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MEVD–202

M. Tech. (Second Semester)
EXAMINATION, August, 2008
(Micro Electronics & VLSI Design)
REAL TIME OPERATING SYSTEM
(MEVD – 202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

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1. (a) What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices ?

   (b) What are the two models of interprocess communication ? What are the strengths and weaknesses of the two approaches ?

2. (a) What is the main advantages of the micro Kernel approach to system design ? How do user programs and system services interact in a micro Kernel architecture ? What are the disadvantages of using the micro Kernel approach.

   (b) Consider a paging system with the page table stored in memory.

      (i) If a memory reference take 200 nanoseconds,

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(ii) If we add associative registers and 75 percent of all page-table references are found in the associative registers, what is the effective memory reference time ? (Assume that finding a page-table entry in the associative memory takes zero time, if the entry is there).

3. (a) Most systems allow programs to allocate more memory to its address space during execution. Data allocation in the heap segments of programs is an example of such allocated memory. What is required to support dynamic memory allocation in the following schemes ?

(i) Contiguous memory allocation

(ii) Pure segmentation

(iii) Pure paging

(b) Explain why interrupt and dispatch latency times must be bounded in a hard real time system

4. (a) Consider a file system on a disk that has both logical and physical block sizes of 512 bytes. Assume that the information about each file is already in memory. For each of the three allocation strategies (contiguous, linked and indexed), answer these questions :

(i) How is the logical-to-physical address mapping accomplished in this system ? (For the indexed allocation, assume that a file is always less than 512 blocks long).

(ii) If we are currently at logical block 10 (the last block accessed was block 10) and want to access logical block 4, how many physical blocks must be read from the disk ?

(b) Discuss ways in which the priority inversion problem could be addressed in a real time system. Also discuss whether the solutions could be implemented within the context of a proportional share scheduler.

5. (a) Consider two processes P_1 and P_2 where $P_1 = 50$, $t_1 = 25$, $P_2 = 75$ and $t_2 = 30$.

(i) Can these two processes be scheduled using rate monotonic scheduling ? Illustrate your answer using a Gantt Chart.

(ii) Illustrate the scheduling of these two processes using earliest deadline first (EDF) scheduling.

(b) Explain the various system tasks of V_x works.

6. (a) Explain the file system of LINUX OS.

(b) Explain the relationship between windows mobile, Pocket PC and smartphone.

7. (a) Explain the different services provided by a real-time OS Kernel.

(b) Differentiate between Real-time Operating System and general purpose OSs.

8. Write short notes on the following :

(i) μ cosII

(ii) PCOS

(iii) WinCE

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