**Assignment**
**Operating system.**

You have studied various memory management techniques in operating system and its high time to implement various memory management techniques as an computer Engineer. The different techniques includes: fixed-sized memory partitioning, unequal-sized fixed partitioning, dynamic memory allocation, buddy system and pagination.

**Memory Management Simulator design Assignment**

Objective:

To implement a memory management simulator design in a programming language of your choice (e.g., C, C++, Java, Python) that demonstrates the following memory management techniques:

- Fixed-sized memory partitioning
- Unequal-sized fixed partitioning
- Dynamic memory allocation
- Buddy system
- Paging

**Requirements:**

- **Fixed-sized Memory Partitioning:**

Divide the memory into fixed-size partitions.

Allocate processes to partitions using First Fit, Best Fit, or Worst Fit strategies.

Display the memory allocation status.

- **Unequal-sized Fixed Partitioning:**

Divide the memory into partitions of different sizes.

Allocate processes based on the partition sizes using appropriate strategies.

Display the memory allocation status.

- **Dynamic Memory Allocation:**

Use dynamic memory allocation techniques like the First Fit, Best Fit, or Worst Fit.

Implement allocation and de-allocation of memory blocks.

Handle external fragmentation.

Display the memory allocation status.

- **Buddy system**

Get a Big memory chunk and make a request of memory for the process of different size of your choice.

Implement allocation and de-allocation of memory blocks.

- **Paging:**

Implement paging with a fixed page size.

Simulate the process of dividing the process memory into pages and the physical memory into frames.

Use a page table to keep track of the mapping between pages and frames.

Display the memory allocation status.

- **User Interface:**

Create a simple UI that allows the user to:

Define the total size of memory.

Select a memory management technique.

Add or remove processes with specific memory requirements.

View the current memory allocation status.

- **Process Management:**

Simulate the arrival and departure of processes.

Each process should have a unique identifier and a specified memory requirement.

Memory Allocation Algorithms:

Implement at least two different allocation strategies (e.g., First Fit, Best Fit) for fixed-sized partitioning and dynamic memory allocation.

- **Output:**

For each memory management technique, display:

The memory layout showing allocated and free partitions/blocks/frames.

The allocation table showing which process occupies which partition/block/frame.

Any fragmentation (internal or external) if applicable.

Try to run all the techniques/algorithm for the same size process and generate a comparison chart and analyze the result.

This is a group assignment and make the group of three (max) and submit the assignment as per the deadline stated in the class.