

Unit One: Introduction to Java Applications & Applets

Topic 1: Major components of any computer system

1) Input devices - devices used to enter data into the computer's memory.

examples: 1) keyboard
2) flash drive
3) internal or external hard drive

2) Storage devices - devices where the data is stored.

examples: 1) Primary Storage
a) ROM - Read only memory
b) RAM - Random access memory
2) Secondary Storage
a) hard drive
b) flash drive
c) server

3) Processing device (CPU) - the device where all data is processed.

examples: 1) locates and executes program instructions
2) carries out arithmetic operations
3) sends and receives data to/from primary and secondary storage

4) Output devices - devices used to display results.

examples: 1) monitor
2) printer

Topic 2: Types of computer languages

1) Machine Language

- very difficult to program in
- very fast at executing code
- all other languages are converted to machine language and this file is called the **object file**

2) Assembly Language

- requires a software program called an assembler to translate assemble language into machine language.
- difficult to program in
- fast at executing code

3) High Level Language (Visual Basic, C++, Python, Java)

- requires a software program called a compiler to translate the language into machine language.
- relatively easy to program in
- relatively slow at executing code
- produces a file called the **source file**

Examples of the 3 different types of languages...

Each of the following commands will place the base 10 number 64 into a memory cell named A.

- 1) Machine: 0807 A9 64
- 2) Assembly: LDA #!64
- 3) Java: A = 64;

Topic 3: The Origins of Java

Development of the Java language began in 1991, but it was not until the SunWorld exhibition in 1995 that it made substantial gains in popularity.

Since 1996, both Netscape and Microsoft have supported Java in their web browsers. The Java 1.5.0 language and library, that are tested on the AP exam was released in 2005. Java 8 update 45 which is installed on our computers was released in 2015.

A Java compiler translates Java not into machine language, but into a pseudomachine language called Java byte code. To run Java byte code on a particular computer, you must install a Java virtual machine (JVM) on that computer. A JVM is a program that behaves like a computer. Such a program is called an interpreter.

Advantages of using Java

- 1) Yields programs that can be run on different types of computers without change (portable).
- 2) Java is designed to be used on the Internet.
- 3) Enables the construction of virus-free and tamper-free systems (secure).

- 4) Java syntax is very similar to C++ syntax, but easier to learn (no pointers).
- 5) The Java virtual machine can catch many kinds of beginners' mistakes and report them accurately.

Disadvantages of using Java

- 1) The Java virtual machine is slower than a C++ compiler.
- 2) Since Java is a totally object oriented language and was designed for the Internet, solving simple problems will require more code than other languages.
- 3) Although the Java language itself is relatively simple, Java contains a vast set of library packages that are necessary to write useful programs. You will have to use Java resources to learn the functionality of these libraries.

<http://download.oracle.com/javase/6/docs/api/index.html>

Topic 4: Programming in Java

What is a library package?

- a group of classes found in your compiler that define commonly needed tasks.
- these classes are linked to your project when you run it for the first time.
- to get your project access to these classes, you must use the command ...

```
import java.packagename.classname;
```

(This is only used when the class you need is NOT in the java.lang package!)

Program Output

All classes you will need for the output of the first project are in java.lang and no import statements are necessary.

WARNING: Java is case sensitive!!

```
System.out.print("Hello,");  
System.out.println(" my name is");  
System.out.println();  
System.out.println("BOB");
```

Line 1: prints Hello, and keeps cursor on same line.
Line 2: prints my name is and moves cursor to next line.
Line 3: skips a line
Line 4: prints BOB and moves cursor to next line.

Final Output

Hello, my name is

BOB

Escape Sequences

1) \" - used when you want to include " in your output.

```
System.out.println("\"BOB\"");
```

Final Output

"BOB"

2) \\ - used when you want to include \ in your output.

```
System.out.println("input\\output");
```

Final Output

input\output

3) \n - used to move cursor to the next line.

```
System.out.print("*\n**\n***\n");
```

Final Output

```
*  
**  
***
```

Documenting your projects

All Java files must begin with the following comments...

```
// Student's Name  
//  
/* Project Description: One or two sentences describing  
   what your project will do.  
*/
```

Other comments may be required by specific projects.

Setting up the project class and main method

Since Java is totally object oriented, even the smallest project must be part of a class.

If your project is a Java application and has only one class, it must contain a main method. If your project is a Java application and has multiple classes, one of them must contain a main method. The class containing main is called the "driver".

```
public class U1A1
{
    public static void main(String args[])
    {
        Java code goes here
    }
}
```

Please notice the body of a class is indented inside an open ({} and closed (}) brace.

Also notice the body of a method is indented inside an open ({} and closed (}) brace.

Topic 5: Using Java (JDK 8 Update 45) and TextPad to create a Java project

- **JDK 8 Update 45 is produced by Oracle**
- **download at www.oracle.com/technetwork/java/index.html
(see handout for specifics)**
- **TextPad is the text editor
produced by Helios Software Solutions
can be downloaded at www.textpad.com
(see handout for specifics)**

These two pieces of software, produced by different companies, can combine to compile, link, and execute Java applications and applets.

Step 1: On your flash drive and/or West folder create a new folder with the same name as your project (ie. U1A1)

Step 2: Double click on the TextPad icon located on your desktop and type in your Java code.

Step 3: Save your project to the folder you created in step 1 as a .java file. Make sure the name of your project matches the name of your driver class. U1A1.java is your source file.

Step 4: Go to the Tools menu and highlight Compile Java. This creates a .class file. U1A1.class is your object file.

Step 5: When your code reappears on the screen, go to the Tools menu and highlight Run Java Application or Run Java Applet whichever is appropriate for your project. If your project is a Java Application, there should be 2 files in your project folder. A .java file and a .class file. If your project is a Java Applet, there should be 3 files in your project folder. A .java file, a .class file, and a .html file.

Step 6: **OPTION 1:** The output should come up in a console window. Right click in the blue title bar and select edit. Select either Select All or Mark whichever is available. If you had to select Mark, manually select all the text. Right click in the blue title bar, a second time, and select copy. Now close the console window. You should be back at the text editor. Paste your output as a comment below your code.

Option 2: With the console window visible, execute a Alt/Print Scrn. This places the console window in memory. Open a Word document and select paste from the edit menu. This pastes the console window in a Word document. Print it and exit Word, then close the console window.

Step 7: Now go to the File menu and highlight Print. In the new window, click on the OK button. Retrieve your hardcopy from the printer and turn it in.

Step 10: Close the TextPad application.

Assignment U1A1: The Face

Examples:

Convert 58₁₀ to base 2

1	1	1	0	1	0
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
32	16	8	4	2	1

$$32+16+8+2 = 58$$

Convert 1101₂ to base 10

$$8 + 4 + 1 = 13$$

Convert 1001010110₂ to base 8

001 001 010 110

1 1 2 6 → 1126₈

Convert 3676₈ to base 16

3 6 7 6

011 110 111 110

0111 1011 1110

7 B E → 7BE₁₆

Convert 300₁₀ to base 16

1	2	C
<hr/>	<hr/>	<hr/>
256	16	1

$$256+(2*16)+12 = 300$$

Convert 6B₁₆ to base 10

$$6*16 + 11*1 = 96 + 11 = 107$$

Convert 1001010110₂ to base 16

0010 0101 0110

2 5 6 → 256₁₆