Assignment 4

Q1) Fill in the blanks

1) Demand paging is the concept in which a process is copied into main memory from the secondary memory according to the requirement.

2) If relocation is static and is done at assembly or load time, compaction cannot be done.

3) The first fit, best fit and worst fit are strategies to select a free hole from a set of available holes.

4) When memory is divided into several fixed sized partitions, each partition may contain exactly one process.

5) In fixed sized partition, the degree of multiprogramming is bounded by the number of partitions.

Q2) Choose Correct Options.

1) Which one of the following is the address generated by CPU?

Ans: C. logical address.

2) Effective access time is directly proportional to:

Ans: A. page-fault rate

A 3) A process is thrashing if:

Ans: A) it is spending more time paging than executing

4) In contiguous memory allocation:

Ans: A. each process is contained in a single contiguous section of memory.

5) The relocation register helps in:

Ans: C. to protect the address spaces of processes

6) A solution to the problem of external fragmentation is:

Ans: A Compaction

7) Because of virtual memory, the memory can be shared among:

Ans: A. processes.

8) Working set model for page replacement is based on the assumption of:

Ans: B. locality

9) When the memory allocated to a process is slightly larger than the process, then:

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Ans: A. internal fragmentation occurs

10) Transient operating system code is code that:

Ans: B) Comes and goes as needed.

Q3) Answer the following questions

1) Explain paging scheme for memory management, discuss the paging hardware & Paging model.

Ans: Paging is a memory management scheme that eliminates the need for contingous allocation of physical memory. This scheme permits the physical address space of a process to be non-contingous.

- Logical Address or Virtual Address (represented in bits): An address generated by the CPU
- Logical Address Space or Virtual Address Space (represented in words or bytes): The set of all logical addresses generated by a program.
- Physical Address (represented in bits): An address actually available on memory unit
- Physical Address Space (represented in words or bytes): The set of all physical addresses corresponding to the logical addresses.

2) Explain the basic concept of segmentation in detail.

Ans: Segmentation is a memory management technique in which the memory is divided into the variable

size parts. Each part is known as a segment which can be allocated to a process. The details about each segment are stored in a table called a segment table. Segment table is stored in one of the segments.

3) Explain with the help of examples FIFO & LRU, optical page replacement algorithms with example reference string. Mention the merits & demerits of each of the above diagram.

Ans: First In First Out (FIFO)

In this algorithm, the OS maintains a queue that keeps track of all the pages in memory, with the oldest page at the front and the most recent page at the back.

Merits

- Simple & easy to implement.
- Low overhead.

Demerits

- Poor performance
- Doesn't consider the frequency of use or last used time, simply replaces the oldest page.

Least Recently Used (LRU)

It keeps track of page usage over a short period of time.

Merits

- Efficient
- Doesn't suffer from Belady's Anomaly

Demerits

- Complex implementation
- Expensive

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Optimal Page Replacement

It is the best page replacement algorithm as it gives the least no. of page faults.

Merits

- Easy to implement
- Simple data structures are used.

Demerits

- Requires future knowledge of the program
- Time - consuming.

4) What is Demand Paging? What do you mean by Best Fit, First Fit & worst fit?

Ans: Demand Paging suggests keeping all pages of the frames in the secondary memory until they are required.

Best fit method keeps the free/busy list in order by size - smallest to largest. In worst fit allocation technique, the process traverses the whole memory & always search for the largest hole/partition, & then the process is placed in that hole/partition. First fit fits data into memory by scanning from the beginning of available memory to the end, until the first free space which is at least big enough to accept data is found.

5) What is virtual memory? Mention its advantages.

Ans. Virtual memory is a storage mechanism which

offers user an illusion of having a very big main memory.

Advantage of Virtual Memory:

- Virtual memory helps to gain speed when only a particular segment of the program is required for the execution of the program.
- It is very helpful in implementing a multiprogramming environment.
- It allows you to run more applications at once.
- It helps you to fit many large programs into smaller programs.