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OPERATING SYSTEMS

Report #08

Lab 08 : Contiguous Memory Allocation

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1 Exercise 1 :

Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order)? Rank the algorithms in terms of how efficiently they use memory.

Proof:

* **First-Fit Algorithm:**

- Allocating 115 KB to memory partition of 300 KB.
- Allocating 500 KB to memory partition of 600 KB.
- Allocating 358 KB to memory partition of 750 KB.
- Allocating 200 KB to memory partition of 350 KB.
- Allocating 375 KB to memory partition of 750 KB. Because memory partition of 750 KB still have $750 - 358 = 392$ KB memory location unused.

→ Total unused memory = 452 KB (memory partition of 125 KB is not used so we ignored it).

* **Best-Fit Algorithm:**

- Allocating 115 KB to memory partition of 125 KB.
- Allocating 500 KB to memory partition of 600 KB.
- Allocating 358 KB to memory partition of 750 KB.
- Allocating 200 KB to memory partition of 200 KB.
- Allocating 375 KB to memory partition of 750 KB. Because memory partition of 750 KB still have $750 - 358 = 392$ KB memory location unused.

→ Total unused memory = 127 KB (memory partition of 300 KB is not used so we ignored it).

* **Worst-Fit Algorithm:**

- Allocating 115 KB to memory partition of 750 KB.
- Allocating 500 KB to memory partition of 600 KB.
- Allocating 358 KB to memory partition of 750 KB. Because memory partition of 750 KB still have $750 - 115 = 635$ KB memory location unused.
- Allocating 200 KB to memory partition of 200 KB.
- Process size 375 KB must wait for other processes to finish to access the compatible memory. Because other memory locations is not enough size to allocated to that process.

→ Total unused memory = 377 KB. Memory partition of 300 KB, 350 KB and 150 KB is not used although Process size 375 KB has not been allocated.

⇒ Based on above results, the most effective memory usage algorithm is *Best-Fit* and the least effective memory usage algorithm is *Worst-Fit*.



2 Exercise 2 :

Student write a short report that compares the advantages as well as disadvantages of the allocation algorithms, namely **First-Fit**, **Best-Fit**, **Worst-Fit**.

Proof:

* **First-Fit Algorithm:**

- Advantages: This is the fastest algorithm in three algorithms mentioned above.
- Disadvantages:
 - Tends to leave “average” size holes inside memory allocated.
 - If the process has large memory comes later, it may not be allocated memory location and must wait.

* **Best-Fit Algorithm:**

- Advantages:
 - This algorithm uses memory effectively, avoiding wasting resources.
 - Although this algorithm allocates the minimum possible memory space, the lack of memory to allocate to later processes must wait or lost even though there is still free memory location.
- Disadvantages:
 - This algorithm is so slow because it takes time to find the most suitable memory location for each process.
 - It easily occurs high fragmentation.

* **Worst-Fit Algorithm:**

- Advantages: Avoid to leave “average” size holes inside memory allocated.
- Disadvantages:
 - This algorithm is so slow because it takes time to find memory location for each process.
 - Later processes must wait or lost even though there is still free memory location.