in order to do the team specification. Below is the table and screen shot of the page.

1	UTP logo	▪ Leads user to the UTP's official website
2	Main window	▪ Provides instruction for user to input their id
3	Login button	▪ Allows user to the next page which is the team specification page after entering the correct id

Table AV-3.5: Table of description for leaderlogin screen components Login page in the team leader module

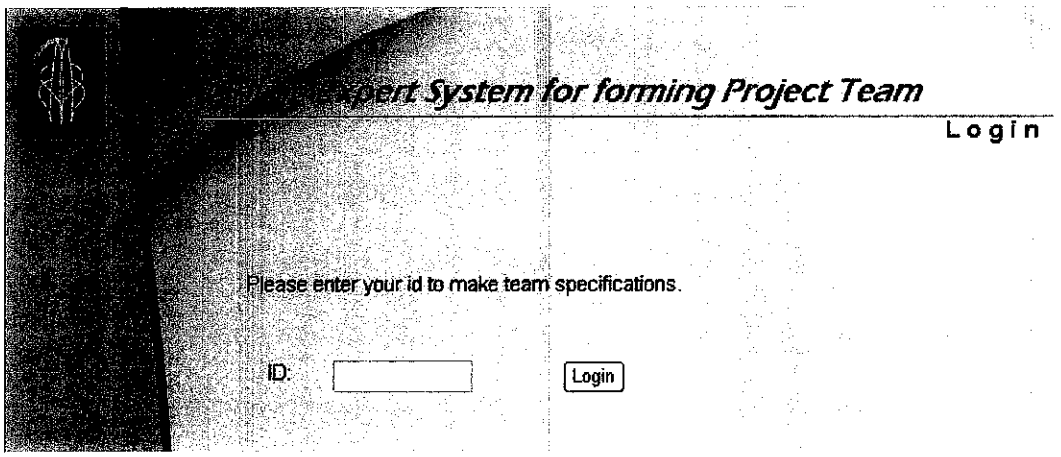

Figure AV-3.5: Screen shot of the leaderlogin screen from the team leader's login page

If the id entered is incorrect, the page will appear an error message asking for the correct id (see Figure AV-3.6).

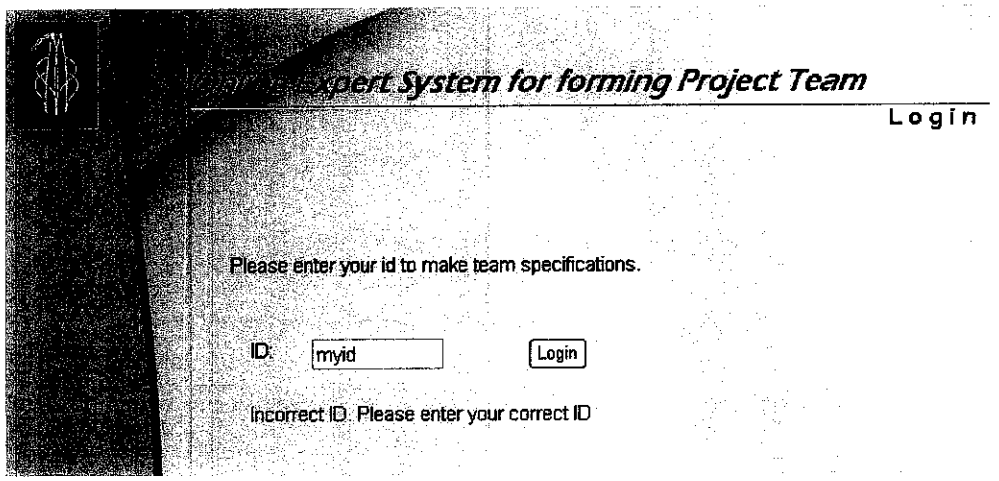

Figure AV-3.6: Screen shot of the leaderlogin screen from the team leader's login page incorrect id

Team specification page

In this leader screen, it consists of team leader details and team details. Below is the table and screen shot of the team specification page description:

No.	Component	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Main window	▪ Provides instruction for user to enter their input ▪ Consists of 2 sections namely the team leader's details and team's details ▪ Team leader's details consists of 2 textboxes of name and student id (sid) and a combo box for user to select the course of project concerned ▪ Team's details consist of 2 textboxes for user to enter team name and project title, 5 combo boxes for the team role and another 5 for the rating from 1 (the least proficient) to 10 (the most proficient).

3	Reset button	▪ Allows user to clear the form
4	Cancel button	▪ Leads user back to the login page
5	Submit button	▪ Allows user to submit their team specification in order for the system to process the information ▪ Leads user to the next page which is the team result page whereby the result of the team specification are exhibited

Table AV-3.6: Table of description for leaderlogin screen components Login page in the team leader module

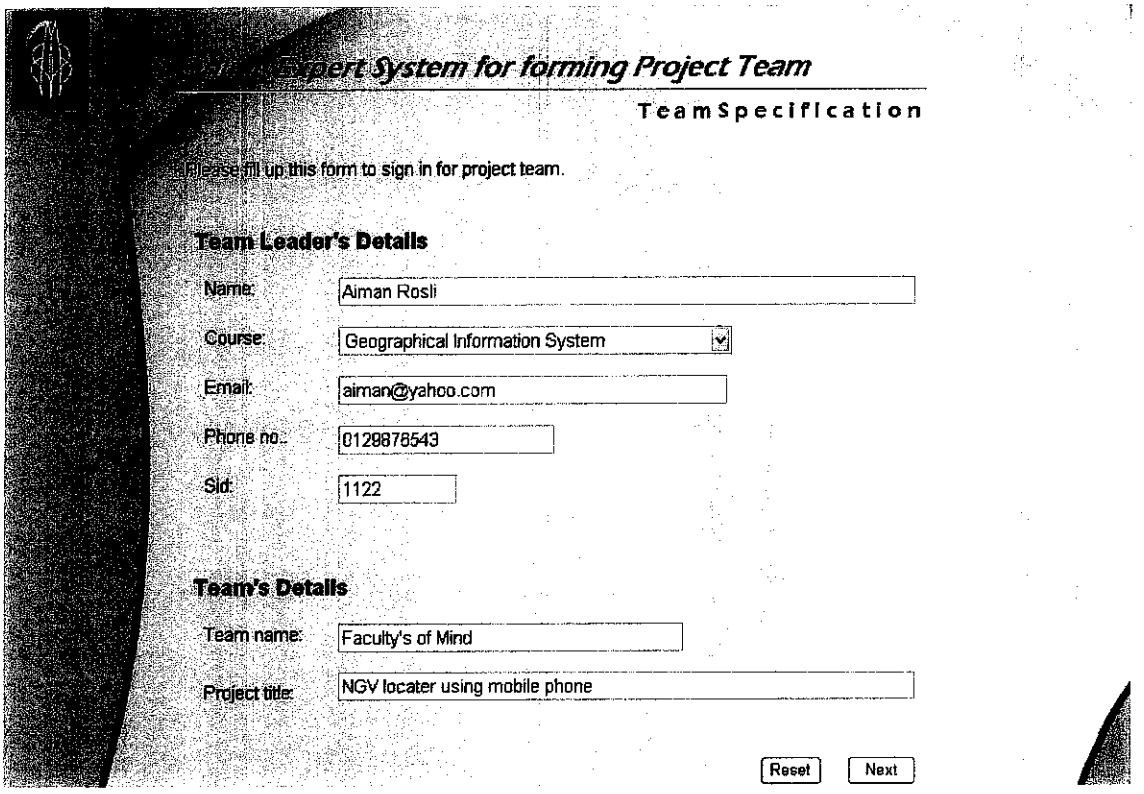

Figure AV-3.7 (a): Screen shot of leader screen team specification page for team leader's details and team's details

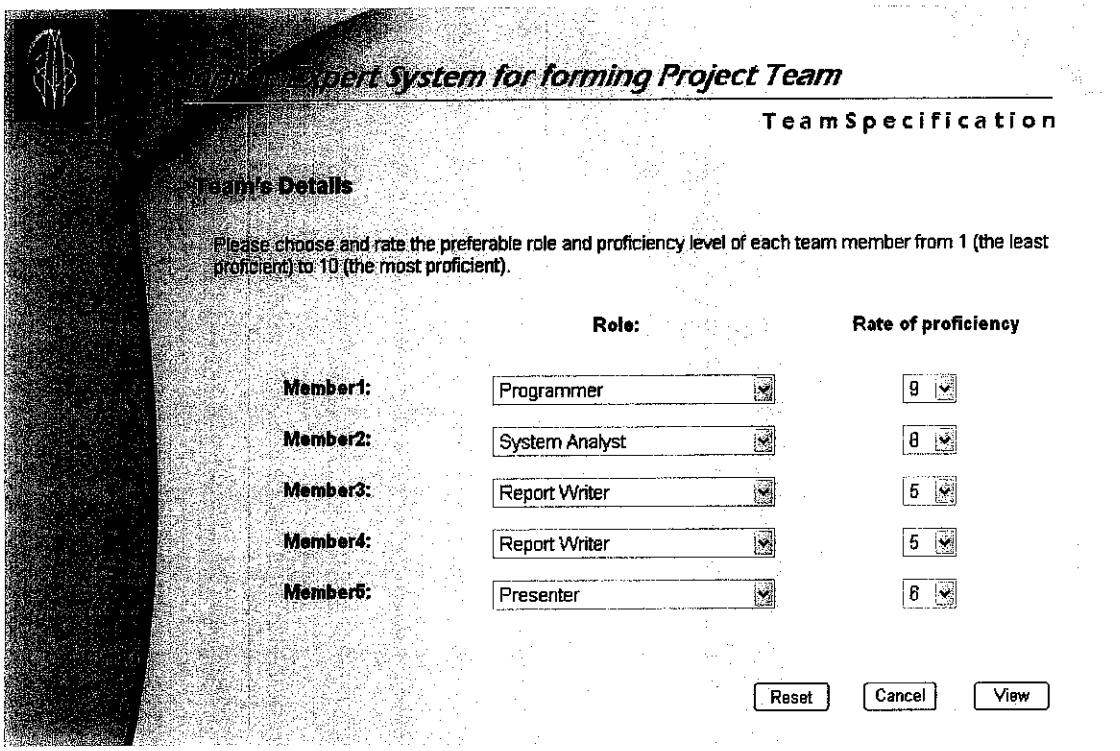

Figure AV-3.7 (b): Screen shot of leader screen for the team specification according to preferable role and rate of proficiency by the team leader

Team result page

In this page, user can see the result of the team specification from the previous page. Please refer to the table and figure below for screen components' descriptions.

No	Component	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Main window	▪ Provides user with the team result from the team specification
3	OK button	▪ Leads user back to the login page

Table AV-3.7: Table of description for leaderlogin screen components Login page in the team leader module

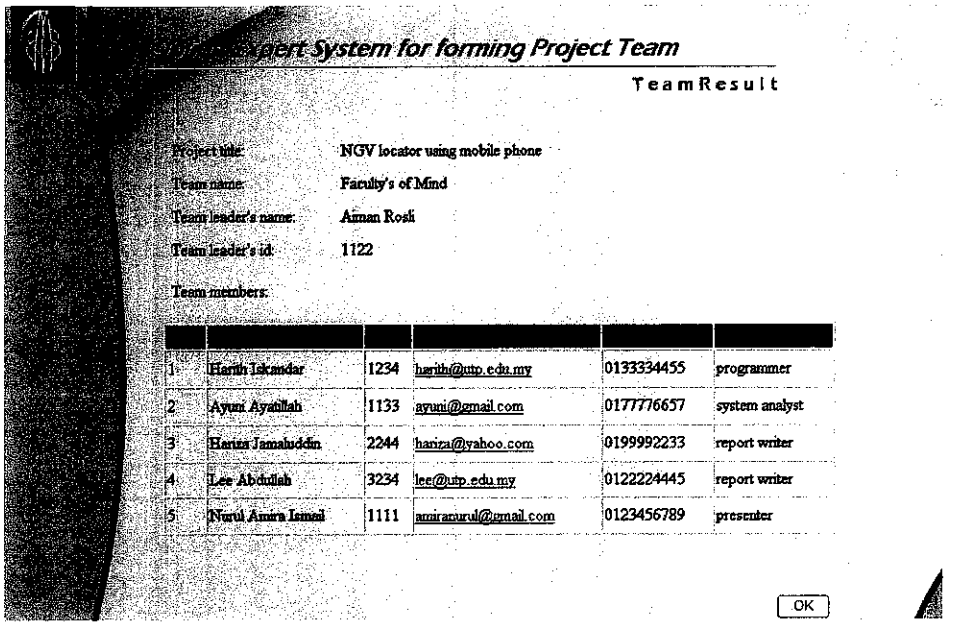

Figure AV-3.8: Screen shot of team result page showing the project team details after team specification by the leader

c. Lecturer Module

Basically, lecturer module consists of 2 screen namely lecturerlogin and lecturer screens. Each screen has its own functions as depicted in the table and screen shot below:

Login page

In this lecturerlogin screen, user required to enter their id in order to view the project team list. Below are the descriptions of the screen components providing some screen shots for better view:

No	Components	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Main window	▪ Provides instruction for user to input their id
3	Login button	▪ Allows user to the next page which is the team specification page after entering the correct id

Table AV-3.5: Table of description for leaderlogin screen components Login page in the team leader module

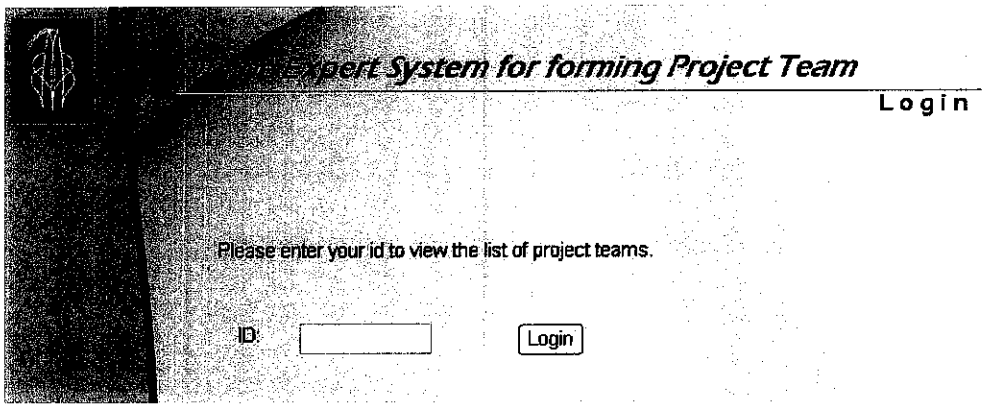

Figure AV-3.9: Screen shot of the lecturerlogin screen

If the id entered is incorrect, an error message will appear asking for the correct id (see Figure AV-3.10).

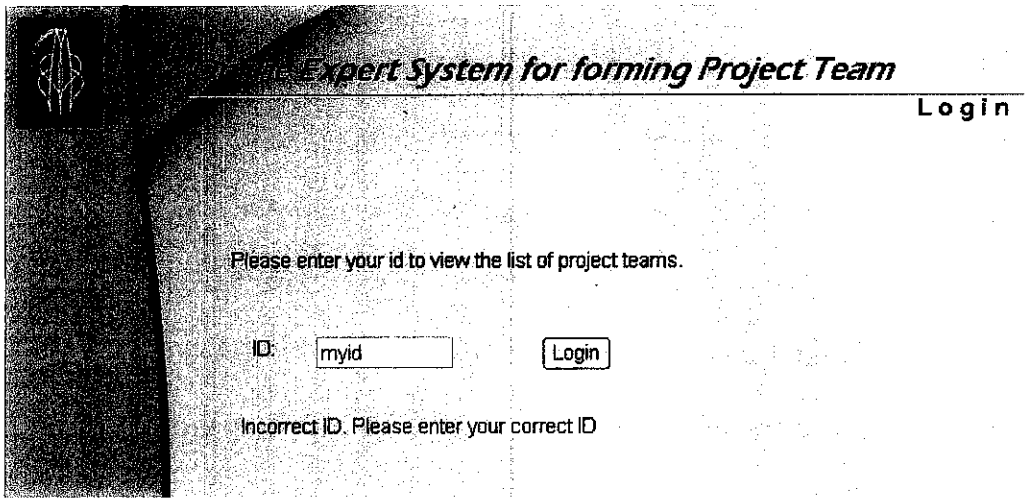

Figure AV-3.10: Screen shot of the lecturer's login page for incorrect id

Team list page

In the lecturer screen, user required to select the course of project concerned in order to view the team list. Below are the descriptions of the screen components providing some screen shots for better view.

No.	Component	Description
1	UTP logo	▪ Leads user to the UTP's official website
2	Main window	▪ Provides instruction for user to select the course of project concerned
3	View button	▪ Allows user to view the list of students according to project team
4	OK button	▪ Leads user back to the login page

Table AV-3.11: Table of description for leaderlogin screen components Login page in the team leader module

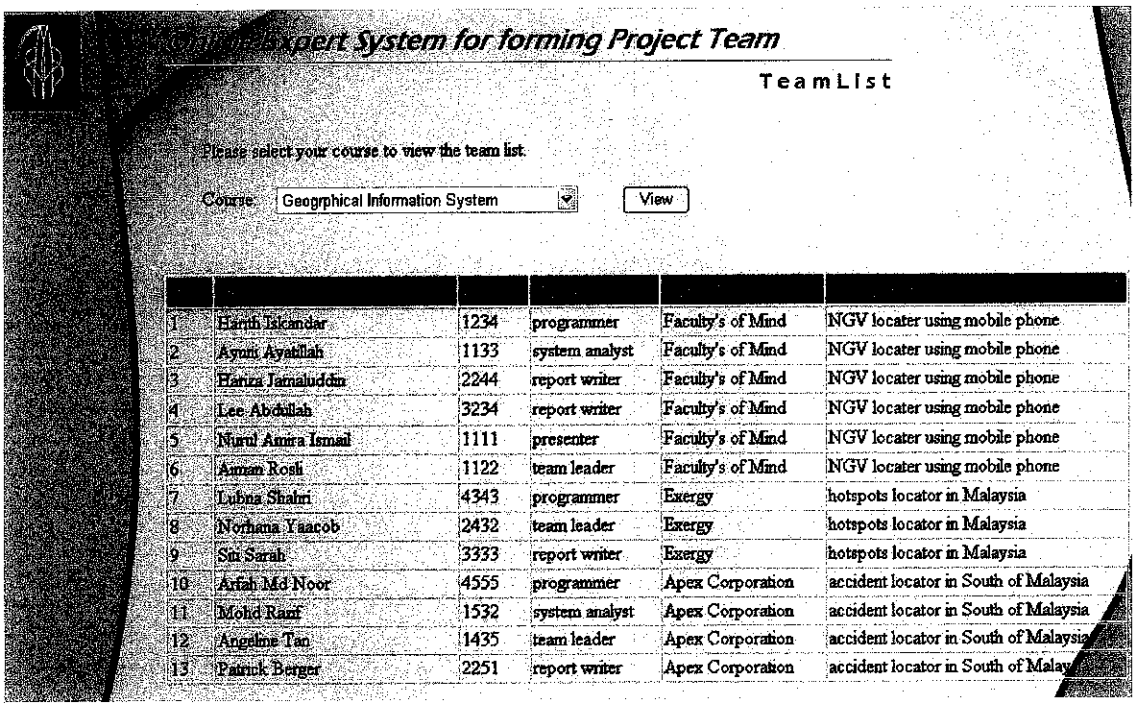

Figure AV-3.11: Screen shot of team list page from lecturer module showing the list of students according to project team