The Pop Framework

CS134

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Outline

- OO Simulations
- The Pop Source Code
- Essential Pop Classes
- UML Class Diagrams
- Using the Pop Framework

OO Simulations

- Games often simulate some aspect of the real world.
- A simulation is a model of real world phenomena that is run on a computer (or any other device other than on the world itself)
- Some examples of things we can simulate: dynamics of motion, motion of group of objects such as rockets, birds, sports balls, etc. Growth of cities, spread of diseases, etc.

OO and Simulations

- OO Design lends itself to simulations. Most simulations break into a variety of objects that are being simulated and these objects called modelled using classes.
- We can wrap into a class definition the properties of an object and defining member functions we can say how the object behaves according to various inputs. This ``Wrapping'' is called *encapsulation.*

Yet More OO Stuff

- OO also allows one to give the objects in the simulation a uniform behavior. All instances of an object can behave according to some behavior function. If want new objects which are the same but use a different behavior function we can use inheritance or strategy patterns.
- Example: could override Person to get PersonOnEarth or PersonOnMars where the physics of motion might be different

The Pop Source Code

- Consists of the following groups of file:
  - MFC files: childfrm, mainfrm, pop, PopDoc, popview, stdafx
  - Game files: game, gameairhockey, gameballworld, gamedambuilder, gamepicknpop, GameSpacewar, gamestub, gamestub3d
  - Critter files:biota, critter, critterarmed, critterwall, critterviewer

More Source Files

- Sprite files: sprite, spritebubble, spritepolygon, spritemultiIcon.
- Physics files: VectorTransformation, realbox, force
- Utility files: controller, listener, metric, Randomizer, timer
- Graphics files: graphics, graphicsMFC, graphicsOpenGL, memoryydc, RealPixelConverter, texture, glshapes
- Dialog files: SpeedDialog
- Parameter and Resource files

Pop Build Involves

-->h-->cpp-->obj\

-->vcproj --> sln -->exe

-->bmp\ /

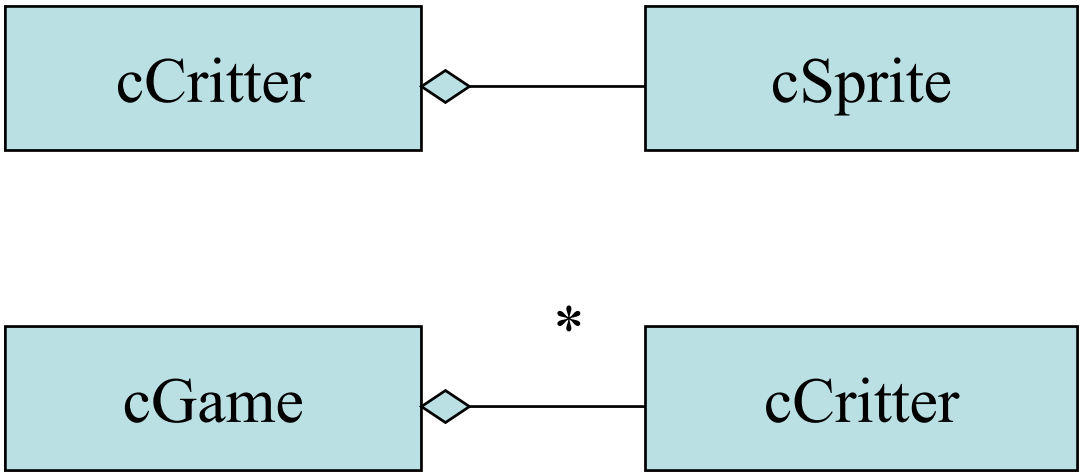
-->cur---->rc-->res/

-->wav/

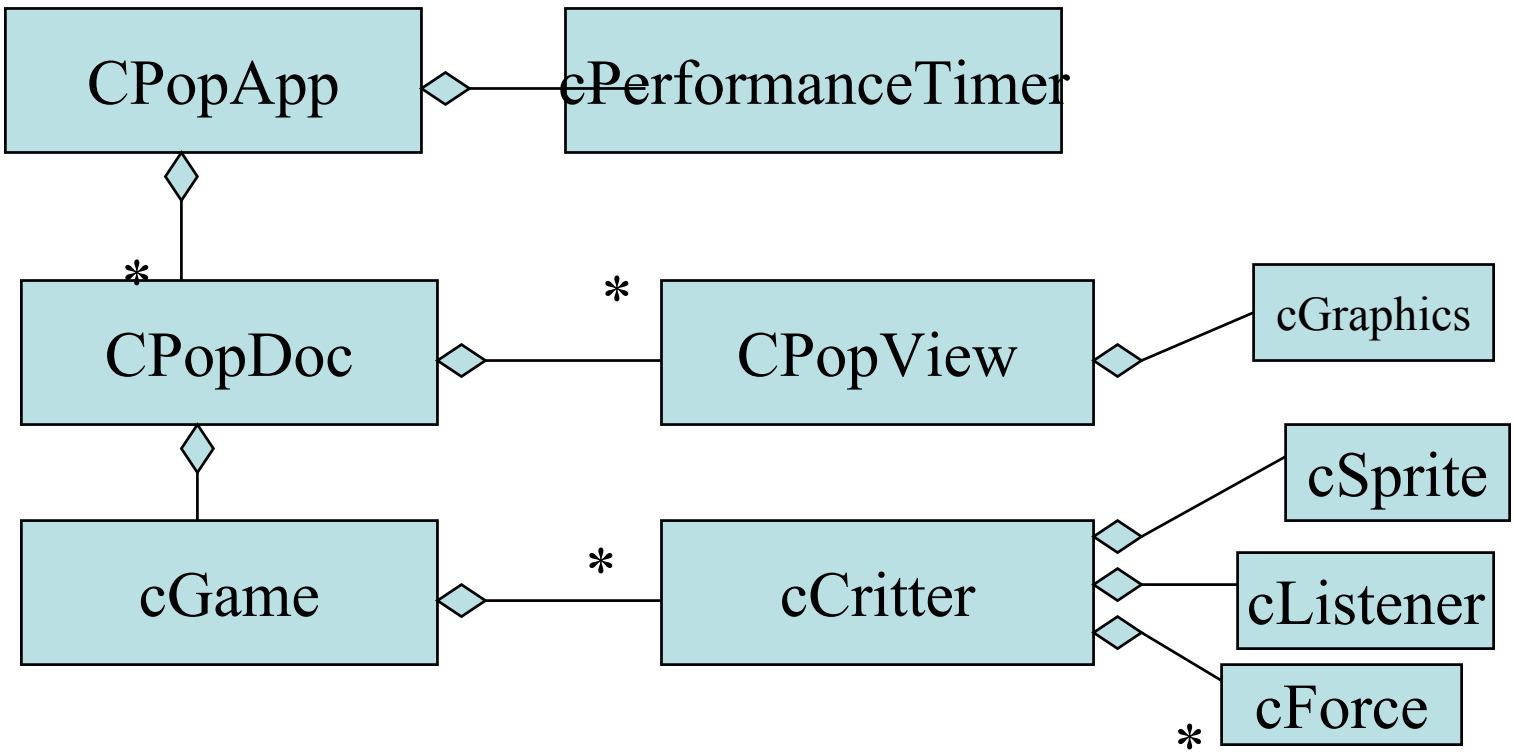
-->ico/

Essential Pop Classes

Some of the classes + basic UML



Main Pop Classes



cCritter

- One of the most important classes is cCritter.
- It is used for the basic objects in the Pop world.
- Some subclasses are: cCritterArmed, cCritterBullet, cCritterArmedPlayer, cCritterArmedRobot, cCritterWall, cCritterViewer,etc

cSprite

- cCritter *delegates* to cSprite the responsibility of how a critter actually looks
- Can change appearance of a critter without have to create a new class.
- cSprite has a draw method to do drawing
- cSprite has subclasses cPolygon, cSpriteIcon, cSpriteDirectional, cSpriteLoop, cSpriteCircle, cSpriteBubble,etc

cGame

- Initializes all the creatures in the world
- Keeps track of each critters status and status of game
- Has a function step(dt) that simulates dt amount of time

Everything is stored as a real number (I.e, dt) to avoid resolution dependence. cVector used to specify points in world. There is a related cMatrix.

cForce

- A critter's behavior can be influence by any number of force objects.
- Some example subclasses are cForceGravity, cForceDrag, cForceObjectSpringRod, cForceObjectSeek, cForceEvadeBullet.

cListener

- At each update a critter's cListener object is given access to the current mouse and key state and is allowed to change the critter's motion or state.
- Some subclasses include cListenerArrow, cListenerScooter, cListenerCursor, etc.

CPopApp

- This is the main application class. It is an MFC subclass
- OnIdle has been overwritten to drive the animation.
- Calls cPerformanceTimer to find the time since last update which is used eventually to call step(dt)

CPopDoc

- Document that holds the data associated with your windows and game you are running

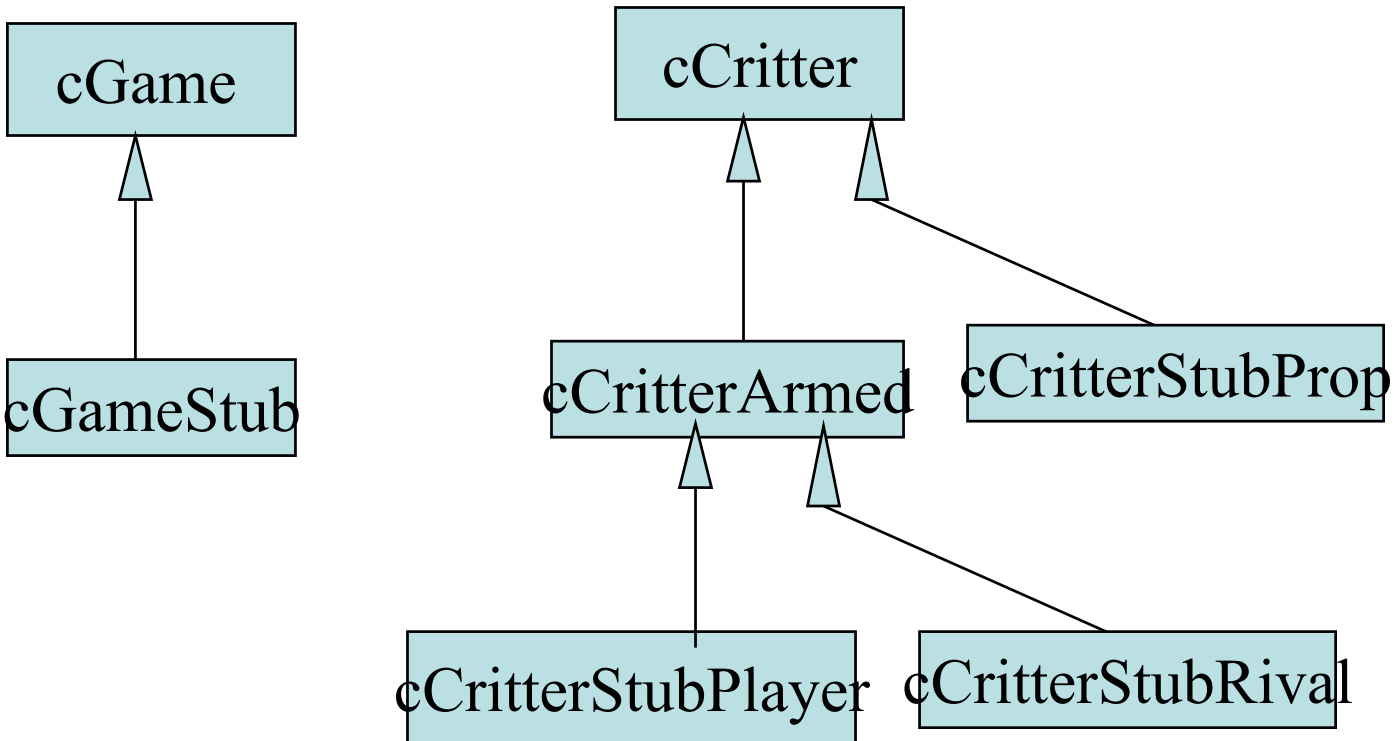
CPopView

- Is a view that controls how the data is displayed in an onscreen window. Also does initial processing on user input.
- Delegates actual drawing to a cGraphics object which is a bridge to an underlying graphics system like GDI or OpenGL.

Subclasses of cGraphics include cGraphicsMFC and cGraphicsOpenGL

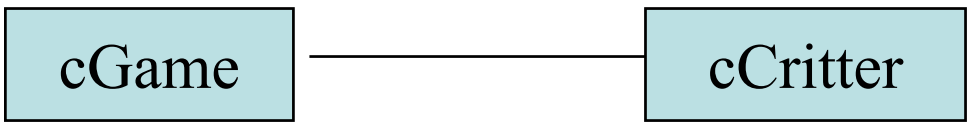
UML Class Diagrams

- Have seen has-a relationships already. To draw subclasses can use:



Associations

- Class has an instance of another object or has a function which returns the other object.



- Can add arrows to indicate has a way to navigate to an object

Using the Pop Framework

- Want to subclass the class cGame. (In homework we take cGameStub and modify it)
- Edit CPopDoc so that it sets your game as the default game: setGameClass(RUNTIME_CLASS(cGameMyGame));
- Probably will want to modify resource files cCritterStubPlayer and cCritterStubRival and cCritterStubProp. For example, setMoveBox function of critter controls region critter can move in