SUE: Standard Unix Environment at CERN

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SUE stands for Standard Unix Environment. It is a set of software components, configuration files and utility programs which ease the installation and automate the maintenance of site-customised Unix systems.

Key words: Unix; configuration; installation; management;

1 Introduction

This paper presents the SUE scheme which was designed and implemented by the Unix Workstation Support section of CERN's Information Technology division in order to automate the system configuration and management of large numbers of Unix systems.

SUE stands for Standard Unix Environment. It is a set of software components, configuration files and utility programs which together set up a ready-to-use, site-customized Unix system.

SUE works on top of standard operating system configurations provided by the vendors. SUE does not replace them, it provides instead a common system administration superstructure tailored to work in CERN's intranet.

SUE controls the choice of system components and configurations, simplifying installations. It reduces the possibility of erroneous manipulations thus easing problem solving, decreasing the need for Unix system management skills by individual workstation owners and also decreasing the load on support staff.

SUE is available for Solaris 2, HP-UX 9 and 10, AIX 4, and Digital-UNIX and has been installed on several hundred of systems at CERN [1].

[1] On 14/Feb/97 276 Solaris, 180 HP-UX, 200 AIX and 30 Digital-UNIX

SUE is implemented mostly in `perl`. The current implementation relies on the availability of a distributed file system such as `AFS`.

2 Motivation

At CERN there are presently about two thousand UNIX workstations and servers, split roughly among seven hundred Sun and HP workstations each, two hundred IBM's, three hundred and fifty DEC's and fifty SGI's. Some one thousand seven hundred X-terminals are also registered. More than eight thousand users have a UNIX login account.

Offering Unix system support in this environment is a challenging task, moreover the limited manpower available for the service has driven us to an increased focus in automated system installation and configuration management. This goes together with a standardization effort required in order to rationalize the support tasks.

Our goal is to offer a managed system configuration. This includes automated installation procedures, with minimal user intervention, providing a ready-to-use system with the default CERN Unix environment [6]. We want to achieve this goal in several Unix flavours thus helping to hide some of the differences among these flavours.

3 Structure of SUE

SUE is structured in features and profiles.

3.1 SUE features

A SUE feature encapsulates a particular piece of configuration or functionality.

Examples for features are **network**, **mail**, **hepix**, **ssh** and **asis**.

network Does all the necessary setup to configure the IP network access, it includes the setup of the network mask, broadcast address, the default gateway or mandatory routes, and the CERN domain name servers.

mail Setup of electronic mail via the CERN electronic mail gateway(s).

hepix The necessary hooks are installed for the HEPiX [5] shell scripts to be called for every user upon login.

ssh Installs ssh (secure shell) with `AFS` and `Kerberos` support.
asis Configures access to the `ASIS` [2] public domain software repository.

Here are the typical operations that a feature may support:

update - Insures that a feature is correctly configured.
daily, weekly, monthly - Intended for feature-specific housekeeping activities, e.g. cycle log files, clean `/tmp` directory, etc.
init - To be invoked upon system boot, designed to start feature-specific daemons.
install - The SUE install command is used to install features or to re-install them at the latest available level.

Each feature is defined in a subtree of a distributed file system through routines implementing the operations that are possible on that feature as well as feature-specific data including configuration variables, a file describing dependencies and documentation.

Configuration variables change the behaviour of the feature, allowing for instance the choice of the public domain `sendmail` rather than the vendor provided version.

3.2 Dependencies

A feature can depend on other features which are specified by an include file that contains the name of the features that are prerequisite to it.

When requesting a feature installation the features in the include file are automatically installed prior to the one in question.

3.3 SUE Profiles

A profile is a set of features. This is implemented as a feature which only contains an include file. Installing a profile installs all the features (or profiles) listed in the include file.

The minimum set of features to be installed on every SUE machine is called **base** profile.

The default profile which is installed when SUE is installed without any parameters is called **cern**.

More profiles can be defined for particular user groups, e.g. **project_atlas**,

project_cms or **project_sp2**. SUE can therefore be used to install different flavours of configurations while maintaining a common base.

3.4 Installation Service

SUE is installed on top of a standard system configuration as provided by the vendors. Installation servers are provided for all supported architectures in order to provide an installation procedure with minimal user intervention that includes SUE with the recommended profiles. A certification procedure [4] has been put in place to provide a framework to test SUE with the **cern** standard profile when a new version of the Operating System appears.

4 Other Information

The full documentation of SUE is available at the URL: `http://wwwcn.cern.ch/dci/sue`. This gives access to the "SUE Users Guide" [1], the "SUE Definition Document" [3], and various related publications.

References

[1] Lionel Cons. *SUE Users Guide*. CERN, the European Laboratory for Particle Physics, 1996.

[2] Ph. Defert, E. Fernandez, M. Goossens, O. Le Moigne, A. Peyrat, and I. Reguero. Managing and distributing application software. In *10th Systems Administration Conference (LISA'96)*, pages 213–226. Usenix, 1996.

[3] Unix Workstation Support CN Division. *SUE Definition Document*. CERN, the European Laboratory for Particle Physics, 1.00 edition, 1995.

[4] Alan Silverman. Operating system certification cern/cn/dpg/96-8. Technical report, CERN, the European Laboratory for Particle Physics, 1996.

[5] Arnaud Taddei. Common hep unix environment. In *Computing in High Energy Physics Conference 1995*, pages 668–672. CHEP, 1995.

[6] Rainer Toebbicke and Philippe Defert. Recommended standard for unix workstation environment setup. Technical report, CERN, the European Laboratory for Particle Physics, 1990.