CS6233: Introduction to Operating Systems

Assignment 9

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Ans 1.

Variable Sized Partitioning:

- The physical memory is divided into variable sized partitions and regions, memory allocation is done dynamically at runtime.
- The addressing in variable sized partitioning is typically performed using absolute or relative addressing.

Segmentation:

- Segmentation divides the logical address space of a process into segments, where each segment represents specific type of data or code (eg. code segment, data segment).
- Segmentation uses a two level addressing mechanism with a segment register and an offset, allowing more flexible and logical organization of the memory.

Ans 2.

Paging:

- In paging, physical memory and logical address space are divided into fixed-size blocks known as pages and page frames, memory allocation occurs in fixed-size units and the size of pages is determined by the hardware and operating system and is typically a power of 2.
- Paging uses a simple, uniform addressing mechanism. Logical addresses consist of a page number and an offset within the page.

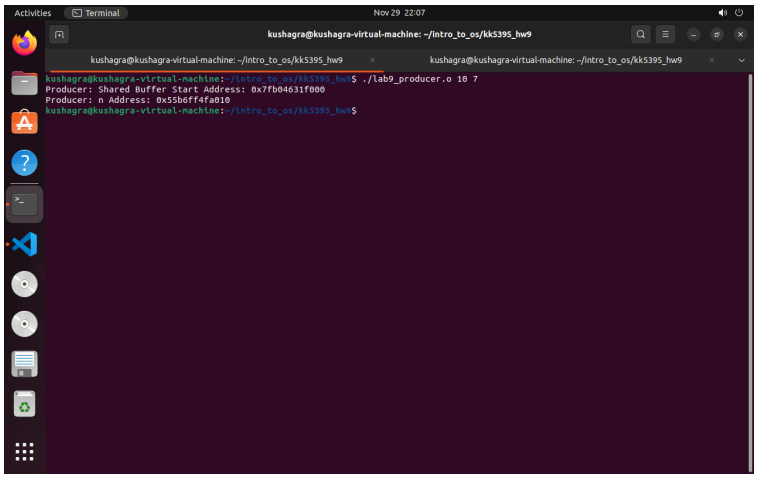
Segmentation:

- In segmentation, memory is divided into variable-sized segments, each representing a logical unit of a program, such as a code segment, data segment, or stack. The size of segments is not fixed and depends on the organization of the program.

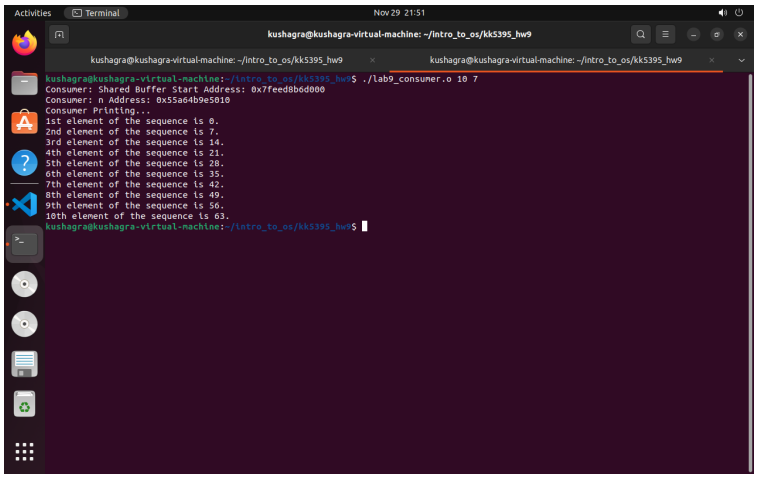
- Segmentation uses a more complex two-level addressing mechanism. Logical addresses consist of a segment identifier and an offset within the segment.

Ans 3.

1.



(a) Producer

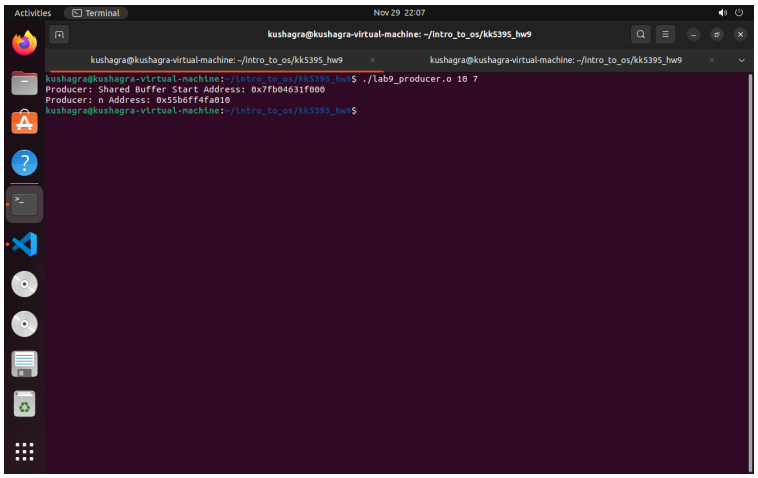


(b) Consumer

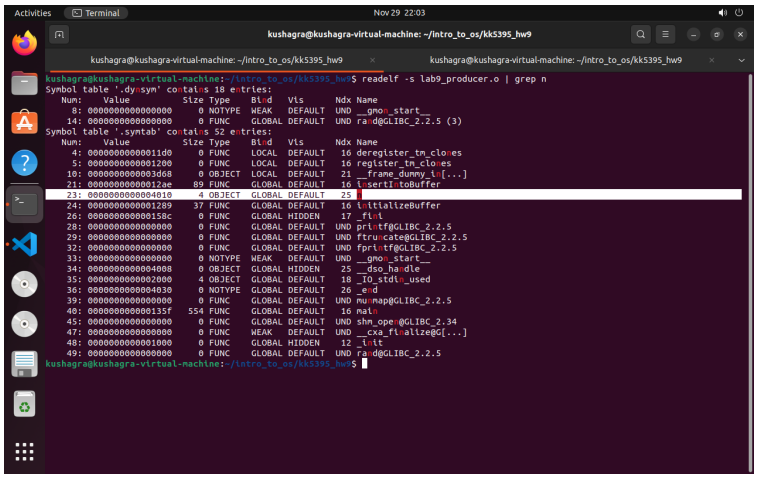
Figure 1: Address of buffer shown in images for consumer and producer

i) The address printed is virtual address.The operating system provides each process with a virtual address space that is mapped to physical memory.

2.



(a) Producer Running Program

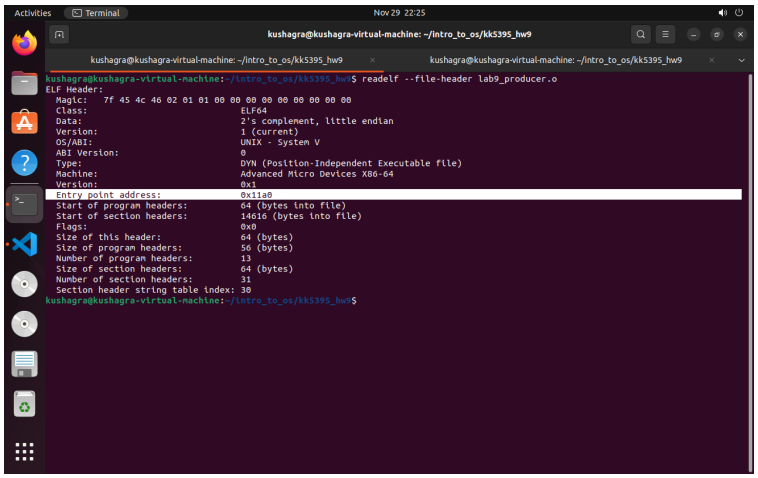


(b) ELF file for Producer

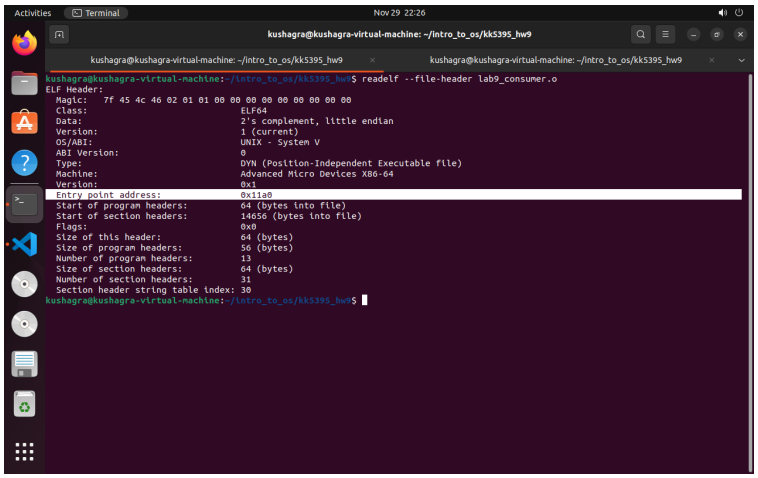
Figure 2: Address of n in elf file and running program for producer.

i) The address for n is 0x55b6ff4fa010 in running program whereas in the ELF file it has a address 0000000000004010. Both the addresses are different because in the ELF file the address represents the virtual addresses at the time of compilation or linking whereas when we print the address from the running program it is different because OS can assign different base address each time when the program runs.

3.



(a) Entry Point for Producer



(b) Entry Point for Consumer

Figure 3: Entry Point for Producer and Consumer

The entry point virtual address in both my producer and consumer was same, 0x11a0.