Linux Developments at DESY

Uwe Ensslin, DESY - IT
2003 Jun 30
Outline

- DESY Linux
- Experiences
- Challenges
- Developments
- Outlook
DESY Linux

- Hardware Consulting
  - We monitor the market and work with vendors
  - We make suggestions for buying server systems
  - PC standardization group provides base for reliable (commodity) hardware operation by
    - Selecting appropriate components
    - Reducing diversity by developing and maintaining standards

- Registration Service
  - Prerequisite for later support
    - Installation will not work properly without registration
  - Example for a cooperative administration
    - Process is initiated by group admins
    - Registration is done centrally by IT personnel
Installation Service

- We provide and maintain an installation server
- Group admins do a network based installation from floppy or USB stick
- We provide, adapt and maintain the boot images
- The installation process is (semi-) automated
- We use RPM packages as building blocks

Layered installation concept

- First: Installation of base distribution
- Second: Installation of Add-Ons provided by IT (AFS, Kernel, NIS, Printing, Mail, PAM, HEPX11, HEPENV, ..)
- Third: Installation of group specific Add-Ons
Software Maintenance

- We follow developments in distributions, kernels, tools and security issues
- We keep RPMs on the installation server current
- We install patches and updates on the installed base in coordination with DESY groups
- If all fails: A re-install costs ~20 minutes

Daily work

- Analyzing problems on ~1000 heavily interconnected systems is time consuming
- We track user requests are using a tracking system (“Request Tracker” from Best Practical)
- We are monitoring important systems using Nagios
System administration at DESY is a cooperative effort:

- Many systems are co-administered by IT and group admins
- Installation process allows group-specific add ons to the system and software environment
- Parts of system and software maintenance can be done by group admins via SALAD
- Regular Linux User Meeting (LUM) every 2 months (more frequent, if required e.g. during new releases)
Experiences

- Some History
  - DESY Linux 1 from autumn 1997 to November 1999
  - DESY Linux 2 from December 1999 to February 2000
  - DESY Linux 3 from March 2000 to June 2002
  - DESY Linux 4 from June 2002 to ?
  - DESY Linux 5 in preparation (see below)
Experiences (2)

- Broad acceptance: > 20 group profiles, > 500 server systems, > 600 desktops
- Network-centric model of operation provides flexibility
- Commodity hardware allows us to follow technological progress
- Standardization successfully reduced adaption efforts
- Cooperative administration model works
- We have powerful software maintenance tools that are well established
- Maintaining $O(1000)$ systems is a workload
Challenges

- **Notebooks**
  - Hardware changes rapidly
  - Network integration difficult
  - Disconnected operation
  - How to maintain mobile systems?
  - OS coexistence

- **Control systems**
  - Do not fit the network centric model

- **GRID**
  - Globalization of IT services
  - New technologies start to emerge
  - Growing interoperability requirements
  - New task: Operating GRID resources

- **DESY Linux 4 is aging**
  - SuSE 7.2 bugfix support ends in July
  - YaST 1 no longer available
  - Old user environment (KDE 2)
Developments

- Initial notebook support
  - Based on SuSE 8.x
  - AFS, VPN support
  - PC standardization group is evaluating models
    - Model stability has grown
- New software distribution concept
  - Joint effort with Zeuthen
  - Published at LUM, CUC
  - Software is installed to local disk
  - RPM used as package format

New software distribution concept (cont'd)
- Installs into /opt/products, not /usr/local
  - /usr/local free for user or distribution
  - Packages are self contained
- Several versions of a product on one system
- SW distribution via AFS still possible, but no longer required
Developments (2)

- DESY is founding member of the DGRID initiative
  - Linux based test cluster in CC
  - www-it.desy.de/physics
- DESY Linux 5 is being developed
  - We have been evaluating distributions for DESY Linux 5
Selection: Why?

- DL 4 based on SuSE 7.2
- Bug fix support to be terminated end of July
- Installation tool (YaST 1) no longer available
- We have to do something new
- Opportunity of doing something different

- Observations at the last HEPIX conference:
  - 16 site reports
  - 14 sites use Redhat (7.x)
  - 1 Debian, 1 SuSE (DESY)

- GRID
  - Development done on RH (6,7.x) systems
  - Adaption effort required for users and IT
Selection: Who?

- Close cooperation between Hamburg and Zeuthen involving many people
  - Uwe Ensslin
  - Martin Flemming
  - Wolfgang Friebel
  - Jürgen Kahnert
  - Waltraud Niepraschck
  - Mario Sachteleben
  - Sven Sternberger
  - Peter Wegner
  - Stefan Wiesand
  - Knut Woller
Selection: The Process

- We have been looking at a number of candidates
- We defined some basic requirements
- We added other important criteria
- We did a common effort to collect all the facts needed for an educated decision
- We then compiled them into an evaluation matrix

We are going public:
- 2. 6. CUC
- 25. 6. Linux User Meeting
- 30. 6. DV Seminar
- 2. 7. CRB
- 7. 7. CUC
## Selection: Candidates

### Redhat
- Major player
- 2 support models:  
  - Professional  
  - Enterprise  
- Widely used within HEP  
- Base for GRID development

### SuSE
- Major player  
- 2 support models  
- Good experiences at DESY  
- Responsive Company

### Debian
- Major player  
- “Good will” support model  
- Active community  
- Good package manager  
- Some experiences at DESY
Selection: Basic Requirements

- Recent software versions to justify the effort
- Version stability within the life cycle
  - Install patches to the same software version
- Adequate support time for a production environment
  - Still many (~1/3 of installed base) DL 3 systems in production (3/2000)
  - Bug/Security fixes from the distributor for >= 3 years
- Support for new hardware (Notebooks)
- Reduce internal adaption effort
  - Use kernels from distributor?
  - Use (application) software 'out of the box', when suitable
- Try to be compatible with the HEP and GRID world

2003-06-30 Uwe Ensslin, DESY IT
DV Seminar: Linux Developments at DESY
IT–Systems 16
Selection: Additional Criteria (1)

- **Release date**
  - Past LUMs: DL5 to be ready this year
  - Work must start in July

- **Release cycle**
  - Flexible enough not to collide with Accelerator run times

- **AFS client**
  - Needed, if distributor's kernels are to be used
  - Needed for certification; e.g. for Oracle

- **Cost**
  - Cost per system multiplied by $O(1000)$
  - Carefully select the licence scheme
  - Negotiate adequate terms with distributor
  - GPL: Buy one, install many?
Selection: Input from users

- HERA high luminosity run indicates time constraints:
  - Have DL 5 ready by October
  - Give users the ability to migrate to DL 5 until December
  - Take data using DL 5 during 2004

- Input from the Linux User Meeting
  - Migration
    - Migrate the earlier the better <-->
    - Wait for longer HERA breaks
  - Stability is important, especially from January '04
  - Bug fixes for 2-3 years
  - GRID is just starting to be a technical issue
  - Start working now
## Selection: The Evaluation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Debian</th>
<th>Red Hat</th>
<th>SuSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distribution</strong></td>
<td>Stable</td>
<td>Unstable</td>
<td>Professional</td>
</tr>
<tr>
<td><strong>Version</strong></td>
<td>woody</td>
<td>sid</td>
<td>9</td>
</tr>
<tr>
<td><strong>Recent Software</strong></td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Release Cycle</strong></td>
<td>2 - 3 Years</td>
<td></td>
<td>4 - 6 Months</td>
</tr>
<tr>
<td><strong>Support time</strong></td>
<td>~ 2 - 3 Years</td>
<td>10 - 12 Months</td>
<td>4 - 4.5² Years</td>
</tr>
<tr>
<td><strong>Stability</strong></td>
<td>Breach of compatibility: unlikely</td>
<td>possible</td>
<td>Distributor ensures stability</td>
</tr>
<tr>
<td><strong>Cost</strong> ³</td>
<td>Media / Download</td>
<td>199,99</td>
<td>ES / WS 926,84 / 347,00</td>
</tr>
<tr>
<td><strong>Notebook support</strong></td>
<td>no</td>
<td>Certified Models</td>
<td>no Certified Models</td>
</tr>
<tr>
<td><strong>AFS Client</strong></td>
<td>yes</td>
<td>no (OpenAFS)</td>
<td>no</td>
</tr>
<tr>
<td><strong>HEP/GRID Compatibility</strong></td>
<td>no⁵</td>
<td>no⁶</td>
<td>yes</td>
</tr>
</tbody>
</table>

---

1. Version 2.2.5. Most recent: 2.3.2
2. “3 years after next release”
3. Euro, from official price list unless noted otherwise. Prices are per year for enterprise distributions.
4. SuSE offers to expand the contract to include additional products for a fee.
5. globus “being worked on”.
6. Redhat 7.(2.3) still in use within HEP/GRID. New ABI with Rel. 9.
7. SuSE offers to expand the contract to include additional products for a fee.

**Red:** Unsuitable

**Blue:** Drawback

**Green:** Positive
Selection: Evaluation Results (1)

- Debian
  - Stable is **outdated** (~ DL 4)
  - Unstable is **not yet released**, release date unknown
  - Breach of compatibility possible (unlikely for 'stable')
  - AFS client part of distribution
  - Low acceptance in HEP community

- Redhat professional 9
  - Recent software
  - Available for immediate start
  - Certified notebook models
  - AFS client from OpenAFS
  - <= 12 months supported lifetime after recent support policy change
Selection: Evaluation Results (2)

- **Redhat Enterprise ES/WS**
  - Higher costs than professional
  - Buy once, install many?
  - Max 4.5 years support
  - No AFS client or notebook support
  - Fully HEP and GRID compatible
  - ES 2.1 based on RH 7 is outdated
  - Release date of newer version unclear (expected “Fall '03”)

- **SuSE 8.2 professional**
  - Recent software
  - Available for immediate start
  - Support lifetime 2 years
  - Certified notebook models
  - AFS client part of distribution
  - “globus” toolkit part of distribution
Selection: Evaluation Results (3)

- **SuSE SLES 8**
  - *Quite* recent software (SuSE 8.1+)
  - Available for immediate start
    - Desktop just released
  - Higher costs than 'professional'
  - 'buy one, install many' ?
    - positive signals from SuSE
  - Slower release cycle then 'professional'
  - 5 years support life time
  - Certified notebook models
  - “globus” toolkit can be made part of distribution for a fee
  - AFS client can be made part of distribution for a fee
Selection: Summary

- We have prepared the basis for a educated decision
- We have integrated the users into the decision making process
- Together we have made a decision to stay with SuSE this time
- We will now start implementing DL 5 based on SuSE 8.2 professional
Outlook

A roadmap for DL 5
- We picked a release in July
- We will now create work packages and start working on them in June
- We aim to get a pre-release out in September
- We try to be production-ready in October

A roadmap for software distribution
- Finalize concept until July
- Implement infrastructure in June
- Start building RPMs
- Start testing distribution tools

On a longer timescale
- Work more closely together with other HEP institutes
- Start with CERN
- Look at GRID technology
  - Support larger number of systems
  - Fabric management workshop at last HEPIX
- We will do another evaluation when we start working on DESY Linux 6
Thank you for your attention