

Whitepaper

**Efficient installation and operation  
of terminal server farms**



>>> manage IT



# Installation

## INTRODUCTION

No-one disputes the advantages of a server-based computing architecture for consolidation, standardization and cost-cutting in IT environments. A large and growing number of companies from all market sectors are adopting server-based computing, and the rapid, efficient and reliable provision of applications is emerging as one of the main advantages of this computing model.

This whitepaper describes some of the potential issues that may be encountered with the installation and operation of terminal servers and explains straightforward ways to resolve them.

## REQUIREMENTS FOR THE INSTALLATION OF TERMINAL SERVERS

Basically, there are two ways to install terminal servers

- > manually or
- > automatically.

The installation steps are identical for both but with manual installation they are, of course, performed by hand by an administrator. With automatic installation, the process is prepared in advance and then runs fully automatically and, if required, under timed control.

As it is such a time intensive process, the cost of the manual installation of several identical terminal servers can very quickly exceed that of automatic installation. Furthermore, with manual installation there is always a risk of small discrepancies in the installation process for individual terminal servers, which can very easily result in differences between the terminal servers in one server farm.

This would suggest that for medium-sized and large terminal server farms, automatic installation is the answer. There are, however, a number of important points to be considered during automation in order to avoid the creation of new problems.

## MANUAL INSTALLATION

Manual installation by an administrator involves a series of installation and configuration steps. The partitioning of the hard disk and installation of the server operating system on the target hardware is followed by the activation of the terminal services in the role of application server. Any licenses required are then imported and the relevant parameters for terminal services, the Microsoft Windows basic system, system policies, the file system, the registry, the user management and security settings are configured.

During the next stage, Citrix MetaFrame/Presentation Server is installed on the majority of the terminal servers used in the company environment in order to provide access to expanded functions (such as published applications, seamless application windows and highly scalable load distribution). For the subsequent installation of applications, a terminal server first has to be switched to a special installation mode in which no users other than the administrator are working on the server. When each individual application has been installed, it is mandatory to return the system to its normal run mode. This is usually followed by adjustments to the system policies, file system, registry, security system, user and group settings and general updates to the user profiles and the login scripts.

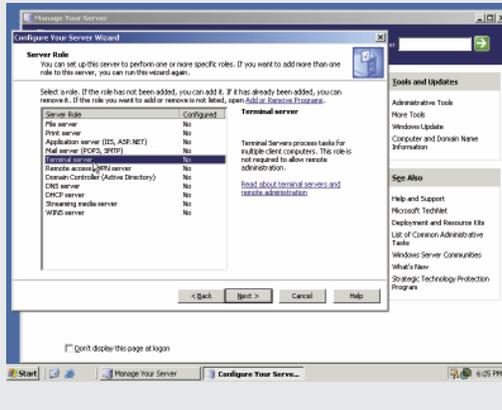
Nor should we forget the work required for the configuration of the associated specific parameters and the publication of the installed applications when using Citrix MetaFrame/Presentation Server. The following diagram is a summary of the stages described above in the correct sequence.

**FIG. 1  
SEQUENCE OF THE  
INSTALLATION AND  
CONFIGURATION  
OF A TERMINAL  
SERVER BASED  
ON CITRIX  
METAFRAME/  
PRESENTATION  
SERVER**

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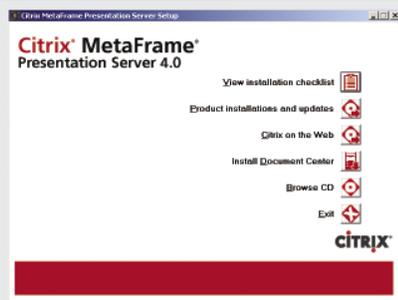
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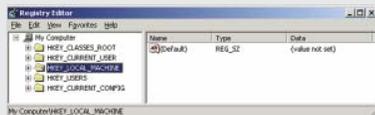
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## INSTALLATION STEPS

- 1 Partitioning of the target hardware
- 2 Installation of the operating system on the target hardware
- 3 Activation of the terminal services in the role of an application server
- 4 Import of the required licenses
- 5 Configuration of the parameters for
  - > the terminal services,
  - > the Microsoft Windows basic system,
  - > the system policies,
  - > the file system,
  - > the registry,
  - > the user management and
  - > the security settings
- 6 Installation of Citrix software
- 7 Switch to installation mode
- 8 Installation of an application
- 9 Switch to run mode (steps 7-9 are repeated for each individual application)
- 10 Adjustments to
  - > the system policies,
  - > the file system,
  - > the registry,
  - > the security settings,
  - > the user and group settings,
  - > the user profiles and
  - > the login scripts
- 11 Configuration of the specific parameters of Citrix servers
- 12 Publication of the installed applications

## Manual or automatic

Even in this brief overview of the steps involved for terminal server installation, it is evident that the amount of work and the associated complexity should not be underestimated. The fact that the sequence of each individual installation step must not be changed adds to the overall intricacy of the operation. The installation of terminal servers has been found to be extremely sensitive to the slightest deviations from a reference installation. Administrators and users usually learn this the hard way from the often non-deterministic behavior of several manually duplicated terminal servers.

However, in terms of achieving identical behavior from several terminal servers in a common load distribution farm, not even the skills of experienced administrators will be sufficient to perform a manual farm installation 100% successfully, 100% of the time.

This risk is compounded if additional software components, such as service packs or new applications have to be post-installed after a few days or weeks. Reproducing a multi-step installation manually – even only adding a new server to an existing farm – is well nigh impossible even if the documentation available is complete. The ability to perform several hundred or even thousands of installation steps manually in exactly the specified way for several target servers is way beyond the skills of the majority of administrators. In such cases, there is no option but to use supporting automation methods.

### AUTOMATIC INSTALLATION

Automatic installation inevitably comprises all the steps described above for manual installation. In principle, two options are available for this, both of which are already familiar from client installation:

- > cloning or
- > software distribution.

With cloning, a 1:1 copy of a reference installation is copied onto all the target systems, while with software distribution, applications or operating systems are distributed between the individual target systems in the form of software packages. Both variants have their advantages and disadvantages. There are also additional requirements to take into account in the terminal server environment.



## CLONING

With cloning, a replica of a reference installation is copied to all the target systems. This is feasible, particularly since various cloning products, such as PowerQuest DriveImage or Symantec Ghost, are commercially available and by copying the reference source the requirement for the terminal servers to be identical is guaranteed. However, the subsequent configuration of the server-specific parameters such as server name, specific IDs or local licence information is problematic. These settings still have to be made manually with an associated risk or error. Deviations in the basic hardware or the smallest of changes to the installed software – even the import of a simple patch – may also give rise to problems which generally require the creation of a new replica or manual reworking.

In addition, with cloning it is not possible to differentiate between the special parameters of an initial installation and the parameters of a subsequent installation – something which is essential for the installation of the first and subsequent servers in a server farm based on Citrix MetaFrame/Presentation Server. Once again, this would require an update to the replica or manual reworking. Another aspect to take into account is revision security, i.e. the exact reproducibility of the status of a server at a specific time. If we consider the case of an environment with 100 terminal servers, one single change to the server configuration per month, a data volume of two to four GB per server and a period of 12 months for reproducibility, the data volume for each server will be approximately 25 to 50 GB and the data volume for the entire environment will be well over 1 TB, provided no manual activities are required. Obviously, a conventional backup method may also be used as an alternative to backup in the form of cloning, but, once again, this soon leads to a logistical impasse.

To summarize, cloning represents a possible approach to the installation of terminal servers, but, despite appearing to be a simple procedure, it has serious weaknesses. One of the main problems is the fact that, although the servers in a terminal server farm (configuration and hardware) are virtually identical, they are not 100% identical. However, it does provide an alternative to unattended installation for the installation of the operating system. Figure 2 provides another overview of the problems encountered with cloning.

FIG. 2

### Problems with cloning

- 1 Does not take account of server-specific parameters (server name, specific ID, local licence information etc)
- 2 Discrepancies within the hardware base (new replica required)
- 3 Changes to the installed software require a new replica
- 4 Does not take account of parameter differences between initial installation and subsequent installation (new replica required)
- 5 The provision of revision security is complicated and necessitates the storage of high volumes of data

## SOFTWARE DISTRIBUTION

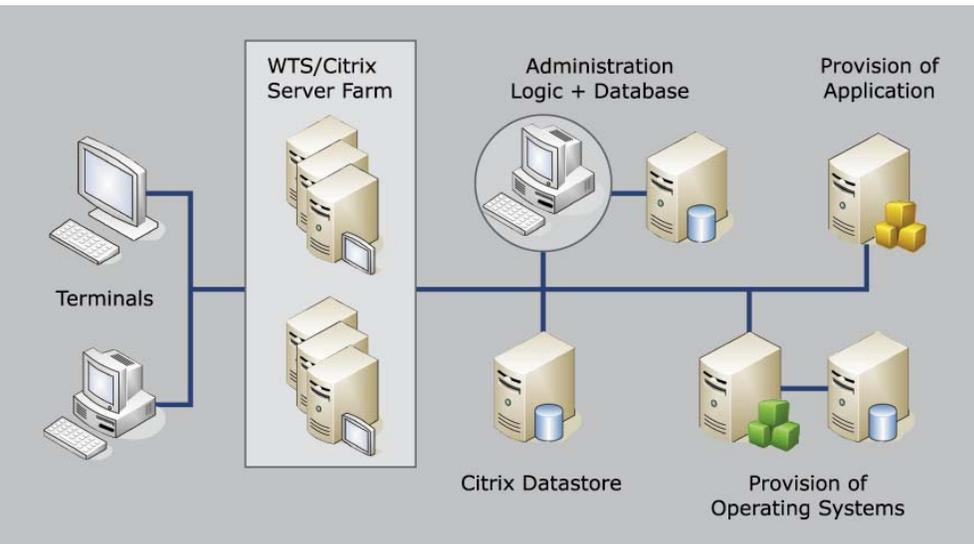
The use of products for software distribution is another alternative for the installation of terminal servers. As in the case of cloning, numerous products are available such as Microsoft Systems Management Server, Citrix Installation Services, enteo NetInstall, Symantec OnCommand and Altiris Deployment Solution.

When the operating system has been installed on the target platform using cloning, unattended installation or another product, such as, for example, enteo Operating System Deploy (OSD) or Microsoft Automated Deployment

Services (ADS), all installation activities are performed in an automated procedure. In principle, these tools address some of the problems described above, such as changes to the hardware base, since the software is installed as opposed to being copied to the target platform in the form of a replica.

As a rule, however, such products are developed and optimized for the "roll out" of large-scale client environments. Consequently, their application for terminal servers is only a marginal consideration.

Particularly when using Citrix MetaFrame/Presentation Server, the special features of a terminal server environment are only taken into account to a limited extent, if at all. Consequently, the use of software distribution products for the installation of terminal servers can cause numerous problems, as the example of the following requirements specific to terminal servers explains.



**FIG. 3**  
**ARCHITECTURE FOR THE**  
**AUTOMATIC PROVISION OF**  
**APPLICATIONS IN A WTS/**  
**CITRIX ENVIRONMENT**

## REQUIREMENTS FOR FULLY AUTOMATED TERMINAL SERVER INSTALLATION

- 1 Support for the switchover to installation mode and return to run mode.
  - 2 Retrieval capability for the mode currently set.
  - 3 Support for concepts such as registry mapping and .ini-file mapping to differentiate between user-specific and global settings on the terminal server.
  - 4 Guarantee the sequence for all installation steps.
  - 5 Grouping of a fixed sequence of installation steps together with the associated files in defined packages and installation of a hierarchy of several packages. This permits the re-use of proven installation patterns and packages, even if they are to be installed on different types of target servers.
  - 6 Dynamic setting of optional installation package parameters during installation on an individual server. Ideally, the specific parameters for each target server may be managed in a database.
  - 7 Support for concepts such as repackaging and retro-installation to permit small updates without a complete re-installation.
  - 8 Addressing different target environments with exactly the same unmodified packages and external parameter driven fixed installation logic. (For example, to differentiate between development, pilot, acceptance and production environments.)
  - 9 Automated relocation of a selection of servers from an "installation organisation unit" in the active directory into a "productive organisation unit" with different security policies.
  - 10 Automatic information and, when required, precautionary logging-off of users from their terminal server sessions before a re-installation on a terminal server takes place.
  - 11 Automatic deactivation of a user logon on a server when it is subject to a re-installation and automatic monitoring of the load distribution mechanism.
  - 12 Support for the installation and management of the Microsoft Session Directory.
  - 13 Complete and centrally managed logging of the success or failure of each installation step.
  - 14 Selective stopping and restarting of Windows services at specific times while an installation is being performed on a terminal server.
  - 15 Appropriate treatment of exceptions and errors specific to terminal servers. This may entail the interruption of an installation process, for example, if individual installation steps cannot be performed successfully.
  - 16 Monitoring of the time stamp for specific registry values in order to avoid any inconsistent behaviour of servers introduced subsequently to a farm in interaction with existing user profiles.
  - 17 Support for the terminal server-specific pre-installation of printer drivers.
  - 18 Terminal server-specific configuration of user profiles and log-on procedures.
  - 19 Import and activation of the licences required for terminal services and installed applications.
- In conjunction with these installation steps, the requirements described (see Fig. 1) demonstrate the complexity of performing installations on a terminal server or a terminal server farm.

FIG. 4

## IMPLEMENTATION OF AUTOMATIC INSTALLATION

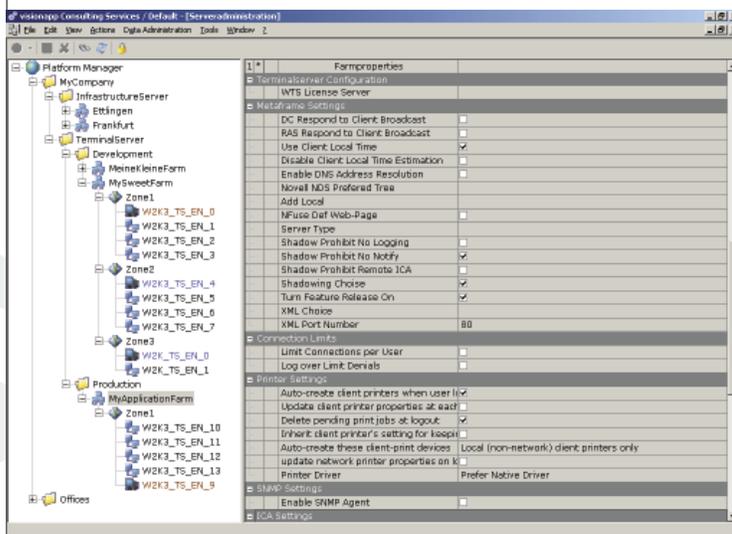
Automatic installation on a terminal server (or a farm) involves numerous different installation steps. In order to obtain a highly available and stable system environment, the software must be installed in a specific sequence on all target systems (server hardware).

The optimized installation procedure is organized as follows:

Firstly, the terminal server operating system is automatically installed on the target systems. The operating system software required for this is copied and installed on the target systems in the form of previously created software packages, which are held in a database or file system, without human involvement. The entire system is then expanded and optimized with further software packages, such as Citrix MetaFrame/Presentation Server or the available service packs, hot fixes, patches and security packs.

The necessary security settings are set automatically on the target systems and in this way the entire system is "hardened". This process requires extremely sophisticated sequence logic and control.

**FIG. 6  
VISIONAPP  
PLATFORM  
MANAGER  
CONTROL  
CENTER FOR  
THE AUTOMATED  
INSTALLATION  
OF WTS/CITRIX  
SERVER FARMS**



To use Citrix MetaFrame/Presentation Server, the requirements have to be expanded by the following five points:

- 1 Automated update of the Citrix parameters
- 2 Support for the management of several server farms and option of farm splitting
- 3 Delivery of the correct installation sequence for the licenses
- 4 Automated installation and management of the Citrix datastore and the data collector
- 5 Publication of the installed applications in the correct manner

**FIG. 5  
EXPANDED REQUIREMENTS WHEN USING  
CITRIX METAFRAME/PRESENTATION SERVER**

The next step consists of the configuration of the terminal server-specific settings such as management of the registry mapping options, monitoring of the farm configuration or changing the target systems to installation mode. This requires further tools, which are copied together with server-specific configuration files onto the target platform by means of a script. Script commands mean this can be performed remotely. Before execution, the tools' configuration files are filled with data from a database containing all the server-specific parameters.

The result obtained after several installation phases and restarts of the target systems is an operational and optimized basic system. Depending upon the attributes of the script logic and the sequencing control developed, complete automation of the operating system installation is possible.

An optimized and customized basic system is then installed on every target platform. An entry must be generated for each individual installation step in a log file or in a central database to ensure that the installation sequence may be reproduced. In the next step, the applications are installed on the target systems. Here, once again software packages with placeholders for dynamic, server-specific parameters are used (see Fig. 8). With this form of application installation, the “msi-format” of the Microsoft installer plays a dominant role.

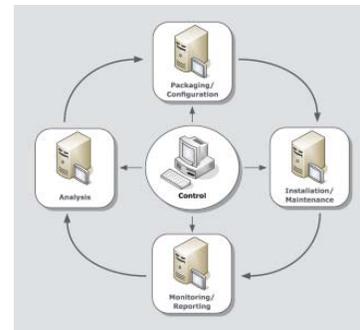
Until the installations on the server are complete, the exact sequence should also be monitored by scripts. The last step when using Citrix MetaFrame/Presentation Server consists of the automated publication of the applications for which a further tool is required.

The tools and scripts described provide for fully-automated and revision-secure installation processes on terminal server farms. Revision security means that earlier versions of the system environment may be restored based on the stored configurations. Consequently, rollback to a functioning system environment is possible at any time in the event of any problems occurring during an update or the subsequent installation of other application packages. Changes to the configuration during operation, the addition of servers to the farm or even the relocation of servers between different environments can also be performed without problems, due to the use of dynamic placeholders during installation.

Companies wishing to automate the operation of their terminal server farms and hence organize them more efficiently may have access to the knowledge of highly specialized suppliers. These suppliers have pre-assembled installation frameworks or products specially designed for efficient installation and the operation of terminal server farms.

Here, reference is made to the visionapp Platform Management Suite (vPMS) as a particular product (see Fig. 6). This consists of a user interface for the configuration of all target server parameters and for the modification of the sequence control. It also has a database and centrally configurable additional tools for specific terminal server settings. In addition, the vPMS has interfaces for monitoring standard installation products such as enteo OSD, enteo NetInstall, Fujitsu Siemens Computers Remote Deploy, Microsoft Automated Deployment Services, Microsoft Systems Management Server or Altiris Server Management Suite.

The visionapp Platform Management Suite also offers more than 450 packages for the automated installation and configuration of a terminal server environment. These packages were created, tested and refined in complex, enterprise terminal server projects. They make the implementation and support work much easier, shorten the project delivery time, reduce costs and consequently result in an enormous reduction in the project risk. The packages comprise terminal services under Microsoft Windows 2000 Server, Windows Server 2003 and Citrix MetaFrame/Presentation Server and also contain a series of conventional standard applications.



**FIG. 7**  
**CONTROL AND**  
**MONITORING OF**  
**TERMINAL SERVER**  
**FARMS THROUGHOUT**  
**THEIR ENTIRE LIFE-**  
**TIME**

The associated package logic is coupled to a sequence control for all installation steps that have been tried and tested over many years. One essential element of the vPMS is a complete record of all installation steps to significantly simplify subsequent analyses. All companies can use this product for the installation and operation of their terminal server environments even if they themselves do not have years of experience in this field. It supports administrators not only in installation but also in the performance of repeated tasks, i.e. the operation of the terminal server farm throughout its entire lifetime (see Fig. 7).

The Butler Group, an internationally renowned market research institute, recently conducted a technology audit on the visionapp Platform Management Suite and the results can be downloaded from [www.visionapp.com](http://www.visionapp.com).

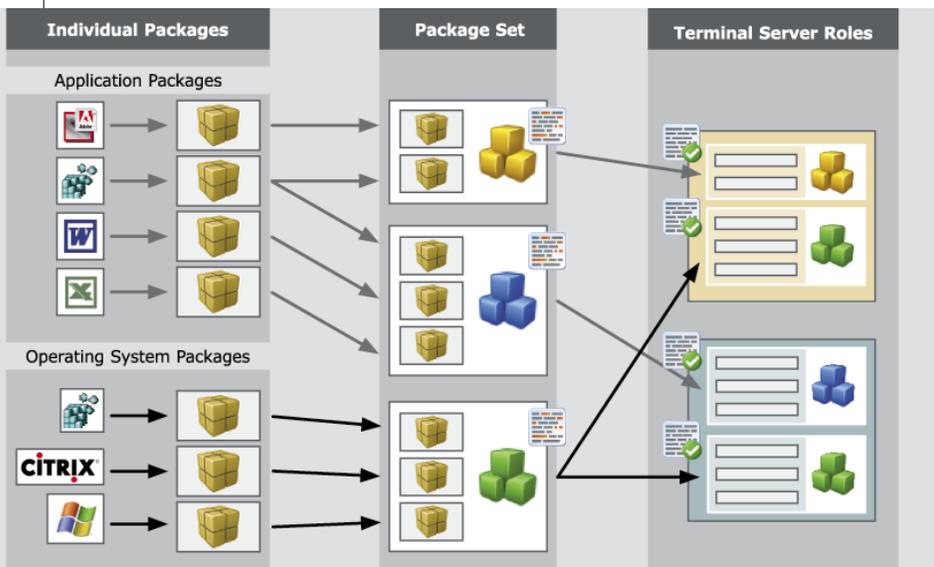
## SUMMARY

Today, many companies use terminal servers as the basis for the efficient provision of in-house applications to users. This technology facilitates the timely and centralized provision of applications. Cost savings of up to 20 % and payback times of between 12 and 36 months have encouraged the utilization and adoption of this technology in many companies.

However, centralized systems also have their weaknesses. For example, a central server farm represents the „single point of failure“ for the entire system and therefore stability and availability are two of the most important requirements for the successful operation of a terminal server environment. Even when companies operate strategically, i.e. with a large number of users and applications on a terminal server farm, new mechanisms and processes should be used for lifecycle management during the installation and operation of the system environment.

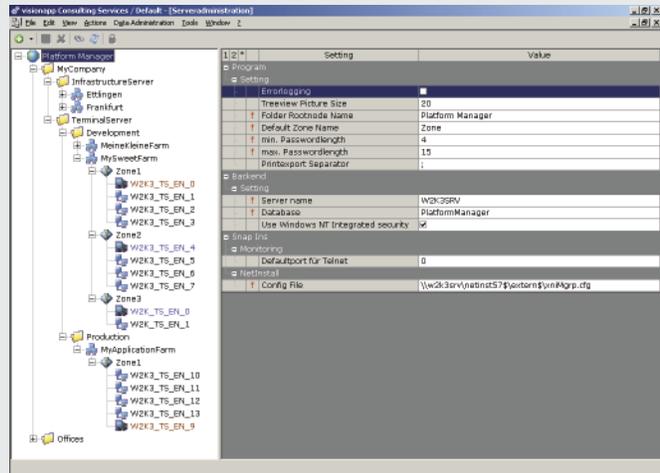
While for small server farms with 1-5 servers, installation and operation may still be performed manually or by cloning, the use of automated solutions makes sense in environments with 5-10 terminal servers and above. System environments with more than 10 terminal servers should not use manual or cloning procedures for installation and operation. In such cases, automation is virtually unavoidable if it is wished to keep the operating costs and risks as low as possible.

**FIG. 8**  
**HIERARCHY OF**  
**INSTALLATION**  
**PACKAGES COU-**  
**PLED TO DYNAMIC**  
**PARAMETERS BY**  
**SEQUENCE CONTROL**

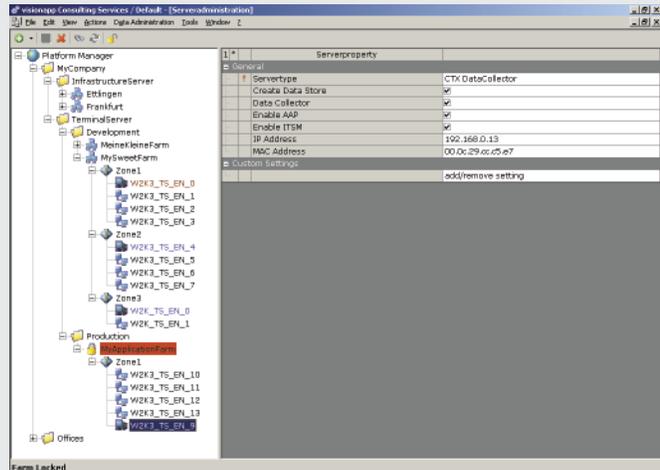


Many large and medium-sized companies are already using automation very successfully and hence are creating a solid base for the expansion of the centralized terminal server environment, which would enable the entire company to benefit from subsequent economic and functional advantages.

With a team experienced in large and medium-scale projects, visionapp is one of the leading European specialists in the terminal server/Citrix environment. The products the company developed for automated installation and operational management are currently being enjoyed by many blue-chip companies in Europe.



**FIG. 9 VISIONAPP PLATFORM MANAGER BASIC CONFIGURATION OF THE INSTALLATION ENVIRONMENT**



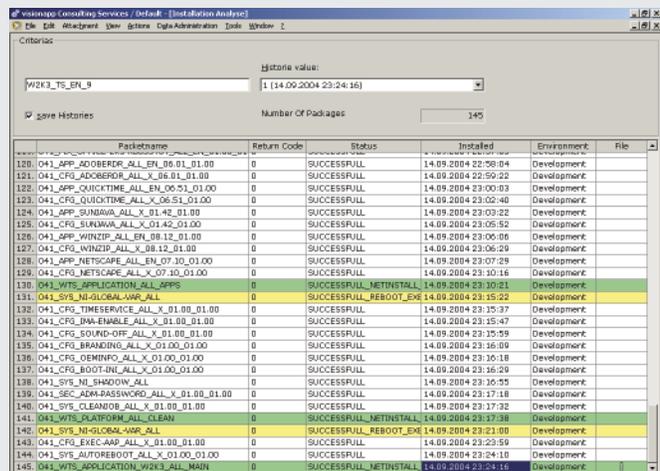
**FIG. 10 CONFIGURATION OF THE SERVER ENVIRONMENT**

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For more information on the products and solutions for the automation and operational management of terminal server environments with Citrix MetaFrame/Presentation Server, please go to [www.visionapp.com](http://www.visionapp.com).



**FIG. 11 ANALYSIS OF THE INSTALLATION PROCESS IN THE REPORT MODULE**

## SBC Lifecycle Management

visionapp Control Center (vCC) integrates visionapp Platform Management Suite (vPMS) and visionapp Access Portal (vAP) enabling companies to consolidate and simplify access to their corporate applications, delivering increased productivity whilst reducing risk and cost.

### Managed Application Delivery

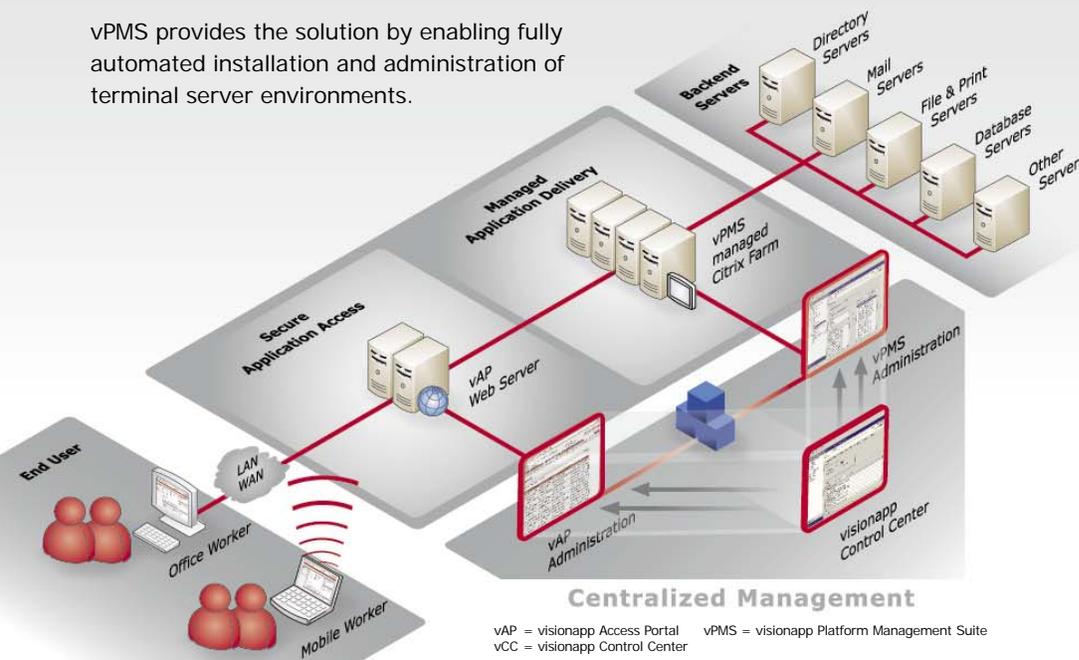
The pace of modern business has resulted in the rapid growth of an increasingly complex IT environment with a high management overhead. This is driving many companies down the server consolidation route by utilizing SBC technologies. However, server consolidation is only the first step to realizing the full benefits of consolidation. By delivering many installation and management processes manually or with disparate scripting methods companies often increase their exposure to risk, dramatically increase cost and use highly skilled personnel to complete low level administration.

vPMS provides the solution by enabling fully automated installation and administration of terminal server environments.

### Secure Application Access

By centralizing application access, companies can gain greater control, enjoy more flexibility and realize better cost benefits. As workforces become increasingly mobile, secure and consistent access to corporate applications is now a critical business requirement for most companies. However, mobile access represents problems for the enterprise. IT becomes very complex to manage using numerous and disparate PCs/laptops and access mechanisms. Providing secure access to applications in a server-based computing environment is the answer to this IT headache, because data never leaves the data center, users can seamlessly access their corporate applications from their desk, their home, or in transit.

vAP provides the solution by enabling a secure, consistent access to corporate applications through a centralized environment.



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#### About visionapp

visionapp is one of Europe's leading providers of server-based solutions based on Microsoft and Citrix technologies. A member of the Allianz Group, visionapp has more than 100 employees, a worldwide network of premier business and technology partners and a blue chip customer base e.g. Deutsche Bank, L'Oréal and Pfizer. The company supports many large and medium-sized enterprises operating in numerous market sectors throughout the world. visionapp's solutions reduce costs, enhance flexibility and availability of IT infrastructures and increase business productivity through server-based solutions.