

9. Implementation

- Choice of programming language
- Scripting languages
- Debugging
- Development Environments
- Performance
- Human-Computer Interaction

9.1 Programming Languages

- Programming languages
 - The basic tools of software development
- Compiled versus interpreted
 - Compiled: C++, Pascal
 - Interpreted: Perl, Basic
 - Both: Java, Smalltalk
- High-level versus assembly
- System programming versus scripting
- Imperative versus functional versus logical
 - Imperative: object-oriented, structured, Fortran, machine language
 - Functional: Lisp, Scheme
 - Logical: Prolog

Programming Language Qualities

- Performance
- Usability
 - readability
 - learnability
 - programming efficiency
- Portability
 - will it run on next year's computers?
- Tool support
 - analyzers, reverse engineering, profilers...
- Library support
 - reusable code
- Interoperability
 - integration with other programming languages
- Standardization / popularity
 - will it be around in ten years?

Comparison: C++ and Java

- At the moment, the two most popular languages
- C++
 - object-oriented extension of C
 - problem: C code is still legal in C++
 - problem: pointer manipulation, macros
 - twice as fast as Java
 - programmer can decide when to use object-oriented constructs and when not
 - compilers for all platforms
 - generic types ("templates")
 - most operating system libraries are for C or C++
 - performance is predictable
 - no garbage collection
 - no just-in-time compilation

Comparison: C++ and Java

- Java
 - completely object-oriented
 - except for primitive types
 - compiled to byte codes, then interpreted
 - has its own platform: the Java Virtual Machine
 - very large standard library
 - Internet support
 - applets, RMI
 - remote class loading
 - reflection
 - efficient to use
 - programs can be written twice as fast as in C++
 - garbage collection

Comparison: C++ and Java

- Conclusion:
 - use Java for most things
 - use C++ if you need performance
 - use C++ if you want to interoperate with operating systems or hardware
- That's just my opinion, of course ;)