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CS342

Project-3 Report

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Introduction

In these experiments, the request sizes are in between 128 bytes and 4096 bytes and they are generated randomly. Also, the shared segment sizes are in between 32 KB and 256 KB.

The buddy algorithm that manages memory in power of two increments. In the implementation each block that will be allocated, includes the overhead that consists of 'isAllocated', 'order' and 'offset'. isAllocated segment represents whether the block is allocated or not. Order segment stores the level of the block. Finally, the offset information stores the offset of the next free space with the same segment size. If the block is allocated already, it does not store any information about the offset. Additionally, in the shared segment memory information table is stored. It is initialized with the sbmem_alloc() method like other processes.

Experiment

In this experiment, each process allocates a single space with random size. In order to see the internal fragmentation for different sizes, we repeat the experiment for 10 times. Also, the experiment is done with multi processes. First 5 processes do not free their allocations so that shared memory will be partially filled after returning. Last 5 processes free their allocations.

Allocating Bytes	Internal Fragmentation
Allocating = 1447 Bytes	Internal Fragmentation = 601 bytes
Allocating = 2848 bytes	Internal Fragmentation = 1248 bytes
Allocating = 3433 bytes	Internal Fragmentation = 663 bytes
Allocating = 3119 bytes	Internal Fragmentation = 977 bytes
Allocating = 1510 bytes	Internal Fragmentation = 538 bytes
Allocating = 1652 bytes	Internal Fragmentation = 396 bytes
Allocating = 1602 bytes	Internal Fragmentation = 446 bytes
Allocating = 1770 bytes	Internal Fragmentation = 278 bytes
Allocating = 1214 bytes	Internal Fragmentation = 834 bytes
Allocating = 1495 bytes	Internal Fragmentation = 553 bytes
Average Allocating = 2009 bytes	Average Internal Fragmentation = 653.4 bytes

Experiment Results:

Total allocations: 20,090 bytes

Total internal fragmentations: 6,534 bytes

Wasted storage / Allocated storage percentage: 32.5%

Conclusion:

In addition to the experiment with random allocation request sizes, we check the output of the scenarios that we can calculate ourselves and compare them. We can see that if allocation size is close to the power of 2, internal fragmentation will be small as it is expected.