CS 162
Intro to CS II
State Machines
Odds & Ends

• Assignment #2 Due Sunday
• Questions?
What are State Machines?

- AKA – Finite State Machine (FSM) or Finite State Automaton (FSA)
- Modeling in CS/ECE
  - Theory (Regular Grammars)
  - **Hardware** (Show Operation)
  - **Software** (Process Events)
Example State Machine

- **States (circles)**
  - Label indicates state
  - Start State
  - Types: Accepting & Error

- **Transitions (arrows)**
  - Label indicates event causing switch in state
  - Direction indicates which state to switch to
More Examples

• Hardware: Tape Player

• Software
What do you notice about these?

• Infinite Loop (or until done getting input)
  – Get the input
  – Based on current state and input
    • Update current state
    OR
    • Perform ops in current state
How do we implement these?

```java
while(input to get) {
    get input;
    switch(state) {
        case 0:
            if(input == ...) {
                state = update_state;
                ...
            }
            else {
                ...
                //Perform ops associated with state
            }
        case 1:
            ...
            //Do State 1 stuff
            ...
            //Test more cases
    }
}
```
Associate States w/ Case

• Define Macros for States
  
  ```
  #define EMPTY 0
  #define LOADED 1
  ```
  ...

• Enumerate States
  – C Style
    ```
    enum tape_states {EMPTY, LOADED, PLAYING, PAUSED};
    enum tape_states state;
    ```
  – C++ Style
    ```
    enum tape_states {EMPTY, LOADED, PLAYING, PAUSED};
    tape_states state;
    ```
How to implement Tape Player?
Quiz #3

- Get into groups of 4 – 5.
- Write the switch statement code for this state machine in Lab #4...