

Indian Linux Users' Group, Chennai (ILUGC)

in association with

Crescent Engineering College, Chennai

presents

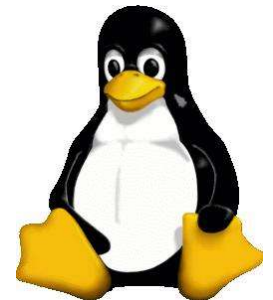


Embedded GNU/Linux Labs HOWTO



by

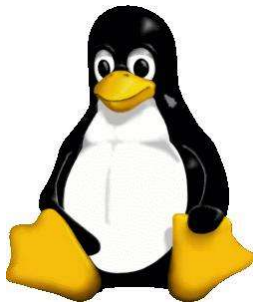
Shakthi Kannan MS



Crescent Engineering College, Chennai

Classification of Labs

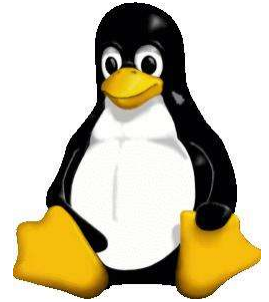
- **Embedded Labs**
- **Hardware Labs**
- **VLSI Labs**



Embedded Labs



- **Firmware**
- **Device drivers**
- **Operating systems**



Embedded Labs

Hardware

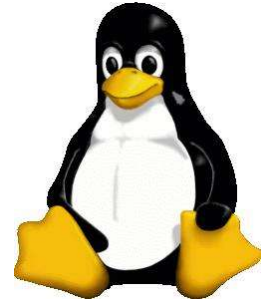


- **Desktop Systems**
 - High-end for development
 - Low-end for testing
- **LAN**
- **Development boards**
(Based on development needs,
processors/micro-controllers)

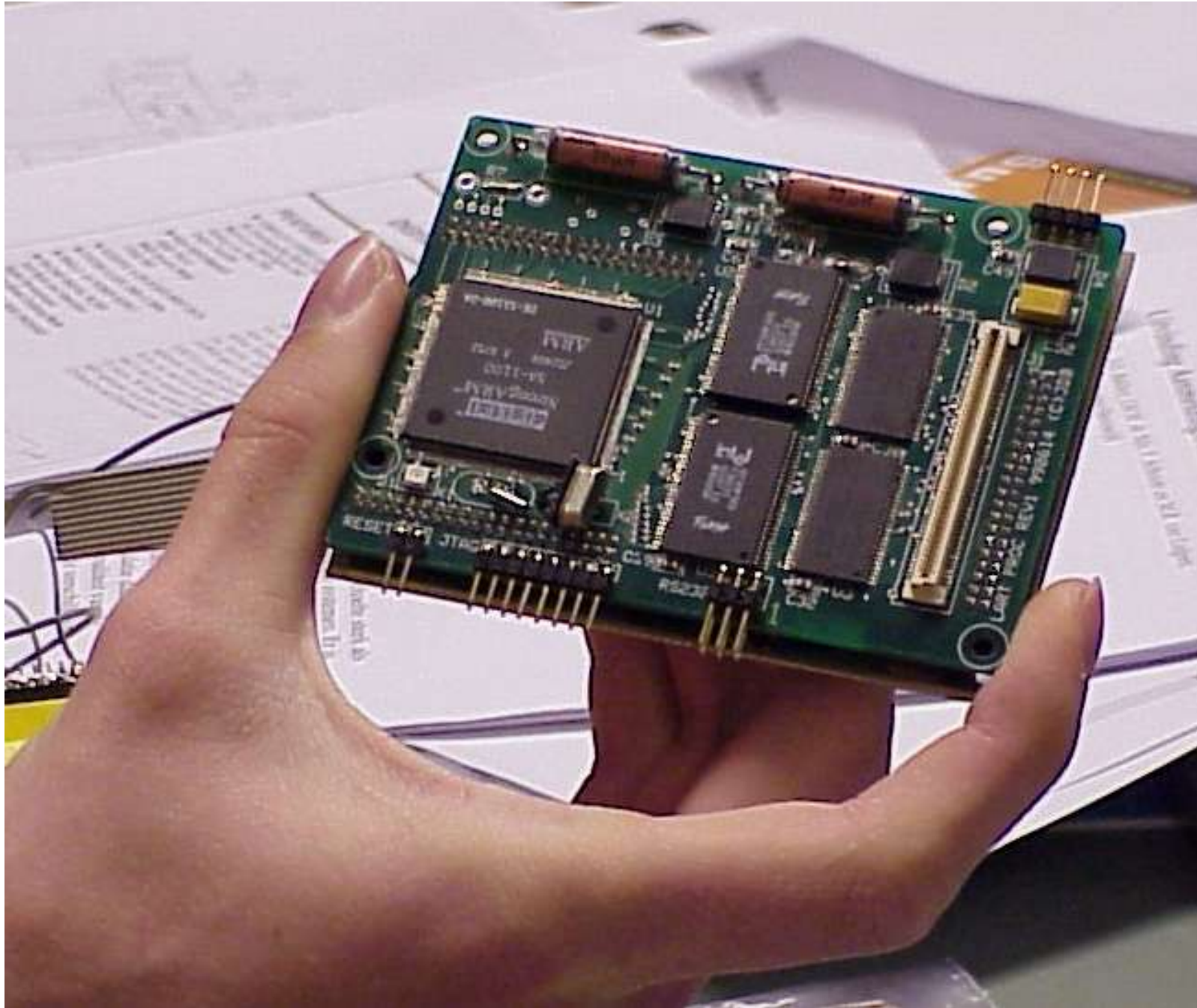
Embedded Labs

Hardware

- **Debuggers/emulators**
- **Cables**
(Ethernet, power, serial, USB, JTAG, “domain-specific” cables, etc.)
- **Power supply units**



LART



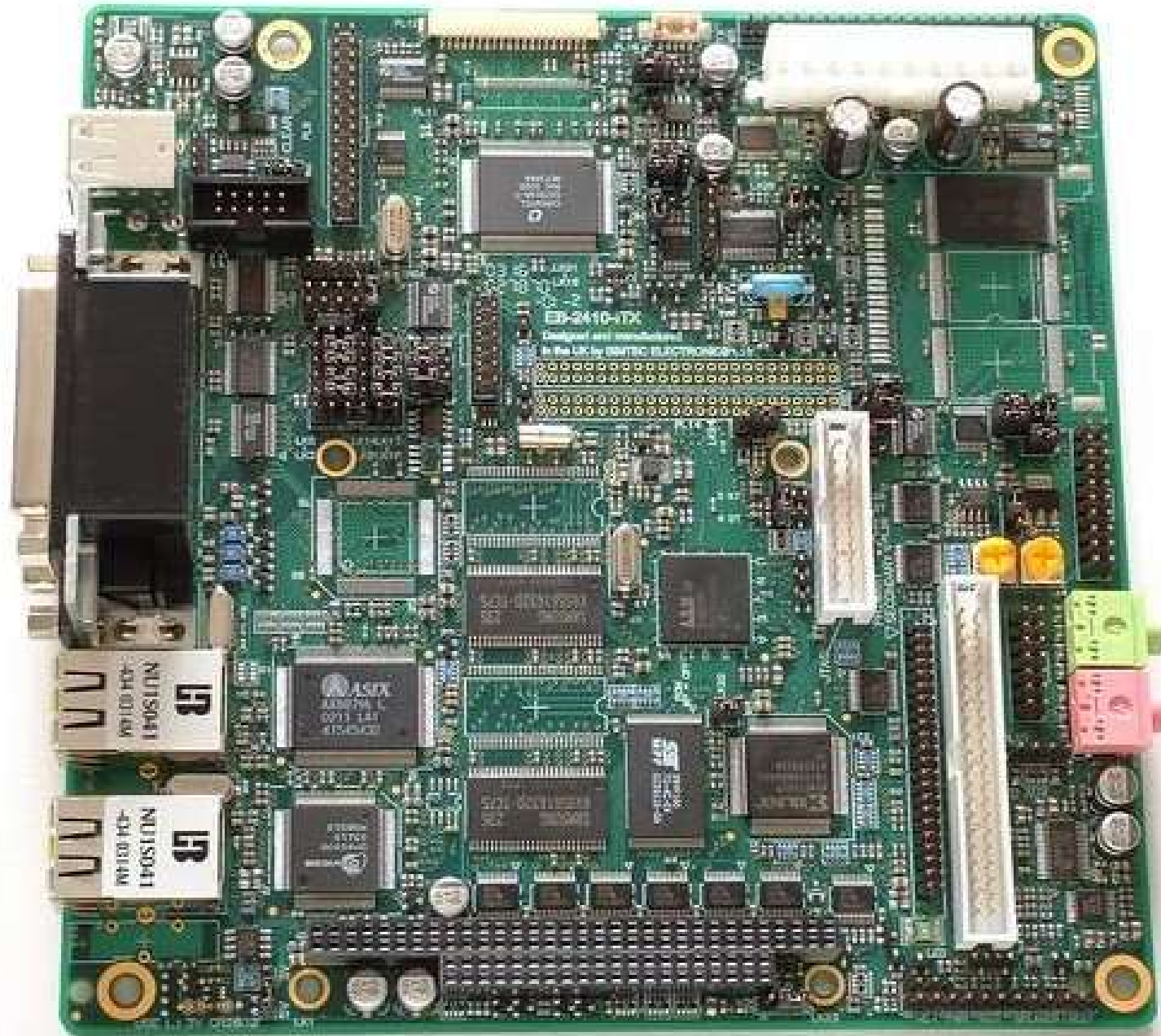
Source: <http://www.lart.tudelft.nl/gallery/hand.jpg>

LART with Digital VT220 Terminal



Source: <http://www.lart.tudelft.nl/gallery/vt220.jpg>

Samsung 2410 Evaluation Board



Source: <http://www.simtec.co.uk/products/EB2410ITX/plan-sml.jpg>

Embedded Labs

Software

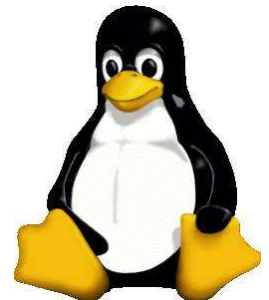
- GNU/Linux distros
(CDs, floppy, USB, etc.)
- GNU toolchains
- Simulators
- Emulators
- Source-code cross-referencing tools
- Editors
(GNU emacs, vi, etc.)



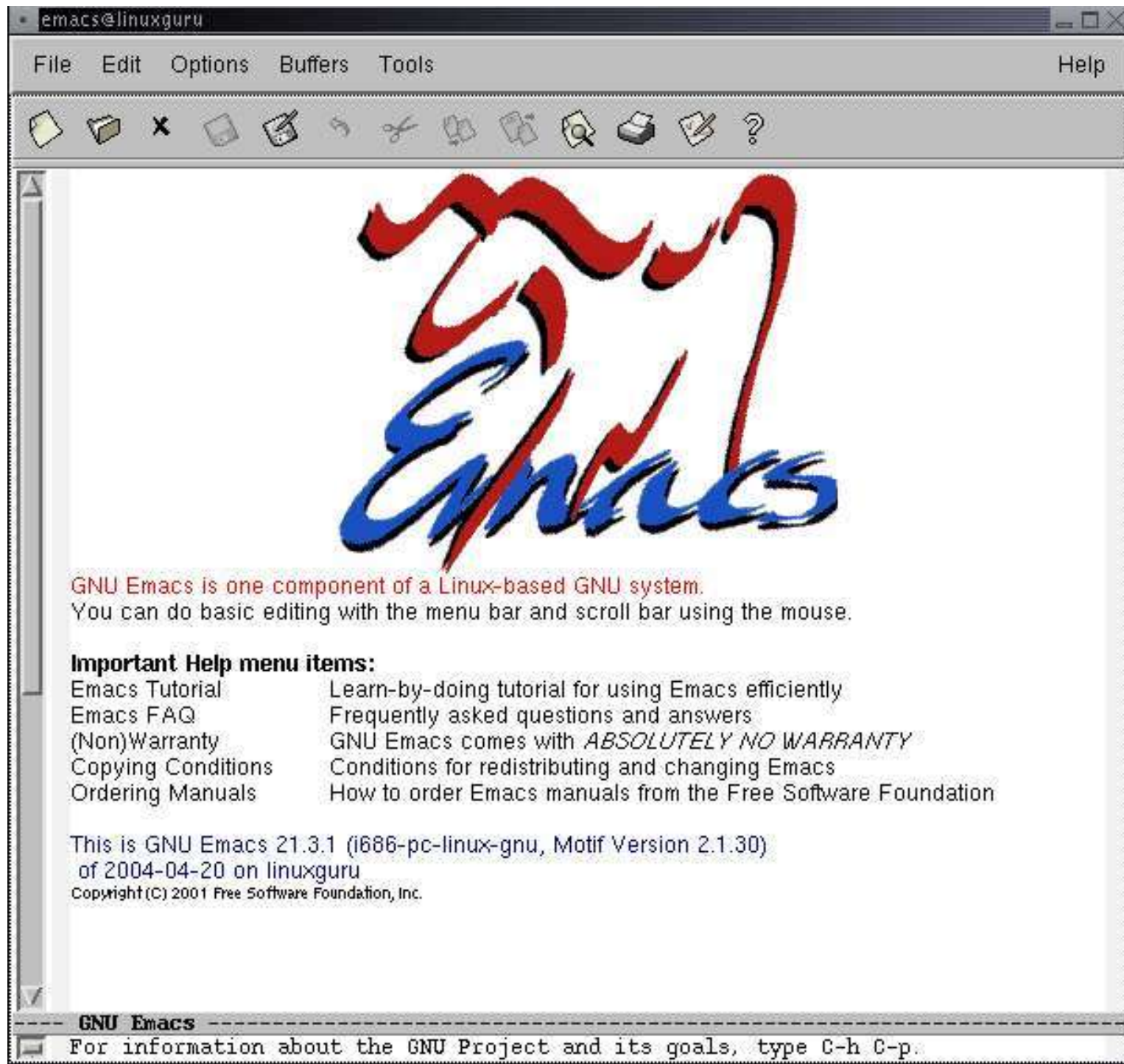
Embedded Labs

Software

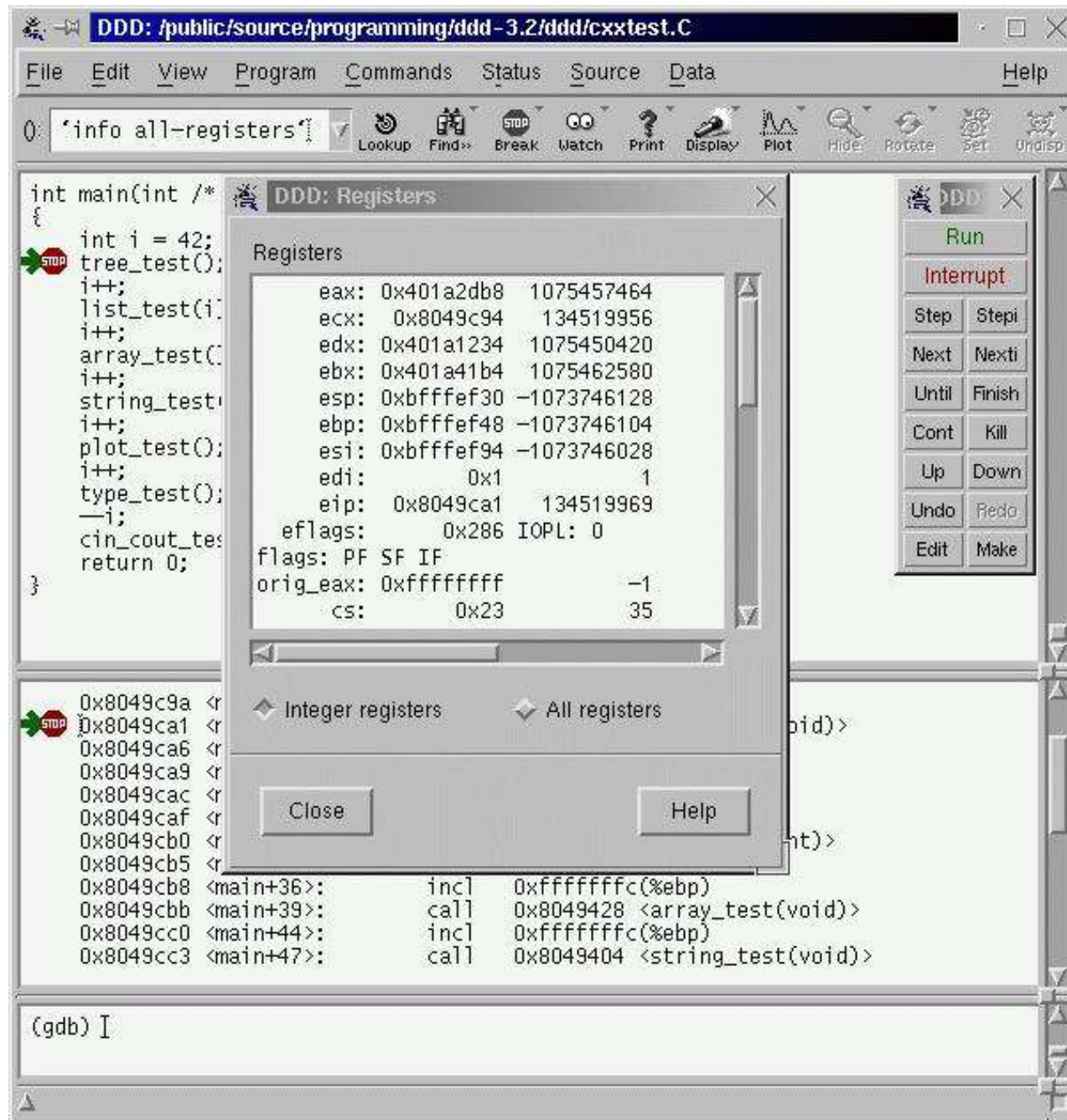
- **Bootloaders**
(redboot, u-boot, blob, etc.)
- **Kernels**
(Linux, uclinux, GNU Mach GNU Hurd, L4 etc.)
- **GDB**
- **DDD**
- **PDF viewers**
- **LaTeX**



GNU Emacs

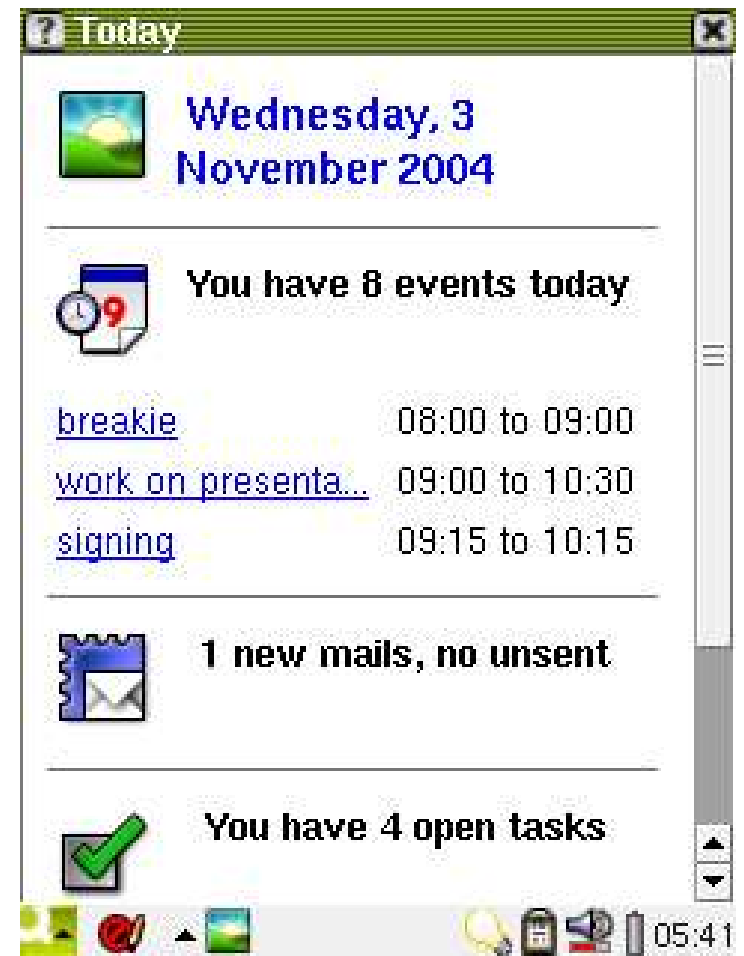
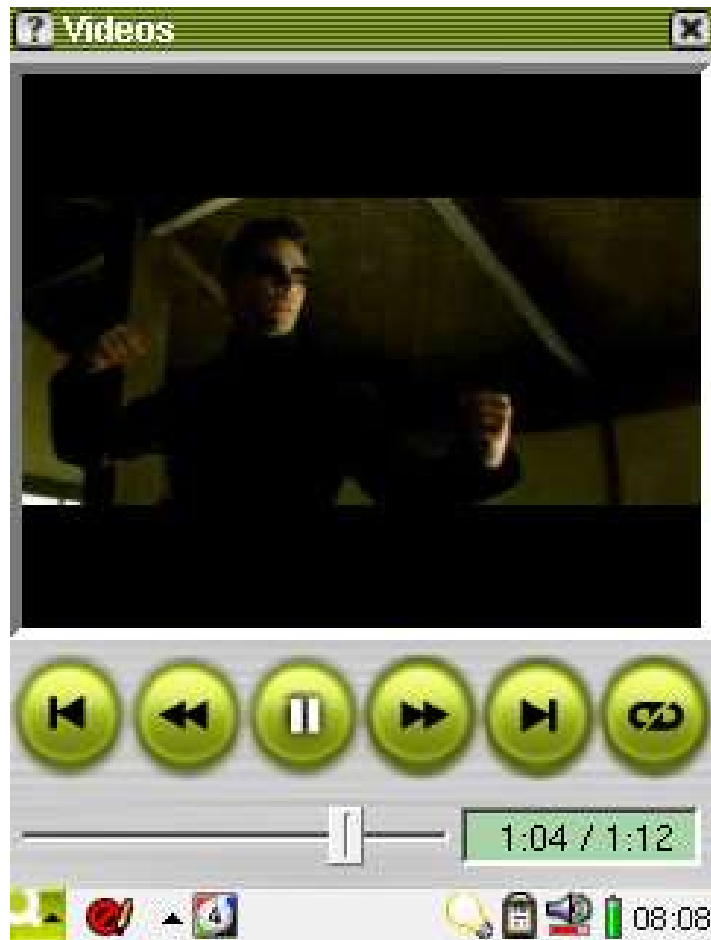


DDD with GDB



Source: <http://www.gnu.org/software/ddd/registers.jpg>

Qtopia PDA



Qtopia Phone



Hardware Labs



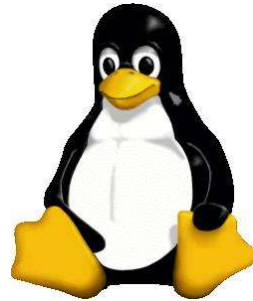
Hardware

- **Desktop Systems**
High-end and low-end configurations
- **Large displays**
17", 19", 21" onwards
- **Cables**
(Ethernet, power, serial, USB, JTAG, "domain-specific" cables, etc.)
- **Power supply units**
- **Antistatic mat, wristband**

Hardware Labs

Hardware

- **Instrumentation equipment**
- **Soldering equipment**
- **Magnifying glass**
- **Debuggers/emulators**
- **Oscilloscopes**
- **Analyzers**



Hardware Labs

Software

- **GNU/Linux distros**
(CDs, floppy, USB, etc.)
- **PCB Tool**
- **Gerbv**
- **Emulation software**
- **GNU toolchains**
- **PDF viewer**



pcB

File Edit Screen Sizes Settings Select Buffer Connects Info Window 2495,680

on/off
solder
GND-solder
Vcc-solder
component
GND-component
Vcc-component
unused
unused
silk
pins/pads
vias
far side
rat lines

active
solder

VIA LINE
ARC TEXT
RECT POLY
BUF DEL
ROT INS
THRM SEL

FLARE GENESIS harry eaton

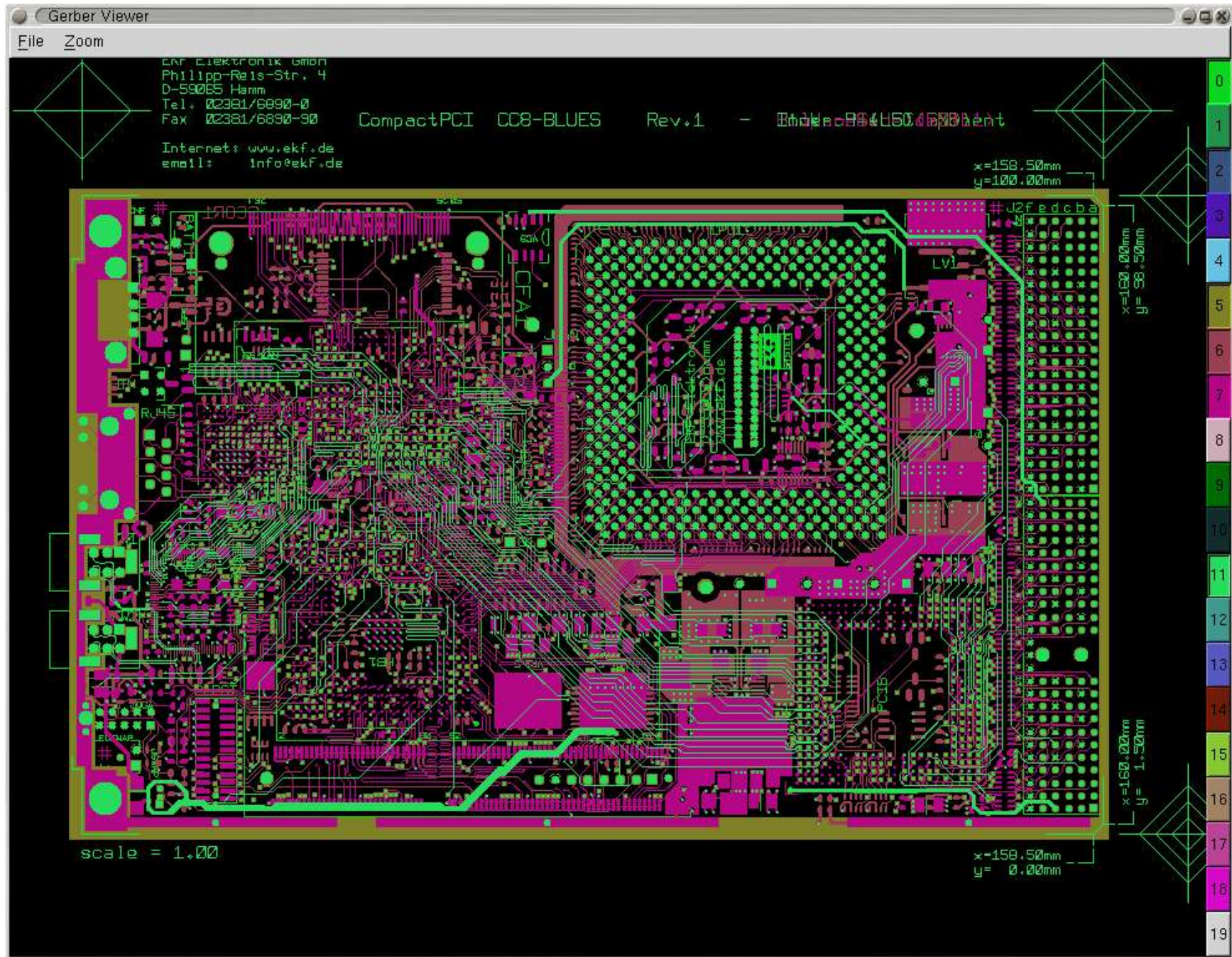
LED(BH03)
LED Interface

12 -X +X -Y +Y ANODE 11

component,abs,all,R, grid=5:10, zoom=1:8, line=10, via=60(28), text=100%, buffer=#1, name: (unknown)

Source: http://bach.ece.jhu.edu/~haceaton/pcb/pcb_screen.gif

Gerber Viewer



Source: <http://gerbv.sourceforge.net/screenshot2.png>

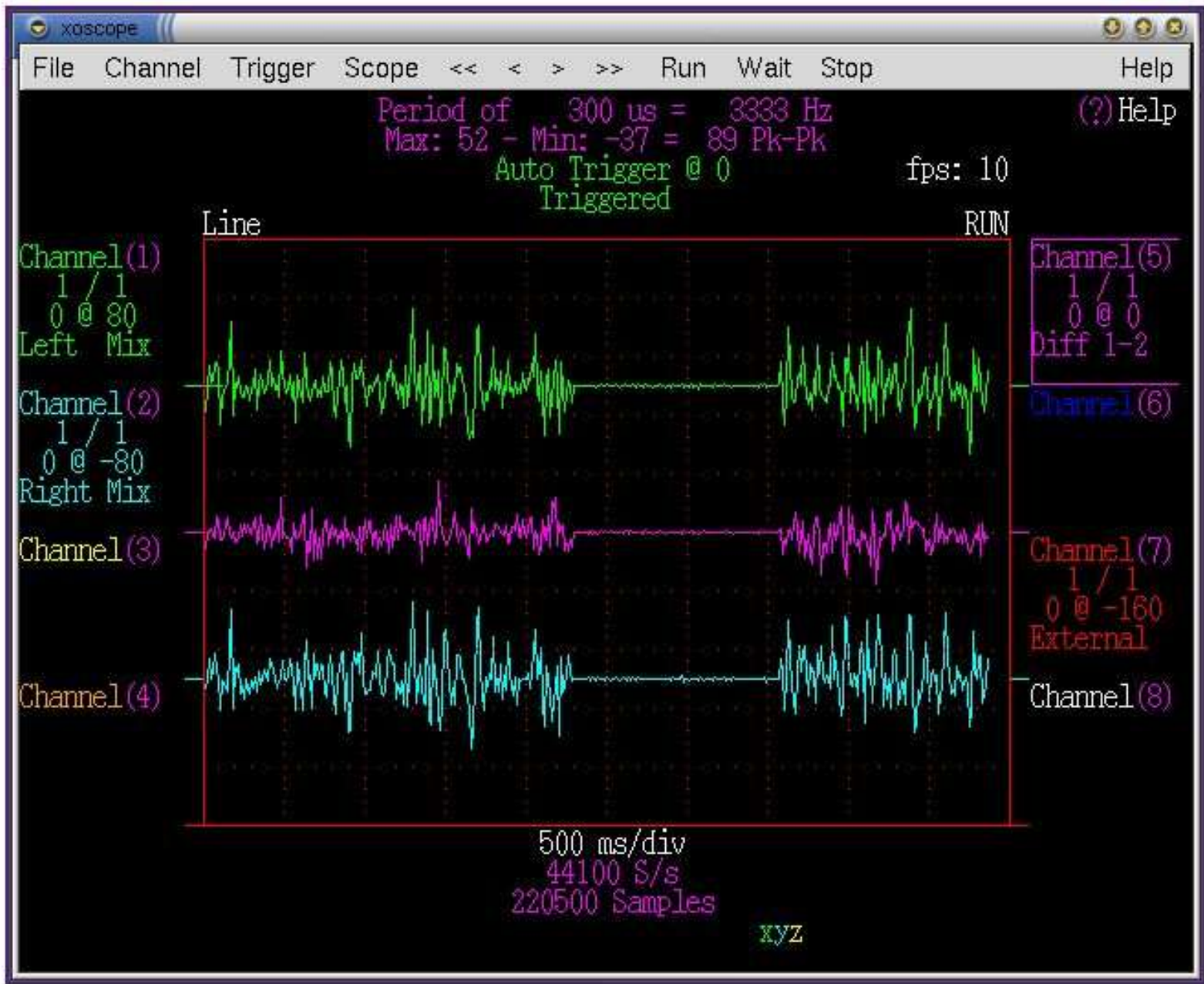
GNU/Linux Simulators/Emulators

- **DOSBox**
- **Bochs**
- **xmame**
- **PearPC**
- **MESS**
- **MAMEoX**
- **gsim51**
- **qucs**



Source: <http://www.mess.org/messscrs.html>

Xoscope



M621 Digital Storage Oscilloscope



Source: <http://www.etcsk.com/products/m621/index.php?lang=eng>

VLSI Labs

Hardware

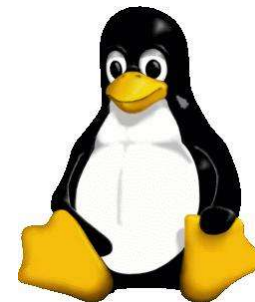
- Desktop Systems (high-end)
 - Sun
 - Intel PCs
- Large screen displays
17", 19", 21" onwards
- Analyzers
- Oscilloscopes
- LAN



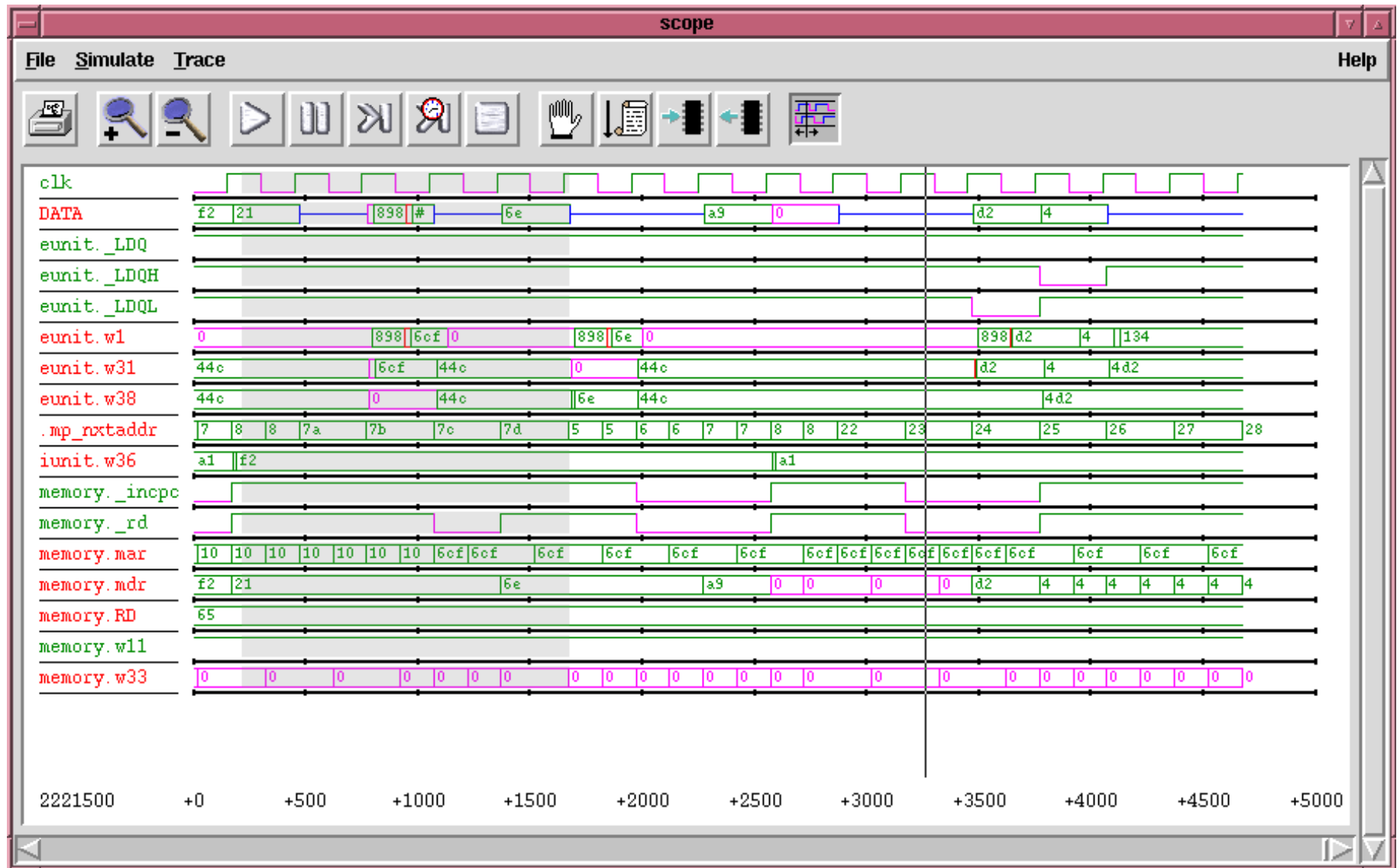
VLSI Labs

Software

- GNU/Linux distros/clusters
- Alliance VLSI CAD Tools
- Icarus verilog
- Spice
- Magic VLSI
- gEDA
- TkGate

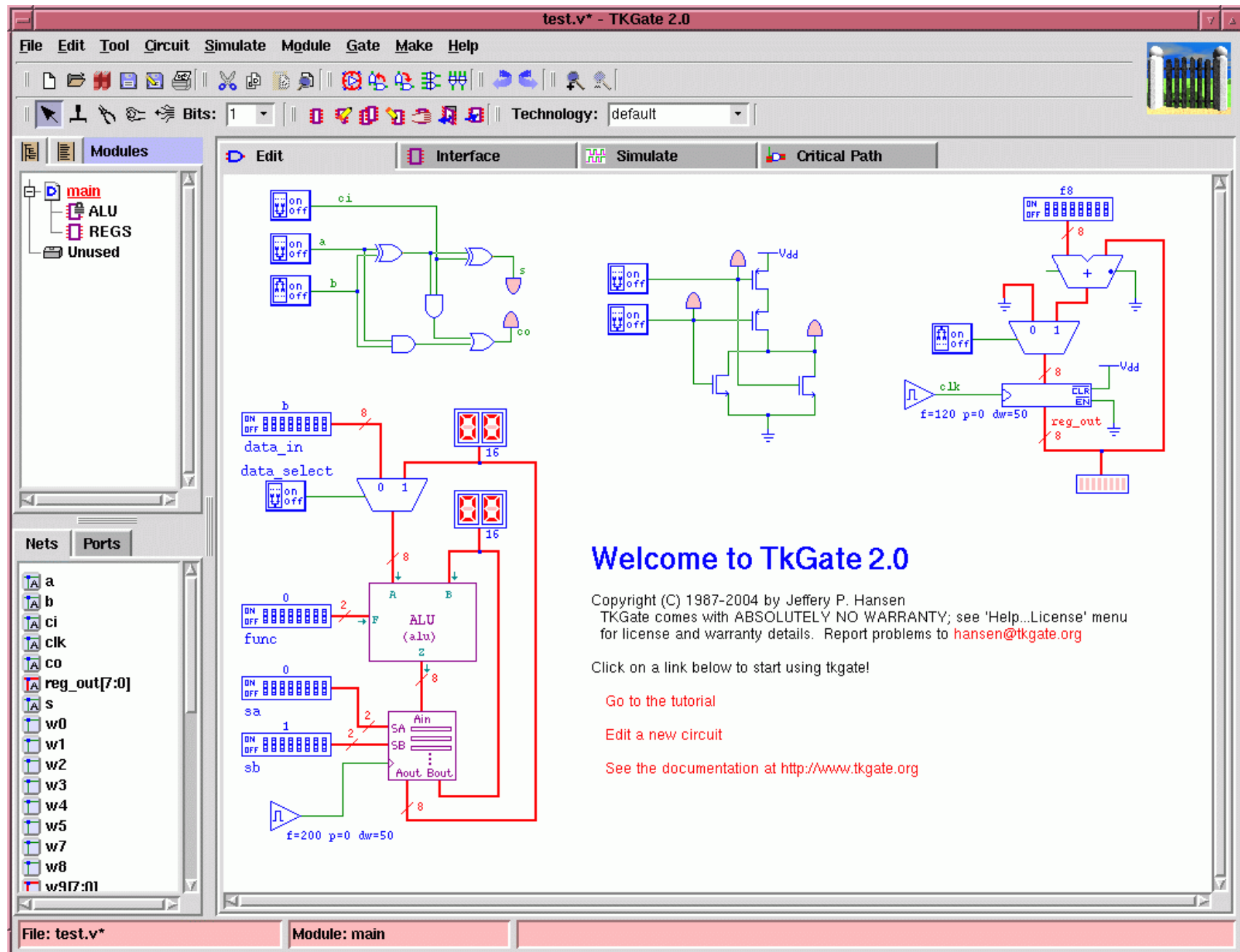


TkGate



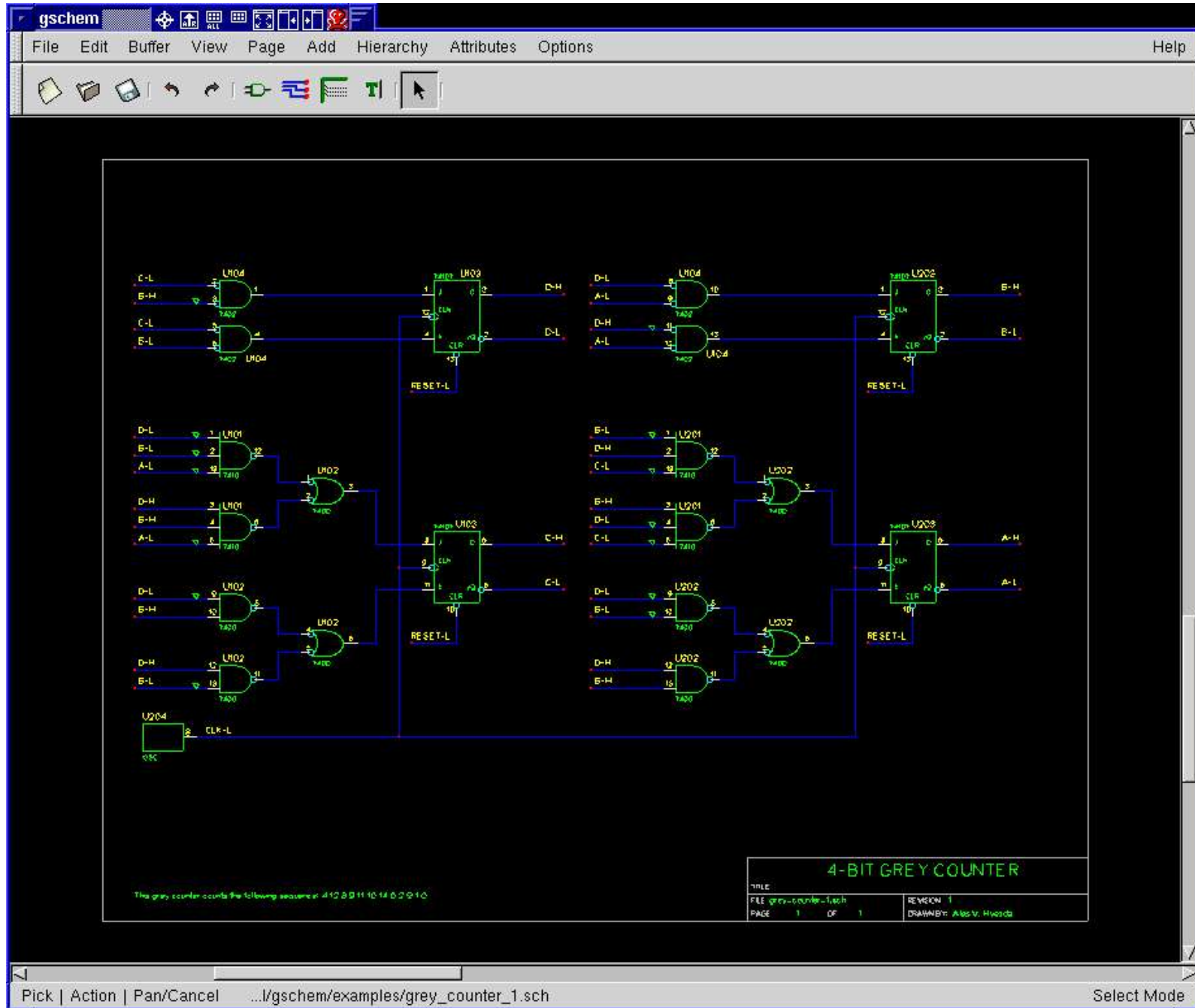
Source: <http://www.tkgate.org/fig/scopewin.gif>

TkGate

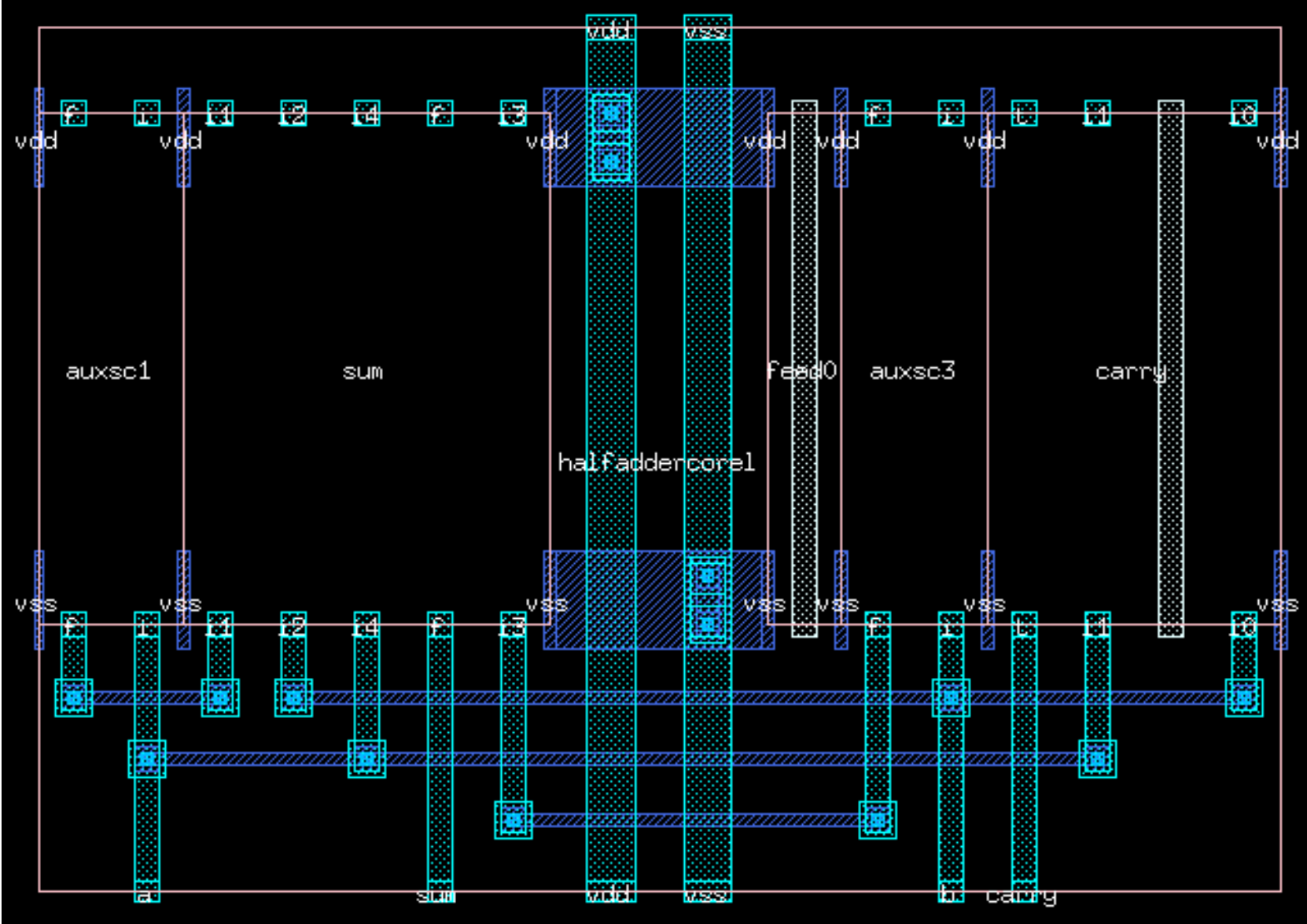


Source: <http://www.tkgate.org/fig/2.0/main.gif>

gEDA



Source: <http://www.geda.seul.org/screenshots/screenshot-gschem1.png>



Source: <http://www-asim.lip6.fr/recherche/alliance/olddoc/jumpstart/Examples/FullAdder.html>

LAN



- **Ethernet-based LAN**
- **Servers:**
FTP, sshd, mail, apache, mysqld, ircd
- **Client software:**
ftp, ssh, scp, firefox, xchat, gaim
- **CVS, Sub Version**
- **Project management**
mrproject, bugzilla, netoffice
- **Internet access**

DCO Lab, CE, RIT



Source: http://gallery.ce.rit.edu/DCO/DCP_0865

DCO Lab, CE, RIT



Source: http://gallery.ce.rit.edu/DCO/DCP_0863

Server Cage, CE, RIT



Source: http://gallery.ce.rit.edu/Cage/DCP_0861

Roadmap



Step 1: Throw your marks in the trash

Step 2: Setup Embedded GNU/Linux labs

Step 3: Prove yourselves:
Do practical projects
<http://www.opencores.org>
<http://sourceforge.net>
<http://savannah.gnu.org>
<http://freshmeat.net>

Step 4: Invite FLOSS companies for placements

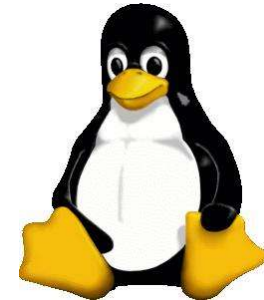
Links



- <http://www.opencores.org>
- <http://www.linuxdevices.com>
- <http://www.uclinux.org>
- <http://free-electrons.com>
- <http://kegel.com>
- <http://www.debian.org/ports>

Contact

- N Shakthi Kannan
- E shaks@shakthimaan.com
- W shakthimaan.com
- IRC nickname "mbuf"
 - #kernel
 - #kernelnewbies
 - #gnu-india
 - #linux-india
 - #linuxforum
- linuxforum.com "x86processor"



Question Answer Session

