



Pune District Education Association's College Of Engineering

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EXPERIMENT NO.

Title : Implement a program to simulate memory placement strategies - best fit, first fit next fit and worst fit

Problem Statement :

Write a program to simulate memory placement strategies - best fit, first fit, next fit and worst fit

Objectives :

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1. To understand concept of memory placement technique
2. To implement concept of memory placement technique.

Theory

Placement Algorithms

- In an environment that supports dynamic memory allocation, the memory manager must keep a record of the usage of each allocatable block of memory. This record could be kept by using almost any data structure that implements linked lists.

- An obvious implementation is to define a free list of block descriptors with each descriptor containing a pointer to the next descriptor, a pointer to the block and the length of the block.
- The memory manager keeps a free list pointer and inserts entries into the list in some order conducive to its allocation strategy. A number of strategies are used to allocate space to the processes that are competing for memory

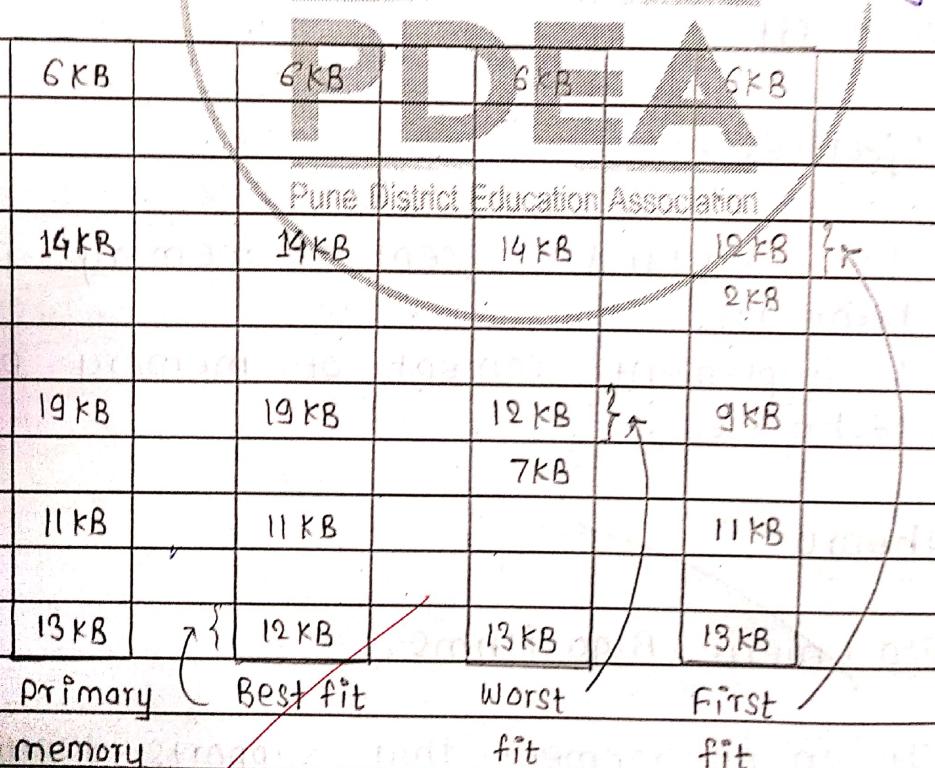


fig. Placement algorithm

1. Best fit :

The allocator places a process in the smallest block of unallocated memory in which it will fit. For example, suppose a process requests



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12 KB of memory in which it will fit and the memory manager currently has a list of unallocated blocks of 6 KB, 14 KB, 19 KB, 11 KB and 18 KB blocks. The best-fit strategy will allocate 12 KB of the 18 KB block to the process.

Algorithm :

- free table is kept stored by partition size
- Thus the first free area, we find that is large enough for the desired partition is the "Best Fit"

Advantages :

1. On average the best fit free area can be found by searching only half the table.
2. If there is a free area of exactly desired size, it will be selected. This is not true for "First Fit".
3. Lower memory wastage than First Fit

Disadvantages :

- Fragmentation problem
very small parts of memory remain unutilised which is called "Fragmentation"



2. Worst Fit : The memory manager places a process in the largest block of unallocated memory available. The idea is that this placement will create the largest hole after the allocations, thus increasing the possibility that compared to best fit ; another process can be use the remaining space. Using the same example as above, worst fit will allocate 12 kB of the 19 kB block to the process, leaving a 7 kB block for future use.

Algorithm :

- Input memory blocks and processes with sizes
- Initialize all memory blocks as free
- Start by picking each process and find the max block size that can be assigned to current process
- If not then leave that the process and keep checking the further processes.

Advantages :

The process chooses the largest partition. therefore there will be large internal fragmentation.

Disadvantages :

It is a slow process



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3. First Fit :

- FIRST FIT ALLOCATION IS A MEMORY ALLOCATION TECHNIQUE USED IN OPERATING SYSTEMS TO ALLOCATE MEMORY TO A PROCESS.
- IN FIRST FIT THE OPERATING SYSTEM SEARCHES THROUGH THE LIST OF FREE BLOCKS OF MEMORY STARTING FROM THE BEGINNING OF THE LIST, UNTIL IT FINDS A BLOCK THAT IS LARGE ENOUGH TO ACCOMMODATE THE MEMORY REQUEST FROM THE PROCESS.
- ONCE A SUITABLE BLOCK IS FOUND, THE OPERATING SYSTEM SPLITS THE BLOCK INTO TWO PARTS : THE PORTION THAT WILL BE ALLOCATED TO THE PROCESS

Advantages

1. simple and efficient search algorithm
2. minimizes memory fragmentation
3. fast allocation of memory.

Disadvantages

1. poor performance in highly fragmented memory
2. may lead to poor memory utilization
3. may allocate larger blocks of memory than required.

4. Next Fit :

The next fit is a modified version of first fit. It begins as the first fit to find a free partition but when called next time -

it starts searching from where it left off, not from the beginning. This policy makes use of a reusing pointer. The pointer moves along the memory chain to search for the next fit.

Algorithm :

1. Input the number of memory blocks and their sizes and initializes the blocks as free
2. Input the number of processes and their sizes
3. Start by picking each process and check if it can be assigned to the current block, if yes allocate the required memory and check for next process but from the block where we left not from starting
4. If the current block size is smaller than keep checking for the further blocks.

Advantages :

- Next fit is a straight and fast algorithm

Ex. Input : blocksize [] = {5, 10, 20}
process size [] = {10, 20, 30}

Output :

Process No	Process Size	Block No
1	10	2
2	20	3
3	30	Not allocated

Conclusion : Thus we studied the memory placement algo strategies.