THE IMPLEMENTATION OF STUDENT AUTOMATION EVALUATION SYSTEM USING SAS/IntrNet®

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Abstract. Academic and Student Information System (ASIS) was developed by Universiti Utara Malaysia (UUM) to provide information and facilities to process students' results submitted by UUM lecturers. These functionalities were a part of the whole processes of student information system currently implemented in UUM. But, the constraint was arisen when the current system unable to provide a facility to assist the lecturers to manage the score and perform an evaluation on students' performance through assignments, quizzes, tests, projects and final examination. Thus, we have developed a system to provide these facilities and become complimentary to the current system - ASIS. The system was developed using PowerDynamo as a front-end and SAS/IntrNet® as a flavour in ingredients to enrich the output and enhancing interface functionality. The system allows lecturers to create a temporary workspace to input and edit the fields mentioned. The number of fields and the percentage of each field to store score on students' assessment are determined by the lecturer itself. The system will calculate the contribution of each field and store as a total coursework. With SAS/IntrNet®, the performances of the students' grades were easily evaluated prior the final scores submitted for result processing. Finally, the total coursework and final examination scores will be submitted online to ASIS when instructed by the lecturers and this will end the student examination processes. Furthermore, the system has successfully supported the implementation of Student Advisory System by providing useful information to the lecturer (Mentor) in order to advice students (Mentee) more effectively, whose main purpose is to help and assist UUM students to boost their academic performance.

Keyword: Academic Information System, Students' Performance, Students' Records, SAS Application SAS/IntrNet®

INTRODUCTION

Academic and Student Information System (ASIS) was developed to provides information and facilities to process students' results submitted by the lecturers. These functionalities were a part of the whole processes of student information system currently implemented in UUM to manage students' information and their academic performance. Main modules available in the system are student registration, students' profile, course registration, examination, time tabling and graduation. Three menus provided for the convenience of the lecturers are marks inputting, practicum marks inputting and mentor-mentee (student advisory system). The main users of the system are Department of Academic Affair and lecturers.

Marks inputting menu allows the lecturers to key-in online the total scores of the coursework (per one hundred) for students who registered the courses conducted by the lecturers at the end of the semester. After ASIS has processed the inputted scores, the lecturers can obtain the report containing the total scores of the coursework, the scores of final examination, the total mark and the grades accordingly. Simple statistical report such as the number of students, the minimum score, the maximum score grouped by grades can be displayed upon request by the lecturers. Practicum marks inputting menu provides facility for the lecturers to key-in the student scores who have completed the practical training programme. Meanwhile, the Mentor-Mentee system provides the facility for lecturers to view profile and academic performance for those who are assigned under their supervision in order to provide better advices to the students.

ISSUES AND CHALLENGES

Based on current functionality provided by ASIS, the constraint was arose when the system unable to provide a facility to assist the lecturers to manage the scores and perform an evaluation on students' performance through assignments, quizzes, tests, projects and final examination. Thus, the development of the facilities becomes important as a complimentary to the current system. One of the system drawbacks is that the system does not allow the lecturers to compute and display other marks and information apart from on-going assessment marks, the final scores and overall grades. The lecturers need to store the coursework for the whole semester either on a paper or onto other applications such as Microsoft Excel or Microsoft Access. At the end of semester, the lecturers have to sum up the contribution of each evaluation done manually or writing a piece of program (for those who have programming experience) based on the percentage suggested to obtain the total scores of the coursework. After that, the lecturers must produce the total scores of coursework based on percentage 100 before inputting to the system. The problems were difficult if there are many students registered for the course and handling the scores is become troublesome. Besides that, ASIS does not provide facilities to analyse or evaluate the students' performance on going basis. Through observation was made, most of the lecturers who want to perform statistical analysis on the assignments, quizzes, total scores of coursework and scores of final examination must use other statistical analysis systems such as SAS separately. The providing of students automation evaluation system as required become challenging and will be discussed further.

DEVELOPMENT OF THE SYSTEM

To overcome the stated drawbacks, Students Automation Evaluation System (SAES) was developed. The system can help the lecturers to manage scores more systematically and perform statistical analysis on selected data of any courses without knowing how to use any statistical applications. The system was developed using web based technology, while the data was analysed by Statistical Analysis System (SAS) and integrated with ASIS to complete the automation processes of student evaluation system. Through this approach, SAES can control procedures and properties of SAS and apply the functionality of statistics provided by SAS via SAS/INTRNET®.

Automation is the main element in the system that part of technology defined a standard of communication between applications on the same computer or applications running on different computers connected via a network. A major component of the system is an application developed from web based architecture which comprises of clients, web server, SAS server and database server. Based on multi-tier architecture approach, the components are bound together by a programming language called PowerDynamo and supported by HTML to perform the automation transactions. The principal of automation architecture is based on the structure as shown in Figure 1.

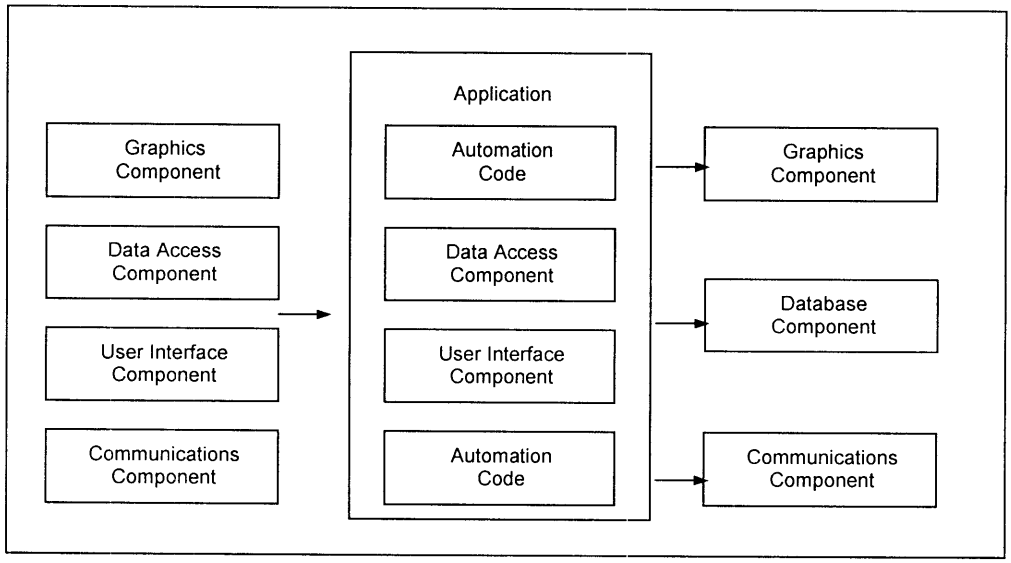


Figure 1 The Automation Pathways

The Automation is based on a dialog between two applications running under Windows operating system. During the dialog, the applications will share data, commands and other resources such as database files. In an automation scenario, one of the applications serves as an application server that provides services and resources. Another application is the controller that uses the services and resources provided by the server.

Figure 2 shows how automation works. The client application connects to the automation server through variables declared using the PowerDynamo scripts. After the objects are connected through object variables, the properties and methods of the server's objects are accessible by client application. Writing an automation code in PowerDynamo scripts involves three steps:

1. Declare object variables
2. Hook the variables into the server's objects
3. Manipulate the objects through their properties and methods

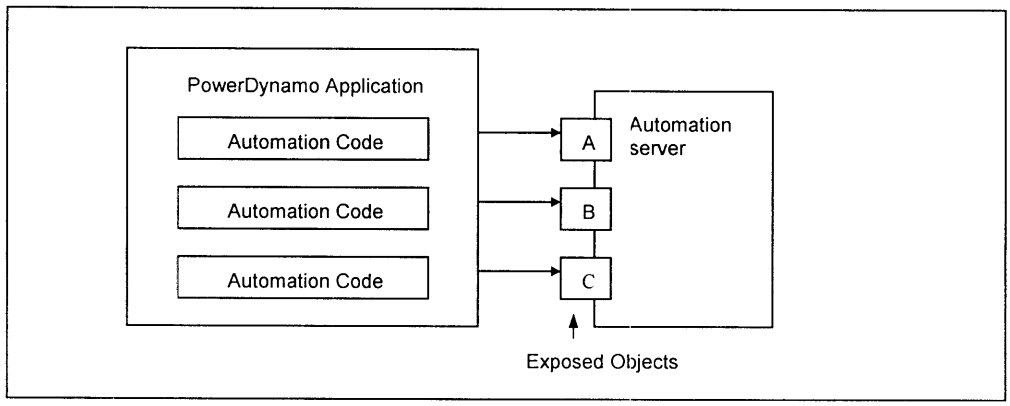


Figure 2 Basic Concept of Automation

In this research, SAS server serves as an application server, ASIS server serves as database server while SAES serves as a controller whose utilize resources provided by SAS especially in analysing data run by the lecturer. The interaction among the components can be shown in Figure 3.

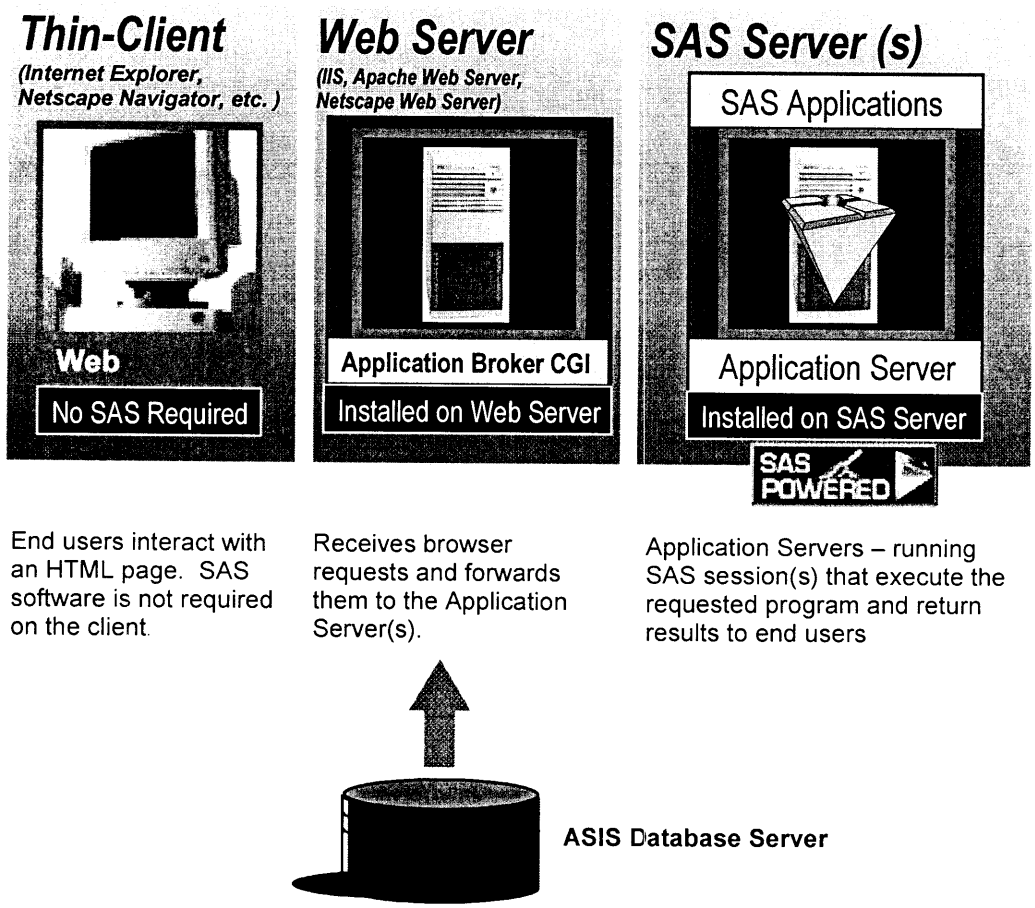


Figure 3 Interaction among the Components

The HTML code and PowerDynamo script used to fashion the front-end Graphical User Interface (GUI) and the original background SAS program designed to generate the interaction among the component and establish the transactions such as inputting scores and produce statistical analysis report are illustrated in Figure 4.

```
<!--SCRIPT PSOBJMOD=TRUE
   import(site.GetRootDocument().location + "/ObjMod.ssc" );
   import(site.GetRootDocument().location +
"/basefunc/common.ssc" );
   import(  site.GetRootDocument().location +
"/ae1/enman/function_sas.ssc" );
session.active = true;
InitObjects(session);

var PortalSession=psSession.GetValue("Portal_Session");
OpenConn ("PortalCon");
sql="execute  asp_get_Portalsession  @UserID=0,
@IDSession="+PortalSession;
p=GetRecordset(sql);
p.MoveNext();

var nopkj=p.GetValue('f100nopkj');
OpenConn('AsisCon');
sql = "execute student.asp_ret_currsem_web2"
p=GetRecordset(sql);
p.MoveNext();
var term=p.GetValue('f005term');
p.Close();

kodk=document.value('kodk');
kump=document.value('kump');
koditem=document.value('koditem');
peratus=document.value('peratus');
penuh=document.value('penuh');
jenis=document.value('TypeAnalysis');

document.write('<br>jenis='+jenis);
psSession.SetValue("gl_kodk", kodk);
psSession.SetValue("gl_kump", kump);
psSession.SetValue("gl_koditem", koditem);
psSession.SetValue("gl_peratus", peratus);
psSession.SetValue("gl_penuh", penuh);
file=jenis+koditem+"-"+kodk+"-"+kump+"-"+term;
path="c:\\sasdata\\";
function underscore(more){
arr_joint=more.split(' ');

if arr_joint.length>1{
joint=arr_joint[0];
for (b=1;b<arr_joint.length;b++)
{
 joint=joint+"_"+arr_joint[b];
}
 else
{
 joint=more;
 }
 return joint;
```

```
<p> </p>
<p> </p>
<div align="center"><center>
<form method="POST" action="proses_enter_mark.ssc">
<table border="1" width="91%" height="156">
<!--script
 outputFile = new File ( path+file+".sas","a" );
 ProcTemplate()
 SetGraphic()
 StatPattern()
 CreateData()
 outputFile.Close( );

 i=0;
 matrik1=matrik2=0;
 for(i=0;i<bil;i++){

 outputFile =new File ( path+file+".sas","a" );
 document.write(matrik[i]+"  "+peratus_tugasan[i]+"
"+bangsa[i]+"  "+jantina[i]+"  "+kes[i]+"  "+rate[i]+"  1 <br>"
);
 outputFile.Write(matrik[i]+"  "+peratus_tugasan[i]+"
"+bangsa[i]+"  "+jantina[i]+"  "+kes[i]+"  "+rate[i]+"  1 \n" );

outputFile.Close();

}
 outputFile = new File ( path+file+".sas","a" );
 outputFile.Write(";RUN;" );
 outputFile.Close();
 outputFile = new File ( path+file+".sas","a" );

 switch(jenis) {
 case "1":
      StatFreq("BANGSA")
      StatFreq("JANTINA")
      StatFreq("KESMASUK")
      break;

 case "2" :
     ProcMean("GRED")
     StatProcFreq2("JANTINA")
     ProcMean("JANTINA")
     StatProcFreq2("BANGSA")
     ProcMean("BANGSA")
     StatProcFreq2("KESMASUK")
     ProcMean("KESMASUK")
  break;
 .
 .
 case "7":
     ProcMean("GRED")
 break;
 .
 .
 case "11":
     ProcUnivariate();
 break;
 default:
}

 outputFile.Close( );
 outputFile = new File ( path+file+".sas","a" );
 CloseSas();
 outputFile.Close( );
 ftpSybase = new FTP( "172.23.1.200", "sasuser", "abc123" );
 ftpSybase.DeleteFile( file+".sas");
 ftpSybase.PutFile( file+".sas", path+file+".sas");
 ftpSybase.GetErrorCode( )
 ftpSybase.GetErrorInfo()
 ftpSybase.Disconnect();
 outputFile.Delete()
document.redirect='http://172.23.1.200/scripts/broker.exe?_SER
VICE=default&_PROGRAM=sasdata.'+file+'.sas';
```

Figure 4 HTML Code and PowerDynamo Script

IMPLEMENTATION OF THE SYSTEM

The implementation of the system is based on the physical architecture as shown in Figure 5. The interactions among component were operational through local area network environment and using two type of connectivity protocol namely hypertext transfer protocol (http) and Internet Inter-Orb Protocol (IIOP).

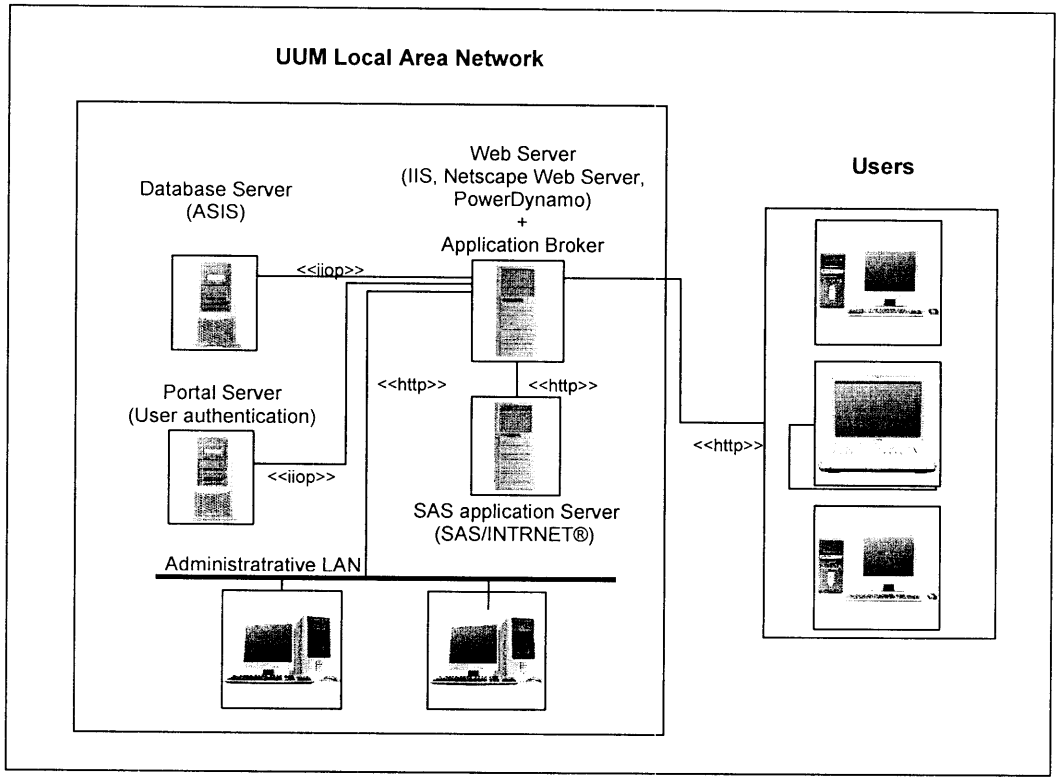


Figure 5 Physical Architecture for SAES

Using SAES, the lecturers can specify the number and the contribution of each assignment, quiz and test for the courses conducted. It will create a temporary workspace based on the number of evaluation specified and new column will be added to enable the lecturers to input and edit the score on final examination. The lecturers also need to specify the percentage of evaluation suggested as illustrated in Figure 6. The entire contribution of each assessment can be shown in Figure 7. Finally, the system will calculate automatically the contribution of each assignment, quiz and test onto the total scores of the coursework and for the entire course as soon as the lecturers input or edit the scores as shown in Figure 8.

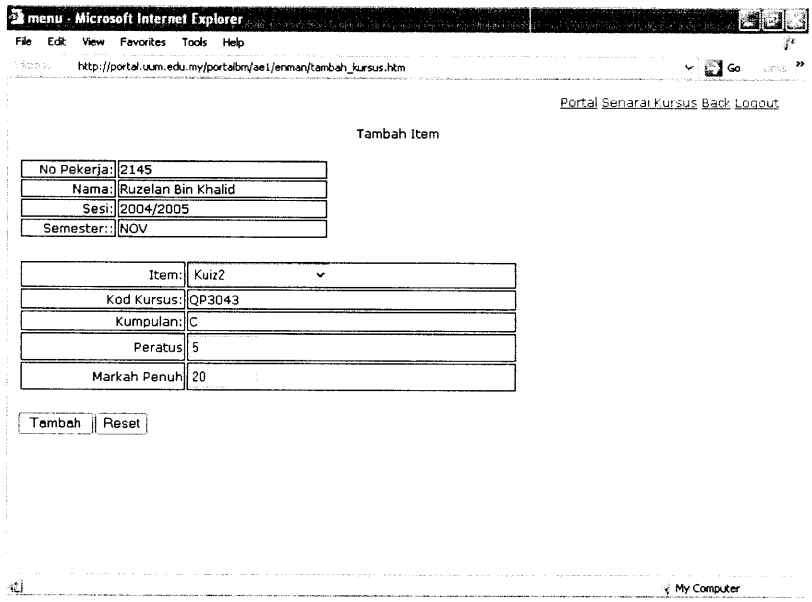


Figure 6 Specify the Assessment Contribution

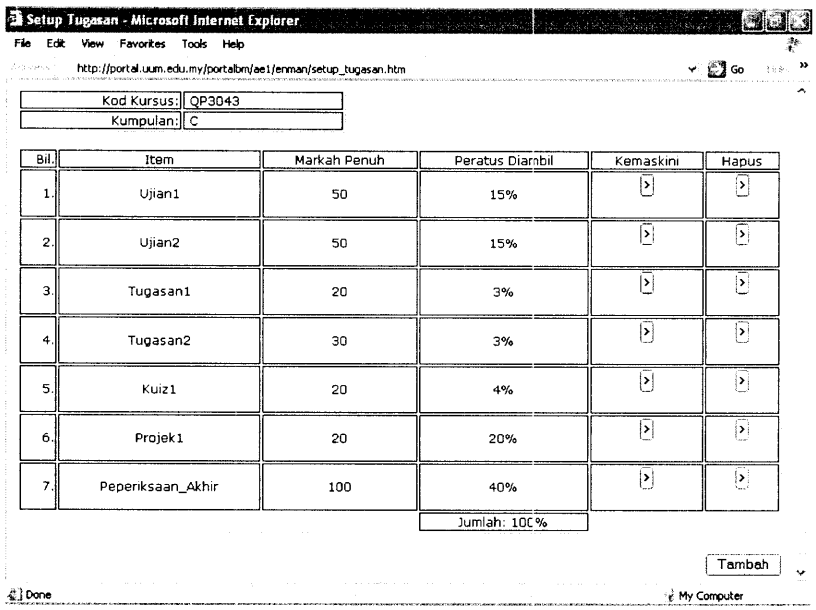


Figure 7 The Entire Contribution for Each Assessment

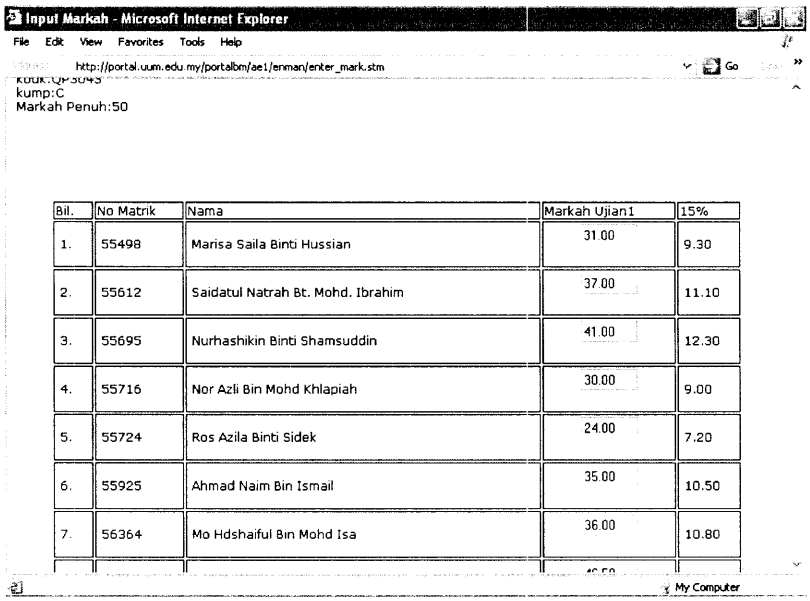


Figure 8 Input or Edit the Scores

STATISTICAL DATA ANALYSIS THROUGH SAS/INTRNET®

SAES provides a lot of statistical analysis function through SAS/IntrNet® such as the general analysis of coursework, comparative analysis of grades, comparative analysis of min by general or grouped by gender, and the ethnic or types of entrance to UUM. These functionalities can be accessed using *Laporan Dan Analisis Ikut Tugasan* menu as illustrated in Figure 9. Furthermore, the lecturer needs to select certain data as shown in figure 10 and the data will be submitted to the system for analysed by SAS/IntrNet®.

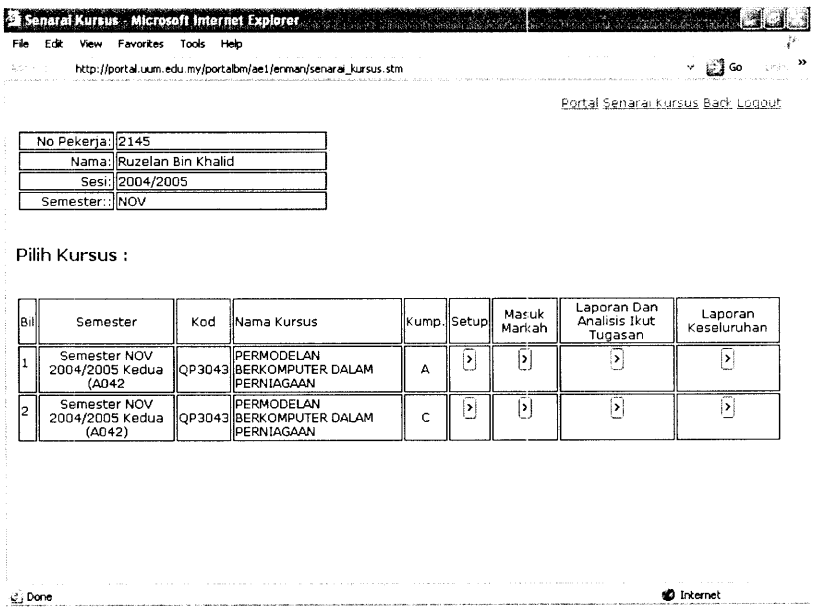


Figure 9 Statistical Analysis Functionalities

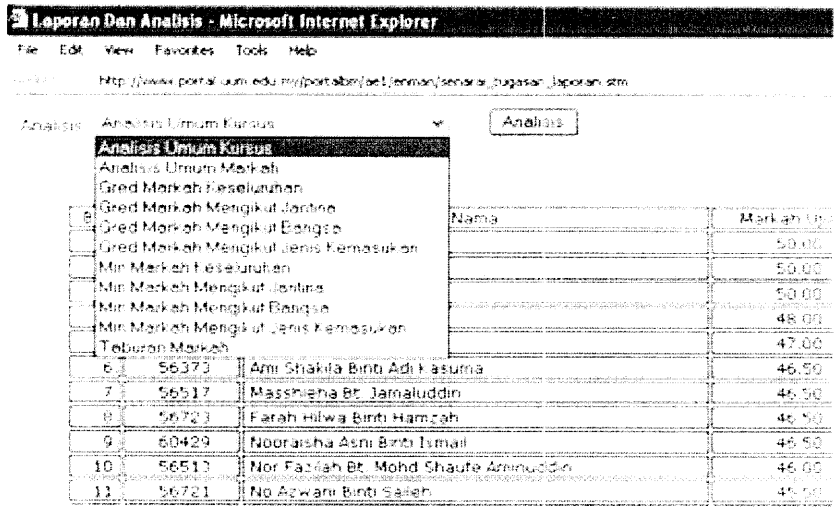
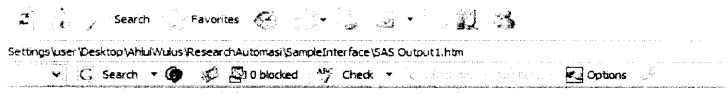


Figure 10 Selected Data to be Analysed

Figure 11 shows the example output of the students' percentage grouped by races and gender. While Figure 12 and Figure 13 shows the example output of the frequency and percentage of entrance type grouped by grades for Ujian1 in different type of output presentation.



JADUAL KEKERAPAN BANGSA

The FREQ Procedure

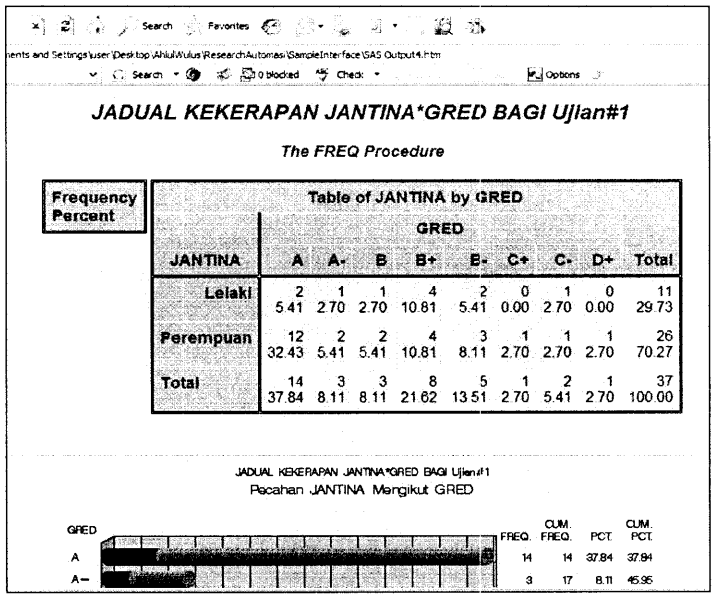
BANGSA	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Cina	4	10.81	4	10.81
India	3	8.11	7	18.92
Melayu	30	81.08	37	100.00

JADUAL KEKERAPAN JANTINA

The FREQ Procedure

JANTINA	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Lelaki	11	29.73	11	29.73
Perempuan	26	70.27	37	100.00

Figure 11 The Percentage of Students by Racist and Gender



JADUAL KEKERAPAN JANTINA*GRED BAGI Ujian#1

The FREQ Procedure

Frequency / Percent	Table of JANTINA by GRED								
	GRED								
JANTINA	A	A-	B	B+	B-	C+	C-	D+	Total
Lelaki	2 5.41	1 2.70	1 2.70	4 10.81	2 5.41	0 0.00	1 2.70	0 0.00	11 29.73
Perempuan	12 32.43	2 5.41	2 5.41	4 10.81	3 8.11	1 2.70	1 2.70	1 2.70	26 70.27
Total	14 37.84	3 8.11	3 8.11	8 21.62	5 13.51	1 2.70	2 5.41	1 2.70	37 100.00

JADUAL KEKERAPAN JANTINA*GRED BAGI Ujian#1
Pecahan JANTINA Mengikut GRED

GRED	FREQ.	CUM. FREQ.	PCT.	CUM. PCT.
A	14	14	37.84	37.84
A-	3	17	8.11	45.95

Figure 12 Frequency and Percentage of Gender

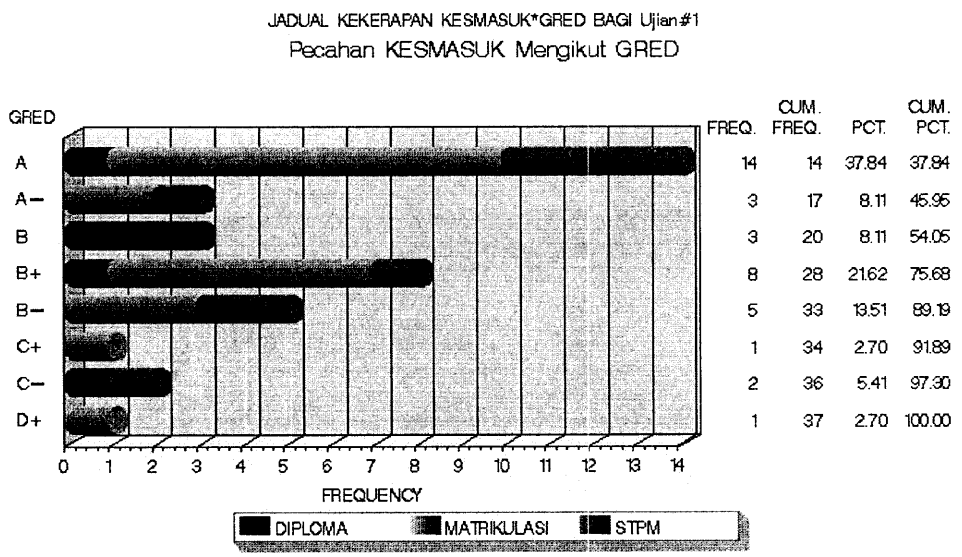


Figure 13 High Resolution Graph provided SAS/IntrNet®

CONCLUSION

The SAES was developed to manage and organized the students' scores systematically. The system also enables the lecturers to perform statistical analysis on the data using SAS/IntrNet® without the need to know the syntax which should be used. The statistical analysis functionalities provided by SAES are more effective when there are many students registered for a certain course such as core courses, which requires the lecturers to key in

the scores onto statistical analysis packages to perform the data analysis. Lecturers were advised to have enough knowledge to assess the output performed by SAS. Charts and plots are also provided to translate the data to graphical output so that the data can easily be read and understood. Other statistical analysis can regularly be added when necessary.

Besides that, SAES will be updated from time to time to help the university to perform mentor-mentee system more efficiently. Individual students' performance for each semester, the comparison of a student with other students taking the same programme, the comparison of a student with other students from other programmes and other statistical analysis will be converted to graphical output (shown in Figure 12 and Figure 13) so that the lecturer can easily view and supervised the performance of the students. SAS/IntrNet® provides several methods of accessing the SAS system from the web. With these capabilities, the implementation of student automation evaluation system was easily deployed to the users.

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