scVENUS

automates system administration for homogeneous and heterogeneous networks
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Overview

scVENUS is a software that takes the automation of system administration tasks in homogenous and heterogeneous computer systems to the highest level. This technical white paper explains the underlying concepts and technologies of scVENUS.

Computer networks are often collections of various hardware architectures and operating systems. The larger the computer system, the more time the system administrator has to spend in managing it. Systems can quickly become so complex that only with computer support can they be maintained efficiently and with a high standard of quality.

scVENUS is a software for the intelligent system management of complex Unix, Linux and Windows networks. The software automates host administration and raises the productivity of system management, of the network and therefore also of the user. scVENUS considerably reduces the down-time due to system failure and facilitates consistent administration of a computer network despite the variety of different platforms.

Using scVENUS, an administrator configures the system, manages all the users, clients and file systems, and installs all the software. Resource planning is a straightforward task using scVENUS Inventory, while scVENUS Monitoring keeps the administrator updated on the current status of the network.

scVENUS was originally designed for use in heterogeneous computer systems as are typically found in research, development and computing. However, it can also be used to efficiently administer homogenous networks. But the software can be employed in systems of any size, from a small number of networked hosts to networks of several thousand hosts.

This white paper is aimed at administrators and IT planners who are looking for ways of making the administration of complex computer networks more efficient and cost-effective. It shows how scVENUS makes an important contribution to optimizing system management.
Introduction

A modern computer network is often a collection of various hardware architectures and operating systems. The operation and administration of a Unix host is completely different from that of a Windows computer, and even within the Unix world there are many variations and versions, each with subtle differences. Working with such a heterogeneous computer system becomes increasingly complex, and a computer-aided solution is needed to keep this complexity under control.

And this is exactly the aim of the scVENUS administration software. It is a tool that enables system administrators to manage architecture differences efficiently and structurally, and, if necessary, it can make these differences as unnoticeable as possible to the users.

With scVENUS, the configuration parameters of all the hosts are held centrally on one server, even if the network extends over several departments or locations. From this one host, the administrator controls the other hosts, and can centrally carry out monitoring, configuring and software installation. Each administration step is documented. If several administrators are working on the same system, scVENUS ensures that they do not interfere with one another. In all the administration tasks, the administrator determines What, and scVENUS determines How.
Heterogeneous networks

To have a pool of completely identical hosts is the dream of every administrator because it would be so simple to maintain. But in reality, the situation is quite different. As soon as the first hardware upgrade has been made, differences in performance or configuration have to be taken into consideration. Over the years, new architectures and operating systems are added and transform the once homogeneous pool into a heterogeneous system with a variety of individual characteristics.

In this case, the scVENUS software serves to aid the administrator in keeping the network under control despite its increasing complexity.

Standard administration steps for this purpose are multiply implemented in scVENUS: a suitable implementation exists for every architecture. When a system administrator issues an administrative command, scVENUS selects the correct version for each host. In this way, the differences among the systems are largely hidden.

But a network can also be deliberately managed by scVENUS heterogeneously. This can be useful if the network extends over several departments of a company, or if individual hosts are assigned special tasks. Just as it does for various architectures, scVENUS also manages for self-defined host groups similar administration tasks having different variations.

On the hosts in the intranet a different DNS configuration can be installed than on the hosts with direct access to the internet. The important point here is that the administrator issues the same commands, while scVENUS handles the differences.
Configuration Administration

System administration with scVENUS is done in two steps: Changes in the host configuration are not executed directly, but with the help of so-called methods. These are scripts that execute the required changes on the appropriate host. The method is installed or uninstalled in a separate step - if it is uninstalled, it undoes its changes. A method can be specially configured using so-called context files. The advantages of the two-step process are apparent in the case of hardware defects, for example: After the head crash of a hard disk, say, a replacement host can easily be installed with an identical configuration using data from the configuration depot.

The administrator executes one single method to change the configuration within the whole network.

scVENUS gets the appropriate version from the configuration depot. System differences do not need to be handled by the administrator any more.
If necessary, there are different versions of each method and of each context for every host architecture, for every user-defined host group or for every individual host. For example, services under Windows are started differently than under Unix, the name servers get their special DNS configuration and the host of the department manager gets a separate printer queue. All the methods and context files are located centrally on one administration host, the scVENUS master. There they are arranged hierarchically according to the architecture, group, or host to which they belong. When a method is applied to a computer, scVENUS selects the corresponding method and context file from the configuration depot. From this point on, the administrator does not have to worry about system differences.

The scVENUS commands log every administration task. Methods and context files are managed by a version control system so that every modification can be reconstructed, and, if necessary, reversed. And scVENUS even provides support for coordination between several administrators. Using exclusion mechanisms, individual files in the configuration depot or whole administration tasks are protected, preventing system administrators from simultaneously making conflicting modifications.
Software Administration

scVENUS has its own package manager with which the software in the entire network can be managed. While other package managers are available only for individual operating systems, scVENUS provides software administration that operates across platforms. With it, each package is given a number of attributes: the operating system, the hardware architecture or the required libc version, for example. Different variations of the same package are stored in the central software depot. With one command the software can be installed throughout the network. scVENUS retrieves the appropriate package out of the depot for each host type. If required, flexible additional scripts in the package prepare the system for installation or execute cleanup operations.

On smaller networks it is sufficient to distribute the software from the central depot to all the hosts. If the network is distributed over several locations, however, it is recommendable to use local servers.

scVENUS is thus be able to duplicate the central depot on additional clients and synchronize them regularly. This saves bandwidth in the connections between the individual locations and makes it possible to distribute new software quickly and in parallel to all the hosts in a network.

In addition to its own package format, the scVENUS software depot can manage and install MSI packages. A wide variety of programs for Windows is distributed in the MSI format. The depot can even handle regular updates for Windows, also for the Internet Explorer. Easy-to-use commands show the patch status of the Windows clients or update the Windows clients immediately. Like all other administration steps, the administrator can issue the commands for Windows patch management from the central scVENUS administration host.
Software installation within the whole network is triggered by executing a single command.

scVENUS gets the appropriate version (software version, binary) for each client type.
Client Installation

Configuration and software administration require a running operating system and subsequently provide a full client installation.

In addition, scVENUS also offers the possibility to install the basic system automatically for all operating systems that are supported by all other scVENUS components.

No matter whether it is Windows, Linux or Unix, scVENUS uses the native installation mechanisms like WinPE, Kickstart, AutoYAST or NIM and makes them available via a unified interface.

Start the installation over the network or from CD. The package sources are located on a HTTP server or CIFS or NFS shares.

scVENUS can also manage arbitrary variants for the initial configuration. The administrator uses scVENUS commands to specify the configuration with which the host is to be installed.

In case of a defect, a replacement system with a new hardware can be installed with minimal effort, or in case of capacity constraints an additional server with an identical configuration can be provided in no time. A reinstallation with a modified configuration is possible at any time. In a special mode for cluster systems scVENUS recognizes each node by means of the connected switch port. In this way, complete clusters can be consistently installed without having to maintain a list of MAC addresses.
Monitoring

It is almost impossible for an administrator to keep an eye on the status of only a single host’s system. Alone the regular checking of the log files takes up a considerable amount of time. In large networks consisting of hundreds of hosts, anomalies can be overlooked in the mass of data. That is, if there are no automated routines that examine and filter the information for the administrator.

The scVENUS Monitoring and Reporting module gathers system information on a central server. To limit the volume of data, however, each client preselects the information to be transferred. The administrator can specify whatever filter rules are needed. All interfaces can easily be inserted into scripts and thus extended to arbitrary information sources. scVENUS Monitoring not only monitors single events but also provides a reporting functionality that records and processes system statuses over a given time period.

The central scVENUS Monitoring server then processes this data: The reporting information is integrated in tables and graphics that can be requested via the web browser. They provide a transparent means to monitor long-term system loads and are the basis for capacity management of the environment.

In addition, Java based clients with graphical user interface can log in from the entire network and receive real-time messages.

If a client registers itself only for certain categories of messages, the server sends it only that range of messages. In this way, for example, a network administrator can limit what is displayed on his monitor to information about the status of the network. If desired, scVENUS can also be configured in such a way that an automatic reaction is triggered as soon as the Monitoring server registers a specific event.
Inventory

With increasing size, heterogeneous computer networks become more and more unmanageable. The scVENUS Inventory module keeps administrators informed about the hosts they manage. By issuing a short command - or taking a look at the graphical user interface - they can see which hosts are fitted with which graphic card, for example, or on which hosts a particular program is installed.

In the central Inventory database, scVENUS stores all the information about each host’s specification. The administrators can request not only the architecture of its hardware and its storage capacity, but also a list of its installed software. At the same time, the database can be used to document changes made to specific hosts by administrators. Here, scVENUS pays particular attention to ease of use: Most of the entries are determined automatically by a subprogram. The administrator only has to enter information manually that cannot automatically be determined, such as the location of the host.

Not only administrators but also users profit from the central Inventory. Administrators can extract information from the database by means of a simple command-line interface. In this way, they can link their methods directly to the Inventory, for example, to automatically optimize the configuration of the graphical interface for the installed graphic card.

The module Inventory is used to centrally collect information according to a client’s system equipment. This information is centrally administered in a database.

The administrator can use the integrated target/actual comparison that shows at a glance if the current configuration of the host deviates from specified standard values or a defined reference system. Errors in hardware supply or maintenance measures can be detected by a single mouse click.
Single system image

Heterogeneous networks make life difficult not only for administrators. Changing file system paths and different program versions on different hosts reduce the productivity also of users. With scVENUS, however, every host on the network has a reliable basic framework of functions available, regardless of its platform.

Even the home directory is always available in the same path - the necessary configuration of NFS and automount daemons is handled by scVENUS in the background. This works too, with limitations, even on clients running under Windows. Although the operating system does not allow a file system path that would be identical to the Unix variations, scVENUS does, at least, use Samba to synchronize user names and passwords, and integrates the home directories uniformly as network drives.

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From administrator's point of view, the combination of network file systems, directory services and automounters typical of scVENUS offers another special advantage: Without any additional administration effort, the users' home directories can be distributed among many different hosts in the network.

The most reasonable location for a home directory is on each user’s host. In this way, he can access most of his data locally. This is usually faster than a traditional configuration using a central file server, by which data frequently has to be exchanged over a relatively slow network, and it is also less susceptible to disruptions in the network connection.
Graphical interface

scVENUS can completely be operated via command line. So an administrator can automate individual steps by embedding these commands any way he likes into own scripts. Alternatively, the graphical user interface (GUI) can be used. This is a cross-platform interface, programmed in Java, offering a more convenient way of managing the system.

While the usual commands must always be executed on the central administration host, the Java GUI can be started on any computer, even outside of the managed network.

![Adding XEmacs to the software depot](image)

So standard tasks, such as executing a method, require only a few mouse clicks. Graphical wizards lead through the various tasks in the configuration and software depot. This is not only convenient, it also reduces the risk of typing errors. And to exclude any data security concerns, communication between the GUI and the administration host is completely SSL-coded.

The so-called Job Log Browser allows access to the protocol of all administrative tasks. With simple queries the administrator can for example get an overview of the methods that have recently been executed on a system or reconstruct if a modification in the configuration depot has already been installed.
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