

The history and Overview of Java

Object Oriented Programming BS (AI) II

By

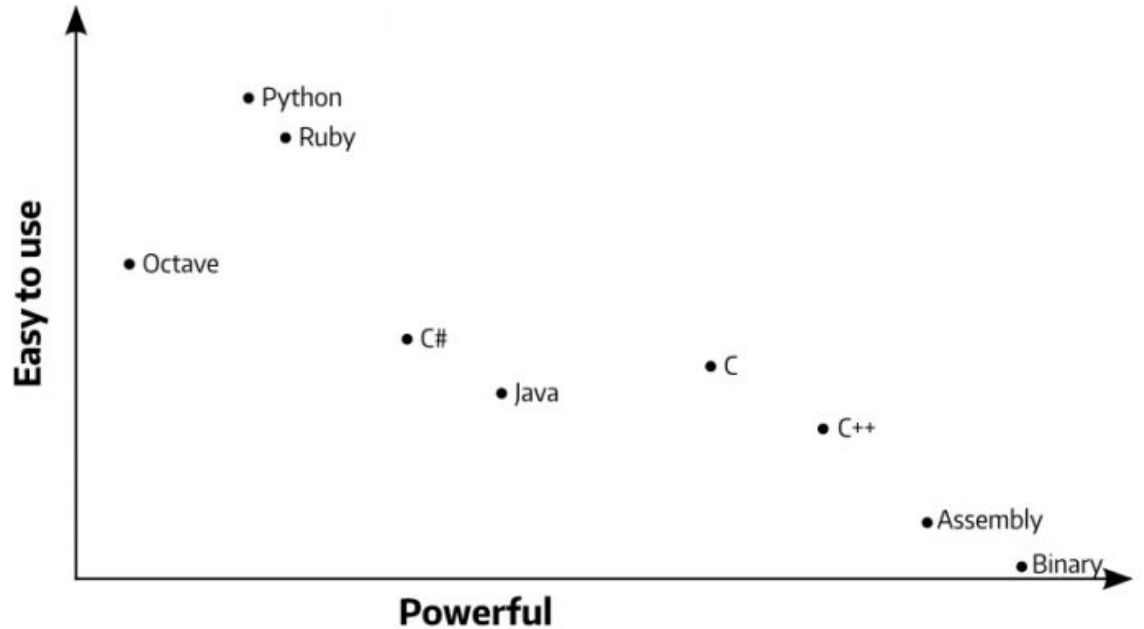
Abdul Haseeb Shaikh

Introduction to Course

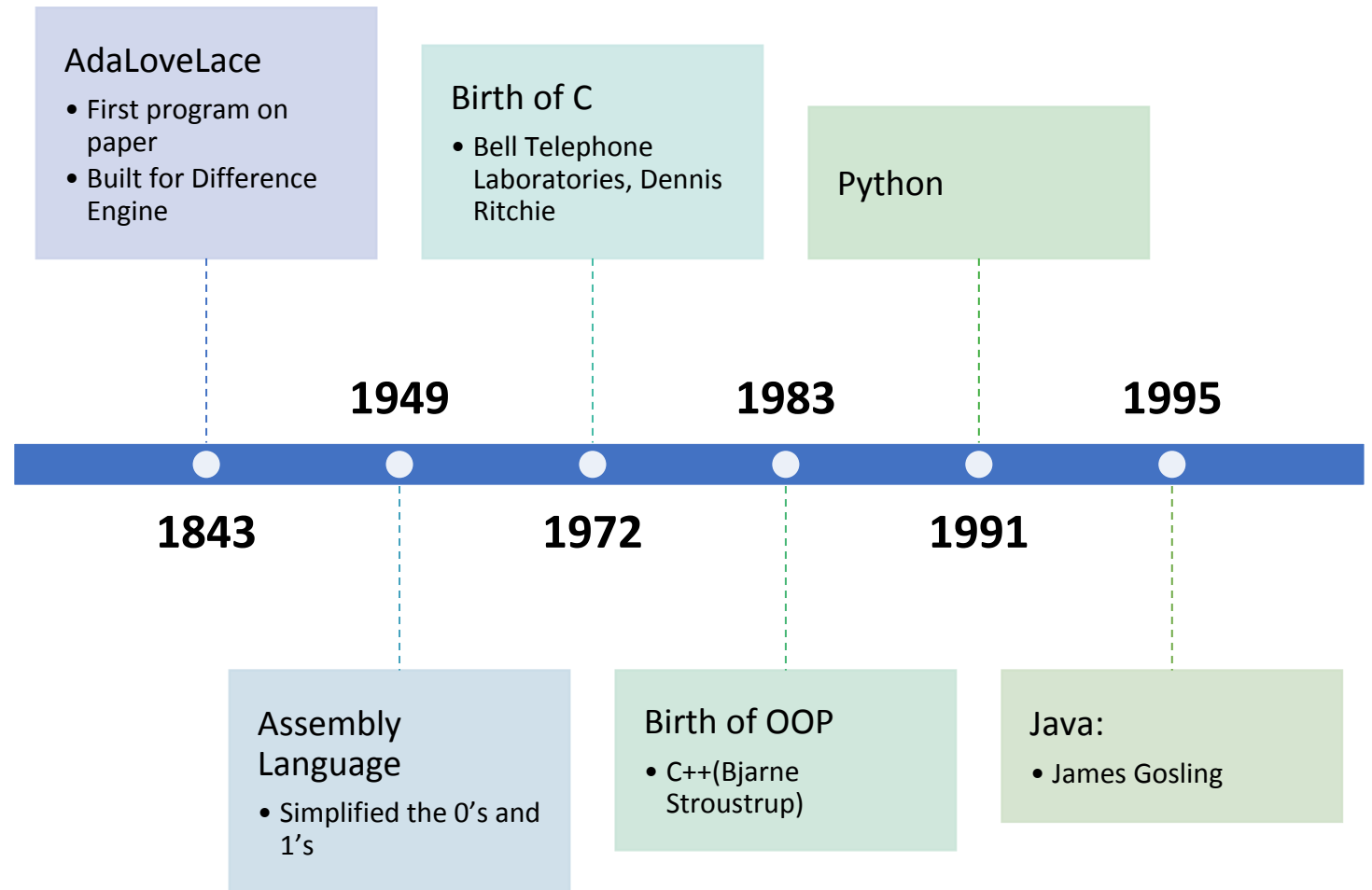
- Assessment (Theory 100 Marks)
 - 30% Mid Term
 - 30% Sessional:
 - 50% Project
 - 50% Quiz and Assignments
- Course Outlines
- 75% Attendance is mandatory for appearing in Final Term Exam, and there will be no compromise on attendance.
- Assignments Should be submitted on due time.
- Quiz will not be retaken.
- During the class, if any one found using cellphone, will get penalty.

Trade-offs in language design

- Ease of use vs power



History of Programming



History of Java

Assembly, Basic, Pascal, Fortran, COBOL...

- All relied on GOTO

Birth of modern programming: C

- 1970 BCPL
- Formalized in 1989 as C with adoption of ANSI

The next step: C++

- In Bell Labs 1979

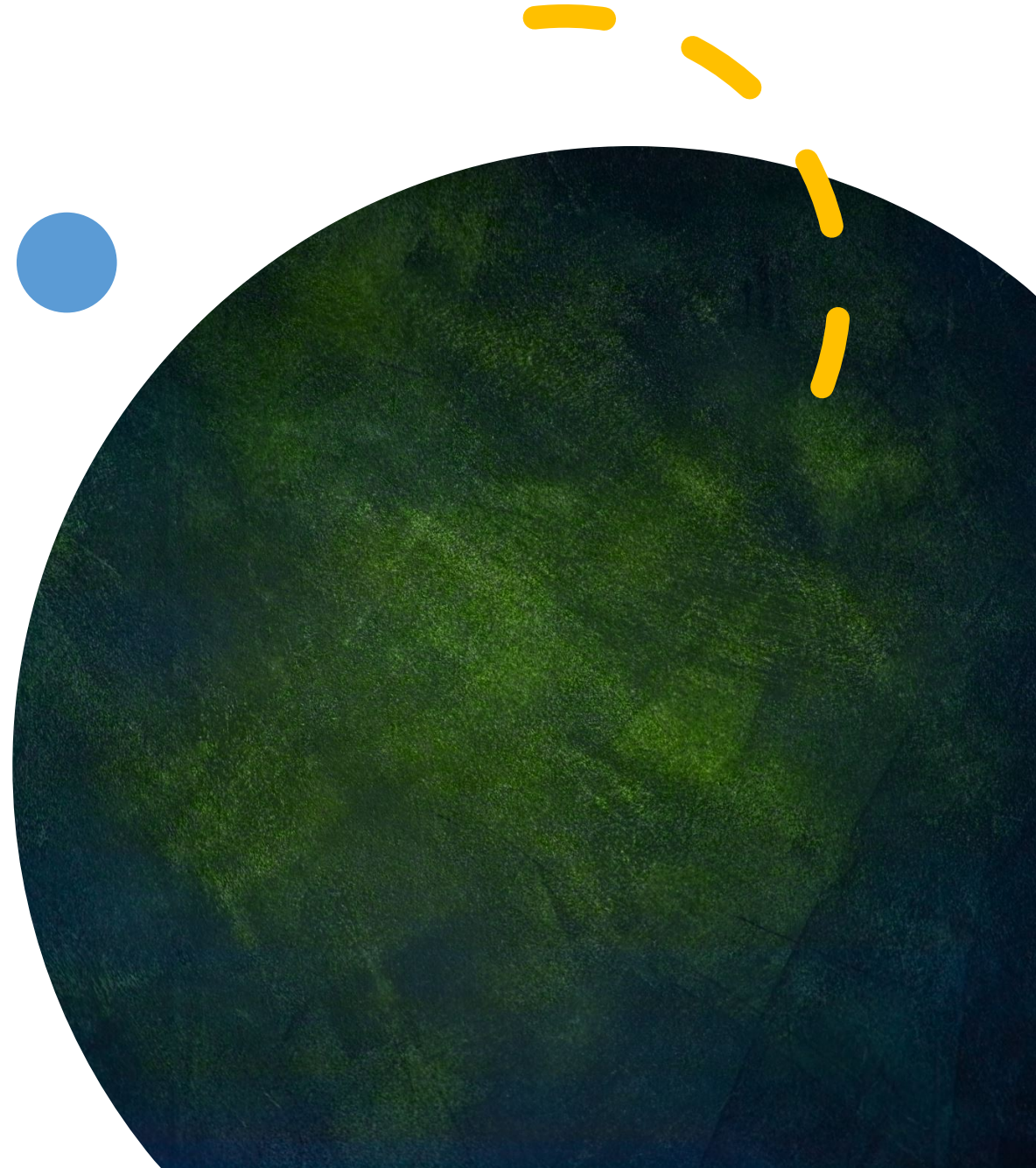
History of Java

The Java creation

- 1991 by James Gosling and Co. at Sun Microsystem
- Initially named as Oak, went through a name “Green” and finally in 1995 renamed to Java

Primary motivation

- Platform independence
- Consumer Electronics





What is Java?

- Java is a high-level, general-purpose, object-oriented, and secure programming language used for creating wide variety of software programs

Editions of Java



Java Standard Edition (JSE):

Programs for Desktops



Java Enterprise Edition (JEE):

Programs for servers



Java Micro Edition (JME):

Programs for small devices:

- Set Top Boxes

Types of Java Applications

Standalone Applications

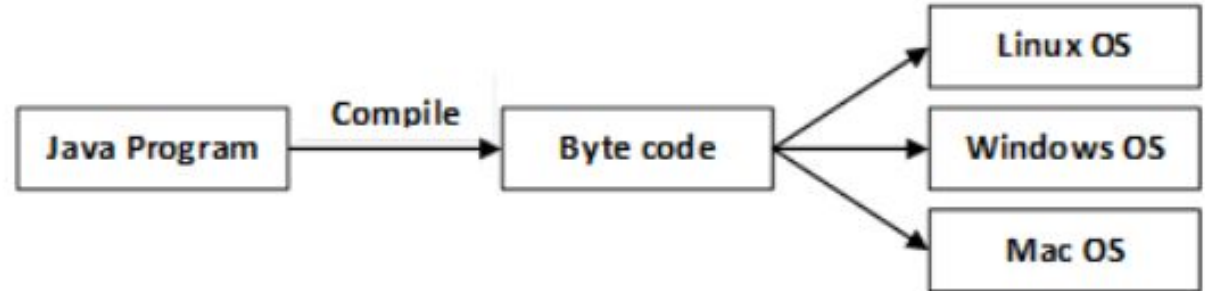
Enterprise Applications

Web Applications

Mobile Applications

Bytecode — the magic of Java (WORA)

A.java
A.class



Bytecode — the magic of Java (WORA)

- Java Code is compiled(javac) into byte code
 - .class file is produced
 - .class or bytecode:
 - Interpreted by java compiler to produce machine code

JDK,JRE AND JVM

JDK:

- Java Development Kit
- Contains all set of necessary tools to work with java

JRE:

- Java Run-Time Environment
- Includes JVM
 - Environment to execute a java program

JVM:

- Software in form of interpreter
- Written in C Language
- Executes bytecode

JVM, JRE AND JDK

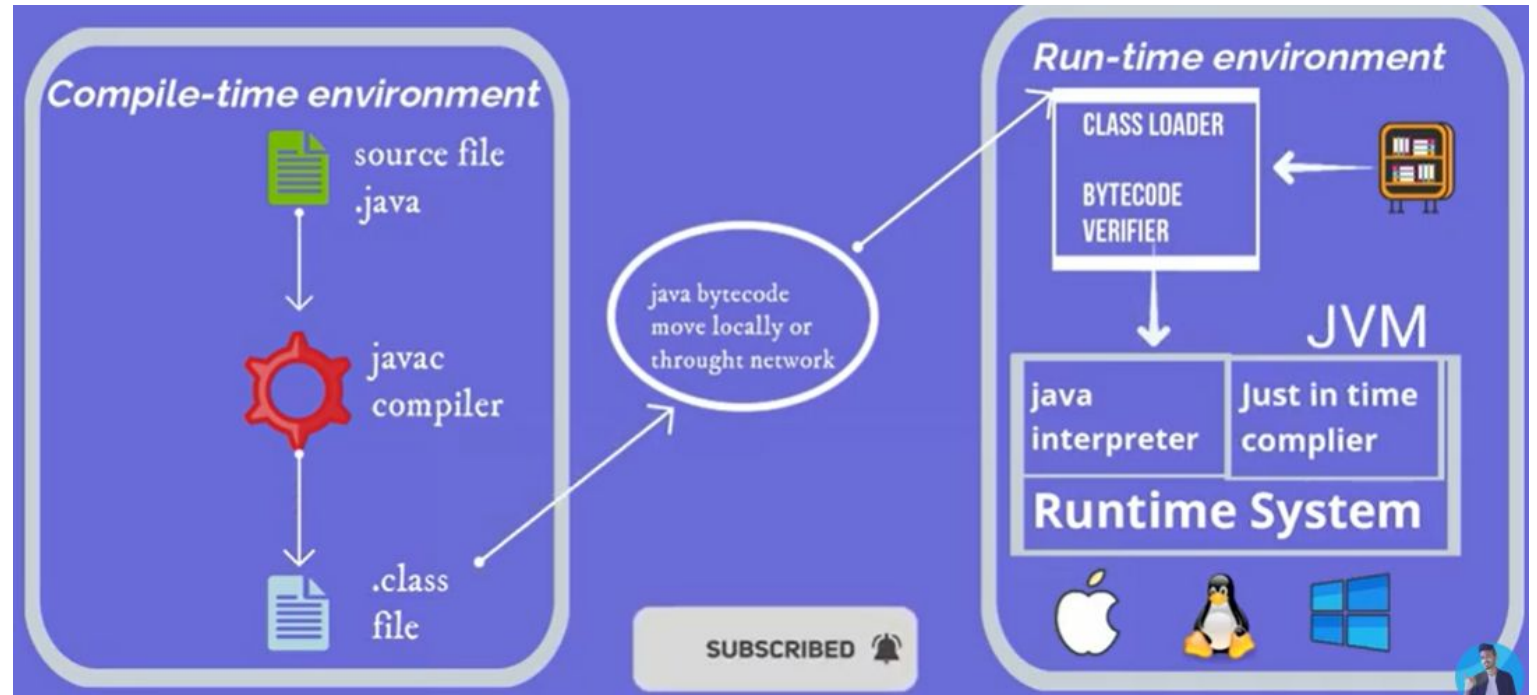
JDK:

- JRE+JVM+Development Tools
- Programmers and students (Java Developers)

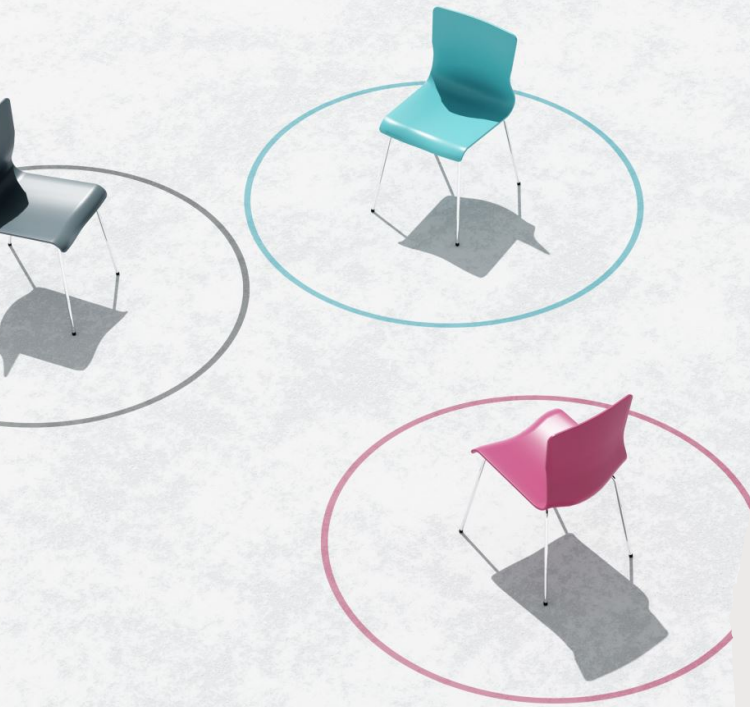
JRE:

- JVM+Libraries
- Bytecode can be directly executed

How Java Works?

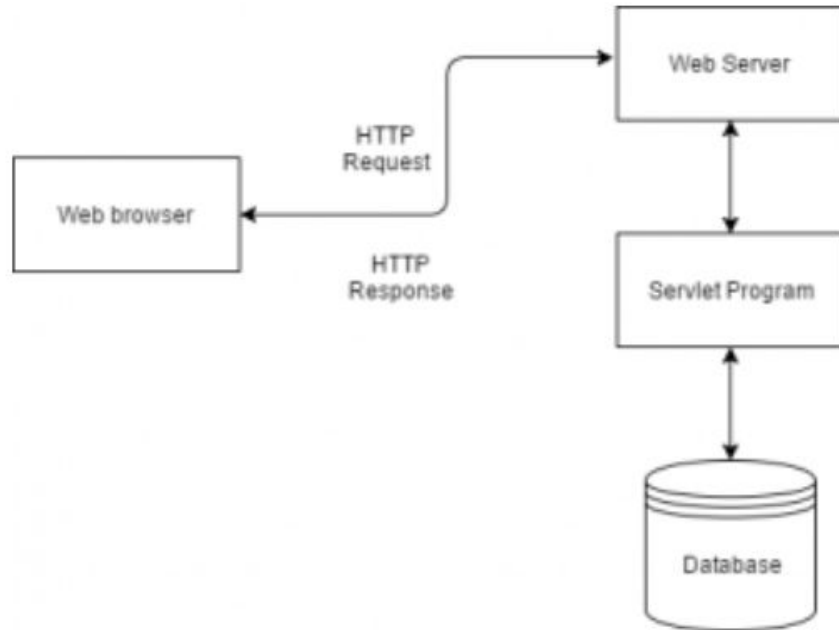


Java Buzzwords



1. Simple
 - a) Easy to understand and use
 - b) Complex concepts like pointers are eliminated
2. Secure:
 - a) No pointers and memory conflicts
3. Portable
 - a) Bytecode can be carried to any platform
4. Object-oriented
 - a) Every thing is object (Dog, Chair, etc)
5. Robust (memory management, exception handling, reliability)
6. Architecture-neutral (write once; run anywhere, anytime, forever)
7. Interpreted and High Performance (JIT, no compromise on performance)

Servlets



- Dynamic Web Pages:
 - Generate change content according to request
- Java Servlet allows Dynamic Web Pages
 - Server side programs
 - Handle the request, process and send back the response

OOP (Programming Paradigm)

- Object-Oriented Programming (OOP) is a programming paradigm that organizes software design around the concept of classes and objects.

Classes and Objects

Object:

- Object is real world entity:
 - Dog, Chair, Laptop
- Easy to develop programs using real world entities

Class:

- Class is a template or blueprint through which objects of different types are created
 - Animal, Furniture, Computer

Characteristics of an Object

- An object has state, behavior and identity
 - State:
 - Data values of an object, like legs of a dog
 - Behavior:
 - Functionality of an object like barking of dog
 - Identity:
 - Unique id for each object
 - Used by JVM for unique identification



OOP Principles



A vertical orange line on the left side of the diagram connects the four OOP principles listed on the right. Each principle is contained within a colored rounded rectangle, which is part of a larger rectangular frame of the same color. The frames are connected by horizontal lines on the right and vertical lines on the left, with the orange line acting as a central spine.

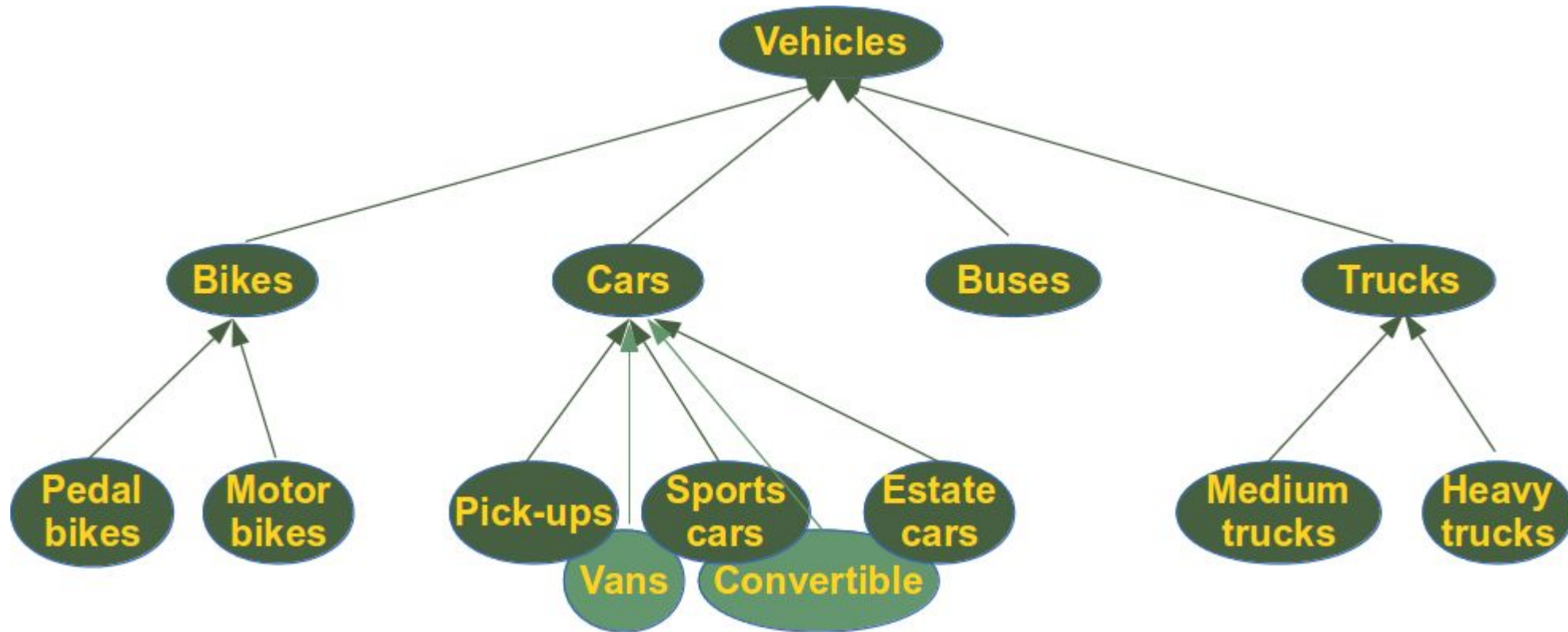
Encapsulation


Inheritance

Polymorphism

Abstraction

An Overview of Java





Code: “Hello World”

```
class Simple{  
    public static void main(String args[])  
    {  
        System.out.println("Hello Java");  
    }  
}
```

Code: “VariablesDemo”



print



println



comments



multiline
comments



block of code

Concatenate string value with a numeric value

It works in java

The Numeric value is converted to string before the concatenation occurs

Second Short Program

```
/*
    Here is another short example.
    Call this file "Example2.java".
*/

class Example2 {
    public static void main(String args []) {
        int num; // this declares a variable called num

        num = 100; // this assigns num the value 100

        System.out.println("This is num: " + num);

        num = num * 2;

        System.out.print("The value of num * 2 is ");
        System.out.println(num);
    }
}
```

Changing the flow of execution

```
/*
    Here is another short example.
    Call this file "Example2.java".
*/


class Example2 {
    public static void main(String args []) {
        int num; // this declares a variable called num

        num = 100; // this assigns num the value 100

        System.out.println("This is num: " + num);

        num = num * 2;

        System.out.print("The value of num * 2 is ");
        System.out.println(num);
    }
}
```



Introduction of Repetitions

```
/*  
    Demonstrate the for loop.  
  
    Call this file "ForTest.java".  
*/  
class ForTest {  
    public static void main(String args[]) {  
        int x;  
  
        for(x = 0; x<10; x = x+1)  
            System.out.println("This is x: " + x);  
    }  
}
```

This program generates the following output:

```
This is x: 0  
This is x: 1  
This is x: 2  
This is x: 3  
This is x: 4  
This is x: 5  
This is x: 6  
This is x: 7  
This is x: 8  
This is x: 9
```

Block of code

- Two or more statements form a code block

```
if(x < y) { // begin a block
    x = y;
    y = 0;
} // end of block
```


Lexical Issues

- A program is collection of Lexicons:
 - Whitespaces
 - Identifiers
 - Literals
 - Comments
 - Operators
 - Separators
 - Keywords





Whitespace

- Java is a free-form language
 - Don't worry about line breaks
 - Start on one line, end several lines below
 - Whitespace include,
 - Space
 - Tab
 - Newline
- 

Identifiers

- Names of variables, methods, classes etc..
- Allowed
 - Uppercase lowercase letter
 - Numbers (must not be before char)
 - Dollar sign (\$)
 - Underscore (_)

Literals

100	98.6	'X'	"This is a test"
-----	------	-----	------------------

Comments

- Single line `//`
- Multiline `/* */`
- Documentation comments `/** */`



Separators

Symbol	Name	Purpose
()	Parentheses	Used to contain lists of parameters in method definition and invocation. Also used for defining precedence in expressions, containing expressions in control statements, and surrounding cast types.
{ }	Braces	Used to contain the values of automatically initialized arrays. Also used to define a block of code, for classes, methods, and local scopes.
[]	Brackets	Used to declare array types. Also used when dereferencing array values.
;	Semicolon	Terminates statements.
,	Comma	Separates consecutive identifiers in a variable declaration. Also used to chain statements together inside a for statement.
.	Period	Used to separate package names from subpackages and classes. Also used to separate a variable or method from a reference variable.
::	Colons	Used to create a method or constructor reference.
...	Ellipsis	Indicates a variable-arity parameter.
@	Ampersand	Begins an annotation.

Keywords

abstract	assert	boolean	break	byte	case
catch	char	class	const	continue	default
do	double	else	enum	exports	extends
final	finally	float	for	goto	if
implements	import	instanceof	int	interface	long
module	native	new	open	opens	package
private	protected	provides	public	requires	return
short	static	strictfp	super	switch	synchronized
this	throw	throws	to	transient	transitive
try	uses	void	volatile	while	with
—					

Table 2-1 Java Keywords

Java Class Libraries

- java.lang.*
- System class

