# *Use R!* in fifteen different ways: A survey of R front-ends in Quantian

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# Outline





# What is Quantian?

A live-dvd for quantitative work

- Quantian is a directly bootable and self-configuring Linux sytem that runs from a compressed dvd image.
- Quantian can run concurrently to your existing OS thanks to the free-only-as-in-beer VMWare Player (or the free-but-slower Qemu) emulator, including virtual and networked disk access to persistent session.
- Quantian contains over 7.5gb of software, including an additional 5gb of 'quantitative' software with scientific, numerical, statistical, engineering, ... application.
- Quantian also contains editors, programming languages, complete latex support, two 'office' suites, networking tools and more.
- http://dirk.eddelbuettel.com/quantian



# Quantian and R

R, CRAN, BioConductor, and more

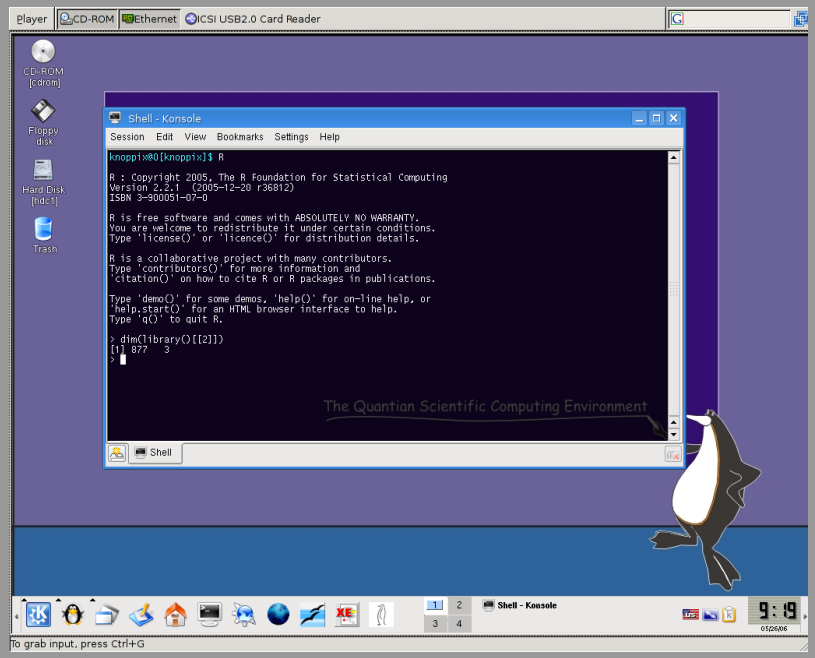
- Quantian has always included R, and release 0.7.9.2 contains 877 R packages providing a complete collection of R code: essentially all Unix-installable packages from CRAN, the complete BioConductor relase 1.7, as well as packages from Omegahat, from J. Lindsey and from T. Yee.
- Suitable editors (ESS for Emacsen, Vim, Kate), LaTeX support, and more – making Quantian possibly the single-best source of R and related software.
- Several related projects such as Ggobi, Mondrian, Weka or GRASS further complement Quantian for particular scientific communities.
- This presentation focuses on R interfaces: direct, graphical, or programmed.

# Outline





# Standard command-line





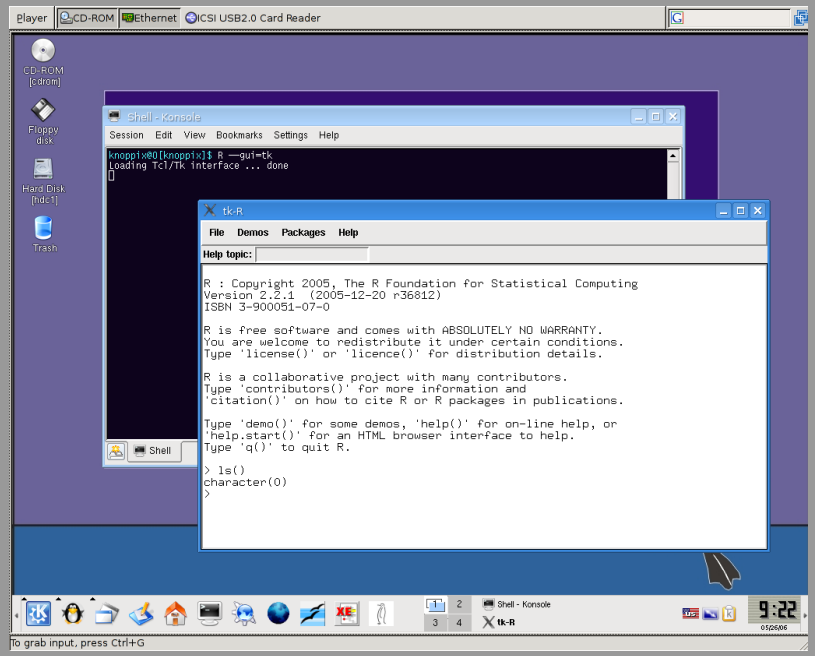

# Standard command-line

Details

- Probably the only interface everybody is, or has been, using.
- Fairly flexible, searchable, customizable, ... thanks to GNU readline.
- Direct access to excellent help facilities, package administration, and more.
- Useable for scripting and piping, but still no direct script support.



# Portable simple GUI

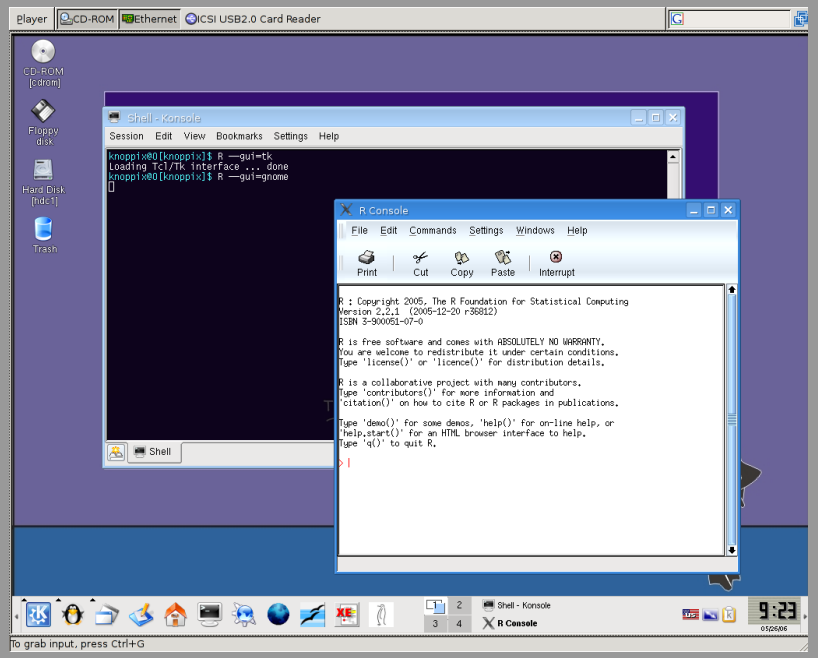


# Portable simple GUI
Details

- Implemented using R's core tcltk package, it provides the only truly portable UI.
- This UI is more an illustration, but other projects have built successfully on tcltk: Rcmdr (more below) and Sciviews are examples.
- Tcl/Tk is mature, well known and ... somewhat ugly.
- Documentation is provided by P. Dalgaard in two R News articles (1(3), 2(3)), via J. Wettenhall's examples site and via postings on the r-help and r-sig-gui lists.



# Gtk/Gnome GUI



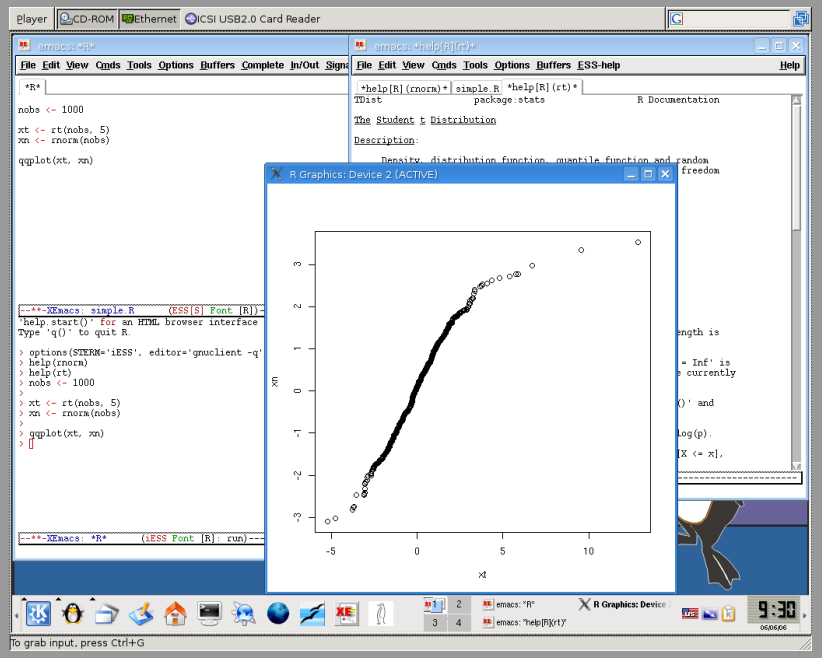



# Gtk/Gnome GUI
Details

- Status is dormant at best. Unsure about port to Gnome2.
- Only (?) available on Unix, though Gtk/Gnome has been ported to Windows
- RGtk2 provides an updated port of Gtk2 toolkit to R this is used e.g. for J. Verzani's PMG.
- Now on CRAN as package gnomeGUI.



# R via ESS

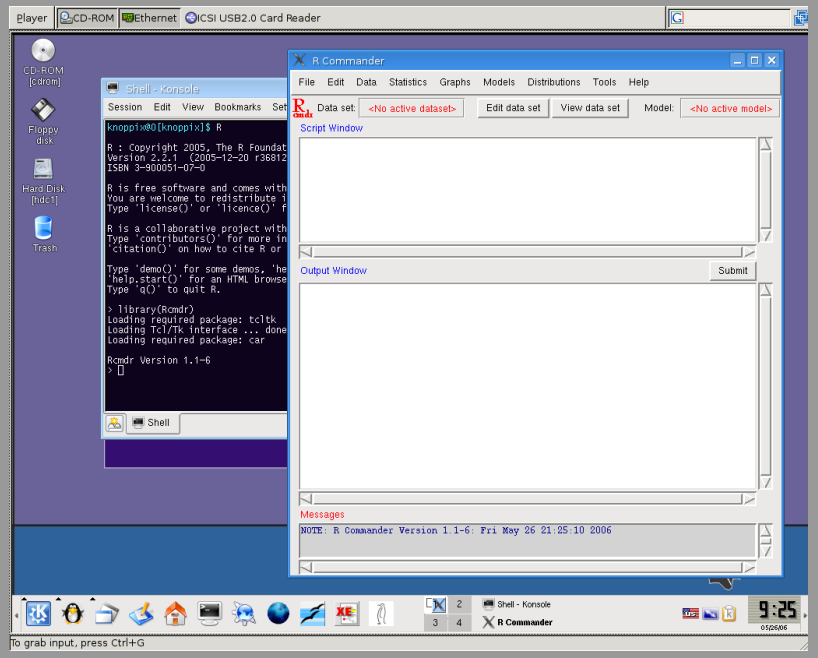


# R via ESS
Details

- Probably *the* power user's interface
- R FAQ 6.2: Should I run R from within Emacs? Yes, *definitely*.
- Lots of power, lots of documentation, and even an UseR 2006 tutorial session.
- Don't leave home without it.
- `http://ess.r-project.org/`



# Rcmdr





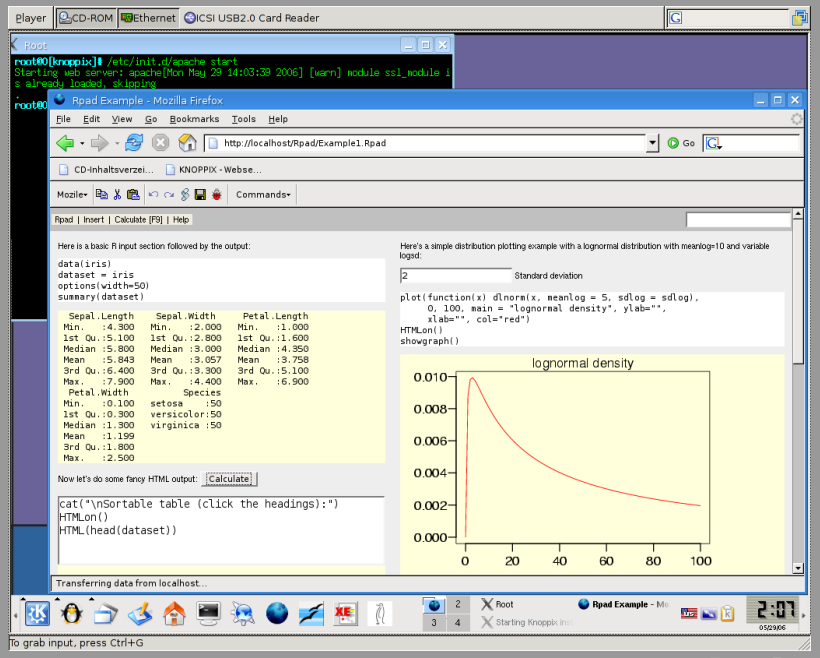

# Rcmdr
Details

- Very impressive tcltk-based UI by John Fox.
- Aimed a R beginners, allowing them gradually morph from clicking menus to entering commands.
- Provides plugin mechanism used by urca; has been extended too by QCAGUI.
- Described in an JSS article.
- `http://socserv.mcmaster.ca/jfox/Misc/Rcmdr/`



# Outline

# Rpad






# Rpad
## Details

- Rpad integrates R with the Apache webserver
- Rpad also uses some Mozilla webbrowser customisation using the textile menu bar extension.
- Together, they provide R using the 'browser as an operating system' paradigm; this can be useful when little or no software can be installed on the client side, or when pre-programmed solutions need to be distributed.
- Alternatively, Quantian also provides Rcgi as a second web-based interface.
- http://www.rpad.org/Rpad

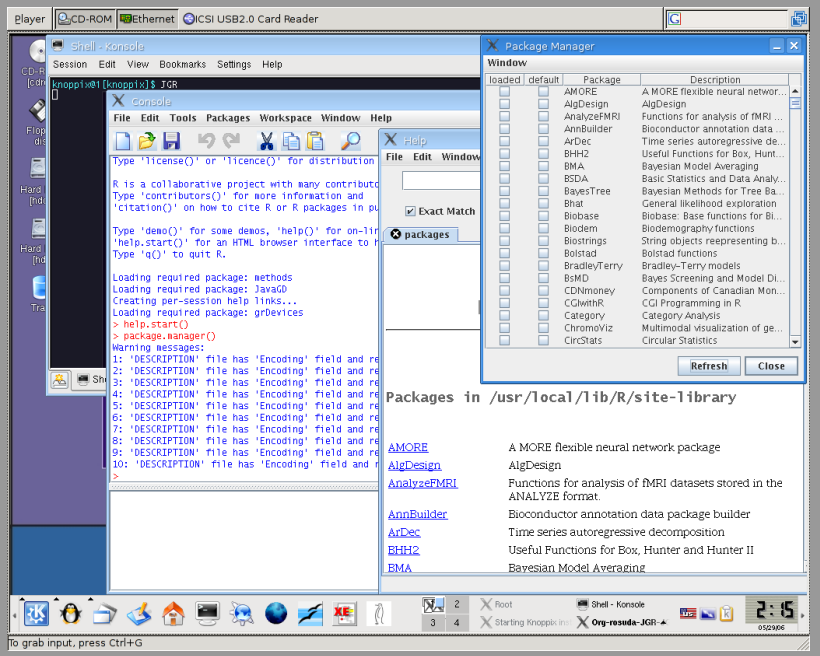


# Outline





# JGR

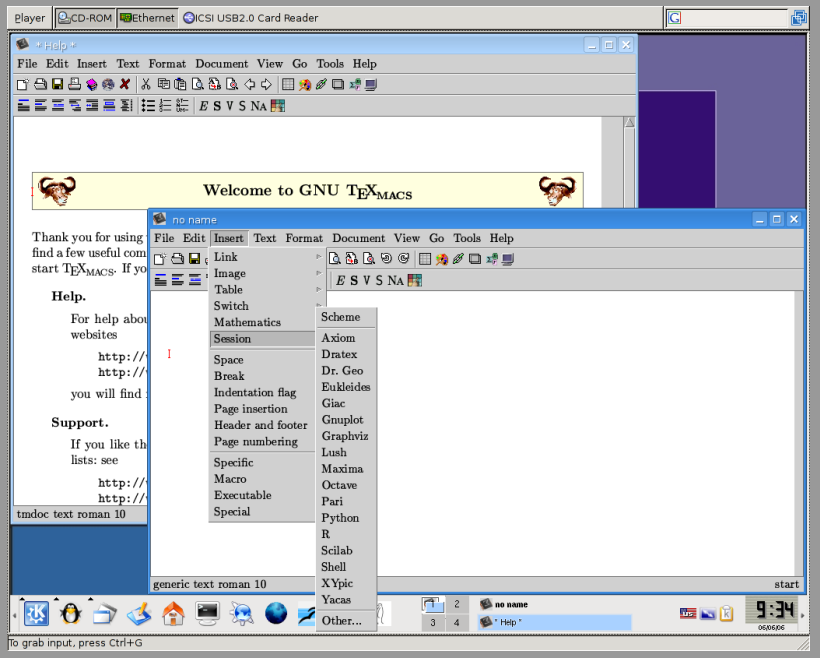


# JGR
Details

- Cross-platform *Java GUI for R* that is the winner of the 2005 Chambers Award.
- Very nice integration of developer IDE (including syntax highlighting, autocompletion and context-sensitive help pop-ups), multi-tab help system, object browser, dynamic graphs, package manager, and more. Very slick.
- http://www.rosuda.org/JGR/



# TeXmacs



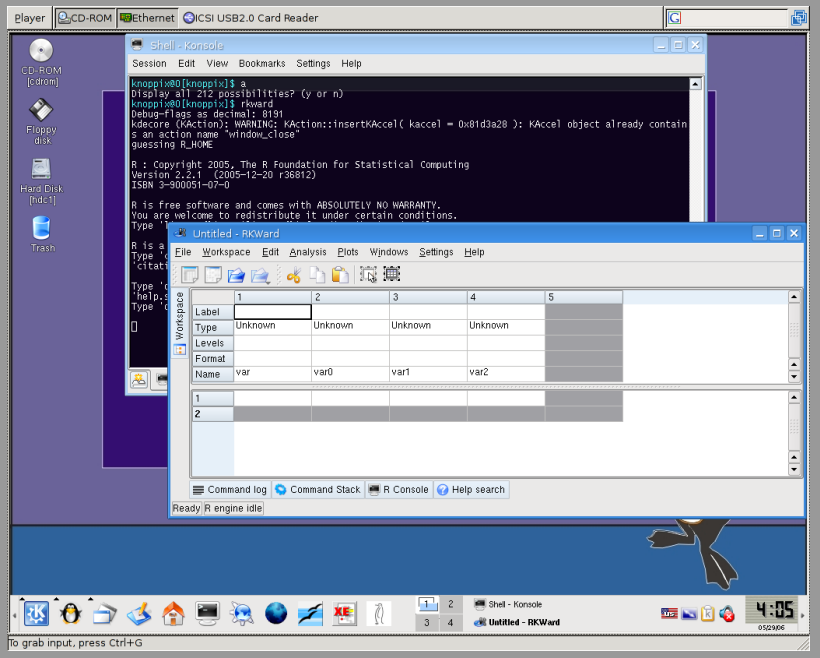



# TeXmacs
Details

- GNU TeXmacs calls itself a ‘wysiwyw (what you see is what you want)’ editing platform.
- Aims to provide a unified framework for editing structured documents with different types of content (text, graphics, mathematics, interactive content, etc.).
- Rendering engine uses high-quality typesetting algorithms to produce professionally looking documents.
- Includes a text editor with support for mathematical formulas, a small technical picture editor and a tool for making presentations from a laptop.
- TeXmacs can be used as an interface to numerous external programs for computer algebra, numerical analysis, statistics, shells, etc.
- http://www.texmacs.org/



# Rkward



# Rkward
## Details

- Rkward aims to becomes a modern GUI for R.
- Uses the KDE / Qt libraries and toolkits providing nice desktop integration.
- Currently in alpha status.
- `http://rkward.sourceforge.net/`

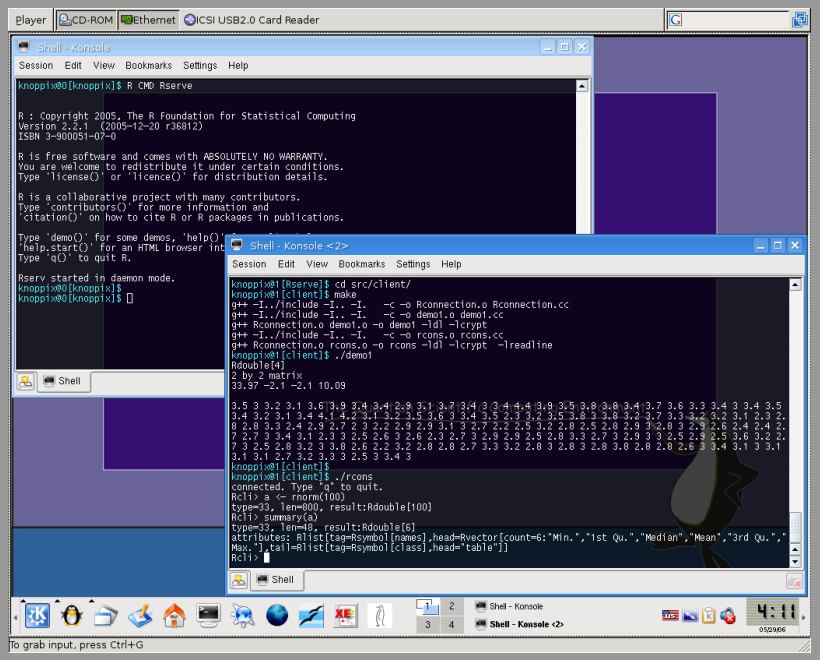


# Outline





# Rserve

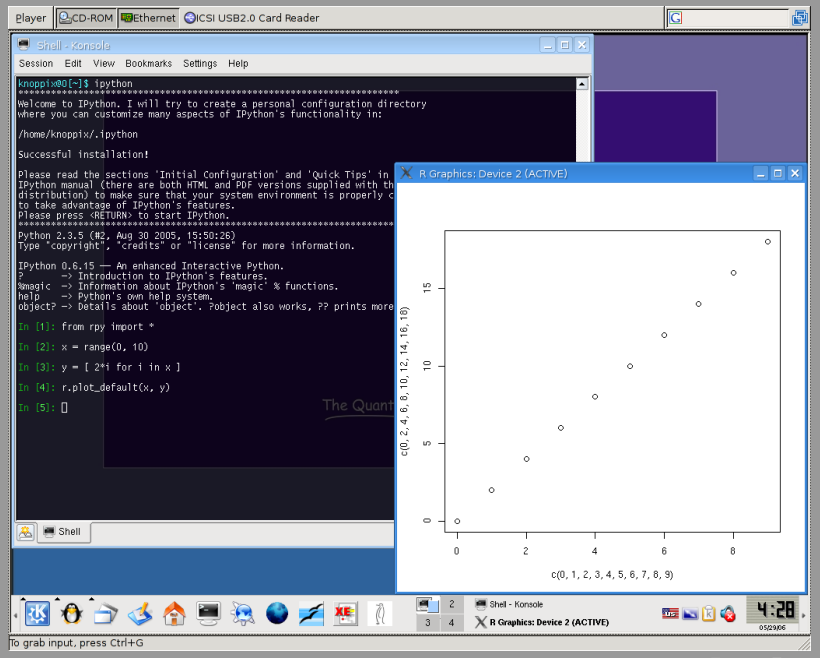





# Rserve
## Details

- Rserve provides a 'headless' R server accessible programmatically via TCP/IP from various languages over the network.
- Initially only provided with Java clients, it now also contains provides C++ client examples (which are currently not installed in Quantian).
- Every connection gets a separate workspace and working directory.
- Supports remote connection, authentication and file transfer.
- `http://www.rosuda.org/Rserve/`

# RPy



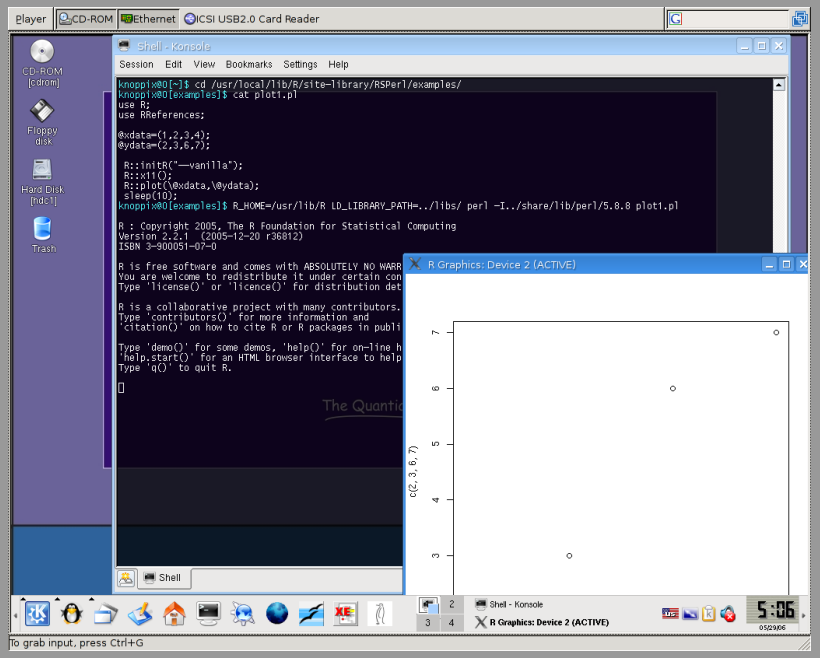



# RPy
## Details

- RPy provides a simple yet robust interface to R from Python.
- An option for those familiar with Python but not (yet) with R.
- Related to, but simpler than, Omegahat's RSPython
- RPy can manage all kinds of R objects and can execute arbitrary R functions (including the graphic functions).
- Errors from the R language are converted to Python exceptions.
- Any module installed for the R system can be used from within Python.
- The examples and documentation are not currently installed in Quantian.
- RPy is a part of G. Warnes' OpenStatServer / RStatServer / Chaco projects.
- `http://rpy.sourceforge.net`



# RSPerl

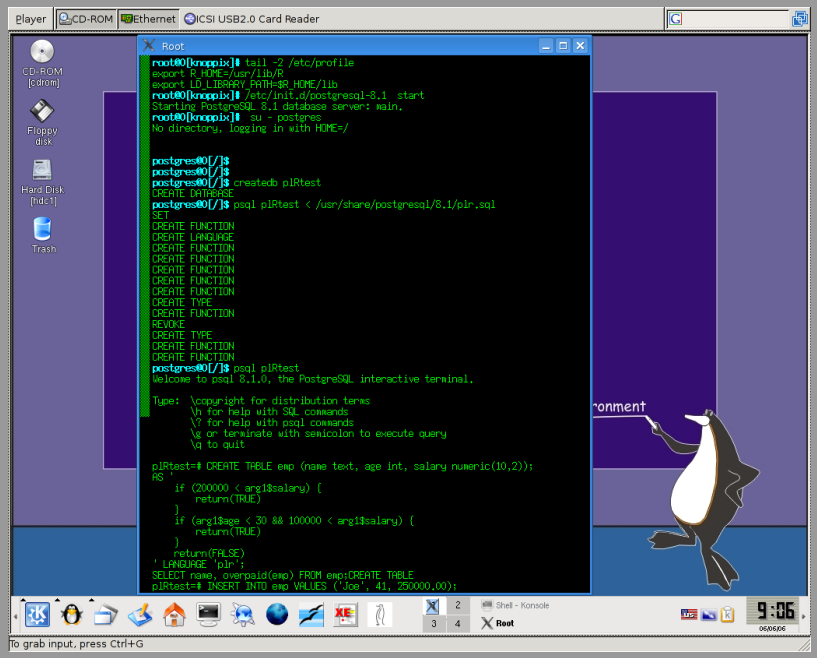





# RSPerl
## Details

- Bi-directional interface between Perl and R.
- Embeds one interpreter (e.g. R) within the process of the other interpreter (e.g. Perl).
- Permits to call routines and functions in the other language as if they were part of the local environment – avoids having to program in a different language while making the functionality in the other system transparently available with no additional coding.
- This makes Perl more interactive, also allows the R/Splus programmer to use convenient and familiar syntax to mix computations in the two different sytems, and provide statistical functionality to Perl applications.
- Some environment variables are needed as seen on the screenshot.
- `http://www.omegahat.org/RSPerl`

# Embedded: PlR



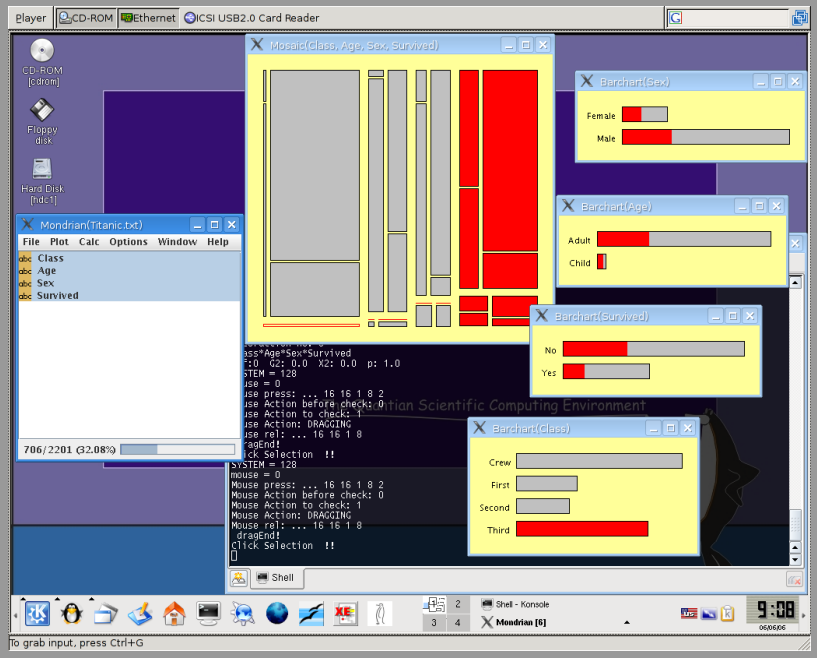



# Embedded: PlR
Details

- Probably the earliest production-quality examply of embedding R into another application.
- In this case, R is embedded into the PostgreSQL RDBM – as 'just another embedded language'.
- Obvious appeal: *Programming with data* goes directly to where the data resides.
- PlR is shipped with the PostgreSQL sources.
- http://www.joeconway.com/plr/



# rJava

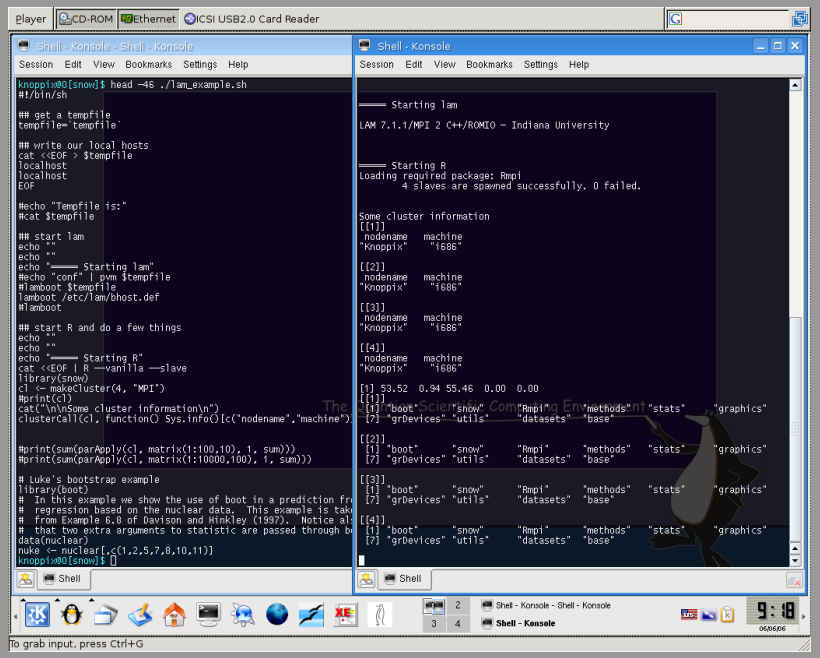





# rJava
Details

- rJava is a simple R-to-Java interface. It is comparable to the .C/.Call C interface.
- rJava provides a low-level bridge between R and Java (via JNI). It allows to create objects, call methods and access fields of Java objects from R.
- rJava is used e.g. by the recent RWeka package (also in Quantian).
- Eclipse should be in the next Quantian revision.
- http://www.rosuda.org/rJava

# SNOW






# SNOW
Details

- SNOW provides the 'Simple Network of Workstations', a simple wrapper around MPI, PVM and sockets to permit computation on a (possibly heterogenous) cluster of machines.
- Beowulf-style distributed statistical computing – with an easy R frontend.
- Works out of the box in Quantian, with or without an underlying openMosix cluster.
- We explored distributed statistical computing with Quantian in previous presentations (Usenix 2004; DSC 2005).
- http://www.stat.uiowa.edu/~luke/R/cluster/cluster.html



# Outline





# Summary

- Quantian provides unparalled support for various ways to 'Use R' – ready-to-run directly out-of-the box.
- Quantian can be used directly, via various graphical interfaces, different programming interfaces, embedded, as part of distributed computing, ...
- Thanks to virtualization, users can also access Quantian without reboots.
- Easy to try Quantian: just download and write to DVD, or order an inexpensive pre-made DVD.
- http://dirk.eddelbuettel.com/quantian