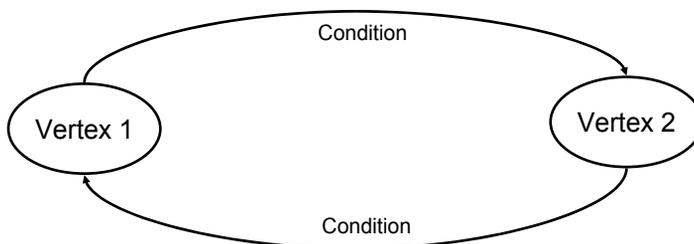# Finite State Machines

You will learn about how computer programs can
be abstracted in the form of a state machine.

What Is A Finite State Machine?

•It's a special form of multi graph (vertices and edges) that have
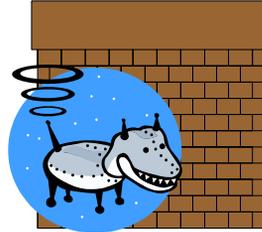conditions that show how you go from one vertex to another.

First Example: The Robot Redux

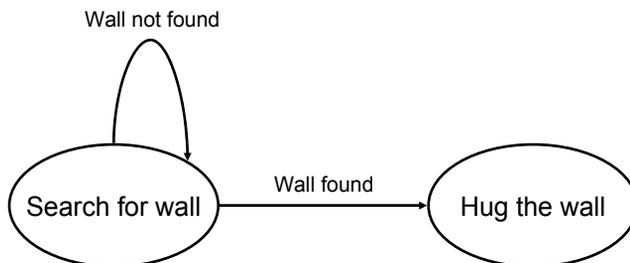•This example comes from the example described in the section on "problem solving".

Search

Hug

First Example: Robot Redux (State Machine)
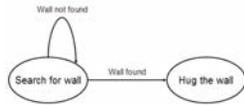
Wall not found

Search for wall → Wall found → Hug the wall

Why Learn About State Machines

• A state machine is another level of abstraction that specifies
  what a computer is supposed to do.
  - Level I: Finite state machine

  - Level II: Human language instructions (pseudo code)

Search for wall	**Hug the wall**
If RS = W, then done this phase	Repeat the following steps:
If FS = W, then L, done this phase	If RS = W and FS = S, then F
If FS = S, then F	If FS = W, then L
	If RS = S and FS = S, then R and F

  - Level III: Programming language instructions

```
if (robot.wallToRight () == true)
{
  isDone = true;
  return;
}
```

Second Example: The Sims © EA

• The Sims™ Electronic Arts is a game that simulates the life of
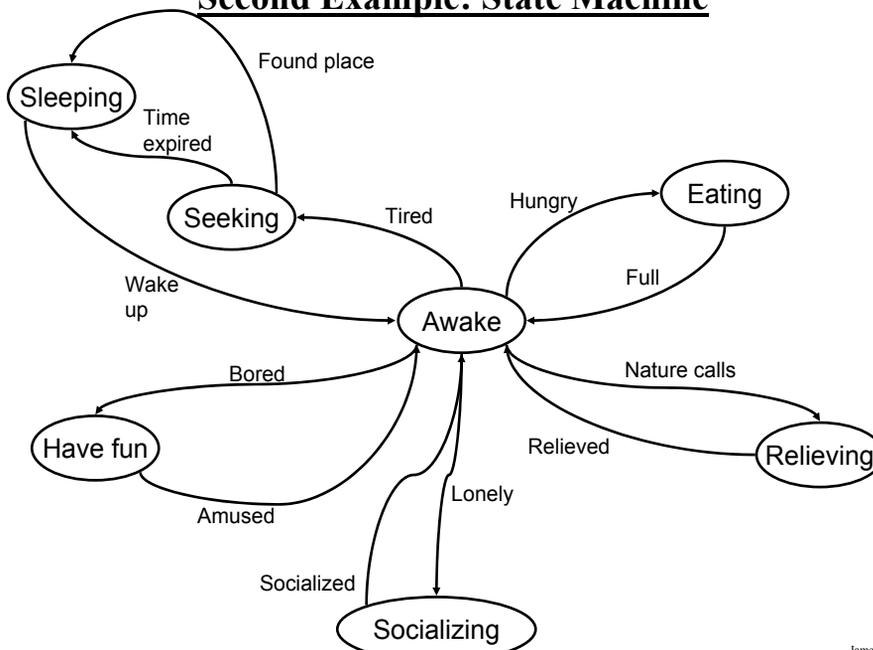 one or more humans (a "sim").

Second Example: Table Of States

| Events	States
Tired	Seek (place to sleep)
Found sleep place	Sleep
Seek time expired	Sleep
Wake up	Awake
Hungry	Eating
Full	Return (awake)
Nature calls	Relieving
Relieved	Return (awake)
Lonely	Socializing
Socialized	Return (awake)
Bored	Have fun
Amused	Return (awake)

Second Example: State Machine

Third Example: An RPG

- Draw a finite state machine that shows the states (vertices) and transitions (edges) between states for a role playing game (RPG).
- Adventurer's states: Okay, poisoned, confused, dead, poisoned and confused.
- If stung an adventurer becomes poisoned.
  - If given an antidote in time when poisoned then the adventurer is cured.
  - The adventurer dies after being poisoned for 10 minutes.
- A dead person can receive a resurrection spell and become okay.
- If hit by a confusion spell the adventurer becomes confused until a heal spell is received.
- A dead person cannot/won't be poisoned or confused.
- A poisoned person can be affected by a confusion spell.
- A confused person can be poisoned.

James Tam

RPG (Finite State Machine)
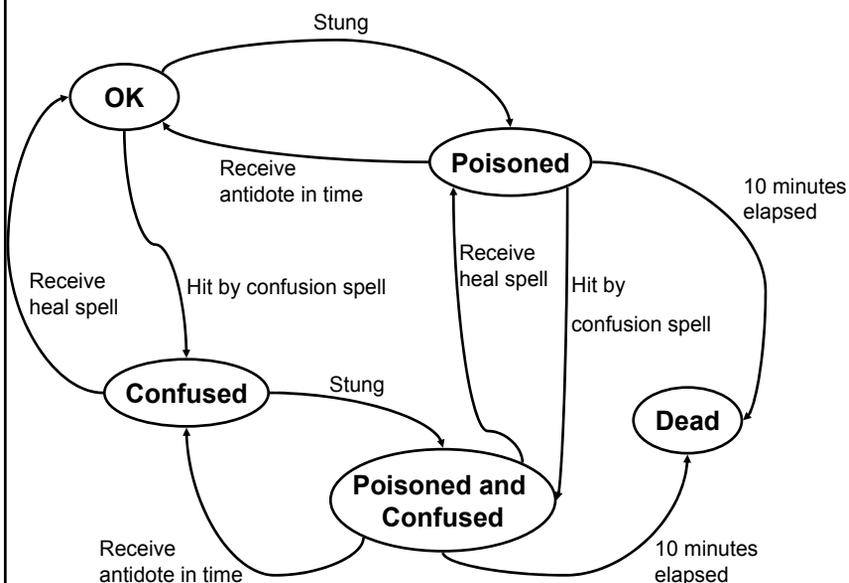
James Tam

You Should Now Know

- What is a finite state machine
- How state machines are one level of abstraction in describing the capabilities of a computer program
- How to create a state machine from: a state table or a text description