

Chapter VI

Conclusions

Summary of Results

The performance analysis concentrates 3 main procedures of the University Entrance Examination application system.

1. Student Records Getting Procedure.

In this procedure the evaluation is scoped into 4 points.

1) The maximum transaction rate per minute (TPM) of the client-server enrollment system.

The data came from monitoring program, called pumping.

2) The average service time for each student of the client-server enrollment system.

3) The amount of a successful transaction per hours of the client-server enrollment system.

The data came from the monitoring program.

4) The daily error records of the enrollment system.

The data was gotten by the log sheet paper from 30 client terminals.

2. Examination Rooms Preparing Procedure.

The evaluation concerns with report printing time and job accounting. Most data came from the job accounting books that the officers recorded when they did their jobs.

3. Examination Seat Numbers Validating Procedure.

The important part of the procedure was operated on ORACLE database management. Results of the evaluation came from the historical files that were created by ORACLE. They recorded about the updating list of each file. Thus summarized data can be created to show how long the system could validate each subject file.

The Conclusion of the System Performance

The duration of the University Entrance Examination application system is short, about 3 months and the officers that take care of the system are event-driven officers. They have to take care of the security of the system too. Thus the performance of the system must be considered and tuned it correctly. As a result the system will be finished in time.

1. Machine power that make the system run smoothly.

1) Each client terminal of the enrollment procedure must be able to record 50 application forms per hour.

2) The minimum client-server system speed of the enrollment procedure is about 3 transaction per seconds. The connection line speed is 16 Mbits per second.

3) The enrollment procedure requires 30 dot matrix printers. Each printer is able to print Thai characters. Time that printer spend to print each record should not more than 30 seconds.

4) The client-server system of the enrollment procedure should consist of a powerful server system. The server is a IBM RISC/6000 workstation. There are two 400 Mbytes hard disks.

5) SUN SPARC 10 work station that is a main server of the system consists of 32 Mbytes RAM, 109.5 MIPS CPU, 2 parallel ports, 1 serial port and ethernet communication card. The CPU is able to sort 100,000 records in 10 minutes, 1 key sorting.

6) The system requires 2 Gbyte hard disk for keeping all data because it wastes the time to transfer all data to other storages or compress it. Sorting process requires a double space of data to keep temporary files.

7) There are two line printers to print all reports. The speeds are 1200 lines per minute and 300 lines per minute.

8) The system requires at least four PC (Personal Computer) terminals that are connected to the SUN work station. At least 6 PCs are required to key in the absent student records.

9) There is one tape drive attached to the SUN work station and there is one 386 PC that handles ORACLE database management. The operating system is UNIX.

10) UPS is also required to take care of the SUN server and IBM RISC/6000 server.

2. The effective application process.

Each application process should be controlled to make the system perform better. The important application processes that the officers should consider are as follows.

1) The officers that record TM1 forms at 30 client terminals for the enrollment procedure should be able to record 35 characters per minute. They should have the ability to operate the terminals and printer basically.

2) The officers have to validate TM13 files about 9000 records in 3 hours every day after the enrollment is finished.

3) Seat numbers must be clean before the enrollment takes place.

4) TM13 files of other 7 universities should be clear in 4 days after the last enrollment date.

5) About the examination rooms preparing procedure, the officers have to prepare them in 7 days. The preparation process is reoperated 2 or 3 times until the University Entrance Examination committee approve them. One loop of process should succeed in a day.

6) All main report for the examination rooms preparing procedure must be printed in 4 days after the preparation rooms process finished. The officers have to urgently print letters to tell the students about the examination places. These letters must be mailed to the students in time.

7) TM4 files should be read by the OMR readers in 7 days after the first examination date. The amount of student records must be urgently corrected in 2 days to detect the lost records. After that the TM4 files validating operation will succeed in 15 days.

8) There are 2 tables in students selecting procedure. One is in file TABLESUM.DAT another is in the selection program. The selection table is updated oftenly. The selection process is reoperated every time that the table is updated. The selection process should not be more than 3 hours.

The Evaluation Problems

There are some problems in performance evaluation.

1) Because the evaluator has not worked for the University Entrance Examination application sytem before, it is difficult to decide clearly about the topics to be evaluated in each steps of the system. Some ideas to evaluate the system performance was discovered when the evaluator finish working for that step. Working experience is very important for the system performance evaluator.

2) Some performance data was ignored and lost because the evaluator has to spent most time to serve the requirement of the University Entrance Examination committee. The monitoring programs and log files help performance evaluating. An evaluator can run program as a background process to keep an important data into files. But some monitoring programs make system performance slow down. Because the programs interrupt CPU

time of the real work oftenly. The evaluators should think carefully when they use the monitoring programs or they could test the programs before implement it into the real work.

The Suggestion of the University Entrance Examination Application System

The suggestions consists of 3 main items.

1. The suggestions for machine power

1) The server machine should be powerful enough to serve a data processing jobs. It may be a work station or MINI computer. The server should consists of 2 Gbytes Hard disk, 32 Mbytes RAM and at least 100 MIPS CPU.

2) The printers should work smoothly and easy to set the configuration. In 1994, the best dot matrix printer is Epson LQ1170. It is able to print each TM13 record in 15 seconds. The line printer should be able to recover some printing errors. It should take care about the lost data or the spooler program should be created to handle the printing. The speed of the line printer should be about 2000 lines per minute.

About the enrollment procedure, the officers have to spend most time to set 30 printers that attach to 30 clients terminal. If we have a powerful spooler program to handle the printing queue, the 30 dot matrix printers will be replaced by 3 line printers. This method requires printer server processes. This is one way to reduce the printer setting time.

2. The suggestions for the system design

System design is important to every application systems. It is the main parameter that effects system performance. About the University Entrance Examination application system, in 1994, the system ran smoothly and finished in time. It concerns with data processing design concept. Data

validating, data security and data integrity must be considered. Some suggestions are as follows.

1) To increase the data integrity performance, the cross checking module must be established. The University Entrance Examination committee should record the total numbers of data. Thus, the numbers can be cross checked with the officers who work for the system at Chulalongkorn university to detect the lost records.

2) Each printing report should be stamped with a serial number, so the lost pages can be detected.

3) Steps in validate data should be established. Some validating modules are ignored because of other urgent works. The invalid data causes problems later.

4) Because the Entrance Examination application system is arranged annually and the officers that take care of the system are event-driven officers, the system documents should be created clearly. All procedure steps should be noted. It is very useful for the new officers that will take care of the system in the later year.

3. The suggestions for the officers who take care of the system.

The officers consist of 3 types.

1) project leader.

There should be 1 project leader.

2) programmers and operators.

There should be 6 persons that were programmers and operators.

3) general purpose officers.

At first, for the enrollment procedure, there were about 15 officers who service at 30 client terminals. They helped 30 key-in officers to service the applicants and there were 2 system programmers took care of the network system.

About 6 operators were required for data editing and data on-line updating. After the enrollment process finished, only the 4 general purpose officers and 6 programmers were required for the examination room preparing process. The 3 operators had to take care of 2 line printers. There were 12 key-in operators worked for the process to key-in the Absent files. Next, there were 6 programmers and 2 general purpose officers worked for the later processes.

The project leader should classify clearly about the duties of each officers. At least 2 sub-project leaders should be held to take care all works.

About the programmers and operators, there are main abilities that they should consider.

- 1) They should be able to operate the operating system.
- 2) They must have a programming language skill. The example are AWK programming, C programming and COBOL programming.
- 3) They must have knowledges about the computer network and can operate a file transferring.
- 4) They must be able to operate and set the line printer configuration.
- 5) They should understand the over view of the system clearly.

Thus, the system will be driven correctly.

There are many duties that the general purpose officers have. They can help the project leader to improve the system performance. The examples of duties are as follow.

- 1) They should record every jobs that finish each day.
- 2) They should control the input data that come from the University Entrance Examination committee and the output report that will be given to the committee. All documents must be taken care and kept in files.
- 3) They can create the reports for what the project leader request.