

Course Name - Object Oriented Programming using Java

Lecture 5– Difference between different OOPs Languages.

Presented By
Dr. Sudipta Sahana
Associate Professor
Dept. of CSE
UEM - Kolkata

Topic of Interest

- ▶ **History of Object-oriented programming:**
- ▶ **Smalltalk**
- ▶ **C++**
- ▶ **JAVA**
- ▶ **C#**
- ▶ **Eiffel**
- ▶ **Ruby**
- ▶ **Python**

History of Object-oriented programming

SIMULA I (1962-65) and Simula 67 (1967) are the two first object-oriented languages. Simula 67 introduced most of the key concepts of object-oriented programming: both objects and classes

The idea of object-oriented programming gained momentum in the 1970s with the introduction of Smalltalk (1972 to 1980), which embraced the concepts of class and message of Simula. Smalltalk is the language with which much of the theory of object-oriented programming was developed.

In the early 1980s, Bjorn Stroustrup integrated object-oriented programming into the C language. The resulting language was called C++ and it became the first object-oriented language to be widely used commercially. Then in the 1990s a group at sun led by James Gosling developed a similar version of C++ called Java that was developed to let devices, peripherals and appliances possess a common programming interface. In 2000, Microsoft announced both the .NET platform and a new programming language called C#. C# is similar in many respects to C++ and Java. Ruby and Python are scripting languages which support the object-oriented paradigm.

Properties of Smalltalk, Java, C++, C#, Eiffel, Ruby and Python which are common Object-Oriented Programming Languages (OOPs) are outlined in this section

Properties \ Languages	Smalltalk	Java	C++	C#	Eiffel	Ruby	Python
Object-Orientation	Pure	Hybrid	Hybrid	Hybrid	Pure	Pure	Hybrid
Static/Dynamic Typing	Dynamic	Static	Static	Static	Static	Dynamic	Dynamic
Inheritance	Single	Single (class) Multiple (interface)	Multiple	Single (class) Multiple (interface)	Multiple	Single (class) Multiple (mixins)	Multiple
Method Overloading	No	Yes	Yes	Yes	No	No	No
Operator Overloading	Yes	No	Yes	Yes	Yes	Yes	Yes
Generic Classes	N.A.	Yes	Yes	Yes	Yes	N.A.	N.A.
Dynamic Binding	Yes	Yes	Yes (static by default)	Yes (static by default)	Yes	Yes	Yes

Table : Comparison between different OOPs

Smalltalk

Smalltalk was the first general purpose object-oriented programming language. It is a pure dynamically-typed object-oriented language. Smalltalk supports a uniform object model. Everything a programmer deals with is an object including primitive types (such as numbers) and user-defined types. Clients can access the functionality of a class only by invoking well defined methods. Hence, all operations are performed by sending messages to objects.

Language paradigms: Object-oriented program.

Language designers: Alan Kay

Software: VisualWorks, GNU Smalltalk

C++

- C++ was developed at Bell Labs by Bjarne Stroustrup (1979).
- Language paradigms: Object-oriented program.
- Language designers: Bjarne Stroustrup
- It has added support for statically-typed object-oriented programming, exception handling, virtual functions, and generic programming to the C programming language.
- C++ is not a pure object oriented languages.
- It provides multiple inheritance and exception handling
- It does not provide garbage collection.

Java

- JAVA was developed by Sun Microsystems Inc in 1991,
- It is a simple programming language.
- Java is designed as a portable language that can run on any web-enabled computer
- A major benefit of using Java byte code is portability, since the byte code can be executed regardless of the operating system on a given computer.
- Java has class hierarchy with class Object at the root and provides single inheritance of classes.

C#

- C# is an OOP language part of the .NET framework
- It has an object-oriented syntax based on C++ and is heavily influenced by Java.
- Like Java, it has garbage collection and it is compiled to an intermediate language, which is executed by the runtime environment known as Common Language Runtime (CLR) which is similar to the JVM.
- The C# conception of class and instances, as well as inheritance and polymorphism, are relatively standard.

Eiffel

- Eiffel is a proprietary language, which was developed in 1985
- It is a pure object-oriented language.
- The design is based on classes. All messages are directed to a class.
- Eiffel enables use of assertions which express formal properties of member methods in terms of preconditions, post conditions, and class invariants.
- Multiple inheritance is permitted in Eiffel.

Ruby

- Ruby is an object-oriented scripting language
- It is developed in 1993 by Matsumiko Yukihiro.
- It is similar in purpose to python or Perl.
- Ruby is designed to be an object-oriented programming language based on Perl
- All methods must belong to some class.
- Ruby only supports single inheritance, though multiple inheritance functionality is indirectly supported through the modules.

Python

- Python is an object-oriented scripting language
- It is developed in 1990 by Guido Van Rossum.
- Python allows both procedural and objected-oriented development.
- The encapsulation however is not fully supported as access control is primitive in Python.
- There are no public, private methods and the only protection is by name mangling. If a programmer knows how name mangling is performed (which is very simple and known mechanism) he could invoke any class method.
- Python allows multiple inheritance. The issue of name clashes in multiple inheritance is resolved by letting programmer define the order of super classes by the order in which they are declared.

*Thank
You*