Final Exam–May 2, 9:00 AM
Closed book section (50 points)

The exam is to be turned in at 12:00 NOON. Work the closed book section first and turn it in before you consult your books and notes to work on the open book section. For the closed book section, write your answers on the exam itself.

University regulations require that you sign the following pledge on the first page of your turned-in exam.

I have neither received nor given any unauthorized aid on this exam. _____

There are 40 questions. Each is worth 1.25 points.

Circle the most appropriate completion for each sentence.

Question 1. The designers of the Unix operating system are
A. Ken Thompson and Dennis Richie.
B. Maurice Bach and Brian Kernighan.
C. Steven Jobs and Bill Gates.
D. Ken Olson and Jack Dennis.

Question 2. A Unix file is structured as a sequence of
A. disk blocks.
B. variable-length records.
C. fixed-length records.
D. bytes.

Question 3. A Unix directory file contains
A. component names.
B. component names and inode numbers.
C. component names, inode numbers, and device numbers.
D. component names, inode numbers, device numbers, and generation numbers.

Question 4. A reasonable number of system calls for a Unix operating system is
A. 8.
B. 80.
C. 800.
D. 0 – user programs don't execute in system mode.

Question 5. In operating systems, a process is
A. a swapped program.
B. a sequence for starting a program.
C. a program in memory.
D. a program in execution.

Question 6. The shell is
A. a user program that interprets commands.
B. the outermost layer of the operating system.
C. a kernel routine that starts a new process.
D. the kernel routines that boot the machine.

Question 7. A pipe is
A. a duplex connection.
B. a first-in, first-out queue.
C. a last-in, first-out queue.
D. a pair of file descriptors.

Question 8. A non-`NULL` pointer in an executing C program is most likely to contain
A. a page table reference.
B. a virtual address.
C. a real address.
D. a data block address.

Question 9. Kernel priority is higher than user priority because
A. the "real" work of a system is executing kernel programs.
B. operating systems designers give higher priority to their own code.
C. the kernel is an allocator of resources.
D. smaller numbers have higher priority.

Question 10. If two users are simultaneously executing the same program, they should be sharing the same
A. text.
B. data.
C. stack.
D. text and data.

Question 11. Critical sections of code
A. have a half-life of five years.
B. must be executed by only one process at a time.
C. must be executed quickly.
D. must be protected from user access.

Question 12. The buffer cache contains
A. recently referenced page table entries.
B. recently used file blocks.
C. recently used pages.
D. arrays used by the standard I/O library routines.

Question 13. One disadvantage of the Unix buffer cache is
A. disk traffic is increased.
B. user I/O must be aligned with buffer boundaries.
C. in-core data blocks may be lost when the system crashes.
D. two process may use different buffers when accessing the same file.

Question 14. An inode will *not* contain
A. a directory of data blocks.
B. a file pathname.
C. file access permissions.
D. a file link count.

Question 15. A five million byte program can run on a machine with four million bytes if the machine and its operating system support
A. dynamic stacks.
B. time sharing.
C. virtual memory.
D. dynamic RAM (random access memory).

Question 16. A successful `open` system call always
A. allocates a new file descriptor entry.
B. allocates a new inode table entry.
C. allocates new file descriptor and inode table entries.
D. returns 0.

Question 17. In Unix, standard input
A. is read on file descriptor 0.
B. passes through the buffer pool.
C. is read from the user terminal.
D. follows the specification of the ANSI C committee.

Question 18. The mount table may be searched when
A. a file is read.
B. a file is written.
C. a file is opened.
D. a file is closed.

Question 19. A process is blocked when reading a pipe
A. which has only one reader.
B. which is empty.
C. which has writers.
D. which is empty and has writers.

Question 20. When a pathname to a file is unlinked
A. the file may no longer be opened with that pathname.
B. the data blocks of the file are reclaimed.
C. the data blocks of the file are no longer writable.
D. the linked list of free inodes is broken.

Question 21. One function of the operating system that is probably written in a high-level programming language is that of
A. performing a context switch.
B. initiating the booting of the operating system.
C. reading the contents of the control and status register of a memory-mapped device.
D. multiplying large matrices.

Question 22. All executing processes share the same
A. kernel data region.
B. user data region.
C. kernel stack region.
D. user stack region.

Question 23. The *environment,* passed as the third argument to the `main` routine, is likely to contain
A. the code of the process.
B. the current working directory.
C. the name of preferred printer of the owner of the process.
D. the open files of a process.

Question 24. The context of a process would *not* contain
A. inodes used by the process.
B. register values.
C. uninitialized program arrays.
D. user id numbers.

Question 25. In Unix, the events upon which kernel processes sleep are really
A. memory addresses.
B. interrupts.
C. system calls.
D. signals.

Question 26. A successful `fork` system call returns
A. 0 to the child.
B. 0 to the parent.
C. 1 to the child.
D. 1 to the parent.

Question 27. The Unix system call for sending a signal to another process is
A. `signal.`
B. `sendsig.`
C. `putsig.`
D. `kill.`

Question 28. A process attempting to access element `A[2000000000]` of an array `A` of size 8 will be terminated

A. if `A` is on the top of the stack.
B. if it does not handle the signal (`SIGFPE`) generated for arithmetic exceptions.
C. if it does not handle the signal (`SIGSEGV`) generated for accessing memory outside its bounds.
D. if it results in a page fault.

Question 29. A successful `execve` system call

A. returns the process id of the new child process.
B. does not return.
C. generates a death-of-child signal.
D. returns 0.

Question 30. Generally, a local area network is contained in

A. a single computer.
B. a room.
C. a building.
D. a telephone exchange.

Question 31. Token rings and Ethernet packets contain CRC (cyclic redundancy code) fields to detect transmission errors of

A. packets overwriting the free token.
B. packets being transmitted on the wrong network.
C. bits being changed during transmission.
D. packets being received by the wrong hosts.

Question 32. A virtual circuit is similar to the BSD socket type

A. Unix.
B. datagram (UDP).
C. stream (TCP).
D. internet.

Question 33. A switch table is

A. an array of procedure addresses.
B. a list of compiler options.
C. an array of boolean values.
D. a data structure used to change the context of a process.

Question 34. In memory mapped I/O,

A. file data blocks are accessed through the page tables.
B. I/O devices responds to read and writes at specific address.
C. I/O is initiated with special hardware instructions.
D. programs read files from in-core I/O buffers.

Question 35. On an Ethernet, a host begins its first attempt at transmitting a message
A. when the host cannot sense a carrier on the Ethernet.
B. when the Ethernet is jammed.
C. when the Ethernet is gelled.
D. when the host has the free token.

Question 36. When Ethernet technology is used with coax cable, transceivers are located
A. on the cable.
B. in the nearest bridge.
C. on host interface boards.
D. within 1 meter of hosts.

Question 37. A collision occurs on an Ethernet
A. when one host has transmitted too long a message.
B. when the cables are crossed.
C. when two hosts start transmitting at almost the same time.
D. when the operating system requests the interface card to transmit to soon.

Question 38. The star configuration, with wiring concentrators, used to physically connect token rings increases
A. speed.
B. down time.
C. reliability.
D. maximum packet size.

Question 39. Most likely a page fault occurs when a process
A. references a page it hasn't referenced in a long time.
B. is swapped to disk.
C. accesses two successive pages.
D. references a page it recently referenced.

Question 40. The page table of a process is constructed by
A. the compiler.
B. the operating system.
C. the disk controller.
D. the loader.