RADFORD UNIVERSITY

ITEC 120

Lecture 2
Computation Cycle

Review

- Welcome to ITEC 120
- Basics of java
  - Compiling
  - Running

Objectives

- Introduce the programming cycle
  - Input
  - Computation
  - Output

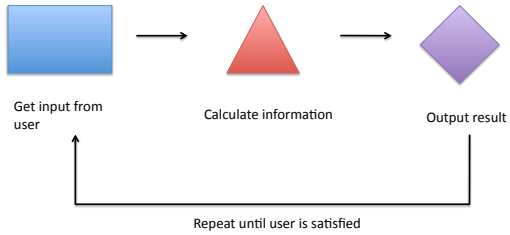
Basic program

```
public class template
{
   public static void main(String[] args)
   {
       //Insert your code below this comment

      //Do not insert any code after this comment
   }
}
```

How do you make calculate the slope of a line?

Cycle



Input

- How do you get input in pBot?
- Java uses the Scanner class for input

Simple

```
int x;
double y;
float z;
String a;
```

Complex

```
Scanner scan = new Scanner(System.in);
Robot rob = new Robot();
```


In the format of:
Type name = new Type();

Methods

- Variable

Keyboard

```
Scanner scan = new Scanner(System.in);
```

- Methods

```
scan.nextInt();          → Next whole #
scan.next();             → String until <space>
scan.nextDouble();       → 3.14159
scan.nextLine();         → String until <enter>
```


Example

```
public class Adder
{
   public static void main(String[] args)
   {
      int x;
      int y;
      Scanner scan = new Scanner(System.in);
      x = scan.nextInt();
      y = scan.nextInt();
      int z;
      z=x+y;
      System.out.println(x+y);
   }
}
```

Example

```
public class Paycheck
{
   public static void main(String[] args)
   {
      String name;
      double paycheck;
      Scanner scan = new Scanner(System.in);
      name = scan.next();
      paycheck = scan.nextDouble();
      if (paycheck > 250.00)
         {  System.out.println("You are rich!"); }
      else
         {  System.out.println("Keep working"); }
   }
}
```

Computation Cycle

End of line

Line 1 → The quick fox ate 2
Line 2 → mushrooms

```
String word1,word2,word3,word4,word5;
int num;
word1 = scan.next();
word2 = scan.next();
word3 = scan.next();
word4 = scan.next();
num = scan.nextInt();
word5 = scan.next();
```

← Will not hold mushrooms

Need to add scan.nextLine(); to guarantee you go to the next line so that word5 will hold mushrooms

Computation Cycle

Computation

- Obtained input
- What do you do with it?

Perform mathematical calculations:

```
double value  = Math.sin(angleInRadians);
double value2 = Math.sqrt(doubleValue);
```

Check to see if it is valid:

```
String password = scan.next();
if (password.length() < 5)
   { System.out.println("Your password is too short"); }
```

Computation Cycle

Operators

- Add one

```
variable++;
```

- Subtract one

```
variable--;
```

- Convenience

```
total = total + 5;        total = total * 5;
total += 5;               total *= 5;
```

Computation Cycle

Precedence

- What is the answer for the following calculations

4+9*2
14+8/2
2/3-1

Precedence ordering:
`* / (left to right)`
`+ -`
`=`

(4+9)*2
14+(8/2)
2/(3-1)

Conversion

3 types:
Assignment (automatic)
Promotion (automatic)
Casting (manual)

Assignment
```
double a=1.5;
double b=5.1;
int c = 1;
b=c;
```
Result:
b = 1.0

Promotion
```
double a=1.5;
double b=5.1;
int c = 1;
a=c/b;
```
Result:
a = .196

Casting
```
double a=1.5;
double b=5.1;
int c = 1;
a=(int)(c/b);
```
Result:
a = 0.0

C is changed to a double
Then the division happens
Then a double is assigned to a double

Gotcha

- Widening
  - int-double (No possible loss)
- Narrowing
  - double->int (Possible precision lost)

Java doesn't allow this

Output

- How do you present the result to the user
- How you use the program
- How would someone who just walked up view your program?

Examples

Pre-calculated:

```
int x=3;
System.out.println(x);
```

Calculated in statement:

```
System.out.println(3+6);
```

Combining Strings and Numbers:

```
System.out.println("Apple" + 3 + 4);
```
→ Prints out Apple34

```
System.out.println("Apple" + (3 + 4));
```
→ Prints out Apple7

Multiple Lines:

```
System.out.println("Hey look
                    at me");
```


Combining I/O

```
System.out.println("Enter a number:");
int num = scan.nextInt();
System.out.println("You entered " + num);
if (num > 1000)
{
   System.out.println("You entered a big number");
}
```


Example

- Fahrenheit to Celsius calculator
- Quadratic formula calculator
- What input do we need?
- What are the calculations needed?
- How do we display the output?

Summary

- Computing cycle
  - Input
  - Computation
  - Output