

Smalltalk

CSCI 334
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Example: Point Class

- Class definition written in tabular form

| | |
|---|--------|
| class name | Point |
| super class | Object |
| class vars | pi |
| instance vars | x y |
| class messages and methods | |
| <i><...names and code for methods...></i> | |
| instance messages and methods | |
| <i><...names and code for methods...></i> | |

constructors

Instance Messages and Methods

Instance methods

```
moveDx: dx Dy: dy | |  
  x <- dx + x  
  y <- dy + y
```

Usage

```
pt moveDx: 1 Dy: 1
```

In Java:

```
void moveDxDy(int dx, int dy) {  
  x = x + dx;  
  y = y + dy;  
}
```

```
pt.moveDxDy(1,1);
```

Instance Messages and Methods

Instance methods

```
moveDx: dx Dy: dy | |  
  x <- dx + x  
  y <- dy + y
```

Usage

```
pt moveDx: 1 Dy: 1
```

```
x: xcoord y: ycoord | |  
  x <- xcoord  
  y <- ycoord
```

```
pt x:3 y:2
```

```
void xy(int xcoord, int ycoord) {  
  x = xcoord;  
  y = ycoord;  
}
```

```
pt.xy(3,2);
```

Instance Messages and Methods

Instance methods

```
moveDx: dx Dy: dy | |  
  x <- dx + x  
  y <- dy + y
```

Examples

```
pt moveDx: 1 Dy: 1
```

```
x: xcoord y: ycoord | |  
  x <- xcoord  
  y <- ycoord
```

```
pt x:3 y:2
```

```
x | | ^x  
y | | ^y  
draw | |  
  (...draw point...)
```

```
z <- pt x + pt y
```

Class Messages and Methods

Three class methods

```
newX: xval Y: yval ||
^ self new x: xval y: yval
```

Example

```
p <- Point newX:3 Y:2
(new is method inherited
from Object)
```

```
class Point {
  static Point newXY(int xval, int yval) {
    Point temp = new Point();
    temp.xy(xval, yval);
    return temp;
  }
}
p = Point.newXY(3,2);
```

Class Messages and Methods

Three class methods

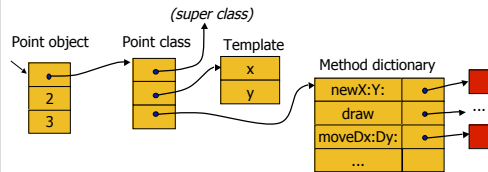
```
newX: xval Y: yval ||
^ self new x: xval y: yval
```

Example

```
p <- Point newOrigin
^ self new x: 0 y: 0
```

```
class Point {
  static Point newOrigin() {
    Point temp = new Point();
    temp.xy(0, 0);
    return temp;
  }
}
p = Point.newOrigin();
```

Run-time Representation



- Three primary operations
 - object creation
 - method lookup
 - field lookup

Inheritance

- Define colored points from points

| | |
|-------------------------------|------------------------------------|
| class name | ColorPoint |
| super class | Point |
| class var | |
| instance var | color |
| class messages and methods | newX:xv Y:yv C:cv { ... code ... } |
| instance messages and methods | color ^color |
| draw | < ... code ... |

Annotations: new instance variable (points to color), new method (points to newXY), override Point method (points to draw).

ColorPoint Methods

Instance Methods

```
x: xcoord y: ycoord c:col ||
x <- xcoord
y <- ycoord
color <- c
```

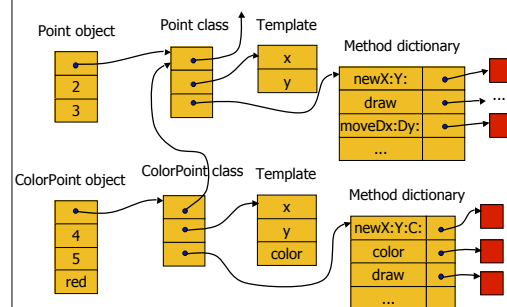
```
color || ^color
draw || ...
```

Class Methods

```
newX: xv Y: yv C:cv ||
^self new x:xv y:yv c:cv

newOrigin ||
^self newX:0 Y:0 C:red
```

Run-time Representation



Collection Hierarchy

