Java vs. C++
Programming Language Comparison

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Presentation adapted from
http://www.openloop.com/education/classes/sjsu/sjsu_oop/spring01/presentation/jcCompare.ppt

Object-Oriented Programming Languages

- Java and C++ are the most popular object-oriented programming languages
- C++ was created at AT&T Bell Labs in 1979
- Java was born in Sun Microsystems in 1990

Features for Comparison

- Simple
- Object-oriented
- Distributed
- Robust
- Secure
- Architecture Neutral
- Portable
- Compiled or Interpreted
- High Performance
- Multithreaded
- Dynamic
- Fun

Simple

JAVA	**C++**
• No pointer	• Pointer
• No multiple inheritance	• Multiple inheritance
• Automatic garbage collection	• Manual garbage collection
• No operator overloading	• Operator overloading
• No goto statement and no structure and union data structure	• Goto statement and structure and union data structure

Object-Oriented

JAVA

- Purely object-oriented
- No stand-alone data and functions
- Automatically supports polymorphism

C++

- Hybrid object-oriented
- Allows the stand-alone data and functions
- Needs declare virtual methods explicitly

Distributed

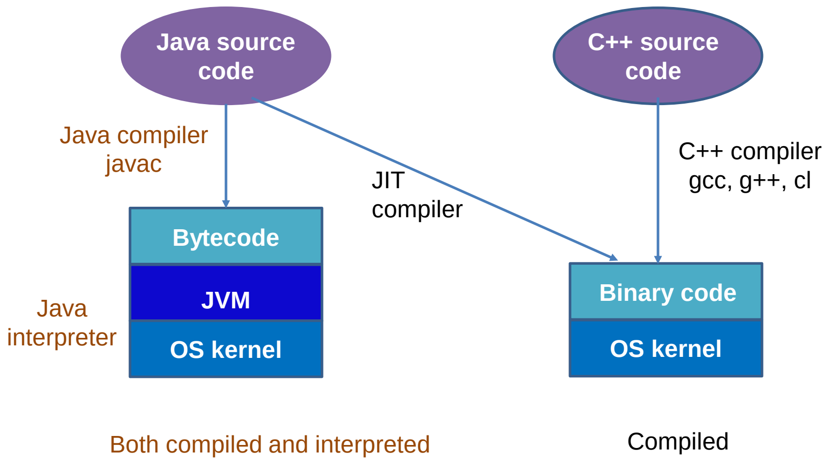
JAVA

- Handles TCP/IP networking easily and nicely, can open and access objects across the Internet via URL just like a local file system

C++

- External library supports TCP/IP networking, but much harder to do network programming

Interpreted or Compiled



High Performance

JAVA

- Much slower than C++, but good enough to run interactively for most applications
- JIT compiler available

C++

- About 10-20 times faster than equivalent Java code
- Most operating systems are written using C/C++

Robust

JAVA

- Originally designed for writing highly reliable or robust software
- Explicit method declarations
- No pointers and automatic garbage collection avoid hard-to-debug mistakes
- Array bounds-checking

C++

- Allows implicit type and function declarations
- No automatic garbage collection is susceptible to memory leakage
- Using pointers is susceptible to memory corruption
- No array bounds checking

Secure

JAVA

- Byte-code is verified at run-time to ensure security restrictions are not violated
- Memory layout is handled at run-time by JVM
- Uses multiple namespaces to prevent hostile classes from spoofing a JAVA program

C++

- Memory is handled at compile-time by compiler

Architecture Neutral and Portable

JAVA

- Same bytecode can run on any machine supporting JVM
- Well-defined and fixed-size data types, file formats, and GUI behavior

C++

- Platform-dependent binary code cannot be executed on a different machine
- Implementation-specific and varied-size data types by platforms

Multithreaded

JAVA

- Provides native multithreading support
- Concurrent applications are quite easy

C++

- Rely on external libraries for multithreading
- Harder to do multithreaded programming

Dynamic

JAVA

- Run-time representation for classes makes it possible to dynamically link classes into a running system
- Loads classes as needed, even from across networks

C++

- Needs recompile if libraries are updated
- Load libraries when compiled

Fun

JAVA

- Nice features combined with the Internet applications make Java programming appealing and fun

C++

- The complicated or even some confusing features make C++ programming error prone

Conclusion

- C++ is a high performance and powerful language
- Most of the industry software is written in C/C++
- Java’s cross-platform compatibility and convenient APIs for networking and multithreading have won it a place in the business world
- Java is logically the next step in the evolution of C++