Java Programming

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Brief History: Java

- Current (stable) version: Java 8
- Designed by James Gosling (SUN Microsystems) in early 90s.
- Goal: WORA – Write Once Run Anywhere
  - unlike C and C++, Java was designed to be a hardware independent software platform.
- Member of the C, C++ family, thus has similar syntax, but has less low-level functionality and control than either of them.

Agenda:

Part I. *Brief Java Intro*

1. *Types*
2. *Keywords*
3. *Strings*
4. *Methods*
5. *Inheritance*
6. *Parameters*
7. *Data Structures*

Part II. *Tour of Android Studio*

1. *Quick Overview*

Helpful Resources to Start

Tools:

- Install Java JDK (Java 8)
- Eclipse IDE (Integrated Developer Environment)
  - Download Eclipse IDE for Java Developers

Java References:

- Good starting point: Java Chapter in AOP
- Oracle Java Reference Guide

Key aspects of Java

- Java is an Object Oriented Language (OOP)
- Everything is contained within a class.
- There are no pointers, but objects in java are by default treated like references in C++. (more on this later)
- Built in Garbage Collection (goodbye Valgrind :D)

Objects + Types

- 8 primitives:
  (basic building blocks of all objects)
  - int
  - float
  - double
  - char
  - boolean

  You'll primarily work with these

  - byte
  - short
  - long

- Everything else is an object.
  - *Point abc = new Point();*
- By convention, the class (aka the blueprint of an object) starts with an uppercase. (e.g. String, Integer, Point, etc..)
- Similar to C++, objects are initialized with their constructor. Rule of 3 need not apply in java.
- All objects in Java extend from the Object Class.

Hello World

- Interactive Eclipse Demo

Important Keywords:

- **new** – allocates on heap, calls an object's constructor, and returns a reference to object.
- **public** - all methods and objects inside and outside class have access.
- **private** – only constructors and methods within the class have access
- **protected** – the class and all of its subclasses and package have access

Access Levels

Modifier	Class	Package	Subclass	World
public	Y	Y	Y	Y
protected	Y	Y	Y	N
no modifier	Y	Y	N	N
private	Y	N	N	N

Strings

Declaration & Initialization:

1. String name = new String(“Ric Telford”);
2. String name = “Ric Telford”

- Both of these behave effectively the same.
- * There is a slight difference, the second one is not allocated on the heap. Uses a concept called String Pooling (advanced topic)

Strings (Cont'd)

- Strings are immutable, meaning they cannot be changed, without reallocating a new string.
- Can be concatenated with the + operator.
- Have a litany of methods available:
  - String methods reference

Strings Demo

- See Eclipse

Methods

- Instance Methods: methods which require variables that are an instance of a class (created by the keyword new) to be called.

- Static Methods: classes which do not require an instance of a class in order to be called.
  - Math class

Methods Demo

- See eclipse

Inheritance

- Child Classes can inherit from at most one parent class (**unlike C++)

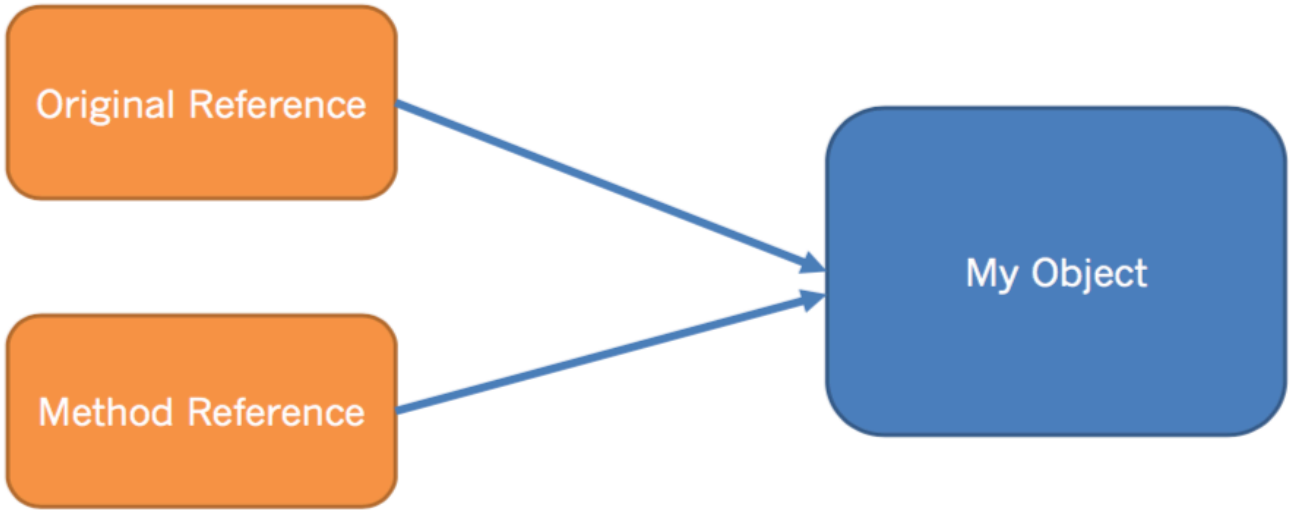
- Interfaces– class like reference that contains abstract methods.
  - Classes can implement multiple interfaces
  - Interfaces only contain abstract methods and do not have any fields. *starting with Java 8, interfaces may provide default implementation.

Inheritance Demo

- see eclipse

Parameters

- “Java copies and passes the reference by value, not the object"



Data Structures

- Arrays – most simple data structure.
  - can store objects or primitives.
- ArrayLists ~ vectors (in C++)
- Lists, Sets, Maps (can only store Objects)

- Note: Java doesn't have one library for all data structures. Look at Java Documentation.
- Arrays are builtin, most others are stored in the util library.

II. Android Studio

- Download Android Studio (IDE for Android)