CST1B10

The Structure and Interpretation of Computer Programs

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Introduction

Language and Platform

- In CST1B10, our codes will run in **Windows**.
- All codes will be written in **Racket**, a popular dialect of Scheme instead of MIT-Scheme.

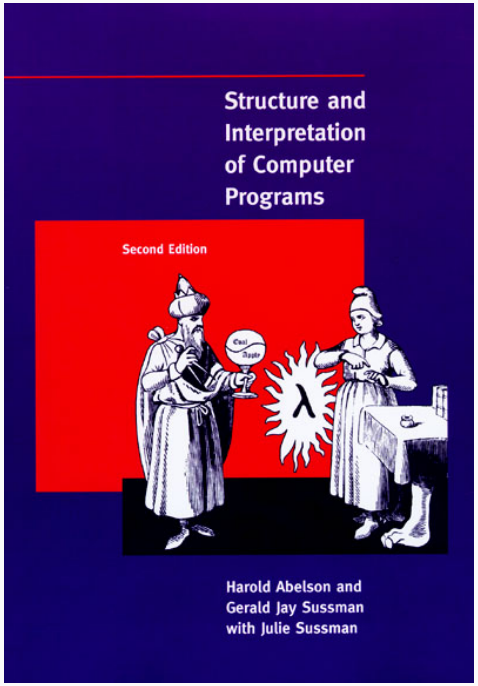
Our Goal

Our goal is that students who complete this subject should

- have a good feeling for the elements of style and the aesthetics of programming
- have command of the major techniques for controlling complexity in a large system
- be capable of reading a 50-page-long program, if it is written in an exemplary style
- know what not to read, and what they need not understand at any moment
- feel secure about modifying a program, retaining the spirit and style of the original author

Textbook

[1] Structure and Interpretation of Computer Programs, 2nd edition, MIT Press



A Swift and Brutal Introduction to Racket

Saluton mondo!

Code:

```
(display "Saluton Mondo!")
```

The Elements of Programming

- primitive expressions
- means of combination
- means of abstraction

Expressions

Run the REPL(Read-Evaluation-Print-Loop) of Racket.

Then have fun!!!

Using Racket as A Calculator

Codes:

```
(+ 23 23) ; => 46
(- 233 23) ; => 210
(* 123 2) ; => 246
(/ 246 2) ; => 123
```

This sort of codes is called **Polish notion** or **Prefix notation**.

Some Concepts

Expressions representing numbers may be combined with an expression representing a primitive procedure (such as + or *) to form a compound expression that represents the application of the procedure to those numbers.

```
(+ 23 23) ; => 46
```

In this simple code, '+' is a **operator**, and the other elements are called **operands**.

Delimit these expressions by parentheses to denote the procedure application which is called a **combination**.

Why Prefix notation?

Prefix notation is not very straightforward, but it is frequently shorter than infix notion. Because prefix notion can accommodate procedures that may take an arbitrary number of arguments. For example:

```
(+ 1 2 3 4 5 6 7 8 9 10) ; => 55
```

if this was infix notion:

```
1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10
```

That is not adorable.

Matryoshka doll

Racket allow you to write your code be nested like a Matryoshka doll. For example:

```
(+ (* 2 (+ 2 3)) 3 5 (- 7 2)) ; => 23
```

Naming

In Racket, we name a thing by

```
(define a 10)
```

Therefore, in this line of code, ‘a’ is associated with ‘2’;

Absolutely, we also can name some symbols with other kinds of data:

```
(define pi 3.1415926)
(define b 'b')
(define mit "Maki's Institute of Technology")
(define toh "猫头鹰魔法社")
```

“define” is one of the simplest means of **abstraction** in Racket.

Environment

When the programs in last pages are runing, they need some 'containers' to keep to track of the name-object pair. We call them **environments**.