

Module 7 - Overview



Introduction

For multiple processes to co-operate on a task, these processes need to share data. They also need to synchronize their actions. In this module, we will learn about different Unix facilities for communication between processes. We will start with an overview of various Unix facilities for inter-process communication or IPC. We will then study the details of pipes and FIFOs which are facilities for sharing data between processes. After that we will explain semaphores which are facilities for synchronizing the actions of multiple processes or threads.

Module Learning Outcomes



After successful completion of this module, you be able to do the following (in addition to answering the questions listed below):

1. Explain the motivation for IPC facilities and their main categories (CLO 1, CLO 6)
 - What are the primary IPC facilities for sharing data between multiple process?
 - What are the primary IPC facilities for synchronizing actions between multiple processes?
2. Compare and contrast IPC facilities for communication (CLO 1, CLO 6)
 - What are the IPC facilities for communication using data transfer vs. those for communication using shared memory?
 - What are pipes and FIFOs? When is it suitable to use one or the other?
 - What are message queues?
 - What are sockets?
3. Compare and contrast IPC facilities for synchronization (CLO 1, CLO 4, CLO 6)
 - What are mutexes?
 - What are semaphores and when can they be used?
 - What are file locks and what is their use?
 - Which facilities can be used by threads and/or which can be used by processes?
4. Write programs that chose an appropriate IPC facility for the task at hand (CLO 2, CLO 3, CLO 4, CLO 6, CLO 7)
 - When should you use pipes for IPC, and what is the relevant API for their use?

- When should you use FIFOs for IPC, and what is the relevant API for their use?
- What are binary semaphores and counting semaphores? What is the appropriate use case for each of these?
- How can you write correct programs using semaphores?

Explorations

Use the pages within this module to explore the following concepts:

- **Exploration: Inter-Process Communication**
(<https://canvas.oregonstate.edu/courses/1821221/pages/exploration-inter-process-communication>)
- **Exploration: Pipes and FIFOs**
(<https://canvas.oregonstate.edu/courses/1821221/pages/exploration-pipes-and-fifo>)
- **Exploration: Semaphores** (<https://canvas.oregonstate.edu/courses/1821221/pages/exploration-semaphores>)

Task List

Please make sure to complete the following assignments and other tasks:

- Complete the exercises provided in the explorations
- Complete the Module by Examining the **Review Page**
(<https://canvas.oregonstate.edu/courses/1821221/pages/review-module-7>)
- Start **Assignment 5** (<https://canvas.oregonstate.edu/courses/1821221/assignments/8482464>) when it is released



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