

Tutorial to create and test automation scripts

1. Introduction:

One of the challenges in using the Emulation technique as a Digital Preservation strategy is that the future user will not have the ample knowledge to run the obsolete technology. Hence we create automation scripts that can automate the entire process of installing the software on an operating system without any intervention from the user. This document serves as a complete tutorial to write these scripts and test them.

2. The Setup:

VMware: Install VMware Workstation/Server on a Windows/Linux Machine with a Windows-XP Virtual Machine. Windows XP has a fantastic compatibility feature and can be successful in installing many obsolete software. You can download VMware Server for free from [VMware Server Download](#). To download VMware Workstation, you will need a registration key. Please contact Rob Henderson robh@indiana.edu to get the key and download it from [VMware Workstation Download](#). The Windows-XP Virtual Machine can be found at [//l/ks/VMWare/images.NOBACKUP/Windows-XP-Bare-Image](http://l/ks/VMWare/images.NOBACKUP/Windows-XP-Bare-Image) on spitz or troy. Use WinSCP or other ssh tools to logon to spitz or troy and copy the image to your local machine. Beware that this is a 10GB image and may take long time to copy, especially if used a wireless network. The steps to create a new virtual machine (VM) on a VMware Server and VMware Workstation can be found at [VMware Server setup](#) and [VMware Workstation setup](#) respectively. The machines 5ky2wh1, spitz, tendulkar and 5ld1wh1 in LH328 have VMware setup on them. Please remember to add multiple CD drives to the virtual machine to deal with multiple disc set images.

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VIRTUAL MACHINE DETAILS
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- SERVICE PROVIDER: VMware Server Console
- VIRTUAL MACHINE: Windows XP Professional
- USERNAME: iucs
- PASSWORD: vmware
- LOCATION ON MY COMPUTER:
 - C:\Virtual Machines\Windows XP Pro\Windows XP Professional.vmx
- LOCATION OF VM DESKTOP: C:\Documents and Settings\iucs\Desktop
- > IMPORTANT: Auto Log-in is to be enabled
 - See: <http://www.microsoft.com/windowsxp/using/setup/learnmore/tips/knox2.mspx>

-> IMPORTANT: Make sure to read the snapshot details.

-> NOTE: Few of these requirements are more suitable to Emulation Assistant but can be helpful in creating automaton scripts.

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ISO image: ISO image is an archive file for an optical disc. The CD-ROMs that contain the software or digital objects are converted to the ISO image using appropriate tools and these .iso files are mounted on the VMware virtual machine. MagicISO is software that can convert small discs to ISO image. It can be downloaded at [MagicISO install](#). While operating from the virtual machine, these ISO images just behave similar to the CD-ROMs. More details on the ISO image can be found [here](#). The digital objects that we experiment on are converted in bulk with help of a program and are assigned a 14-digit Bar Code. The ISOs are stored in appropriate folders under [//nfs/troy/raid](#) on spitz or troy. Access them using WinSCP or Putty.

AutoIt: Once VMware is ready with Windows XP virtual machine running on it, then install AutoIt from [here](#) on the virtual machine. AutoIt v3 is a freeware BASIC-like scripting language designed for automating the Windows GUI and general scripting. This [link](#) is a complete reference to AutoIt scripting.

Snapshot:

Install the international language pack on the virtual machine. To do this you will need a Windows XP Professional disc, please contact any Windows staff seated in Lindley Hall. Because there are many CDROM images that require international language like Chinese, Japanese etc for the set-up. To install an international language pack:

- a) Go to Start → Control Panel → Regional and Language options → Languages → Check “Install files for East Asian Languages” and click OK
- b) It then prompts to insert the Windows XP Professional disk. Insert the follow the instructions.
- c) Reboot the machine after you have finished installation.

Install Adobe Reader X on the virtual machine. Many CDROM installations need Adobe Reader to open the files. And Adobe Reader X takes long installation time. Hence it is a good idea to have Adobe Reader installed on the virtual machine.

The VMware Server has internet adapter settings that enable the web browser usage. AutoIt, Adobe can be downloaded on the virtual machine from the respective websites. In case you have difficulty using the browser, convert the executables into iso images and mount them on the virtual machine and then install.

Take a snapshot of the virtual machine at this point as shown in Fig 1.

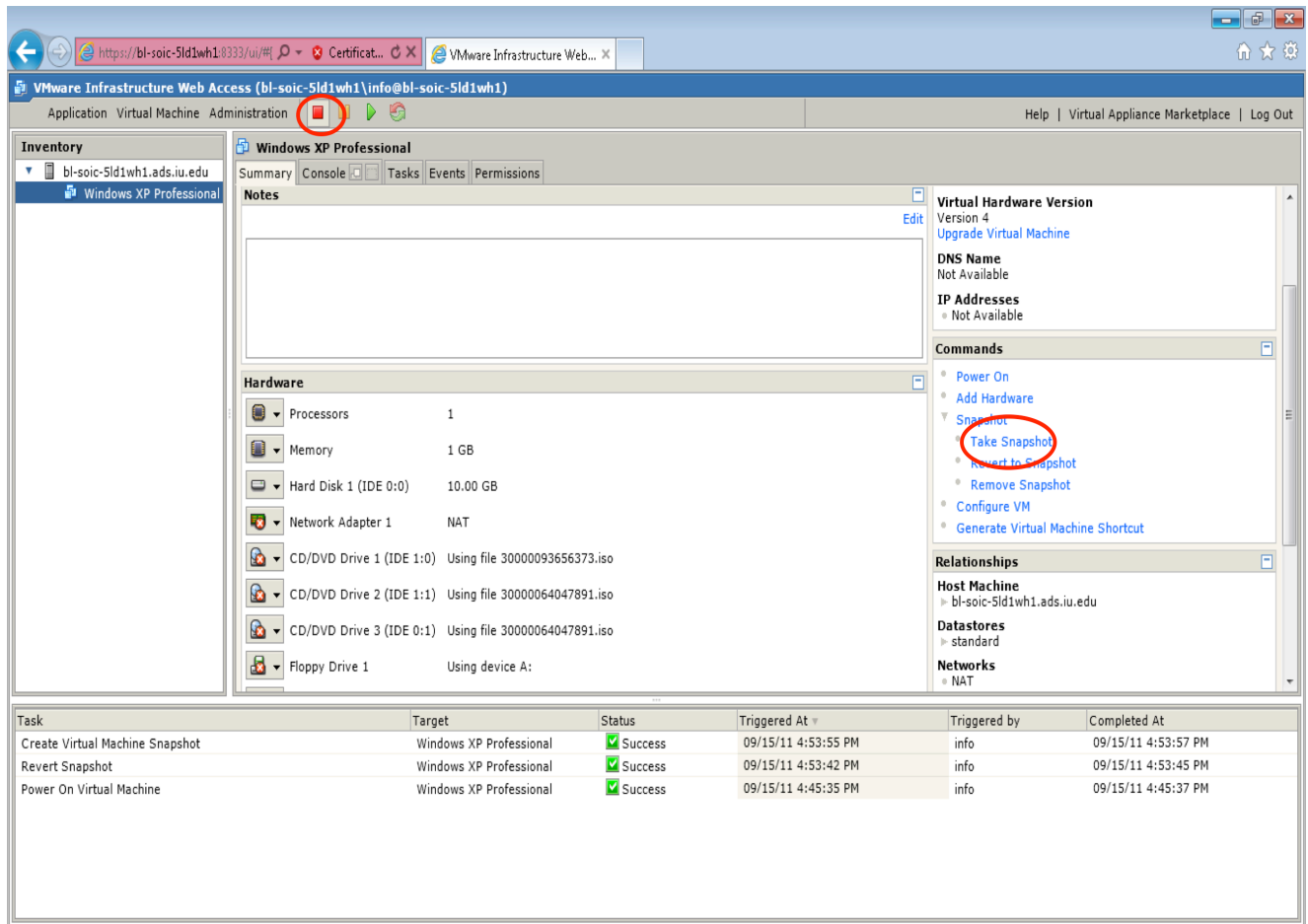


Fig 1: Snapshot details

CRUCIAL NOTE: Always take the snapshot when the virtual machine is in powered off state. If the machine is powered on, power it off and then take the snapshot.

This creates a baseline that has all the tools needed to create automation scripts. The snapshot feature helps to revert the changes back to the original snapshot in case anything goes wrong, so that we do not lose our initial setup. To revert the snapshot, click on the option “Revert the Snapshot” provided below the “Take Snapshot” option. The baseline snapshot can be modified anytime in future to include other software/tools just by taking a new snapshot. But it is important that we do not load our baseline with too many tools or software. Only add the tools those are mandatory and will enhance the emulation process.

3. Storage:

The ISOs along with their final install scripts and additional software are store on the AFS system at the path [//afs.iu.edu/public/sudoc/volumes](https://afs.iu.edu/public/sudoc/volumes) accessed through spitz or troy. AFS, stands for Andrew File System, is a distributed network file system. More details about the Andrew File

System and its installation are discussed in Emulation Assistant documentation. Fig 2 illustrates the layout of AFS archive.

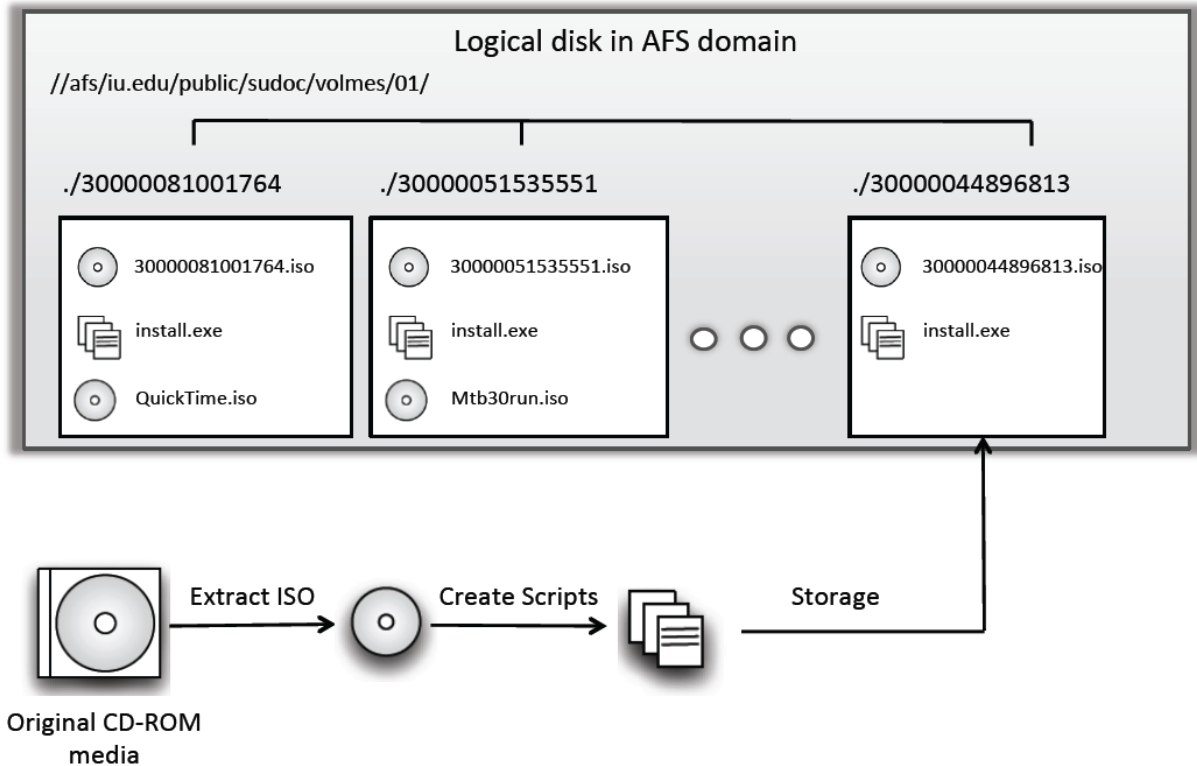


Fig 2: Organization of Virtual Archive

4. Scripting:

Before starting to write scripts, it is important that you do some research on the digital object like what additional software (Acrobat Reader, QuickTime, etc) are needed, what system settings need to be changed and so on. The best way to gather this information is to browse through the directories on the CD-ROM image or check the read-me files that are on the CD-ROM image. Use Autolt to write the scripts. Autolt has a special feature that can convert its au3 file to an executable (.exe) file that can run the script on any machine that does not have Autolt installed on it. So once you have the script a running successfully, convert the .au3 file to the executable file. One sample script is given below:

Example.au3

```
Run("D:\SETUP.EXE")
WinWait("Setup")
ControlClick("Setup", "", "Button1")
WinWait("", "successfully installed")
```

```

ControlClick("", "successfully installed", "Button1", "", 2)
WinWait("CD-ROM Delos")
ControlListView("CD-ROM Delos", "", "SysListView321", "Select", ControlListView
                ("CD-ROM Delos", "", "SysListView321", "FindItem", "Delos"))
ControlSend("CD-ROM Delos", "", "SysListView321", "{ENTER}")
WinWait("Delos Properties", "Shortcut")
WinClose("CD-ROM Delos")
ControlCommand("Delos Properties", "Shortcut", "SysTabControl321", "TabRight")
WinWait("Delos Properties", "Compatibility")
SendKeepActive("Delos Properties", "Compatibility")
Send("{TAB}{SPACE}")
ControlClick("Delos Properties", "Compatibility", "Button11")
ControlClick("Delos Properties", "Compatibility", "Button10")
Run("D:\WIN\DELOS.EXE")

```

Tips:

1. Autolt uses window titles or other information on the window to automate the installation. And it gets hard when the window names are easy to understand. Autolt Window Info is a nice feature of Autolt that can capture the entire window information.
2. Do not ignore autorun ISOs. The autorun.inf may fail under Windows XP. Write script to close all the windows opened by autorun and then run the actual setup file or executable on the ISO.

In general, most of the complexity of these scripts comes from handling special cases - for example, setting compatibility mode for older Windows programs. Consider the script above. The basic setup is accomplished within the first 6 lines. The remainder of the script is concerned with setting compatibility mode for the installed executable, and then running that executable. Few special cases are discussed below:

1) Run Windows in East Asian Language settings:

- a) Find the suitable language. This can be found in a separate documentation that is maintained with the ISO while converting the CD-ROM to its equivalent ISO image.
- b) Install East Asian Languages to support programs in Chinese, Japanese, Korean and other Asian languages. Other languages like German, French did not need any additional package.
- c) Go to Start → Control Panel → Regional and Language options → Languages → Check "Install files for East Asian Languages" and click OK
- d) It then prompts to insert the Windows XP Professional disk. Insert the follow the instructions.
- e) Reboot the machine after you have finished installation.

f) After rebooting, go to Regional and Language options → Regional Options and you can select the required language and it will work.

2) Freeing 3MB Virtual Memory:

- a) Control Panel → System → Advanced → (performance) Settings → Performance Options → Advanced → click Change → check No paging file → click Set → click OK
- b) Restart the machine.

3) Display settings for 16 bit color quality:

- a) Go to Control Panel → Display → Settings → Color Quality → select Medium (16 bit) → click Apply → Monitor Settings → Click Yes → click Ok.

4) Compatibility Mode:

- a) Right Click on the file that you wish to open in compatibility mode and click Properties.
- b) Go to Compatibility option and check “Run this Program in compatibility mode for:” and select the right option from the provided list of operating systems.
- c) Click Apply and then OK.

5) Allocate extended memory(XMS)

- a) Go to C:\Windows\system32, right click on command.com and go to Properties → Memory.
- b) Set Expanded (EMS) memory and Extended (XMS) memory to 16384.
- c) Go to Misc and uncheck Alt+Space, Alt+Esc and Alt+Enter and Click Ok
- d) Run the program from command.com prompt.

Restarting the virtual machine is a special case too. Many of these complicated scripts that managed the intricate requirements of the software have been found to be very useful and re-used in several installation scripts. So we maintain a catalog of these useful scripts and a separate catalog for external software ISOs that has the installers for software like QuickTime (various versions) or any other obsolete software that is hard to find today.

Dealing with Multiple ISOs:

The digital objects may be published on multiple CD-ROMs where there are cross-disk dependences. For example, a program on one image might require access to a file on another image. As discussed earlier, VMware supports multiple disc drives, so mount all the disks at one time on the VMware Server/ Workstation. Similar strategy can be applied to install additional software that is not present on the CD-ROM image.

5. Testing:

Once the automation scripts (.exe) are ready and paired up with their ISOs and additional software ISOs as shown in Fig 2, then test them using emulation assistant. The details can be found in the document for “Emulation Assistant”. If the scripts work fine with Emulation Assistant, then they are ready to be moved to afs directory.

6. Documentation:

Creating and testing the scripts reveal so much information about the digital objects, primarily to evaluate time-based costs. Hence it is important that we document every minute detail while we work on the CD-ROM image. To facilitate this, fill in the following details and put this readme file along with the ISOs and the script (.exe file).

- 1) CD Bar Code
- 2) Title
- 3) Government or Commercial
- 4) Language
- 5) Genre
- 6) Special Cases
- 7) Publication Date
- 8) Operating System
- 9) Additional Software Required
- 10) Method followed to install the additional software
- 11) Time taken to autoit the entire installation
- 12) Reasons (if more time involved)

If any ISO turns out to be bad, in the sense that the software does not run on the Windows XP machine, then document as follows:

- 1) CD Bar Code
- 2) Title
- 3) Issues
- 4) What can be done?
- 5) What has been done?
- 6) Final Status of ISO– Good/Bad

7. Bibliography

- 1) <http://svp.soic.indiana.edu/svp/> - database containing governmental digital objects

- 2) <http://downloads.vmware.com/d/details/server202/dCpiZCVqdGJkZWRq>. - VMware Server Download
- 3) http://downloads.vmware.com/d/details/wkst_714_win/ZGoIYnR0akBiZGh0Kg - VMware Workstation Download.
- 4) http://www.basicconfig.com/create_new_virtual_machine_vmware_server - VMware Server setup
- 5) http://www.vmware.com/support/ws55/doc/ws_newguest_setup_simple_steps.html - VMware Workstation setup
- 6) <//l/ks/VMWare/images.NOBACKUP/Windows-XP-Bare-Image> – path for Virtual Machine on spitz or troy
- 7) <http://www.microsoft.com/windowsxp/using/setup/learnmore/tips/knox2.mspx> - Auto-login enable on Windows
- 8) <http://www.magiciso.com/download.htm> - MagicISO download
- 9) http://en.wikipedia.org/wiki/ISO_image - Documentation for Magic ISO
- 10) <//nfs/troy/raid> – path to find ISOs whose installation needs to be scripted
- 11) <http://www.autoitscript.com/site/autoit/downloads/> AutoIt download.
- 12) <http://www.autoitscript.com/autoit3/docs/> - AutoIt complete reference.
- 13) <//afs.iu.edu/public/sudoc/volumes> – AFS storage
- 14) <link for useful au3>
- 15) <link for useful ISOs>
- 16) <other links if any>