# Computer systems administration TE2003

## Administration av datorsystem TE2003

**7th January 2010**

**09:00 – 13:00**

### IDE, Högskolan i Halmstad

Examinator: Magnus Jonsson, IDE-sektionen
Course Responsible: Kristoffer Lidström, IDE-sektionen tel. 16 73 85

Grades:
        25p  => 3
        33p  => 4
        42p  => 5

Number of questions: 14
Maximum points:    50
Number of pages:    3

According to Halmstad University local exam regulations, section 3.4:
*"Foreign students may take with them a language dictionary in book form. The dictionary should not contain notes of any kind and on request be shown to the invigilator prior to the beginning of the exam."*
Other than dictionary as specified above, no other extra materials (calculators, course books etc.) are allowed.

**Kom ihåg:**
- Skriv namn på varje blad
- Numrera bladen
- Numrera svaren tydligt, siffra och ev. bokstav, t.ex. 7 a)
- Svara på frågan. Tänk på att många poäng kräver längre svar och få poäng kortare svar. Om du skriver ovidkommande eller felaktiga uppgifter i svaret kan det bli poängavdrag.
- Svara **antingen** på svenska **eller** på Engelska

**Remember:**
- Write your name on each sheet of paper
- Number the sheets
- Number your answers clearly, number and possible letter, e.g. 7 a)
- Answer the Question. Many points will demand a longer answer and few points a shorter. If you answer with irrelevant or erroneous information, points may be deducted on that question.
- Answer either in English or in Swedish

Lycka till!

Good luck!

1.      Please order the following stages in the boot process according to when in the process they occur (for example, "first X then Y then Z")          2p
A. POST
B. Windows XP logo is shown
C. PSU sends "POWER OK"/"POWER GOOD" signal
D. Boot loader screen is shown

From first to last: C, A, D, B

2.      Suggest three ways to find out who the manufacturer of the processor in a PC system is.          3p

Through diagnostic software, by looking it up through the manual or other documentation for the system, by visually inspecting the CPU chip.

3.      Below you will find part of an article published by CNET in 2004.          4p
a) Based on what you have learned about processor performance, why did Intel choose to change their marketing so that it focuses less on the clock speed? (Why is clock speed by itself not a good measure of performance?)
b) Suggest a better way to compare the performance of two processors than comparing their clock speeds.

> ## Intel chips take a new number
> By John G. Spooner, Staff Writer, CNET News
>
> **"Intel plans to assign a new numbering system to its Pentium and Celeron processors in order to better illustrate their performance to consumers, according to a source familiar with the company's plans.**
> The chip giant is expected to begin the practice with the launch of its latest Pentium M processor, dubbed Dothan, which is due in the second quarter. Pentium 4 and Celeron chips will also get model numbers, as Intel aims to get the system in place by summer, the source said. Under the model number system, processors will be given numbers to describe their performance, in addition to being described as running at 2GHz or another speed. The planned system, which would focus on the chips' overall performance and de-emphasize how fast its chips run, is a huge change for Intel's marketing machine."

a) The processor clock speed can typically not be used to compare processor performance as the performance varies depending on factors such as caches, instruction sets and so on. I.e. the "amount of work done" by two processors in one clock cycle can be significantly different.

b) For example using benchmarking software, or running similar tasks on both CPU's (assuming that the rest of the system components are comparable)

4.  What is the difference between a hard and soft power off? Which one should you preferably use when turning off a PC and why?                    4p

A soft poweroff occurs when a signal is sent through software to indicate that the system should shut down, e.g. after having clicked the "shut down" button in Windows. A hard poweroff on the other hand is when power is removed from the system, e.g. by pulling the power plug or pushing the power switch (although some physical switches may lead to soft poweroffs). A soft poweroff is preferable. The advantage of a soft poweroff is that the system can be put into a consistent state before shutting down, e.g. empty buffers, move data from volatile to permanent memory and spin down hard drives.

5.  You have just built a new PC system with a single hard-drive. Please indicate the steps you need to take in order to install both Windows and Linux on the new drive.                                                              3p

The drive initially needs to be partitioned, this can be done using the Windows/Linux installers or by using separate software, e.g. GParted. Separate partitions for the Windows installation and Linux installations are needed. The partitions then have to be formatted to different file systems, e.g. NTFS for Windows and EXT3 for Linux. This can also be done through specialized software or through the installers for each OS. Finally the bootloader has to be configured so as to allow choosing which OS to start when powering on the PC.

6.      A user contacts you stating "Windows doesn't start!!" Using the test cases given below, draw a diagnostic flowchart to diagnose the problem. Construct your flowchart so that you avoid doing unnecessary tests (for example if you know that the system gets past POST, you probably don't need to check the power cable)                      4p

| Test case name | Description |
|---|---|
| OS | Is the operating system installation corrupt? Test using installation rescue-disk. |
| POWER_WALL | Is there power in the wall socket? |
| DRIVE_DETECT | Is the primary hard drive installed and detected during boot up? |
| POWER_ON | Does the system power on when pushing the power on button? |
| POST | Does the system get past the POST stage? |
| MONITOR | Is the monitor properly attached to the computer and power outlet? |
| POWER_CABLE | Is the PC power cable plugged into the wall? |
| DRIVE_CABLING | Is the hard-drive power and data cables properly connected to the motherboard? |

Example flowchart, variations are possible:
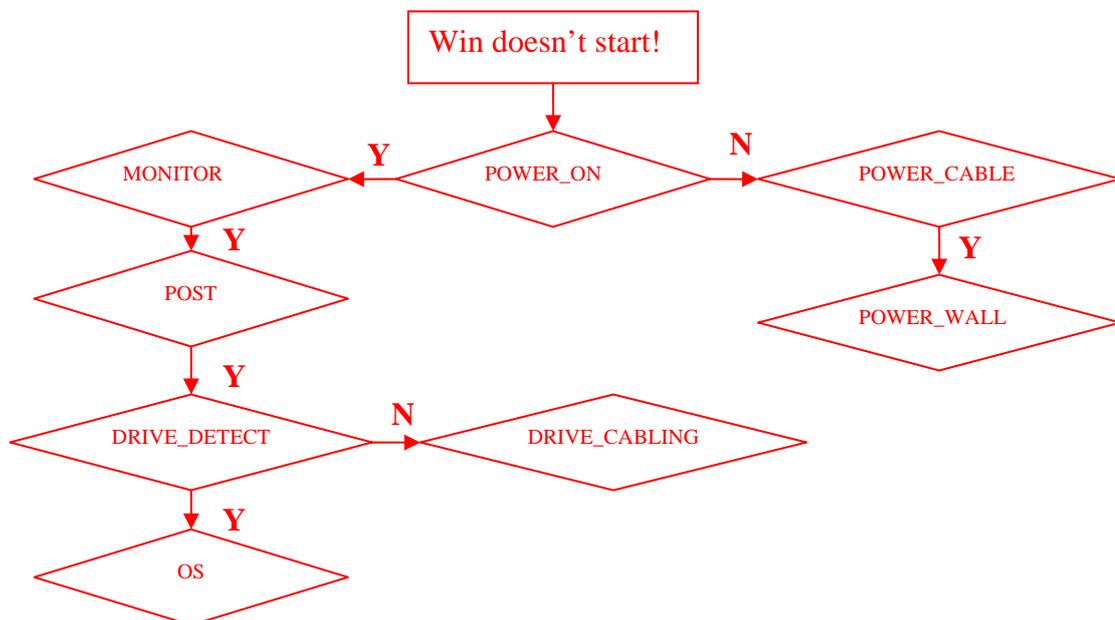
7.     Figure 1 shows a schematic view of a hard disk platter.                3p
       a) What is pointed out by (i) and (ii)?
       b) Item (ii) is the smallest addressable unit on the platter. How much data
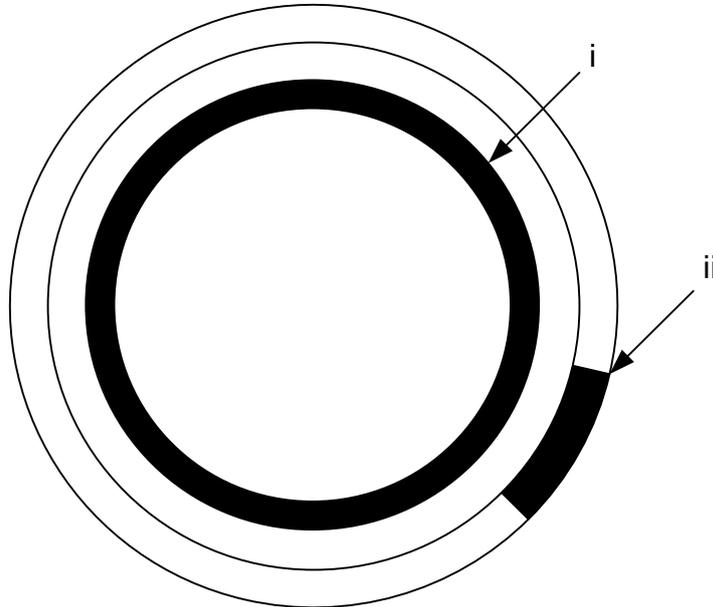          does (ii) typically hold?



*Figure 1. A schematic view of a hard disk platter*

a) (i) Track, (ii) Sector

b) 512 Bytes

8.     What is a *jumper*? Where are jumpers used in a PC and what is their purpose?
                                                                           3p

       A jumper is a connector used to bridge two pins. It acts as a physical
       configuration tool, commonly used on older hard drives and for some
       functions on motherboards, e.g. to reset the BIOS password.

9.     A company wants to make backups of their valuable files. The backup scheme
       would be to take a full backup on day 1 and then use either incremental or
       differential backup for day 2,3,4 and 5. For the two choices of backup scheme
       (incremental or differential) compare the following:                4p
       a) the backup size.
       b) the impact of a lost backup day 3.

       a) incremental backup saves all changes day to day, while differential backup
       saves all changes from day 1. This means that a big change day 2 followed by
       no change at all the following days will result in a smaller total backup size for
       incremental backup.

b) If the backup for day 3 is lost the incremental backups for day 4 and 5 are lost as well.  For the differential backup loosing backup 3 will not affect backups for days 4 and 5.

10.  Give an example of one bad and one good password and explain why they hold these properties.                                                           2p

Bad: "automatically" – although this is a long word it is present in a dictionary, which makes it easy to find out using a so called "dictionary attack".
Good: "5uPER$3ns0mat" – a password that is long, not present in any dictionary and consists of alphanumeric characters as well as special characters.

11.  Right or wrong? Right answers = 0.5p. Wrong answers = -1p.          3p
(Maximum points = 3p, minimum = 0p.)

a) A firewall will protect against trojan and virus infections.
b) In Windows each hard drive can have a maximum of 5 primary partitions.
c) The binary number 01101110 is equal to 101 decimal.
d) 101 is a valid binary number.
e) An octal number contains 8 bits.
f) "DEADBEEF" is a valid hexadecimal number.

a)  Wrong. A firewall protects against communication on certain ports. (0.5p)
b)  Wrong. 4 is the maximum number. (0.5p)
c)  Wrong. It is equal to 110. (0.5p)
d)  Right. (0.5p)
e)  Wrong. An octal number has the base 8. (0.5p)
f)  Right. (0.5p)

Motivations are not required for full points.

12.  Why is it a good idea to *portscan* a newly installed PC?          2p

To find out which ports are open on the system and to judge if those ports are susceptible to attacks over the network. This allows the administrator to close these ports or otherwise restrict access to them.

13.  Please give a description of each of the following five terms related to troubleshooting and why it is relevant to a troubleshooter.          10p
a) Error reproducibility
b) The "Five Why's" method
c) ESD damage
d) Bluescreen
e) Safe mode

a) Specifying the steps necessary to cause a problem to occur again. When describing an error to someone else it is important to include the steps

necessary to make that error occur again, so that this person can create and troubleshoot the problem.

b) A simple method for performing root-cause analysis, asking "why" at least five times so as to find the underlying cause of a problem. Helps in finding the underlying cause so as not to only treat the symptoms.

c) Damage due to electrostatic discharge, i.e. a component has been damaged by a high-voltage discharge. Important to know how to avoid causing this damage when working on a PC.

d) When certain unrecoverable errors occur in Windows a screen with the error code on a blue background appears. Narrows down the possible causes of the problem, error code can be a good starting point.

e) A mode in which Windows starts with a minimal set of drivers and running programs, useful to debug problems related to software that is automatically loaded on startup.

14.     Give three reasons for assigning user permissions (e.g. read/write) access to files in a directory.                                                     3p

For example: Protect against access by unauthorized users. Protect against accidental deletion by authorized users. Protect against deletion/modification by software.