P3 CK1 (et al.)

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A Word on “Design”

Design

≠

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Design

≠

Hitting it with a stick until the twitching stops

A Word on “Design”

- Issue

```
/*caller beware: turns screen blue!*/
void putbyte(char c)
```

- “Solution”

```
...
save_screen_color();
putbyte(b);
restore_screen_color();
...
```

Checkpoint Issue Summary

- What is an OS kernel?
  - VM
  - Context switch
  - Synchronization
- Each one contains ***hard stuff***
  - Not just typing!

Virtual Memory

- Confusion about the hardware
  - You don't get to define your own PT format
  - See text, pp. 309 – 312
- “copy address space to child”
  - This is ***not easy***
  - More than one way to do it
    - Think about tradeoffs

Context Switch

- ***Where*** do registers get saved?
  - The hardware strongly encourages an approach
  - Look at x86 trap/exception actions
  - Look at your P1 interrupt handlers
- "Create child PCB and kernel stack"
  - This is ***not easy***
  - This is a kind of context switch

Context Switch

- “Copy argv[] to child”
  - Where?
  - How does it get used?

minclone() vs. fork()

- Some similarity
- Some differences
- ***Please don't*** “press start on the code photocopier”
- Design is an iterative process
  - (requires iteration)

Synchronization

- There are real issues here
  - readline() vs. getchar()
  - readline() vs. readline()
  - wait() vs. exit()
  - deschedule() vs. make_runnable()

Synchronization

- Please don't try to paper over them
  - “magic mutex dust”
    - ***There is no mutex*** unless you build it
    - ...which requires thinking about the mutex issues
    - ...which are ***different*** in a kernel than in user space.
  - “yield() loop considered harmful”
    - Maybe consult Lecture 9 again?
    - Don't need that ***interface***, do need those ***thoughts***

Synchronization

- yield(-1) ≠ deschedule()
  - Except at a high level of abstraction

Synchronization

- Scanning a queue of disabled processes is bad
  - ...especially if you are the timer ***interrupt handler***
    - Should not be O(N) in common case!
    - "Scanning all PCBs considered harmful"
- Generally, sleep/wakeup requires thought

Miscellaneous

- Managing free frames
  - Don't get bogged down on this
  - But do try to think about it for a while
    - There are “wrong” answers
- Defend static buffer size choices

```
char x[64]; /* Why 64?? */
```

- If you are still uncomfortable in assembly...
  - “cc -S” may be your friend

Checkpoint Issue Summary

- Design ***loop***
  - Outline
  - Think
  - Try
  - Repeat
- What is an OS kernel?
  - VM, context switch, synchronization
  - Each requires design & implementation

Exam Scores

Range	*Count*	*Percent*
90 – 100	21	24
80 – 90	36	42
70 – 80	17	20
60 – 70	10	12
< 60	2	2