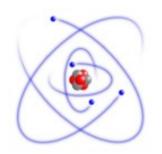# Scientific Linux 5

at

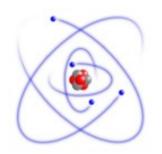Standort Zeuthen

Outline

- **SL5: available now**

  - what's new

  - what's not

- **migration**

  - how long / to which extent keep support for SL3/4?

  - use occasion for changes to **WGS model**?

- SL5 will be status quo for ~ 2 years

  - > 1 year before work on next Linux starts

  - => this is the time for thoughts about the future

    - is our current **Linux desktop support model** still right?
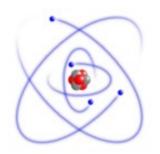
Is SL still the right choice?

- most of HEP (&GRID) uses RHEL or a rebuild

  - CentOS: exact clone, closed development, many users

  - SL(C): more add-ons, open development, fewer users

    - but user/developer community active & strong, low noise mailing lists

- SLES, RHEL: significant cost, no SLES rebuilds (possible?)

- OpenSuSE, Fedora, ...: insufficient life time (2 years or less)

- debian: completely undefined release cycle & support life

  - yet, gaining support by hardware vendors (HP, Dell)

- Ubuntu: paid developers make up for debian's shortcomings

  - free, incl. enterprise edition (3/5 years support)

  - paid support available; alas: quite different from RHEL
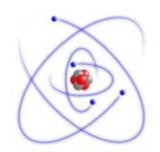
How to try/test/start using SL5

- Details: **http://dvinfo.ifh.de/SL5_User_Information**

- public login systems **sl5.ifh.de** and **sl5-64.ifh.de**

- public PCs **smeagol** and **deagol** in terminal room 2L01
  - using guest account avoids picking up any KDE/GNOME settings
  - switching forth and back with KDE may cause minor problems

- SL5 batch queues
  - currently 16 of the fastest cores in the farm, 2 GB/core
  - addressed with **-l os=sl5** (not used by default yet)
    - -l os='sl3|sl5' should work; will become default eventually (July ?)
  - more systems will be migrated depending on # of jobs
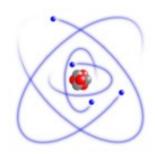
Desktop Upgrades

- good reasons:
  - much better support for USB storage devices
  - more recent versions of applications (TeX, ...)
  - much better interactive response during I/O than SL3
    - more fun to work with, especially on old hardware
  - supporting SL3 on desktops probably hard to impossible soon
    - may even be true for SL4
- **SL5 does not require new hardware**
  - if it runs SL3, it runs SL5
  - but: 6 GB / required (8 GB for 64- bit)
- mail request to uco (see dvinfo for details)

SL 4 and on: Changes

- SL3 was our first Linux ever with many years of support

- => SL4 was the occasion to make a few major changes

- general directions:

    - make systems more independent

        - install software, fonts, ... locally if possible
        - reduce dependency on central services (font, LDAP, NIS, ...)

    - as few modifications as possible to upstream system

        - don't replace profiles, just extend
            - end of HEPiX profiles, HEPiX11 (and fvwm2)
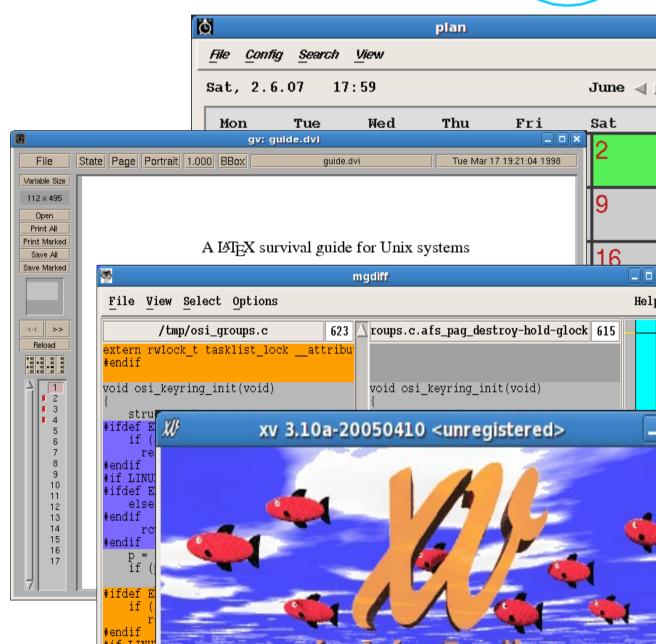   - use unmodified software from distribution wherever possible

What hasn't changed

- **scientific software** equipment

  - cernlib, root, maple, mathematica, ...

    - latest version only yet, older ones on request where possible

- **browsers, mail readers, ...**

  - **firefox** is the recommended browser

    - flash & java plugins, ...

  - **alpine** is the recommended mail reader

    - direct successor of pine

      - much better UTF-8 support, open source license

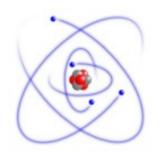   - thunderbird, evolution, ... available as is

Legacy Applications

- many still available

- many users still prefer these over "modern" equivalents

- sometimes they're simply better

- more suitable for old PCs (4 years or older, 256 MB or less RAM)
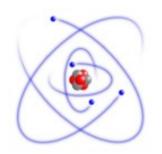
- no intention to provide xemacs

Language Support, I18N

- default is still **`LANG=C`**

  - UTF8 slows things down, still bugs in some applications

- users can set **`LANG=en_US.UTF-8`** for themselves

  - in ~/.i18n (->shell) and/or ~/.dmrc (->window manager)

- [Win] modifier no longer works for äöüßÄÖÜ

  - instead, R-Alt is "Compose Character" key

    - [R-Alt],["],[a] yields ä, also works for ç ø œ Å ñ ô é è €...

    - "european" languages, UTF-8 independent (ISO-8859-15)

- SCIM ("smart common input method") for others, UTF-8 only

  - こんにちは , Дубна Ресторан (getippt: Dubna Restoran)

- only English supported for UI

Desktop Environments

- recommended and default: GNOME

- alternative for low memory desktops: IceWM

- also available: KDE, WindowMaker

- most GNOME/KDE apps work well under IceWM

  - including tray support

- example for combining environments:

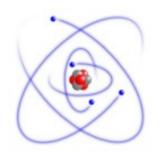 run alpine in UTF-8 mode under IceWM w/ LANG=C:

```
[pc] % LANG=en_US.UTF-8 gnome-terminal -e alpine &
```
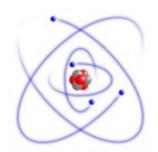
Compilers

- default: GCC4

  - C++ code may need to be adapted

  - FORTRAN frontend is gfortran, not g77

    - Fortran95 (mostly complete?)

    - may not accept all g77 code

  - FORTRAN runtime library is libgfortran, not libg2c

- GCC 3.4.3 (SL4 default) is available

  - g77 command is from this one

- also available: PGI, Intel compilers

  - SUN studio 12 released yesterday -> provide?
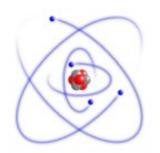
Backward Compatibility

- RHEL provides runtime compatibility with 1 previous version

- => if it's built for SL4, it should work on SL5

  - that's different from "works on SL4"

- in reality, much software built for SL3 works

  - SL5 ships a C++ compatibility library for g++-3.2.3 (SL3)

  - we add missing shared libraries if required and possible

- some software does not work and never will

  - no more kernel support for LinuxThreads: NPTL only

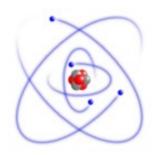- some software requires some extra attention due to SELinux

SELinux

- additional, fine grained permission system

  - consulted after traditional UNIX permissions grant access

- processes and files (and soon: network packets) carry a "security label" (aka "type", "security context")

  - visible with new -Z option for many commands (ls, ps, id, ...)

- (targeted) policy defines permitted access vectors

  - process of type httpd_t can read files of type etc_httpd_t, but not files of type etc_t

- denials logged with prefix "avc:denied", visible through dmesg

- introduced with SL4, does not affect user applications there
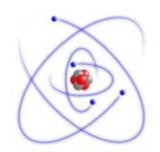
Potential SELinux problems

- **on SL5, the default policy can affect user processes**
  - general aim: make memory either executable or writable
  - protects against buffer overflow attacks
    - other measures in place, some since SL3
      - execshield, position independent executables, stack protector, ...
  - may prevent execution of binaries that are buggy or incorrectly built, but work on SL3/4
  - several fixes/workarounds available (see dvinfo Wiki page)
    - special label for executables to allow violations
    - build everything to go into a shared object with -fPIC
      - generally right, and required on 64-bit anyway
- similar problem: new malloc checks in glibc
  - workaround: MALLOC_CHECK_=1 (see Wiki)
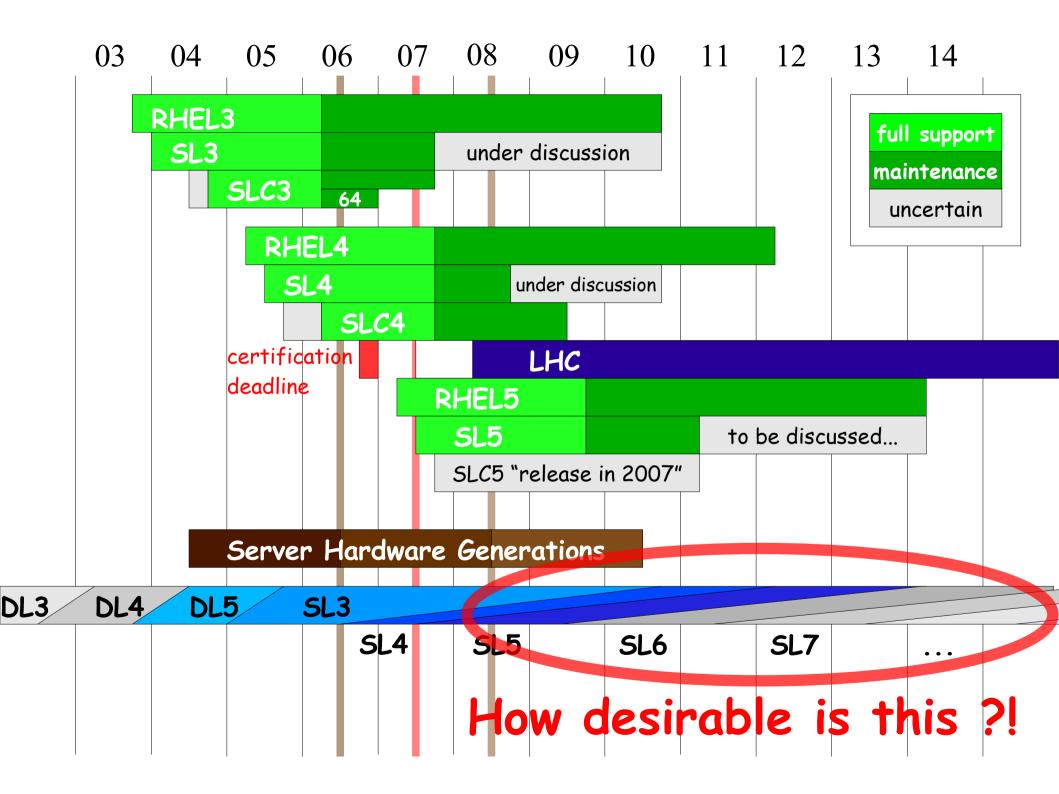
New features under the hood

- XEN Virtualization, coming in two flavours:

  - full virtualization, for unmodified guest systems

    - requires hardware support (latest servers & desktops only)
    - not completely stable yet

  - paravirtualization

    - guest system knows it's virtual and plays along
    - good performance, stability seems production grade
    - no hardware support required (host must support PAE, though)
    - SL4 (4.5+) or SL5 guests, Solaris in progress (!)
      - host+guest must have same memory model (32/64-bit)

- ionice (like nice, but for I/O, not CPU), I/O schedulers per queue and runtime configurable, CPU sets, improved power management,...
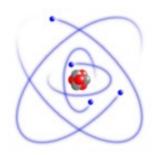
SL5: Summary

- major progress across the board

- good balance of new features and maturity

  - 2nd RHEL distribution with kernel 2.6

  - 2nd RHEL distribution with SELinux

  - 2nd SL with OpenAFS 1.4.x

  - 2nd SL in Zeuthen with major changes in management

- => although we're providing it very early (few weeks after RHEL5 GA), should be more mature than SL4 after a year

- SL4 was a good candidate for skipping
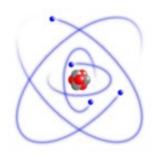
- SL5 is not. Let's use it.

Boundary Condition: Hardware Support
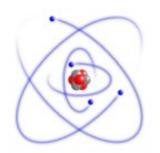
- RHEL receives drivers for new hardware for 2.5 years

  - "at the discretion of Red Hat"

  - RHEL3 exceeded expectations in this respect - on servers

    - SL3 works well on server hardware generation released last summer, even on models released this year

      - many of their customers wanted to skip EL4

  - on the other hand, no (decent) support for common desktop hardware released during RHEL3 "full support phase"

    - X works on our nvidia, boards, but only with the VESA driver

      - BIOS only supports 60Hz => CRT/dual head requires proprietary driver

        - significant extra work with every kernel update

    - Intel HDA onboard audio not supported at all, requires ALSA

      - inordinate amounts of work with every kernel update

  - Sound problems even with SL4 on current desktops
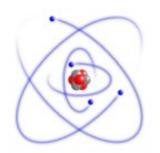
Conclusion from hardware support

- **no way around SL5 on desktops**, sooner or later

  - rather sooner: new Intel desktop chipsets launched today

    - a few months from now, no more choice

    - very unlikely to work well with SL3, may not work at all

    - unlikely to work well with SL4, even may not work at all

      - few hardware certifications for EL4 (different for SL5!)

- **SL3 desktops already very expensive**, except for old models

  - => we should at least:

    - drop sound support where it does not work by default

    - get rid of SL3 systems with dual head display or CRT

- **SL4 situation is similar** w.r.t. sound

  - 4.5 may help, but for how long?
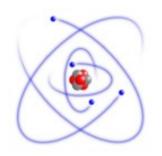
Boundary Condition: SL

- announced SL3 end of life date is October 2007

- SL3 "legacy support" under discussion

    - final release 3.0.9 corresponding to RHEL3 Update 9

        - currently in beta, no new drivers

    - patches as long as RHEL3

- if this doesn't happen, we can use CentOS instead

- in both cases, some current add-ons will be missing

    - firefox, thunderbird
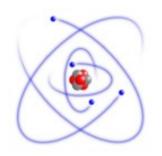
SL3/4/5 Roadmap: Proposal

- **freeze SL3 and SL4 now**
    - no new features, applications, software versions
        - may need to drop Software (acroread) or fall back to SL (openoffice) eventually
- prefer **SL5 on new systems, especially desktops**
    - skip SL4 where possible; ATLAS may need it - really required on desktops?
- aim for **upgrading all desktops** to SL5 a.s.a.p.
    - drop expensive part of SL3 desktop support with 3.0.9 (October)
        - drop ALSA, nvidida driver
        - drop software if required
- **migrate farm, pubs**, ... step by step
- keep remaining SL3/4 systems (servers) alive as required
    - up to 2010
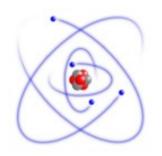
The Future of Workgroup Servers?

- pub1-6 are aging, and to be migrated soon

  - simply upgrade/replace them, or rethink the model?

  - don't panic, these are ideas - not even proposals

- current problems:

  - pubs are often abused, may become unusable for others then

  - some important use cases are not supported well:

    - building large software projects (parallel make)

      - requires several cores (4 typically optimal), as fast as possible, fast RAM, ...

    - interactive analysis, possibly with threaded application

    - others?

- simply replacing the pubs with leading edge systems will make the abuse problem much worse
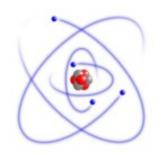
Idea for Future Workgroup Servers

- **replace pubs by 2 minimal systems** with a single purpose: login from outside to connect to internal systems
    - little CPU/RAM/disk, limited network speed
    - no access to bulk data, maybe no AFS at all
- **provide all groups with dedicated workgroup servers**
    - several groups already have them anyway
    - coordinated use much easier to achieve on group level
        - small set of people, usually working together anyway
- HW example: 2xWoodcrest 3GHz, 8GB RAM, 146G RAID-0
    - replace systems after 2 years, then use in farm until retired
- WGS must not be file servers; maintenance slots required
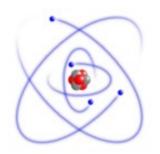
The Future of Linux Desktops?

- current support model is a straight descendant of the "central server + X-Terminal" one (+local disk/CPU)

  - fully centrally managed, no root access for user

- advantages:

  - uniformity across all desktops, WGS, farms

  - good security

  - physicists can simply use their PC, no administration required

- problems:

  - no flexibility, no individual customization

  - results often less than optimal (least common denominator)

  - actual use (as intended) declining steeply
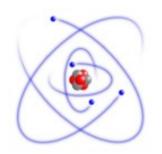
Desktop problems continued

- **possible reasons** for declining use:

  - give a student a 5y old PC with a 10y old monitor, a dirty keyboard, and a mouse without a scroll wheel

  - if this student can afford a notebook, what will happen?

  - what if the PC is up to date, but some wanted feature is not supported? (Firewire, or Midi playback, or ...)

  - what if just some favourite software is not installed? if the user prefers a different keyboard layout? wants a different mouse? a different screen resolution? a different linux distribution? a cyryllic user interface? ...

- **people are no longer forced to use our centrally managed PCs,** and that's good, and they stop doing it (and that's bad)

Linux Desktops: Questions

- are centrally maintained desktops still required ? (at all)

- if yes:

  - how many?

    - current estimates: 20-90

  - what's the right model?

    - true thin client ?
      - only local access
      - no permanent storage
    - user managed ? with opt-in to limited central management ?
      - remote access for "owner" only
      - "owner" is responsible, DV only provides working base installation
    - centrally managed general purpose PC, like today?

  - hybrid models are not feasible; multiple models are

Final Summary

- SL5 should become the platform for user computing asap

- SL3/4 still available (for years)

  - but limit use to cases where it's really required

  - special case: ATLAS depends on CERN schedule

  - others?

- change WGS model ?

  - could be done on the occasion of migrating to SL5

- change desktop model ?

  - would require design, and take much more time

  - if we want this, discussion should start now