computer science
illuminated

Operating Systems

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(adaptation by Michael Goldwasser)

Batch Processing

- A typical computer in the 1960s and ‘70s was a large machine
- Its processing was managed by a human *operator*
- The operator would organize various jobs from multiple users into *batches*

Batch Processing

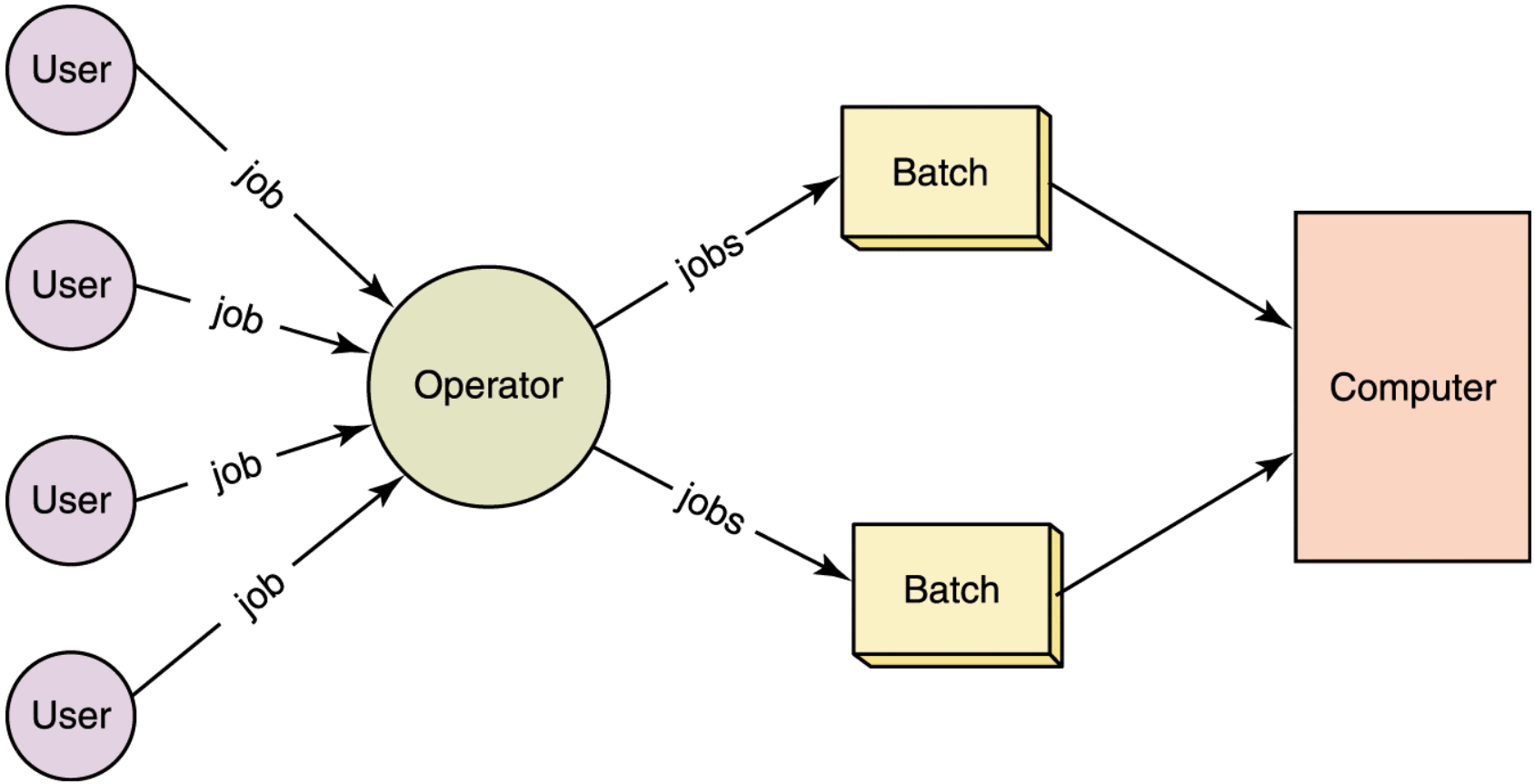

Figure 10.2 In early systems, human operators would organize jobs into batches

Timesharing

- A **timesharing** system allows multiple users to interact with a computer at the same time
- Multiprogramming allowed multiple processes to be active at once, which gave rise to the ability for programmers to interact with the computer system directly, while still sharing its resources
- In a timesharing system, each user has his or her own **virtual machine**, in which all system resources are (in effect) available for use

Operating System

- An **operating system** manages computer resources, such as memory and input/output devices, and provides an interface through which a human can interact with the computer
- An operating system allows an application program to interact with these other system resources

Operating System

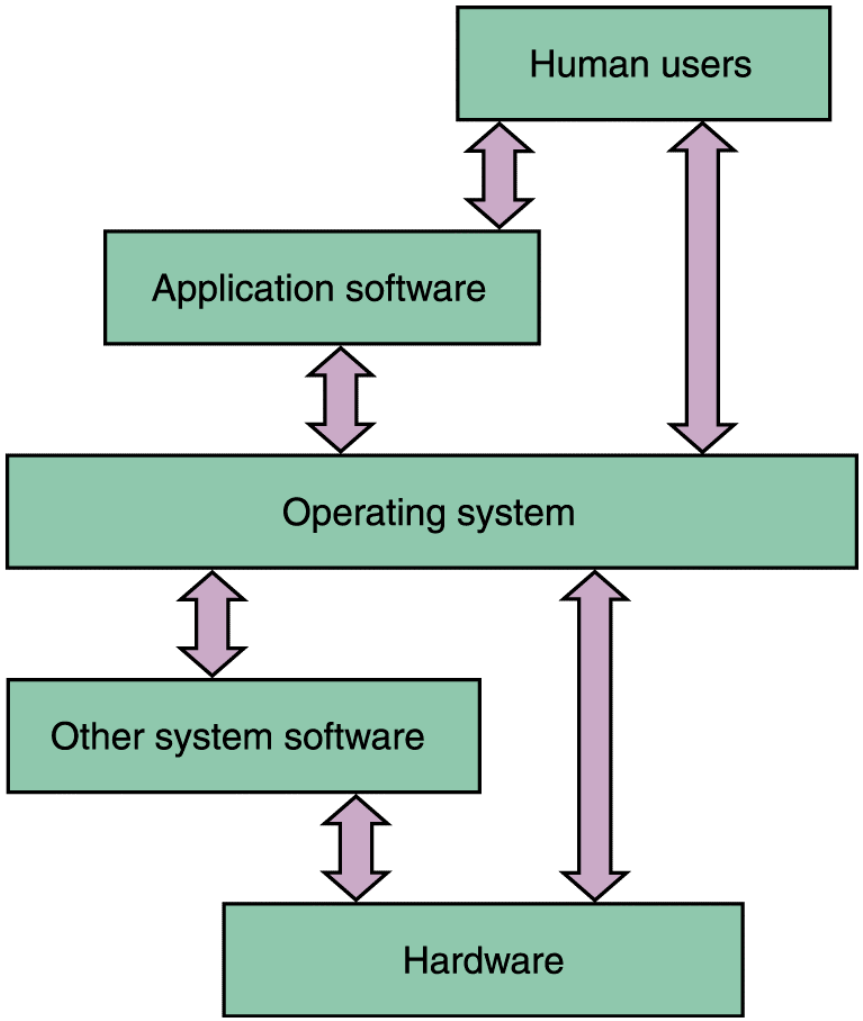

Figure 10.1
An operating system interacts with many aspects of a computer system.

Popular Operating Systems

- **Windows (98, NT, 2000, ME, …)**
- **UNIX**
- **Linux (version of UNIX for PCs)**
- **MacOS (though OS X is Unix based)**

Process Management

- A **process** can be defined as a program in execution. Many processes can be active.
- Each process will need resources (memory, CPU time, auxiliary devices)
- The operating system performs **process management** to carefully track the progress of a process and all of its intermediate states.

  (see the Windows “task manager”)

Resource Management

- **CPU scheduling** determines which process in memory is executed by the CPU at any given point
- **Memory management:** keeps track of what programs are in memory and where in memory they reside.
- **Network Communication**
- **File Systems** (who can read/write files)