2. Virtual Memory Simulation- Base and Bounds

Q1:

Base : 0x0000363c (decimal 13884)

Limit : 290

VA 0: 0x0000030e (decimal: 782) --> segmentation violation

VA 1: 0x00000105 (decimal: 261) --> PA(14145)

VA 2: 0x000001fb (decimal: 507) --> segmentation violation

VA 3: 0x000001cc (decimal: 460) --> segmentation violation

VA 4: 0x0000029b (decimal: 667) --> segmentation violation

Base : 0x00003ca9 (decimal 15529)

Limit : 500

Virtual Address Trace

VA 0: 0x00000039 (decimal: 57) --> PA(15586)

VA 1: 0x00000056 (decimal: 86) --> PA (15615)

VA 2: 0x00000357 (decimal: 855) --> segmentation violation

VA 3: 0x000002f1 (decimal: 753) --> segmentation violation

VA 4: 0x000002ad (decimal: 685) --> segmentation violation

Base : 0x000022d4 (decimal 8916)

Limit : 316

Virtual Address Trace

VA 0: 0x0000017a (decimal: 378) --> segmentation violation

VA 1: 0x0000026a (decimal: 618) --> segmentation violation

VA 2: 0x00000280 (decimal: 640) --> segmentation violation

VA 3: 0x00000043 (decimal: 67) --> PA (8983)

VA 4: 0x0000000d (decimal: 13) --> PA (8929)

Q2:

I set it to 1000 so that it can hold all the addresses

Q3:

16kb-100b-1b=15900b-1b=15899b

**Policy**

<http://www.cs.unc.edu/~dewan/242/s07/notes/intro/node15.html>

Policies are ways to choose which activity to run

**Mechanism**

<http://www.cs.unc.edu/~dewan/242/s07/notes/intro/node15.html>

Implementation of policies often depends on the hardware OS is running on

A process will be granted resources based on first come first serve policy and the implementation(mechanism) of this policy might be a queue.

**system call**

https://www.geeksforgeeks.org/introduction-of-system-call/

It is the programmatic way in which a computer program requests a service from the kernel of the operating system it is executed on. A system call is a way for programs to interact with the operating system.

**API**

https://www.servicetonic.com/service-desk/what-is-an-api-definition-and-examples/

Application Programming Interface is a series of services that provide communications between two programs.

**file descriptor**

chrome-extension://oemmndcbldboiebfnladdacbdfmadadm/https://pages.cs.wisc.edu/~remzi/OSTEP/cpu-intro.pdf

It contains standard input, output, error; these descriptors let programs easily read input from the terminal and print output to the screen.

**Interrupt**

<https://git.tulane.edu/amaus/cmps-2300-02-spring-2021/-/blob/master/lecture-notes/02-intro-to-processes.md>

OS might find one process issuing an I/O request which is slow so it interrupt this process and release CPU time for other processes. After I/O is finished, interrupt whatever process is running and pick up from the first process.

**Trap**

chrome-extension://oemmndcbldboiebfnladdacbdfmadadm/https://pages.cs.wisc.edu/~remzi/OSTEP/intro.pdf

When a system call is initiated (usually through a special hardware instruction called a trap) the hard-ware transfers control to a pre-specified trap handler(that the OS set up previously) and simultaneously raises the privilege level to kernel mode

**trap table**

https://www.cs.rutgers.edu/~pxk/416/notes/03-concepts.html

A series of allowed system calls a program can make. It protects malicious program from accessing hardware directly.

**stack pointer**

<https://whatis.techtarget.com/definition/stack-pointer>

It stores the address of last program in a stack

**kernel mode**

chrome-extension://oemmndcbldboiebfnladdacbdfmadadm/https://pages.cs.wisc.edu/~remzi/OSTEP/intro.pdf

In contrast to limited ability of user mode, in Kernel Mode, the OS has full access to the hardware of the system and thus can do things like initiate an I/O request or make more memory available to a program.

**kernel stack**

<https://www.baeldung.com/linux/kernel-stack-and-user-space-stack>

Similar in structure to user stack but user stack is for process and are readily accessible to users but kernel stack is only accessbile when CPU is under kernel mode.

**standard output**

<https://www.computerhope.com/jargon/s/stdout.htm>

Stdout, also known as standard output, is the default file descriptor for a program. It can output the result of a running program to terminal or to a user specified file.