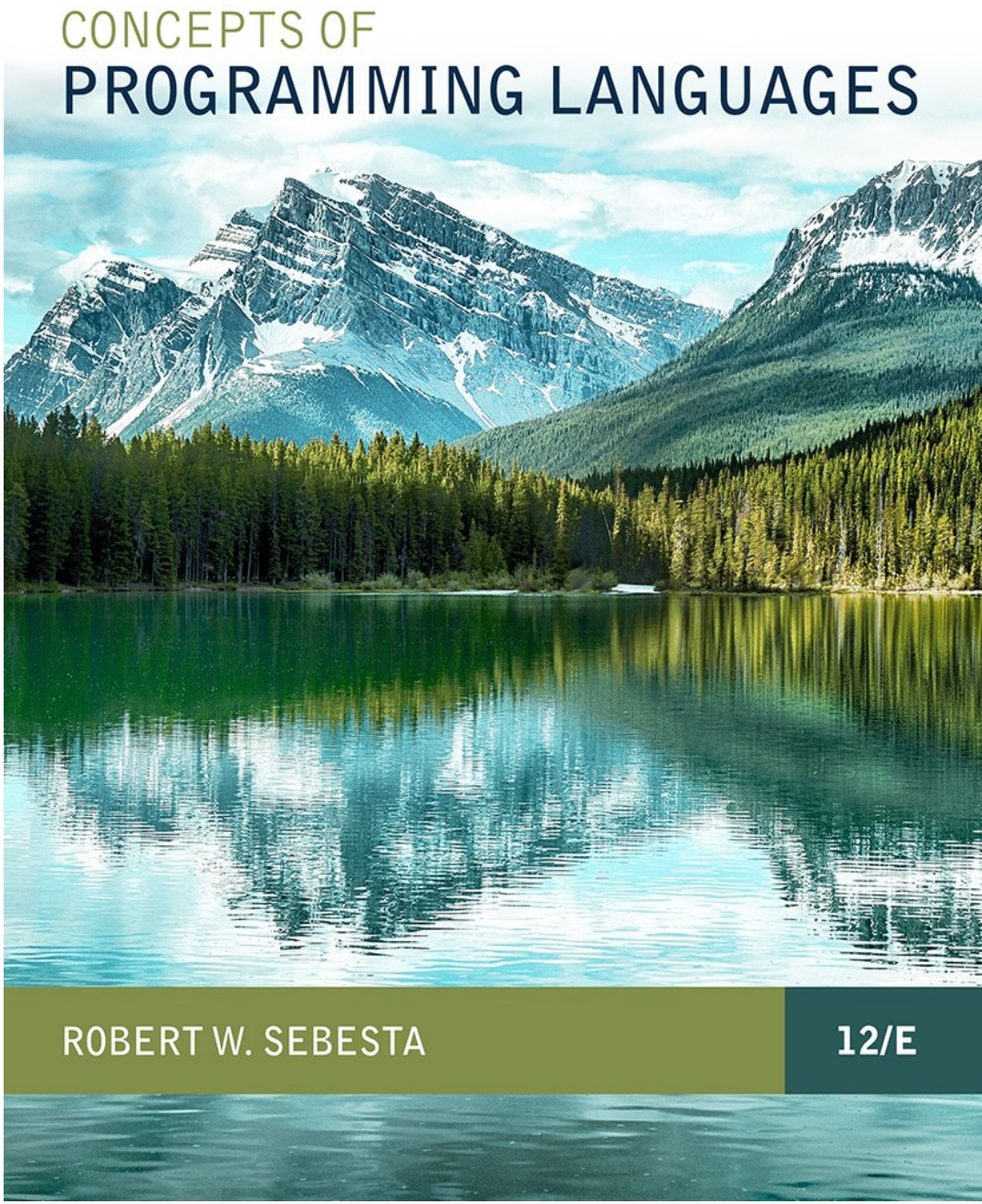
Chapter 1

Preliminaries



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Reasons for Studying Concepts of Programming Languages

- Increased ability to express ideas
- Improved background for choosing appropriate languages
- Increased ability to learn new languages
- Better understanding of significance of implementation
- Better use of languages that are already known
- Overall advancement of computing

Programming Domains

- Scientific applications
  - Large numbers of floating point computations; use of arrays
  - Fortran
- Business applications
  - Produce reports, use decimal numbers and characters
  - COBOL
- Artificial intelligence
  - Symbols rather than numbers manipulated; use of linked lists
  - LISP
- Systems programming
  - Need efficiency because of continuous use
  - C
- Web Software
  - Eclectic collection of languages: markup (e.g., HTML), scripting (e.g., PHP), general-purpose (e.g., Java)

Programming Domains

- Add some more
- ?????

Language Rankings part two

- https://www.tiobe.com/tiobe-index/
- https://en.wikipedia.org/wiki/TIOBE_index

```
A = ((0xa / 0xb) > 0x9) ? !c : !d;
```

Language Evaluation Criteria

- **Readability**: the ease with which programs can be read and understood
- **Writability**: the ease with which a language can be used to create programs
- **Reliability**: conformance to specifications (i.e., performs to its specifications)
- **Cost**: the ultimate total cost

Table 1.1

- Simplicity
- Orthogonality
- DataTypes
- Syntax
- Support for abstraction
- Expressivity
- Type Checking
- Exception handling
- Restricted Aliasing

Evaluation Criteria: Readability

- Overall simplicity
  - A manageable set of features and constructs
  - Minimal feature multiplicity
  - Minimal operator overloading
- Orthogonality
  - A relatively small set of primitive constructs can be combined in a relatively small number of ways
  - Every possible combination is legal
- Data types
  - Adequate predefined data types
- Syntax considerations
  - Identifier forms: flexible composition
  - Special words and methods of forming compound statements
  - Form and meaning: self-descriptive constructs, meaningful keywords

  - *boolean A = ((0xa | 0xb) > 0x9) ? !c : !d;*