

## Chapter V

### The Performance Analysis of the University Entrance Examination Resources System

This chapter is about an analysis of the performance evaluation result from chapter 4. The bottle neck problem and performance parameters of each procedure will also be discussed.

#### The Performance Analysis of the Enrollment Procedure at Chulalongkorn University

The performance parameters of this procedure are as follows.

1. The errors when 30 officers at each terminal were recording data from TM1 forms.

The more the errors occurred the worse the system performance. The officers had to spend most of the time to correct them.

2. The printer speed.

This enrollment procedure required 30 dot-matrix printers. There were 3 types, LQ550, LQ1170 and LQ100. The best one was LQ1170 because they all worked smoothly and easy to use. LQ1170 has the fastest printing speed, about 15 seconds / transaction. While LQ550 and LQ100 print at a low speed, about 40 seconds / transaction.

LQ550 took an hour to set Thai font and the header of the form. LQ550 and LQ100 delay the enrollment service time. The system performance was slowed down.

3. The frequency of programs loading.

When errors occurred, the officers had to correct them. Some problems came from programs running at clients. Therefore, the system had to be stopped. And the programs had to be loaded to 30 clients. After that

the system was restarted. That wasted a lot of time. The student that wanted to take an enrollment had to wait.

One way to solve the problem is storing the client programs at the server. The executable programs will be loaded into the clients for executing.

4. The errors of running application numbers on TM1 forms.

The stamping materials did not work well. They tamped unclearly. So, the officers who recorded an application number at the terminals could not read them clearly. They had to guess and recorded them. Some were wrong. This is the reason that error records occurred and the officers had to clear them every evening after the end of an enrollment period.

5. The configuration setting up of IBM RISC/6000 server peripherals.

There were two IBM RISC/6000 computers connected to Token Ring network. One took part as a server another was used for system backing up and performance monitor. First, the officers connected tape drive to the RISC/6000 server. The connection made system response time slow down when data was being backed up into a tape storage. Some client terminals were paused for 5 minutes. Then the officers changed to connect the tape drive to another RISC/6000. The problem was solved. System response time came up.

From the pumping test, a network speed of the system was 7 TPS (Transactions per second). It shows that the client-server system could support up to 25,200 records per hour. The maximum amount of student taking the enrollment was 7,500 per day. Thus, the network speed was not a problem in this procedure.

The bottleneck of the enrollment period was the recording speed of the officers at 30 client terminals. Main time consuming problem of this procedure is on-line TM13 file updating. The officers had to check it with student documents. TM13 file was corrected. Some errors occurred in this step. Main error came from the application numbers. They were either invalid or duplicate.

### The Performance Analysis of the Examination Rooms Preparing Procedure

This procedure is complicated. It requires a good plan. Most external performance parameters have effects on it. There are 3 main parameters.

#### 1. The accuracy of procedure input data

There were plans and agreements of the University Entrance Examination committee to specify places and rooms for the students that took the exam. Some places were ignored after they had been specified to be used. Some groups of student needed to take the same room. Lots of requirement came. The officers had to reorganize the rooms to put groups of student into them. After finished preparing the examination rooms, 6 types of report were printed. Printing was the longest period of this procedure. If the committee changed their plans after the officers had finished preparing the examination rooms, 6 types of report must be reprinted. It wasted the time and system performance slow down.

#### 2. Printer speed and ease of printer setting.

Printing was the main job of this procedure. Lots of reports were established. Using a high speed printer could improve the performance. Main reports of this procedure were printed by the Genicom printer. It is a line printer. The printing speed is 1200 lines/minute.

Each report required various types of printing configuration. For example, the form to fill the student signatures required the 6 lines per inch and 10 characters per inch printing configuration. It took time to set the configuration directly by pressing any buttons at the printers. One way to set it was sending an escape sequence kept in files into the printer.

Table 5.1 shows an example of escape sequence that the Genicom printer get to set line spacing and character spacing.



LPI	P1(decim point)	CPI	P2(decim point)
3	240	10	72
4	180	12	60
6	120	13.3	54
8	90	15	48
		16.7	43

Table 5.1 Escape Sequence of Genicom Printer.

Examples of escape sequence and output of printing are shown below.

```
^[[240;72 G
ทดสอบเครื่องพิมพ์      PRINTER TESTING      printer testing
ทดสอบเครื่องพิมพ์      PRINTER TESTING      printer testing
ทดสอบเครื่องพิมพ์      PRINTER TESTING      printer testing
3 LPI   10 CPI
-----

^[[180;60 G
ทดสอบเครื่องพิมพ์      PRINTER TESTING      printer testing
ทดสอบเครื่องพิมพ์      PRINTER TESTING      printer testing
ทดสอบเครื่องพิมพ์      PRINTER TESTING      printer testing
4 LPI   12 CPI
-----
```

### 3. System design to control document.

Everyday many types of report were printed. Sometimes they were accidentally lost. Sometimes the officers lost them unintentionally. Incomplete reports were given to the Ministry of University Affairs and

rejected. The report must be reprinted and the system performance slow down.

The officers have to plan a document control. One way to control it is to mark a serial number and a total number on each page of reports. The report files must be checked before printing to confirm that the amount of record was correct.

#### The Performance Analysis of the Examination Seat Numbers Validating Procedure

Lots of records were invalid. There were errors because of many reasons. The officers took time to solve them. This procedure could not arrange manually. It needed an ORACLE database to arrange the data. ORACLE helped in error detecting. Examples of errors were duplicate seat numbers and invalid seat numbers. Main reasons that drop the system performance of this procedure are :

1. The students who took an examination marked his seat number incorrectly. These numbers may be invalid or duplicated. The amount of error effected the system performance.

2. The officers that corrected the answer sheets lost some answer sheets by accident. They did not know that some answer sheets were lost. The officers had to clear it urgently.

3. During the beginning of the work the high speed OMR reader machine was broken. Most answer sheets had to be read by the slow speed machines. Some answer sheets were poor. They stucked into each other because of the humidity. That was difficult for the OMR readers to read them.

### The Performance Analysis of the Students Selecting Procedure

There were 2 main performance parameters. One was internal parameter, the CPU speed, another was the accuracy of table used for the selection process.

The job is a CPU-bound job. Most of the time was spent on sorting process, the student score sorting.

The selection procedure was created 3 times for testing , for real output and for statistic report. About the testing and real output, the officers ran the selection programs on SUN SPARC 10 CPU and they ran these programs for the statistic report on SUN SPARC 20 CPU. There is 32 Mbytes RAM that was available in both machines. The SUN SPARC 10 took about 80 minutes to run a selection algorithm and the SUN SPARC 20 took about 46 minutes to run it. The CPU speed is one important performance parameter for this procedure.

Another important performance parameter was the accuracy of table that was used in the selection programs. This table was in file TM23SEL1.CBL. It kept the amount of student that faculties required. Every time, when the officers wanted to modify this table, they had to recompile the program TM23SEL1.CBL and ran this selection program again to get the new output. Table correcting job wasted the time. It was a manual job. Thus some error may occur. Before running this selection program the officers must be sure that data in the table was correct.

### Problems That Make the Overall System Performance Slow Down

1. Manually data correcting by using a vi editor bring a problem. Some records were accidental deleted or modified. The officers should create a program to modify any data files that they wanted to correct.

2. The officers had to transfer some data into tapes and disketts because the limitation of a disk space. For example, the selection procedure required about 200 Mbytes of a disk space to process all steps. Other data

that was not necessary was transferred into tapes and diskettes. Half space of the hard disk was reserved for system files and temporary files.

3. First step of the work, it was difficult to set the system. The officers had to install many system software and hardware because there were not a permanent computer system for the University Entrance Examination application system. Some problem occurred. COBOL compiler required a C++ library to include for executable code generating.

4. Sometimes there was a very busy situation. The officers made a mistake. For example, they lost the report or they attached carbon-copy paper into the printer in the wrong way or they missed some steps of work. All mistakes slowed down the system performance. They had to print long reports again when they lost them. They all should take a note about every steps, every jobs that they had to do.

5. Sometimes, there were some problems communication between the officers and the University Entrance Examination committee. The examination room preparing procedure is a good example. When the officers finished their room preparing job, the Examination Room Preparing committee gave another new data to modify the work, It wasted the time to reorganize the examination rooms.

Some requirements of the University Entrance Examination committee were not clear. Some reports that the officers made were wrong. Cross checking procedures were required to make a system performance came up.

6. File formats and file names standard should be set. Most data files that were sent from other universities were in the wrong format. Data conversion waste the time. Sometimes the officers had to guess because there were various types of file name.

### Time Considering of the System Performance

There are 4 main processes in the University Entrance Examination application system.

1. Student records getting process.
2. Examination rooms preparing process.
3. Examination seat numbers validating process.
4. Students selecting process.

There is the latest date for each process. Because they all work continuously. If one process does not work completely, the following process will not be able to be operated. Thus the whole system waste the time.

In 1994, all processes of the University Entrance Examination application system was finished before the latest date. They all work smoothly.



ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย