CS 381

- Game Engines are composed from
  - Entities – A collection of game entities
  - GFX – a graphics engine to display entities
  - PHX – a physics engine to move entities
  - UI – to select, command, and describe entities
  - AI – an AI engine to carry out commands
  - Net – to connect to other game engines
- We will study how to integrate
  - Entities, GFX, PHX, UI, AI and perhaps Net in this class

GFX

- We are using python-ogre because
  - Python-ogre is cross-platform and open source
  - Python is much quicker for prototyping than C/C++
  - Python-ogre is under active development
  - With a little effort, you can create a windows, mac, and linux executables for distribution

Graphics Engine basics

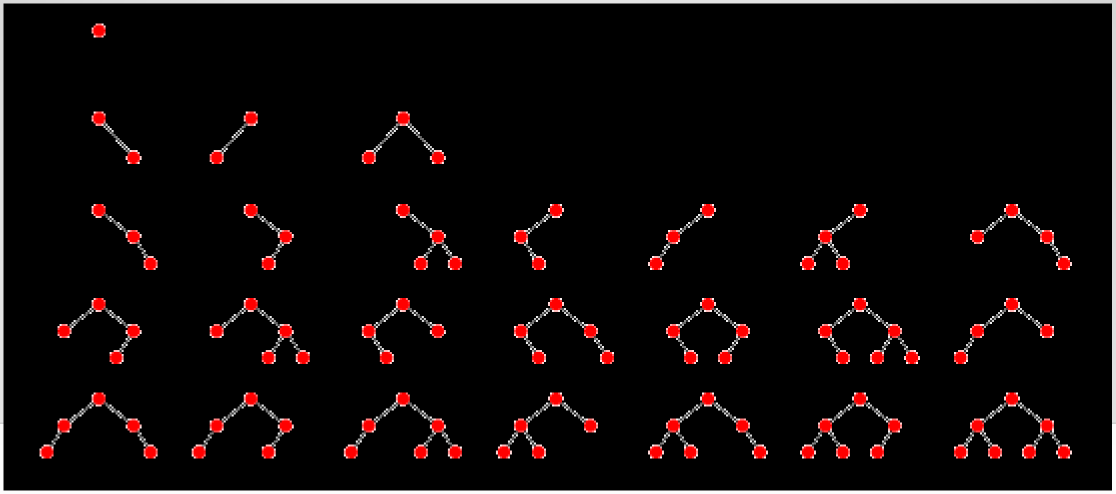
- Scene managers manage your display and are optimized for types of scenes. Terrain scene managers may not be best suited for first person shooters but may be well suited for RTS games
- Scene is an abstract representation of what is displayed on the screen
  - Static geometry like terrain or building
  - Models – trees, boats, monsters, ...
  - Light sources – let there be light
  - Cameras – so users can have a point of view

Movable objects

- Renderable (displayable) and Movable
- Entity is a subclass of MovableObject
  - 3D Mesh
  - No location or orientation
- SceneNode is a class that contains location and orientation information
- To display an entity object, attach object to a scene node object
- Lights, Particles, Cameras are not Entities but are MovableObjects

Renderables and Scene Nodes

- Attach an entity (3D mesh) to a scene node (position, orientation) to render (make it appear) it on screen (in the scene)
- The scene manager gives you root scene node. This root scene node forms the root of a tree of scene nodes



Scene Nodes

- Position and orientation of a scene node N are relative to that of N's parent.
- In general
  - Attach independently moving entities to scene nodes that are children of the root scene node
  - Example: Attach Ferrari's mesh to node1, child of root scene node. Attach Ferrari's wheel's meshes to node1
- You will usually create a shallow hierarchy of scene nodes

- `sceneManager = self.sceneManager sceneManager.ambientLight = ogre.ColourValue (1, 1, 1)`
  - sceneManager is created for us by the SampleFramework. We will continue to use the SampleFramework for a couple of assignments.
- `ent1 = sceneManager.createEntity ("Robot", "robot.mesh")`
  - First parameter must be a UNIQUE name
  - Second parameter must be the name of a file that contains the 3D robot's mesh in Ogre's 3D mesh format. This file has been found and loaded by the SampleFramework
- `node1 = sceneManager.getRootSceneNode().createChildSceneNode ("RobotNode“)`
  - Create a scene node that is a child of the root scene node. Scene node name must also be UNIQUE
- `node1.attachObject (ent1)`
  - Now you can run your code

Code

Coordinates

- X – Z horizontal plane
- Y vertical axis
- -X left, +X right
- -Y down, +Y up
- -Z into screen, +Z out of screen towards you
- Meshes that you load can face any direction. It is up to you and your modeling program (blender) to orient your meshes

Vectors and Color Value

- Vector3
  - ogre.Vector3(0, 50, 0) or
  - (0, 50, 0)
- ogre.ColorValue(1, 1, 1) or
  - (1, 1, 1)
  -

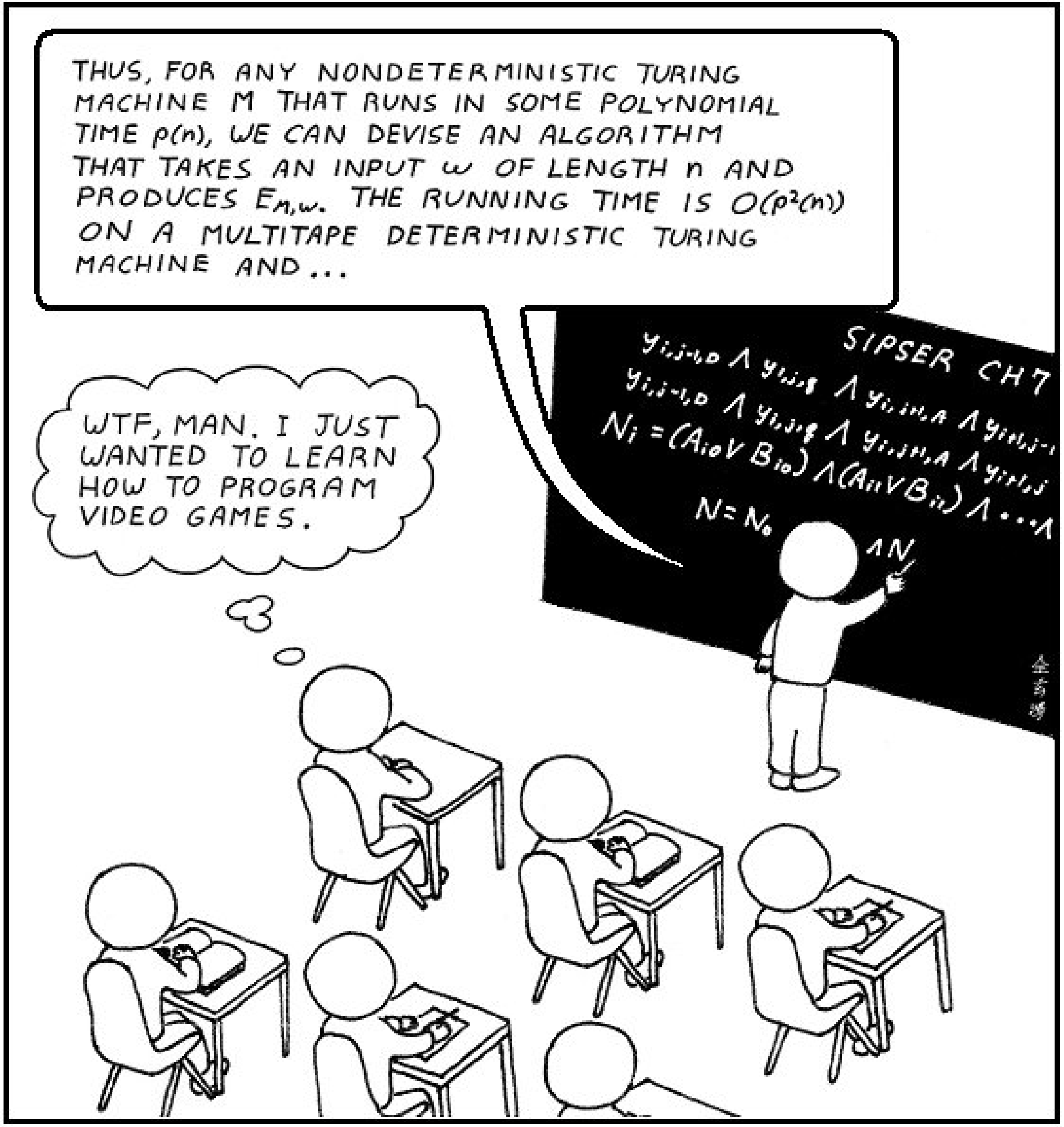
```
node2 = sceneManager.getRootSceneNode().createChildSceneNode
("RobotNode2", ogre.Vector3 (50, 0, 0))          OR
node2 = sceneManager.getRootSceneNode().createChildSceneNode
("RobotNode2", (50, 0, 0))
```

```
import ogre.renderer.OGRE as ogre
import SampleFramework as sf

class TutorialApplication(sf.Application):

   def _createScene(self):
       pass

if __name__ == '__main__':
   ta = TutorialApplication()
   ta.go()
```

Python Ogre Tutorial 1

_createScene

```
sceneManager = self.sceneManager
sceneManager.ambientLight = ogre.ColourValue (1, 1, 1)
```


THUS, FOR ANY NONDETERMINISTIC TURING MACHINE M THAT RUNS IN SOME POLYNOMIAL TIME p(n), WE CAN DEVISE AN ALGORITHM THAT TAKES AN INPUT w OF LENGTH n AND PRODUCES E_{M,w}. THE RUNNING TIME IS O(p²(n)) ON A MULTITAPE DETERMINISTIC TURING MACHINE AND...
WTF, MAN. I JUST WANTED TO LEARN HOW TO PROGRAM VIDEO GAMES.
SIPSER CH7