



Bilkent University

Bilkent University

Computer Science

CS 342 - Operating Systems

Project 3 - Report

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Section: 1

Experiments 1 & 2:

While conducting the experiments 1 & 2, we used the same order of the processes' memory allocation requests and memory deallocation requests. Instead, we changed the number of processes and the total shared memory sizes. In experiment 1, we changed the number of processes for a shared memory size of 32 KB. Thus, we examined the effect of the number of processes on internal fragmentation amount. In experiment 2, we changed the shared memory size for a constant number of processes, 8. Thus, we examined the effect of the shared memory size on internal fragmentation amount.

Order of allocation and deallocation requests :

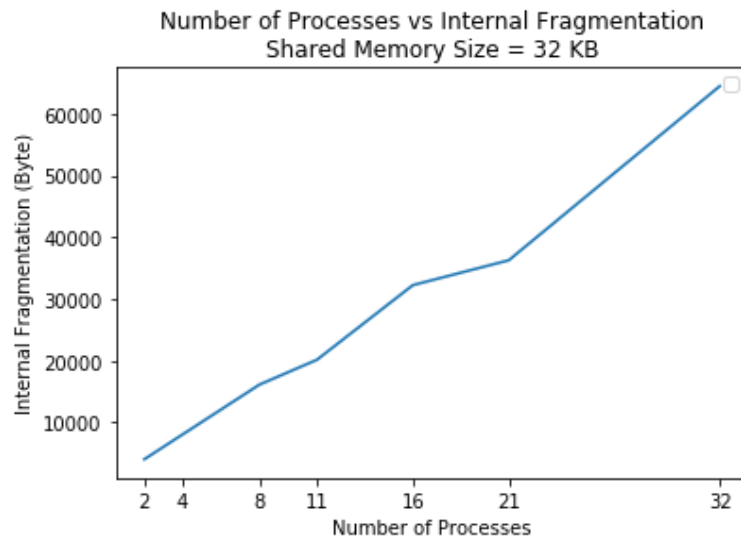
1. Allocate: 128 bytes
2. Allocate: 2000 bytes
3. Deallocate: 128 bytes
4. Allocate: 1350 bytes
5. Deallocate: 1350 bytes
6. Allocate: 400 bytes
7. Allocate: 875 bytes
8. Deallocate: 400 bytes
9. Deallocate: 875 bytes
10. Deallocate: 2000 bytes
11. Allocate: 4096 bytes
12. Deallocate: 4096 bytes

Experiment 1:

Shared Memory Size: 32 KB

Number of Processes	Fragmentation Amount
2	4028
4	8056
8	16112
11	20140
16	32224
21	36252
32	64448

Table 1: Number of Processes vs Fragmentation



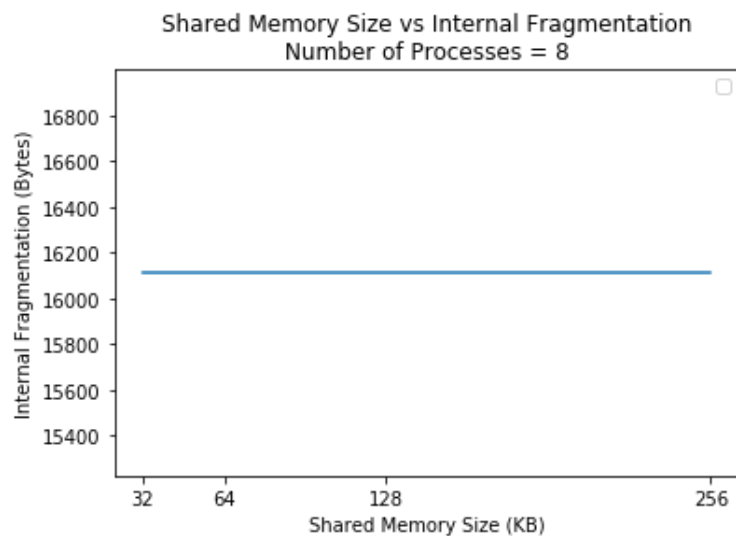
Graph 1. Number of processes vs Internal Fragmentation

Experiment 2:

Number of Processes: 8

Shared Memory Size	Fragmentation Amount
32 KB	16112
64 KB	16112
128 KB	16112
256 KB	16112

Table 2: Shared Memory Size vs Fragmentation



Graph 2. Shared Memory Size vs Internal Fragmentation

Experiment 3:

In this experiment, we multiplied an initial set of allocations/deallocations with certain multipliers in order to calculate internal fragmentation and the effect of allocation/deallocation sizes on it.

Order of allocation and deallocation requests :

Initial Set:

1. Allocate: 128 bytes
2. Allocate: 150 bytes
3. Deallocate: 128 bytes
4. Allocate: 200 bytes
5. Deallocate: 200 bytes
6. Allocate: 300 bytes
7. Allocate: 400 bytes
8. Deallocate: 400 bytes
9. Deallocate: 300 bytes
10. Deallocate: 150 bytes
11. Allocate: 256 bytes
12. Deallocate: 256 bytes

Set 2: Multiplier = 2

Each allocation and deallocation size in the initial set will be multiplied by 2.

Set 3: Multiplier = 3

Each allocation and deallocation size in the initial set will be multiplied by 3.

Set 4: Multiplier = 4

Each allocation and deallocation size in the initial set will be multiplied by 4.

Set 5: Multiplier = 5

Each allocation and deallocation size in the initial set will be multiplied by 5.

Set 6: Multiplier = 8

Each allocation and deallocation size in the initial set will be multiplied by 8.

Set 7: Multiplier = 10

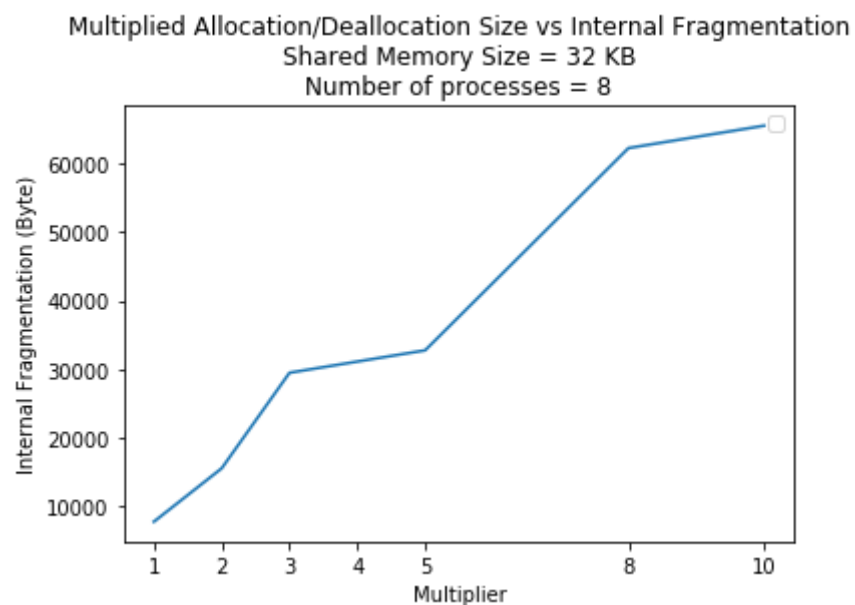
Each allocation and deallocation size in the initial set will be multiplied by 10.

Number of Processes: 8

Shared Memory Size: 32 KB

Set No	Fragmentation Amount
Set 1	7776
Set 2	15552
Set 3	29472
Set 4	31104
Set 5	32736
Set 6	62208
Set 7	65472

Table 3: Allocation Size vs Fragmentation



Graph 3. Multiplied Allocation/Deallocation Size vs Internal Fragmentation

CONCLUSION:

In experiment 1, the effect of process numbers on fragmentation amounts was investigated by using 32KB shared memory size and the order of allocation/deallocation requests are kept constant for each experiment for different numbers of processes. As can be seen from Table 1 and Graph 1, when we increase the number of processes, the fragmentation amount increases.

In experiment 2, the effect of shared memory size on the fragmentation amount is examined and the number of processes is kept 8 as constant. As can be seen from Table 2 and Graph 2, the size of the shared memory has no effect on fragmentation amount if the number of processes and the order of allocation/deallocation requests are kept constant.

In experiment 3, the effect of allocation/deallocation size on fragmentation is examined and the number of processes and size of shared memory is kept constant as 8 and 32 KB ,respectively. As can be seen from Table 3 and Graph 3, fragmentation amount increases as the allocation/deallocation size increases if the order of allocation/deallocation requests are kept constant.

GitHub Link:

https://github.com/ardaakcabuyuk/CS342_project3_sbmem