Shift to FOSS packages: FOSSEE, IIT Bombay

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Outline

- National Mission on Education through ICT
- FOSSEE project objectives. Why FOSS?
- Scilab/Python/other FOSS
- FOSSEE activities

This presentation on
www.ee.iitb.ac.in/∼belur/fossee/WhyFossJan25.pdf

NME ICT

- National Mission on Education through Information & Communication Technology
- ICT strengths : largely unutilized in Education
- MHRD launched this Mission in February, 2009
- Mission likely to continue in the next plan period

FOSSEE

- **The FOSSEE project is funded by NMEICT, MHRD.**
- **PIs: Prabhu Ramachandran, Mani Bhushan, Kannan Moudgalya, Madhu Belur**
- **"Free & Open-source Software in Science and Engineering Education"**
- **Project objective: Minimize use of commercial/proprietary packages in curriculum.**

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With FOSS packages: users can:

- See and modify the source code
- Redistribute and improve the source code
- Use the software for any purpose

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We teachers like this?
What if our college bought (subsidized) Natla packages for teaching Natla packages?

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- **Placements?**
  "If guy knows Natla package, he/she is unlikely to be useless."
- **Natla skills typically useless (unless pirated versions)**

Adopt FOSS

- **Skills learnt using FOSS at academic level are later useful in the industry**
- **Obvious advantage for Private Industries, Entrepreneurs, Defence Establishments, Research Organizations, Academic Institutions and Individual User.**
- **For an institution, piracy checking issues are eliminated by adopting FOSS tools**

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  (Of late, companies 'do not mind' piracy: future investment)

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- **Weapons lobby in USA, UK, France, Israel: World Bank lends/peddles/funds India!**
- **Microsoft lobby to 'distribute' free licenses for schools (philanthropy?)**
- **Cheap academic licenses : 'subsidized Natla-drug-peddling'**
- **Music copyright extended (thanks to corporate lobby in EU): 50 $\rightarrow$ 70 years (September 2011)**

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Exception: India: NMEICT, MHRD supports FOSSEE!

FOSSEE focus in IITB

Python family

- **Python**
- **NumPy, SciPy**
- **Sage**

Scilab family

- **Scilab**
- **Xcos**

Other FOSS actively pursued/used

GNURadio
OpenFoam
ORCA
GNUKatha
R
COMEDI
NGSpice
LaTeX
OpenFOAM
GNU/Linux

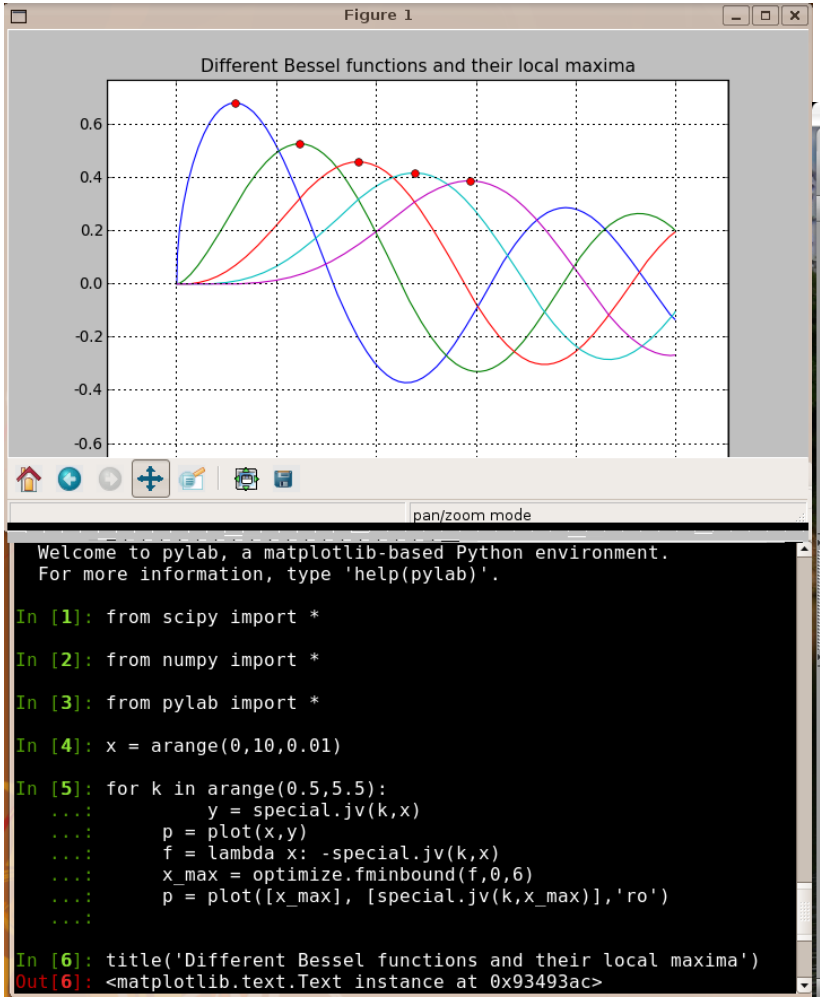
Proprietary package and their FOSS replacements kept at:

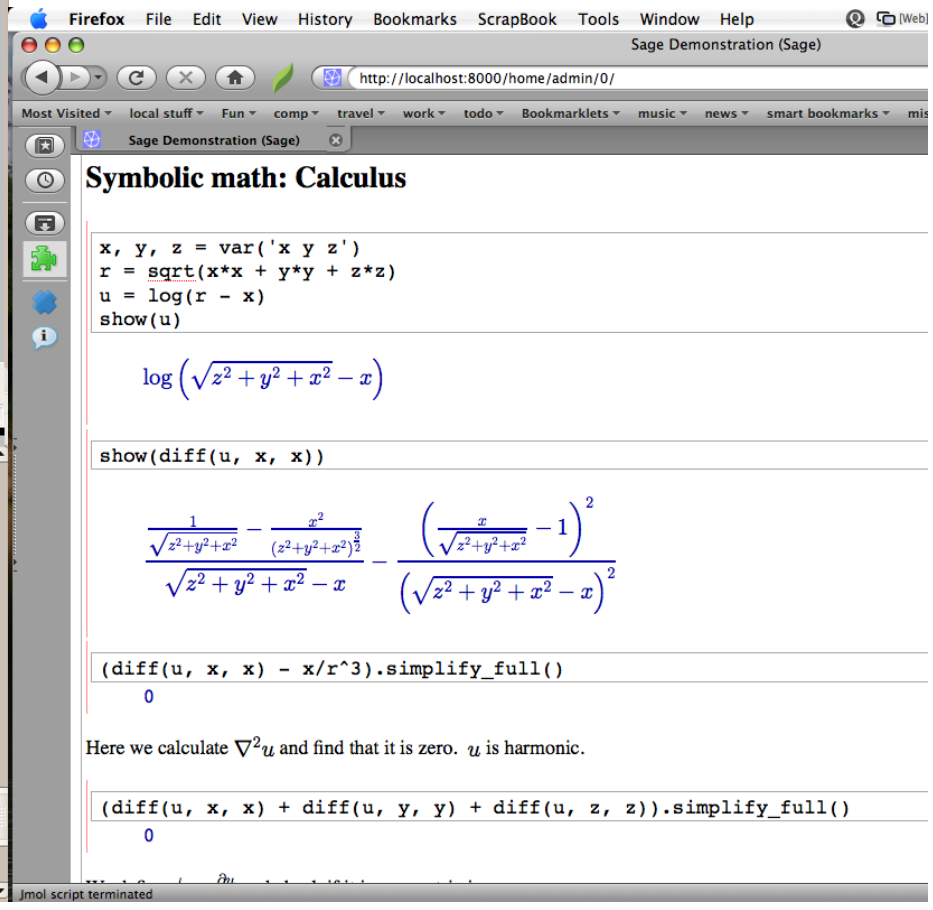
`www.fossee.in/software`

Python: a toolkit for diversity

- **Numeric and Symbolic computation**
- **Exploration and Visualization**
- **High performance**
- **Parallel computing**
- **User interfaces, Web**
- **Other tasks**

Numerics, Symbolics, Web-interface

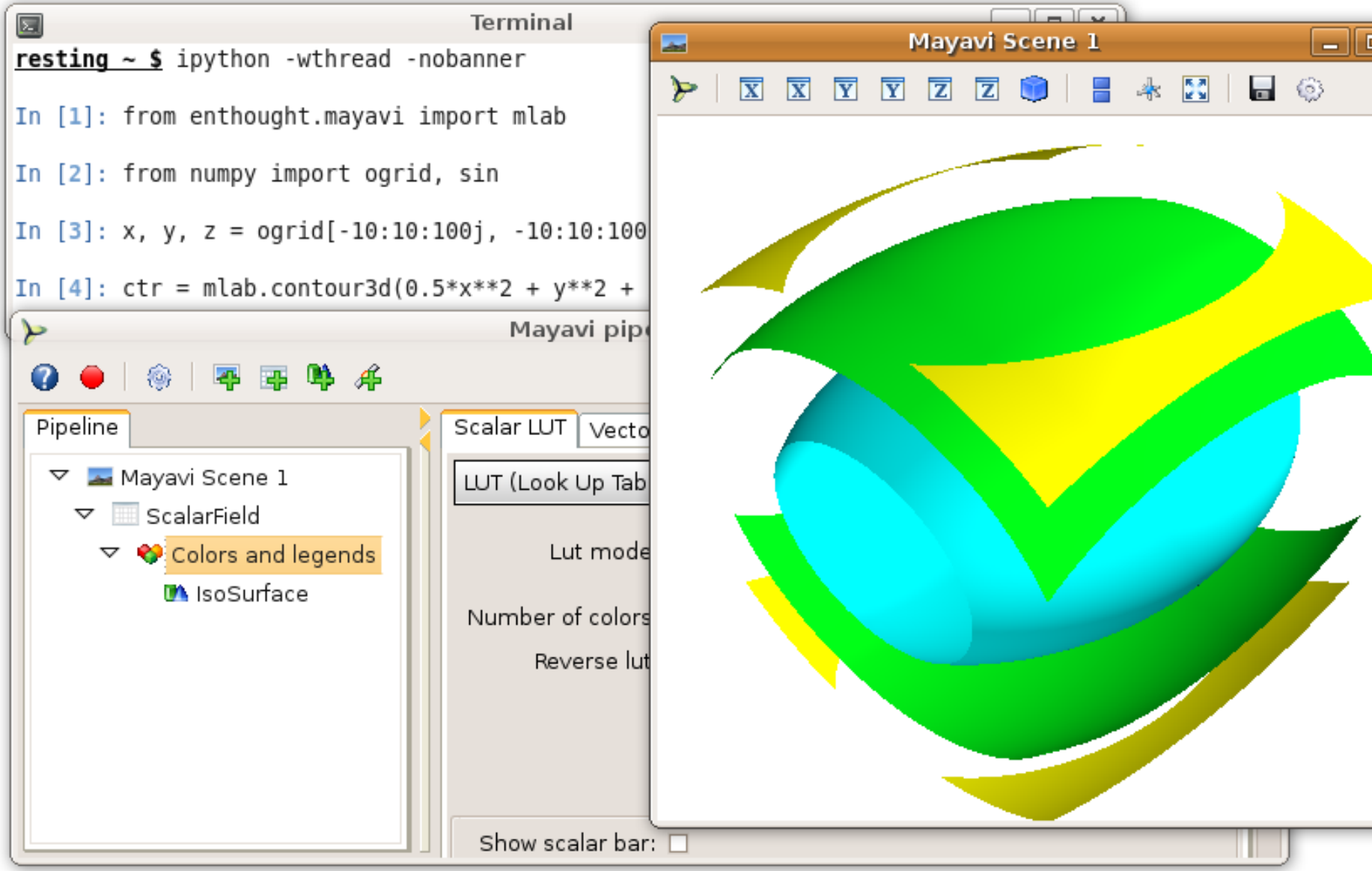




Sage

- **Web based interface, symbolics,**
- **Arbitrary precision math, numerics**
- **Replacement for Mathematica, Maple, Magma and Matlab**

Exploration, Visualization, UI

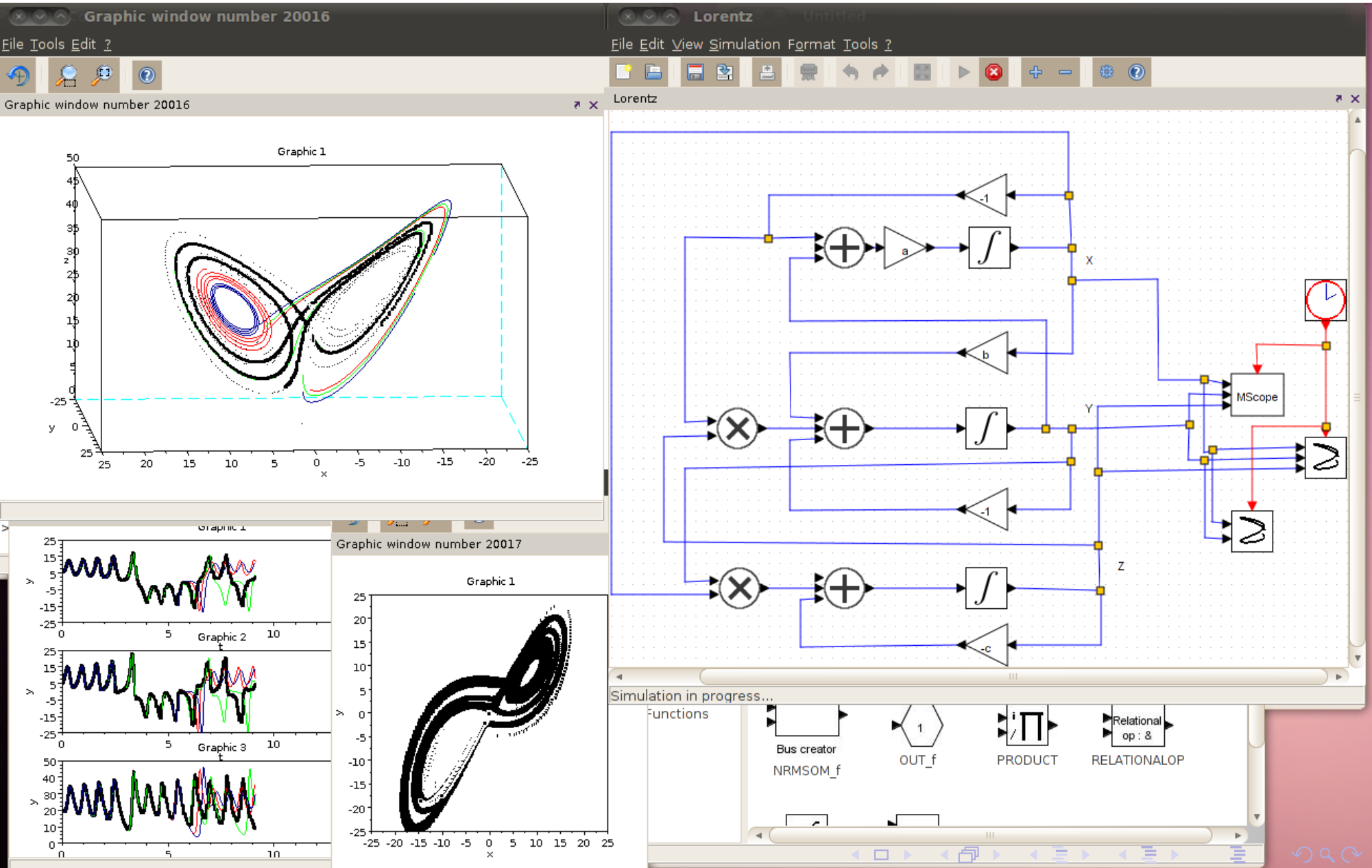


Python users?


redhat.
Sid Meier's CIVILIZATION IV
NOKIA
MOJAM MUSIC
PARDUS
Google™
NASA
journyx
Y!™
Walt Disney FEATURE ANIMATION
Los Alamos NATIONAL LABORATORY EST. 1943
INDUSTRIAL LIGHT & MAGIC A LUCASFILM COMPANY
YouTube
CENTRAL INTELLIGENCE AGENCY
IBM

Scilab

- **Perfect replacement of Matlab®**
- **Xcos: Simulink equivalent: for block-diagram based simulation**
- **Numerical Techniques**
- **Signal processing**
- **Control Systems**
- **Hardware-In-Loop Simulation**
- **Data analysis/regression**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File Tools Edit ?
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Graphic 1
Graphic 2
Graphic 3
Lorentz
File Edit View Simulation Format Tools ?
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Y
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MScope
Simulation in progress...
Functions
Bus creator
NRMSOM_f
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PRODUCT
Relational op : &
RELATIONALOP

Why Scilab?

Scilab together with various toolboxes, which are also free, can perform operations like:

- **Matrix Operations**
- **Optimization**
- **Image and Video Processing**
- **Control Systems**
- **Graph theory**

Accuracy: both use LAPACK (state of the art for core matrix operations)

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In fact, state of the art codes available only to FOSS/Scilab

LSODE : ODE

DASSL : Differential Algebraic equations

Hardware interfacing through Scilab

- **Real-time Control of Hardware through Serial Toolbox**
- **Can access $>$ 400 AD DA and digital I/O cards through Scilab+Xcos+HART+COMEDI**
- **Another solution: GNURadio+COMEDI or GNURadio+Scilab+Xcos+OpenCV**
- **GNURadio: good graphics, Scilab+Xcos: good libraries together: neat replacement of LabView**
- **GNURadio compatible with Scilab and/or Xcos**

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- **GNURadio compatible with Scilab and/or Xcos (LabView can call Matlab scripts, but not Simulink)**
- **Embedded-control and Scilab interface (in progress @IITB)**

CNES

CNES (French Space Satellite Agency) (analog of ISRO)

- **Learning Scilab not 'rocket science' but**

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- **Learning Scilab not 'rocket science' but**
- **One can also send rockets after learning Scilab**
- **CNES launches Arianne rockets: all calculations/simulations done in Scilab**
- **On google, try 'CNES' 'Scilab'**

Many many big/small companies and institutions across the world

Hurdles? Why have all not shifted to FOSS?

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Why waste money of tax-payers/students when alternatives are good and free?
Beware! with all awareness now, RTI/accusations that Principal/purchase committee receives 'cuts'!!

FOSS 'activism'

FOSS enthusiasts/developers are now global

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- **Prompt response to queries on mailing-lists**
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- **More likely to find useful codes for rare applications (Proprietary packages won't develop code for few users.)**

FOSSEE activities: Python+Scilab

FOSSEE @ IIT Bombay can help you

- **New semester-long course: SDES (Software Development Techniques for Engineering and Science education):**

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FOSSEE @ IIT Bombay can help you

- **New semester-long course: SDES (Software Development Techniques for Engineering and Science education): (IITB, 2 universities have included this)**
- **Workshops : 50 so far (across India) (1-5 days workshop)**
- **Spoken tutorials : 46 in English, (dubbed into many other Indian languages)**
- **Online test interface to auto-check codes (in php-mysql)**
- **Lab Migration (Shifting all computational laboratories to Scilab)**
- **Virtual Labs (Remote Access to the Single Board Heater System) www.co-learn.in/webs-sbhs**

Textbook companions

For a textbook, in any subject, its textbook companion

- **is codes in Scilab (or Python, or any other FOSS) for all solved examples**
- **is thus 'documentation' for Scilab**
- **can be taken up by students/interns anywhere**
- **requires no writing skills**
- **allows our php-mysql interface to make uploading/checking/report-generation easy**

61 completed, 41 in progress

Areas where companions are complete/in-progress

Control Systems	Optimization
Differential Equations	Graph theory
Fluid Mechanics	Machines (ME/Design)
Digital/Analog Signal Processing	Thermodynamics
Digital/Analog Image Processing	Electrical Machines
Basic Physics	Computer Programming
Analog Electronics	Digital Electronics
Power Systems Analysis	Digital Communications

Partners

Success in shifting to FOSS possibly only by your participation

- **Please find enthusiastic students and enroll them for textbook companion (Rs. 10k for student, Rs. 5k for teacher)**
- **Help with lab migration (honararia for students/teachers)**
- **How can we help: please suggest**

www.fossee.in
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