Today’s Plan

**Today’s topics:**
- From last time:
  - The Critical Section Problem
  - Software Solutions to the Critical Section Problem
  - A Hardware Solution to the Critical Section Problem

**Upcoming:**
- Quiz #2
- Assignment 1

**Last time:**
- Precedence & Concurrency
- $S()$/$P()$, Cobegin/Coend, Fork & Join
A Hardware Solution

✦ Most modern processors provide an instruction called “Test & Set” or “Exchange.”

✦ Test & Set: tests an item in storage and sets it to a given value

✦ Exchange: swaps two items
A Hardware Solution

BOOLEAN test_and_set(BOOLEAN *location) {
  BOOLEAN x;
  x = *location;
  *location = TRUE;
  return(x);
}

while(1) {
  while (test_and_set(&lock)); /* busy wait */
  Critical Section
  lock = FALSE;
  Non-Critical Section
}
Solution Evaluation

- The software solution given for two processes is difficult to extend to n processes
- The hardware Test & Set solution will work for any number of processes

Problems: