

Advanced Programming Systems

Introduction

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Benton Hess prepares students for a performance of Puccini's La rondine.

Why Do We Write Programs?

The ultimate goal of all computer science is the program. The performance of programs was once the noblest function of computer science, and computer science was indispensable to great programs. Today, programming and computer science exist in complacent isolation, and can be [rescued only] by the conscious cooperation and collaboration of all programmers."

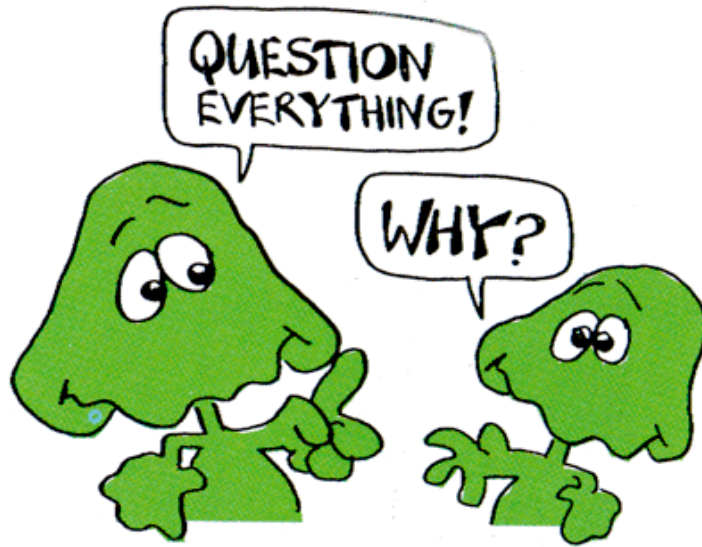
Notes on Postmodern Programming, James Noble
and Robert Biddle

Quoted by Steele and Gabriel, Keynote at History of Programming Languages III in 2007, <http://portal.acm.org/citation.cfm?id=1411839>

Class Content

- Study models of program code
- Find invariants
- Transform programs
 - parallelism: multiple processors
 - locality: better use of memory hierarchy
- Understand formal semantics
 - e.g. whether two programs are equivalent
 - execution-time paradox
- Write compiler optimization passes
- (New) Analysis of parallel code

Class Rule #1



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<http://www.xtrasite.co.nz/monsta/gallery/early/question.gif>

programming languages	programs	program execution	programmer

Some Questions

- What is a program?
- What do all programs have in common?
- What are your favorite, most used, or most unusual programs or programming languages?

Scientific Problem Solving

- Ask the question
 - why is it a problem?
- Formalize the problem
- Develop a solution
- Prove it is correct
- Test its efficiency

Why Programming Support

- Language implementation
 - The first high-level programming language
 - Algol vs. Pascal
- Program efficiency
- Program correctness/reliability/security
- Program analysis as a science
- Other uses of program understanding
- Commercial needs
- Meta-programming