Programming Basics
Foundation Course

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Data types - Basic

- bool/boolean

  ```
  boolean isRaining = false;
  ```

- byte

  ```
  byte x = 120;
  ```

- char (character)

  ```
  char firstLetter = 'a';
  ```

- short

  ```
  short x = 32000;
  ```

- int (integer)

  ```
  int numberOfStudents = 11;
  ```

- float

  ```
  float height = 1.68f;
  ```

- double

  ```
  double width = 2.29;
  ```

Data types - Basic

- Arrays - groups of variables

```
int[] primeNumbers = {2, 3, 5, 7};
char[] firstFiveLetters = {’a’, ’b’, ’c’, ’d’, ’e’};
```

- String

```
String sampleSentence = "This is a sentence";
```

Operators

- Assignment operator (=)

```
int a = 5;
int b = a;
int c = 10;
int a = c;
```

- Arithmetic operators (-, +, *, /, %)

```
double x = 15.0;
double y = 3.0;
double z = x + y;
double m = y - x;
double n = x / y;
int k = x / y;
int j = y / x;
double p = x * y;
int k = 12;
int j = 5;
int i = k % j;
```

Operators

- Unary operators (-, +, - -, ++, !)

```
int x = 5;
x++;
x--;
int y = -x;
int z = +y;
boolean isRaining = true;
boolean isSunny = !isRaining;
```

- Equality and Relational Operators (==, ! =, >, >=, <, <=)

```
int a = 5;
if (a == 5)
if (a != 5)
if (a < 5)
if (a <= 5)
if (a > 6)
boolean x = (a == 10);
```

Operators

- Conditional operators (&&, ||, ? :)

```
boolean isRaining = true;
boolean isSunny = !isRaining;
if (isRaining && isSunny)
if (isRaining || isSunny)
boolean rainbow = (isRaining && isSunny) ? true : false;
```

- Bitwise and Shift Operators (˜, <<, >>, &, ˆ, |)

```
int x = 2; // 0000 0010
x = x << 2; // 0000 1000
int y = x >> 2; //0000 0010
int z = y & x; // 0000 0000
int m = y | x; //0000 1010
int n = ~x; //1111 0111
```

Control Flow

- if, else

```
int x = 5;
int z = 0;
boolean isRaining = false;
if (x == 6) {
    z = 1;
} else if (isRaining || x == 5) {
    z = 2;
} else {
    z = 3;
}
```

Control Flow

- switch

```
int x = 3;
int z = 0;
switch (x) {
    case 1: z = -1;
            break;
    case 2: z = -4;
            break;
    case 3: z = 5;
            break;
    default: z = 10;
            break;
}
```

Control Flow

- while loop

```
int x = 0;
int y = 10;
while (x < 10) {
    x++;
    y--;
}

do {
    x++;
    y--;
} while (x < 10);
```

Control Flow

- for loop

```
int y = 0;
for (int i = 0; i < 10; i++) {
    y++;
}
for ( ; ; ) {
    y++;
}
int[] firstFiveNumbers = {1, 2, 3, 4, 5};
int x = 0;
for (int i = 0; i < firstFiveNumbers.length; i++) {
    x = x + firstFiveNumbers[i];
}
```

Control Flow

- break, continue

```
while (true) {
    x++;
    if (x > 10) {
        break;
    }
}
int[] firstFiveNumbers = {1, 2, 3, 4, 5};
int x = 0;
for (int i = 0; i < firstFiveNumbers.length; i++) {
    if (firstFiveNumbers[i] % 2 == 0) {
        continue;
    }

    x = x + firstFiveNumbers[i];
}
```

Basic I/O - Printing

```java
int x = 5;
System.out.println("This is the value of x: " + x + ".");
System.out.print("This is the value of x: " + x + ".");
System.err.print("Something went wrong");
```

Basic I/O - Reading from console

```java
import java.io.Console;
import java.io.IOException;
public class Login {
    public static void main(String[] args) throws IOException {
        Console c = System.console();
        if (c == null) {
            System.err.println("Console does not exist");
            System.exit(1);
        }
        String login;
        do {
            login = c.readLine("Enter your login: ");
            if (!login.endsWith("2s")) {
                c.printf("Login needs to end with 2s.%n");
            }
        } while (!login.endsWith("2s"));
    }
}
```

Basic I/O - Reading from console

```java
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
public class ReadFromStdin{
    public static void main (String args[]) {
        try {
            BufferedReader br = new BufferedReader(new
                InputStreamReader(System.in));
            String input;
            while( (input = br.readLine())!= null) {
                System.out.println(input);
            }
    } catch(IOException io) {
            io.printStackTrace();
        }
    }
}
```

Recommended Reading

- http://docs.oracle.com/javase/tutorial/java/nutsandbolts/index.html
- http://www.oracle.com/technetwork/java/codeconvtoc-136057.html
- If you're already an expert in Java:
  http://www.cplusplus.com/doc/tutorial/
  http://www.codecademy.com/en/tracks/python

Coming Later

- Classes and object-oriented programming
- Dynamic arrays
- Problem decomposition
- etc.