

Q.1
Star

Explain paging

Paging is a memory Management scheme used in modern operating system to manage how data is stored in and Retrieved from physical Memory. the key idea behind paging is to divide both physical memory and logical Memory (memory space used by program) into fixed size blocks called 'pages' (in logical Memory) and frames (in physical memory)

1. Pages: The logical Memory (virtual memory) used by a program is divided into fixed size blocks called pages. Each page typically represent a fixed chunk of data

2. Frames (physical Memory):
Physical memory is also divided into fixed-size block called frames. which are the same size as the pages.

3. page table :- the operating system maintain a page table for each process. which is used for to map logical memory pages to physical Memory frames

4. page Fault :-

When a program tries to access a page that is not currently loaded in mother a page fault occur.

Q.2 Explain page fault, demand paging, swap in, swap out.

soln

page fault:

A page fault occurs when a program tries to access a page of memory that is not currently loaded in physical memory. This happens in systems that use paging for memory management where not all the memory a program uses is necessarily loaded into RAM at once.

Demand Paging:

Demand paging is a memory management technique in which pages are loaded into memory only when they are needed by a process rather than loading all pages at once when the program starts.

SWAP In:

SWAP In is the process of loading a page (or sometimes an entire process) from the disk (specially from the swap space or virtual memory) into physical memory. This happens when a program that was previously swapped out needs to be brought back into memory for execution.

swap out:

swap out is the process of moving a page (or something an entire process) from physical memory

(RAM to disk (specially to swap space or virtual Memory) to free up space in RAM for other active processes.

Q.3) Explain different page Replacement algorithms with examples.

Soln

Page Replacement algorithms

1) First-In, First-out (FIFO)

Replace the oldest page (the one loaded first)

eg. For References string 1, 2, 3, 4, 1, 2, 5 with 3 frames.

step	loaded page
1	1
2	1, 2
3	1, 2, 3
4	2, 3, 4 (1, Replaced)
5	2, 3, 4
6	2, 3, 4
7	3, 4, 5 (2 Replaced)

2) least Recently used:

Replace the page that hasn't been used for the longest time.

eg: within the same Reference string 1, 2, 3, 4, 1, 2, 5, 1, 3 Frames.

steps	loaded pages
1	1
2	1, 2
3	1, 2, 3
4	2, 3, 4 (1 Replaced)
5	1, 3, 4 (2, Replaced)
6	1, 2, 4
7	1, 2, 5 (4, Replaced)

3) optimal:

Replaced the page that won't be used for the longest time in the future

eg: same Reference string

step	loaded string
1	1
2	1, 2
3	1, 2, 3
4	1, 2, 4 (3, Replaced)