Patt-Ch1 Welcome Aboard!

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- **1.1 Two Recurring Themes**
  - 1.1.1 Abstraction
  - 1.1.2 Hardware&Software
- **1.2 Levels of Transformation**
  - 1.2.1 Problems
  - 1.2.2 Algorithm
  - 1.2.3 Program Language
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1.1 Two Recurring Themes

1.1.1 Abstraction

- low-level details are abstracted into high-level interfaces
- improve efficiency

1.1.2 Hardware&Software

- Two ways to solve problems
- Both contribute to CS

1.2 Levels of Transformation

1.2.1 Problems

- Natural language
- may be ambiguous, imprecise

1.2.2 Algorithm

3 FEATURES:

- definite, each step is precisely stated.
- effective computability,each step can be carried out by a computer.
- finite *有限的* the procedure terminates after finite steps.

1.2.3 Program Language

- High-level-language:
  - easy to human, close to human language
  - machine independent, that is, it's independent of the machine which running the program
- Low-level-language: *Assembly language*
  - easy to computer
  - closely tied to the computer on which the programs will execute.
  - generally **one such low-level language for each ISA**.

1.2.4 ISA - Instruction Set Architecture

指令集架构 ***e.g. x86 / ARM / Power PC***

INTERFACE between hardware&software

including:

- Memory Organization
- Register
- Instruction Set

> See Ch5 **5.1 The ISA: Overview**

1.2.5 Microarchitecture

e.g. 80, 286, 486, Xeon, Pentium

- The detailed implementation of ISA.
- **Relationship between ISA and Microarch:**
  - Generally, one microarch only supports one ISA
  - but one ISA can be supported by many microarchs.
  - How to Choose? - Trade off（权衡，折中）
- Various units.In this course, we only discuss the **CPU**

1.2.6 Logic Circuit, Eletronic Circuit

> See **Ch3 Digital Logic Structure**

1.2.7 Eletrons, Devices