

Loops



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Announcements

- Reminder – readings are due **before** lecture
 - We start off each lecture with a recall activity from your reading!
- Help Sessions and Help Desks
 - Go to them! They make a difference
- **Next Week – Exam Module**
 - **You need to work to have this module open so you can do your Exams**
 - **Catch up if you are behind!**
 - **Don't procrastinate!**



Recall Activity

Grab a paper, write your name and your answers to the following questions. Turn this as your attendance for today's lecture.

What is the difference between a while loop and a for loop?

Analyze the following method:

```
public static void loop(int max, int inc) {  
    for(int i = 0; i < max; i+= inc) {  
        System.out.println(i);  
    }  
}
```

How many lines are printed, given the following call

loop(5, 1)

loop(9, 4)

loop(0, 3)

Recall Activity

```
public static void loop(int max, int inc) {  
    for(int i = 0; i < max; i += inc) {  
        System.out.println(i);  
    }  
}
```

How many lines are printed, given the following call

loop(5, 1) 5

loop(9, 4) 3

loop(0, 3) 0

What are computers good at?

- Computers are good at three things
 - Calculations
 - Formal logic
 - Repeating what you just asked it to do (iteration) - Loops
- Coincidentally
 - Three things humans tend to struggle with
- If you understand
 - Calculations
 - Formal Logic
 - And Loops
 - You will be able to accomplish impressive programs

Loop Types in Java (and most langs)

- While Loops
- For Loops
- For:each loops (we will cover this later)
- Do While loops (we will cover this later)
- All loops have
 - An iterator - a way to cycle through the values you want to look at
 - A condition to exit (else, your computer blows up - it happens to everyone)

While Loop

- Good when:
 - Your “iteration” variable is created outside the loop
 - You need your iterator variable outside of the loop

```
while(TRUE-CONDITION) { /*block of code to execute*/ }
```

```
int end = scan.nextInt();  
int start = scan.nextInt();  
  
while(start < end) {  
    | start++;  
}  
System.out.println("My Start is now: " + start);
```

While Loop

- Lets assume:

end = 3;

start = 1;

```
while(1 < 3){
```

```
    start++;
```

```
}
```

```
while(2 < 3){
```

```
    start++;
```

```
}
```

while(3 < 3) – out of while

```
System.out.println("My Start is now: "+ start);
```

```
int end = scan.nextInt();  
int start = scan.nextInt();
```

```
while(start < end) {  
    start++;  
}  
System.out.println("My Start is now: " + start);
```

end start

3

~~1~~

~~2~~

3

For Loop

- Good when:
 - Your loop has a set start and end
 - You don't need to keep your iterator outside the loop

```
for(variables; condition; iterator) { /* block of code to execute*/ }
```

```
for(int i = 0; i < 10; i++) {  
    System.out.print(i);  
}
```

For Loop

```
for(int i = 0; i < 10; i++) {  
    System.out.print(i);  
}
```

- How the for works:
 1. control variable is initialized
 2. test condition
 - 2.1. if test if true:
 - execute what is in {}
 - increment control variable and
 - go to step 2 again
 - 2.2. if test if false, exit for

What is the program output?

0123456789

What do we need to change to have each number in a different line?

`System.out.println(i);`

What do we need to change to print the numbers in the reverse order?

`for(int i = 9; i >=0; i--)`

In Class Activity – Loop Practice

- Write a method that reads positive numbers and prints the sum and average of those numbers.
- Think about how you are going to solve this problem
 - What kind of loop do we need? Why?
 - When the loop is going to stop?
 - How many variables do we need? Why?
 - What are those variables types?

In Class Activity – Loop Practice

- Write a method that generates the first hundred even numbers.
- Think about how you are going to solve this problem
 - What kind of loop do we need? Why?
 - When the loop is going to stop?
 - How many variables do we need? Why?
 - What are those variables types?

In Class Activity – Loop Practice

- Write the following as a **for** loop

```
public static void simpleLoop(int total) {  
  
    int i = 1;  
    while(i <= total) {  
        System.out.print(i + ",");  
        i = i + 1;  
    }  
}
```

Code Along: loop Practice

- Back to Canvas / Zybooks – work on Activity 2 the number game.
- One person codes, the rests assists in the coding
 - Really, everyone trying it, isn't as beneficial as everyone working together on these!
 - You can always try it on our own later