SESSION 4 : BUILT-IN CLASSES IN JAVA

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Contents

- Arrays Class
- Math Class
- Wrapper Classes
  - Integer
  - Long
  - Double
  - Float
  - Char
- BigInteger Class

Introduction

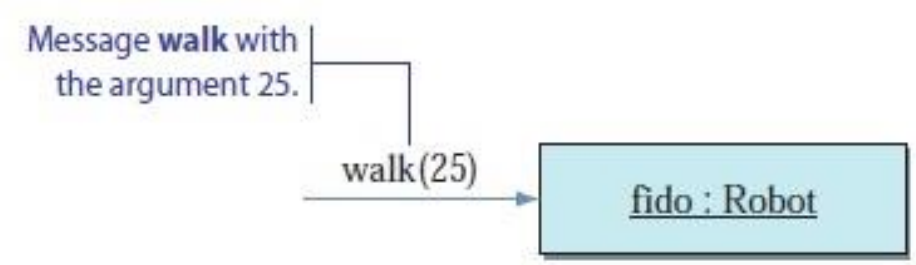
Built-in Classes

- Java provide some useful classes in the java.lang package .

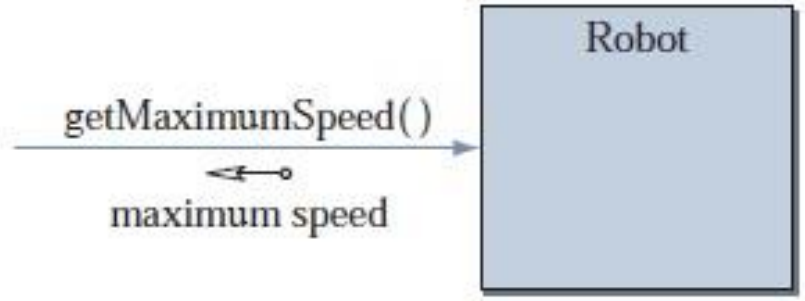
- These classes provide us with some methods and fields that help us save time and effort in writing code and repeating it more and more…

Class and Instance Methods

- Instance Method : a method defined for an object.



- Class Method : a method defined for a class.



*an introduction to object oriented programming in java ,5th Edition , C . Thomas WU

Arrays Class

Arrays Class

- Class **Arrays** helps you avoid reinventing the wheel by providing static methods for common array manipulations
- Methods Include
  - sort(array) : Arranges array elements into increasing order.
  - binarySearch(array , element) : Determines whether an array contains a specific value and, if so, returns where the value is located.
  - equal(array) : Compares arrays.
  - fill(array , element) : Places Values into an array.
  - toString() : Converts array to String.

Arrays Class (cont.)

- We can copy arrays using **copyof** method of the class Arrays Or using class System's static **arraycopy method.**
- To use Arrays Class we import it by

  import java.util.Arrays ;
- To Access Class methods we use the (.) operator.
  - Ex:-
    - Arrays.sort(array);

binarysearch(array,element)
equal(array)
toString(array)
fill(array,element)
copyof()//see its parameters

Math Class

Math Class

- Using only the arithmetic operators to express numerical computations is very limiting. Many computations require the use of mathematical functions.
- For example , Expressing The Following Formula

$$\frac{1}{2}\sin\left(x-\frac{\pi}{\sqrt{y}}\right)$$

- The Math class in the java.lang package contains class methods for commonly used mathematical functions.
- To use Math Class we import it by :
  - import java.lang.Math;

Math Class (cont.)

- Math Class Methods include
  - abs(a) : Returns the absolute value of a.
  - ceil(a) : Returns the smallest whole number greater than a.
  - floor(a) : Returns the largest whole number less than a.
  - max(a , b) : Returns the larger of a and b.
  - min(a , b) : Returns the smaller of a and b.
  - pow(a , b) : Returns the number a raised to power b.
  - random() : Generates a random number less than or equal to 0.0 and less than 1.0 .
  - sqrt(a) : returns the square root of a.

Math Class (cont.)

- toDegrees() : Converts the given angle in radians to degrees.
- toRadians() : Reverse of toDegrees.
- Trigonometric Functions
  - sin(a)
  - cos(a)
  - tan(a)
    - **All trigonometric functions are computed in radians.**
- Arc Trigonometric Functions
  - asin(a)
  - acos(a)
  - atan(a)

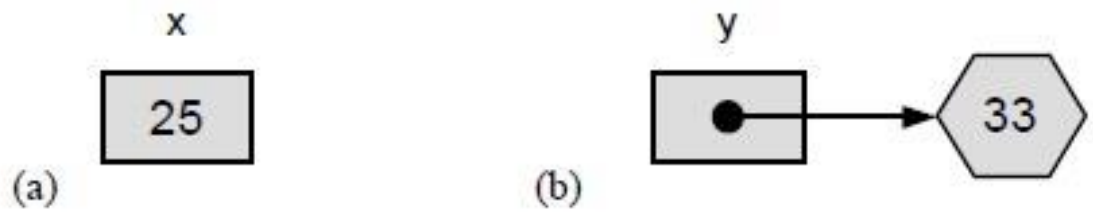
- Let's Code the Formula :

$$\frac{1}{2}\sin\left(x - \frac{\pi}{\sqrt{y}}\right)$$

Wrapper Classes

Wrapper Classes

- Each of Java's eight primitive data types has a class dedicated to it.
- These are known as *wrapper classes*, because they "wrap" the primitive data type into an object of that class.
- there is an Integer class that holds an int variable.



Wrapper Classes(cont.)

- Wrapper Classes have Objects Defined as Follows :
  - Integer
    - Integer x = new Integer(value);
  - Long
    - Long x = new Long(value);
  - Double
    - Double x = new Double (value);
  - Float
    - Float x = new Float(value);
  - Char
    - Character x = new Character(value);

Wrapper Classes(cont.)

- Wrapper Classes have a lot of methods in common :
  - toString() Method :
    - For Example :
      - String s = Integer.toString(5);
      - String s = Character.toString('a');

toString is in arrays and permtive types

  - parse Method : Converts String to an Int , float, double ,..
    - Int x = Integer.parseInt("1234");
    - double x = Double.parseDouble("12.1545");
  - Minimum and Maximum Values of a Primitive type
    - Int min = Integer.MIN_VALUE; //min =-2147483648
    - Int max = Integer.MAX_VALUE; // max = 2147483647
    - float maxv = Float.MAX_VALUE; //maxv = 3.4028235E38

Wrapper Classes(cont.)

- Converting between primitive data types :
  - doubleValue() returns the value of this type as an double.
  - floatValue() returns the value of this type as a float.
  - intValue() returns the value of this type as an int.
  - longValue() returns the value of this type as a long.
    - For Example
      - int x = 15;
      - float y = x.floatValue();

anthor way of casting

Wrapper Classes(cont.)

- Converting to another number system :
  - toBinaryString(a) : Converts a into binary string.
  - toHexString(a) : Converts a into hexadecimal string.
  - toOctalString(a) : Converts a into octal String.
  - For Example :
    - String s = Integer.toBinaryString(10);

BigInteger Class

BigInteger Class

- The **java.math.BigInteger** class provides operations analogues to all of Java's primitive integer operators and for all relevant methods from java.lang.Math.
- **BigInteger** class help us to deal with very large Integers.
- To Declare A **BigInteger** We Use :
  - BigInteger num = BigInteger.valueof(long number);

BigInteger Class(cont.)

- **BigInteger** Fields Include :
  - BigInteger.ONE : The BigInteger constant one.
  - BigInteger.ZERO : The BigInteger constant zero.
  - BigInteger.TEN : The BigInteger constant ten.
- **BigInteger** Methods Include :
  - abs() : returns a BigInteger whose value is the absolute value of this BigInteger.
  - add(val) : returns a BigInteger whose value is (this + val).
  - subtract(val) : returns a BigInteger whose value is (this - val).
  - multiply(val) : returns a BigInteger whose value is (this*val).
  - divide(val): returns a BigInteger whose value is (this / val)

BigInteger Class(cont.)

- pow(int ex) : returns a BigInteger whose value is this^{ex} .
- nextProbablePrime() : returns the first integer greater than this BigInteger that is probably prime.
- isProbablePrime() : returns true if this BigInteger is probably prime, false otherwise .
- intValue() : converts this BigInteger to an int.
- longValue() : converts this BigInteger to a Long.
- floatValue() : converts this BigInteger to a float.
- doubleValue() : converts this BigInteger to a double.
- toString() : returns the decimal String representation of this BigInteger.
- negate() : returns a BigInteger whose value is (-this).

BigInteger Class(cont.)

- Example(http://www.spoj.com/problems/FCTRL2/)
  - You are asked to calculate factorials of some small positive integers where 1<=n<=100

Questions ?

References

- Java How To Program ,early objects 9th edition , Deitel.
- an introduction to object oriented programming in java ,5th Edition , C . Thomas WU .
- Java An Introduction to Problem Solving and Programming , 6th Edition ,Walter Savitch
- TutorialsPoint.com

Thanks