

Lecture 06

VNA & Language Influences

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Summary of Previous Lecture

- 1. Reliability**
- 2. Cost**
- 3. Portability**
- 4. Generality**
- 5. Implementation methods**
- 6. Babbage Analytical Engine**
- 7. ENIAC**

Outline

- 1. Von Neumann Architecture**
- 2. Influences on Language Design**
- 3. Application Domains**

Von Neumann Architecture - 1945

"Where a calculator on the ENIAC is equipped with 18 000 vacuum tubes and weighs 30 tons, computers of the future may have only 1 000 vacuum tubes and perhaps weigh 1½ tons." *Popular Mechan*

- Shared program technique
 - Simple hardware that need not be hardwired for each program
 - Complex instructions to be used to control the hardware, allowing it to be “reprogrammed” much faster.
- Conditional Control Transfer
 - Subroutines or small blocks of code that could be jumped to in any order instead of sequentially ordered steps.

Influences on Language Design

Programming methodologies

- 1950s and early 1960s:
 - *Simple applications; worry about machine efficiency*
- Late 1960s:
 - *People efficiency became important*
 - *readability, better control structures*
- Late 1970s:
 - *Data abstraction*
- Middle 1980s:
 - *Domain and data complexity - Object-oriented programming*
- Today
 - *Web and networked environment; distributed computing*

Application Domains

1. Scientific applications
 - simple data structures, large FP operations - FORTRAN
2. Business applications
 - reports, decimal arithmetic, character operations - COBOL
3. Artificial intelligence
 - Symbol processing, logic programming – Lisp, Prolog
4. Embedded systems
 - Concurrent programming - Ada
5. Systems programming
 - execution efficiency, low-level features – PL/1, BLISS, C
6. Scripting languages
 - list of commands – batch files, ksh, Perl
7. Special purpose languages
 - Hundreds of languages

The First Programmer was a Lady

Charles Babbage and Ada Lovelace, lived in London of Dickens and Prince Albert (and knew them both). A hundred years before some of the best minds in the world used the resources of a nation to build a digital computer, these two eccentric inventor-mathematicians dreamed of building their “Analytical Engine”. He constructed a practical prototype and she used it, with notorious lack of success, in a scheme to win a fortune at the horse races. Despite their apparent failures, Babbage was the first true computer designer, and Ada was history’s first programmer.

Rheingold, *Tools for Thought: The history and future of mind expanding technology*, The MIT Press, 2000.

Summary

- ✓ **Von Neumann Architecture**
- ✓ **Influences on Language Design**
- ✓ **Application Domains**