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There is a standard *finite state machine* that describes the allowed transitions between states

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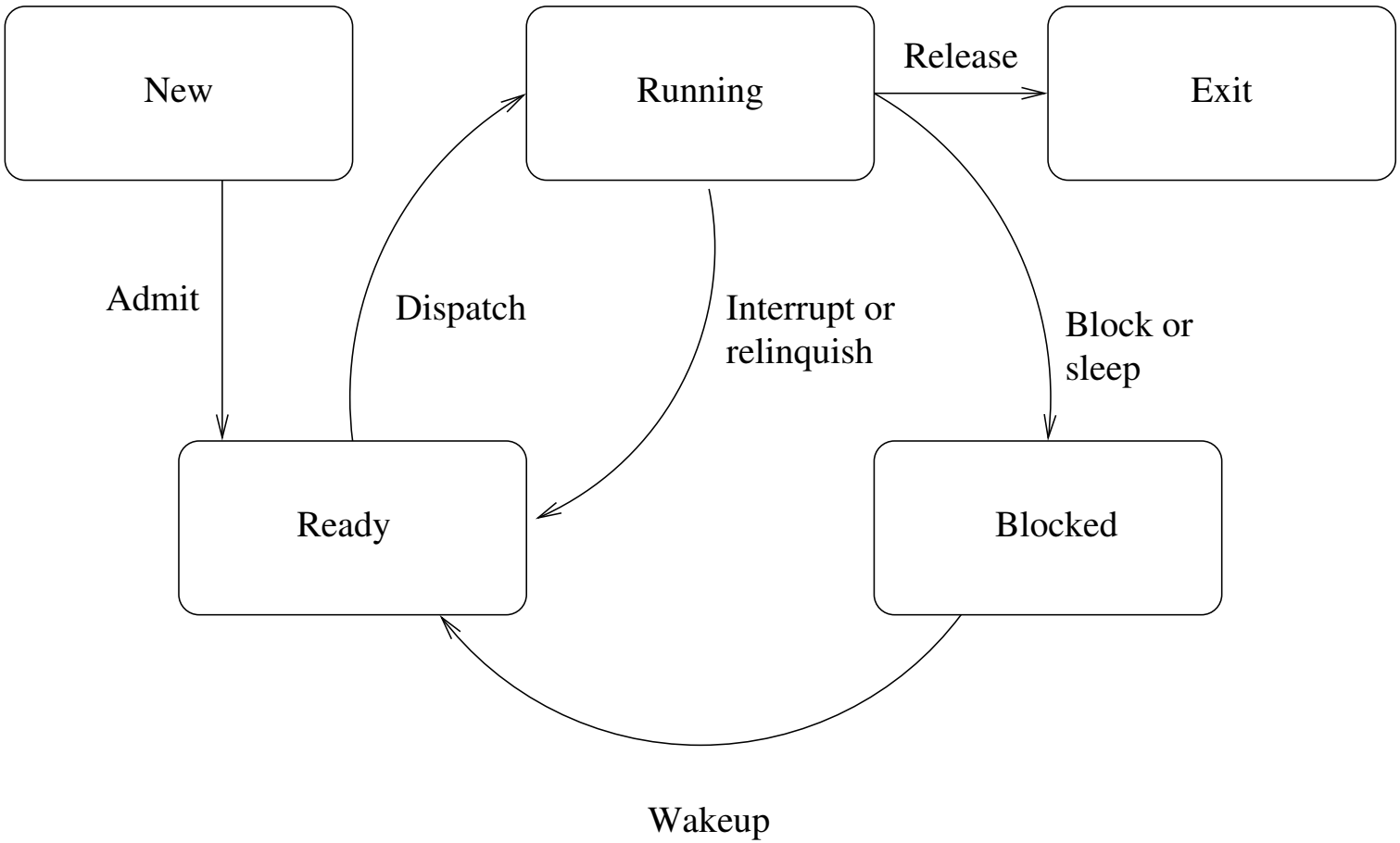

Process State Transitions

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4. Or an interrupt may arise, e.g., from a packet arriving on the network card, or a key being hit on the keyboard
5. Or a timer interrupt may happen when the process has used its *time slice*. In any of these three cases the OS moves the process to the Ready state

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And to make it clear: it's not the processes moving themselves between the states, it's the OS moving them between the lists of processes in each state

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Exercise. Write a program that voluntarily relinquishes occasionally

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- New. For a process just created, perhaps code and data are not yet loaded into memory. The OS datastructures needed to manage the process have been created and filled in
- Exit. For a process that has just finished. Some tidying up is usually needed after a process ends, such as closing files or reclaiming memory or other resources it used

Processes

A real example:

```
USER        PID  PPID PRI %CPU %MEM STAT     TIME COMMAND
rjb        3974  4831  22  0.0  0.1 R+   00:00:00 ps
rjb        4495  4831  24  0.0  2.0 S    00:01:11 emacs
rjb        4538  4530  23  0.0  0.2 Ss+  00:00:00 bash
rjb        4540  4534  24  0.0  0.2 Ss   00:00:00 bash
rjb        4664  4556  21  0.0  0.6 S+   00:00:08 pine
rjb        4831  4829  24  0.0  0.2 Ss+  00:00:00 bash
rjb        7839  4831  15  0.0  0.1 Ss   00:00:00 firefox
rjb        7851  7839  14  0.0  0.1 S    00:00:00 run-mozilla.sh
rjb        7856  7851  24  0.2 16.6 Sl   00:31:47 firefox-bin
rjb       14880     1  16  0.0  3.1 Dsl  00:06:43 recollindex
```

Example processes under Linux

Processes

- S. Sleeping: like blocked (interruptible sleep; waiting for an event like a timer or other interrupt)
- D. Disk wait (uninterruptible sleep; waiting for requested I/O)
- R. Running or ready to run
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s: session leader; +: foreground process group; l: multithreaded

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- CPU, MEM, TIME. How much of these resources this process is using

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This collection of data a process needs is called the *process control block*, or PCB

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So process handling is very similar to the way interrupts are handled