Final Exam

- When: 8:00-10:00 am Tuesday, May 9th
- Location: here (Felgar 303)

- 1/3: midterm material
  - See lecture notes for midterm preparation
- 2/3: material since midterm

- 1 page of personal notes
- No electronic devices/books/other notes

Pre-Midterm Material

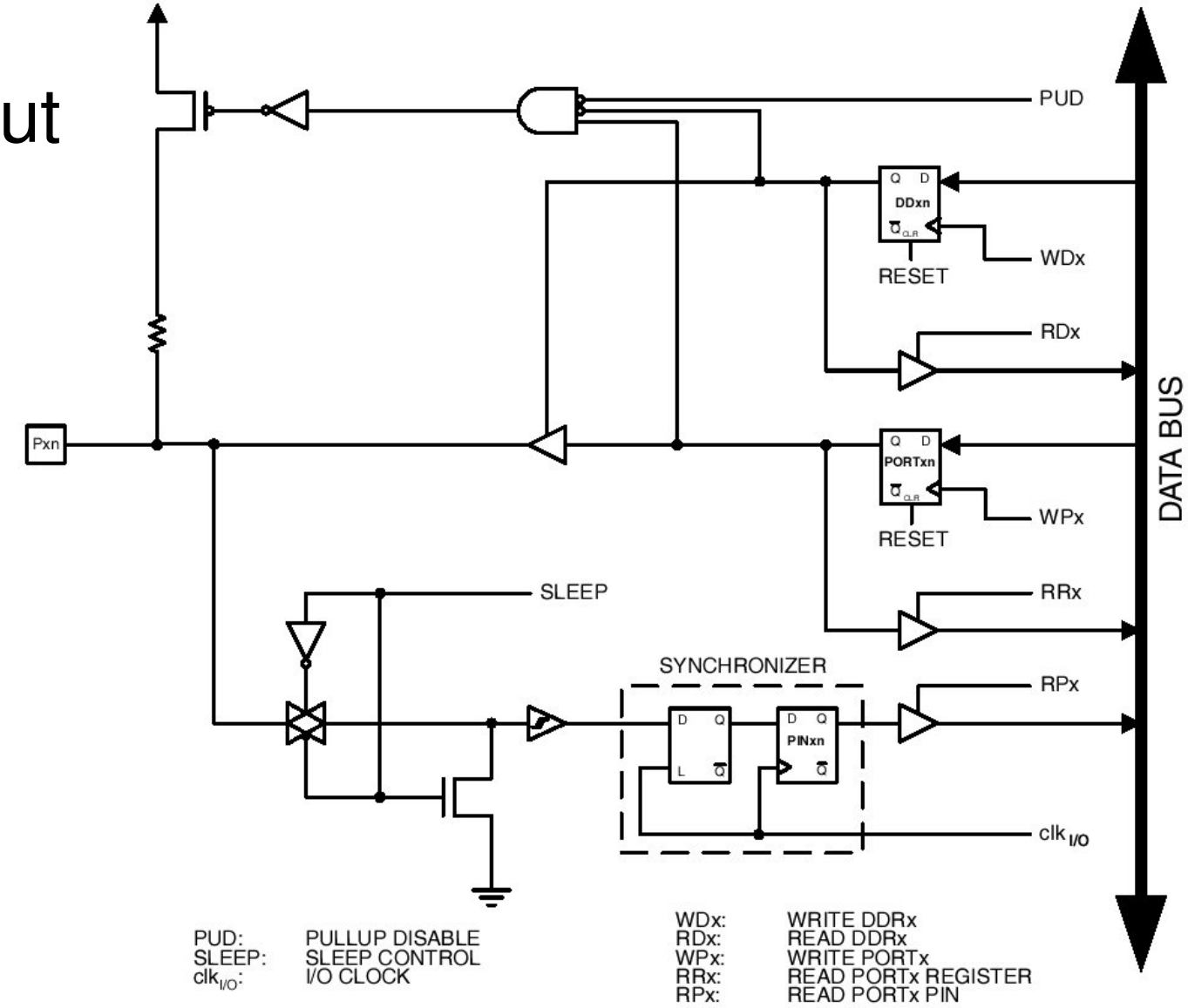
- Basic gates
- Boolean algebra
- Digital circuits and circuit reduction
- Number representations
- Bit-wise operators
- Sequential logic
- Memory behavior (input/output signals, buses, addressing)

Finite State Machines

- Definition
  - States
  - Events
  - Transition function
  - Outputs and output function
- State transition diagrams
- Relationship to sequential logic
- FSMs for control

Basics of Digital Port I/O

- Input/output selection
- Output value
- Input



C Code

- Be prepared to read (and possibly fix) simple C code
- Look to lecture discussions of code and your projects as you preparation

Key Microprocessor Components

- General- versus special-purpose registers
- Instruction decoder
- Data memory (RAM)
- Program memory (EEPROM in our case)
- I/O modules
  - Digital input/output
  - Serial UART

Special-Purpose Registers

What does each do?

- Program counter
- Stack pointer
- Instruction register
- Status register

Analog Processing

- Digital to analog:
  - Pulse-width modulation
  - Resistive network
- Analog to digital:
  - Successive approximation

Polling vs Interrupts

- Implementation (in the abstract)
- Timing constraints

Interrupts

- What happens when an interrupt occurs?
- What happens as an interrupt completes?
- Shared data problem

Timers

- Input sources
- Prescalar
- Counter
- Interrupt generation
- How to compute:
  - Timer increment intervals
  - Interrupt intervals

Device-to-Device Communication

Buses

- Arbitration
- Preemption
- Addressing
- Clocking
- Protocol

Pulse-Width Modulation

- How information is encoded?
- Use in controlling average current
- Implementation (in the abstract)

- H-bridges

Misc

- Encoders
- Buffers

Multi-tasking

- What is a process? (versus a processor)
- Process states and state transitions
- Context switch
- Scheduling
  - Preemption
  - Round-robin
  - Priority
  - Shortest job first
  - Hybrids
  - Rate monotonic scheduling