CSE 142 Objects, Values and Types

Outline for Today

- · Role-Playing Demonstration
- · Discussion of Demonstration
- · Major concepts
- · More about objects (properties and responsibilities)
- Types
- Values
- State
- · Queries and commands (messages)

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Acrobat Role-Playing

- We have Acrobat objects that are responsible for knowing how to:
 - · Clap
 - Twirl
- Count
- $\bullet \ \mbox{We have different types of Acrobat objects:}$
 - Acrobat
 - Choreographer
 - AcrobatWithBuddy
 - Actor
- Curmudgeon

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What did we see? (1)

- · Acrobats as objects
- · What are their properties?
- · What are their responsibilities?
- \bullet Values: pieces of information manipulated by a program
 - Examples: numbers, characters, point on a plane
 - · What values did we see?
- State
 - \cdot The collection of property values in an object is called its $\underline{\textit{state}}$
 - · Values (state) of objects can change over time
 - · How did values change?

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What did we see? (2)

- · Commands and Queries
 - Examples from demonstration?
 - <u>Commands</u> can change the state of an object
 - · Queries determine values associated with an object
- · Commands and queries are messages
 - · May include Parameters to pass information
 - May include <u>Return values</u> Queries always return a value
 - · Chained messages
- Errors
 - · Did we see any errors?

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Technical Terminology

- type, value, object, state, message, command, query, parameter, return value...
- · These are not just random English words
- They are widely used in programming, with specific technical meanings
- Unfortunately, giving precise technical definitions for some of them is difficult, especially at this stage of the course
- Nevertheless, try to use the terms, and use them appropriately!
- (Are those previous two statements contradictory??)

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Values

- · Information manipulated by a program
- · May describe a property of an object
- · Examples: numbers, characters, point on a plane
- Simple vs. Composite values
 - · Simple (or elementary) values: cannot be broken down
 - · Composite values: composed of multiple simple values

Are the following values atomic or composite?

- a. 3
- b. "welcome"
- c. The point (3,5) on the Cartesian plane
- d. M
- e. 2.9783

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State

- At any given time, a particular object can be described by the values of its properties.
- The set of all an object's values is called its state
- · The state of an object changes over time

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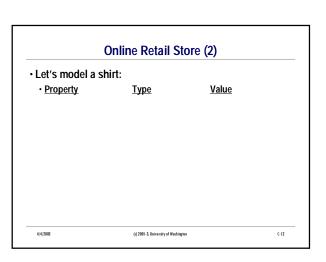
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Types • Type: Set of possible values and associated operations • Example: integers with +, -, /, * • In Java · Primitive types sample values operations int double char boolean etc. · Object types (composites) 2D Points Strings Acrobats etc. 4/4/2003 (c) 2001-3, University of Washington (-9

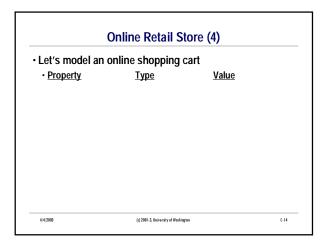
Objects and Design When designing a system Determine objects (properties and responsibilities) Responsibilities can be "knowing" or "doing" Knowing Properties of object About other objects in system Doing Computing Actions to modify state Creating other objects Coordinating activities Give examples of knowing and doing responsibilities in the role-playing

Online Retail Store (1) • Suppose we want to model an online retail store that sells shirts and pants • What objects would you use?



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Online Retail Store (3) Shirt Responsibility Command or Query Changes state? (4/42005 (c) 2001-3 University of Washington C-13



Online Retail Store (5) Online shopping cart Responsibility Command or Query Changes state?

Summary - Values are pieces of information manipulated by a program - A type consists of a set of values and operations on those values - Objects have properties with associated values - The set of property values is the state of the object - Objects have responsibilities that consist of queries and commands (messages that are passed to the object)

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