

Batch: D2 Roll No.: 16010122323

Experiment / assignment / tutorial No.:10

Grade: AA / AB / BB / BC / CC / CD /DD

TITLE: Study of basic computer organisation and architecture concepts through Virtual lab

AIM: Understanding Virtual Lab concepts

Expected OUTCOME of Experiment:

Books/ Journals/ Websites referred:

<http://vlabs.iitb.ac.in/vlab/labscse.html>

<http://vlabs.iitb.ac.in/vlab/#>

<http://www.vlab.co.in/>

Pre Lab/ Prior Concepts:

The main aim of this experiment is to provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars. Also, to enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation. It also provides a complete Learning Management System around the

Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self-evaluation. We can share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distances

Salient Features:

1. Virtual Labs will provide to the students the result of an experiment by one of the following methods (or possibly a combination)

- Modeling the physical phenomenon by a set of equations and carrying out simulations to yield the result of the particular experiment. This can, at-the-best, provide an approximate version of the ‘real-world’ experiment.
- Providing measured data for virtual lab experiments corresponding to the data previously obtained by measurements on an actual system.
- Remotely triggering an experiment in an actual lab and providing the student the result of the experiment through the computer interface. This would entail carrying out the actual lab experiment remotely.

2. Virtual Labs will be made more effective and realistic by providing additional inputs to the students like accompanying audio and video streaming of an actual lab experiment and equipment.

Observations

Title of Study Experiment: Virtual Memory

Brief description of experiment under study:

Virtual Memory provides a clean address space to the processes. Also, by swapping in and swapping out pages gives the illusion of the availability of a large physical memory module to the users. There are different page table organizations and page replacement policies possible while implementing virtual memories in the operating systems.

Learning's recorded:

VIRTUAL MEMORY
File Help

GENERATE MAP

☒ READ ☐ WRITE

GENERATE MAP

VPN VPO

Page Miss 6
Page Hit 1

BASIC - UNDER THE HOOD

Virtual Memory	Main Memory	Dirty
VPG - 0	PPG-0(VPG-4)	0
VPG - 1	PPG-1(VPG-7)	0
VPG - 2	PPG-2(VPG-3)	0
VPG - 3	PPG-3(VPG-5)	0
VPG - 4		
VPG - 5		
VPG - 6		
VPG - 7		

IT'S OVER, WE JUST HAVE TO REPLACE THIS VICTIM PAGE WITH OUR VIRTUAL PAGE.

\$ HEY! IT'S A PAGE HIT OUR VIRTUAL PAGE(5) MAPS TO PHYSICAL PAGE (3).

\$ PAGE FAULT OCCURS BUT OUR PHYSICAL MEMORY IS FULL NOW,SO WE HAVE TO FIND AN VICTIM PAGE FROM PHYSICAL MEMORY TO REPLACE IT WITH OUR CURRENT VIRTUAL PAGE(7).NOW TO FIND VICTIM PAGE WE APPLY OUR PAGE REPLACEMENT POLICY THIS TIME IT IS FIFO. BY THIS POLICY VICTIM PAGE FOUND IS 1 WHICH IS NOT DIRTY. SO WE DON'T REQUIRE TO COPY IT BACK ON DISK. NOW IT'S OVER, WE JUST HAVE TO REPLACE THIS VICTIM PAGE WITH OUR VIRTUAL PAGE.

VPN	At PPN	Valid
PTE 0		0
PTE 1		0
PTE 2		0
PTE 3	2	1
PTE 4	0	1
PTE 5	3	1
PTE 6	1	0
PTE 7	1	1

virtual memory 32 KB
main memory ONE LEVEL
page size 4 KB

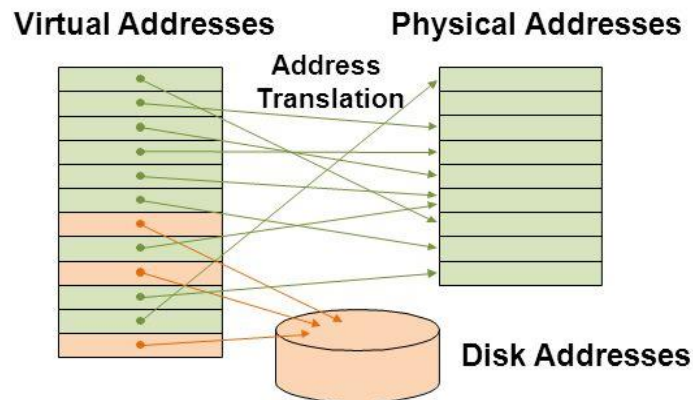
Replacement Policy FIFO
Page Level ONE LEVEL

Recent History

- VPG - 7 PAGE FAULT
- VPG - 6 PAGE FAULT
- VPG - 3 PAGE FAULT
- VPG - 5 PAGE FAULT
- VPG - 4 PAGE FAULT
- VPG - 5 PAGE HIT
- VPG - 7 PAGE FAULT

Virtual Memory

- Main memory can act as a cache for the secondary storage (disk)



- **Advantages:**
 - illusion of having more physical memory
 - program relocation
 - protection

Knowledge gained / Inference Obtained:

From this experiment we learned about virtual memory and page replacement algorithm.

Virtual memory is a feature of an operating system that enables a computer to be able to compensate shortages of physical memory by transferring pages of data from random access memory to disk storage. This process is done temporarily and is designed to work as a combination of RAM and space on the hard disk.

Post Lab Descriptive Questions

1. What are the applications of the virtual lab case study / tool reviewed by you?

Ans. Virtual memory has following applications:

- More processes may be maintained in the main memory: Because we are going to load only some of the pages of any particular process, there is room for more processes. This leads to more efficient utilization of the processor because it is more likely that at least one of the more numerous processes will be in the ready state at any time.
- A process may be larger than all main memory: One of the most fundamental restrictions in programming is lifted. A process larger than the main memory can be executed because of demand paging. The OS itself loads pages of a process in main memory as required.
- It allows greater multiprogramming levels by using less of the available (primary) memory for each process.

Conclusion

The aim of the experiment is verified.

Date: _____

Signature of faculty in-charge