Slide 0

Apparent and real classes

a0

equals(Object) toString()	Object
x 20 y 30	Shape
Shape() Shape(**int**, **int**) getX() getY() toString()	
radius 10	Circle
Circle(**int**, **int**, **int**) area() getRadius() toString()	

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] Circle

Purpose of lecture: Introduce terminology to help us talk about and clarify some issues.

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Apparent class

a0

equals(Object) toString()	Object
x 20 y 30	Shape
Shape() Shape(**int**, **int**) getX() getY() toString()	
radius 10	Circle
Circle(**int**, **int**, **int**) area() getRadius() toString()	

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] Circle

Apparent class of a variable: The class with which it is defined.

Apparent: (1) clearly seen or understood.
(2) appearing to show particular qualities or attributes that may not be genuine.

Apparently, based on its declaration, sp contains an object of class Shape.

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Apparent class

a0

equals(Object) toString()	Object
x 20 y 30	Shape
Shape() Shape(**int**, **int**) getX() getY() toString()	
radius 10	Circle
Circle(**int**, **int**, **int**) area() getRadius() toString()	

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] Circle

Apparent class: Class with which variable is defined.

Apparent class: a syntactic property. It determines what components of the object can legally be referenced.

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Apparent class

a0

equals(Object) toString()	Object
x 20 y 30	Shape
Shape() Shape(**int**, **int**) getX() getY() toString()	
radius 10	Circle
Circle(**int**, **int**, **int**) area() getRadius() toString()	

Object ob;

Shape sp;

Circle ci;

ob [a0] **Object**

sp [a0] Shape

ci [a0] Circle

Apparent class: a syntactic property. It determines what components of the object can legally be referenced.

Legal: ob.equals(…)   ob.toString()

Illegal: ob.x ob.y ob.getX() ob.area()
        ob.getRadius()

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Apparent class

a0

equals(Object) toString()	Object
x 20 y 30	Shape
Shape() Shape(**int**, **int**) getX() getY() toString()	
radius 10	Circle
Circle(**int**, **int**, **int**) area() getRadius() toString()	

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] **Shape**

ci [a0] Circle

Apparent class: a syntactic property. It determines what components of the object can legally be referenced.

Legal: sp.equals(…) sp.toString()   sp.x sp.y
        sp.getX()   sp.getY()

Illegal: sp.area()   sp.getRadius()

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Apparent class

a0

equals(Object) toString()	Object
x 20 y 30	Shape
Shape() Shape(**int**, **int**) getX() getY() toString()	
radius 10	Circle
Circle(**int**, **int**, **int**) area() getRadius() toString()	

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] **Circle**

Apparent class: a syntactic property. It determines what components of the object can legally be referenced.

Legal: ci.equals(…) ci.toString()   ci.x ci.y
        ci.getX()   ci.getY()
        ci.area()   ci.getRadius

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Apparent class

a0

| equals(Object) toString() | Object |

| x 20 y 30 | Shape |

Shape() Shape(**int**, **int**)
getX() getY() toString()

| radius 10 | Circle |

Circle(**int**, **int**, **int**) area()
getRadius() toString()

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] Circle

Apparent class: Class with which variable is defined.

Apparent class: a syntactic property. It determines what components of the object can legally be referenced.

Rule: For a variable x of some class-type C, the only legal references of the form x.*variable* or x.*method-call* are to variables and methods defined in or inherited by class C.

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Real class of a variable

a0

| equals(Object) toString() | Object |

| x 20 y 30 | Shape |

Shape() Shape(**int**, **int**)
getX() getY() toString()

| radius 10 | Circle |

Circle(**int**, **int**, **int**) area()
getRadius() toString()

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] Circle

Apparent class: Class with which variable is defined.

Real class: What the object in the variable *really* is.

Real class: Has to do with execution. Can change during execution, when an assignment to the variable is executed.

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Real class of a variable

a0

| equals(Object) toString() | Object |

| x 20 y 30 | Shape |

Shape() Shape(**int**, **int**)
getX() getY() toString()

| radius 10 | Circle |

Circle(**int**, **int**, **int**) area()
getRadius() toString()

Object ob;

Shape sp;

Circle ci;

ob [a0] Object

sp [a0] Shape

ci [a0] Circle

Ob.toString() is legal. It calls this method.

Consequence of the bottom-up rule: the overriding method is called. This is an important aspect of OO!

We get the most information about the object by calling function toString of partition Circle.

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