

Tutorial 01, (Chapter 1)

You should finish this tutorial before lecture 2. Tutorials are done partly alone, and partly with the tutor's help. This tutorial is not very ambitious. After finishing this tutorial, you should have Mozart running on your computer. Additionally, you will try the examples that have been introduced in the first lecture together with some very similar functions. Use the time available to ask questions! Ask your friends. You can also ask on IVLE's discussion group of Chapter 1.

Install Emacs and Mozart

Install Emacs and Mozart on your PC. Alternatively get an account on tembusu, the Linux cluster, and add to your PATH the following `/home/cs2104/mozart/bin`. If you fail, your teaching assistant will eventually help you with installing Emacs and Mozart on your computer.

Testing Mozart

Start Mozart by typing `oz`. Enter the following Oz program

```
declare
X = 1234 * 5678
{Browse X}
```

A window should appear (a Browser window) and should display 7006652.

1 Computing the Maximum

Try the function `Max` as defined in Lecture 01.

2 Computing the Minimum

Try the different versions of `Min` as defined in Lecture 01.

3 Absolute Value of a Number

Write a function `Abs` that computes the absolute value of a number.

4 Factorial

Try the `Fact` function as discussed in Lecture 01.

Try a large number, for example

```
{Browse {Fact 100}}
```

Try for a crazy number, for example

```
{Browse {Fact 1000}}
```

The precision of integers is only limited by the memory available in your computer.

Use the Oz Panel to get an idea how much memory is needed.

5 Power

Compute n^m where n is an integer and m is a natural number.

Use the following inductive definition of n^m :

$$\begin{aligned}n^0 &= 1 \\ n^m &= n \times (n^{m-1})\end{aligned}$$

Write a function `Pow` as follows:

```
declare
fun {Pow N M}
  if ... then
    ...
  else
    ...
  end
end
```

6 Maximum Recursively

This small exercise is basically a trick question that lets you think a little bit about recursion.

In the following we assume that we are interested in computing the maximum of two natural numbers (that is, the numbers are integers that are greater or equal than zero).

The only allowed test with a conditional is the test whether a number is zero (that is `if N==0 then ... else ... end`).

Given this, how can you compute the maximum of two numbers?

Here are some facts about the maximum (remember both $n \geq 0$ and $m \geq 0$):

- $\max(n, m) = m$, if $n = 0$.

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- $\max(n, m) = 1 + \max(n - 1, m - 1)$, otherwise.