



Solutions for the First Quiz

COSC 6360
Spring 2014



First question

- Match each of the following features with the ***single sentence*** that describes it best:



pipes

- **Forward the standard output of a process to the standard input of another one.**



special files

- Actually represent hardware devices.



file systems

- Are the UNIX equivalents of Windows disk partitions.

Will also accept:

- *Contain both data blocks and i-node blocks.*



symbolic links

- Allow a directory entry to refer to a file located in a different file system.



superblocks

- Describe the contents of a given file system.



synchronous updates

- Used to guarantee the correct serial execution of metadata updates.



cylinder groups

- Contain both data blocks and i-node blocks.



bit maps

- Keep track of free blocks on disk.



fork()

- Creates a new process.



exec()

- Loads in memory the new program to be executed by a given process.



UNIX file system

- In a 64-bit UNIX file system, what is the ***minimum block size*** that would allow users to access ***X GB*** using ***two levels of indirection?***

□ ***Hint: use trial and error***



Answer

- Block Size = 8KB
 - with two levels of indirection we can access $1K \times 1K \times 8 \text{ KB} = 8 \text{ GB}$
- Block Size = 16KB
 - with two levels of indirection we can access $2K \times 2K \times 16KB = \underline{64 \text{ GB}}$
- Block Size = 32KB
 - with two levels of indirection we can access $4K \times 4K \times 32KB = \underline{512 \text{ GB}}$



UNIX directory structure

- What does UNIX do to avoid *loops* in its directory structure?



Answer

- To avoid loops in directory structure, *directory* files cannot have more than one pathname



Mach shared libraries

- In the Mach virtual memory system, what type of ***memory object*** is associated with a ***dynamic library***?



Answer

- Since Mach implements shared libraries through the mapped file interface, the memory object associated with a shared library is a ***file***



Mach threads

- How does Mach specify that the children of a given process should be ***regular processes*** or ***threads***?



Answer

- By setting the inheritance attribute of the address map entry for the data segment to
 - COPY before creating a regular process
 - SHARED before creating a thread



Mach VM implementation

- How does Mach prevent ***deadlocks*** in its virtual memory system?



Answer

- To prevent *deadlocks*, all algorithms gain locks using the same ordering.