



IT540 Operating system

Inter-Process Communication (IPC)

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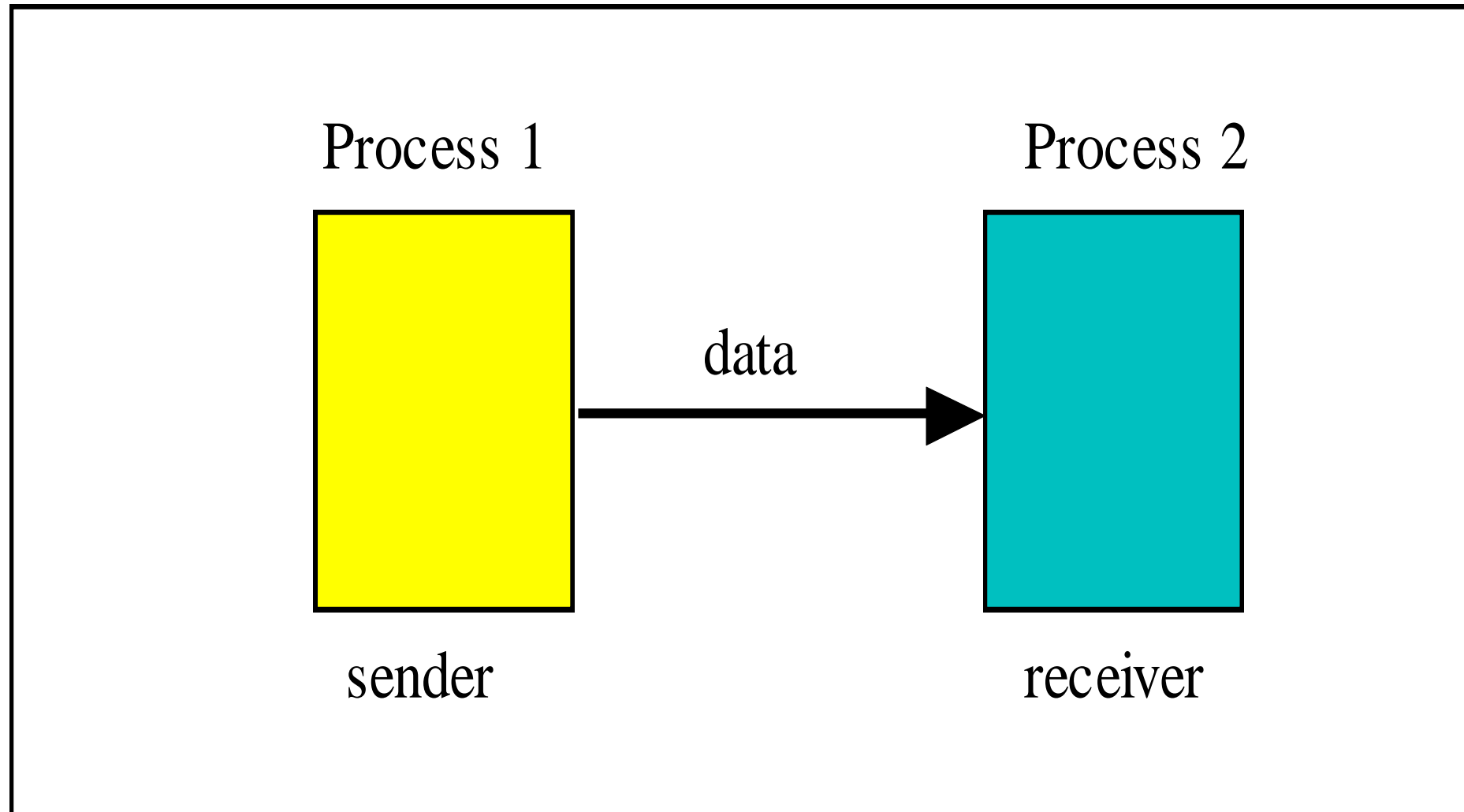
Outline

- Introduction.**
- What is IPC?**
- Types of IPC.**
- IPC Mechanisms.**
- Why IPC?.**
- Potential IPC problems.**

Introduction

- Processes within a system could be *independent* or *cooperating*.
- **Cooperating**: can affect or affected by other process
- **Reasons for cooperating:**
 - Information sharing.
 - Computation speedup.
 - Modularity.
 - Convenience .
- **OS provides facilities for IPC.**

IPC



What is IPC?

Inter-process Communication is a set of mechanisms or techniques for exchanging Data between two processes or applications.

Types IPC

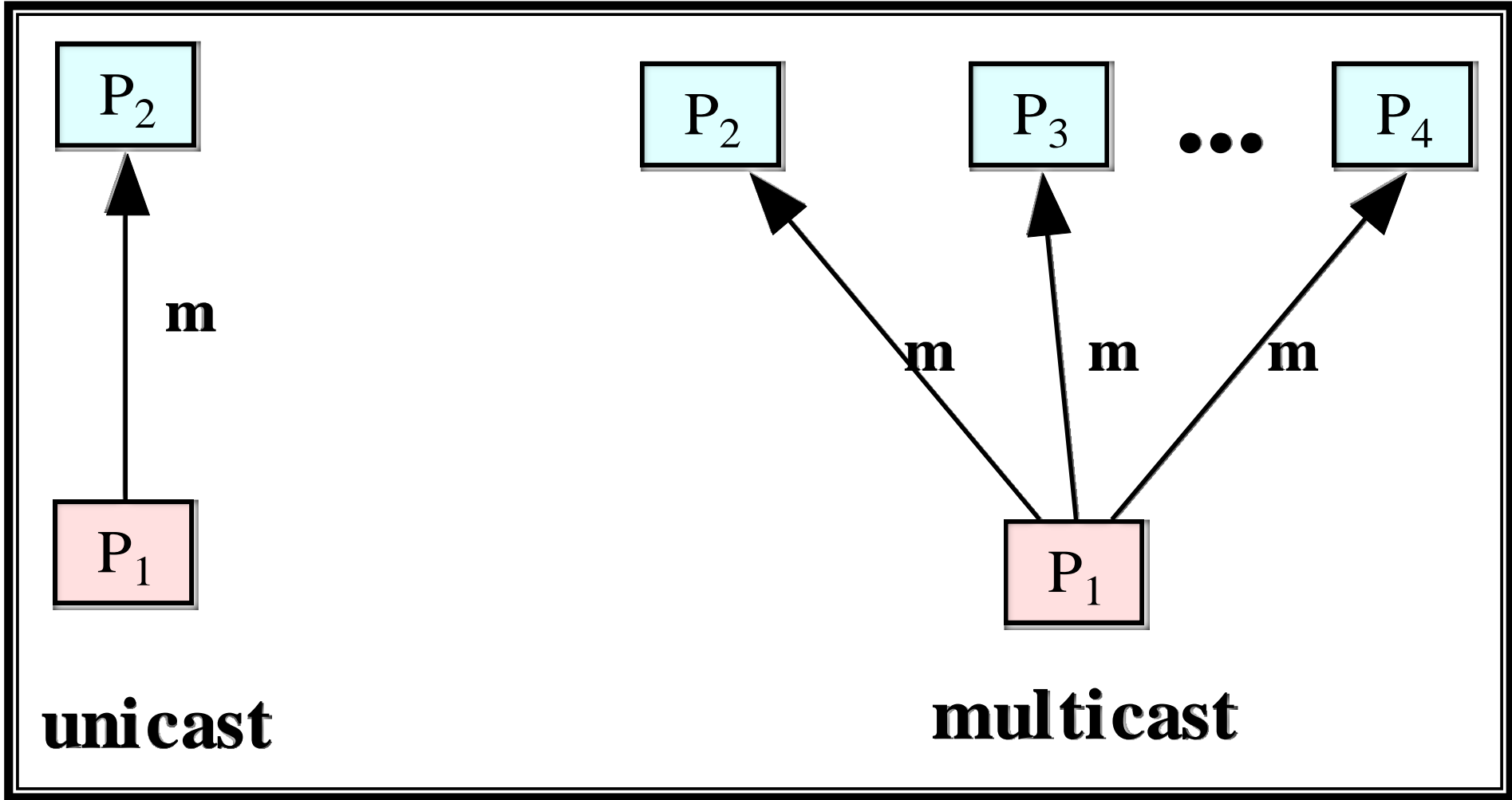
Inter-process communication can be:-

Unicast:

When communication is from one process to a single other process. e.g. Socket communication.

Multicast:

When communication is from one process to a group of processes. e.g. Publish/Subscribe Message model.

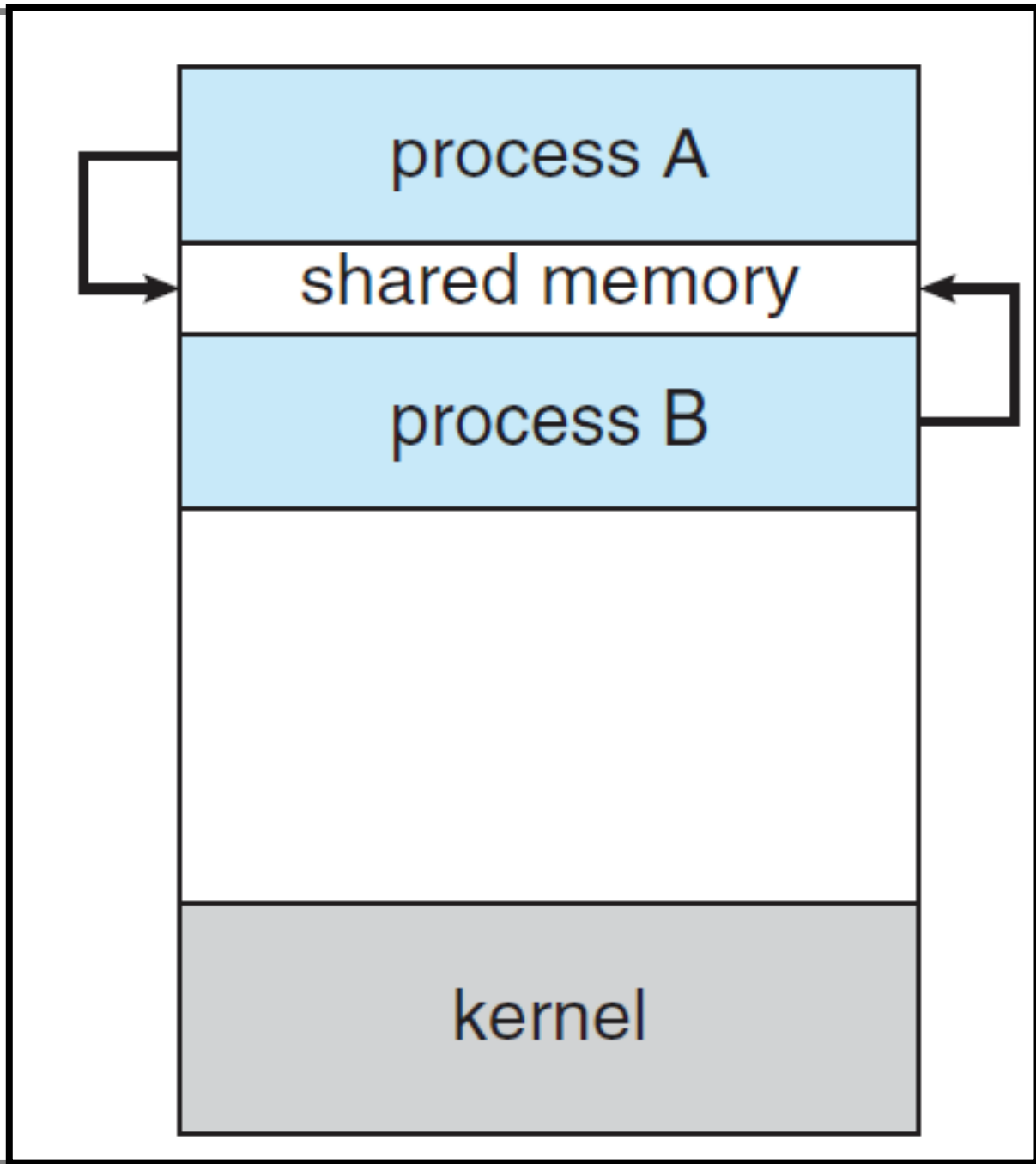


IPC Mechanisms

- **Shared Memory**
- **Message Passing**
- **Pipe**
- **Semaphores**

Shared Memory

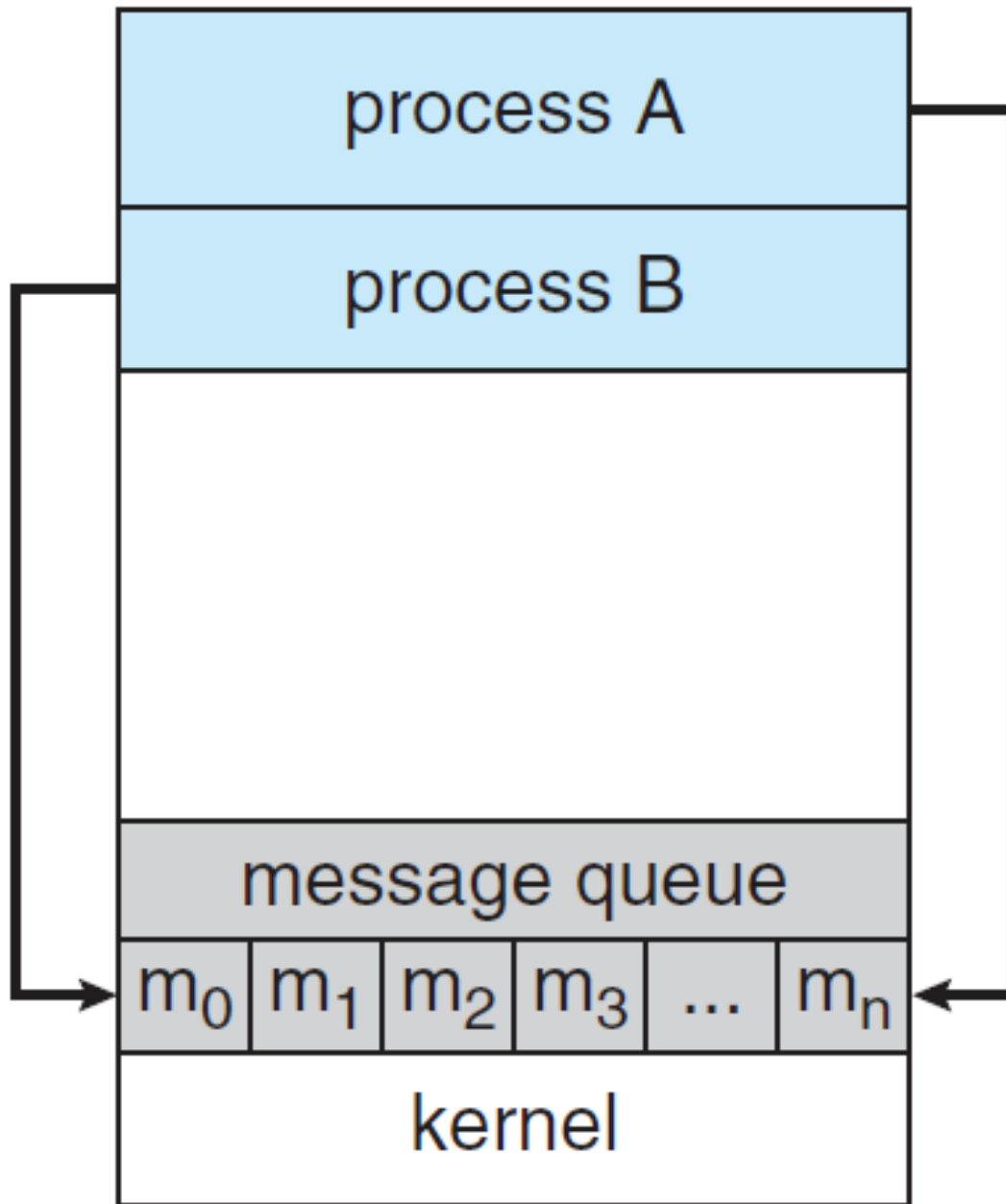
- **Shared Memory is an efficient means of passing data between processes. One will create a memory portion which other processes (if permitted) can access.**
- **This shared memory section is used by communicating processes simultaneously.**
- **Also we have to synchronize the processes so they can alter shared memory simultaneously.**



Message passing

- **Operating system establishes a communication Channel.**
- **One Process is a sender and the other is Receiver.**
- **Each process puts the data in the channel.**
- **IPC messaging lets processes send and receive messages, and queue messages for processing in an arbitrary order.**

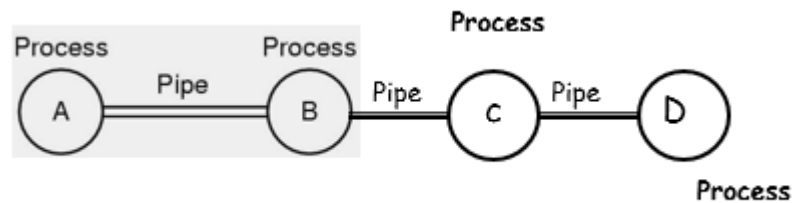
Message passing



pip

- Pipe allow transfer data between processes in First in-First-out manner.
- A pipe is usually realized in memory.
- Pipe operations are memory operations.

Creating pipeline



Process A writes to pipe AB, Process B reads from AB and writes to BC

Process C reads from BC and writes to CD

Semaphores

- They are often used to monitor and control the availability of system resources such as shared memory segments.
- Semaphores are used to synchronize the processes so that they can't access critical section simultaneously.

Why IPC?

- Information sharing.
- Resource sharing.
- Performance speedup.
- Flexibility.
- Maintain protection & isolation.

Potential IPC problems.

- **Starvation**

Occur when multiple processes or threads compete for access to a shared resource. One process may monopolize the resource while others are denied access.

- **Deadlock**

Occur when two processes need multiple shared resources at the same time in order to continue.

- **Data Inconsistency**

Shared resources are modified at the same time by multiple resources.

References

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Thank
you

