

- Debian ROOT packages by ROOT team and Chr. H. Christensen
- Collaboration of Helmut Wolters (german), Vinc. Vangoni (Italian), Pedro Ferreira (French), Oscar Diaz Fouces (Spanish) ...



PAIPIX

is running



PAIPIX:

a live linux based on **KNOPPIX/DEBIAN**
with special emphasis on scientific packages
including **ROOT**

By Antonio Amorim using DEBIAN and KNOPPIX

Motivation (students)

- A live system *requiring no installation*
- *Including latex* to be able to understand the source arXiv scientific papers.
- Including *code development* environments
- It should also support portuguese

State of the art

Several live systems available based either on Debian: KNOPPIX...or Gentoo.

The major Linux releases like REDHAT or SUSE include a live DVD.

While KNOPPIX was by far the best and most used, it did not met our goals

Motivation (Supplement)

The informatics people at my University discouraged me to do anything....

Choices

- Compressed file system of KNOPPIX seemed the best
- There was information around on how to extend modify the CD images
- It was based on the powerful and free Debian system
- Including only full Latex implied already to go from CD to DVD
- Once we opted for DVD the road was open to include:
 - Scientific applications available in Debian
 - New scientific applications by creating Debian packages
 - Also the SERVER tools like web, database and Content M. Systems
 - Nice things to help interesting the students like ... games
- Once installed on disk it becomes normal DEBIAN

Scientific Packages Selected from Debian

Development/Prog	Visual Studio e .net	gcc; g++; g77 ; .. Kdevelop	Development
Debugger and profiler	Visual Studio e .net	ddd valgrind	Development
Development (test)	Visual Fortran and .net	gcc-4.0; g++-4.0; gfortran-4.0; g95	Development fortran
Java	JDK Sun ...	jikes kaffe-threads ; gcj-4.0 ; JRE ; ant	Notes (2) e (3)
Software testing	...	qntest	Development
Numerical Mathematics	IMSL, Numerical Rec.	Gnu Scientific Library, LAPACK	gsl-ref Gsl
Algebraic Mathematics	Mathematica; Maple , etc	Maxima (xmaxima); ...	Utilities maxima
Calculus	Mathcad	Octave , scilab	Utilitários Octave scilab
Distributed Systems	implementações de CORBA, rpc	... OmniObj4 ..	OmniObj4
Parallel Computation	MPI, PVM	lam4, pvm, mpich	MPI ROMIO MPI-IO PVM3
Scientific Documentation	...	Latex; Kile; TeXmacs	Office (Help -
UML case tool	Rational Rose , ...	Umbrello	Development Umbrello
Electronics	Orcad ...	kicad; pcb; geda; ngspice; verilog	Utilities/Technical kicad GEDA
3dModel/2D	Autocad; SolidWorks ; Pro-Eng	kpovmodeler gmsh	Graphics gmsh
FiniteElements	Ansys; Cosmos; pro-Mechanica	FreeFem FreeFem3D	Exemplos
Animation 3D	3dStudio, etc.	blender, k3d	Graphics Blender k3d
Database (DBMS)	Access; SQL Server; Oracle; ...	mysql; postgres; ..	(mysql postgresql mysql postgresql
Data Analysis	Origin; Statistica; ...	root (much more than) paw	Root root-htmldoc root-manual
Simulation of radiation	...	geant3 isajet pythia herwig	Pythia herwig
Earth Science charts	Origin; Metview; ...	gmt	GMT Manual GMT
Meteorology field maps	...	Grads, vis5d	Grads Vis5d
GIS- Geographic infor. Si	...	Grass	Grass
Statistics	Statistica; S-Plus; ...	R	Manual R
medicam images (DICOM)	...	amide, xmedcon, medcon	amide xmedcon
AFS file-system client	AFS for windows	openafs	boot prompt afs=cell afsuser=<user> (5)

New scientific packages created/included

Particle Physics – ROOT, CERNLIB, GEANT3, MONTECARLO

Earth Physics – Graphics tools and format support

Mathematics, Statistics, Chemistry

Electronics

Server - MySQL, Postgresql, Apache, software

amide-0.8.11	ng-spice-15	bufr-2.7	ng-spice_15.0-2.dsc		
care2x-2.1	etcskel-paipix-0.1	evaristo-2.2	g95-4.0		
paipix-bookmarks-0.5	grads-1.9	paipix-patches-3.8	gribex-2.8	paipix-remaster-1	
kernel-hs-paipix-2.6.11	paipix-webcam-1.0	kicad-1.0	phpmybibli-2.0		
kile-templates-paipix-2	knoppix-terminalserver.patch	root-5.03.01	ktidbexplorer		
sermenu-paipix-01	labjack-1	tidb2	tikiwiki-1.9.1	mpich2-1.0.2p1	tikiwiki-
secplugin-0.1	myspell-pt-paipix_1.0	vis5d-tcl-5.2	NFORCE-Linux		

ROOT and Root Development Libraries

ii	libroot-dev	5.03.01	Header files for ROOT
ii	libroot5.03	5.03.01	Numerical data analysis framework - shared runtime lib
ii	root	5.03.01	Meta package to install all ROOT packages
ii	root-bin	5.03.01	Numerical data analysis framework - general applicatio
ii	root-cint	5.03.01	ROOT version of the C/C++ interpreter
ii	root-doc	5.03.01	Tutorial and test suit for the ROOT system
ii	root-plugin-asimage	5.03.01	AfterImage plugin for ROOT
ii	root-plugin-fumili	5.03.01	Fumili plugin for ROOT
ii	root-plugin-gl	5.03.01	GL plugin for ROOT
ii	root-plugin-hbook	5.03.01	Hbook plugin for ROOT
ii	root-plugin-krb5	5.03.01	Kerberos (version 5) plugin for ROOT
ii	root-plugin-ldap	5.03.01	Ldap plugin for ROOT
ii	root-plugin-minuit	5.03.01	Minuit plugin for ROOT
ii	root-plugin-mlp	5.03.01	Multi layer perceptron plugin for ROOT
ii	root-plugin-mysql	5.03.01	MySQL client plugin for ROOT
ii	root-plugin-netx	5.03.01	NetX plugin for ROOT
ii	root-plugin-pgsql	5.03.01	PostgreSQL client plugin for ROOT
ii	root-plugin-proof	5.03.01	PROOF plugin for ROOT
ii	root-plugin-pythia6	5.03.01	Pythia version 6 plugin for ROOT
ii	root-plugin-python	5.03.01	Python plugin for ROOT
ii	root-plugin-qt	5.03.01	Qt plugin for ROOT
ii	root-plugin-quadp	5.03.01	QuadP plugin for ROOT
ii	root-plugin-roofit	5.03.01	Plugin for ROOT for modeling expected distribtions
ii	root-plugin-ruby	5.03.01	Ruby plugin for ROOT
ii	root-plugin-xml	5.03.01	XML reader plugin for ROOT
ii	root-proofd	5.03.01	Parallel ROOT Facility - distributed, parallel computi
ii	root-rootd	5.03.01	ROOT remote file server
ii	root-xrootd	5.03.01	Extented ROOT file server
ii	ttf-root	5.03.01	True type fonts for ROOT

ROOT – The Train travel model

To allow one to *work without network* PAIPIX includes:

all the external development libraries needed to build ROOT

all compilers and most editors.

all CERNLIB, pythia, isajet, herwig

at /cdrom/Books/Root/

The ROOT user guide (compressed)

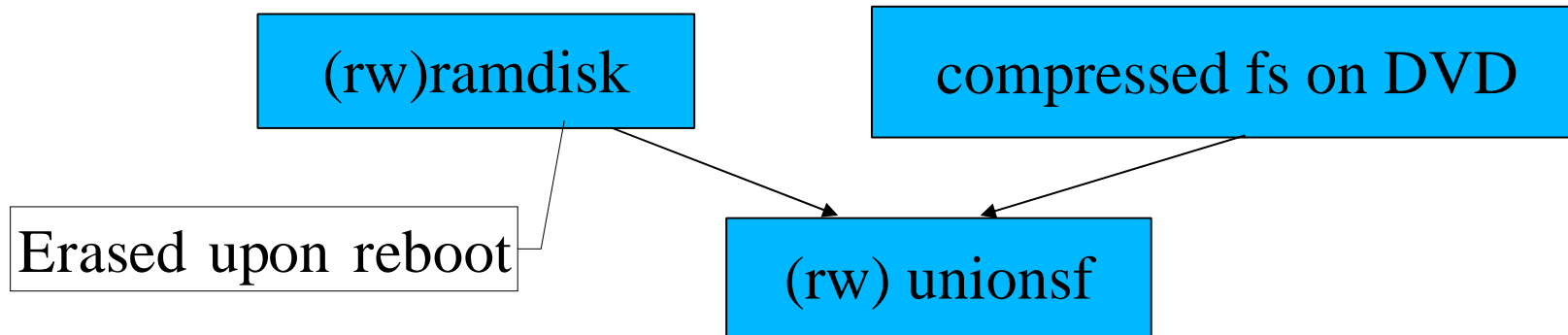
The ROOT reference guide

(without pdf images of the inheritance that take a lot of space)

Public parts of the Particle Data Book



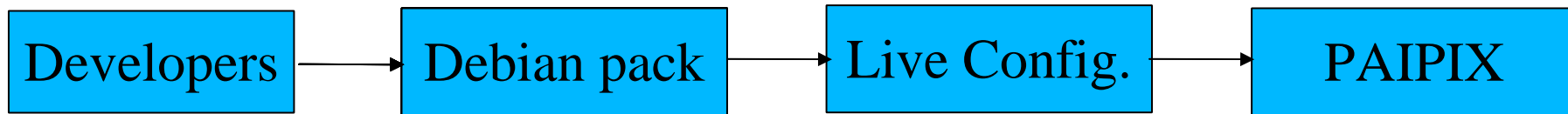
How to deal with /home persistency?



At the boot prompt one can use:

- a) knoppix home=scan (looks in harddisks or pen drives
single file with your home dir)
- b) knoppix afs=cell afsuser=user
(inside CERN use also ntp=ip-time-1.cern.ch)

Keeping in sync: the PAIPIX-PATCHES



All versions are constantly changing

All patches kept in one package:

(apply) `dpkg -i paipix-patches-....deb`
(undo) `dpkg -P paipix-patches`

etc/apt/sources.list usr/bin/openoffice etc/init.d/knoppix-autoconfig etc/menu-methods/zzz-update-menus-knoppix
etc/php4/apache/php.ini etc/skel/.kde/share/config/kickerrc etc/skel/.kde/share/config/konsolerc
etc/skel/.kde/share/config/profilerc etc/skel/.kde/share/config/kcmnspluginrc etc/X11/XF86Config-4.in
etc/apache/httpd.conf usr/share/applnk/OpenOffice.org1.1___.directory usr/share/applnk/OpenOffice.org1.1/calc.desktop
usr/share/applnk/OpenOffice.org1.1/draw.desktop usr/share/applnk/OpenOffice.org1.1/impress.desktop
usr/share/applnk/OpenOffice.org1.1/math.desktop usr/share/applnk/OpenOffice.org1.1/printeradmin.desktop
usr/share/applnk/OpenOffice.org1.1/template.desktop usr/share/applnk/OpenOffice.org1.1/web.desktop
usr/share/applnk/OpenOffice.org1.1/writer.desktop etc/init.d/mysql etc/init.d/postgresql etc/kde3/kdevelop3rc
usr/share/hwdata/pci.ids usr/share/hwdata/pcitable etc/X11/Xsession.d/45xsession usr/share/knoppix-
installer/modules/install/02-install-tools.bm etc/motd usr/sbin/update-rc.d etc/exim4/exim4.conf.template
etc/squirrelmail/config.php etc/imapd.conf usr/lib/zope2.7/skel/etc/zope.conf.in etc/postgresql/pg_hba.conf
etc/init.d/knoppix-hd-config etc/openoffice/psprint.conf etc/init.d/knoppix-reboot usr/sbin/knoppix-terminalserver
usr/share/knoppix-terminalserver/templates/miniroot/linuxrc usr/share/wine/skel/config etc/default/ntpdate
etc/init.d/openafs-client usr/sbin/mkxf86config etc/init.d/xsession usr/share/applications/kde/kdevelop_c_cpp.desktop
usr/share/applications/kde/kdevelop_ruby.desktop usr/share/applications/kde/kdevelop_kde_cpp.desktop
usr/share/applications/kde/kdevelop_scripting.desktop usr/share/applnk/Knoppix/Config___.directory
usr/share/applnk/Knoppix___.directory usr/share/applnk/Knoppix/Services___.directory etc/mysql/my.cnf
etc/default/mpd usr/sbin/netcardconfig usr/lib/menu/tuxmath etc/modprobe.d/nvnet etc/mkinitrd/mkinitrd.conf

Terminalserver: Instant Instalation farms

Terminal-server tool

- 1) introduced in KNOPPIX
- 2) extended by clusterknoppix (openmosix)
- 3) Paipix further extends with about 25 corrections/improvements
ranging from ssh access to farm nodes to proper DNS
configuration, mpi configuration, etc.

Terminal-server includes

- 1) PXE boot and miniroot image creation
- 2) sharing the compressed file system trough nfs
- 3) optional local dns server and iptables routing
- 4) ssh validation

Ex: Used in meteorological model running in LISBOA

(and) ROOT wiki investigation

Wiki web technology:

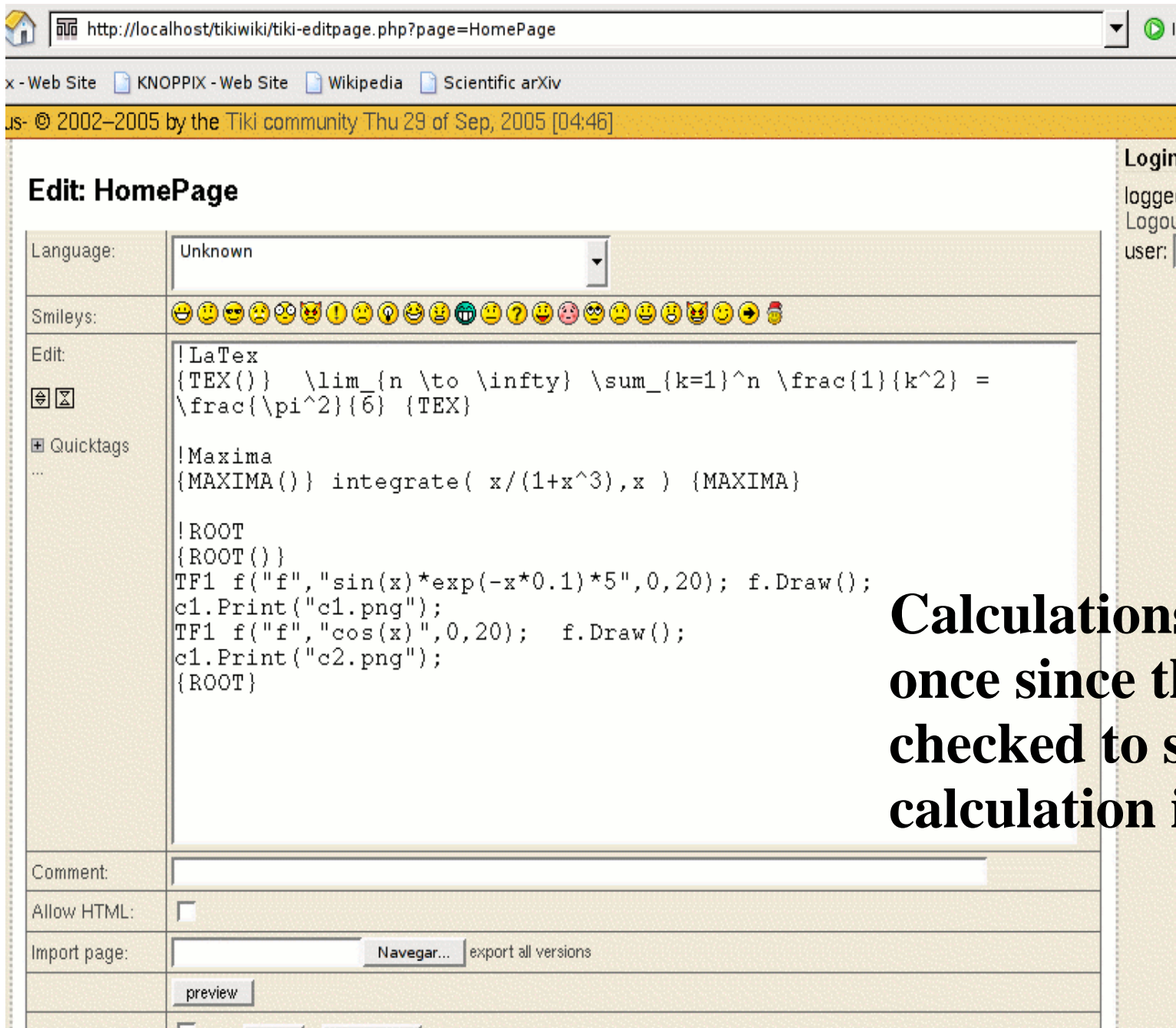
- enables sharing and cumulative construction of documents
- Allows acknowledgment of successive improvements
- Enabling direct interaction with non-experts

We have extended the tikiwiki CMS system with

- 1) latex support,
- 2) MAXIMA algebraic calculation support
- 3) Root macro support (by João Batista)

This is a prof of concept with security problems that is being interfaced to a batch system - Investigating PROOF -

All server tools in the live DVD



The screenshot shows a web browser window with the address bar displaying `http://localhost/tikiwiki/tiki-editpage.php?page=HomePage`. The browser's address bar also shows several tabs: "x - Web Site", "KNOPPIX - Web Site", "Wikipedia", and "Scientific arXiv". The page title is "Edit: HomePage". On the right side, there is a "Login" section with the text "logged", "Logout", and "user:". The main content area is a text editor with a "Language:" dropdown menu set to "Unknown". Below the language menu is a "Smileys:" section with a row of various emoji icons. The editor contains the following code:

```
!LaTeX
{TEX()} \lim_{n \to \infty} \sum_{k=1}^n \frac{1}{k^2} =
\frac{\pi^2}{6} {TEX}

!Maxima
{MAXIMA()} integrate( x/(1+x^3),x ) {MAXIMA}

!ROOT
{ROOT()}
TF1 f("f", "sin(x)*exp(-x*0.1)*5",0,20); f.Draw();
c1.Print("c1.png");
TF1 f("f", "cos(x)",0,20); f.Draw();
c1.Print("c2.png");
{ROOT}
```

Below the code editor, there is a "Comment:" text input field, an "Allow HTML:" checkbox, and an "Import page:" section with a "Navegar..." button and the text "export all versions". At the bottom, there is a "preview" button.

Calculations are done only once since the input md5 is checked to see if a new calculation is required!

- Home
- Calendar
- MyTiki
- Wiki
- Image Galleries
- Articles
- Forums
- File Galleries
- FAQs
- Quizzes
- Admin

LaTeX

$$\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{1}{k^2} = \frac{\pi^2}{6}$$

Maxima

$$\frac{\log(x^2 - x + 1)}{6} + \frac{\arctan\left(\frac{2x-1}{\sqrt{3}}\right)}{\sqrt{3}} - \frac{\log(x+1)}{3}$$

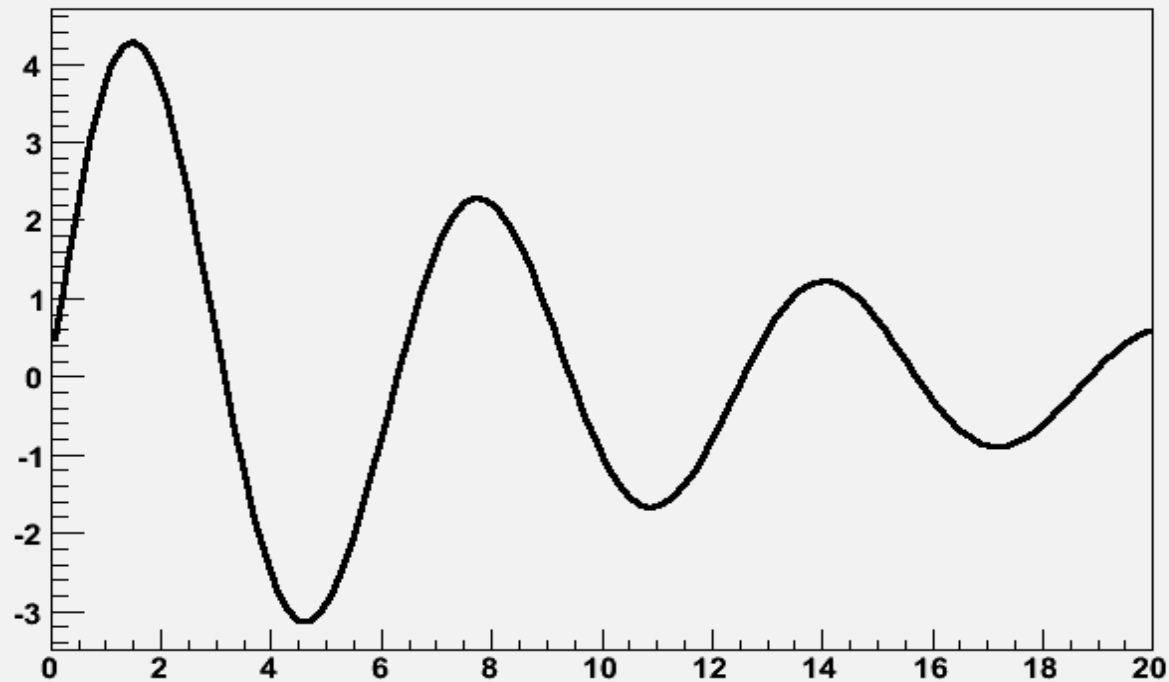
ROOT

[Click here to view this ROOT C++ script's source code](#)

PNG output from ROOT:

c1.png

sin(x)*exp(-x*0.1)*5



Available

- 1) iso images always available from <http://www.paipix.org>
together with forums, instruction pages, etc.
- 2) All individual packages specifically for PAIPIX also
available at the site both in source and compiled.
- 3) Several DVD's in English, German, Italian here...
- 4) Feel free to provide feedback, help in the translation
to other languages *or*
- 5) Re-use the material to build your own better “XXXPIX”