

CS202 - MIDTERM REVIEW

ADMIN

① IN-PERSON, DURING CLASS ON THURSDAY

PLEASE DON'T BE LATE, SCHEDULED FOR 75 mins

② CLOSED BOOK. CAN USE A CHEAT SHEET

- ONE LETTER PAPER SHEET, CAN WRITE/
PRINT ON BOTH SIDES

- 10 PT FONT / LEGIBLE HANDWRITING.

TOPICS WE COVERED

EXAM RATIONALE: SPEND SOME TIME REVISITING & THINKING ABOUT THE TOPICS COVERED IN THE CLASS, LABS, READINGS, HW.

① INTRODUCTION

↳ WHAT THE CLASS COVERS

→ HISTORY — SAFE TO IGNORE

② PROCESSES (& CALLING CONVENTIONS)

→ WHAT IS A PROCESS

↳ PROCESS CONTROL BLOCK

→ HOW PROCESSES ARE CREATED `fork`

→ REGISTERS

↳ WHAT THEY ARE

→ CALLER- SAVED VS CALLEE SAVED

→ THE STACK

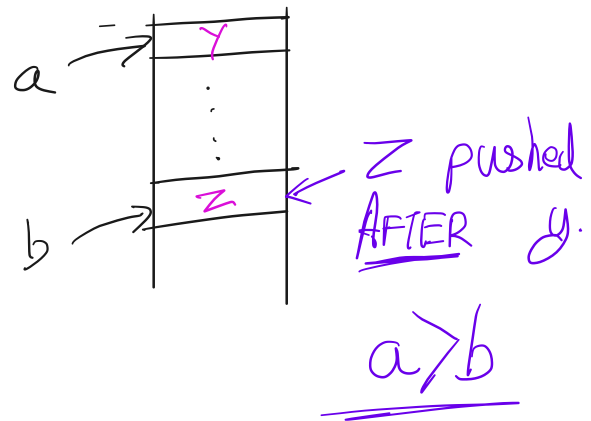
- GROWS DOWN

→ PUSHQ `arg`

$\%rsp = \%rsp - 8$

$*(\%rsp) = arg$

→ POPQ



→ CALLING A FUNCTION

- PASSING ARGUMENTS - Convention

- THE CALL INSTRUCTION

`call h`

- THE FUNCTION PROLOG

↳ SETS UP A STACK FRAME

$\%rbp$ ◦ Base point

- LOCAL VARIABLES : WHERE THEY LIVE.

→ RETURNING FROM A FUNCTION

- THE FUNCTION EPILOG

↳ DESTROYS STACK FRAME.

RESTORES CALLERS STACK FRAME.

call 

syscall

CALLEE SAVED REGISTERS?

- RETURN VALUE

ret

→ USER & KERNEL MODE. TRAPS

③ CONCURRENCY

- THREADS

- DIFFERENCES FROM PROCESSES

- CONCURRENCY & WHY IT IS HARD

- MECHANISMS TO CONTROL CONCURRENCY

- MUTEXES

- CONDITION VARIABLES

- SEMAPHORES

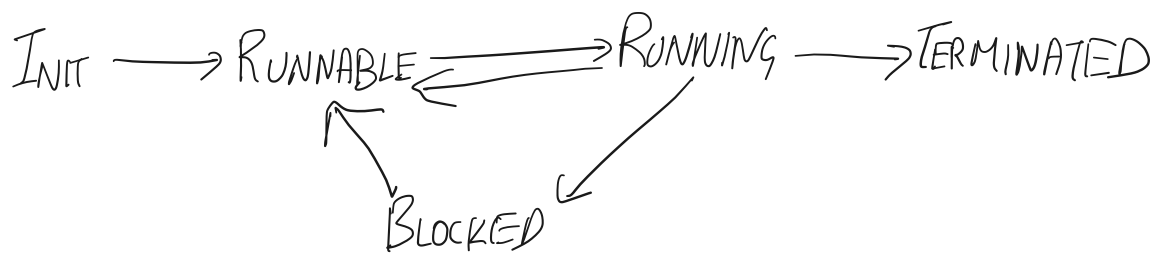
- SPIN LOCKS

- MONITORS & How to USE THEM
- DEADLOCK
- FAIRNESS, STARVATION & OTHER CONCERNS

④

SCHEDULING

- PROCESS STATE MACHINE



- PRE-EMPTIVE VS NON-PRE-EMPTIVE SCHEDULING

↳ YIELD

- METRICS

- TURNAROUND TIME
- OUTPUT TIME
- SYSTEM THROUGHPUT
- RESOURCE UTILIZATION
- FAIRNESS

- POLICIES

- FCFS/FIFO
- STCF
- ROUND ROBIN
- PRIORITIES
 - ↳ WAY USEFUL
 - STRICT PRIORITY } STARVATION
 - MLFQ }
- LOTTERY/CFS
 - ↳ JUST HIGH-LEVEL IDEA

⑤ THERAC-25

- ↳ EXPECTATION: READ THE PAPER
UNDERSTAND IT AT A HIGH-LEVEL.

⑥ VIRTUAL MEMORY - I

→ GOAL

→ VIRTUAL VS PHYSICAL ADDRESSES.

```

int *f ( ) {
    int x = 5;
    return &x;
}

```

```

int main ( ... ) {
    int *t = f();
    g();
}

```

```

void g ( ) {
    int y = 7;
    printf ( "%d\n", y );
}

```