

DIGITAL FORENSICS LAB SERIES

Lab 13: User Profiles and the Windows Registry

Objective: System and Device Profiling and Analysis

Document Version: 2015-09-28



This work by the National Information Security and Geospatial Technologies Consortium (NISGTC), and except where otherwise noted, is licensed under the Creative Commons Attribution 3.0 Unported License.

Development was funded by the Department of Labor (DOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant No. TC-22525-11-60-A-48; The National Information Security, Geospatial Technologies Consortium (NISGTC) is an entity of Collin College of Texas, Bellevue College of Washington, Bunker Hill Community College of Massachusetts, Del Mar College of Texas, Moraine Valley Community College of Illinois, Rio Salado College of Arizona, and Salt Lake Community College of Utah.

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties or assurances of any kind, express or implied, with respect to such information, including any information on linked sites, and including, but not limited to accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability or ownership.

Contents

| Introduction | 3 |
|---|----|
| Objective: System and Device Profiling and Analysis | 3 |
| Lab Topology | 4 |
| Lab Settings | 5 |
| 1 Obtaining a Live Windows XP Registry | 6 |
| 1.1 Placing data to be tracked | 6 |
| 1.2 Using FTK® Imager | 10 |
| 1.3 Conclusion | 13 |
| 1.4 Discussion Questions | 13 |
| 2 Analyzing the Registry Hives using RegViewer | 14 |
| 2.1 Examining a User's Profile | 14 |
| 2.2 Tracking a User's Behavior | 19 |
| 2.3 Exploring the SAM file | 24 |
| 2.4 Exploring the System Registry Hive | 28 |
| 2.5 Examining the SECURITY Hive | 33 |
| 2.6 Exploring the Software Hive | 36 |
| 2.7 Conclusion | 39 |
| 2.8 Discussion Questions | 39 |
| Analyzing the Registry Hives using RegRipper | 40 |
| 3.1 Using RegRipper | 40 |
| 3.2 Conclusion | 43 |
| 3.3 Discussion Questions | 43 |
| Poforoncos | 11 |

Introduction

In this lab, the student will capture the registry hives of the Windows operating system using a free, commercial tool called FTK Imager. Students will then analyze the registry hives using two open source tools, RegRipper and RegViewer.

This lab includes the following tasks:

- 1. Obtaining a live Windows XP registry
- 2. Analyzing the Registry hives using RegViewer
- 3. Analyzing the Registry hives using RegRipper

Objective: System and Device Profiling and Analysis

Performing this lab will provide the student with a hands-on lab experience meeting the **System** and Device Profiling and Analysis Objective:

The candidate will demonstrate an understanding of the Windows Registry structure, and how to profile Windows systems and removable devices.

The Windows Registry contains all of the settings for a system. Everything from the application software that is installed to usernames and passwords are tracked in the registry. The devices that are connected to the system, connections to networks, and browser history are just a few of the many settings that the registry keeps track of.

Windows incorporates a tool called regedit (registry editor) to allow an administrator to directly change the settings within the registry. However, the regedit tool does not allow detailed analysis of the registry because it masks important information--even the administrator of the system is limited. Open source tools go beyond the capabilities of the utilities included within the Windows environment. In this lab, we will take a look at the information that can be gathered from the registry hives in the Windows XP registry. Information can be gathered manually as well as automatically.

FTK Imager – FTK Imager allows you to image a disk or a logical drive.

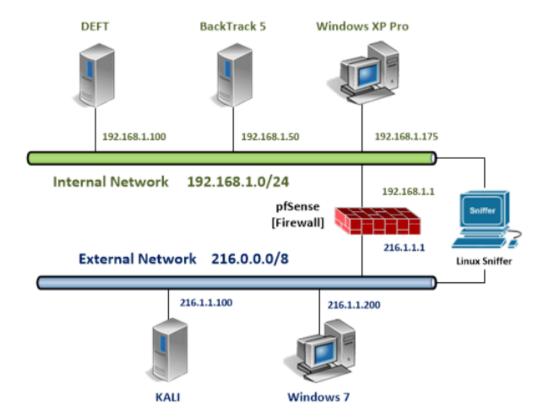
RegViewer – A registry analysis tool that can open Windows Registry files. The free tool can be downloaded from this link: http://www.gaijin.at/en/getitpage.php?id=regview

RegRipper – A tool that extracts and analyzes registry information.

Regedit – A built in program that for viewing registry keys on the Windows operating system

Windows Registry – A database that contains user and computer settings for a Windows OS.

Lab Topology



Lab Settings

The information in the table below will be needed in order to complete the lab. The task sections below provide details on the use of this information.

| Virtual Machine | IP Address | Account (if needed) | Password (if needed) |
|---------------------------------|---------------|------------------------|-------------------------|
| Windows XP Pro Internal Machine | 192.168.1.175 | | |

1 Obtaining a Live Windows XP Registry

The first task requires us to use the system, so that our usage is tracked. Once our footprint is made, we will obtain a copy of the Windows Registry from the system that is running Windows XP and is using the registry to provide the system environment. This method gives you a snapshot of the current registry state.

1.1 Placing data to be tracked

We will access the web and file system as a normal user. This will create the opportunity for traces of our actions to be found while performing the later tasks of this lab.

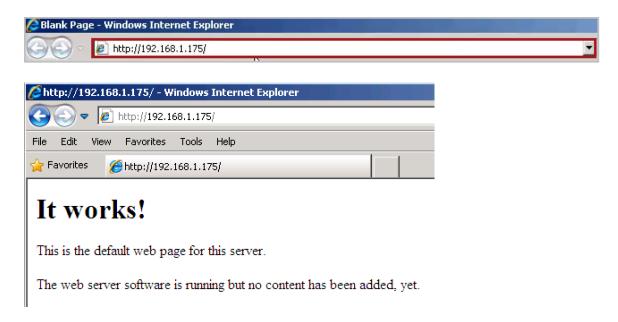
1. On the **Windows XP Pro machine**, open Internet Explorer by double-clicking the **Internet Explorer** launch icon on the desktop.



2. In the Set Up Windows Internet Explorer 8 popup window, click on the **Ask me** later button.



3. In the Internet Explorer address bar, type the URL http://192.168.1.175, then press the Enter key.



4. Again, in the Internet Explorer address bar, type **yahoo.com** (without the http protocol) and then press the **Enter** key. Notice that the "Internet Explorer cannot display the webpage" message appears.

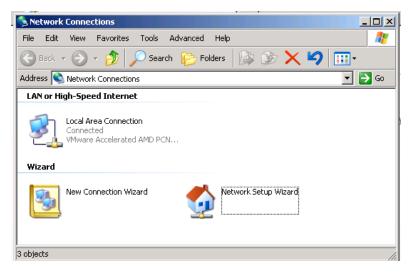


5. Click on the Windows Start button and select Run...



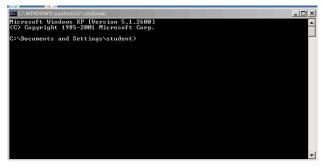
6. In the Run dialog box, type ncpa.cpl, then click OK.





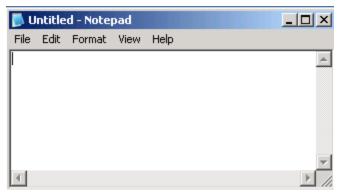
7. In the Run dialog box type cmd.exe, then click OK.





8. In the Run dialog box type **notepad.exe**, then click **OK**.

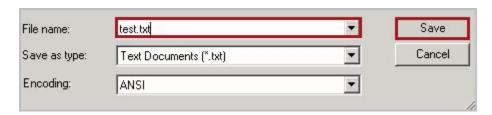




9. In Notepad text area, type **Test Doc**.



10. Now depress **Ctrl+S** to save the text doc as **test.txt**. Click the **Save** button. Close all open windows.



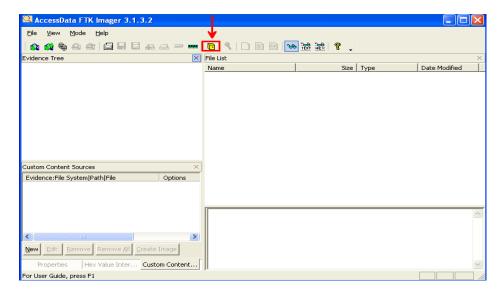
1.2 Using FTK[®] Imager

FTK® Imager is installed on the Windows XP Professional machine.

1. Open FTK® Imager by double-clicking the shortcut on the desktop.



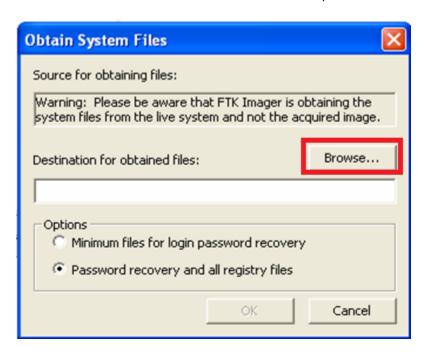
2. Click the Golden locker icon on the FTK® toolbar to obtain the System Registry files.



 At the Obtain System Files screen, choose the Password Recovery and all registry files option (To obtain a full registry including the NTUSER.dat file). The Minimum files for password recovery will only provide access to the SAM and Security hives.



4. To choose the destination for the obtained files, click the **Browse** button.



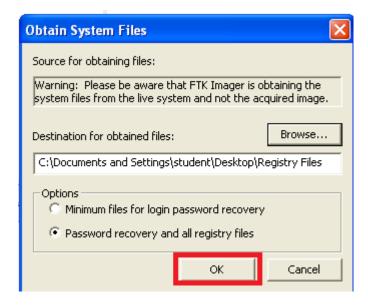
5. Select the **Desktop** from the browser window.



6. Click Make New Folder and name the folder Registry Files. Click OK.



7. Click **OK** again to capture the registry files.



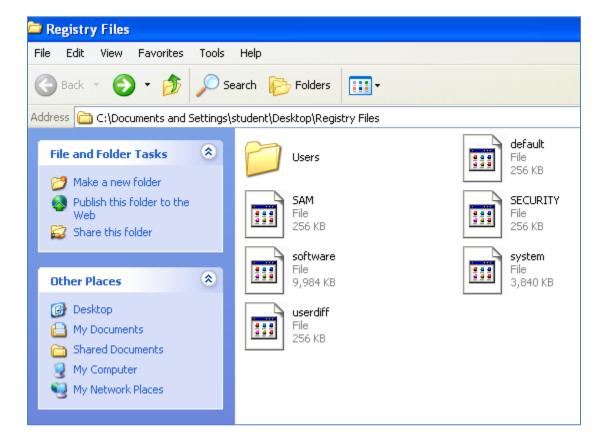
8. FTK imager will provide you with a status bar indicating the export progress.



9. Close FTK Imager by clicking the X in the top-right corner of the program.



10. Open the **Registry Files** folder on the desktop. There are 6 registry files and a folder. Close the folder after viewing.



1.3 Conclusion

Each registry key holds information we can explore about the computer. In the **Users** folder, all users on the machine and their profiles are captured. Within each of the users' profiles, there is a file, NTUSER.dat. The NTUSER.dat file provides information about a user.

1.4 Discussion Questions

- 1. What are the names of the main registry files?
- 2. Where are the registry files located on a Windows machine?
- 3. What does each registry file contain?
- 4. What button is used to export the registry files within FTK Imager?

2 Analyzing the Registry Hives using RegViewer

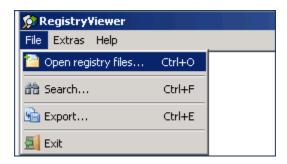
Registry Viewer opens Windows Registry files in a file structure that is similar to the regedit tool. Folders, keys, and values can all be searched for information. The free tool can be downloaded from this link: http://www.gaijin.at/en/getitpage.php?id=regview

2.1 Examining a User's Profile

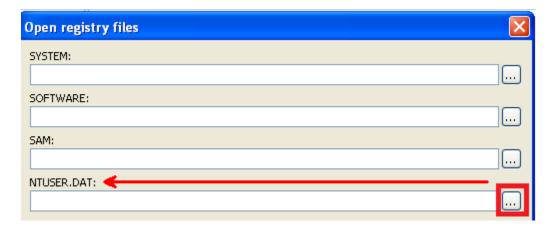
1. Double-click the **RegView** shortcut icon on the desktop.



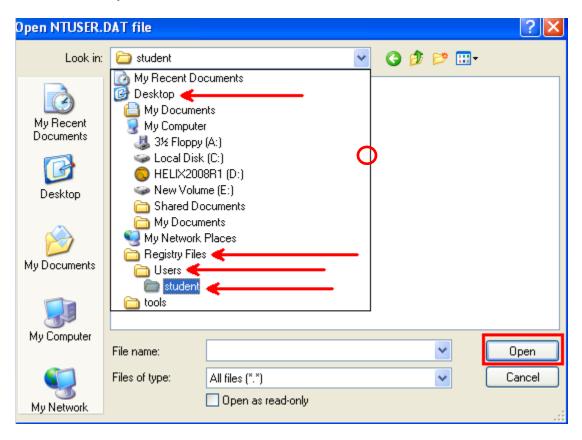
2. To examine a user's profile, select **File > Open registry files.**



3. In the Open registry files box, click on the browse icon for **NTUSER.DAT.**



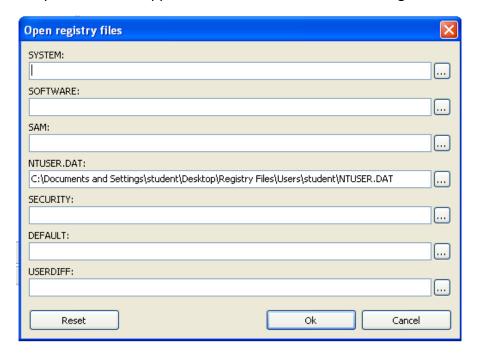
4. Navigate to **Desktop > Registry files.** Double-click on the **Users** folder and select **student**. Click **Open**.



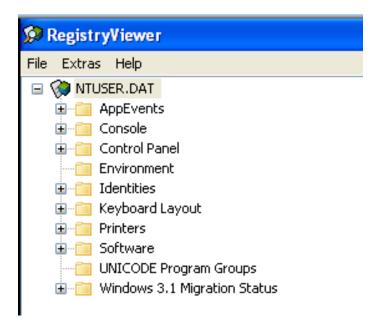
5. Within the **student** folder, select the **NTUSER.DAT** file and click **Open**.



6. The path of the file appears under the NTUSER.DAT heading. Click OK.

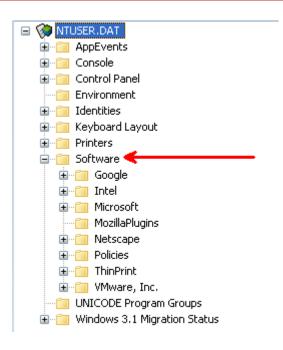


7. You are now examining the user's profile on the machine. This view is not normally seen on a running machine. We will look at some common artifacts in this user's profile.

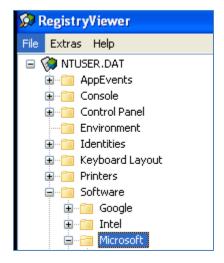


8. We will start with any URLs that the user browsed to in Internet Explorer. Click on the + symbol next to the **Software** folder.

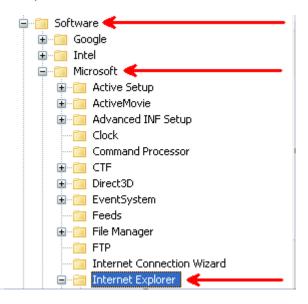
Be aware that the Window's registry does *not* track Firefox or Chrome browsing history.



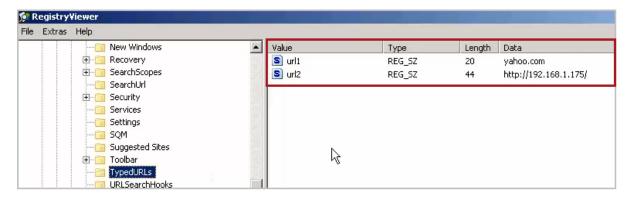
9. Click on the + symbol for Microsoft.



10. Next, under the category of Software, click on the + next to **Internet Explorer** to expand.



11. Next, click **TypedURLs** under **Internet Explorer**. This user has typed 2 URLs into the Internet Explorer URL bar. The registry records up to 25 entries with the latest URL appearing at the top of the list.

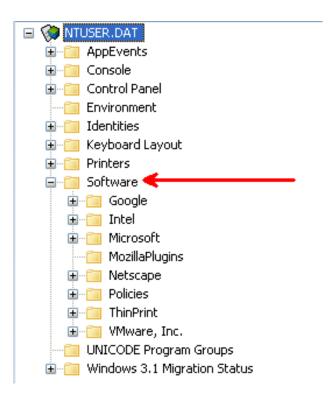


2.2 Tracking a User's Behavior

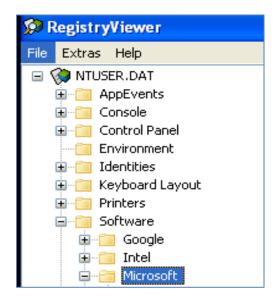
To track whether a user has used the **Open** and **Save As** dialog boxes for Windows utilities, look at the **Most Recently Used (MRU)** value in the ComDLG32 (Common Dialog).

1. Expand the following: Click on the + symbol next to the **Software** folder.

Note that steps 1 and 2 were done previously.



2. Clicking the + symbol for Microsoft.



3. Next, expand Windows.



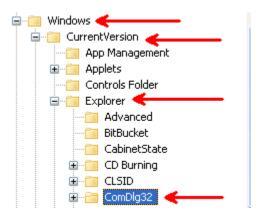
4. Under the Windows folder, expand the CurrentVersion folder.



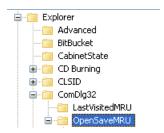
5. Under the **CurrentVersion** folder, expand the **Explorer** folder.



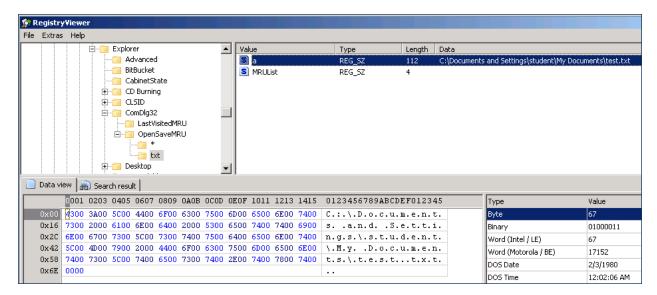
6. Under the **Explorer** folder, expand the **ComDLG32** folder.



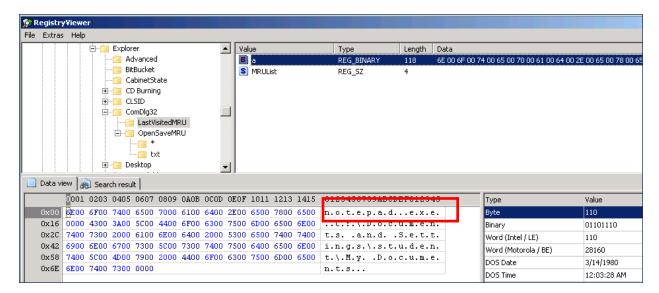
7. Under the **ComDLG32** folder, expand the **OpenSaveMRU** folder.



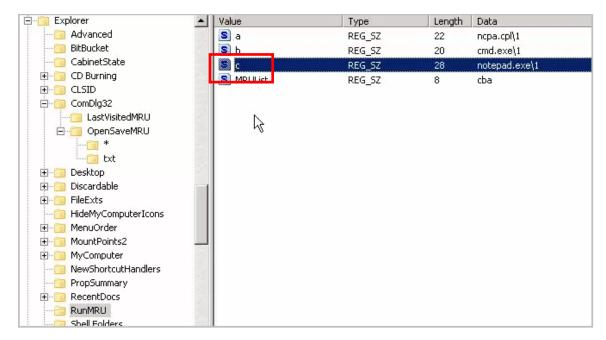
8. Under OpenSaveMRU folder, click the txt folder. Highlight the value **a** on the right to show the last "open" the user performed. This shows that the last "open and save" action that the user performed was on the **test.txt** document.



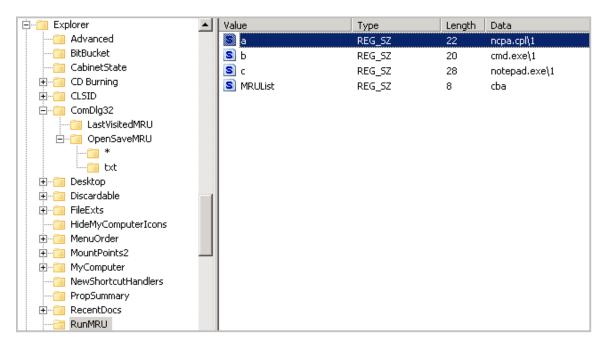
9. Under the ComDLG32 folder, click the LastVistedMRU folder. Highlight the value **a** on the right to show the program used, in this case notepad.exe.



10. Under the Explorer folder, click on the RunMRU folder. To examine the last command run from the Start > Run dialog box, click on c to look at the data value. The command notepad.exe was the last command entered in the Start > Run dialog box.



11. Highlight **a**. The **ncpa.cpl** command, which opens the network connections dialogue box, was also run on the system. This registry key tracks up to 26 entries.



12. Close the Registry Viewer program so the information from NTUSER.dat will be cleared.

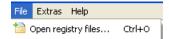
2.3 Exploring the SAM file

The SAM Registry file holds all the account information for the users of the computer.

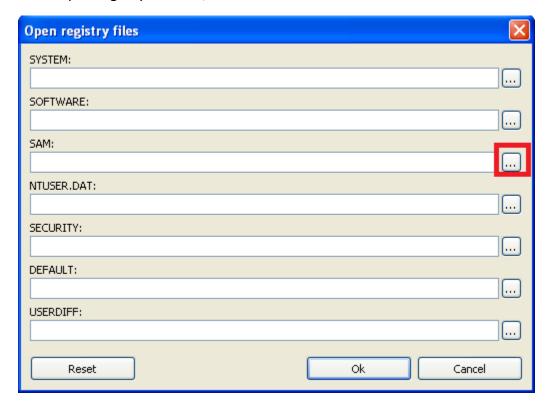
1. Double-click the **RegView** shortcut icon on the desktop.



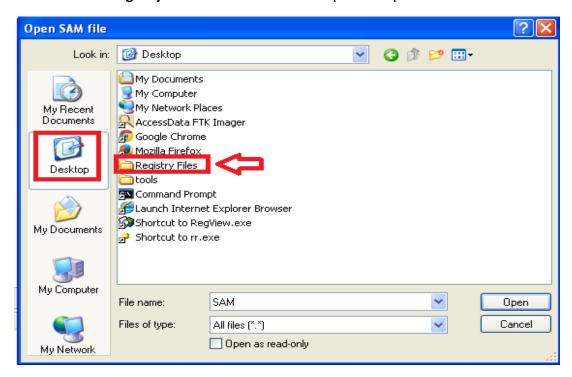
2. To examine a user's profile, select File > Open registry files.



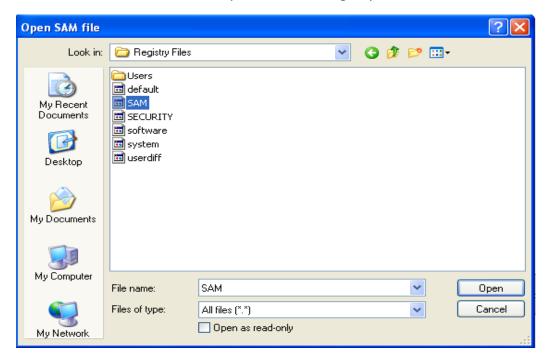
3. In the Open registry files box, click on the browse icon for SAM



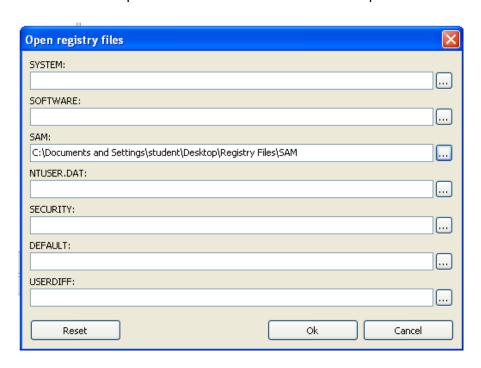
4. Browse to the Registry Files folder on the Desktop. Click Open.



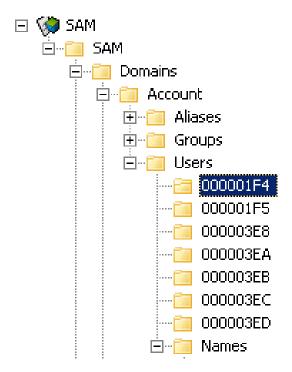
5. Double-click on the **SAM** file to open the file in Registry Viewer.



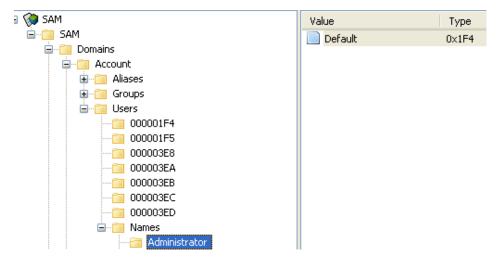
6. Examine the full path to the SAM file and click OK to open the file.



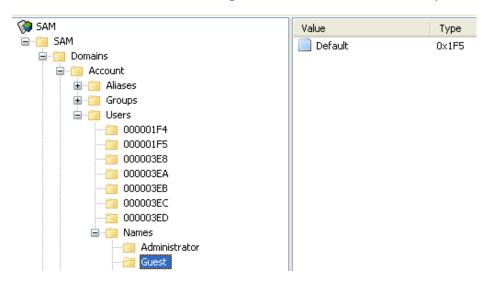
7. Expand the + sign next to the **SAM** folder, **Domains, Account, Users,** and finally **Names**. Both the Relative Identifier (RID), a unique, sequential value assigned by Windows to each account, and the user name is shown. If an account is deleted, there is a gap in numbering. The system does not reuse RID values. The first RID value is **000001F4**.



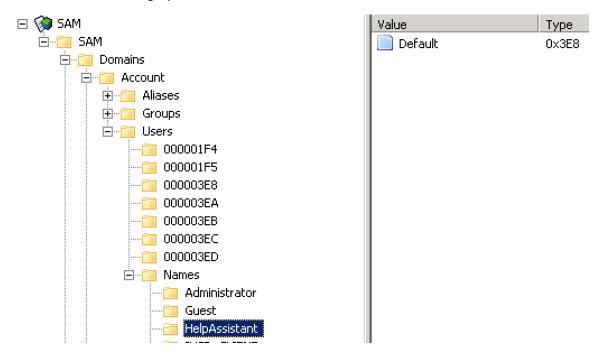
8. Click on the Administrator account under the Names folder and notice that the hex value is 000001F4, which equals 500 in decimal. This is the default RID, or Relative Identifier, value for the Administrator account. The Administrator account always has a value of 500.



9. The next RID hex value is 000001F5, which equals 501 in decimal and is the Guest account. User accounts begin with 000003 such as the HelpAssistant.



10. HelpAssistant is the first user account and has a hex value of 000003E8 (1000 is the decimal equivalent). Follow the sequence of user accounts created. If an account were deleted, there would be a missing number.



11. Close the RegView program.

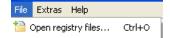
2.4 Exploring the System Registry Hive

The System Registry hive holds all of the computer startup parameters, device driver configurations, OS behavior, and hardware configurations.

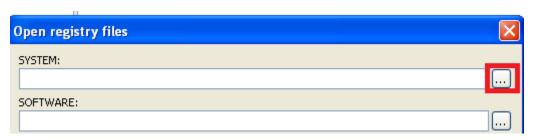
1. Double-click the **RegView** shortcut icon on the desktop.



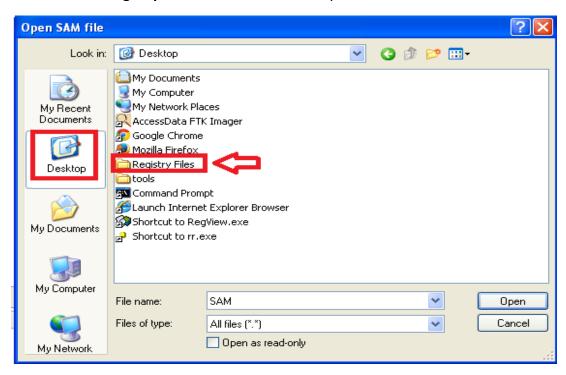
2. To examine a user's profile, select **File > Open registry files.**



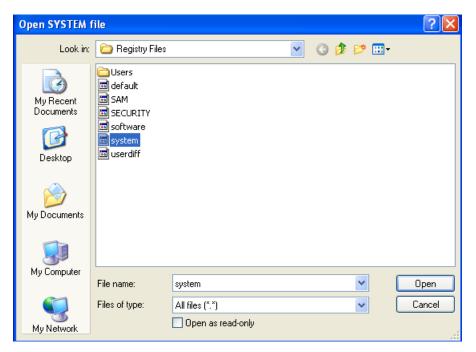
3. In the Open registry files box, click on the browse icon for SYSTEM.



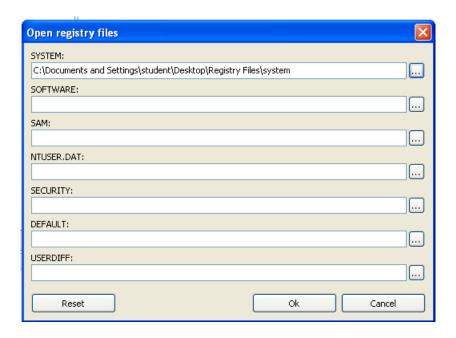
4. Browse to the **Registry Files** folder on the Desktop.



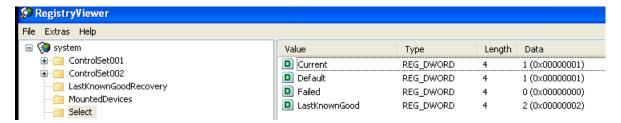
5. Double-click on the **system** file to open the file in Registry Viewer.



6. Examine the full path to the SYSTEM file and click **Ok** to open the file.

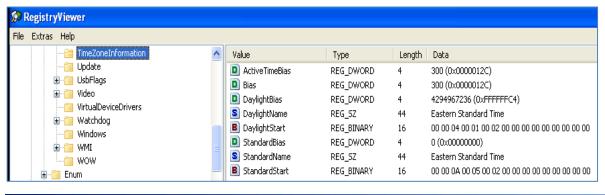


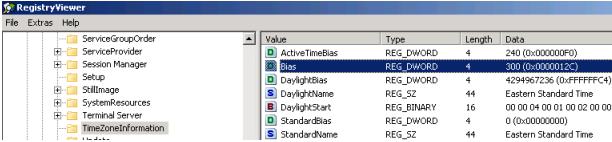
7. Choose the **Select** folder located under system. View the entry for Current in the right pane, which will show the control set that was active when the machine was running and the registry was captured. The value of one for **Current** indicates that **ControlSet001** was the active configuration.



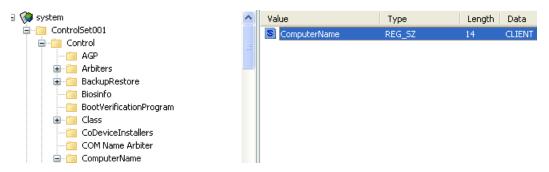
8. Click the + sign next to the CurrentControlSet01 folder to expand. Click the + sign next to the **Control** and navigate down to **TimeZoneInformation**. This machine was set to **Eastern Standard Time** with a Bias value of 300. Bias measures the difference in minutes from Coordinated Universal Time, or UTC time. In this case, the Bias is 300 minutes or +5 hours. Therefore, the time is UTC +5. Time zone information can be critical in computer forensic cases, since the investigator will often establish a timeline of events.

The current time zone for the machine is a very important value to capture, in order to determine the time zone the machine was set to use.

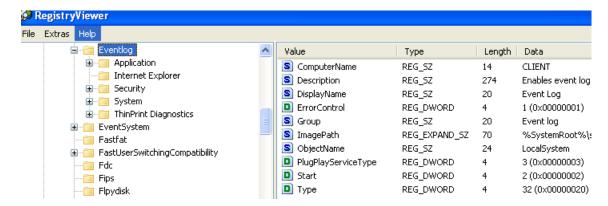




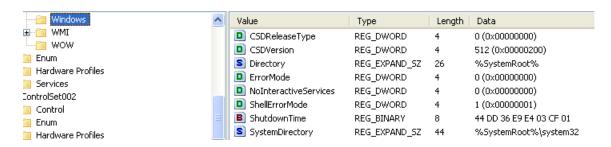
 For ControlSet001, drill down through Control > ComputerName > ComputerName to identify the system's Computer Name.



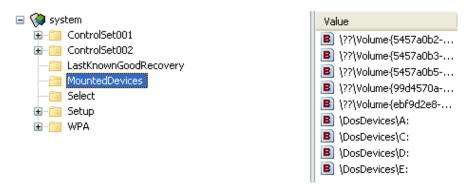
10. A second location to find the computer name on a Windows XP machine is the value of ComputerName in **ControlSet001\Services\Eventlog\.**



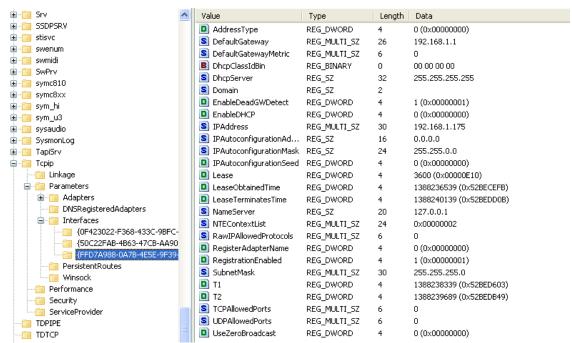
11. Find out when the machine was last shutdown by expanding **ControlSet001\Control\Windows**. The Shutdown Time value is a 64-bit value that is interpreted in the lower part of RegistryViewer as UTC time.



12. To view the devices that were mounted on the machine, select the **MountedDevices** folder. The standard drive letters, A, C, D, E and the volume headers for each are displayed.



13. To find out how the machine is configured for TCP/IP, go to ControlSet001 > Services > Tcpip > Parameters > Interfaces. Look through each interface for any network data.



14. Close the RegistryViewer program so the SYSTEM Registry file is no longer displayed.

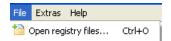
2.5 Examining the SECURITY Hive

The SECURITY hive stores local security policies including User rights, password policy, user account memberships, a link to the SAM file for updates, and a user interface through User Manager.

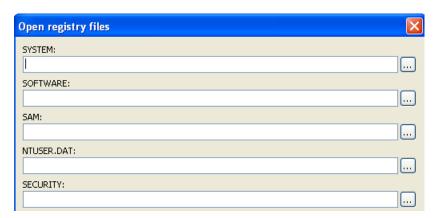
1. Double-click the **RegView** shortcut icon on the desktop.



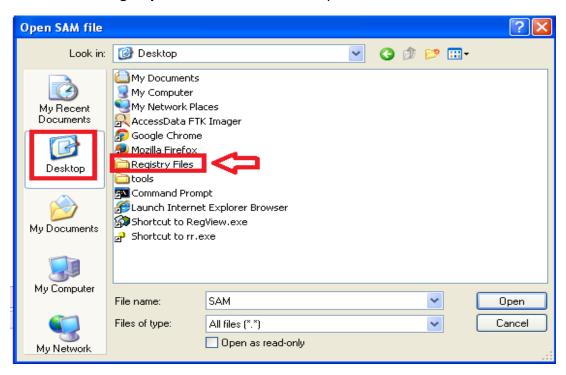
2. To examine a user's profile, select File > Open registry files.



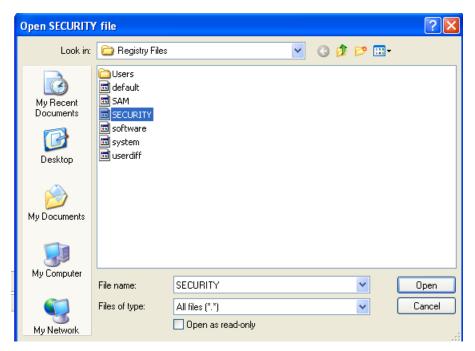
3. In the Open registry files box, click on the browse icon for SECURITY.



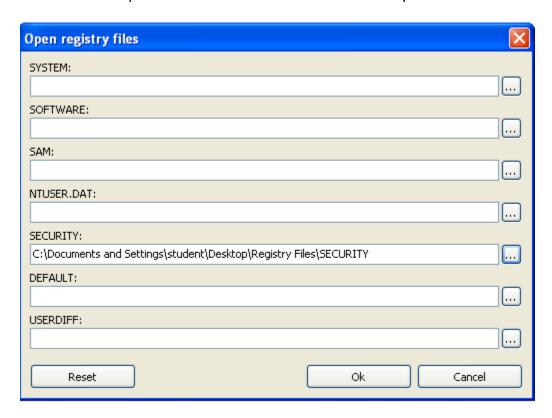
4. Browse to the **Registry Files** folder on the Desktop.



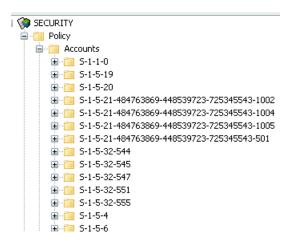
5. Double-click on the **SECURITY** file to open the file in Registry Viewer.



6. Examine the full path to the SECURITY file and click **Ok** to open the file.



7. Expand Policy, then Accounts. Notice the account ending in 501, which is for the Guest account.



8. Close the RegistryViewer program so the SECURITY Registry file is no longer displayed.

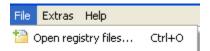
2.6 Exploring the Software Hive

The Software hive stores information about installed software, per-computer settings for each user, file extension associations, and user and operating system information.

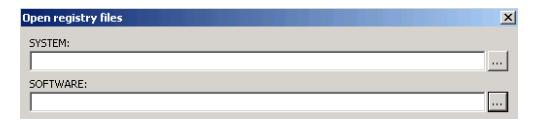
1. Double-click the **RegView** shortcut icon on the desktop.



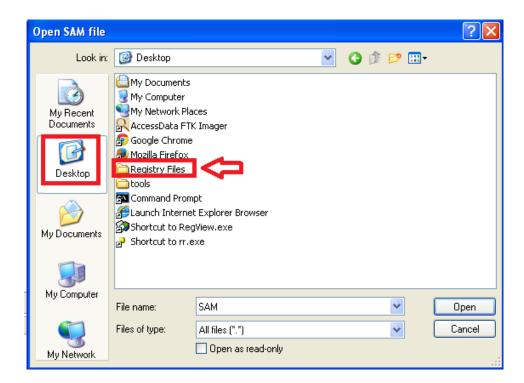
2. To examine a user's profile, select **File > Open registry files.**



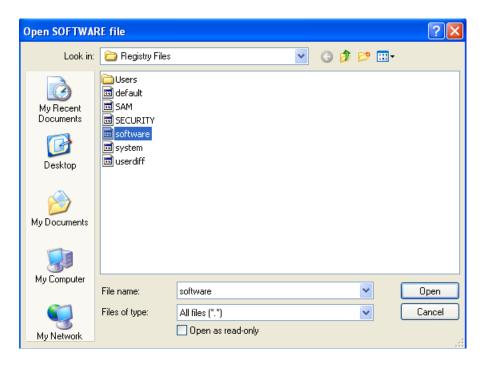
3. In the Open registry files box, click on the browse icon for **software**.



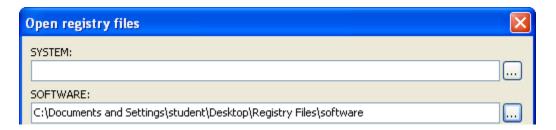
4. Browse to the **Registry Files** folder on the Desktop.



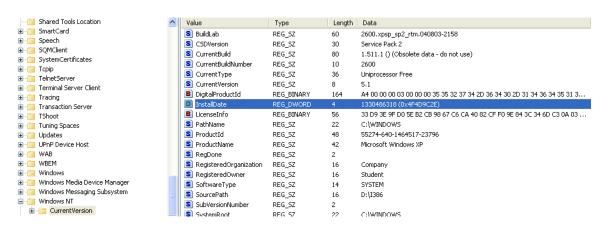
5. Double-click on the **software** file to open the file in Registry Viewer.



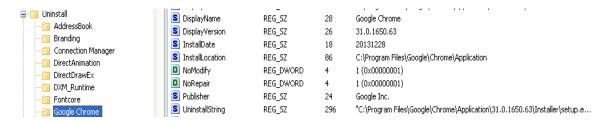
6. Examine the full path to the SOFTWARE file and click Ok to open the file.



 To identify the operating system and the time and date of installation, go to Microsoft > Windows NT > CurrentVersion. The install date needs to be converted using a decode program, since it is a Windows 64-bit hex code.



The Uninstall subkey lists all of the install locations for applications. Expand
 Microsoft > Windows (not Windows NT) > CurrentVersion > Uninstall to view these locations.



9. Each drive letter can be assigned a recycle bin within Windows. We can also verify if a user changed the properties of the recycle bin. For example, users can set files to bypass the recycle bin and just delete an item without recording it in the recycle bin. Drill down through Microsoft > Windows > CurrentVersion > Explorer > BitBucket > NukeOnDelete. The key will be set to 1 if the system is bypassing the recycle bin.



10. Close the Registry viewer

2.7 Conclusion

The Windows Registry is a database. Each registry key holds information we can explore about the computer. Within each of the users' profiles, there is a file, NTUSER.dat. The NTUSER.dat file provides information about a user. The SAM Registry file holds all of the account information for the users of the computer. The System registry hive holds all of the computer startup parameters, device driver configurations, OS behavior, and hardware configurations. The SECURITY hive stores local security policies including user rights, password policy, user account memberships, a link to the SAM file for updates, and a user interface through User Manager. The Software hive stores information about installed software, per-computer settings for each user, file extension associations, and user and operating system information.

2.8 Discussion Questions

- 1. What type of information can be located in the SAM registry key?
- 2. What type of information can be located in the SOFTWARE registry key?
- 3. What type of information can be located in the NTUSER.DAT registry key?
- 4. What type of information can be located in the SYSTEM registry key?

3 Analyzing the Registry Hives using RegRipper

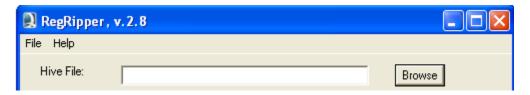
RegRipper is an open source tool that parses each registry file and creates a report detailing values that are found within several subkeys based on plugin modules. In Task 2, we searched the registry manually; in this task, we'll see how RegRipper automates this process.

3.1 Using RegRipper

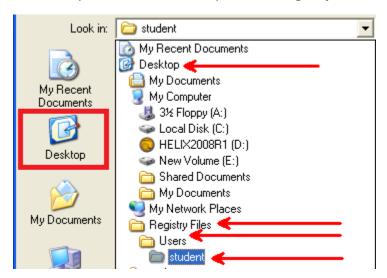
1. On the desktop, double-click the shortcut for **rr.exe** to open Registry Ripper.



2. Click the Browse button next to Hive File to search for the NTUSER.DAT file



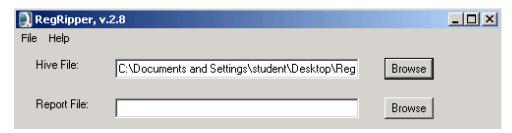
3. In the left pane, click on Desktop. Select Registry Files folder > Users > student.



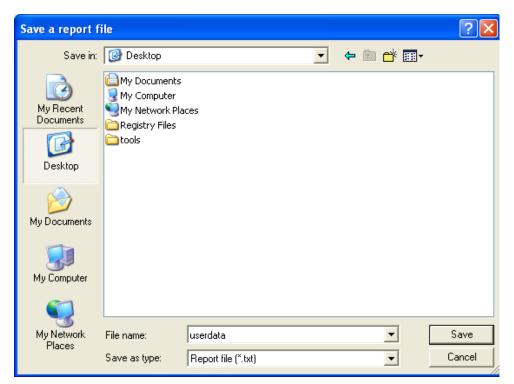
4. Double-click on the NTUSER.DAT file.



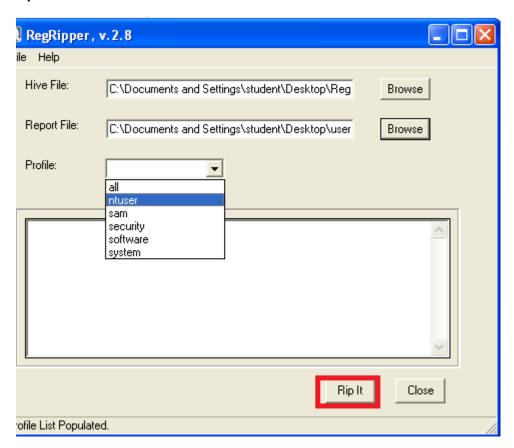
5. Click on the **Browse** button next to Report File to specify the save location and file name for the report file.



6. Browse to the desktop and name the output file userdata. Click Save.



7. From the **Profile** drop-down, select **ntuser** to run the appropriate plugin. Click **Rip It**.



8. A report named userdata.txt will be generated on the desktop. Open it and compare the information in the file with the data retrieved manually using RegistryViewer.

```
📙 userdata.txt - Notepad
File Edit Format View Help
Software\Microsoft\Windows\CurrentVersion\Explorer\ComDlg32
Lastwrite Time Sat Dec 28 13:22:35 2013 (UTC)
LastVisitedMRU
Lastvisileumko
Lastwrite: Sat Dec 28 13:22:35 2013
MRUList = a
a -> EXE: iexplore.exe
    -> Last Dir: C:\Documents and Settings\student\My Documents
OpenSaveMRU
LastWrite: Sat Dec 28 13:22:35 2013
OpenSaveMRU\OpenSaveMRU
LastWrite Time: Sat Dec 28 13:22:35 2013 Z
OpenSaveMRU has no values.
OpenSaveMRU\*
Lastwrite Time: Sat Dec 28 13:22:35 2013 Z
  MRUList = a
  a -> C:\Documents and Settings\student\My Documents\ChromeSetup.exe
OpenSaveMRU\exe
Lastwrite Time: Sat Dec 28 13:22:35 2013 Z
  MRUList = a
  a -> C:\Documents and Settings\student\My Documents\ChromeSetup.exe
```

9. Repeat Steps 2-7 for each registry file name. Name the report file according to the file that you accessed. Select the appropriate Plugin Profile for each as indicated below.

| Hive | Plugin Profile |
|----------|----------------|
| Software | software |
| System | system |
| Security | security |
| SAM | sam |
| Default | ntuser |

10. Close RegRipper and the Windows XP Pro PC Viewer.

3.2 Conclusion

RegRipper is an open source tool that parses each registry file and creates a report detailing values that are found within several subkeys based on plugin modules. In Task 2, we searched the registry manually; in this task, we saw how RegRipper automates the process. Both methods are useful and provide information concerning the computer and its users.

3.3 Discussion Questions

- 1. What Plugin Profile did you select to view the SAM hive?
- 2. What indicates if the system bypasses the recycle bin when a file is deleted?
- 3. What is the IP address for the default gateway that this system is using?
- 4. Which registry hive can give you information about most recently used items?

References

1. FTK Imager:

http://www.accessdata.com/

2. RegViewer:

http://www.gaijin.at/en/dlregview.php

3. RegRipper:

https://code.google.com/p/regripper/wiki/RegRipper

4. FTK Imager Download:

http://www.accessdata.com/support/product-downloads#.UcRImFYo6Ul

5. Windows Registry:

http://support.microsoft.com/kb/256986