Feasibility Study of Local IPC Mechanisms in Support of Highly Communicative Processes

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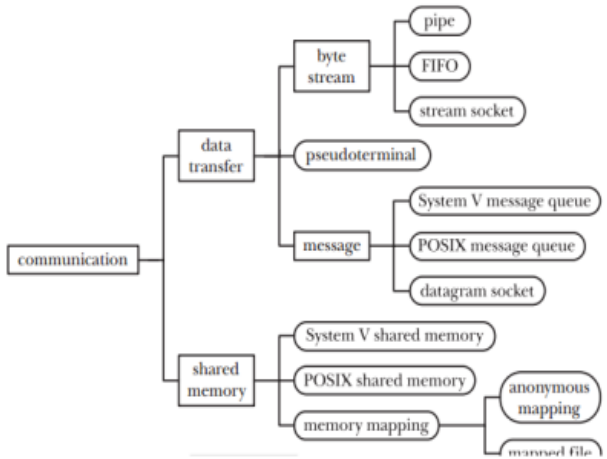
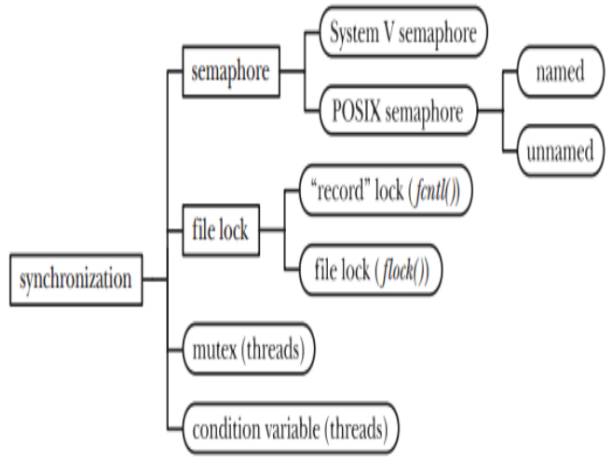
Recall From Inter-Process Communication Basics

IPC Models

- A set of IPC Mechanisms;
  - File;
  - Signal;
  - Socket;
    - Unix
    - Others
  - File Descriptor;
    - Named
    - Un-Named
  - Shared Memory;
  - Message Passing;
  - Cross Memory Attach;





Synchronization Models

- There are Two types/models of Synchronization
  - Blocking
  - Busy-waiting
    - Busy-waiting
    - Spin-lock
    - Polling
  - Non-Blocking & Non-Busy-waiting
    - Lock-free
    - Wait-free
    - Non-blocking

High Performance Computing (HPC) Concerns

Workflow Computation Model

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OS-Noise influence on HPC Applications performance

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Related Works in Terms of HPC

Related Works In HPC

- Argo
- FFMK
  - XEMEM
  - Kitten
  - Palacios
- Netmap
  - Berkeley Packet Filter
  - DPDK

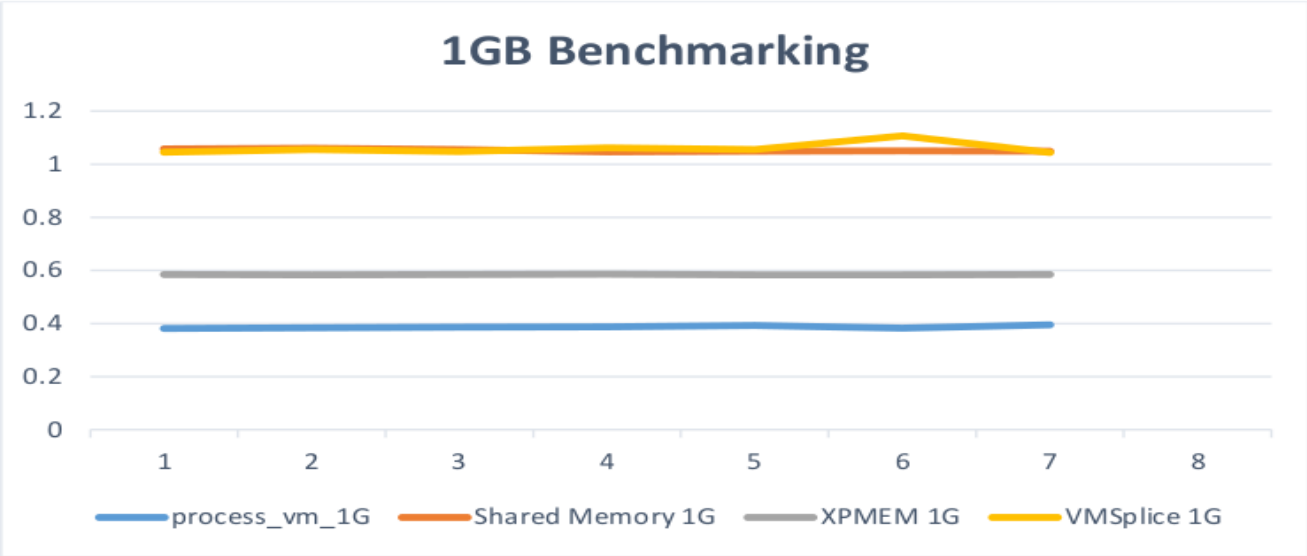
Related Works in Terms of IPC

Evaluation

IPC Mechanisms: 1

Select the first three between four

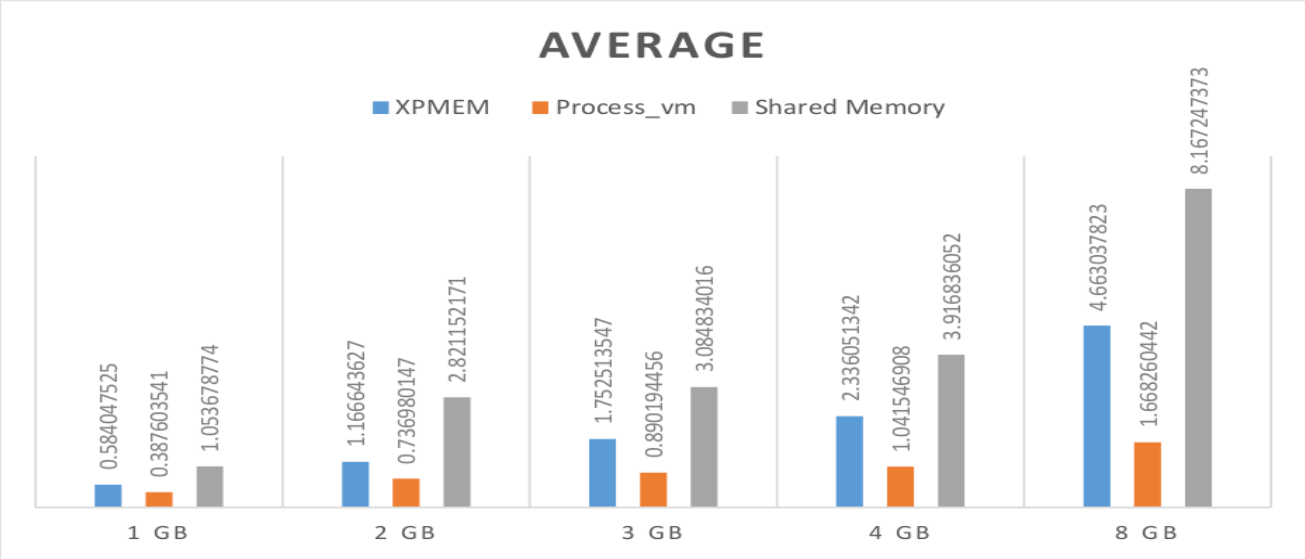
We Measured the time it took to move 1 Gigabyte of data between two processes by the [XPMEM, Process_vm_readv, Shared-Memory, Vmsplice-Splice] and Synchronization Model used is Blocking



IPC Mechanisms: 2

Select the best between the three remained

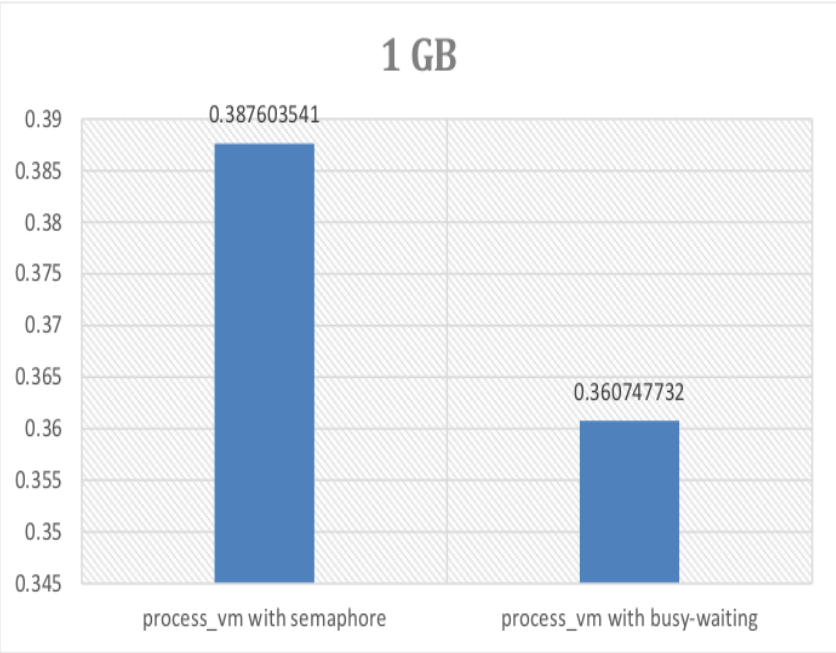
We Measured the time it took to move [2,3,4,8] Gigabyte of data between two processes by the [XPMEM, Process_vm_readv, Shared-Memory] and Synchronization Model used is Blocking

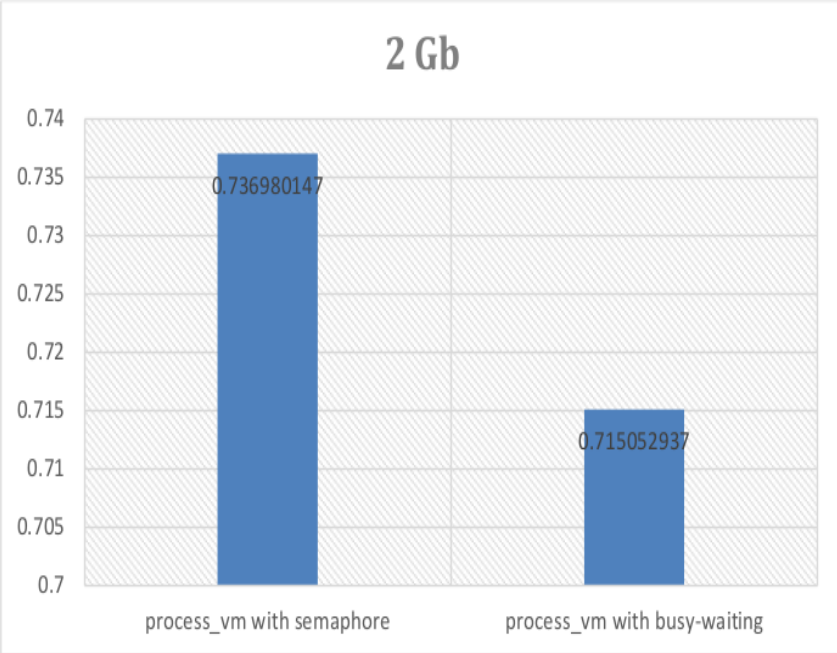


Synchronization

Semaphore vs Busy-waiting

We Measured the Overhead of Semaphore Systemcall by comparing the minimum time require to transfer [1,2] Gigabyte data using Process_vm_readv with the time it took to transfer using semaphore.





Future Works