

Different Points of View

CS 1025 Computer Science Fundamentals I

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Many points of view

- Before we dive into object-oriented programming, let's look at a couple of other points of view.
- We will take a quick look at a couple of other ways of programming and few different development environments.
- Don't worry about getting every detail at this stage, this is more just to get an impression.

Imperative Programming

- This is a C program to compute factorials, $n! = n \times (n - 1) \times \dots \times 3 \times 2 \times 1$.

```
int factorial(int n) {
    int i, prod;
    prod = 1;
    for (i = 1; i <= n; i++)
        prod = prod * i;
    return prod;
}
```

- The main things to notice are the assignments and the loop.

Functional Programming

- This is a Scheme program to compute $n!$

```
(define factorial (lambda (n)
  (if (= n 1)
      1
      (* n (factorial (- n 1))) ) ))
```

- Scheme is a member of the Lisp family of languages, the first of which from about 1960.
- It *uniformly* uses the syntax **(operator arg1 arg2 ...)**.
- This program uses *recursion* and the fact that, for $n > 1$, $n! = n \times (n - 1)!$

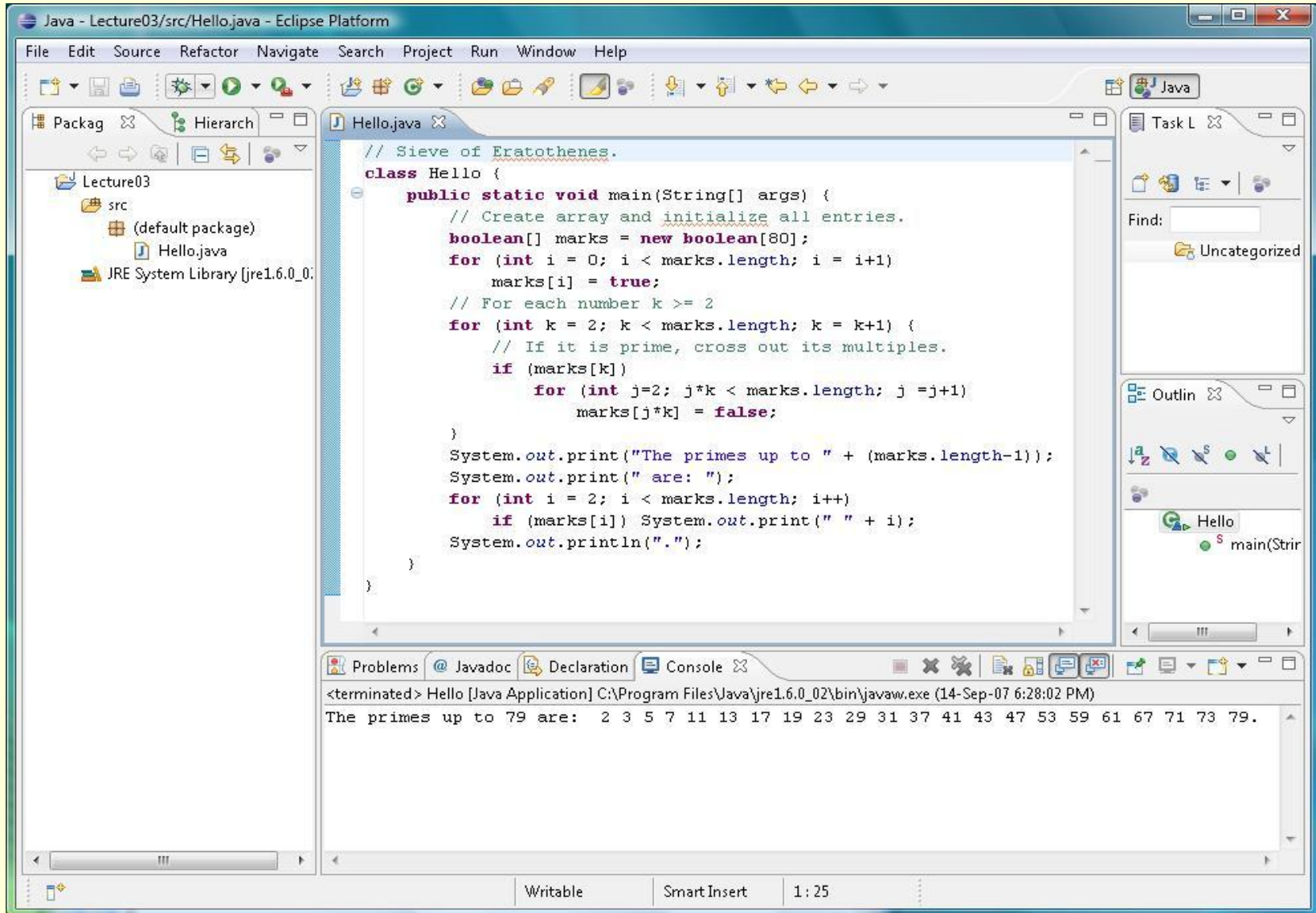
Uniformity vs Convenience

- Which is better, to have convenient, but irregular syntax, like $1 + \cos(\theta)$,
or to have a completely uniform, but less convenient syntax, like $(+ 1 (\cos \theta))$.
- The irregular syntax is easier to use and the regular syntax is easier to compose.
- For single jobs a Swiss Army knife is better than a Lego brick, but *how would you make a replica of the Empire State building out of Swiss Army knives.*

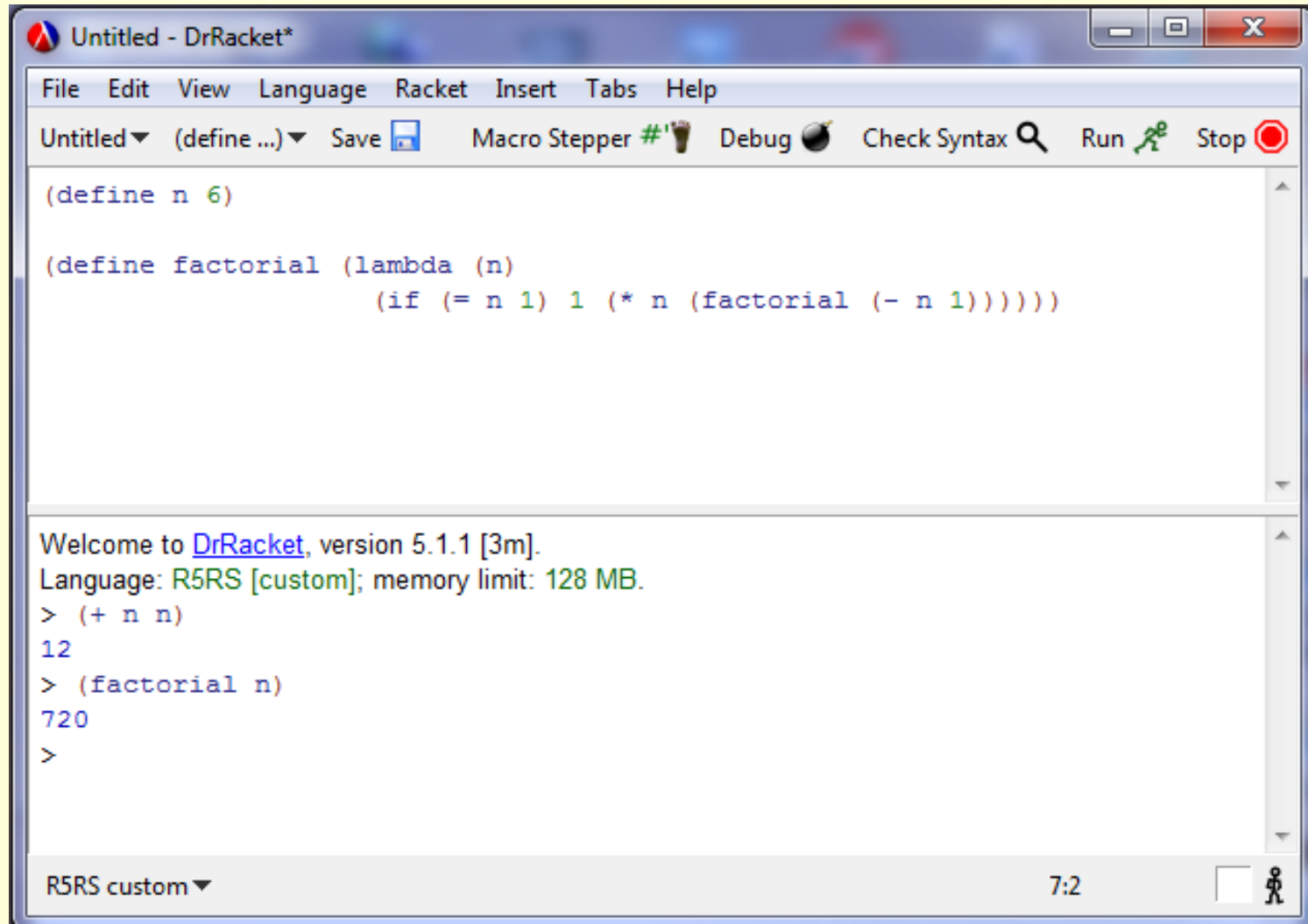
The Lisp family of languages

- Most things are made up of “cons” cells that contain two things.
- The things they contain can be values or pointers to other things.
- Can make complicated data structures from these.

The *Eclipse* IDE for Java Development



The *DrRacket* IDE for Scheme



The screenshot shows the DrRacket IDE interface. The window title is "Untitled - DrRacket*". The menu bar includes File, Edit, View, Language, Racket, Insert, Tabs, and Help. The toolbar contains buttons for (define ...), Save, Macro Stepper, Debug, Check Syntax, Run, and Stop. The main editor area contains the following Scheme code:

```
(define n 6)

(define factorial (lambda (n)
  (if (= n 1) 1 (* n (factorial (- n 1))))))
```

The bottom panel shows the REPL output:

```
Welcome to DrRacket, version 5.1.1 [3m].
Language: R5RS [custom]; memory limit: 128 MB.
> (+ n n)
12
> (factorial n)
720
>
```

The status bar at the bottom left shows "R5RS custom" and the bottom right shows "7:2" and a person icon.

