582497 Operating Systems, 2. course exam 14.12.2006

Please write on each paper the date and the name of the course as well as your name, student id (or social security number) and signature. *Try to keep your answers short. Concentrate on the essential and fundamental parts, but still cover the whole content*.

The exam time is 2.5 hours and there are 24 points available in the exam.

1) FILE SYSTEMS (8 points)

   a) *Free disk blocks*. Explain two approaches to keep track of the free disk blocks available to allocation on a disk. Give the pros and cons for each alternative.

   b) *ext2fs*. What is *inode* and what information does it contain?

   c) *ext2fs.* When the block size is 1 KB, how does the OS store a 30 MB file test.txt? How does it locate the file's allocated disk blocks?

   d) *NTFS.* What is Master File Table (MFT) in NTFS, where is it located, how is it used?

2) SCHEDULING (8 points)

Five jobs (processes) arrive to the system according the following table. Determine the turnaround time for each job and the average turnaround time for all jobs.

   a) Priority. Pure priority-based (low number means high priority), one job at a time runs until it finishes.

   b) SPN (Shortest Job First). Each job is completed before the next can start.

   c) FCFS (First Come First Served). job is completed before the next can start.

   d) Round Robin. Time quantum is 2.

Remember to justify your answer! (Justification is more important than correct numerical result)

Process	Arrival time	Priority	Processing Time
A	0	1	9
B	1	3	15
C	2	5	6
D	3	4	3
E	4	2	12

3) Clusters (8 points)

   a) What is a cluster? What are its benefits? How does it differ from symmetric multiprocessor?

   b) What are the differences in cluster OS compared to a traditional uniprocessor OS? Describe two features that a cluster OS should provide, but that are not needed in a traditional OS?

   c) Describe one of the following cluster systems: Windows 2000 Cluster Server, Sun Cluster, or Beowulf cluster.