

Lab 1

Introduction

Topics

LISP is part of the class of functional languages.
LISP = LIStProgramming.

LISP

Short introduction: LISP history

Emacs

LISP was invented by John McCarthy in the late 1950's, as a formal model for the calculus of recursive equations. Did you know that the only programming language older than LISP that is still used is Fortran?

McCarthy characterized the language in 1980 : "LISP has survived 21 years, because it is an almost optimal choice in the field of programming languages.

Starting

The reputation of LISP is helped by its strong theoretical foundations – functional form; , lambda calculus and usage of generalized functions.

First steps:

Useful keys

- 1956 – McCarthy developed a language for algebraically processing lists, with the purpose of using it in matters related to artificial intelligence
- Between 1960-1965 the main dialect was Lisp 1.5
- in the beginning of the 1970's there were two dialects: MacLisp and Interlisp. MacLisp was developed from Lisp 1.5 by adding special variables, and treating errors, such as the concept of functions with variable number of arguments, macrodefinitions, matrices, etc.

Installation

Interlisp introduced several new concepts, such as iterative construction , adopted also by MacLisp and later on by CommonLisp.

Problems

- In 1981, based on a DARPA project by combining several projects Common Lisp was obtained as a description of a family of languages
- In 1986 ANSI Common Lisp resulted in a new specification of language with the definition of portability, object-oriented programming, conditions systems, etc.

Emacs

Emacs is an adaptable and expandable editor. It is based on a LISP interpreter , *elisp*, a dialect of the language Lisp.

Characteristics:

- modes (major modes) of work for a wide range of languages
- online documents
- expandable through the language *Emacs Lisp*
- support for different languages (natural and programming)

The laboratory will use the program editor Lisp interpreter and Emacs environment and package programs XLisp-stat.

For Emacs commands read the summary of useful [keys](#). You can find details at [GNU Emacs Manual](#).

Starting emacs and lisp

Using Linux

Action	Result
Start a terminal (screen icon)	The terminal window appears
Type <i>emacs &</i>	Emacs is starting
Press C-x 2	The current window is split in two identical windows
Press C-x o	The second window is activated
Press M-x run-xlispstat	XLISP-STAT is starting
Press C-x o	The first window is activated
Press M-x lisp-mode	Emacs enters the inferior lisp mode
Type a LISP line for testing	For example (+ 1 2)
By positioning the cursor over an element between the paranthesis introduced press M-C-X	In the lisp window the result 3 will appear.

Using Windows

Action	Result
Select the icon XLisp-Stat on Desktop	XLisp-Stat is starting
Minimize XLisp-Stat	The application will minimize (the server application will be called by Emacs)
Select the icon Emacs from Desktop	Emacs is starting
Press C-x 2	The current window is split in two identical ones
Press C-x o	The second window is activated
Press M-x run-xlispstat	XLISP-STAT is starting
Press C-x o	The first window is activated
Press M-x lisp-mode	Emacs enters the inferior lisp mode
Insert a lisp line for testing	For example (+ 1 2)
By positioning the cursor on one of the elements between the paranthesis press M-C-X	The result 3 will appear

Important keys in Emacs

The following table is a summary of the important key combinations assigned to different commands in emacs.

In the table **C** represents the key *Control*, whereas **M** represents the key *Alt* or *Meta*. For example **C-x 2** indicates pressing the keys at the same time *Control* and 2, followed by pressing the key 2 (without *Control*!)

Key combinations	Effect
C-_	Undo

C-x 2	Clone windows
C-x C-n	New buffer
C-x o	Switch active window
C-x k	Kill the buffer
C-x b	Selecting the current buffer
C-x C-s	Saving the current buffer
C-x C-w	Saving the buffer with another name
C-x C-f	Opening a file in a buffer
C-x C-c	Close emacs (with saving)
C-SPC or C-@	Positioning the selection point
C-x C-x	Interchanging selection point
M-w	Copy
C-w	Cut
C-y	Paste (yank)
C-s	Cautare(search) in the buffer
C-M-x	Evaluation with the internal <i>Lisp</i> interpreter, in case xisp-stat is not started
C-M-x	Evaluating xisp-stat (only if xisp-stat is open in the activ lisp mode)
C-u <i>n</i>	Repeating <i>n</i> times a simple command
C-x z	Repeating the last command
C-g	Renouncing an unfinished operation (which awaits another parameter)
M-x	Extended commands that do not have assigned key combinations
M-x lisp-mode	Transfers the current buffer in the lisp mode, necessary for interpreting the combination C-M-x
M-x inferior-lisp-mode	Transfer the current buffer in the inferior-lisp mode, in case the mode was changed by mistake

Problem

Practice:

- Creating a buffer
- Inserting a text
- Selection operation and copy-paste
- Saving a buffer
- Reloading a buffer
- Evaluating a lisp expression with lisp-stat (+ 1 2 3) using the incorporated interpreter
- Starting emacs and xisp-stat
- evaluating a lisp expression with xisp-stat

Notă: Activitatea la această ora de laborator nu se va finaliza printr-o notă, ca activitățile următoare, începând cu laboratorul 3 necunoașterea operațiilor de bază emacs și xispstat implică **nota 4** la toate lucrările de laborator în termen și încă nepredate!

Installing *emacs* and *xlispstat*

Sub Linux

Redhat 6.2

1. Install (during the installation of Linux) the packages emacs and xlispstat
2. Copy the file [.emacs](#) in the home directory of the user
3. Configure in .emacs the directory where xlispstat is

Redhat 7.3

1. Install Linux
2. Save the precompiled xlispstat version from [here](#).
3. Unarchive the root .tar-ul obtained in the root folder.
4. You have to relocate [/home/student/.emacs](#). In the home directory of the user you work with, in case you want to use xlispstat with a user different from **student**.

Installing with other versions

1. Obtain the source code from <ftp://ftp.stat.umn.edu/pub/xlispstat/3-52/xlispstat-3-52-20.tar.gz>,
2. Unzip the archive.
3. Follow the installation instructions from the file Install:
 - run: *configure*
 - run: *make*
 - run: *make install*
4. Copy the file [.emacs](#) in the home directory
5. Copy the file [xlispstat.el](#) in the directory `/usr/local/etc`

Sub Windows

1. Save the last distribution of emacs. The archives can be found at the address <http://ftp.gnu.org/gnu/windows/emacs/>, the versions precompiled for the Windows system contain in the name of the file *i386*. At the current moment the most recent precompiled version is at [aici](#) or on the local [website](#).
2. Unzip the archive [tar](#) in the directory `c:\cflp` (the following directory will be created `c:\cflp\emacs`)
3. Create a link towards desktop `c:\cflp\emacs\bin\emacs.exe`
4. Save xlisp-stat for Windows from <ftp://ftp.stat.umn.edu/pub/xlispstat/>. The most recent version (3.53.17) from <ftp.stat.umn.edu> or the version [locală](#).
5. Copy the executable **Wxls32zp.exe** in the directory `c:\cflp\xlispstat` and start the unpacking.
6. Create a link on the Desktop towards `c:\cflp\xlispstat\Wxls32.exe`
7. Set the environment variable **HOME** at the value `c:/cflp/`
8. Copy the file [.emacs](#) in the directory `c:\cflp`
9. Copy the file [xlispstat.el](#) in the directory `c:\cflp`
10. Done! You can now [test lisp](#)!

Useful links

[GNU Emacs Manual](#) - a good description of the lisp commands

[The XLISP-PLUS Home Page](#)

[Istorie Lisp - lisp.org](#)

[Istorie Lisp și famili de limbaje lisp](#)

[GNU Emacs Lisp Reference Manual - Unix](#)

[GNU Emacs FAQ For Windows 95/98/ME/NT/XP and 2000](#)

[Implementări Lisp](#)

[Implementări comerciale](#)

Problems

[Problem 1.](#) Getting familiar with emacs and xisp-stat

[Problem 2.](#) Installing emacs and xisp-stat (optional, as homework)