Understanding class definitions
Lecture 4

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Presentation outline

Estimated duration presentation

Questions at end presentation - helps to note slide numbers

Topics discussed:

- Parameters - formal & actual
- Scope - visibility & lifetime variables
- Styles
- Expression, statement, block
- Getters & setters (Accessors & Mutators)
- Print statement
- Conditional statement - facilitates branching
- JavaDoc tool

Parameter data

Constructors & methods receive data from parameters
Parameters also known as arguments
Defined in constructor or method header

- public `TicketMachine`(int `ticketCost`)
- public void `inserMoney`(int `amount`)

Data assigned to object field *price*

```
public TicketMachine(int ticketCost)
{
    price = ticketCost;
}
```

ticketCost referred to as *formal parameter*
Value passed, e.g. 500 *actual parameter*

Parameter data

Formal and actual parameters

int amount is the formal parameter

- public void `makeDeposit(int amount)`

100 below example actual parameter (argument)

```
public void makeDeposit(int deposit)
{
    this.balance += deposit;
}
.
.
bank.makeDeposit(100);
```

Scope

Scope of variable is block of code within which variable visible
Consider this code:

```
public class TicketMachine
{
    int price;
    public TicketMachine(int ticketCost)
    {
        price = ticketCost;
    }
    ...
 }
```

Field **price** visible

- Throughout entire class
- But **ticketCost** visible only in constructor

Local variables

Consider this code snippet:

```
public int refundBalance()
{
    int refundAmount;
    refundAmount = balance - adminCost;
    return refundAmount;
 }
```

refundAmount a local variable, not a field

- Defined inside method
- `int refundAmount;` is *declaration*
- Simultaneous declaration and initialization valid
- `int refundAmount = balance - adminCost;`
- `return balance-adminCost;//avoid local variable`

Verbose v concise styles

Verbose

```
public int refundBalance()
{
    int refundAmount;
    refundAmount = balance - adminCost;
    return refundAmount;
 }
```

Concise

```
public int refundBalance()
{
    return balance - adminCost;
 }
```

Source code format

Diffferent styles of layout format used
positioning curly brace pairs {}

Recommendation: use one style only throughout project

Styles mixed throughout presentation for layout convenience

```
public void insertMoney(int amount)
{
   if (amount > 0) {
      balance = balance + amount;
   }
}
```

```
public void insertMoney(int amount)
{
   if (amount > 0)
   {
      balance = balance + amount;
   }
}
```

Lifetime of variable

Variable lifetime

- *ticketCost* invisible outside constructor
- But field *price* and object lifespans same
- *price* dies when object destroyed

```
public class TicketMachine
{
    int price;
    public TicketMachine(int ticketCost)
    {
        price = ticketCost;
    }
}
```

Expressions, statements, blocks

Expression

- Comprises variables, operators & methods
- Constructed to evaluate to single value
- The following expression evaluates to 3
- `1 + 2;`

Statement

- Like sentences in language
- Line of code that performs some action
- `int savings = 1.1*(savings + getBonus());`

Block: Group statements within corresponding pair braces

- ```
  public void aMethod(int val)
  {
      value = val;
  }
  ```
  ```

Accessors

Accessor (Getter)

- Value of field unchanged
- `getNumber`
- `getStudent`

```
public class SomeClass
{
    private int number;
    private Student student;

    public int getNumber()
    {
        return number;
    }
    public Student getStudent()
    {
        return student;
    }
    ...
}
```

Mutators

Mutator (Setter) changes field value

- `updateBalance`
- `setCustomer`

```
public class BIABank
{
    private int balance;
    private Customer customer;

    public void updateBalance(int deposit)
    {
        balance += deposit;
    }
    public void setCustomer(Customer customer)
    {
        this.customer = customer;
    }
}
```

Printing

```
/**
 * Print a ticket.
 */
public void printTicket()
{
    // Simulate the printing of a ticket.
    System.out.println("#####################");
    System.out.println("# The BlueJ Line");
    System.out.println("# Ticket");
    System.out.println("# " + price + " cents.");
    System.out.println("#####################");
    System.out.println();
}
```

```
#####################
# The BlueJ Line
# Ticket
# 500 cents.
#####################
```

Printing continued

`printTicket` method analysed:

- void `printTicket`(): Method signature
- **System**: An inbuilt Java class
- **out**: *Printstream out* is System field
- **println**: is Printstream method
- `"# " + price + " cents."`

  concatenates to single string

Conditional statements

Facilitates choice

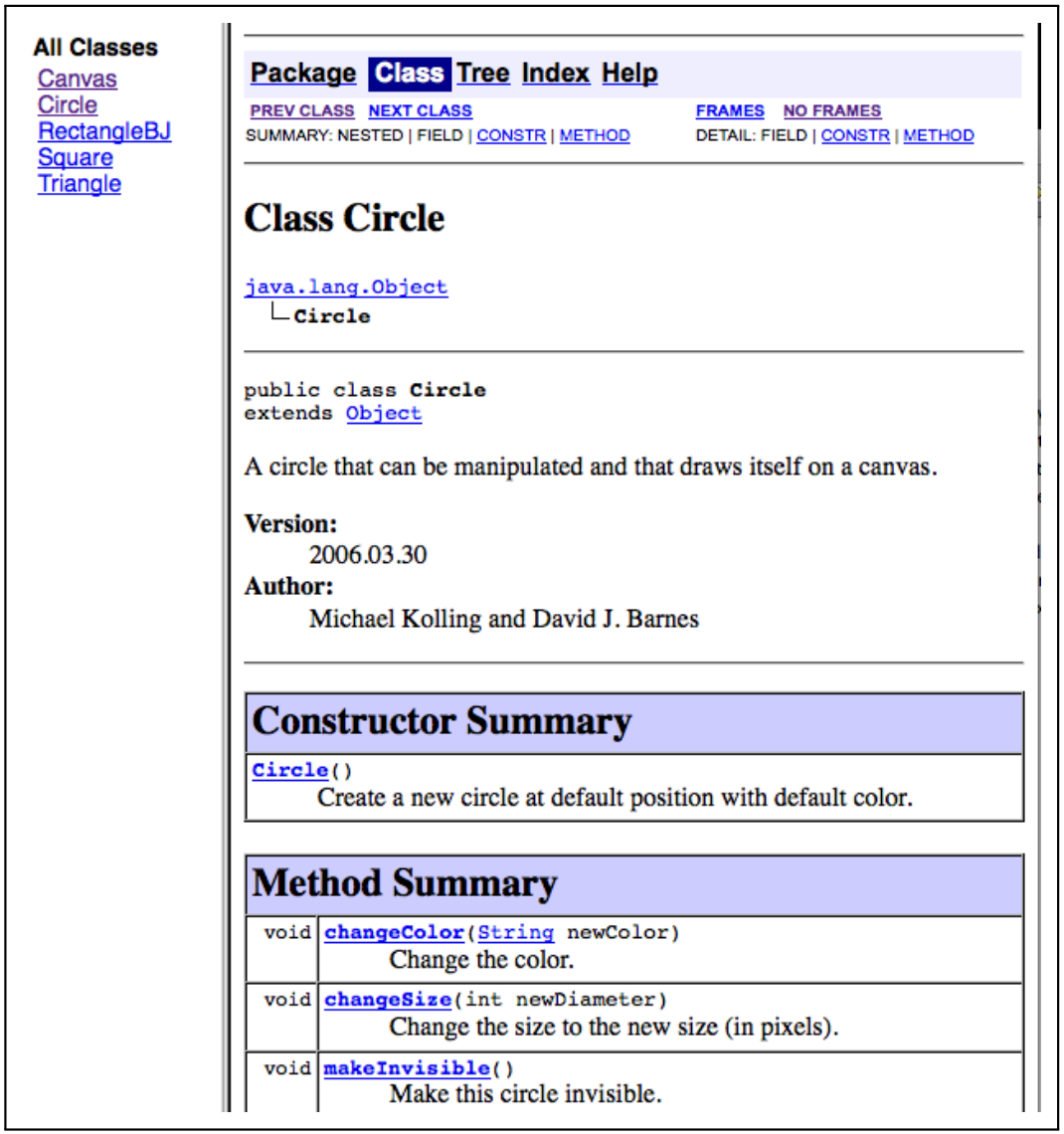
Accept only positive sum

- If amount greater than zero
  - Update balance
- Else amount zero or less
  - Print error message

```
public void insertMoney(int amount)
{
  if (amount > 0)
  {
    balance += amount;
  }
  else
  {
    System.out.println("Invalid amount");
  }
}
```

Class documentation

shapes project documentation



All Classes

Canvas
Circle
RectangleBJ
Square
Triangle

Package **Class** Tree Index Help

PREV CLASS NEXT CLASS FRAMES NO FRAMES
SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAIL: FIELD | CONSTR | METHOD

Class Circle

java.lang.Object
  └ **Circle**

```
public class Circle
extends Object
```

A circle that can be manipulated and that draws itself on a canvas.

Version:
2006.03.30
Author:
Michael Kolling and David J. Barnes

Constructor Summary

Circle() Create a new circle at default position with default color.

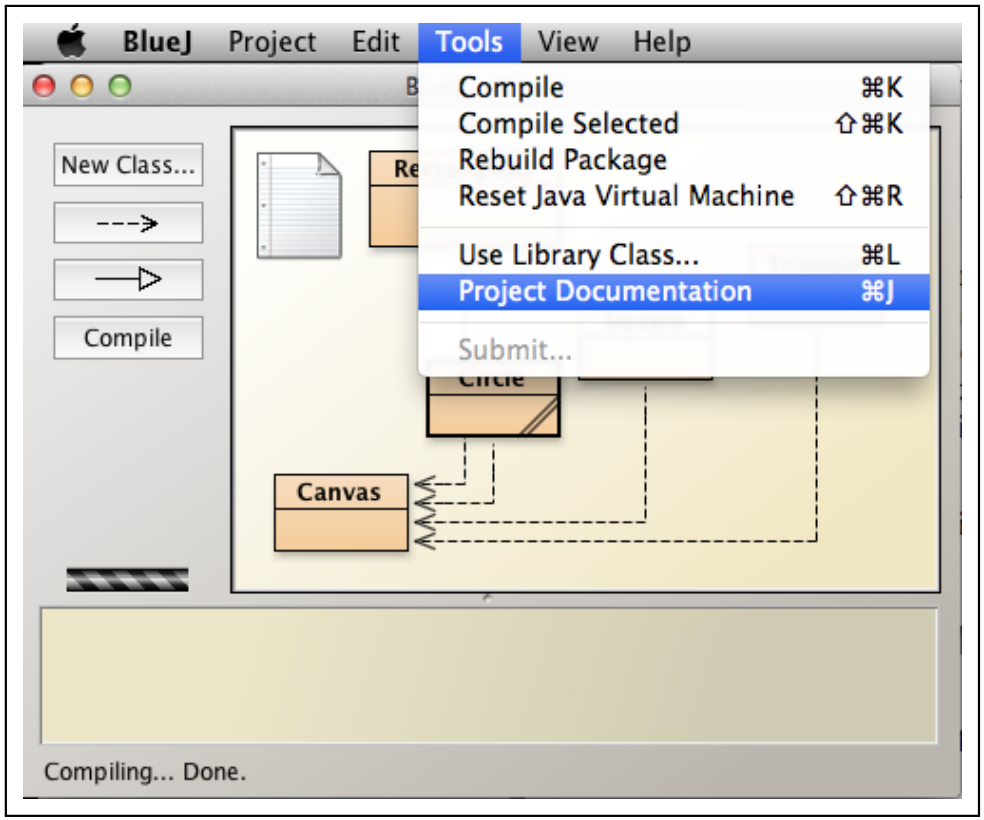
Method Summary

void	**changeColor**(String newColor) Change the color.
void	**changeSize**(int newDiameter) Change the size to the new size (in pixels).
void	**makeInvisible**() Make this circle invisible.

Class documentation

Generate *javadoc*

- BlueJ Menu
  - Tools
  - Project Documentation



Class documentation

Different philosophies exist on how to document

- Good documentation adds value to application
- Choose descriptive class, variable and method names
  - Bad : `int r = 10;`
  - Good: `int radius = 10;`
- Avoid naive comments such as
  - `radius = 10; //sets radius = 10`
- State the reason for code, the *why*
- Write code so that *what* code does is self-evident
- Make commenting code the norm

Class documentation

Comment block

/**

* *this is a comment*

*/

```
/**
* Changes Color color attribute value and redraws object
* @param newColor this color used in rendering all objects
*/
public void changeColor(String newColor)
{
        color = newColor;
        draw();
}
```

Question: do you think the above is a good comment?

Class documentation

Use approved tags

- `@param`
- `@return`

```
/**
* Accessor to retrieve color
* @return the color of the rectangle
*/
public String getColor()
{
        return color;
}
```

TicketMachine JavaDoc output extract

```java
/**
 * Create a machine that issues tickets of the given price.
 * Note that the price must be greater than zero.
 *
 * @param ticketCost is the price of the current ticket.
 */
public TicketMachine(int ticketCost)
{
    if (ticketCost > 0)
    {
```

Constructor Detail

TicketMachine

```
public TicketMachine(int ticketCost)
```

Create a machine that issues tickets of the given price. Note that the price must be greater than zero.

Parameters:

`ticketCost` - is the price of the current ticket.

Summary

Understanding class definitions

- Comment: documentation only, not executed
- Constructor: sets up object at creation (instantiation)
- Scope: defines section in code where variable visible
- Lifetime: how long variable exists before destruction
- Accessor: returns information on state of object
- Mutator: changes object state
- Conditional: takes one of two actions following test
- Local variable: declared within single method with same scope & lifetime as method

Referenced material

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`www.oracle.com/technetwork/java/javase/documentation/index-137868.html`

[Accessed 2014-02-09]

2. Barnes D.J. Kolling M. Objects First with Java. Third Edition. Pearson Education Ltd. 2003

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`http://docs.oracle.com/javase/tutorial/java/nutsandbolts/expressions.html`

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4. System API

`https://docs.oracle.com/javase/7/docs/api/java/lang/System.html`

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5. Javadoc documentation generator

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