1. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212K, 417K, 112K, and 426K (in order)? Which algorithm makes the most efficient use of memory?

Solution:

First-Fit:
212K is put in 500K partition.
417K is put in 600K partition.
112K is put in 288K partition (new partition 288K = 500K - 212K).
426K must wait.

Best-Fit:
212K is put in 300K partition.
417K is put in 500K partition.
112K is put in 200K partition.
426K is put in 600K partition.

Worst-Fit:
212K is put in 600K partition.
417K is put in 500K partition.
112K is put in 388K partition.
426K must wait.

In this example, Best-Fit turns out to be the best.

Q2. The memory partitions available are:

- **200KB**
- **30KB**
- **750KB**
- **50KB**

The processes have the following memory requirements:

- **P1**: 30KB
- **P2**: 200KB
- **P3**: 500KB
- **P4**: 45KB

i) First Fit Allocation

In **First Fit**, the allocator checks the memory partitions in order (from first to last) and allocates the first partition that is large enough to hold the process.

Allocation Process (First Fit):

1. **P1 (30KB)**: The first partition that can fit is the **30KB** partition. So, P1 is allocated to the **30KB** partition.
   o Remaining partitions: **200KB**, **750KB**, **50KB**
2. **P2 (200KB)**: The first partition that can fit is the **200KB** partition. So, P2 is allocated to the **200KB** partition.
   o Remaining partitions: **750KB**, **50KB**
3. **P3 (500KB)**: The first partition that can fit is the **750KB** partition. So, P3 is allocated to the **750KB** partition.
   o Remaining partition: **50KB**
4. **P4 (45KB)**: The first partition that can fit is the **50KB** partition. So, P4 is allocated to the **50KB** partition.
   o Remaining partitions: none

First Fit Allocation Summary:

Process	Memory Required	Allocated Partition
P1	30KB	30KB
P2	200KB	200KB
P3	500KB	750KB
P4	45KB	50KB

ii) Best Fit Allocation

In **Best Fit**, the allocator looks for the smallest partition that is large enough to hold the process. It selects the partition that leaves the least amount of unused space.

Allocation Process (Best Fit):

1. **P1 (30KB)**: The best partition for P1 is the **30KB** partition, as it perfectly matches the required size.
   o Remaining partitions: **200KB**, **750KB**, **50KB**
2. **P2 (200KB)**: The best partition for P2 is the **200KB** partition, as it perfectly matches the required size.
   o Remaining partitions: **750KB**, **50KB**
3. **P3 (500KB)**: The best partition for P3 is the **750KB** partition, as it leaves the least amount of unused space (250KB).
   o Remaining partition: **50KB**
4. **P4 (45KB)**: The best partition for P4 is the **50KB** partition, as it leaves the least amount of unused space (5KB).
   o Remaining partitions: none

Best Fit Allocation Summary:

Process	Memory Required	Allocated Partition
P1	30KB	30KB
P2	200KB	200KB
P3	500KB	750KB

Process	Memory Required	Allocated Partition
P4	45KB	50KB

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iii) Worst Fit Allocation

In **Worst Fit**, the allocator looks for the largest partition that is large enough to hold the process. It selects the partition that leaves the most unused space.

Allocation Process (Worst Fit):

1. **P1 (30KB)**: The worst partition for P1 is the **750KB** partition, as it is the largest partition.
   o Remaining partitions: **200KB**, **30KB**, **50KB**
2. **P2 (200KB)**: The worst partition for P2 is the **200KB** partition, as it perfectly matches the required size.
   o Remaining partitions: **30KB**, **50KB**
3. **P3 (500KB)**: The worst partition for P3 is the **50KB** partition, as it is the largest remaining partition that could fit.
   o Remaining partition: **30KB**
4. **P4 (45KB)**: The worst partition for P4 is the **30KB** partition, as it is the only remaining partition. But since 30KB is not enough for P4, **P4 cannot be allocated**.

Worst Fit Allocation Summary:

Process	Memory Required	Allocated Partition
P1	30KB	750KB
P2	200KB	200KB
P3	500KB	50KB
P4	45KB	Not Allocated

Summary of Allocations:

Allocation Method	Process	Memory Required	Allocated Partition
First Fit	P1	30KB	30KB
	P2	200KB	200KB
	P3	500KB	750KB
	P4	45KB	50KB
Best Fit	P1	30KB	30KB
	P2	200KB	200KB
	P3	500KB	750KB
	P4	45KB	50KB
Worst Fit	P1	30KB	750KB
	P2	200KB	200KB

Allocation Method Process Memory Required Allocated Partition

P3	500KB	50KB
P4	45KB	Not Allocated

Conclusion:

- **First Fit** and **Best Fit** both allocate memory successfully for all processes.
- **Worst Fit** fails to allocate memory to **P4** because there is not enough space in the remaining partitions after allocating to the other processes.