

Question 1 – Memory Management

A linked list is the most appropriate data structure for this scenario because number of element required are not fixed and we need a linear data structure.

Test cases

| Test case id | Test scenario | Test steps | Test inputs | Expected result | Actual result | Pass/Fail |
|--------------|-------------------|---|-------------------------------|---------------------------|---------------|-----------|
| 1 | Allocate P1 600k | 1. Enter command A 2. Enter process id 3. Enter size of the process | processID = P1 size = 600 | Allocate P1 of size: 600 | As Expected | Pass |
| 2 | Allocate P2 1000k | 1. Enter command A 2. Enter process id 3. Enter size of the process | processID = P2 size = 1000 | Allocate P2 of size: 1000 | As Expected | Pass |
| 3 | Allocate P3 300k | 1. Enter command A 2. Enter process id 3. Enter size of the process | processID = P3 size = 300 | Allocate P3 of size: 300 | As Expected | Pass |
| 4 | Terminate P2 | 1. Enter command R 2. Enter process id | processID = P2 | Release P2 | As Expected | Pass |
| 5 | Allocate P4 700k | 1. Enter command A 2. Enter process id 3. Enter size of the process | processID = P4 size = 700 | Allocate P4 of size: 700 | As Expected | Pass |
| 6 | Terminate P1 | 1. Enter command R 2. Enter process id | processID = P1 | Release P1 | As Expected | Pass |
| 5 | Allocate P5 400k | 1. Enter command A 2. Enter process id 3. Enter size of the process | processID = P5 size = 400 | Allocate P5 of size: 400 | As Expected | Pass |

```
Allocate System of size: 400
-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: Free, Start: 400, End: 2600, Size: 2200, IsFree: 1
-- Memory Snapshot : END --
```

Figure 1 – Initial memory

```
Enter command:A
Enter process id: P1
Enter memory size: 600
Allocate P1 of size: 600

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: P1, Start: 400, End: 1000, Size: 600, IsFree: 0
Process: Free, Start: 1000, End: 2600, Size: 1600, IsFree: 1
-- Memory Snapshot : END --
```

Figure 2 – Screenshot of test case 1

```
Enter command:A
Enter process id: P2
Enter memory size: 1000
Allocate P2 of size: 1000

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: P1, Start: 400, End: 1000, Size: 600, IsFree: 0
Process: P2, Start: 1000, End: 2000, Size: 1000, IsFree: 0
Process: Free, Start: 2000, End: 2600, Size: 600, IsFree: 1
-- Memory Snapshot : END --
```

Figure 3 – Screenshot of test case 2

```
Enter command:A
Enter process id: P3
Enter memory size: 300
Allocate P3 of size: 300

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: P1, Start: 400, End: 1000, Size: 600, IsFree: 0
Process: P2, Start: 1000, End: 2000, Size: 1000, IsFree: 0
Process: P3, Start: 2000, End: 2300, Size: 300, IsFree: 0
Process: Free, Start: 2300, End: 2600, Size: 300, IsFree: 1
-- Memory Snapshot : END --
```

Figure 4 – Screenshot of test case 3

```
Enter command:R
Enter process id: P2
Release P2

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: P1, Start: 400, End: 1000, Size: 600, IsFree: 0
Process: Free, Start: 1000, End: 2000, Size: 1000, IsFree: 1
Process: P3, Start: 2000, End: 2300, Size: 300, IsFree: 0
Process: Free, Start: 2300, End: 2600, Size: 300, IsFree: 1
-- Memory Snapshot : END --
```

Figure 5 – Screenshot of test case 4

```
Enter process id: P4
Enter memory size: 700
Allocate P4 of size: 700

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: P1, Start: 400, End: 1000, Size: 600, IsFree: 0
Process: P4, Start: 1000, End: 1700, Size: 700, IsFree: 0
Process: Free, Start: 1700, End: 2000, Size: 300, IsFree: 1
Process: P3, Start: 2000, End: 2300, Size: 300, IsFree: 0
Process: Free, Start: 2300, End: 2600, Size: 300, IsFree: 1
-- Memory Snapshot : END --
```

Figure 6 – Screenshot of test case 5

```
Enter command:R
Enter process id: P1
Release P1

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: Free, Start: 400, End: 1000, Size: 600, IsFree: 1
Process: P4, Start: 1000, End: 1700, Size: 700, IsFree: 0
Process: Free, Start: 1700, End: 2000, Size: 300, IsFree: 1
Process: P3, Start: 2000, End: 2300, Size: 300, IsFree: 0
Process: Free, Start: 2300, End: 2600, Size: 300, IsFree: 1
-- Memory Snapshot : END --
```

Figure 7 – Screenshot of test case 6

```
Enter command:A
Enter process id: P5
Enter memory size: 400
Allocate P5 of size: 400

-- Memory Snapshot : START --
Process: System, Start: 0, End: 400, Size: 400, IsFree: 0
Process: P5, Start: 400, End: 800, Size: 400, IsFree: 0
Process: Free, Start: 800, End: 1000, Size: 200, IsFree: 1
Process: P4, Start: 1000, End: 1700, Size: 700, IsFree: 0
Process: Free, Start: 1700, End: 2000, Size: 300, IsFree: 1
Process: P3, Start: 2000, End: 2300, Size: 300, IsFree: 0
Process: Free, Start: 2300, End: 2600, Size: 300, IsFree: 1
-- Memory Snapshot : END --
```

Figure 8 – Screenshot of test case 7