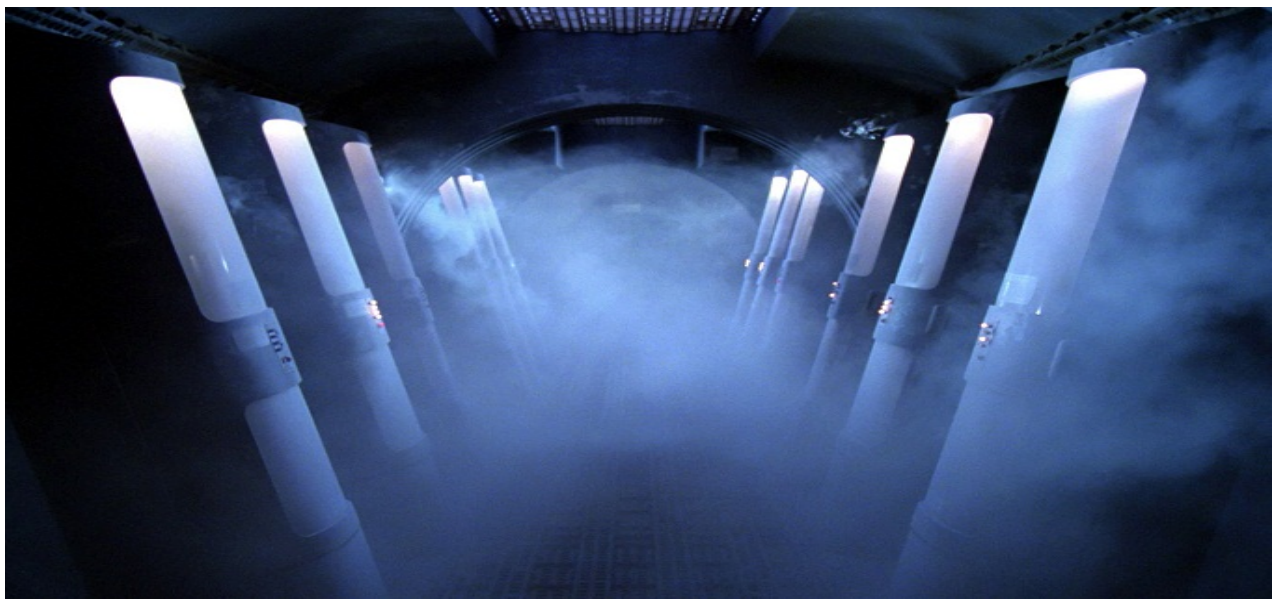
Object Serialization

Spring 2016



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[Examples are in the repository folder `examples/serialization`.]

Basic Examples

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- Example 2: MioAlma.java, Cryogenics.java
  - Shows how to (de)serialize our own class. Also shows the affect of the `transient` keyword.

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- Use the program `serialver` (bundled with Java) to generate the `serialVersionUID` for a given class. Or use Eclipse to generate it for you!

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- Going the other way requires additional processing depending upon the amount of backwards compatibility desired.

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   - 4.1 Revert `MioAlma` back to version 1.
   - 4.2 Revive a `MioAlma` version 1 object from a freeze-dried `MioAlma` version 2 object!

SerialVersionUID

- It is strongly recommended that all serializable classes explicitly declare `serialVersionUID` values, since the default `serialVersionUID` computation is highly sensitive to class details that may vary depending on compiler implementations, and can thus result in unexpected `InvalidClassException`s.

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- Example:

```
private void readObject (ObjectInputStream s)
{
  s.defaultReadObject(); //standard deserialization
  initialize(); //our custom initialization
  //call optional method after customization
  if (isRunning)
      start();
}
```

Overriding Deserialization

- Use the `java.io.Externalizable` interface to override the serialization process.

`void readExternal(ObjectInput in)`
`void writeExternal(ObjectOutput out)`

- `readExternal`: Implement the method to restore its contents by calling the methods of DataInput for primitive types and readObject for objects, strings and arrays.
- `writeExternal`: Implement the method to save its contents by calling the methods of DataOutput for its primitive values or calling the writeObject method of ObjectOutput for objects, strings, and arrays.

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  - Encrypt and sign the entire object using `javax.crypto.SealedObject` and/or `java.security.SignedObject` wrapper. However, this requires managing symmetric keys.
  - For secure transport over the network, use SSL (Secure Sockets Layer) layer to encrypt the data. This requires minimal change in our code and is a widely used technique.

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- Research how to use the Protocol Buffers serialization framework for Java. Convert the program from the previous exercise to use *Protocol Buffers* and then time the program again.

References

- Other object serialization frameworks: Kryo, JSON, Google Protocol Buffers, Apache Avro, Facebook Thrift etc.
- Serialization (Wikipedia). https://en.wikipedia.org/wiki/Serialization
- Performance comparison of various serialization frameworks: http://www.slideshare.net/AlexTumanoff/serialization-and-performance