

schoolLAN

a heterogeneous computer infrastructure for primary schools based on a UNIX server

by Ruud Suk, Stichting schoolLAN foundation, Arnhem, the Netherlands.

Introduction

SchoolLAN is much more than the usual network solution for small and medium size office environments: it provides a highly integrated, *ready-to-go* networked work environment targeted for primary schools, and it is based on the latest Open Source UNIX components. The Stichting schoolLAN foundation (established by Stichting NLnet), co-ordinates the regional schoolLAN initiatives (technical, educational and service) in the various parts of the Netherlands and it steers the future technical GNU GPL based system and network developments. The network configuration and services for this dedicated technical hostile (primary schools!...) environment are built upon a Linux server system, that is configured as a full resource sharing system for MS Windows clients. Windows client installation is highly simplified. The server provides and secures intranet- and Internet access to e.g. Kennisnet (Dutch education network) and commercial ISPs via ISDN, ADSL and cable. Network configuration is simplified for use by novices and remote second level maintenance.

Roaming pupils will find back their own personal work environment and learning situation (learning groups) on every workstation they logon to via a special configured Samba service. The server is configured with special tools for rapid (re-)installation of Windows client operating systems and Windows applications, based on PXE NIC features and BpBatch configuration tools. An extensive set of tools is provided for remote configuration of both the Linux server and Windows clients and Windows applications .

As schools are usually on a low budget, the schoolLAN server needs to provide support for a wide variety of PC's starting from the very low-end versions of the 486 PC up to modern Giga Hz PC's.

The technical part of schoolLAN

The goal:

SchoolLAN has to be a ready-to-go long term and stable network configuration solution (technical cookbook) targeted for the primary school environment. It must provide an operational network service in a naive and technically hostile (not only for UNIX reasons!) educational environment where youngsters come and play around and where professional system managers are not easily available. A low budget environment by culture.

The technical challenge:

Selecting and configuring the right Open Source network technologies and creating a simple technical configuration cookbook for the system administrators. Each administrator needs to support (remotely) more than a dozen Windows OS systems at each of a dozen different locations. The Linux server has to support (remote) secured system/network management. The Windows client systems can be reinstalled via the power button and can be re-Registered from many miles away. The schoolLAN software and configuration installations need to stay (remotely) synchronized for maintenance costs reasons.

The methods:

First of all a well thought out selection of system and network services and configurations: BpBatch for Windows re-installation, Samba for Microsoft Network, Sendmail for email services, DHCP V3 for client installations, NAT for hiding the intranet, iptables for Internet security, Bind V9 for internal DNS management, Windows application (mirroring) installation tools, student account maintenance tools for learning group management and privacy, ext3 and quota for system maintenance, Lire from LogReport, etc.). Secondly, configuration templates for scalable data and software installations (e.g. Autoload) and special easy to use configuration scripts for maintaining

the integrity of the different network configuration files throughout the server system. E.g. with very few global, easy to understand, parameters in one central configuration file (or via a web page) all the different configuration scripts and all needed values in the widely spread UNIX service configuration files (including ISP-specific firewall rules) can be changed and the affected network services will be automatically restarted or reloaded.

A scheme for building and loading various different, hardware dependent, Windows OS client images is available; it loads the necessary changes in the Windows Registry and it loads the necessary local files for the different workstations via a secured on-boot menu system (based on BpBatch, application installation tooling, DHCP and PXE-based installation DOS scripts and software).

The configuration supports functions as mail relaying and access (sendmail and dns), web (reverse) proxy-ing and caching (squid), web URL filtering (squirm), secure remote access (ssh), time synchronization (ntp) and internal/external web access (apache and IP aliasing).

Also included is virus scan support for (idling) Windows clients, the centralized user files on the Linux server, incoming/outgoing email (sendmail militering). The virus scanner signature database is automatically updated.

There is no need to back up the workstations, however there is an extensive backup scheme for the server. Backup of the system and user files is provided on a daily and weekly basis to a separate disk. If a tape unit is available a monthly backup to tape is made automatically.

The organisational part

While the technical issues are resolved, it turns out that there are many organizational issues to be solved: bringing the different cultures of the technical world and the educational world together is not straight forward. The primary schools (the practice and target) will be supported by IT-technology professional schools for technical service and by teacher schools for educational content using the IT functionality of the computer systems. Another organisational and logistic issue is how to devise an infrastructure for the schoolLAN school, which has the right technical support, the support and tooling they really need and can provide in the end by themselves.

In order to solve these very important and logistic issues schoolLAN foundation is not only providing UNIX experience, but tries to make use of the hands on experiences from the technical professional parents (and other geeks) in order to improve the UNIX technology and tooling.

Together we enable the children to pick up the technical achievements in a quick and easy way.

Results to date

Up until today the schoolLAN schools have been provided with a ready-to-go disk drive with 20 GB of data for the server and a small handbook how to start up. In June 2002, a CD with the full Linux server software and configuration (schoolLAN V1.0) will be ready, to distribute schoolLAN in a scalable way. Many ready made Windows OS images for the different PC manufacturers for the common types of PC's will accompany this release.

SchoolLAN is distributed under GNU GPL licensing terms.

In January 2002 more than 25 enthusiastic primary schools are working with schoolLAN in four regions of the Netherlands (Noord-Holland, Friesland, Gelderland and Limburg).

Three high schools have adopted schoolLAN for their IT classes and use the schoolLAN environment at the school for field experience.

Conclusion

The school environments are delighted with this initiative from the UNIX technical professionals (and not only because of the license free components!). They are adapting the evolutionary strength of the Open Source community: combine the efforts and share the (technical AND educational) experience and knowledge.

More information

More information on schoolLAN is available from the schoolLAN website

<http://www.schoolLAN.nl> or the NLnet page <http://www.NLnet.nl/projects/schoollan/>.