OBJECT-ORIENTED DESIGN, PROJECT KICK-OFF

CSSE 120—Rose Hulman Institute of Technology

Software Design

- A process of breaking a problem down into manageable pieces—*components*
  - Components **interact** to solve the problem
  - Every component **provides** *services* through *interfaces*
  - Other components, called *clients*, **use** these services
- The components are *abstractions*
  - They **hide irrelevant details** from clients
  - They can be **independently developed** and **improved**
- Components provide *separation of concerns*

Object-Oriented Design

- The processes of **finding** and **defining** a useful set of classes for a given problem
- Dominant design method for **large** software systems
- A **data-centered** view of computing
  - Seems to be a good match for how many people break down problems into pieces
- Part art and part science

Top-down vs. object-oriented design

	Top-down Design	Object-oriented Design
Abstraction mechanism (What sort of thing are the components?)	Functions	Objects
Interface (How do clients interact with other components?)	Formal parameters, return values	**Accessor and mutator methods** (with formal params, return vals)

Zelle writes:

"If we can *break a* large *problem into a set of* cooperating *classes*, we drastically *reduce the complexity* that must be considered *to understand any* given *part of the program*."

emphasis added

Guidelines for OO design

- Look for *object candidates*
  - Look for **nouns** in problem statement (card, hand, deck)
  - Which of them have **interesting behavior** (card, deck)?
  - Which of them **group related data** (hand)?
- Identify *instance variables*
  - What **info** do objects need **to do their jobs**?
  - Find **home** classes for all the data
- Identify *methods*
  - Look for **verbs** in problem statement (deal, hit, win)
  - What **operations** should objects provide **to be useful**?

OO Design Process

- Within classes, uses top-down design to refine methods
  - Break down complex methods into calls to helper methods
  - Sometimes need to add methods to other classes
- Work iteratively
  - Add methods, design new classes, change existing classes
- Experiment!
- Keep it simple!

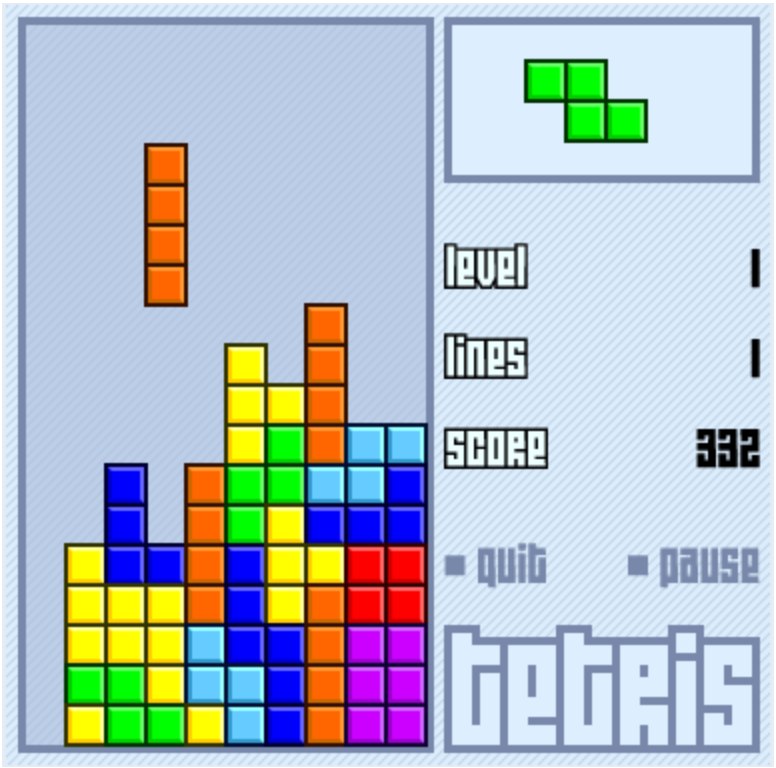
OOD Case Study: Forest Fire

Watch demo, then read problem statement

Pipe Dreams – by Animusic

- As you watch, think about how Objects could make the code for this easier to write.
- Each object (ball, string, xylophone key, etc.) knows its own physical characteristics, position, velocity, as well as how it reacts to striking or being struck by another object.
- There could be a loop that calls **timePasses()** for each object in the picture.
- Each object does what it would do in that time, and draws itself in its new position.

Project Kickoff



Taken from http://www.socialfiction.org

Getting Started with Tetris

- Read specification
  - On ANGEL: **Lessons → Project → Instructions**
  - Do related quiz questions
- Instructor will announce project teams
- Get together with teammates and work on the following:
  - Exchange contact information:
    - Email, cell phones, preferred meeting times and places
  - Begin object-oriented design of Tetris
    - OOD sketches due **next meeting**