

# Theory and Specification

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## Principles:

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1. It must be simple, object-oriented, and familiar.
2. It must be robust and secure.
3. It must be architecture-neutral and portable.
4. It must execute with high performance.
5. It must be interpreted, threaded, and dynamic.

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## Basic Definitions:

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- an object is a runtime entity and its state is stored in fields and behavior is shown via methods
  - methods operate on an object's internal state and serve as the primary mechanism for object-to-object communication
  - the Object class is the parent class of all the classes in java by default
- a class represents the set of properties or methods that are common to all objects of one type
  - a class can contain fields and methods to describe the behavior of an object
- an interface is an abstract type that is used to specify a behavior that classes must implement

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## Inheritance:

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- the class which inherits the properties of other is known as subclass (derived class, child class)
- the class whose properties are inherited is known as superclass (base class, parent class).
- extends is the keyword used to inherit the properties of a class

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```
class Super {  
    ....  
    ....  
}  
class Sub extends Super {  
    ....  
    ....  
}
```

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### Overloading:

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occurs when two or more methods in one class have the same method name but different parameters

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```
class Dog{
    public void bark(){
        System.out.println("woof ");
    }
    // overloading method
    public void bark(int num){
        for(int i=0; i<num; i++)
            System.out.println("woof ");
    }
}
```

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### Access Modifiers:

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- public
    - any class can access
    - accessible by entire application
  - private
    - only accessible within the class
  - protected
    - allow the class itself to access them
    - classes inside of the same package to access them
    - subclasses of that class to access them
  - package protected
    - default
    - the same class and any class in the same package has access
    - protected minus the subclass unless subclass is in package
  - Static: Belongs to class not an instance of the class
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### Type Classifications:

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- Concrete Types

- concrete types describe object implementations, including memory layout and the code executed upon method invocation
- the exact class of which an object is an instance not the more general set of the class and its subclasses
- beware of falling into the trap of thinking that all concrete types are single classes!
- Set of Exact Classes
- ex: List x has concrete type ArrayList, LinkedList, ...
- Abstract Types
  - Abstract types, on the other hand, describe properties of objects
  - They do not distinguish between different implementations of the same behavior
  - Java provides abstract types in the form of interfaces, which list the fields and operations that implementations must support

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### Generics:

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- Definition
  - generics are a facility of generic programming
    - \* a style of computer programming in which algorithms are written in terms of types to-be-specified-later that are then instantiated when needed for specific types provided as parameters
  - ex: compiletime:

`List<String>`
  - runtime: List
- Notes
  - in java, generics are only checked at compile time for type correctness
  - generic type information is then removed via a process called type erasure, to maintain compatibility with old JVM implementations, making it unavailable at runtime
- Sources
  - [https://en.wikipedia.org/wiki/Generics\\_in\\_Java](https://en.wikipedia.org/wiki/Generics_in_Java)

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### Sources:

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- [https://en.wikipedia.org/wiki/Java\\_\(programming\\_language\)](https://en.wikipedia.org/wiki/Java_(programming_language))
- [https://www.tutorialspoint.com/java/java\\_interview\\_questions.htm](https://www.tutorialspoint.com/java/java_interview_questions.htm)