How 1000+ Greek schools switched to Debian-based distributions

Alkis Georgopoulos (alkisg)
Foteini Tsiami (fottsia)
I.T. teachers, developers
A success story about how 1000+ schools switched to:

- (Ed)Ubuntu/Debian: Operating System
- LTSP: Linux Terminal Server Project (netboot clients)
- Epoptes: classroom monitoring tool (teacher)
- LTSP Manager: computer lab administration tool (sysadmin)
  - Debianized from Greek "sch-scripts" as part of Debian Outreachy
- Repositories of educational software
A typical Greek school

- 50-200 students
- 15-30 teachers
- One I.T. teacher with limited technical skills
- One computer lab
  - One "server" which is also the teacher workstation
  - 12 diverse clients, from Pentium 3 to Core i5
- Minimal budget!
3 levels of school I.T. support

1) The **school** I.T. teacher can dedicate about one hour per week to maintain the lab using GUI programs. He has no Linux experience.

2) Two I.T. teachers serving as full-time sysadmins for 200-300 schools in the **prefecture** I.T. office. No Linux experience either.

3) A **national** team of 3-5 developers that test solutions and write documentation and best practice guides. Schools follow those on a voluntary basis. I.T. teachers communicate with the national team via forums, helpdesk, IRC, VNC.
What is LTSP?

- Linux Terminal Server Project
- Thin clients are netbooted, diskless workstations
- Applications run on the server
- Screen/keyboard is transferred to/from the client (remote Xorg)

Software used:

- DHCPD for PXE
- TFTP for kernel / initramfs
- NBD/NFS for ro root
- Overlayfs to make root rw
- LDM/SSH for authentication
- SSHFS/NFS for home
- LTSPFS for CD/sticks
LTSP+Linux benefits

- **Financial**
  - Reuse old PCs as thin clients
  - Existing labs only need server and switch (500€)
  - No software license fees
  - Needs less support!

- **Maintenance**
  - Maintain only one OS installation
  - Software is open, we can adjust it to our needs
  - Can coexist with existing Windows installations
  - No viruses
2007: First contact with LTSP

- Ideal for our Pentium 3-4 labs! Let's do a pilot!
- Sent Edubuntu 7.04 servers to 20 schools.
- But very difficult to make it work:
  - Hardware: 2 NICs, 2 switches, rewiring
  - Text configuration files for static IPs, DHCPD...
  - Example: server image was cloned => eth0,1 became eth2,3 => configuration broken => clients didn't boot
  - No guide for the first steps (install applications etc)
- Result: from 20 pilot labs, only mine was successful
2008: Joining national team

- Joined national I.T. support team
- Wrote 200-page guides
  - Setting up the OS, LTSP, software, user accounts...
- First versions of sch-scripts (now LTSP Manager)
  - Simple scripts to run at each phase of the guides, instead of copy/pasting commands
2008: Developing sch-scripts

sch-scripts - μία συλλογή βοηθημάτων για τη διαχείριση του σχολικού εργαστηρίου

Παρακαλώ επιλέξτε από το παρακάτω μενού:

40 Κεφάλαιο: Βασικές ρυθμίσεις
50 Κεφάλαιο: Εγκατάσταση επιπλέον λογισμικού
70 Κεφάλαιο: Προαιρετικές ρυθμίσεις
80 Κεφάλαιο: Για προχωρημένους
-- Βοηθητικά προγράμματα εκτός εγχειριδίου

<Εντάξει>  <Ακύρωση>
Debian repository managed with reprepro

100+ Greek Windows-based education apps, now packaged as .deb

Using wine, java, html, Adobe flash

Ubuntu PPA to ship software that we couldn't SRU

New versions of our software: ltsp, sch-scripts, epoptes...

New versions of software that we require: win32-loader, dnsmasq...
2009: Integration of Greek Windows apps
2009: Joining the LTSP team

- Scott Balneaves invites Alkis to the LTSP devs team!
- 1st contribution: ProxyDHCP
  - Boot info, not leases!
  - Simplify networking!
  - 1 NIC, 1 switch
  - 1 DHCPD (router)
  - dnsmasq, iPXE, win32-loader
Επιλέξτε το λειτουργικό σύστημα που θέλετε να ξεκινήσει:

Microsoft Windows XP Professional

PXE - Εκκίνηση από δίκτυο

Πατήστε επάνω και κάτω βέλος για να μετακινήσετε την επίλογη σας.
Πατήστε Enter για να διαλέξετε.
Δευτέρα έως Πέμπτη την αυτόματη εκκίνηση της φωτισμένης επιλογής: 28

Για επίλυση προβλημάτων και επιλογές εκκίνησης για προχωρημένους, πατήστε F8.
Jan 2010: Add experimental fat-client plugin
- Jonathan Carter (highvoltage)
- Stéphane Graber (stgraber)

Ideal for all newer labs, let's work on that!

LTSP thin clients:
- Apps run on server
  (beefy server)
- Lots of bandwidth

LTSP fat clients:
- Apps run locally
  (light server)
- Same CPU/RAM specs as workstations, but diskless
2011: Developing Epoptes

- iTalc had severe bugs
- Let's develop our own classroom monitoring tool:
  - WoL, logout, reboot, shutdown
  - Broadcast / monitor screens
  - Send messages, mute, lock screens
- Vagrant Cascadian uploads it to Debian in 2011
Classic LTSP:
- Maintain two installations: server and chroot
- Install applications in the chroot via terminal
- Difficult and with issues

LTSP-PNP:
- Maintain only the server installation via GUI
- Clone installation for the clients, omitting sensitive data
- Server and clients need to be the same arch (i386)
2012: Live CDs

- Gnome/Unity no longer suitable for thin clients due to OpenGL
- Gnome-flashback is suitable; but no distro defaults to that
- DVD for primary schools (4 GB)
- DVD for secondary schools (4 GB)
- DVD for high schools (3 GB)
- CD without educational software (700 MB)
2012-2014: Promotion!

- LTSP seminars in 50 cities
- 1842 I.T. teachers were educated
- The education ministry started actively promoting open source
  - Edubuntu in 120,000 dual boot laptops (not really used though)
  - FOSS, LTSP etc mentioned in some school books
- Alkis joins the prefecture school I.T. support office
  - Local prefecture: ~80% of school computer labs use Linux
2011-2016: Using LTSP in schools

- 2011: Started using LTSP in my schools
  - My old Windows-2000 based computer labs were now working!
  - Modern software, no licenses, can give software to students...
  - Students adjusted very easily

- 2013-2016: Promoting LTSP in I.T. teacher seminars
  - Using an LTSP lab to train other I.T. teachers made them want to try out the solution
  - Very positive feedback for Epoptes and shared folders!

- 2015: Joined national team
Component missing from Debian: sch-scripts
Project: internationalization of **sch-scripts** into **ltsp-manager**

**Sch-scripts** has evolved a lot since 2008:
- Automatically installs all dependencies, transforming a "workstation" into an LTSP server
- Exposes all configuration and LTSP virtual disk management in GUI menus
- Supports (mass) creation/management of users/groups
- Supports shared folders per group with bindfs
### LTSP Manager – main window

**Image Description:**
A screenshot of the LTSP Manager interface is displayed. The window is titled `LTSP manager (as superuser)` and shows a table with columns for `GiD`, `Group name`, `UID`, `Username`, `Primary group`, `Real name`, and `Office`. The interface includes options for `File`, `Server`, `View`, `Groups`, `Users`, and `Help`. There are options to `New user...`, `Edit user...`, `Delete users...`, and `Remove user from selected group`. The table shows entries for various GiDs and usernames, with corresponding values in the columns mentioned.

**Table Data:**

<table>
<thead>
<tr>
<th>GiD</th>
<th>Group name</th>
<th>UID</th>
<th>Username</th>
<th>Primary group</th>
<th>Real name</th>
<th>Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>a1</td>
<td>1000</td>
<td>administrator</td>
<td>administrator</td>
<td>Διαχειριστής</td>
<td></td>
</tr>
<tr>
<td>1002</td>
<td>a2</td>
<td>1001</td>
<td>a1-01</td>
<td>a1-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1003</td>
<td>b1</td>
<td>1002</td>
<td>a1-02</td>
<td>a1-02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1004</td>
<td>b2</td>
<td>1003</td>
<td>a1-03</td>
<td>a1-03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1005</td>
<td>c1</td>
<td>1004</td>
<td>a1-04</td>
<td>a1-04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1006</td>
<td>c2</td>
<td>1005</td>
<td>a1-05</td>
<td>a1-05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1007</td>
<td></td>
<td>1006</td>
<td>a1-06</td>
<td>a1-06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1008</td>
<td></td>
<td>1007</td>
<td>a1-07</td>
<td>a1-07</td>
<td>User a1-07</td>
<td></td>
</tr>
<tr>
<td>1009</td>
<td></td>
<td>1008</td>
<td>a1-08</td>
<td>a1-08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1010</td>
<td></td>
<td>1009</td>
<td>a1-09</td>
<td>a1-09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1011</td>
<td></td>
<td>1010</td>
<td>a1-10</td>
<td>a1-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1012</td>
<td></td>
<td>1011</td>
<td>a1-11</td>
<td>a1-11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diagram Features:**
- **Menu Bar:** Options for `File`, `Server`, `View`, `Groups`, `Users`, and `Help`.
- **Table Columns:** `GiD`, `Group name`, `UID`, `Username`, `Primary group`, `Real name`, `Office`.
- **User Interface Options:** `New user...`, `Edit user...`, `Delete users...`, `Remove user from selected group`.

**Image Context:**
The screenshot is from a software application used for managing LTSP (Linux Terminal Server Project) clients, allowing administrators to view and manage user accounts and their associated groups.
2017: LTSP Manager – mass create users

Create accounts per workstation (as superuser)

Mandatory information
- Group names: a1 a2 b1 b2 c1 c2
- Number of accounts per group: 12
- Create shared folders: 
- Add teachers to those groups: 

Account templates (optional)
- Username template: {c}-{0i}
- Real name template: User {c}-{0i}
- Password template: {c}-{0i}
- Member of groups: {c}

The following 72 accounts will be created

<table>
<thead>
<tr>
<th>Username</th>
<th>Real name</th>
<th>Home</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1-01</td>
<td>User a1-01</td>
<td>/home/a1-01</td>
<td>a1-01</td>
</tr>
<tr>
<td>a1-02</td>
<td>User a1-02</td>
<td>/home/a1-02</td>
<td>a1-02</td>
</tr>
<tr>
<td>a1-03</td>
<td>User a1-03</td>
<td>/home/a1-03</td>
<td>a1-03</td>
</tr>
<tr>
<td>a1-04</td>
<td>User a1-04</td>
<td>/home/a1-04</td>
<td>a1-04</td>
</tr>
</tbody>
</table>

(Only the first 300 accounts are shown in the table above)
2017: Outreachy – internationalization
2017: Outreachy – localization

LTSP Manager

Translating into Greek

Before translating, be sure to go through Launchpad Translators Instructions and Greek guidelines.

Download translation  Upload translation  Translation details  Reviewer mode (What's this?)

Translating: all items  using (nothing selected)  as a guide. Change

71 of 274 results

71. English: This directory is in use by another user in the system

Current Greek: (no translation yet)

New translation: Αυτή η κατάλογος χρησιμοποιείται από κάποιον άλλο χρήστη του συστήματος

Someone should review this translation

Located in /share/ltsp-manager/input_files/g536

72. English: This directory is in use by another user in the list

Current Greek: (no translation yet)
More details in my blog: http://fottsia.wordpress.com
Mentors will upload it to Debian Experimental within August
Testing, troubleshooting...
Write documentation at wiki.ltsp.org

After Outreachy:
- Continue using it in my schools
- Suggest improvements, report issues...
- Present solution in future seminars etc
What the Outreachy experience meant to me?
  - Contribution back to the community
  - Get more involved with Debian, upstream LTSP etc
  - Inspire my students to participate in FOSS communities

Thanks to Debian Outreachy for the sponsorship and to my mentors, Alkis and Vagrant
Thank you! Any questions?

Solution checklist:
- Debian/Ubuntu
- LTSP
- Epoptes
- LTSP Manager
- Software repositories
- Local support (via GUI)
- National support