Signals
Introduction

- A **signal** is a mechanism for notifying a process that an event has occurred.
  - When a signal is sent to a process, normal execution is interrupted.
- Events can arise from executing an instruction in the process's instruction stream:
  - Illegal instruction e.g., divide by zero
Introduction

Events occur at any time and come from an external source
- may be unrelated to the execution of the process
  - e.g., ctrl-D, ctrl-C, ctrl-Z

Upon receipt of a signal a process may take some action
- Take a default action; or
- Use a pre-defined signal handler
Introduction

- Signal sending:
  - OS kernel updates info for destination process

- Signal receiving:
  - kernel forces target process to handle signal

- A process can block some signals
Dealing with Signals

- Each signal type has a system-defined default action.
  - abort and dump core (SIGSEGV, SIGBUS, etc.)
  - ignore, stop, exit, continue
- A process may choose to block or ignore some signal types.
Dealing with Signals: Actions

- There are different actions that a process may choose to deal with a signal
  - Ignore
    - Exceptions: SIGKILL and SIGSTOP
  - Default
    - Different for different signals
  - Programmer-specified handler
    - Used instead of default
Example

```c
int alarmflag=0;
alarmHandler ()
{
    printf("An alarm clock signal was received\n");
    alarmflag = 1;
}
main()
{
    signal (SIGALRM, alarmHandler);
    alarm(3);
    printf("Alarm has been set\n");
    while (!alarmflag) pause ();
    printf("Back from alarm signal handler\n");
}
```

- **Sets up signal handler**
- **Instructs OS kernel to send SIGALRM in 3 seconds**
- **Suspends caller until signal**
Signal Handling

- The system call `signal` captures a specific function and associates it with a programmer-defined function.
- To use the `signal` system call requires that you include `signal.h`.
- The form of the signal system call does vary across different versions of Linux/Unix.
Important Signals

- **SIGINT**
  - Interrupt signal from terminal (ctrl-c)

- **SIGTSTP**
  - Stop signal from terminal (ctrl-z)

- **SIGCHLD**
  - A child process has stopped or terminated