

# *OHJ-4106 Operating Systems*

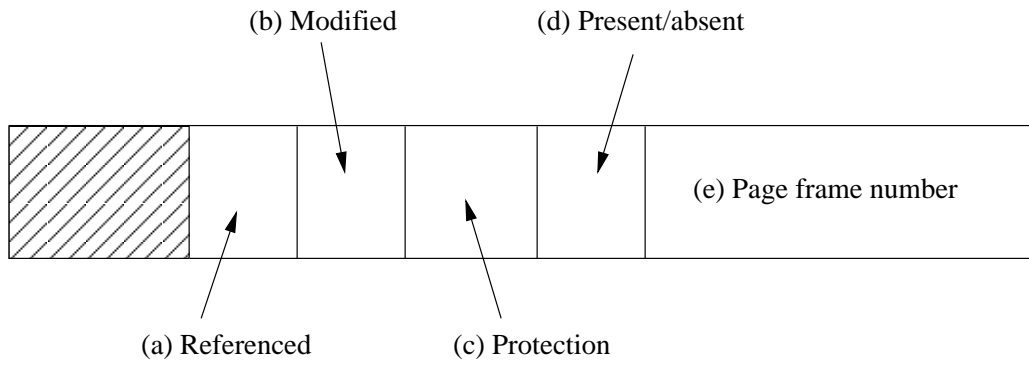
Exam 17.3.2009

**Calculators, computers or literature are NOT allowed in this exam.**

1. Describe shortly (as to someone not familiar with this particular software systems subject) what these concepts are: (*1 p/item*):
  - a) What are the main functions of an operating system?
  - b) Operating System can be seen as an interrupt driven system – what does this mean?
  - c) Page fault
  - d) Software Interrupt (SVC)
  - e) Context switch.
  - f) Translation Lookaside Buffer (TLB)
  - g) *seek* operation in UFS (Unix File System).
2. Evaluate a system which contains only one external device: a disk. Program execution in this system contains steps: wait to use CPU, use CPU, wait to use Disk, use Disk.  
In this system we consider a workload, which consist of two programs: A and B. A step “use Disk” length for both programs is always (for simplicity) 30 ms. Program A step “use CPU” length is always 40 ms. For program B this step length is 10 ms. Program A execution contains steps: CPU, disk, CPU, disk, CPU. For program B the steps are: CPU, disk, CPU, disk, CPU, disk, CPU, disk, CPU.  
Compare the following scheduling methods in executing this workload. Draw a diagram of the execution steps and give a rationale why a process is in each state. (*6 p*)
  - FIFO scheduling (program A starts in CPU)
  - pre-emptive fixed priority (program B has greater priority)
  - round-robin scheduling (time slice is 5 ms)

continues ...

3. A process can have the following states: RUN, READY, WAIT, SWAPPED WAIT and SWAPPED READY. Describe:
- What is the meaning of each state?
  - What transitions are possible between the states and when a transition can happen?
4. The page table of processor X uses Page Table Entries shown in Figure 1. For each of the fields (a to e) explain for what it is used in implementing a paging virtual memory. (5 p)



Kuva 1: a typical Page Table Entry