15-410

"...misbehave(7)..."

Project 2
Feb. 9, 2022

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Synchronization

Partner issues

- If you think you are dropping, or switching to P/F...
  - Please let us know
- If you think your partner is dropping
  - Please let us know

Synchronization

Project 2 out today

- Writeup this afternoon
  - Please read carefully!
- Tarball afternoon/evening
  - Feeling impatient? Consider reading the writeup again
- Group volumes should be ready this afternoon

Please make sure you've discussed with your partner

- How many late days?
- Project *schedule* in other classes
  - *Write down* a joint project schedule
- Auditing or pass/fail? Target 410 grade?
- Prior experience
- Interviews

Outline

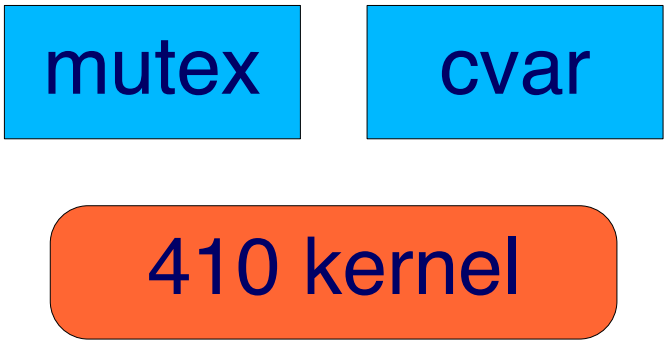
What you'll build

- Mutex, condition variable
- Thread library
- Supplemental library routines
- Tests

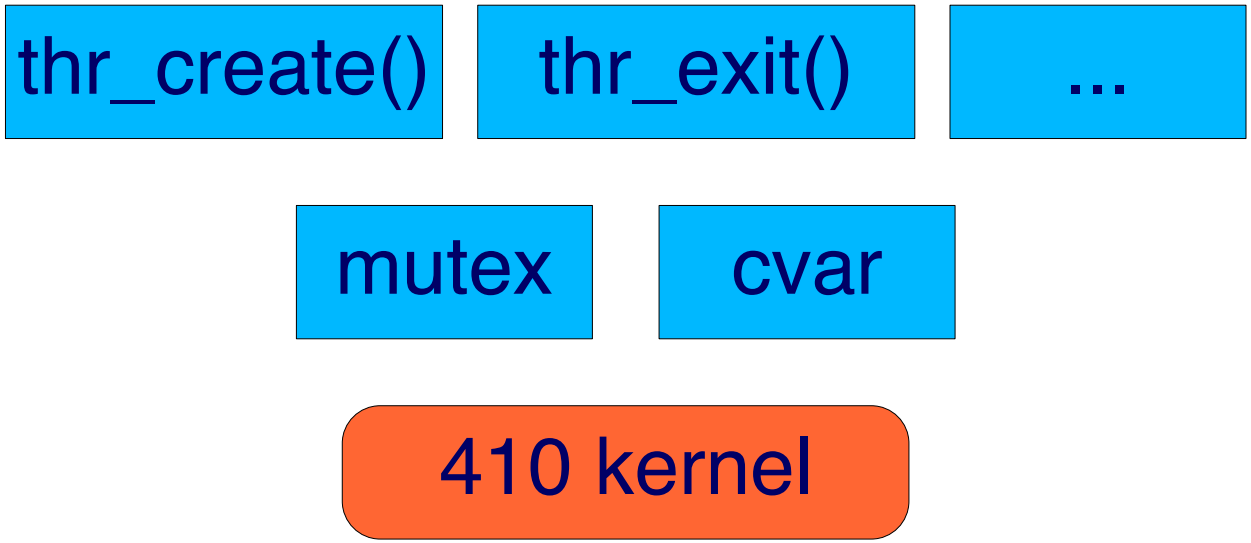
How the pieces fit together

- A picture is worth 1000 words
- You'll need to read the handouts too
  - (two, each >1000 words)
  - kspec – specifies our kernel for P2, your kernel for P3
  - thr_lib – specifies thread library

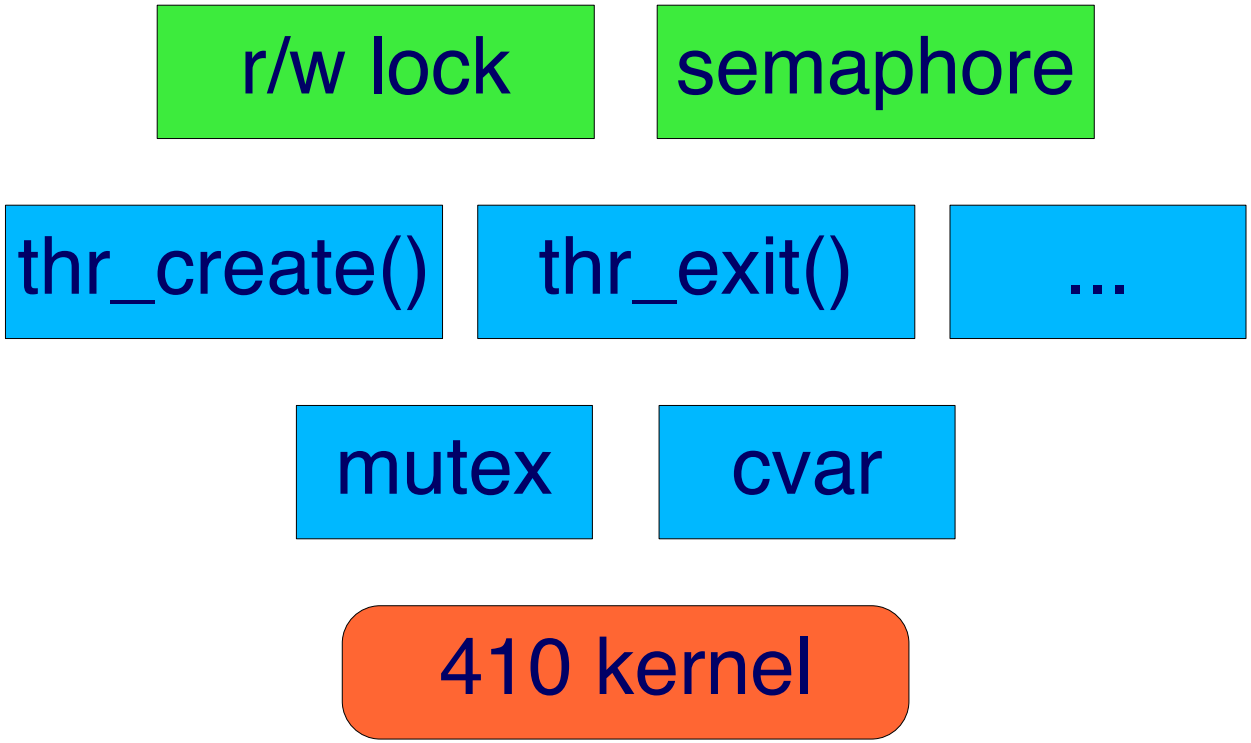
Mutex & Condition Variable



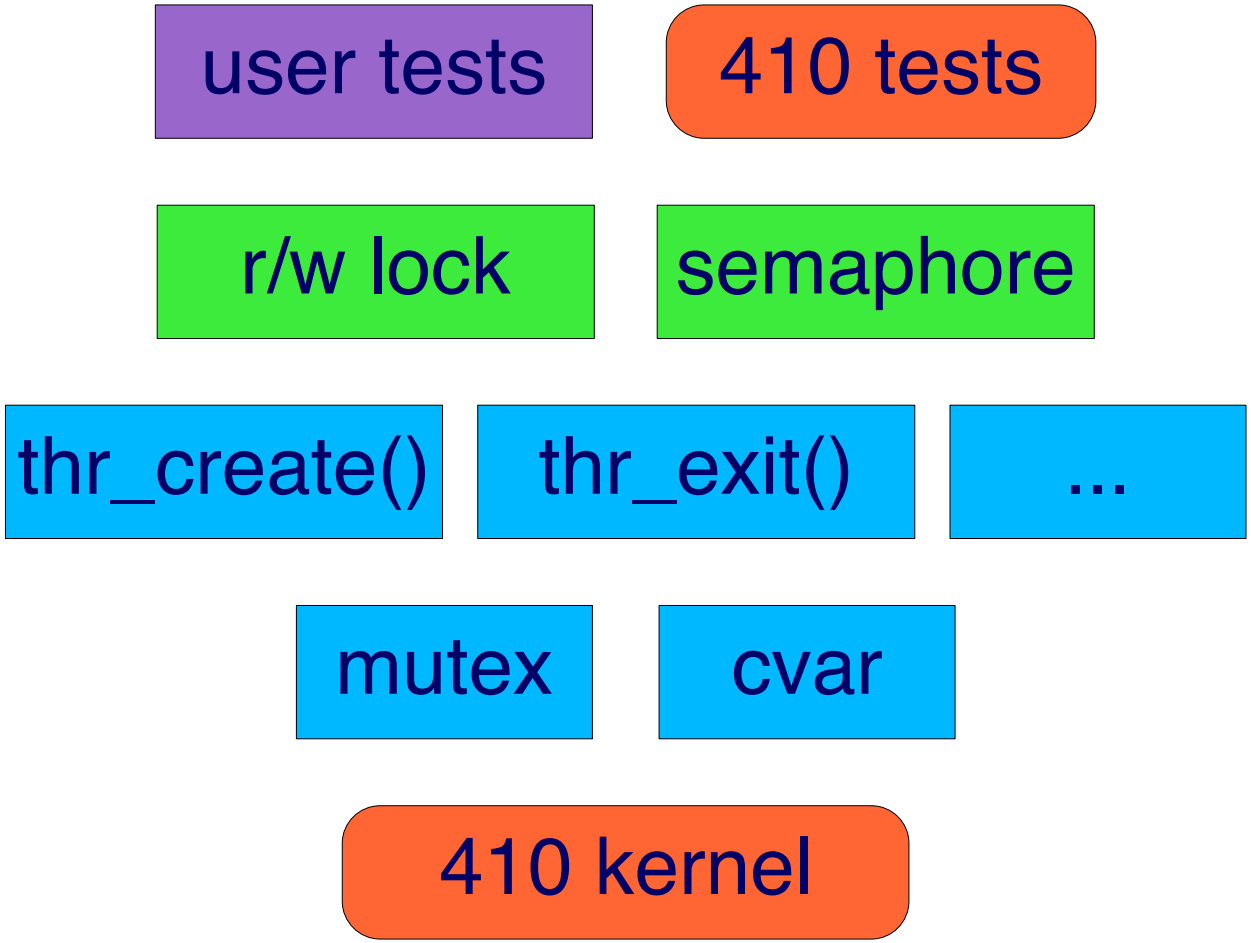
Remainder of Thread Library



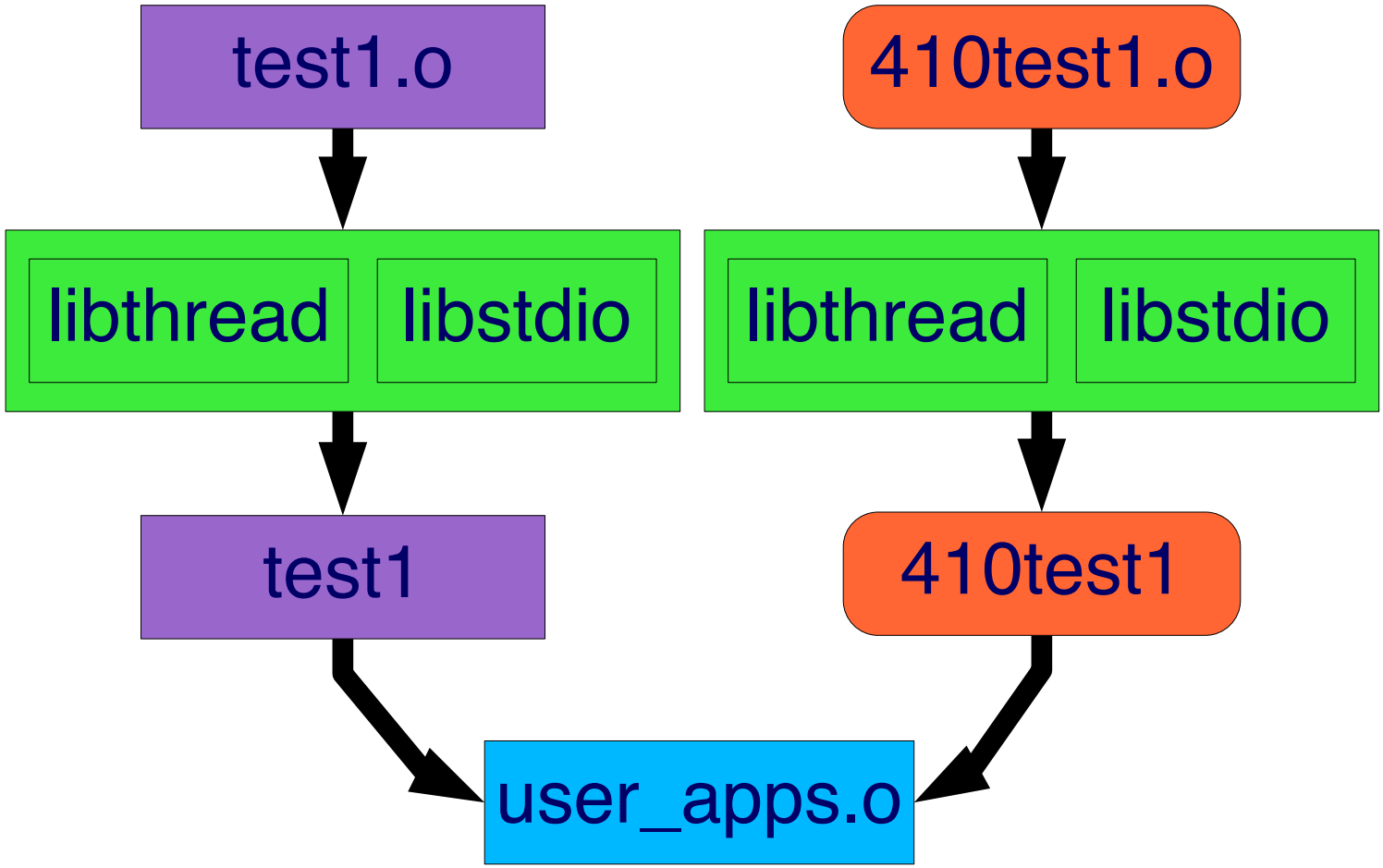
Supplemental Library Routines



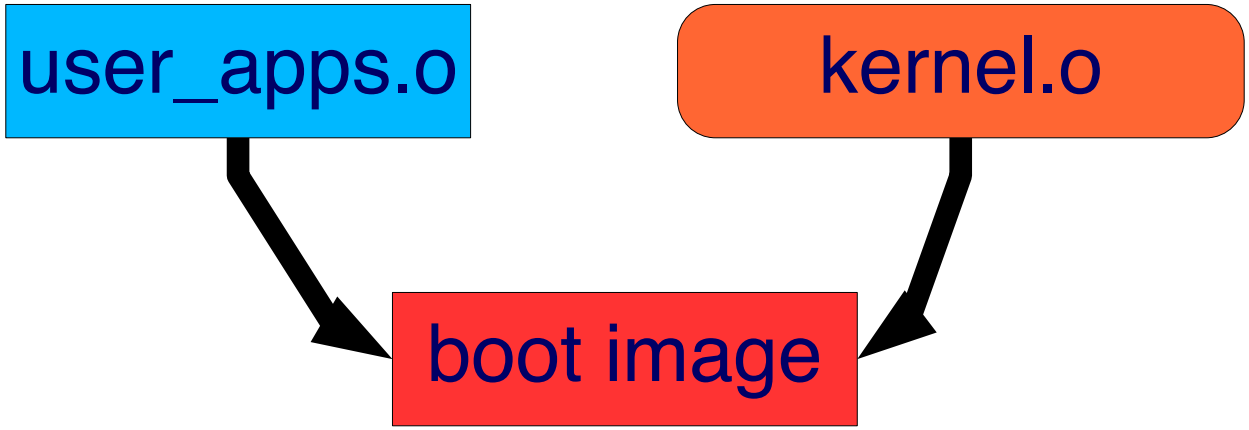
Tests (Yours & Ours)



Building a “RAM disk” image



Linking “RAM disk” to kernel



Misbehave

misbehave(int mode)

- Special debugging-support system call in our 410 kernel
- Adjusts "behavior" of system
  - Multiple legal behaviors (you will feel this during P3)
  - Each mode selects a particular mix
  - We will not document these
  - We expect you to not "document" them to classmates either
- Debug your thread library with one mode, then the next...
  - A dazzling array of flavors
  - 0...63
  - maybe even more
  - -1
- You will not be required to implement misbehave() in P3

threadinfo

```
simics> tidinfo 11
REGISTER DUMP FOLLOWS
 CS = 0x00000043, EFLAGS = 0x00010246, SS = 0x0000004b
 EIP = 0x0100004a, ESP = 0xffffffa0, EBP = 0xffffffcc
 EDI = 0x00000000, ESI = 0x00000000, EAX = 0x31337000
 EBX = 0x00000000, ECX = 0x00000000, EDX = 0x01000c0a
```

Cool, what is it?

- Debugging information about thread 11
- The last instruction it executed in user space

Why would I want that?

- It might help with certain hard problems

SIMICS_TEXT_CONSOLE

Simics “Graphical Console” is slow

- It makes *a lot* of small X11 drawing requests
  - Fine if you are sitting in front of an Andrew Linux machine in a cluster on campus
  - Less fine if you are sitting 200ms away from LINUX.ANDREW
- Console fidelity is important while debugging a console driver in P1
  - Less important during P2, since all I/O to hardware will be done by code we provide

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Simics has a "less-graphical" console

- An xterm is used to draw ASCII graphics representing the CGA text console
- Set the `SIMICS_TEXT_CONSOLE` environment variable before running "simics46"
- Verify daily that the regular console works right too!

Plea – Conceptual

This code is *tricky*

- Most of you have already written multi-threaded code
  - That can be tricky enough
- Writing the internals is harder
  - Get a part 99% done
  - Discover a "bug"...
  - ...which is really a misconception...
  - *Totally new design* to fix it

Make sure core parts are *solid*

- Better to skip readers/writers locks if not

Plea – Time

The first 90% will take the first 90% of the time

- The last 10% will take the *second 90% of the time*

"Code complete"

- Plan to spend *at least three days* debugging based on the tests we release
- If your thread library doesn't pass `cyclone` and `agility_drill` it won't pass a bunch of our tests either
  - Resultant grade is unlikely to exceed a C

"You should be here" guidance in handout

- Based on bitter experiences of former students