

**Professional Services & Support for  
Scilab,**  
Free Open Source Software for Numerical  
Computation

# Sylvestre Ledru

- Operation manager at Scilab Enterprises
- Responsible of GNU/Linux & Mac OS X
- Community manager for Scilab
- ... and also for IRILL
- Debian Developer

# History of Scilab

# History of Scilab

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- Developed by a research project at the INRIA since 1990
- From 2003 to 2008, through the Scilab consortium
- Since 2008, the Scilab consortium is hosted by the Digiteo foundation
- 2011 : *Scilab enterprises* created for the *classical* open source business model (most of the current employees being founders)
- Currently ~15 persons

# About Scilab Enterprises

SAS created in June 2010

- President: Denis Ranque and now Jacques Dhellemmes  
Vice presidents: Christian Saguez
- A high level team who has extensive knowledge of Scilab software and its environment and benefit directly from the Scilab developers expertise.

# Services & Support

- Development and optimization of applications
- Realization of in-house optimized or extended versions
- Scilab Long Term Support
- Migrations to Scilab

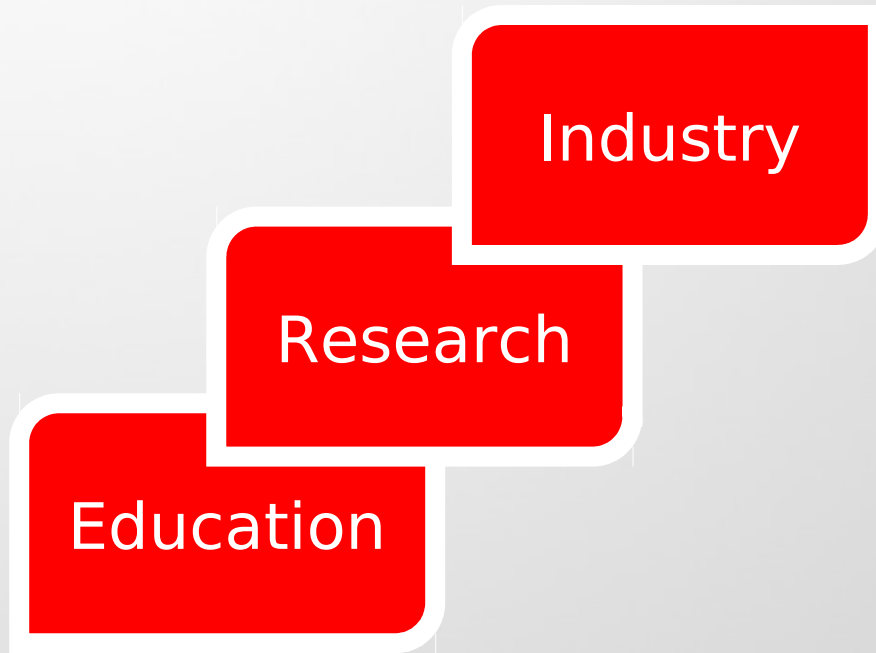
# Services & Support

- Training
- Commercial external modules

# Scientific Computation for your Innovation



# Our Domains of Expertise



Biology, Medicine  
Environment, Natural Resources  
and Risks, Materials...

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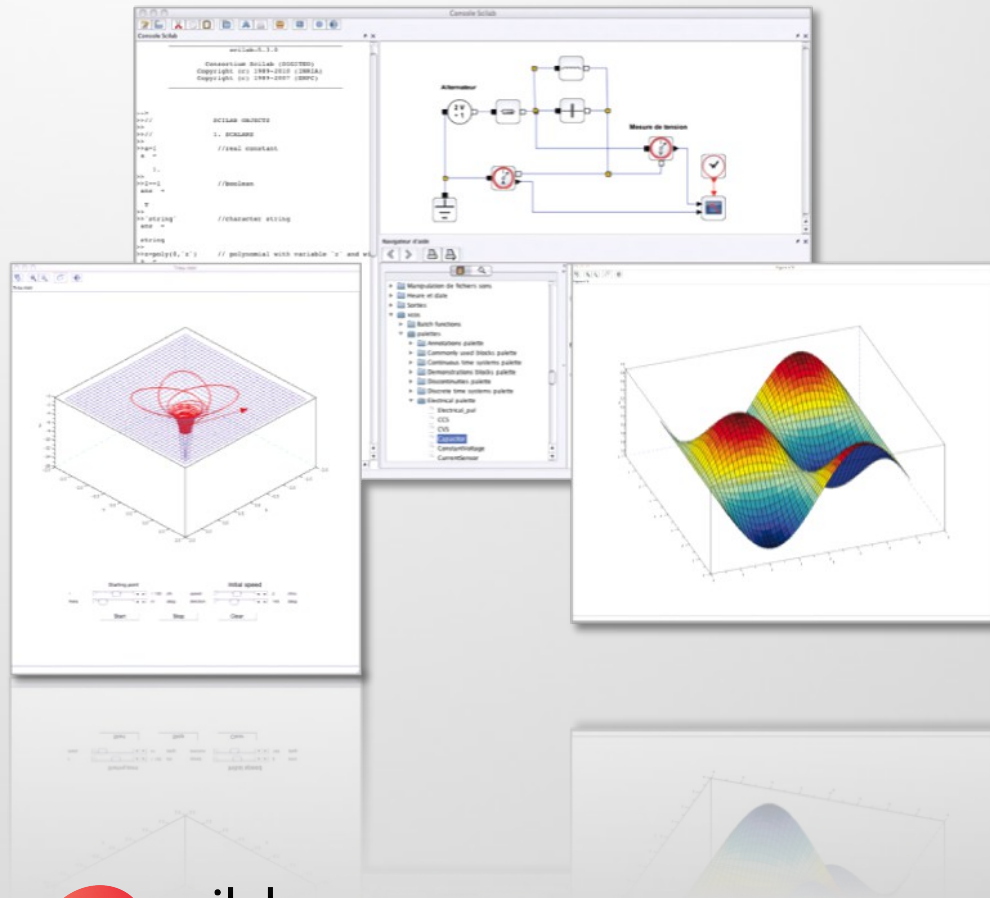
Energy, Defense,  
Automotive, Aerospace,  
Telecommunications,  
Biomedical, Finance,  
Multimedia, Transportation...

# Major Scilab Users

- Aerospace:  
**CNES, EADS, Astrium Safran...**
- Automotive:  
**LEONI, PSA, Renault,  
Valeo...**
- Mechanics:  
**ArcelorMittal...**
- Energy:  
**CEA, EDF, IFP, RTE, Total...**
- Defense:  
**DGA, Thales...**
- Civil engineering:  
**CSTB...**
- Health:  
**Sanofi...**
- Computers:  
**Bull, C-S, Oxalya...**
- Mining:  
**Eramet...**

# Scilab Software

# The Free and Open Source Solution



## Powerful computation software

- Numerical computation engine  
**easy to embed into applications**
- **Extended capabilities** with professional & specialized modules

**System Requirements**  
Windows XP / Vista / 7  
GNU / Linux  
Mac OS X

# Key Features

- **High level programming language**
- **2,300 mathematical functions**
- **Advanced data structures & user-defined data types**

Maths & Simulation

Optimization

Statistics

Signal Processing

Control System Design & Analysis

2-D/3-D Visualization

Application Development

# Scilab - CLI

```
Paramétrage de scilab-full-bin (5.3.3-2) ...
Paramétrage de scilab (5.3.3-2) ...
Paramétrage de scilab-doc (5.3.3-2) ...
Paramétrage de scilab-sivp (0.5.3-2) ...
Traitement des actions différées (« triggers ») pour « menu »...
[23:59:08][sylvestreglosin] ~$ scilab-cli

-----
                    scilab-5.3.3
-----

      Consortium Scilab (DIGITEO)
      Copyright (c) 1989-2011 (INRIA)
      Copyright (c) 1989-2007 (ENPC)
-----

Initialisation :
  Chargement de l'environnement de travail

-->a=2*[2,3]
a =

    4.    6.

-->
```

# An Ergonomic Environment

File Browser

Console

Variable Browser

The screenshot displays the Scilab environment with four main components:

- File Browser (left):** Shows a directory tree with folders like Applications, Library, Network, System, Users, Volumes, bin, cores, dev, etc, home, net, private, sbin, tmp, usr, var, and mach\_kernel.
- Console (center):** Shows the Scilab startup sequence for version 5.4.0-alpha-1, including copyright information and the execution of commands: `a=rand(4,4)` (displaying a 4x4 matrix of random numbers), `spec(a)` (displaying eigenvalues), and `b=testmatrix('magic',3)` (displaying a 3x3 magic square).
- Variable Browser (right):** A table listing variables with their names, dimensions, types, and visibility.
- Command History (bottom right):** A list of executed commands with timestamps.

Nom	Dimension	Type	Visibilité
b	3x3	Double local	
a	4x4	Double local	
home	1x1	Chaîne local	
PWD	1x1	Chaîne local	
%k	1x1	Booléen local	
%F	1x1	Booléen local	
%T	1x1	Booléen local	
%nan	1x1	Double local	
%inf	1x1	Double local	
SCI	1x1	Chaîne local	
SCIHOME	1x1	Chaîne local	
TMPDIR	1x1	Chaîne local	
%gui	1x1	Booléen local	
%fftw	1x1	Booléen local	
%t	1x1	Booléen local	
%f	1x1	Booléen local	
%eps	1x1	Double local	
%io	1x2	Double local	
%i	1x1	Double local	
%e	1x1	Double local	
%pi	1x1	Double local	
%modalWarning	1x1	Booléen global	
%driverName	1x1	Chaîne global	
%exportFileNa...	1x1	Double global	
%toolboxes	1x1	Double global	
%toolboxes_dir	1x1	Chaîne global	
%helps	1x1	Double global	

```
// -- 01/01/2012 10:42:45 -- //  
a=rand(4,4)  
spec(a)  
b=testmatrix('magic',3)
```

Command History

# With Embedded Applications

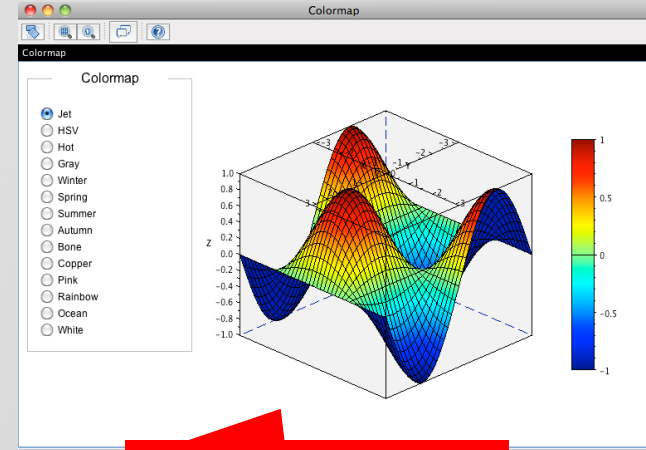
```

1 //Définition directe de la transformée de Fourier discrète
2 //-----
3 function xf=DFT(x, flag);
4 n=size(x, '*');
5 //Calcul de la matrice de Fourier (n by n !)
6 if flag==1 then, //transformation inverse
7 am=exp(2*pi*i*(0:n-1)*(0:n-1)/n);
8 else //transformation directe
9 am=exp(-2*pi*i*(0:n-1)*(0:n-1)/n);
10 end
11 xf=am*matrix(x,n,1); //dft
12 xf=matrix(xf,size(x)); //mise en formz
13 if flag==1 then,xf=xf;/end
14 endfunction
15
16 //Comparaison avec l'algorithme de la transformée rapide:
17 a=rand(1,1000);
18 norm(DFT(a,1) - fft(a,1))
19 norm(DFT(a,-1) - fft(a,-1))
20
21 timer();DFT(a,-1);timer()
22 timer();fft(a,-1);timer()
    
```

Editor

Var - a	1	2	3	4	5
1	0,2113	0,6654	0,8782	0,7264	
2	0,756	0,6284	0,0684	0,1985	
3	2,2113e...	0,8497	0,5608	0,5443	
4	0,3303	0,6857	0,6624	0,2321	
5					
6					
7					

Variable Editor



2-D/3-D Visualization

**ode\_discrete**  
ordinary differential equation solver, discrete time simulation

**Calling Sequence**  
y=ode('discrete',y0,k0,xvec,t)

**Arguments**  
y0: real vector or matrix (initial conditions).  
t0: real scalar (initial time).  
f: external i.e. function or character string or list.  
xvec: integer (initial time).  
kvec: integer vector.

**Description**  
With this syntax (first argument equal to "discrete") ode computes recursively  $y_i(k+1)=f(k,y_i(k))$  from an initial state  $y_0(k)$  and returns  $y(k)$  for  $k$  in  $xvec$ .  $xvec(1)$  must be greater than or equal to  $k_0$ .  
Other arguments and other options are the same as for ode, see the ode help.

**Examples**  

```

Y1=[1;2;3]; [ode('ode_discrete','y0',k0,xvec,t)]
Y2=[1;2;3]; [ode('ode_discrete','y0',k0,xvec,t)]
Y3=[1;2;3]; [ode('ode_discrete','y0',k0,xvec,t)]
    
```

Embedded Help

External Modules Manager

**Aerospace - ATOMS**

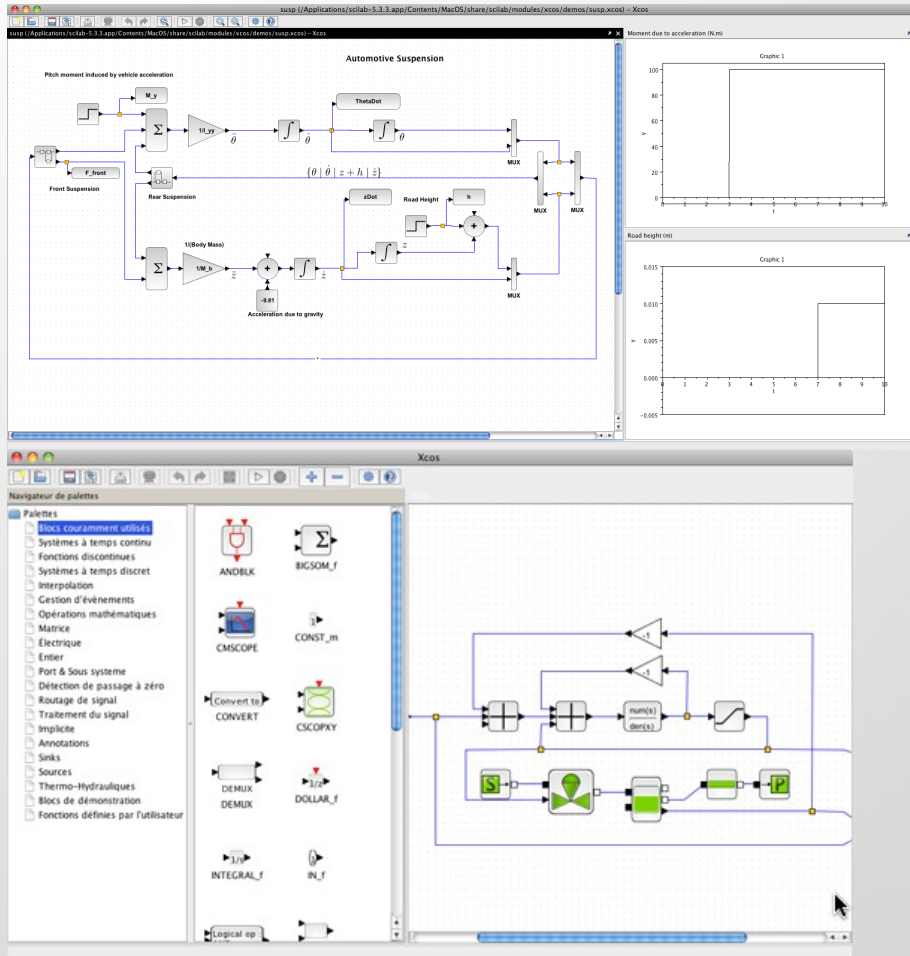
- Tous les modules
- Aerospace
- Data Acquisition
- Data Analysis And Statistics
- Data Handling
- Education
- GUI
- Graphics
- Linear algebra
- Modeling and Control Tools
- Numerical Maths
- Optimization
- Physics
- Scilab development
- Signal Processing
- Technical

**CelestLab**

Version: 2.1.1-1  
Auteur(s):  
Description:  
CelestLab is a library of space flight dynamics functions written in Scilab. This library has been developed by CNES (Centre National d'Etudes Spatiales) for mission analysis purposes. It is used for trajectory analysis and orbit design for various types of missions (around Earth, interplanetary...)  
CelestLab includes about 200 functions that allow mission designers to perform various tasks such as: orbit propagation, manoeuvre computation, change of reference frames and coordinates, etc...  
You may leave comments below (any remark, suggestions...)  
But if you would like to report bugs, please go to: <http://forge.scilab.org>  
Voir aussi:  
<http://atoms.scilab.org/forge/atoms/celestlab/2.1.1>  
Date de sortie: 2011-01-06  
Taille du téléchargement: 2 Mo  
Installer



# And Xcos, Modeling & Simulation of Dynamic Systems

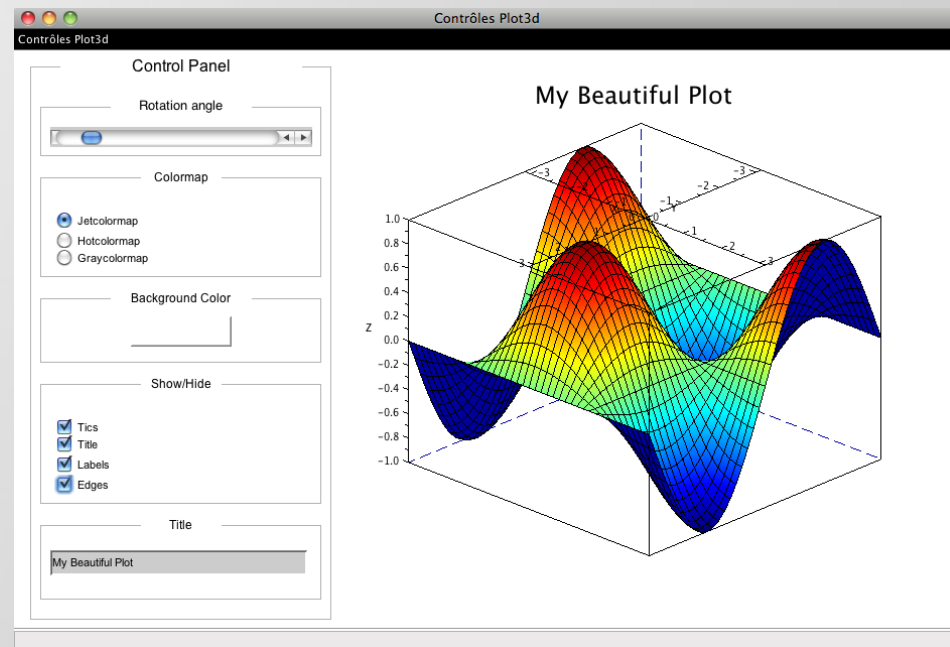


- **Professional tool for industrial needs**
- Intuitive and ergonomic interface
- **Model building, edition and customization**
- Embedded Modelica Compiler
- **Freely available and distributed with Scilab**

# GUI creations

## uicontrol/uimenu/waitbar/messagebox

- **Many functions provided to create and design GUI**
- Available from Scilab
- **Interaction between GUI and plots**
- Fully integrated in the OS environment



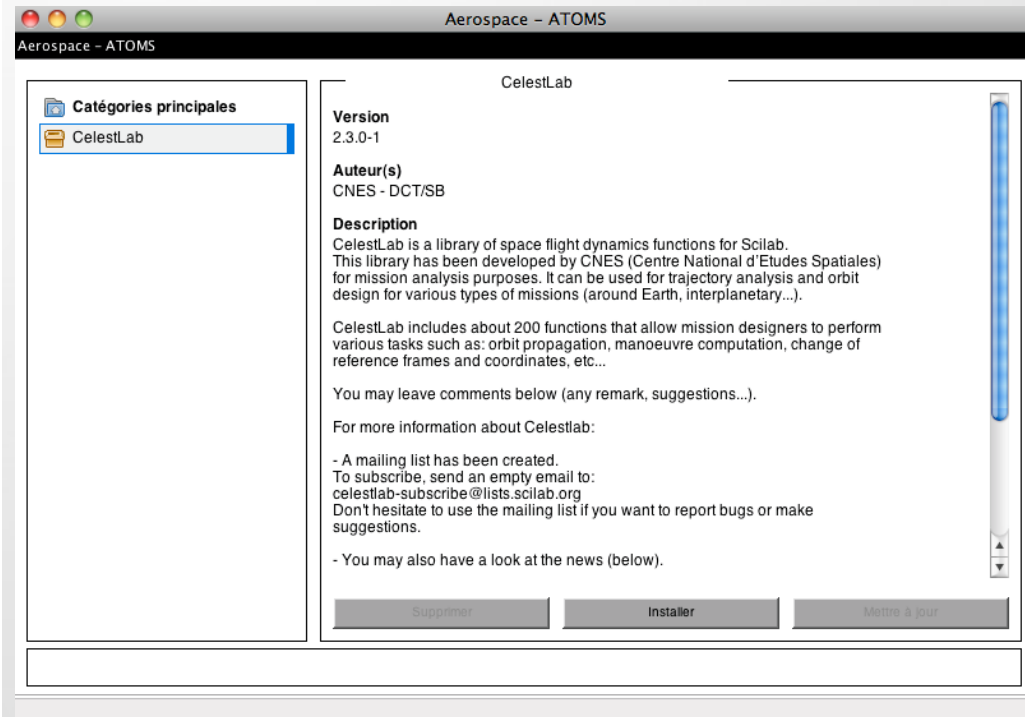
# Extend Scilab capabilities

## ATOMS

### AuTomatic mOdules

### Management for Scilab

- Automatic installation and management in Scilab software
- An external portal to host and manage all external modules



# A strong platform in an ecosystem

- Management of **C, C++, Fortran, Java, Python, .net...** from Scilab
- Available as a computing engine with C, C++, Java, Python, .net API...
- **Connection with:**
  - **Excel®**, **COM/DCOM®** (Microsoft),
  - **Labview®** (National Instruments),
  - **Isight®** (Dassault Systèmes),
  - **Alternova®** (Eurodecision),
  - **modeFRONTIER®** (ESTECO),
  - etc.

# Data formats

- **Default Scilab data format (SOD):**
  - Based on the HDF5 standard
  - Open documentation and specification
- Several data formats are managed (read / write):
  - **Excel (XLS)**
  - **CSV**
  - **MAT-files**
  - **XML**
  - Etc.

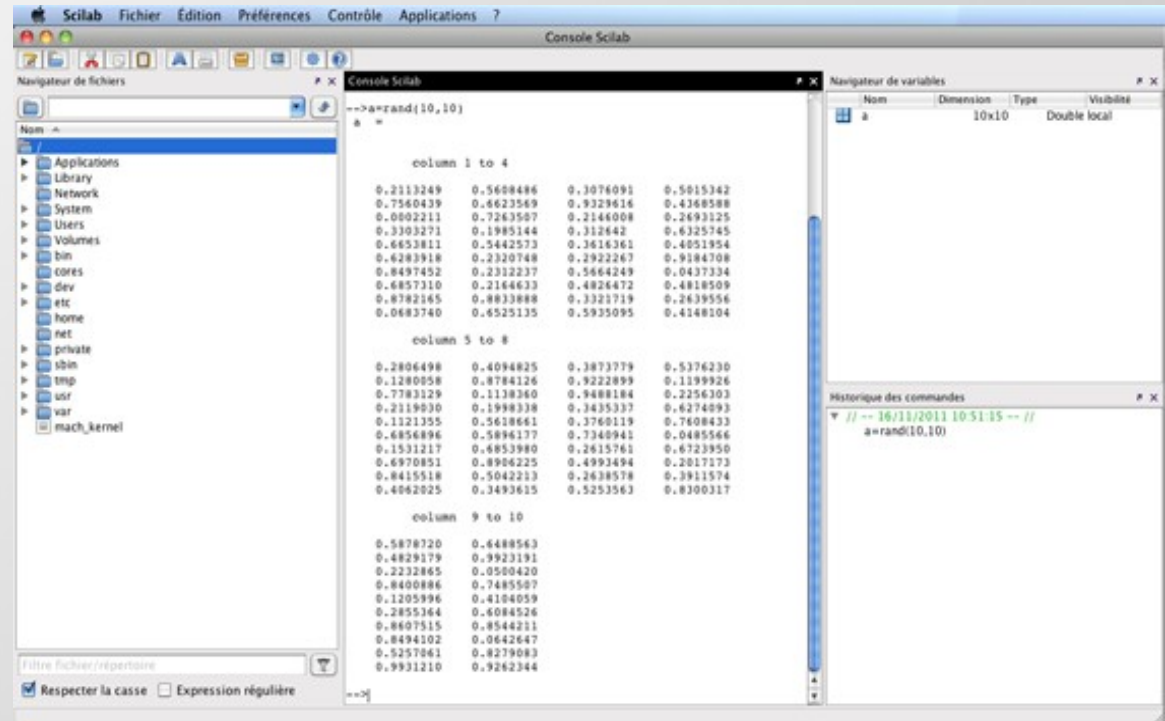
# Next Release – Scilab 5.4.0

Beta released last Friday

## Scilab Desktop

Docking system

Save positions,  
size and other  
information



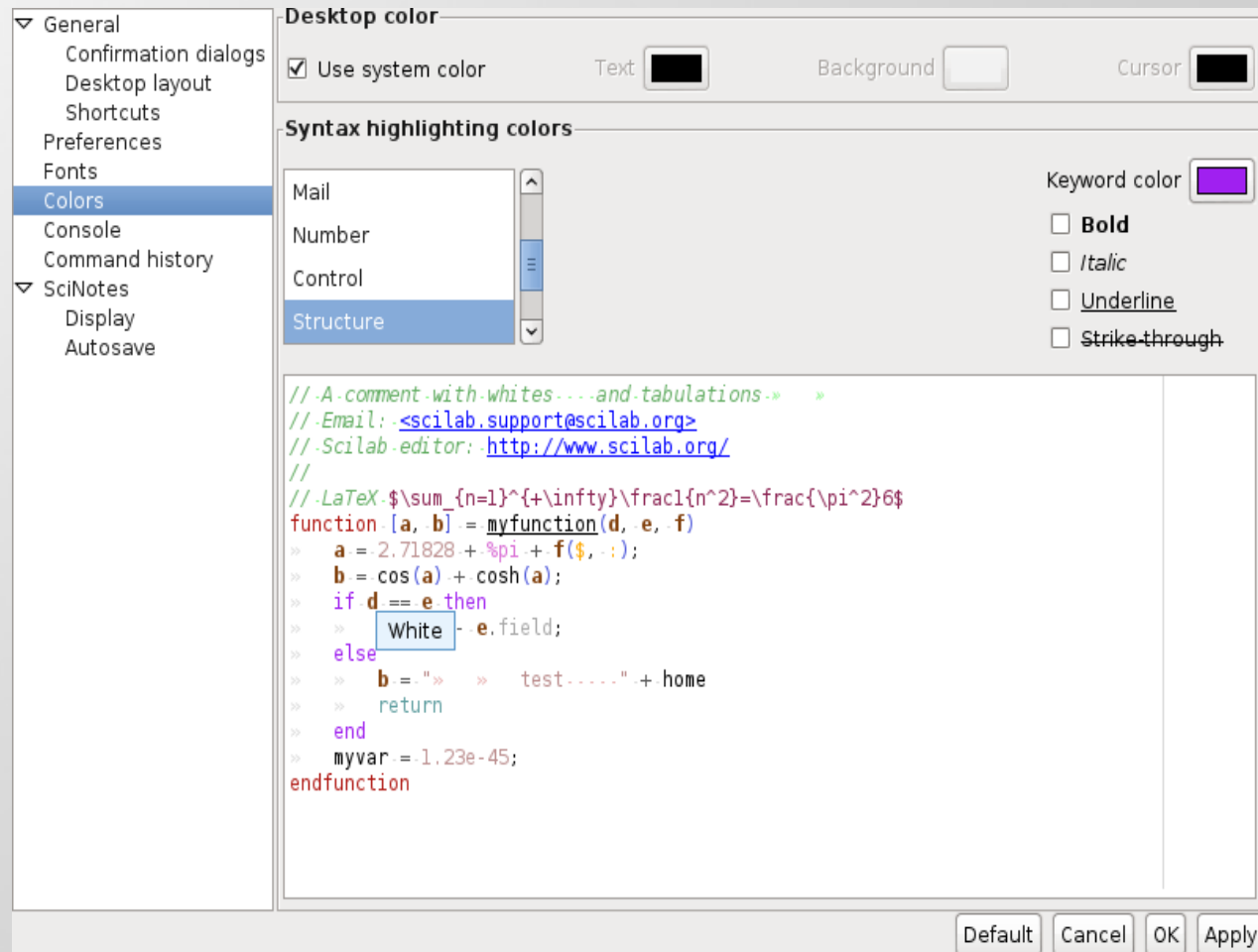
# Next Release – Scilab 5.4.0

Beta released last Friday

## Unified Scilab




## Preferences:

Console,  
Desktop,  
Scinotes,  
Xcos, ...




The screenshot shows the 'Colors' preference dialog in Scilab. The left sidebar lists various preference categories, with 'Colors' selected. The main area is titled 'Syntax highlighting colors' and contains a list of color categories: Mail, Number, Control, and Structure. The 'Structure' category is currently selected, and its color is set to a purple square. To the right of the list are checkboxes for 'Bold', 'Italic', 'Underline', and 'Strike-through', all of which are currently unchecked. Below the list is a preview window showing a snippet of Scilab code with syntax highlighting applied. The code includes comments, a function definition, and mathematical expressions. The preview shows that keywords like 'function', 'endfunction', 'if', 'else', and 'return' are highlighted in blue, while comments are in green. The 'Structure' category is highlighted in purple in the preview. At the bottom of the dialog are buttons for 'Default', 'Cancel', 'OK', and 'Apply'.

Desktop color

Use system color    Text     Background     Cursor 

Syntax highlighting colors

Mail  
Number  
Control  
Structure

Keyword color 

Bold  
 Italic  
 Underline  
 Strike-through

```
// .A comment with whitespaces and tabulations »  
// .Email: <scilab.support@scilab.org>  
// .Scilab editor: http://www.scilab.org/  
//  
// .LaTeX:  $\sum_{n=1}^{+\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$   
function [a, b] = myfunction(d, e, f)  
  » a = 2.71828 + %pi + f($, :);  
  » b = cos(a) + cosh(a);  
  » if d == e then  
  »   White - e.field;  
  » else  
  »   b = "» » test....." + home  
  »   return  
  » end  
  » myvar = -1.23e-45;  
endfunction
```

Default Cancel OK Apply

# Next Release – Scilab 5.4.0

Beta released last Friday

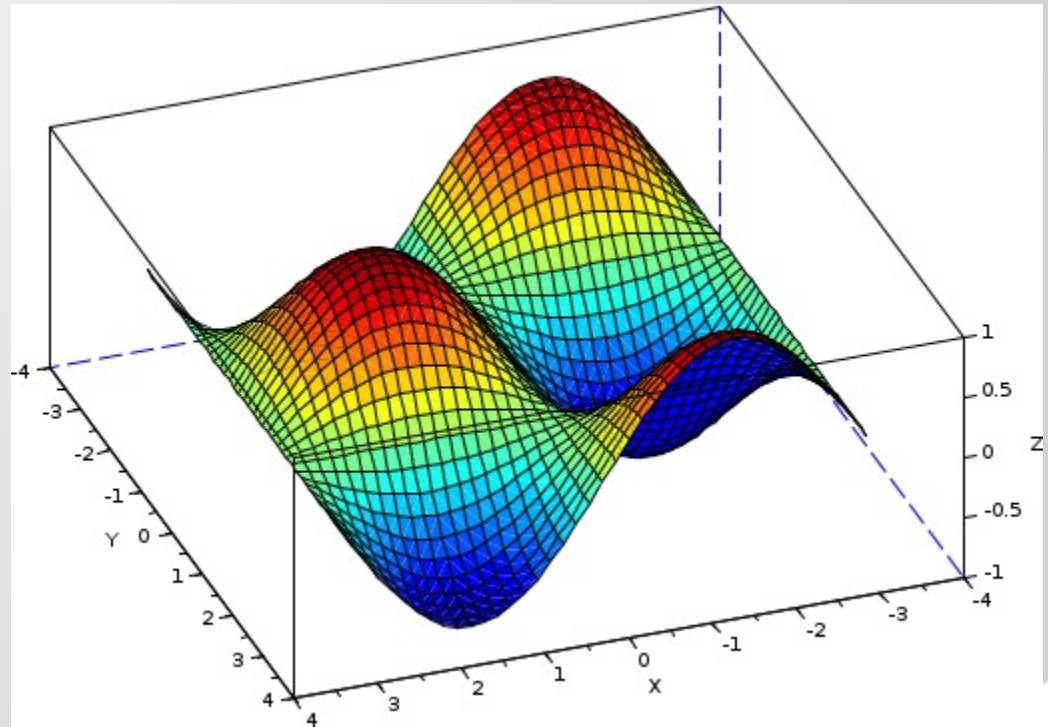
## Graphics

Fully portable

4 to 100x faster

Improved usability

Many export formats





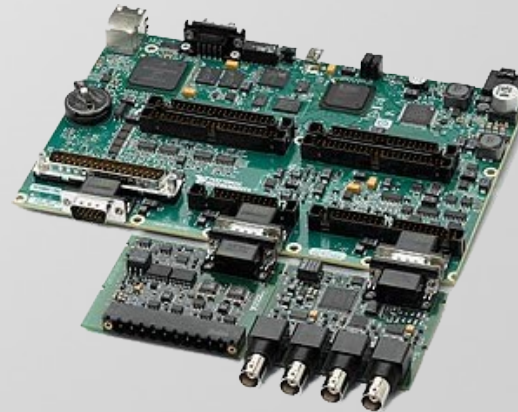
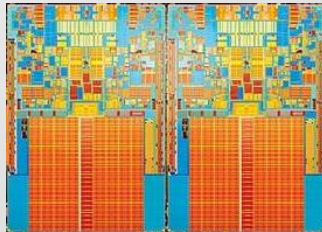
# Main Development Axis

## Covering strategic fields

- From HPC to multicore:  
Scilab 6 with new kernel
- Just-In-Time (LLVM based)
- Embedded systems:  
C code generation with Xcos

## Extending Scilab & Xcos

- Interface with main simulation software
- Dedicated sectorial modules



# Scilab & Octave

# Scilab vs Octave - Features

- A lot of in common  
... even sharing effort on common project like arpack-ng
- Scilab provides an equivalent to Simulink called Xcos.  
A simulation and modeling for complex systems.  
Only free alternative in the FOSS world
- Scilab provides out of the box graphics

# Scilab vs Octave - Matlab compatibility

- Octave focus on Matlab compatibility
- Scilab: Matlab is a source of inspiration when they are doing good things
- Scilab has some important differences:
  - // for comments instead of %
  - 2./ <> 2 ./
  - Different function profiles
  - Different graphics features

# Scilab vs Octave - Community

- Octave has a bigger ecosystem (toolboxes)
- ... probably because Scilab was not free for a while
- Octave has no structure behind while Scilab has full time (paid) engineers  
ie : the classical « community driven » vs « integrated team driven »

# Scilab & Debian

# Scilab & Debian

- Increase the visibility and notoriety
- Strong dependency management and feedback
- Benefit of the QA tools (lintian, rebuild, etc)



scilab  
enterprises

**SCILAB ENTERPRISES IS  
YOUR PARTNER FOR USING  
SCILAB**

Scilab is worldwide reference open source software for numerical computation in industry, education and research:

- Integration of results from scientific world
- Links with other free and non free software



