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INTERPROCESS COMMUNICATION IN OS

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Abstract: *Inter process communication is used to design process for a microkernel and nanokernels. Microkernels cut back quantity of functionalities provided by the kernel. So, reliability is the more important matter for security. This paper represents review of Interposes Communication methods such as message queue, semaphore and shared memory and discusses their advantages and disadvantages. I identified the various factors that could affect their performance such as message size .The purpose of this paper is to provide a survey of IPC methods that appeared in the literature over the past decade which was not discussed and also categorize them into meaningful approaches.*

General Terms: *Operating system, Linux*

Keywords: *Interprocess communication, semaphore, message queue, shared memory, Process.*

1. INTRODUCTION:

IPC mechanisms are used for transferring information between two or more processes. but they may be implemented of many ways in the operating system.

(i) Whether the communication is restricted to related processes.
(ii) Whether the communication is write-only and read only
(iii) Whether the communication is between two processes or more.
(iv) Whether the communication is synchronous, i.e. the reading process blocks on a read.

In this paper, I evaluate three popular and powerful inter- process communication mechanisms – Semaphore, message queue and shared memory.

2. POTENTIAL IPC PROBLEM:

An Interprocess communication (IPC) needs the utilization of resources, like memory. That square measure shared between processes or threads. However, the major drawbacks of IPC are:

2.1 Starvation Problem

It's may be a condition wherever a method doesn't get the resources it desires for a protracted time as a result of the resources area unit being allotted to alternative processes. It usually happens in an exceedingly Priority primarily based programming System.

2.2 Deadlock Problem

A situation condition will occur once two processes would like multiple shared resources at a similar time to continue.

3. REVIEW OF IPC MECHANISAM:

IPC mechanism divided into categories:

- Shared Memory
- Message Queue
- Semaphore

3.1 Shared Memory

Shared memory permits multiple processes to share store house. This technique is that the quickest to coordinate. In general, one method creates/allocates the shared memory section. The size and access permissions for the section area unit set once it's created. The process then attaches, or opens, the shared segment, causing it to be mapped into its current data space. If needed, the making method then initializes the shared memory. Once created, and if permissions allow, alternative processes will gain access to the shared memory and map it into their information area. Ordinarily, semaphores area unit want to coordinate access to a shared memory section. When a method is

finished with the shared memory section, it can detach from it without deleting. The creator of the section might grant possession of the section to a different method. When all processes area unit finished with the shared memory section, the process that created the segment is usually responsible for removing it. Information is communicated by accessing shared method knowledge house. This is the fastest method of inter process communication. Shared memory permits taking part processes to haphazardly access the shared memory section.

3.2 Message Queue

A message queue is employed for passing little amounts of data between processes in an exceedingly structured manner. Information to be communicated is placed in an exceedingly predefined message structure. The process generating the message specifies its kind (user-defined) and places the message in an exceedingly system-maintained message queue. Processes accessing the message queue will use the message kind to by selection scan messages of specific sorts in an exceedingly first-in-first-out manner. Message queues give the user with a way of multiplexing information from multiple producers. Non-related processes execution at totally different times, will use a message queue to pass info.

3.3 Semaphore

Semaphore Semaphores are specialized data structures used to coordinate access to a non-sharable resource. Cooperating, or possibly processes use semaphores to determine if a specific resource is available. If a resource is unobtainable, by default, the system will place the requesting process in an associated queue. The system can inform the waiting method once the resource is offered. In IPC Most often, semaphores area unit used for method synchronization, or software lock associated queue. Semaphores area unit usually of either kind binary or count, depending upon how they are used. A binary semaphore controls a single resource and it is either 0 or 1, indicating that the resource is available. A counting semaphore increments and decrements a counter, a positive integer to determine if an instance of the controlled resource is currently available. The system assures that the check increment.

4. OVERVIEW, ADVANTAGE AND DISADVANTAGEFEATURES, ALGORITHAM, FUNCATIOALITY OF DIFFERENT IPC TECHNIQUE:

Method	Shared Memory	Message Queue	Semaphore
Overview	• Multiple processes are given access to the same block of memory which creates shared buffer or the process to communicate with each other.	• A message queue may be a connected list of messages holds on at intervals the kernel and known by a message queue symbol.	• Semaphore is placed during a region of memory that's shar ed between multiple threads (a thread-shared semaphore) or processes (a process-shared semaphore).
Application Area	• JUMP • Parade • SCASH	• Java Message Service (JMS) • IBM MQ • Apache active MQ	• Mutual Exclusion
Advantages	• It is closer to conventional machine, Easy to program. • overhead is low • OS services are leveraged to utilize the additional CPUs	• Strong ability to scale solution and retain performance • Ability to queue request and allow process to continue • Flexibility	• Data access synchronization simplified (vs. semaphores or locks) • Better encapsulation
Disadvantages	• It leads to bottleneck problem. • Expensive to build. • It is less sensitive to partitioning	• Complex Implementation	• Deadlock still possible (in monitor code) • No provision for information exchange between machines
Features	• Shared memory is a feature that is supported by UNIX V, together with UNIX, SunOS and Solaris systems. • A shared memory	• A process generating a message may specify its type when it place the message in a message queue. • Message Queue provide a	• It used to synchronize operations when process access a common limited, and possibly non- sharable resource. • Each time a method needs

	segment is identified by unique integers, which are known as the shared memory IDs. • A Synchronization protocol should be setup to protect a shared memory from being accessed at an equivalent time by many processes.	user with a means of multiplexing data from one or more producers to or more consumers. • It's also used the message type to selectively read only message of specific type in First-in First- out manner.	to get the resource, the associated semaphore is tested. A positive, nonzero semaphore value indicate the resource is available.
Limitation	• maximum size of shared memory segments to much smaller values than normal physical or virtual memory limits	• Message queues create additional operational complexity. Every queue must be created, configured, and monitored. Every sender and recipient should be organized with the situation and name of every queue.	• Priority Inversion is a big limitation of semaphores. Their use isn't implemented but is by convention only. With improper use, a process may block indefinitely. Such a situation is called Deadlock.

Table 1. Overview, Advantage and disadvantage, features, Limitations, algorithm, and functionality of different IPC Techniques

5. BENEFITS OF IPC METHODS:

- **Sharing information/data:**

One of the big benefits of using IPC systems is Share data between processes to synchronize different applications.

- **Better Security:**

It is often useful to separate processes to ensure system security. In IPC each method has its own memory and if they convey as hostile sharing memory the method is going to be modularized and presumably it is safer.

- **Modularity:**

IPC gives the modularity. Google Chrome separates each tab into a separate method to assist avoid crashes, yet as security.

- **Computational Speedups:**

Inter process communication mechanism gives Sending data off site for processing

6. CONCLUSION:

In this paper, I elaborated the need of inter-process communication, some of the IPC methods, mechanisms and their implementation. We looked at IPC methods message queue, Shared memory and Semaphore made short comparison of their properties. Each of the IPC mechanisms discussed has some advantages and some disadvantages Application Areas, features, algorithm Functionality. each of them is perfect resolution for a specific drawback for the appliance applied scientist. The usability of those strategies is incredibly versatile, particularly regionally on an equivalent IPC however in numerous environments. Overall, the inter- process communication is great for introducing reliable communication, maximum performance, great functionality, application modularity and support and secure communication in our multi-process environment.

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