Lab 2

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Task 1

The main memory will be 4MiB with a uniform page size of 4KiB (1024 pages). I will use Next Fit memory allocation and FIFO page replacement.

For block size, I will use exponentially more pages. Selecting the quantity of each block size is a balancing act to get a reasonable number of each while ending with exactly 1024 pages. I settled on the following configuration:

Block Quantity	Page Quantity	Blocks' Total Page Count	Blocks' Total Size (KiB)
32	2	64	256
16	4	64	256
16	8	128	512
16	16	256	1024
16	32	512	2048

32 2-page blocks and 16 of every other size. This does place some preference on smaller memory allocations, but it has the upside of keeping every value in this table as a power of 2, which should simplify the logic.

Task 2

Class Page

- Members:
  - 4 KiB Page Data
- Methods:
  - Print data
- Logic:
  - The Page is managed by the Block, so all it needs to do is own its data.

Class Block

- Members:
  - A certain number of Pages
  - A pointer to the next Block
  - Free? boolean
- Methods:
  - Methods to print status, write to pages, etc.
- Logic:
  - The block manages the pages it's given, keeping track of its size and whether it's allocated.

Class MemoryManager

- Members:

- - A linked list of Blocks
- Methods:
  - Methods to instantiate the linked list with the given parameters
  - Methods to allocate and free memory
  - Methods to manage swapping and memory request errors
- Logic:
  - The MemoryManager is the main class. It sets up the memory linked list and manages all aspects of the simulation.