Introduction

Serialization is a converting the state of an object into a byte stream. Deserialization is the reverse process where the byte stream is used to recreate the actual Java object in memory. The serialization and deserialization process is platform-independent, it means you can serialize an object on one platform and deserialize it on a different platform.

Benefits

1)Data Persistence: Serialized objects can be saved to files or databases, allowing the state of an application to be preserved between sessions.

2) Communication: Serialized data can be transmitted over networks, facilitating distributed systems and remote method invocation (RMI).

3) Deep Cloning: Serialization provides a mechanism for creating deep copies of objects without manually copying each field.

4) Interoperability: Serialization allows for the easy exchange of data between different parts of a system or between different systems.

5) State Capture: Serialization can capture the state of an object at a specific point in time, aiding in logging and debugging complex applications by preserving the exact state of objects for later analysis.

Mechanism

Serialization Process:

Serialization in Java involves converting an object's state into a byte stream, which can then be saved to a file, sent over a network, or stored in memory. This process captures the object's state so it can be recreated later.

1) Implementing Serializable Interface: For a class to be serializable, it must implement the java.io.Serializable interface. This is a marker interface, meaning it does not contain any methods but indicates that the class can be serialized.

```
public class Person implements Serializable {  4 usag
    private static final long serialVersionUID = 1l;
    private String name;  4 usages
    private int id;  4 usages
```

2) Using ObjectOutputStream: To serialize an object, an ObjectOutputStream is used in conjunction with a FileOutputStream. The ObjectOutputStream writes the object's state to a byte stream, and the FileOutputStream writes this byte stream to a file.

3) Writing Objects: The writeObject method of ObjectOutputStream is used to serialize the object.

```java
Person person = new Person( name: "Dinelka",  id: 12345);

// Serialize object
try (ObjectOutputStream oos = new ObjectOutputStream(new FileOutputStream( name: "person.ser"))) {
    oos.writeObject(person);
    System.out.println("Serialization done: " + person);
} catch (IOException e) {
    e.printStackTrace();
}
```

Deserialization Process:

Deserialization is the process of reconstructing an object from a byte stream, essentially reversing the serialization process. It restores the object's state from the byte stream.

1) Using ObjectInputStream: To deserialize an object, an ObjectInputStream is used with a FileInputStream. The ObjectInputStream reads the byte stream from the file and reconstructs the object.

2) Reading Objects: The readObject method of ObjectInputStream is used to deserialize the object.

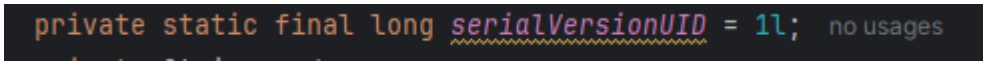
```java
try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream( name: "person.ser"))) {
    Person deserializedPerson = (Person) ois.readObject();
    System.out.println("Deserialization done: " + deserializedPerson);
} catch (IOException | ClassNotFoundException e) {
    e.printStackTrace();
}

}
```

SerialVersionUID Explain:

The serialVersionUID is a unique identifier for each Serializable class. This identifier is used during the deserialization process to verify that the sender and receiver of a serialized object have loaded classes for that object that are compatible with respect to serialization.

Version Control: The serialVersionUID helps in version control of Serializable classes. When a class structure is changed (for example, adding new fields), the serialVersionUID ensures that the class is compatible with its previous versions.

Deserialization Verification: During deserialization, Java's serialization mechanism checks that the serialVersionUID of the serialized object matches that of the corresponding class.



private static final: These keywords ensure that the serialVersionUID field is a constant, belongs to the class (not instances of the class), and cannot be modified.

long serialVersionUID = 1L:sets the serialVersionUID to a specific value (1 in this case). This value can be changed manually if the class undergoes incompatible changes.

See code snippet:

https://github.com/dinelkalakshan40/Serialization-and-Deserialization.git

Serialization and Deserialization Diagram: