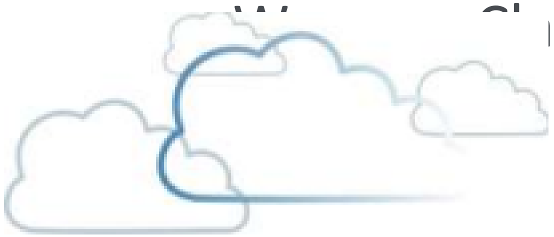
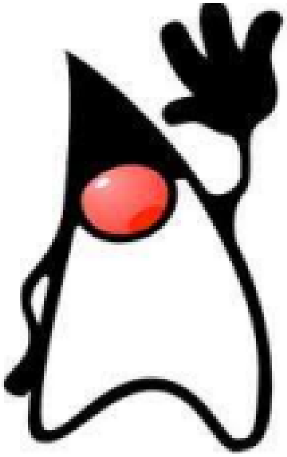
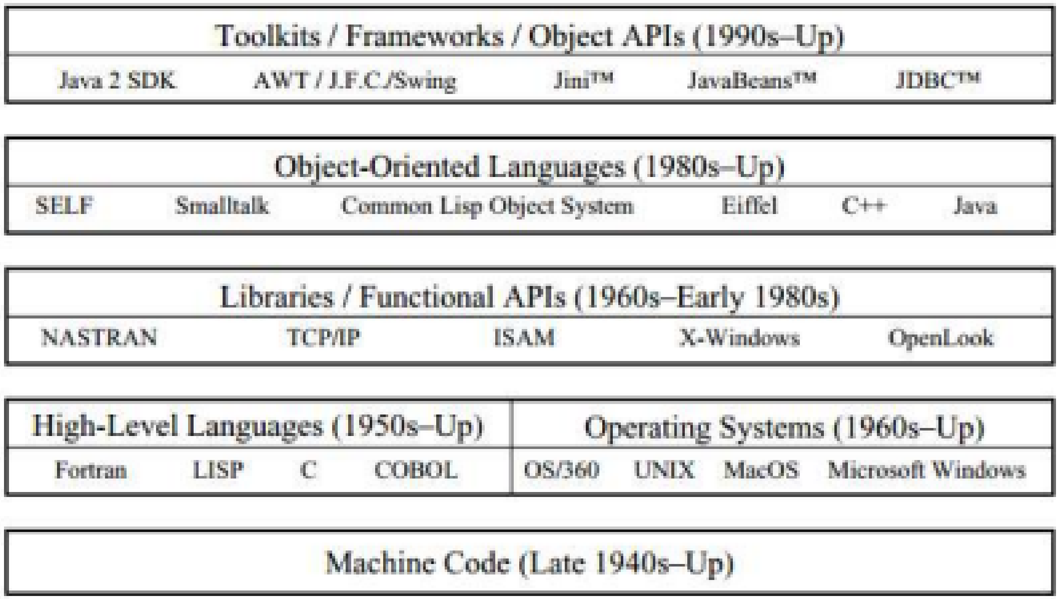
Program Outline

- History - Java
- Object Oriented Programming concepts • Primitive Data Types
- Wrapper Classes





History



Toolkits / Frameworks / Object APIs (1990s–Up)

Java 2 SDK AWT / J.F.C./Swing Jini™ JavaBeans™ JDBC™

Object-Oriented Languages (1980s–Up)

SELF Smalltalk Common Lisp Object System Eiffel C++ Java

Libraries / Functional APIs (1960s–Early 1980s)

NASTRAN TCP/IP ISAM X-Windows OpenLook

High-Level Languages (1950s–Up)

Fortran LISP C COBOL

Operating Systems (1960s–Up)

OS/360 UNIX MacOS Microsoft Windows

Machine Code (Late 1940s–Up)

About Java

- Java programming language was originally developed by Sun Microsystems – by James Gosling
  - – released in 1995 as core component of Sun Microsystems
  - – Java platform (Java 1.0 [J2SE]).
  - – Latest release
    - Java Standard Edition 7 Update 25 (1.7.25) (June 18, 2013; 52 days ago)
- Multiple Editions
  - – Java Card for smartcards.

– Java Platform, Micro Edition (Java ME) — targeting environments with limited resources.
– Java Platform, Standard Edition (Java SE) — targeting workstation environments. – Java Platform, Enterprise Edition (Java EE) — targeting large distributed enterprise or Internet environments.

• Sun Microsystems has renamed the new J2 versions as Java SE, Java EE and Java /.

”Write Once, Run Anywhere”

Features of Java

• **Object Oriented** :

– In java everything is an Object.

– Java can be easily extended since it is based on the Object model.

• **Platform independent**:

- Unlike many other programming languages including C and C++ when Java is compiled, it is compiled into platform independent byte code.

- **Simple** :
  - Java is designed to be easy to learn.

- **Secure**
  - Compiler , Class loader , Byte code verifier , Sandbox

- **Architectural- neutral** :
  - Java compiler generates an architecture-neutral object file format executable on many processors, with the presence Java runtime system.

l neutral and having no implementation dependent aspects of the specification makes Java

Contd

- **Robust** :
  - Java makes an effort to eliminate error prone situations by emphasizing mainly on compile time error checking and runtime checking.
- **Multi-threaded** :
  - With Java's multi-threaded feature it is possible to write programs that can do many tasks simultaneously.
- **Interpreted** :
  - Java byte code is translated on the fly to native machine instructions and is not stored anywhere.
- **High Performance**:
  - With the use of Just-In-Time compilers Java enables high performance.
- **Distributed** :
  - Java is designed for the distributed environment of the internet.
- **Dynamic** :
  - Java programs can carry extensive amount of run-time information that can be used to verify

ccesses to objects on run-time.

Java Program Lifecycle

- Java programs normally undergo four phases – Edit

- Programmer writes program (and stores program on disk) –

Compile

- Compiler creates *byte codes* from program (.class) – Load

- Class loader stores byte codes in memory

– Execute

- Interpreter: translates *byte codes* into machine language

Java Program Lifecycle

8

JVM - Portability
Object Oriented Programming

- Encapsulation
- Abstraction
- Polymorphism
- Inheritance

Encapsulation

- Hiding the irrelevant information

– Class
• State & Behavior
– Access Specifiers
• Private

– Hides the implementation details of a class
– Forces the user to use an interface to access data
– Makes the code more maintainable

Abstraction

• Abstraction means to show only the necessary details to the client of the object. – Public methods
– Perspective based

Access Specifiers

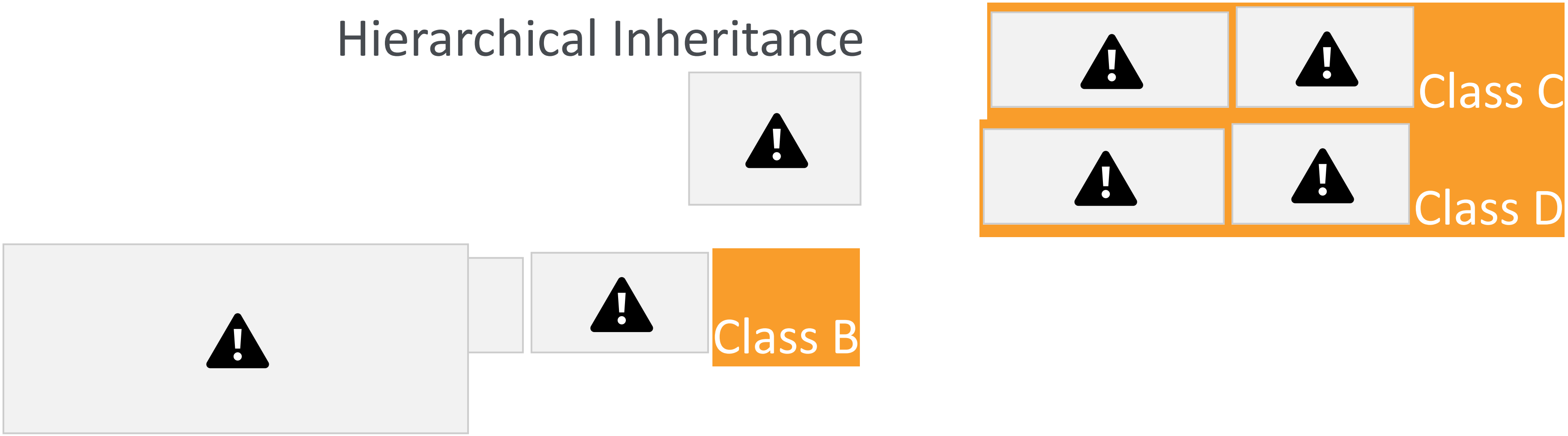
Inheritance

Single Inheritance

Multilevel Inheritance

Class A

Hierarchical Inheritance



Class B

Class C

Class D

Relationship

- Is-a

– Mammal IS-A Animal – Reptile IS-A Animal

– Dog IS-A Mammal

- Has-a

Polymorphism

- Taking multiple forms

– Compile time Polymorphism •

Over Loading

– Runtime Polymorphism

- Overriding

Primitive Data Types

The Java programming language defines eight primitive types:

- Logical – boolean
- Textual – char
- Integral – byte, short, int, and long
- Floating – double and float

Logical –boolean

The boolean primitive has the following characteristics: • The boolean data type has two literals, true andfalse. • For example, the statement:

boolean truth = true;

declares the variable truth as boolean type and lue of true.

Textual –char

The textual char primitive has the following characteristics: • Represents a 16-bit Unicode character

- Must have its literal enclosed in single quotes (’
’) • Uses the following notations:

'a' The letter a

'\t' The tab character

'\u????‘ A specific Unicode character, ????, is replaced with exactly four hexadecimal digits .

’\u03A6’ is the Greek letter phi [Φ].

Integral –byte,short,int, andlong

The integral primitives have the following characteristics: • Integral primates use three forms: Decimal, octal, or hexadecimal

- Literals have a default type of int.
- Literals with the suffix L or l are of type long.

Floating Point –floatanddouble

The floating point primitives have the following characteristics:

- Floating-point literal includes either a decimal point or
one of the following:
- E or e (add exponential value)
- F or f (float)
- D or d (double)

Examples:

3.14 A simple floating-point value (a double) 6.02E23 A large floating-point value

2.718F A simple float size value

123.4E+306D A large double value with redundant D

Primitive Data Types contd..

- byte:

– Byte data type is a 8-bit signed two's complement integer. – Minimum value is -128 (-2^7)

– Maximum value is 127 (inclusive)(2^7 -1)

– Default value is 0

- Byte data type is used to save space in large arrays, mainly in place of integers, since a byte is four times smaller than an int.
- Example : byte a = 100 , byte b = -50

- short:
  - Short data type is a 16-bit signed two's complement integer.
  - Minimum value is -32,768 (-2^15)
  - Maximum value is 32,767(inclusive) (2^15 -1)
  - Short data type can also be used to save memory as byte data type. A short is 2 times smaller than an int

ue is 0.

short s= 10000 , short r = -20000

- int:
  - Int data type is a 32-bit signed two's complement integer.
  - Minimum value is - 2,147,483,648.(-2^31)
  - Maximum value is 2,147,483,647(inclusive).(2^31 -1)
  - Int is generally used as the default data type for integral values unless there is a concern about memory.
  - The default value is 0.
  - Example : int a = 100000, int b = -200000

- long:
  - Long data type is a 64-bit signed two's complement integer. – Minimum value is -9,223,372,036,854,775,808.(-2^63) – Maximum value is 9,223,372,036,854,775,807 (inclusive). (2^63 - 1)
  - This type is used when a wider range than int is needed.

  lue is 0L.

  long a = 100000L, int b = -200000L

- float:
  - Float data type is a single-precision 32-bit IEEE 754 floating point.
  - Float is mainly used to save memory in large arrays of floating point numbers.
  - Default value is 0.0f.
  - Float data type is never used for precise values such as currency.
  - Example : float f1 = 234.5f
- double:
  - double data type is a double-precision 64-bit IEEE 754 floating point.
  - This data type is generally used as the default data type for decimal values. generally the default choice.
  - Default value is 0.0d.
  - Example : double d1 = 123.4

- boolean:
  - – boolean data type represents one bit of information.
  - – There are only two possible values : true and false.
  - – This data type is used for simple flags that track true/false conditions.
  - – Default value is false.
  - – Example : boolean one = true

- char:
  - – char data type is a single 16-bit Unicode character.
  - – Minimum value is '\u0000' (or 0).
  - – Maximum value is '\uffff' (or 65,535 inclusive).
  - – Char data type is used to store any character. –

char letterA ='A'

Reference Data Types

- Reference variables are created using defined constructors of the classes.
- Class objects, and various type of array variables come under reference data type.
- Default value of any reference variable is null.
- A reference variable can be used to refer to any object of the declared type or any compatible type.
  - Example : Animal animal = new Animal("giraffe");

Inheritance

- extends - keyword
- Single , Multilevel, Hierarchical – supported

Thank

You

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