EXAM 1

CS 450 – Spring 2009

ANSWER KEY

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This is a closed book test. No notes or other resources are allowed. Read each question carefully and pace yourself. Put all answers on the exam paper, in the space provided.

1. (20 points: 2 each)

TRUE OR FALSE

a) UNIX was originally designed as a single-user OS *TRUE*

b) OS/360 was delivered on time and with few bugs. *FALSE*

OS/360 was years late and hundreds of bugs were found.

c) Timesharing was not feasible before the development of file systems. *TRUE*

d) A user interface interacts with the OS though the program interface. *TRUE*

e) Command languages do not provide conditional and loop structures, since they would have no use. *FALSE*

These structures are important in scripts and CLI programs

f) A system call is often implemented as a type of interrupt. *TRUE*

g) Some OSs provide ID numbers for processes, but every system requires processes to have names. *FALSE*

Process IDs are always used. Names are optional.

h) A process must always be in the ready state before changing to the running state. *TRUE*

i) A drawback of shortest-job-first scheduling is that it may make long jobs wait forever. *TRUE*

j) When scheduling with feedback queues, highly interactive processes should be assigned high priorities and short time quanta. *TRUE*

2. (20 points: 4 each)

Explain briefly each of the following terms.

a) Logical resource

A resource that is information rather than a physical object. Examples are files, data structures, processes

b) Keyword arguments

Command Language arguments that are identified by a string name, for example, SOURCE=FILE1. Contrasts with positional arguments.

c) Astonishment Factor

A characteristic of some user interface elements that causes the user to be "astonished" when the interface does something unexpected. One cause of this might be automatic command completion.

d) Aging

A strategy for avoiding "starvation" (indefinite delay of low-priority processes) in a priority-based scheduler such as SJF. Periodically, the priority of all processes is raised. Eventually, long-waiting processes will have their priority raised enough that they will be scheduled.

e) Interrupt Vector

A small block of memory, usually at the lowest addresses, dedicated to handling a particular interrupt. The interrupt vector specifies where the handler is located and may provide storage for saving critical state information.

3. (10 points)

An operating system is a manger of resources. Identify the two principal objectives of resource management, and give a brief example for each objective.

1) ***Convenient use.*** *An example is a file system, which makes it much more convenient to manage information on a storage device.*

2) ***Controlled sharing.*** *An example is a device allocation routine, which ensures that only one process at a time is permitted to use a particular device.*

4. (10 points)

Match an OS from the list given to each of the descriptive phrases below. You may use the same name more than once. Here is the list:

SOS, SAGE, SABRE, ATLAS, OS/360, VMS, CTSS, MULTICS, T.H.E., UNIX, CP/M

1. Designed by IBM users ___*SOS*___
2. Introduced the interrupt concept ___*ATLAS*___
3. The principal influence for the design of Unix ___*MULTICS*___
4. The first popular OS for microcomputers ___*CP/M*___
5. The first timesharing system ___*CTSS*___

5. (15 points: 5 each)

These questions concern the design of a user interface.

a) Identify two tasks normally performed by a terminal handler.

Some examples, as found in the text, include echoing, line buffering, handling break characters, etc. A brief phrase is sufficient.

b) A common way to confirm a "dangerous" action, such as deleting all files in a directory, is to ask a question such as "ARE YOU SURE (Y OR N)?" Explain a problem with this type of confirmation.

The biggest danger with this method is that users will grow overly used to it and type Y without thinking. If the action is truly drastic, it would be better to use a confirmation method that forces the user to stop and think for a moment.

c) In spite of the popularity and attractiveness of Graphic User Interfaces (GUIs), Command Line Interfaces (CLIs) are often used. Give one reason for this.

a. When communicating with a remote server, the CLI greatly reduces communication costs

b. Scripting is easier

c. More complex parameters and options can be specified simply

6. (10 points: 5 each)

One important criteria for process scheduling is throughput. The goal of throughput is to get the most work done in a given period of time. Explain briefly two other criteria that might be appropriate for some schedulers.

1. Turnaround – minimize the time to completion of each job

2. Response time – maintain short and consistent response for interactive users

3. Fairness – Provide the best service to the processes that require it (not necessarily equal service to all).

ETC.

7. (15 points)

Draw a process state diagram with at least five states. Label each state with an appropriate name. Show the transitions that would normally occur in a nonpreemptive timesharing system.

This diagram shows seven states. Any five are sufficient.