

Introduction to Computers and Programming

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Reading: FK: 1-34; B: 208-217, 237-244

Lecture 1
Sept 5 2003

Learning Objectives for CP

- The learning objectives of CP are those of a “First Course” in CP.
- Students who successfully pass CP should:
 - Use the Ada programming language as an engineering tool in designing and implementing aerospace software systems.
 - Develop a programming style that is accepted industry practice.
 - Develop a basic understanding of computer architecture.

Measurable Outcomes

Fall term

1. Describe program language evolution and classification
2. Describe basic computer architecture
3. Solve basic numerical computation in binary/ other number representation systems
4. Design and implement simple assembly language programs

Measurable Outcomes

Fall term

5. Describe the various classes of OSs and the correlation to HW growth. Evolution based classification, Domain-specific classification
6. Design and implement straight-line Ada programs
7. Design recursive programs and mathematically compute the upper bound on execution time
8. Develop a programming style that is accepted industry practice

Outline

- Texts and handouts
- Topics covered
 - Programming
 - Bits, bytes, number systems
 - Computer architecture
 - Operating systems
 - Recurrence functions
 - Matrices
- 17 lectures
- 5 recitations
- 15 problem sets

Ada 95

- Ada 95
 - Strong typing / run-time checking / parallel processing / exception handling / generics
 - Originally targeted for embedded and real-time systems

Use of Ada Around the World

- The control software of nearly every new commercial aircraft model, including the Boeing 777, the Airbus 340, and many regional airlines
- Nearly every country's air traffic control system
- High-speed railroads, including French TGV, and the French/British Channel Tunnel system
- A number of communications and navigational satellites and ground-based equipment
- Steel mills, industrial robotics, medical electronics, telecommunications, ...

Books

- **Computer Science: An Overview**
by J. Glenn Brookshear
Paperback: 575 pages;
Publisher: Addison-Wesley ; 7th edition
ISBN: 0201781301
- **Ada 95: Problem Solving and Program Design**
by Michael B. Feldman, Elliot B. Koffman
Paperback: 784 pages
Publisher: Addison-Wesley ; 3rd edition
ISBN: 020136123X

Computer Software

- Computer applications
 - Functionality to end user
- System software
 - Managing the computer system

Programming Language

Application Language

High-level Language

} Easy to understand, use, portable,
compiled, less efficient

Assembly Language

Machine Language

} Efficient, hard to use, machine
dependent, not portable

Hardware

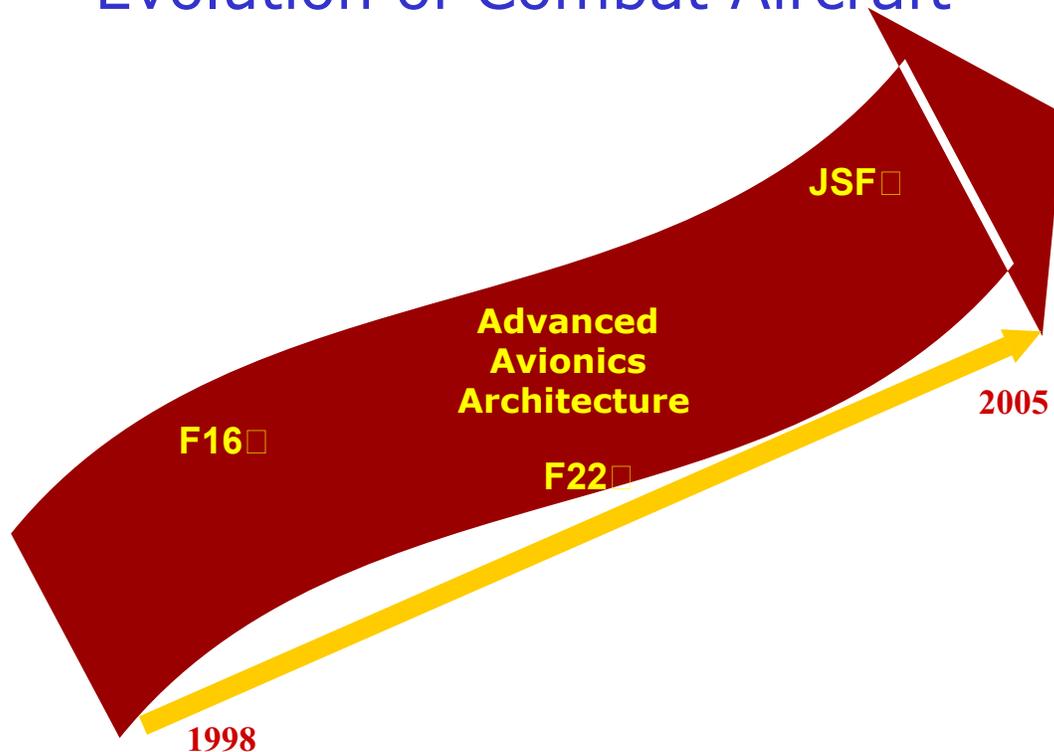
High-level language processing

- Logging-in
 - Creating your program
 - Compiling your program
 - Binding/linking
 - Execution
-
- Example from Feldman book:
Program 14.8 Palindrome, page 608

Robots

- What do robots have in common with aerospace systems?

Evolution of Combat Aircraft



"Informal survey"

1. Programming? What class is this?
2. I know what a programming language is
3. I have used one programming language
4. I have used 2 programming languages
5. I have been coding since I was a kid