

# Automated Unattended Installation in Kovárna Viva, a.s.

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**Abstract**— This paper was created on the basis of the design, development and implementation of the project of Unattended installation for company Kovárna VIVA, a.s. This article briefly describes the project and the field automated unattended installations. In the introduction the reader is informed about the project and offline installation issues in general. Furthermore, this paper focuses only on projects where there are necessary analyses for the deployment of automated unattended installations. In conclusion, there is sample of source code of the program (batch file) that automates the entire process.

**Keywords**— Installation, Unattended Installation, Unattended automated installation, environment analysis, tools analysis, WAIK, image.

## I. INTRODUCTION

How to simplify and speed up routine and tedious installation of the operating system and applications on user workstations? It is the eternal problem of all system and network administrators. This activity is not too difficult but the greatest problem is time. The constant lack of time forces us to automate many things. We need to work as easy as possible and save time and energy that we spend with other activities. The absolute utopia would be if we did not have to do some things because it is do them. Unfortunately, utopia will always remain a utopia; however it is possible to approach it in many ways.

If the administrator has to perform one installation of the operating system and install also all the necessary applications several times per month, then it is no problem. However, if he should install the operating system on dozens of computers, then it is really problem in terms of the time and ensures the smooth running of the whole system.

Automatic unattended installation help solve this problem, and administrators can use their saved time for their daily tasks and resolve incidents to maintain the functionality of the system.

Company Kovárna VIVA, a.s. is important Czech engineering company operating on the market for 20 years. During its existence it has grown and logically this grow has influence on increased the number of employees. Even if it is

engineering company then it cannot work well without the services that provide ICT. Computers play an important role in monitoring, controlling production quality even for the management and control of the manufacturing sector, engineers, technologists and others. Given that the operation of IT / IS depends functioning of the company is a key factor in utilization of administrators.

## II. INSTALLATION

Installation is the process where a new operating system, computer program or driver is copied to the computer. After this process is possible use this installed component or components. Software makers seek maximum simplification of the installation process, which usually involves configuration and any other necessary activities.

When installing an operating system in a dedicated storage area (typically a hard disk) created favorable environment (disk formatting and bootloader installation) and it is then copied the operating system kernel and other necessary components. Everything is configured so that the operating system can be easily used.

Programs are usually delivered in the form of compressed packages containing a set of necessary files into a single file, because with them to better handle the distribution and sale. Before using the package has to be decompressed ("expanded"), the location of their seats and made other necessary settings. To simplify installation were developed universal installation programs whose activities can be set using the configuration file, so the programmer does not have to change the setup program.

According to the installation parameters can be defined several types:

- Clean installation
- Attended installation
- Silent installation
- Unattended Installation
- Headless installation
- Automated installation
- Network installation

### A. Clean installation

The installation process does not affect unforeseen conditions which could cause a collision (such as the existence of files or settings from the previous installation of the same program due to repeated installations of the same program, or

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other circumstances that the creator did not foresee the installation process). An example might be a complete new installation of the operating system when the target disk (or partition) is formatted first and then will install on a blank disk and each operation is performed exactly as it was intended (of course do not enter into foreign influences, starting with the so-called . clear table).

#### B. *Attended installation*

It is a most common type of installation in operating systems based on MS Windows. This type of installation requires the presence of the user who will handle the entire process. Installation wizard offers the user a choice of acceptance / rejection of End User License Agreement (EULA) and the choice of installation location, set passwords, etc. Graphical user interface (GUI) wizard is now a matter of course.

#### C. *Silent installation*

Installation which during its trial does not showing any messages or windows. Silent installation is not the same as unattended installation (see below). All silent installations are unattended installations, but not all unattended installations are silent. This type of installation is running in the background without the user's knowledge. The reason may be the installation convenience, the installation process is busy and can fully concentrate on their business, or as tricked the user knows what is in his system installed. This method uses most of Malware.

#### D. *Unattended installation*

Installation that the installation process takes place without interaction with the user, or the user's presence is not required. Unattended installation does not require user to enter or otherwise provided all the necessary information for start of the installation process. All this information is already contained in any file which is part of installation source. These can be in the form of the command line or answer file.

#### E. *Headless installation*

It is performed without the use of a display device or even without the graphics card, which is not plugged into the computer on which the installation is performed. Installation can be performed from another PC connected via LAN or via the serial port.

#### F. *Scheduled installation*

It is also known as a planned installation. The installation process runs at a predetermined time, or generally under certain conditions. The normal installation process begins specifically at the initiative of the user. For example, a system administrator may want to install a newer version of the used software. It will be installed only if the software is not already in use. This event will start the installation process. Generally, this type of installation is commonly used in most operating systems. The operating system automatically installs drivers

for the connected device (plug and play).

#### G. *Network installation*

In this method, the installation process copies the files to the target directory from a shared network location. At this point, it may not always find the original installation files, but may also include a copy of your original installation media.

### III. ANALYSIS OF THE ENVIRONMENT, TOOLS AND POLICY

#### A. *Environmental analysis*

Corporate LAN is built on TCP / IP protocols and provides its users with all the basic network services (data, voice and Internet services). At the same time it is in compliance with security measures resulting from its primary function, which is the transmission of sensitive data (data about customers, manufacturing processes, etc.)

The clients, which are a total of 99, can be in the company divided into several groups. They further described in the following table (Table I). These groups have been established based on software specific clients, so even if the target client is located in production hall, but it is used to work with office programs, access control and so on, then this client is listed in the category "Office".

It is also important to determine what programs each group use and then build a software package.

Table I: List of clients groups

Nr.	Name	Count of clients	Description
1	Production	16	Clients placed in production halls, which is used for production quality control and reporting production
2	Office	50	Clients for standard office works (office SW, e-mail, ...)
3	Workstations	13	Clients with high performance for designers
4	Thin clients	11	Clients which allow connect to terminal server or CCTV
5	Others	9	Clients which is part of other device and need special attention

Another important information is the number and type of operating systems on individual clients (Table II) and of course the installed software.

Table II: List of operating systems

OS name	Version	Type	Count
Windows XP	Professional	32-bit	40
Windows XP	Professional	64-bit	1
Windows Vista	Home Premium	32-bit	1
Windows 7	Professional	32-bit	3
Windows 7	Professional	64-bit	30
Windows Embedded	Standard 7	32-bit	5

Given that many of the clients are already personalized, and there is large diversity of the installed software. Therefore, it was chosen only the SW, which has majority representation (Table III).

Table III: List of installed software

SOFTWARE	Overall	Groups				
		1	2	3	4	5
Abas	88	16	50	13	x	9
Adobe Reader	88	16	50	13	x	9
Aktion	50	1	25	24	x	0
Alvao monitoring agent	13	16	50	13	x	9
EMS	10	0	10	0	x	0
MS office 2007	35	16	17	0	x	2
MS office 2010	40	0	25	13	x	2
UGS NX	21	0	8	13	x	0
PLM Team Center	70	13	41	13	x	3
ProgeCad	25	0	23	2	x	0
RQM	26	6	16	2	x	2
Symantec Endpoint Protection	88	16	50	13	x	9
ultra VNC server	88	16	50	13	x	9
VLC player	15	0	15	0	x	0

Based on the environmental analysis was compiled list of software that is used to create the reference PC. It is important to emphasize that not always installed software on the PC is used. However the licenses are not wasted. All installed software uses network or floating licenses, and in some cases it is free software. The only exception is MS Office, which were purchased in bulk OEM license version of MS Office Home and Business 2010. This version of the software was pre-installed on the reference PC. Then the license key is inserted manually during final setting of PC and connecting it to the domain.

Although the analysis environment was defined a total of 5 groups, installation packages then the was created for only 2 groups. "Thin clients" and "Others" were excluded. "Thin clients" is used to connect terminal server and therefore is not need to install additional applications. Everything needed is already installed on the terminal server. The group "Others" includes a PC that came as part of other device (hardness tester, microscope, ...) and their management requires co-operation with the contractor of these devices. For groups "Production" and "Office" was due to the installed and used SW to merge.

#### Group 1 (workstation):

- Abas
- Adobe Reader
- Aktion
- Alvao monitoring agent
- EMS
- MS office 2010
- UGS NX
- PLM Team Center
- ProgeCad
- RQM
- ultra VNC server
- VLC player

#### Group 2 (office):

- Aktion
- Alvao monitoring agent
- EMS
- MS office 2010
- ProgeCad
- RQM
- ultra VNC server
- VLC player

#### *B. Windows automated installation kit*

The Windows Automated Installation Kit (Windows AIK) for Windows 7 is a set of tools and documentation designed to support automated configuration and deployment series of operating systems Windows 7 and Windows Server 2008.

Allows installation of Windows using the following tools:

- ImageX – A tool for capturing an image of Windows.
- DISM – Deployment image servicing and management tool allows configures and edit image.
- WindowsPE – Preinstallation Environment for creating image.
- USMT – User State Migration Tool transfer users' data and profiles.
- VAMT – Volume Activation Management Tool enables IT professionals to automate and centrally manage the volume activation process using an activation code MAK (Multiple Activation Key).

Windows AIK can be installed on the following systems:

- Windows Server 2003 Service Pack 2
- Windows Vista SP1
- Windows Server 2008
- Windows 7
- Windows Server 2008 R2

#### *C. Policy analysis*

In the company's IT policy is for automated unattended installations of operating system important these few points:

- Purchase of new IT equipment from the contractor.
- Purchase a PC of the same manufacturer - the same series
- Purchase a PC within the project - a larger delivery
- End of the technical support for the operating system MS Windows XP.

#### IV. TIME SAVINGS

At the beginning of this paper was mentioned that automatic unattended installation saves time. This type of installation is not ideal choice for a few computers, however, this cannot be considered as the rule. Even in small companies, where are only few computers, will find this type of installation used primarily in the emergency plan and recovery plan.

The entire process of automated unattended installation can be divided into four phases (Fig.1). It is not necessary to go through the whole process, but the last phase of the deployment image is enough. The problem comes it is necessary to deploy the image on the PC with different hardware (different manufacturer / model). In this case there are 2 options

1. Before capture image is important to remove all actually installed drivers in OS. After that operation run sysprep and prepare OS for capturing image.
2. Create new image of corresponding PC

The second option is suitable for larger companies with more PC of the same type (manufacturer / model), while the first option is suitable for smaller companies, where computers are acquired individually and majority even from another manufacturer.

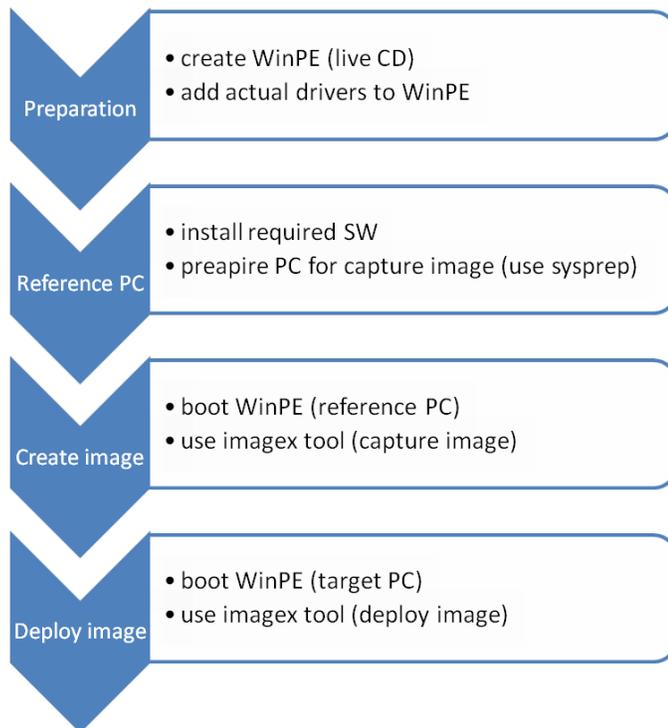


Fig. 1 Phases of automated unattended installation

For installing more PC is for the total time important downtime. So in addition to the time required to install each application must also add the a time when any new software is not installing During this time, the administrator changes the installation media, connecting or disconnecting peripherals and other connectors, etc. The total time for installation and setup of a PC from various groups is described in the following table (Table IV, Table V).

Table IV: required time for install and setting up PC from "workstation" group

SW	Time [min]
Abas	0:29
Adobe Reader	1:13
Aktion	5:36
Alvao monitoring agent	1:22
EMS	2:08
MS office 2010	11:47
UGS NX	18:03
PLM Team Center	41:39
ProgeCad	4:02
RQM	3:14
ultra VNC server	1:57
VLC player	2:21
Settings (PC name, domain, rebooting ...)	12:33
Downtime	3:31
<b>Overall time</b>	<b>110:55</b>

Table V: required time for install and setting up PC from "office" group

SW	Time [min]
Abas	0:29
Adobe Reader	1:41
Aktion	6:22
Alvao monitoring agent	1:59
EMS	2:36
MS office 2010	14:35
ProgeCad	7:18
RQM	4:46
ultra VNC server	4:07
VLC player	3:21
Settings (PC name, domain, ...)	13:01
Downtime	4:19
<b>Overall time</b>	<b>64:34</b>

Those tables show that for the installation and setup of 10 PCs from the group "workstation" IT administrator will need approximately 18h of pure time and for a group "office" is approximately 11h. During this time, he is fully engages only the installation and setup of the PCs. In real operation, which is needed perform other duties installation may take several days.

Table VI: required time for phase I and III

Operation	Time [min]
Install WAIK	2:33
Copy install source	1:02
Create winpe	1:58
Add required drivers	8:14
Use sysprep	0:46
Capture image	24:42
Downtime	2:37
<b>Overall time</b>	<b>41:52</b>

Table VII: required time for last phase – deploy image

Operation	Time [min]
Deploy image	1:44
Settings	15:23
Downtime	3:08
<b>Overall time</b>	<b>20:15</b>

For overall time, it is necessary add time of each phase (Table VI, Table VII), where the time of second phase for each group is presented in Tables 4 and 5 as the overall time. Then, when using automated unattended installation, is for installing and setting of 10 PCs from the group "workstation" is approximately needed 5.5 hours of pure time and for a group "office" less than 5h (Table VIII). Deploying image in real time takes about 30-50 min, but during this time, IT administrators can perform other activities.

Time savings in Kovárna VIVA, a.s. is described in the following table (Table VIII), where:

T<sub>1</sub> – standard installation of 10 PC

T<sub>2</sub> – automated unattended installation of 10 PC

Table VIII: time savings in Kovárna Viva, a.s.

Group	T <sub>1</sub>	T <sub>2</sub>	Saving time
Office	18	5,5	12,5
Workstation	11	5	6

## V. CONCLUSION

Due to the fact that the management of IT in the company Kovárna VIVA, a.s., is currently performed by one person (about 100 computers), it was decided to implement automated unattended installation of operating system. The aim of project was to analyze and propose appropriate solutions. The main requirements were minimal costs - the use of open source and other free tools and the ability to offline installation. As mentioned in section 3b as a suitable tool was selected WAIK from Microsoft. It is primarily used to create an answer file for unattended automated installation, which is also used for deployment. However, in the project were not used all the tools which this kit provides. Automated unattended installation is solved more like creating operating system backup image. Regard to the requirements of the project is deploying of an image solved by using WinPE. For make the process more automated and simplify the work of IT administrators was created a simple program (batch file).

In addition to significantly faster installation of new computers is also reduced errors when any software is not installed. This negatively affected the attitude of end users to the IT department. After successful implementation, user satisfaction was increased.

## APPENDIX

### Source code of batch file:

```
@echo off
title Windows 7 Deployment

echo
*****
echo.
echo Nastroj pro Windows 7 Deployment
echo urceno pro vnitřni potrebu spolecnosti Kovarna
Viva, a.s.
echo copyright 2013 Lukas Kralik
echo.
echo
*****
echo.

:: connecting to shared folder whit windows image
and necessary files
:: for succesfully connection is required password
for user bl_tpv
net use z: \\server2\share\wim /user:viva\b_ltpv

:: run diskpart tool to clear and prepare the disk
:: all commands for diskpart are saved in script.txt
which is stored in connected shared folder
diskpart /s script.txt

:: windows image selection
```

```
:choice
echo seznam dostupnych obrazu:
echo -----
echo.
echo 1 - Lenovo workstation
echo.
echo 2 - Lenovo worsktation_x64
echo.
echo 3 - Lenovo office
echo.
echo 4 - Lenovo office_x64
echo.
echo 5 - Fujitsu workstation
echo.
echo 6 - Fujitsu workstation_x64
echo.
echo 7 - Fujitsu office
echo.
echo 8 - Fujitsu office_x64
echo.
echo.

:: branching of batch file, if user enter wrong
character then windows image selection will repeat
set /p A=Zvolte image pro nasazeni:
if %A%==1 goto lenovo_w
if %A%==2 goto lenovo_w64
if %A%==3 goto lenovo_o
if %A%==4 goto lenovo_o64
if %A%==5 goto fujitsu_w
if %A%==6 goto fujitsu_w64
if %A%==7 goto fujitsu_o
if %A%==8 goto fujitsu_o64

:: error message
echo nespravny image, stiskem libovolne klavesy
opakujte volbu

pause

goto choice

:: apply choise nr. 1 on disk c
:lenovo_w
:: switch to disk z (connected shared folder) and
deploy image
z:
imagex /apply z:\lenovo_w.wim "System" c:

:: after finish deploying skip to end
goto end

:lenovo_w64
z:
imagex /apply z:\lenovo_w64.wim "System" c:
goto end

:lenovo_o
z:
imagex /apply z:\lenovo_o.wim "System" c:
goto end

:lenovo_o64
z:
imagex /apply z:\lenovo_o64.wim "System" c:
goto end

:fujitsu_w
z:
imagex /apply z:\fujitsu_w.wim "System" c:
goto end
```

```

:fujitsu_w64
z:
imagex /apply z:\fujitsu_w64.wim "System" c:
goto end

:fujitsu_o
z:
imagex /apply z:\fujitsu_o.wim "System" c:
goto end

:fujitsu_o64
z:
imagex /apply z:\fujitsu_o64.wim "System" c:
goto end

:: display message about rebooting PC and wait for
press any key then reboot
:end
echo pocitac bude restartovan
pause
exit

```

#### script text file:

```

select disk 0
clean
create partition primary size=80000
select partition 1
active
format FS=NTFS quick
create partition primary
select partition 2
format FS=NTFS quick
exit

```

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