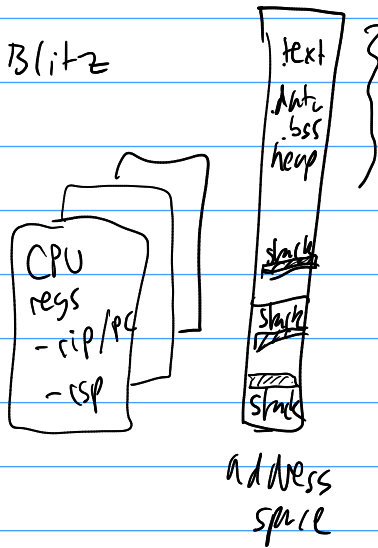


CS 3214 "mutexes" locks



Ex 3. Dutch Blitz

threads



Multi threading

user? ← pthreads
kernel?

- parallel computation
- web server
- GUI

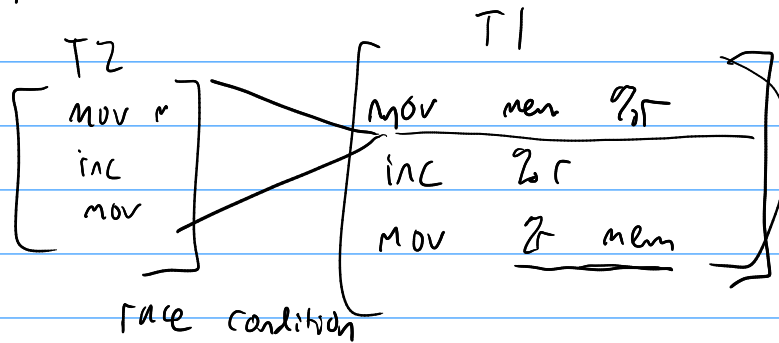
- multiple CPUs
- overlapping I/O

threads share

- code
- data, heap
- fds, etc

don't share

- CPU regs
- = stack



"atomic"

How to fix?

- thread sync. (lock)
- local variable, or thread-private } remove sharing

CPU ready queues
Region-based mallocs

manage all
heap

futex
"fast user"

MOV
INC
MOV

locking: mutual exclusion "lock"
mutex

- Only 1 thread in critical section at a time
- global shared variable can only be accessed in critical section

