13—Language Processing

CS1101S: Programming Methodology

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October 5, 2012

Generated on Friday 5 October, 2012, 09:50
T-Diagrams

x86-64 Processor

Program “C&C” (x86-64 code)

“C&C” running on x86-64
Running an app on iPhone 5

Apple A6, the processor of iPhone 5

Program “Angry Birds” (A6 build)

“Angry Birds” running on iPhone 5
Interpreter

- Interpreter is a program that executes another program.
- The interpreter’s *source language* is the language in which the interpreter is written.
- The interpreter’s *target language* is the language in which the programs are written which the interpreter can execute.
Interpreters

Interpreter for Basic, written in x86-64 machine code
Basic program “Calc”
running on x86-64 using interpretation
“Angry Birds” app running on a PC using hardware emulation
The browser acts as an interpreter for JavaScript.
Translators

- Translator translates from one language—the *from-language*—to another language—the *to-language*
- Compiler translates from “high-level” language to “low-level” language
Scheme-to-C compiler written in x86-64 machine code
Compiling “nim” from Scheme to C
Two-stage Compilation

Compiling “nim” from Scheme to C to x86-64 machine code
Compiling a Scheme-to-C compiler from C# to x86-64 machine code
Typical Execution of Java Programs

Compiling “C&C” from Java to JVM code, and running the JVM code on a JVM running on an x86-64
Excursion: Making these Slides

Compiling these slides from \LaTeX to DVI to PostScript to PDF on x86-64
Excursion: Viewing these Slides

Viewing the slides on a PC

- 13_color
- PDF
- PDF
- x86-64
- x86-64
The "Usual" way to use leJOS

Compiling "Segway" from Java to NXJ
Running NXJ Programs on Brick

NXJ program “Segway” running on NXT brick using NXJ
Compiling "sumo" from JavaScript to Java to NXJ code
Running sumo

NXJ program “sumo”
running on NXT using NXJ runtime system
Components: programs, translators, interpreters, machines

T-diagrams

Combination of interpretation and compilation is common

Interpretation and compilation are ubiquitous in computing

Robot contest is making use of interpreters and compilers