Written response to questions raised during the meeting of the LegCo Panel on Financial Affairs on the IPO of the MTRCL Limited

Q. 1 The result of the investigation commissioned by Central Registration Hong Kong Limited (Central) into the computer systems causing the duplicate certificates incident.

A. 1 Central Registration has submitted its investigation report to the Securities & Futures Commission. A copy of the management summary of the report is attached.

Q. 2 Whether Central had informed MTR Corporation Limited in the first instance of the delay in computer data processing and its decision to change the procedures for printing share certificates ?

A. 2 MTRCL was not aware of the computer slow down problems or the attempted remedial action taken prior to 5 October 2000.

Q. 3 Whether investors who placed orders to sell their MTR shares before receiving the share certificates had breached the Securities Ordinance or codes/rules of the Securities and Futures Commission ?

A. 3 In the case of MTRC or other similar IPO situations whether the first trading of the new shares commences on the day immediately after the day when the share certificates are distributed to investors, investors who sell their shares on the first trading day do not breach the short selling provisions (i.e. section 80 of the Securities Ordinance), if they have checked the allotment results and found that new shares have been allotted to them before making the sell transactions as, at the time of making the sell transactions, they have a reasonable and honest belief that new shares have been allotted to them.

However, under such circumstances, the investors still face the potential risk of being unable to deliver the shares to the broker for settlement on T+2 as they may not have received the shares in time due to various reasons (e.g. delay in delivering the shares by the post office; wrong address etc.). In the event that the investors are unable to deliver the shares for settlement, HKSCC will initiate the share buy-in and charge the broker for the costs. The broker will, in turn, charge the costs back to the investors for failure to settle the transactions.

Before he executes the sell transactions, a broker who is an exchange participant is required by the Rules of the Stock Exchange to make enquiry of his clients about whether they own the shares or, more appropriately in this case, have been allotted new shares. If the clients confirm that they have been allotted new shares, the broker can execute the sell transactions. However, in practice, for operational reasons, some brokers will ask their clients to produce the share certificates from an IPO before selling the shares on their behalf.

In the circumstances described above, neither the investors nor the broker breach the short selling provisions or any laws.

NON TECHNICAL MANAGEMENT SUMMARY

REPORT TO THE BOARD COMMITTEE OF CENTRAL REGISTRATION HONG KONG LTD ON COMPUTER PERFORMANCE DURING THE MTR IPO

Introduction

The success of the processing by Central Registration of the offer of shares in MTR Corporation to the public in early October was marred by the production and despatch of some 1,500 duplicate share certificates in addition to the 615,000 original certificates.

This error was largely a result of departures from normal and proven procedures made necessary in order to make up time. Much of this lost time was a result of computer jobs making up the IPO process taking some 2 to 4 times longer to complete than had been estimated. This estimate was based on test runs performed on Central's development machine with similar volumes of data.

This paper seeks to explain in non-technical terms, why the same or similar jobs on the Production computer took significantly longer to run, than estimates based on the Back-up & Development machine, which to all appearances is a less powerful computer. In the interests of clarity, the report omits a significant amount of technical detail. In so doing it makes some quite complex issues appear significantly simpler than they are.

The Two Machines

Both the Production and the Back-up & Development computers are Hewlett Packard (HP) 9000 series mini-computers.

The Production machine is a model T600.

It has 3 @ 180 Mhz Processors
- 639 Megabytes of "real" memory
- 150 Gigabytes of disks

plus tape and CD Rom drives.

The Back-up & Development machine is a model D390.

It has 2 @ 240 Mhz Processors
- 384 Megabytes of memory
- 25 Gigabytes of disk.

It could be assumed from the above, that the Production machine is the more powerful (3 processors as opposed to 2, more memory and more disk space).

As stated above, it was assumed therefore by Central's management that a job run on the Development machine would run at least as fast on the larger Production machine.

Reasons for the Discrepancies

The power of a computer and its capacity to process large volumes of data is made up of a number of factors, the four most significant being:

a) Amount of Memory available
b) Processing (CPU) speed
c) Disk speed and availability
d) Efficiency of the Computer Programs, in particular in relation to their use of the database.

The relative importance of these factors is dependent on the job being processed and even on the part of the job being processed. A typical program or job will involve

- selecting and reading data from disk

- manipulating this data, partly in memory, partly by the use of work files

- performing arithmetic operations on the data

- writing the results back to disk, possibly by way of memory or work files

We shall examine the above performance factors in turn and compare the true availability and speed of the two machines.

a) Memory

Comparing the total memory of the two machines (639 Mb v 384Mb) can be misleading as each machine is effectively "partitioned" so that it can run a number of jobs and databases at the same time.

The Production machine has 5 partitions, whilst the Back-up & Development machine has only 2. Memory available to each partition was in fact therefore greater on the Back-up & Development machine (384/2 = 192 Mb) than on the Production machine (639/5 = 127.8 Mb)

b) Processing Speed

Processing Speed tends to be of more significance in large "number crunching" jobs than in data manipulation jobs such as an IPO. Nevertheless processing speed does contribute to the overall performance of a computer since virtually every activity requires use of the CPU/s (Central Processor unit/s).

Although both of Central's computers are multi-processor machines, the benefits of having multi-processors are not available when processing a single, batch job on a single database as was the case with the MTR IPO.

In practice therefore the volume test was run on a machine with a 240 Mhz processor, whilst the live run used a machine with a 180 Mhz processor. The effective raw processing power of the machine used for the MTR IPO was only 75% that of the test machine.

c) Disk Speed and Availability

The availability of sufficient disk space to hold and manipulate the data was not a problem in the Production machine as it had been on the Back-up & Development machine when the MTR volume test was attempted.

The Production machine has in total 150 gigabytes of disk compared with 25 gigabytes on the Development machine.

However, the Production machine is configured to use "Disk Mirroring", whereby data written to disk is written to two separate disks. This technique is used, normally only in real-time, time critical applications, to guard against disk failure - so that if one disk drive fails, the computer can continue running, since the data required is available on the mirror disk to the failed one.

Disk mirroring, however, has 2 costs

- it effectively reduces the amount of usable disk space by half

- it introduces a performance overhead, the magnitude of which is debatable, but which experience has shown to be greater than that claimed by computer suppliers.

Even allowing the reduced disk space availability, resulting from mirroring, the Production machine has 3 times the available disk of the Back-up & Development machine.

However, what is believed to have contributed significantly to the lesser performance of the Production machine is the fact that ALL disks and not only those holding critical data are mirrored.

Extensive use is made of "Temporary" files and "Work files" when manipulating large volumes of data. Because of the relatively small amount of memory available to hold this data, it is believed that mirroring will have had a significant adverse effect on machine performance, particularly in view of the large volume of data processed.

d) Program Efficiency

Although the efficiency of the computer program code itself can be a significant factor in program run times, particularly in terms of the code used to access the data base, the fact that the same programs were used on both machines means that this cannot be a contributory factor. The code of the principal programs used for the MTR IPO has been examined and no significant problems have been discovered.

Summary of Significant Factors

Three significant differences in the resources available on the Production computer from those used on the Back-up & Development machine to carry out volume testing contributed to the greatly increased run times of the "live" jobs.

These factors were:

- less memory
- less powerful processor
- significant disk I/O overhead resulting from disk mirroring.

Remedial Action

A separate technical report has been produced which includes recommendations on actions that should be taken to remedy the above deficiencies on the Production machine. Some of these will require further investigation, particularly in regard to the possible options on hardware upgrades.

General technical recommendations include:

(i) upgrade/reconfigure the hardware to make the two machines more similar.

(ii) remove mirroring from all but the most critical disks/files. (This may allow some disks to be transferred to the Back-up & Development machine).

(iii) upgrade or replace the Production machine to provide greater processing power or "swap" the two machines so that the more powerful machine is used for production.

(iv) allocate more memory to data cache on the Production machine and consider the purchase of additional memory.

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