Kontrollskrivning / Written Test

TDDC31

”Orientering i IT-infrastrukturer”
“Introduction to IT Infrastructures”

TDDC31 ”Orientering i IT-infrastrukturer”

Monday, 2005-12-12

Instructions
1. Write your name and personal number on every page.
2. You have to turn in the test before you leave (even if it is empty).

About the test
• Maximum score for each question is 2 points.
• On multiple-choice questions each correct choice will give you 0,5 points in addition while each wrong choice will give minus 0,5 point for that particular question. You cannot get less than 0 points for a question.
• Note! More than one choice may be right.
• Maximum number of points for the whole test is 50. To pass you will need at least 25 points.

Name: Personal number:

Points: Grade:
**Computer architecture**

1. **What is a CPU composed of?**
   - yes no
   a) ☐ ☐ arithmetic and logic unit
   b) ☐ ☐ memory unit
   c) ☐ ☐ control unit
   d) ☐ ☐ registers

2. **The stages of the instruction cycle are:**
   - yes no
   a) ☐ ☐ fetch instruction
   b) ☐ ☐ decode instruction
   c) ☐ ☐ fetch operand
   d) ☐ ☐ decode operand

3. **A machine instruction contains information concerning:**
   - yes no
   a) ☐ ☐ The operation which has to be executed
   b) ☐ ☐ The programming language in which the program has been written
   c) ☐ ☐ The address of the operand
   d) ☐ ☐ The size of the memory

4. **The following are input devices:**
   - yes no
   a) ☐ ☐ mouse
   b) ☐ ☐ inkjet printer
   c) ☐ ☐ scanner
   d) ☐ ☐ keyboard

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5. Which are the main components of a von Neumann Architecture?  
   yes no  
   a)  ☐  ☐  control unit  
   b)  ☐  ☐  secondary memory  
   c)  ☐  ☐  arithmetic and logic unit  
   d)  ☐  ☐  registers  

6. Why are assembly languages used?  
   yes no  
   a)  ☐  ☐  Because they are easier to use than current programming languages  
   b)  ☐  ☐  Because they are easier to use than binary encoded machine language  
   c)  ☐  ☐  Because we need to access details of the machine architecture  
   d)  ☐  ☐  Because they are at a higher level of abstraction than current programming languages  

7. Numerical data in the computer:  
   yes no  
   a)  ☐  ☐  are represented in decimal form  
   b)  ☐  ☐  are represented in binary form  
   c)  ☐  ☐  are represented binary and are converted to decimal for computation  
   d)  ☐  ☐  are represented binary and computations are performed in the same format  

8. In the context of cache memory:  
   yes no  
   a)  ☐  ☐  an access to an item which is in the cache is a "cache hit"  
   b)  ☐  ☐  a good cache has a small "hit ratio"  
   c)  ☐  ☐  a cache memory is slower than the main memory  
   d)  ☐  ☐  the size of a cache is smaller than the size of the main memory
Operating systems.

9. In event driven operating systems…

   yes no
   a) ☐ ☐ … the OS (kernel) remains idle most of the time.
   b) ☐ ☐ … the OS stops executing if an interrupt (I/O, time-out, …) occurs.
   c) ☐ ☐ … the OS executes if service request (I/O, file request, keyboard input, …) event occurs.
   d) ☐ ☐ … the CPU is dedicated to count the number of events.

10. An operating system, besides other activities, handles interrupts. Interrupts are:…

    yes no
    a) ☐ ☐ a delay in processing due to operating system overload.
    b) ☐ ☐ signals from hardware or software requesting attention from the operating system.
    c) ☐ ☐ messages received by your PC from other computers.
    d) ☐ ☐ time slices for updating the PCB (Process Control Block).

11. Process scheduling:

    yes no
    a) ☐ ☐ An CPU-bound process is a process which exchanges numerous messages with another computer system.
    b) ☐ ☐ In a preemptive scheduling schema a process can be forced by the operating system to give up the CPU at any time.
    c) ☐ ☐ In general a context switch is more difficult among processes than threads.
    d) ☐ ☐ For a general operating system, a good CPU-scheduling algorithm should maximize the CPU utilization.
12. Memory management

Consider the following page table,

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>00</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>00</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

and assume the following physical memory content (represented horizontally):

<table>
<thead>
<tr>
<th>Frame 00</th>
<th>Frame 01</th>
<th>Frame 10</th>
<th>Frame 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

Each frame is 4 bytes long, and the memory is byte addressable. We count the position from left to right, similar to the frame numbering schema.

The logical address …

yes no

a) 0100 is translated to point to (i.e. to access) memory location A.
b) 1011 is translated to point to L.

Fill in the corresponding letter of the memory location pointed by the following logical addresses:

c) 1111 is translated to point to …SVAR:
d) 0000 is translated to point to …SVAR:

13. The following file management scheduling algorithms suffer from starvation if the user makes requests to blocks located on peripheral tracks (most inside or outside tracks):

yes no

a) First Come First Served (FCFS)
b) Shortest Distance First (SDF)
c) Scan
d) N-Step, C-Scan
14. File system.

   yes  no
   a)  ☐  ☐  A logical (file) record needs always to fit inside a physical block.
   b)  ☐  ☐  If a logical record uses 75% of the physical block, and each record is allocated to separate block, then the file ends up with 25% of internal fragmentation. (Assume that the entire file is only a set of fixed size records.)
   c)  ☐  ☐  External fragmentation cannot occur with contiguous allocation.
   d)  ☐  ☐  External fragmentation cannot occur with linked allocation.

15. In a paged system, with a page size of 64 bytes, what is the page number and page offset for the following binary virtual address: 10100110b (i.e. 166d)?

   yes  no
   a)  ☐  ☐  page number: 1
   b)  ☐  ☐  page number: 2
   c)  ☐  ☐  page offset: 38
   d)  ☐  ☐  page offset: 66

16. The architecture of an operating system can be categorized as:

   yes  no
   a)  ☐  ☐  Monolithic: no special conceptual organization of the OS architecture.
   b)  ☐  ☐  Stereolithic: there is a conceptual borderline between drivers and the kernel.
   c)  ☐  ☐  Layered: the operating system is conceptually subdivided into (communicating) layers.
   d)  ☐  ☐  Bigkernel: a configuration that consists only of a unique module (ex. UNIX OS)
Network

17. Select which of the following that are true:

   Yes  No
   a)  □  □ Two techniques for transfer data through the network core are circuit switching and packet switching
   b)  □  □ The application runs in the end systems and not in the network core
   c)  □  □ The network core contains routers
   d)  □  □ The network edge contains you.

18. The following protocols are typical application layer protocols on the Internet:

   Yes  No
   a)  □  □ IP
   b)  □  □ HTTP
   c)  □  □ SMTP
   d)  □  □ TCP

19. The following are true about general protocol concepts:

   Yes  No
   a)  □  □ Encapsulation is the mechanism of adding of headers to a message as it passes through layers
   b)  □  □ A network architecture is the structuring of network hardware into sending and receiving routers
   c)  □  □ A protocol stack is a list of specific protocols that work together to make an application in an edge computer to connect to another edge computer through the network core
   d)  □  □ The peer-to-peer interface of a protocol defines the syntax, semantics, and timing of messages exchanged with the peer
20. The following are true about Ethernet:

<table>
<thead>
<tr>
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Before transmitting, a station must first listen if the channel is idle; if it is, then the station is allowed to transmit its data.

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<td>b)</td>
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A token is also circulated in the network and must be acquired by a station before the station is allowed to send any data.

<table>
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It consists of, among other things, adaptors that communicate in the link layer.

<table>
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<td>d)</td>
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Typical speeds are 56 kbps and 128 kbps.

21. Name and explain one typical service that TCP provides.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

22. What is meant by a MAC protocol? Define the term, explain it and give an example!

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

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23. List the typical elements of a wireless network! (The ones that make it work as a wireless network.)

24. What is the function of the network layer on the Internet? (Name and describe one of its services.)

25. Define the Internet with a maximum of two sentences.