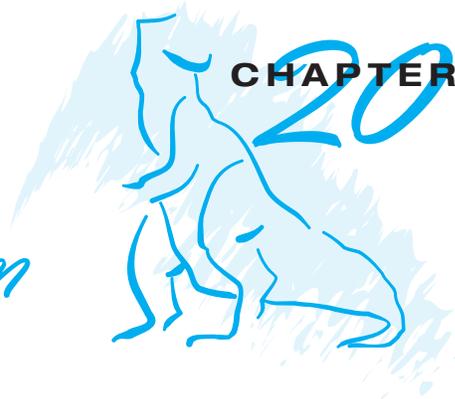


The Linux System



Exercises

- 20.12 What are the advantages and disadvantages of writing an operating system in a high-level language, such as C?
- 20.13 In what circumstances is the system-call sequence `fork()` `exec()` most appropriate? When is `vfork()` preferable?
- 20.14 What socket type should be used to implement an intercomputer file-transfer program? What type should be used for a program that periodically tests to see whether another computer is up on the network? Explain your answer.
- 20.15 Linux runs on a variety of hardware platforms. What steps must Linux developers take to ensure that the system is portable to different processors and memory-management architectures and to minimize the amount of architecture-specific kernel code?
- 20.16 What are the advantages and disadvantages of making only some of the symbols defined inside a kernel accessible to a loadable kernel module?
- 20.17 What are the primary goals of the conflict-resolution mechanism used by the Linux kernel for loading kernel modules?
- 20.18 Discuss how the `clone()` operation supported by Linux is used to support both processes and threads.
- 20.19 Would you classify Linux threads as user-level threads or as kernel-level threads? Support your answer with the appropriate arguments.
- 20.20 What extra costs are incurred in the creation and scheduling of a process, compared with the cost of a cloned thread?
- 20.21 How does Linux's Completely Fair Scheduler (CFS) provide improved fairness over a traditional UNIX process scheduler? When is the fairness guaranteed?

- 20.22 What are the two configurable variables of the Completely Fair Scheduler (CFS)? What are the pros and cons of setting each of them to very small and very large values?
- 20.23 The Linux scheduler implements “soft” real-time scheduling. What features necessary for certain real-time programming tasks are missing? How might they be added to the kernel? What are the costs (downsides) of such features?
- 20.24 Under what circumstances would a user process request an operation that results in the allocation of a demand-zero memory region?
- 20.25 What scenarios would cause a page of memory to be mapped into a user program’s address space with the copy-on-write attribute enabled?
- 20.26 In Linux, shared libraries perform many operations central to the operating system. What is the advantage of keeping this functionality out of the kernel? Are there any drawbacks? Explain your answer.
- 20.27 What are the benefits of a journaling file system such as Linux’s ext3? What are the costs? Why does ext3 provide the option to journal only metadata?
- 20.28 The directory structure of a Linux operating system could include files corresponding to several different file systems, including the Linux /proc file system. How might the need to support different file-system types affect the structure of the Linux kernel?
- 20.29 In what ways does the Linux `setuid` feature differ from the `setuid` feature SVR4?
- 20.30 The Linux source code is freely and widely available over the Internet and from CD-ROM vendors. What are three implications of this availability for the security of the Linux system?