

# CSGE602055 Operating Systems

## CSF2600505 Sistem Operasi

### Week 05

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# Week 05: Memory

- 1 Start
- 2 Week 05
- 3 Memory
- 4 Paging
- 5 Translation
- 6 Hierarchical
- 7 Lab
- 8 The End

- Reference: (OSCE2e ch7/8) (UCB 11 12 13) (UDA P3L2) (OLD 06)
- Binding & Linking
  - Address Binding
  - Address Space: Logical & Physical
  - Dynamic & Static Linking
  - MMU: Memory Management Unit
  - Base and Limit Registers
  - Swapping
  - Mobile Systems Problem: no swap
- Memory Allocation
  - Contiguous Allocation
  - Multiple-variable-partition Allocation
  - First, Best, Worst Fit Allocation Strategy
- Fragmentation
  - External
  - Internal
  - Compaction

- Address Space
- Logical/Virtual Address
- Pages
- Page Number
- Page Offset
- Page Table
- PTE: Page Table Entry
- Page Flags: Valid/ Invalid
- TLBs: Translation Look-aside Buffers/ Associative Memory
- Physical Address
- Frames

# Address Translation Scheme

## Example (Address Translation Scheme)

00	00000	0 0000	00 000	000 00	0000 0
01	00001	0001	001	01	1
02	00010	0010	010	10	0001 0
03	00011	0011	011	11	1
04	00100	0100	100	001 00	0010 0
05	00101	0101	101	01	1
06	00110	0110	110	10	0011 0
07	00111	0111	111	11	1
08	01000	1000	01 000	010 00	0100 0
09	01001	1001	001	01	1
0A	01010	1010	010	10	0101 0
. . . . .					
1D	11101	1 1101	11 101	111 01	1110 1
1E	11110	1110	110	10	1111 0
1F	11111	1111	111	11	0

# Hierarchical Page Table

- OPT: outer page table (P1)
- PT: page table (P2)
- Offset (D)

- Lab
  - top
  - malloc()
  - system()

# The End

- This is the end of the presentation.