FORENSICS
LAB SERIES

Lab 9: Web Browser Forensics

Material in this Lab Aligns to the Following Certification Domains/Objectives
GIAC Certified Forensics Examiner (GCFE) Domains
1: Browser Forensics

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Contents

Introduction

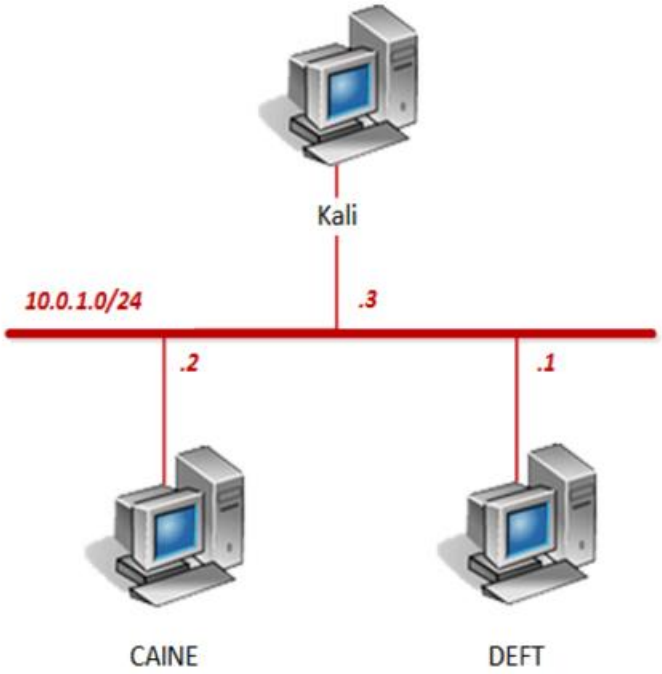
This lab will introduce the basics of Internet browser forensics. Web browsers such as Mozilla Firefox and Google Chrome store their data in SQLite databases that can be examined with a SQL browser.

Objective

In this lab, you will be conducting forensic practices using various tools. You will be performing the following tasks:

1. Mozilla Firefox Browser Forensics
2. Google Chrome Browser Forensics

Pod 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)
DEFT	10.0.1.1	deft	password
CAINE	10.0.1.2	caine	
Kali	10.0.1.3	root	toor

1 Mozilla Firefox Browser Forensics

1. Click on the **CAINE** graphic on the *topology page* to open the VM.
2. Open a new terminal by clicking on the **MATE Terminal** icon located in the bottom tool pane.

3. Identify the hidden files and directories from the *Home* directory. Enter the command below followed by pressing the **Enter** key.

```
ls -a
```

```
caine@Caine01:~$ ls -a
.               .gconf          .profile        Videos
..              .gimp-2.8       Public          .wine
.bash_history   .gksu.lock      .pureadminrc    .wireshark
.bash_logout    .gnupg          .putty          .wxHexEditor
.bashrc         .gstreamer-0.10 .python_history .x11vnc.log.caine:5900
.cache          .ICEauthority   qphotorec.log   .x11vnc.log.caine:5980
.compiz         .icons          .remmina        .Xauthority
.config         .java           .save_dir       .Xdefaults
.cpan           .kde            .ssh            .xinputrc
.dbus           .local          Templates       .xsession-errors
Desktop         .mobiusft       .themes         .xsession-errors.old
.dmrc           .mozilla        .thumbnails     .zenmap
Documents       Music           .tkcvs          .zuluCrypt
Downloads       Pictures        .tkcvs-picklists .zuluCrypt-socket
.dvdisaster     .pip            .TrueCrypt
.fred           .PlayOnLinux    Ubuntu
caine@Caine01:~$
```

Notice the *".mozilla"* directory. This is where *Mozilla Firefox* keeps all of its data.

4. Enter the command below to change to the *.mozilla* directory.

```
cd .mozilla
```

```
caine@Caine01:~$ cd .mozilla
caine@Caine01:~/.mozilla$
```

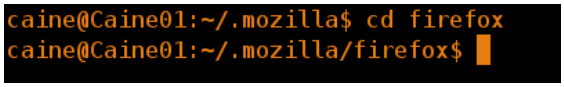
5. List the current files and directors by entering the command below.

```
ls -a
```

```
caine@Caine01:~/.mozilla$ ls -a
.  ..  extensions  firefox
caine@Caine01:~/.mozilla$
```

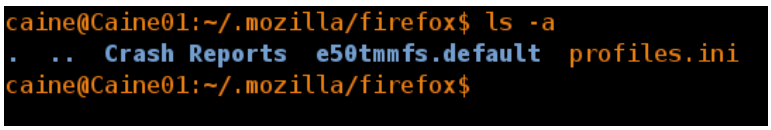

6. Move further down the directory tree by entering the command below.

```
cd firefox
```



7. Again, identify the files and directories in the current directory. Enter the command below.

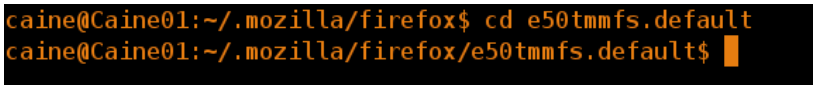
```
ls -a
```



Notice the randomly generated directory by Firefox, "*e50tmmfs.default*".

8. Navigate to the directory with the randomly generated number. Enter the command below.

```
cd e50tmmfs.default
```



9. Identify all files and directories by entering the command below.

```
ls- a
```

```
caine@Caine01:~/.mozilla/firefox/e50tmmfs.default$ ls -a
.                       features            revocations.txt
..                      formhistory.sqlite  saved-telemetry-pings
addons.json             gmp                 search.json
blocklist.xml           gmp-gmpopenh264     search.json.mozlz4
bookmarkbackups         healthreport        search-metadata.json
cert8.db                Invalidprefs.js     secmod.db
compatibility.ini       key3.db             sessionCheckpoints.json
content-prefs.sqlite    localstore.rdf      sessionstore-backups
cookies.sqlite          logins.json         sessionstore.js
cookies.sqlite.bak      mimeTypes.rdf       SiteSecurityServiceState.txt
crashes                 minidumps           storage
datareporting           .parentlock         times.json
enumerate_devices.txt   permissions.sqlite  webapps
extensions              places.sqlite       webappsstore.sqlite
extensions.ini          pluginreg.dat       xulstore.json
extensions.json         prefs.js
caine@Caine01:~/.mozilla/firefox/e50tmmfs.default$
```

Notice several *SQLite* databases in the directory with the *".sqlite"* extension. This is where the *userdata,* among other items are stored.

10. Copy the files with the *.sqlite* extension in the current directory to the *home* directory for examination purposes. Enter the command below.

```
cp *.sqlite /home/caine
```

```
caine@Caine01:~/.mozilla/firefox/e50tmmfs.default$ cp *.sqlite /home/caine
caine@Caine01:~/.mozilla/firefox/e50tmmfs.default$
```

11. Enter the command below to change to the *home* directory for *caine*.

```
cd
```

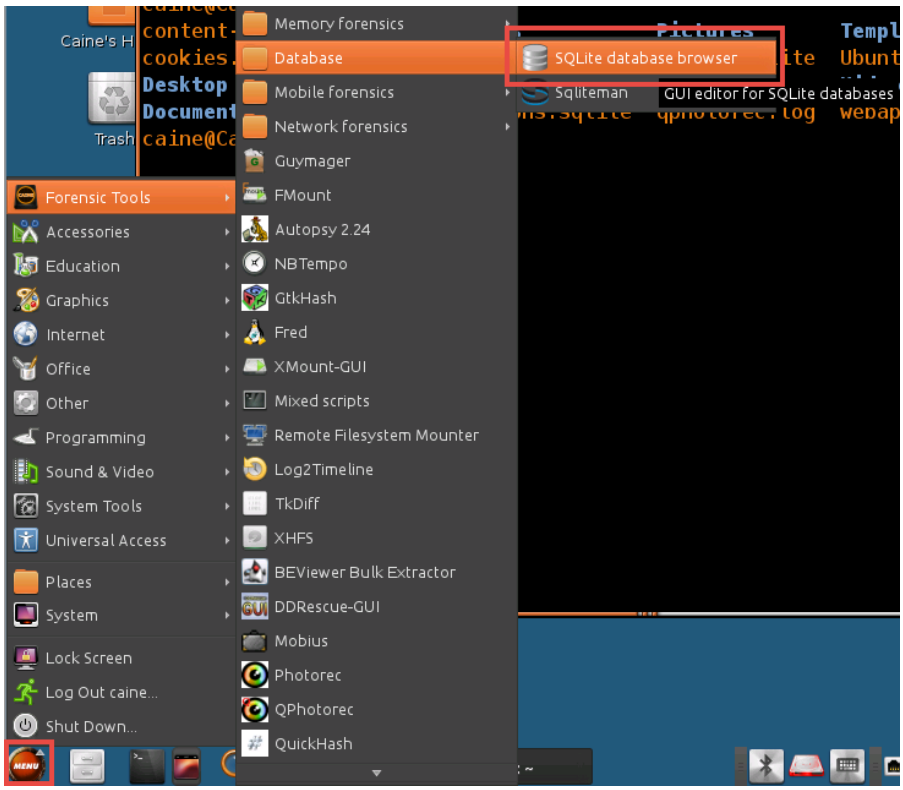
```
caine@Caine01:~/.mozilla/firefox/e50tmmfs.default$ cd
caine@Caine01:~$
```


12. List the files in the current directory. Enter the command below.

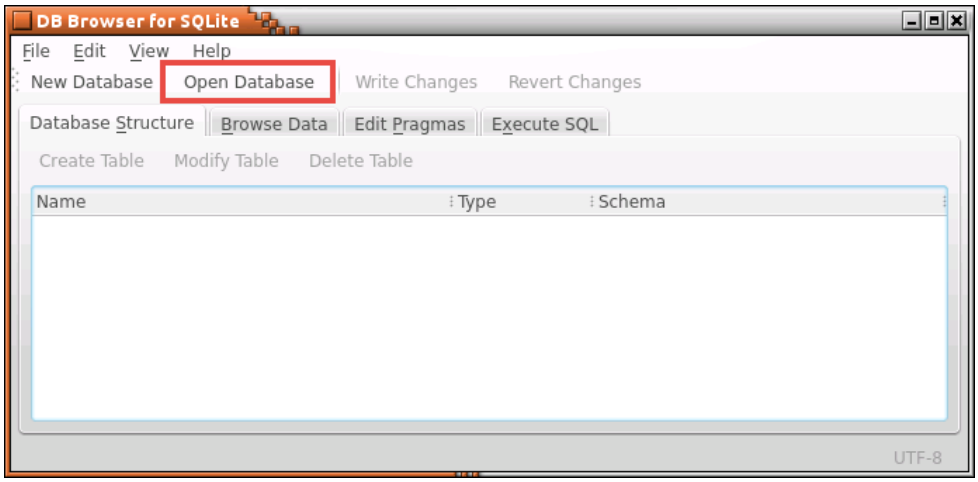
```
ls
```

Notice all files with the *.sqlite* extension have been copied over.

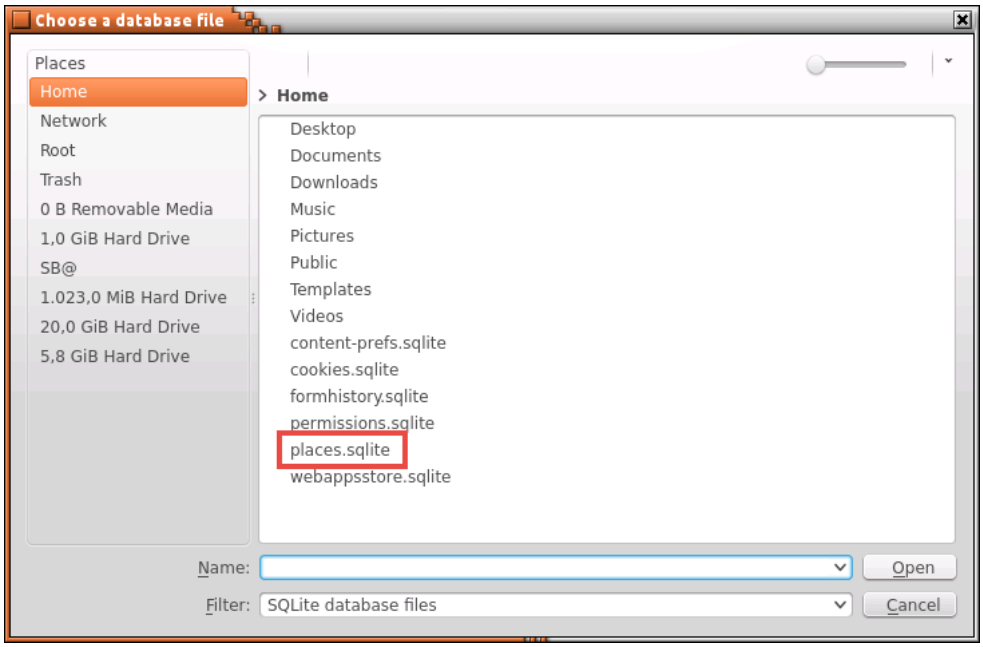
13. Navigate to **Menu > Forensic Tools > Database > SQLite database browser** to open the *SQLite* database reader.



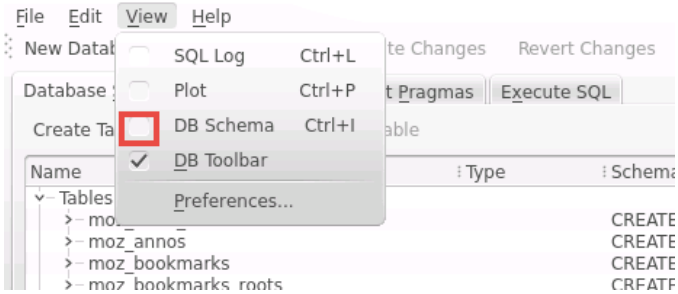
14. In the *SQLite* window, click on **Open Database**.



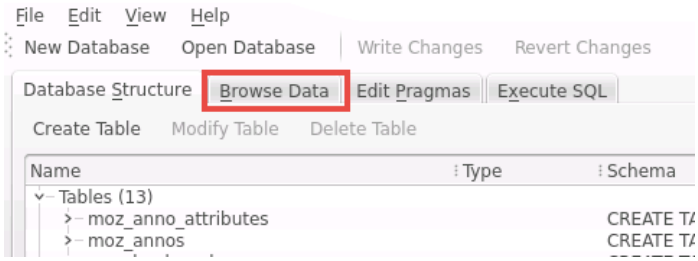
15. In the *Choose a database file* window, select **places.sqlite** from the *Home* directory.



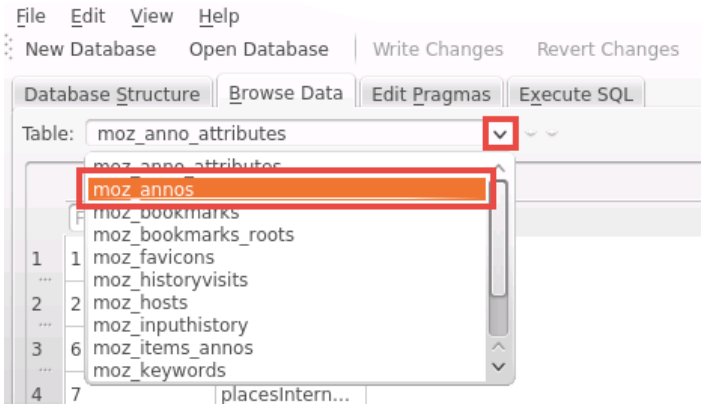
16. Verify that the *DB Schema* is disabled from the view by clicking on **View** and unchecking the **DB Schema** checkbox.



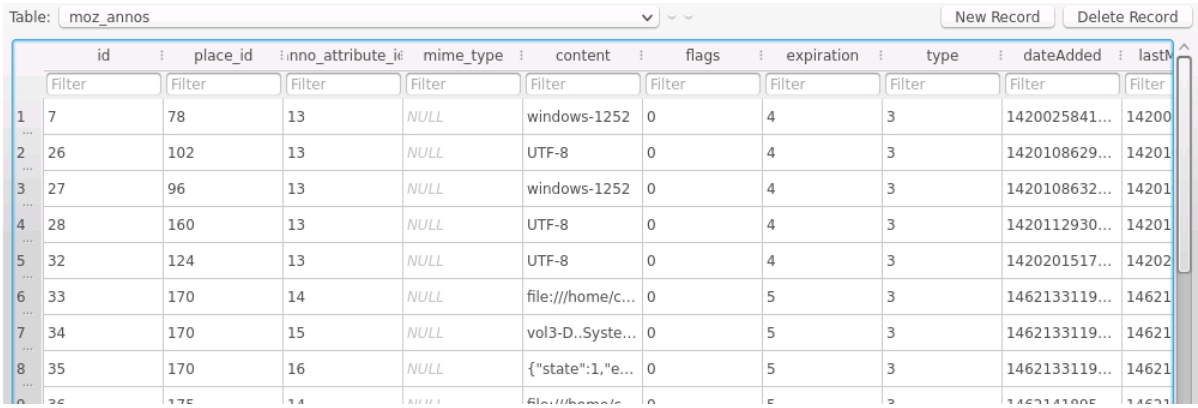
17. Click on the **Browse Data** tab.



18. In this view, various tables in the database can be explored. Begin exploring metadata in the *moz_annos* table. Click on the **drop-down menu** next to *Table:* and select **moz_annos**.



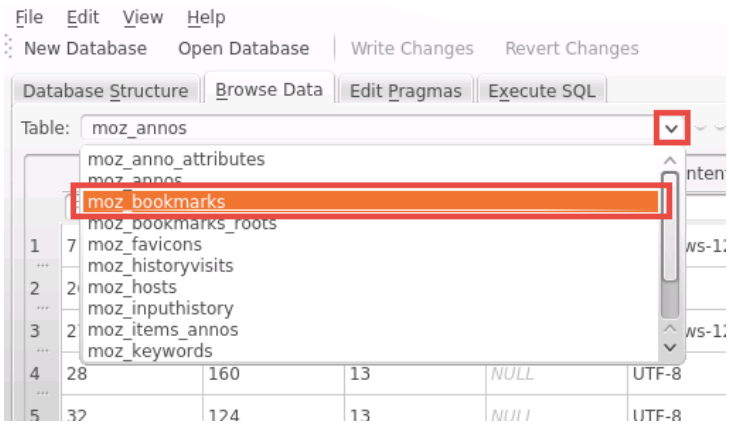
19. In this table, there is metadata available for various downloads and files that were executed by the web browser. The *content* column contains some of the information. Notice the dates are stored in *WebKit* time (number of microseconds since *01/01/1601 00:00:00 UTC* represents in 64-bit integers).



	id	place_id	nno_attribute_id	mime_type	content	flags	expiration	type	dateAdded	lastM
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	7	78	13	NULL	windows-1252	0	4	3	1420025841...	14200
2	26	102	13	NULL	UTF-8	0	4	3	1420108629...	14201
3	27	96	13	NULL	windows-1252	0	4	3	1420108632...	14201
4	28	160	13	NULL	UTF-8	0	4	3	1420112930...	14201
5	32	124	13	NULL	UTF-8	0	4	3	1420201517...	14202
6	33	170	14	NULL	file:///home/c...	0	5	3	1462133119...	14621
7	34	170	15	NULL	vol3-D..Syste...	0	5	3	1462133119...	14621
8	35	170	16	NULL	{"state":1,"e...	0	5	3	1462133119...	14621

To convert *WebKit* time, use conversion websites such as, http://www.epochconverter.com/webkit.

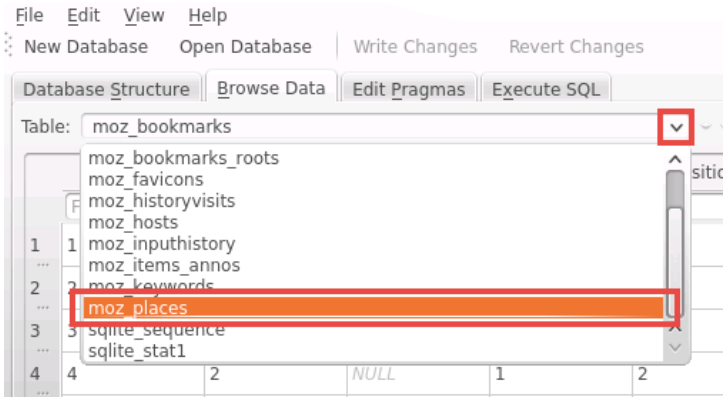
20. Using the *SQLite* application, change to another table. Click on the **drop-down menu** located next to *Table:* and select **moz_bookmarks**.



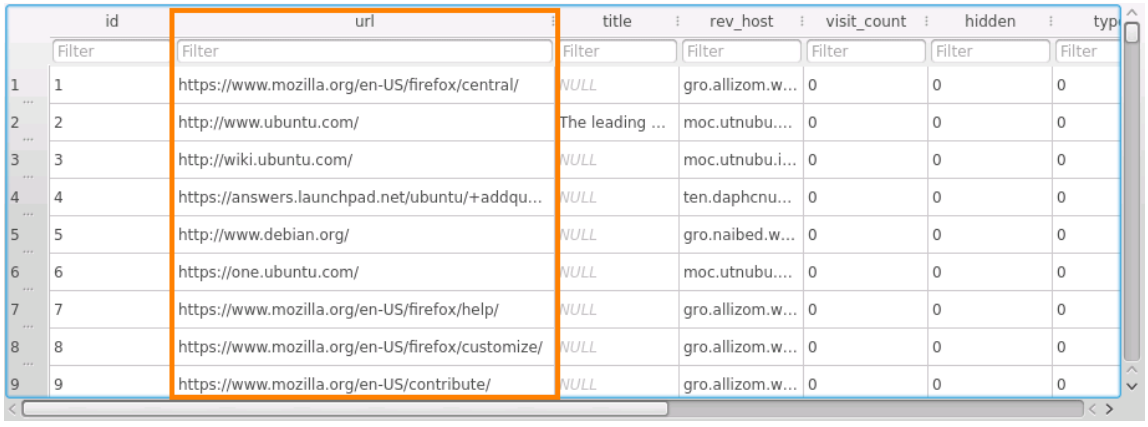
21. Briefly analyze through the titles of the bookmarks underneath the *title* column. Notice the bookmarks from *Mozilla* that are present.

	id	type	fk	parent	position	title	keyword_id	folder_type
1	1	2	NULL	0	0		NULL	NULL
2	2	2	NULL	1	0	Bookmarks Menu	NULL	NULL
3	3	2	NULL	1	1	Bookmarks Toolbar	NULL	NULL
4	4	2	NULL	1	2	Tags	NULL	NULL
5	5	2	NULL	1	3	Unsorted Bookmarks	NULL	NULL
6	6	1	1	3	1	Getting Started	NULL	NULL
7	7	2	NULL	2	3	Ubuntu and Free Soft...	NULL	NULL
8	8	1	2	7	0	Ubuntu	NULL	NULL
9	9	1	3	7	1	Ubuntu Wiki (commu...	NULL	NULL

22. Identify the user history left on the system. Change the database table by clicking on the **drop-down menu** next to *Table:* and select **moz_places**.



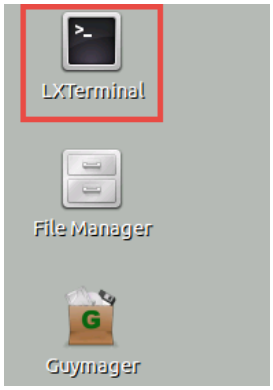
23. Briefly analyze through the web history underneath the *url* column. Notice the various URLs in *Mozilla's* history.



	id	url	title	rev_host	visit_count	hidden	typ
1	1	https://www.mozilla.org/en-US/firefox/central/	NULL	gro.allizom.w...	0	0	0
2	2	http://www.ubuntu.com/	The leading ...	moc.utnubu....	0	0	0
3	3	http://wiki.ubuntu.com/	NULL	moc.utnubu.i...	0	0	0
4	4	https://answers.launchpad.net/ubuntu/+addqu...	NULL	ten.daphcnu...	0	0	0
5	5	http://www.debian.org/	NULL	gro.naibed.w...	0	0	0
6	6	https://one.ubuntu.com/	NULL	moc.utnubu....	0	0	0
7	7	https://www.mozilla.org/en-US/firefox/help/	NULL	gro.allizom.w...	0	0	0
8	8	https://www.mozilla.org/en-US/firefox/customize/	NULL	gro.allizom.w...	0	0	0
9	9	https://www.mozilla.org/en-US/contribute/	NULL	gro.allizom.w...	0	0	0

2 Google Chrome Browser Forensics

1. Click on the **DEFT** graphic on the *topology page* to open the VM.
2. Open a new terminal by clicking on the **LXTerminal** icon located on the *Desktop*.



3. Using the terminal, list all the files and directories in the */home/deft/* directory. Enter the command below.

```
ls -a
```

```
deft-virtual-machine ~ % ls -a
.               Documents           .local          .pulse
..              Downloads           .macromedia     .pulse-cookie
.adobe          evidence            .mountmanager   .ssh
.android        .gconf              .mozilla        Templates
.ant            .gksu.lock          .mtpaint        .thumbnails
.bash_history   .gnome              Music           Videos
.bashrc         .gstreamer-0.10     NewFolder       .vim
.cache          .gtk-bookmarks      pdfcrack-01.5   .viminfo
.config         .icons              .pip            .Xauthority
.dbus           .java               .pki            .xscreensaver
Desktop         .lesshst            .profile        .xsession-errors
.dmrc           .libnet-openssh-perl Public         .xsession-errors.old
deft-virtual-machine ~ %
```

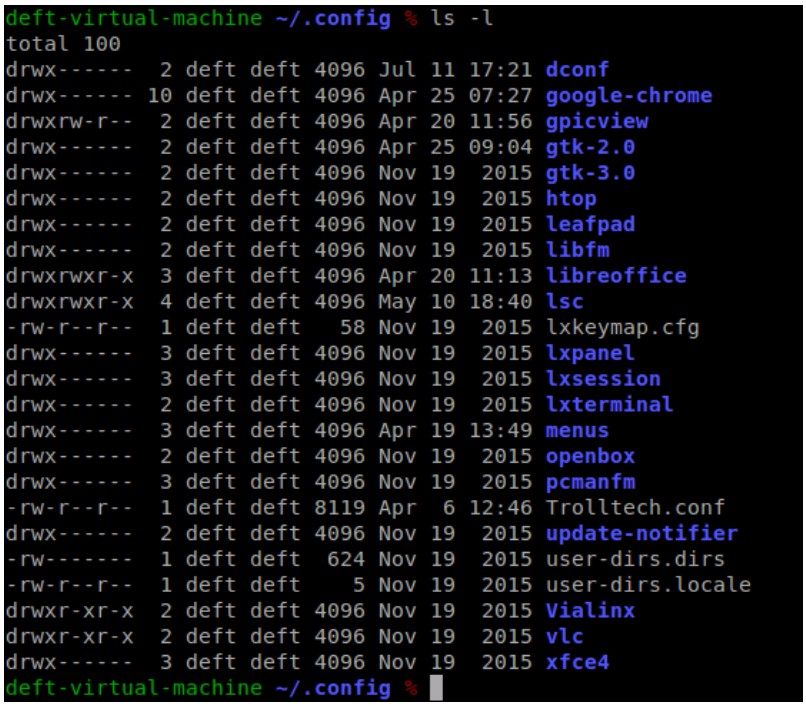
4. Notice the hidden files and directories. Navigate to the **.config/** directory by entering the command below.

```
cd .config
```

```
deft-virtual-machine ~ % cd .config/
deft-virtual-machine ~/.config %
```

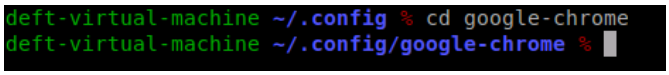

5. Enter the command below to list files and directories in a list view in the current directory.

```
ls -l
```



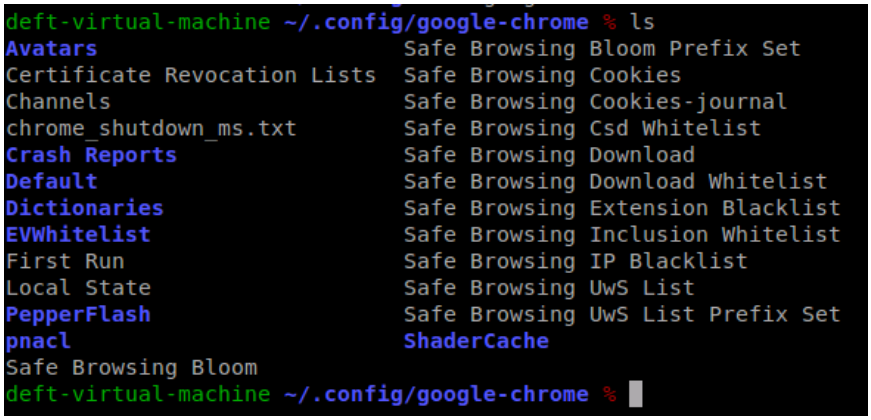
6. Enter the command below to navigate into the google-chrome directory.

```
cd google-chrome
```



7. List the files and directories by entering the command below.

```
ls
```



8. Navigate to the Default directory to access the databases.

```
cd Default
```

```
deft-virtual-machine ~/.config/google-chrome % cd Default
deft-virtual-machine ../google-chrome/Default %
```

9. List the files and directories in the current directory.

```
ls
```

```
deft-virtual-machine ../google-chrome/Default % ls
Application Cache             GPUCache                        Pepper Data
Bookmarks                     History                         Preferences
Bookmarks.bak                 History-journal                 QuotaManager
Cookies                       History Provider Cache          QuotaManager-journal
Cookies-journal               IndexedDB                       README
Current Session               Last Session                    Secure Preferences
Current Tabs                  Last Tabs                       Service Worker
databases                     Local Extension Settings        Session Storage
data_reduction_proxy_leveldb  Local Storage                   Shortcuts
Extension Cookies             Login Data                      Shortcuts-journal
Extension Cookies-journal     Login Data-journal              Top Sites
Extensions                    Network Action Predictor        Top Sites-journal
Extension State               Network Action Predictor-journal TransportSecurity
Favicons                      Network Persistent State        Visited Links
Favicons-journal              Origin Bound Certs              Web Data
File System                   Origin Bound Certs-journal      Web Data-journal
deft-virtual-machine ../google-chrome/Default %
```

10. Copy the *SQLite* databases to the Home directory. Start with the **History** database by entering the command below.

```
sudo cp History /home/deft/
```

```
deft-virtual-machine ../google-chrome/Default % sudo cp History /home/deft/
[sudo] password for deft:
deft-virtual-machine ../google-chrome/Default %
```

If prompted for a password, type **`password`** followed by pressing the **Enter** key.

11. Enter the command below to copy the **Cookies** database to the *Home* directory.

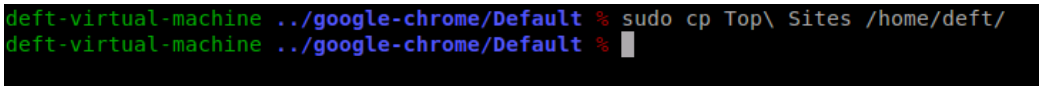
```
sudo cp Cookies /home/deft/
```

```
deft-virtual-machine ../google-chrome/Default % sudo cp Cookies /home/deft/
deft-virtual-machine ../google-chrome/Default %
```

If prompted for a password, type **`password`** followed by pressing the **Enter** key.

12. Copy the **Top Sites** database to the *home* directory.

```
sudo cp Top\ Sites /home/deft/
```



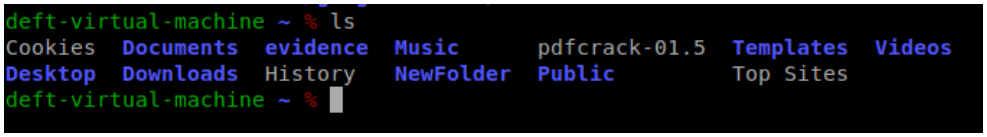
If prompted for a password, type **password** followed by pressing the **Enter** key.

13. Change to the deft user home directory by entering the command below.

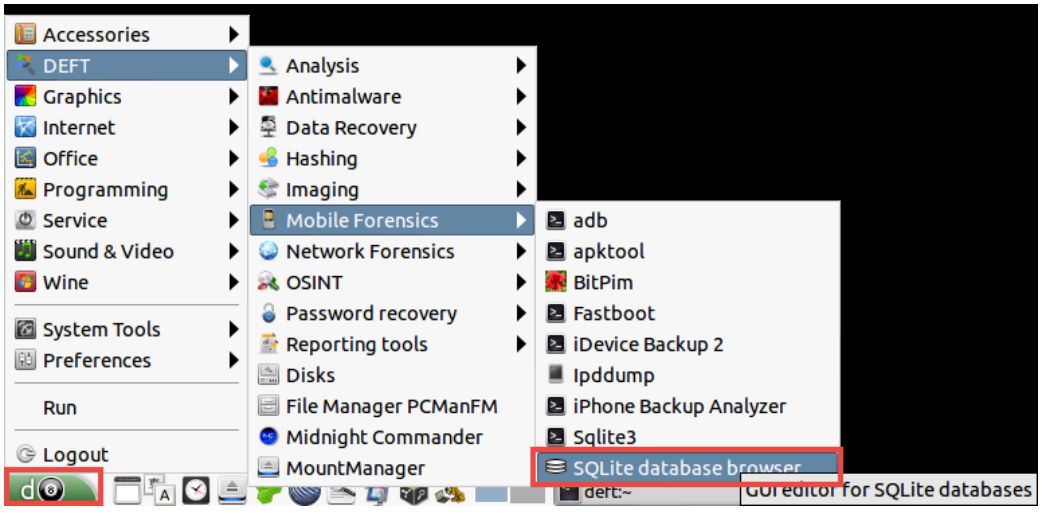
```
cd
```

14. List the files and directories in the current *home* directory and verify that the files have been copied over.

```
ls
```

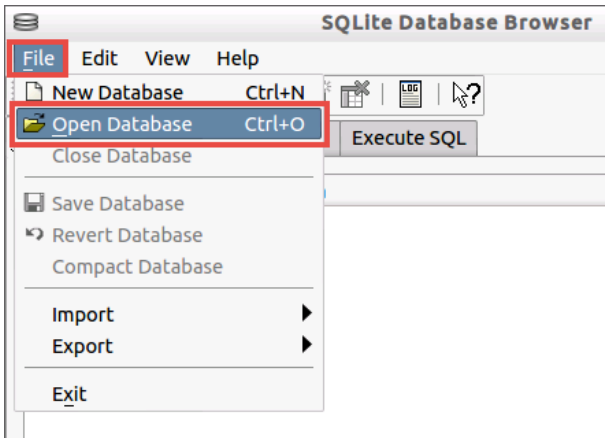


15. Open the *SQLite* application by navigating to **Menu > DEFT > Mobile Forensics > SQLite data browser**.

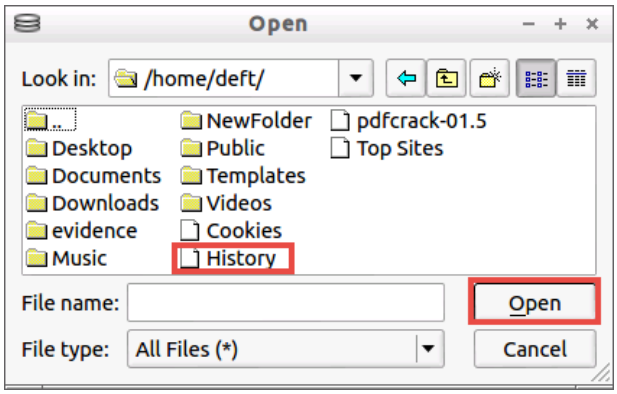


If prompted for a password, type **password** and click **OK**.

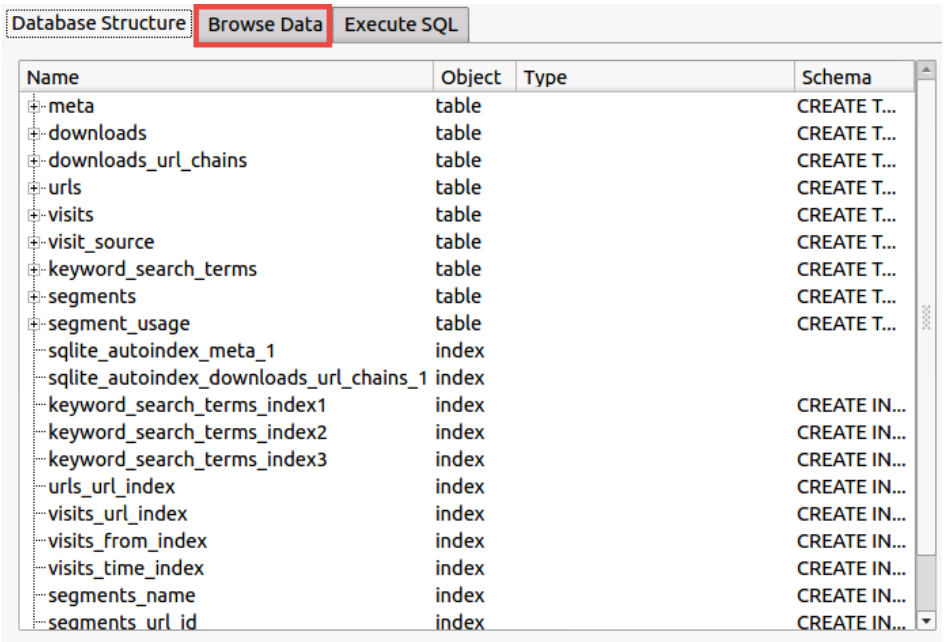
16. Using the *SQLite* application, navigate to **File > Open Database**.



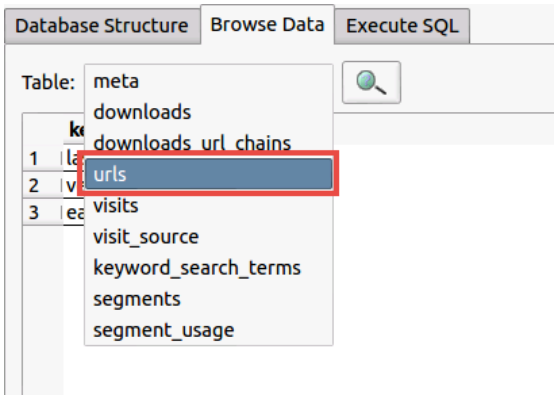
17. In the *Open* dialog window, change the location to **/home/deft/** and select the **History** file. Click **Open**.



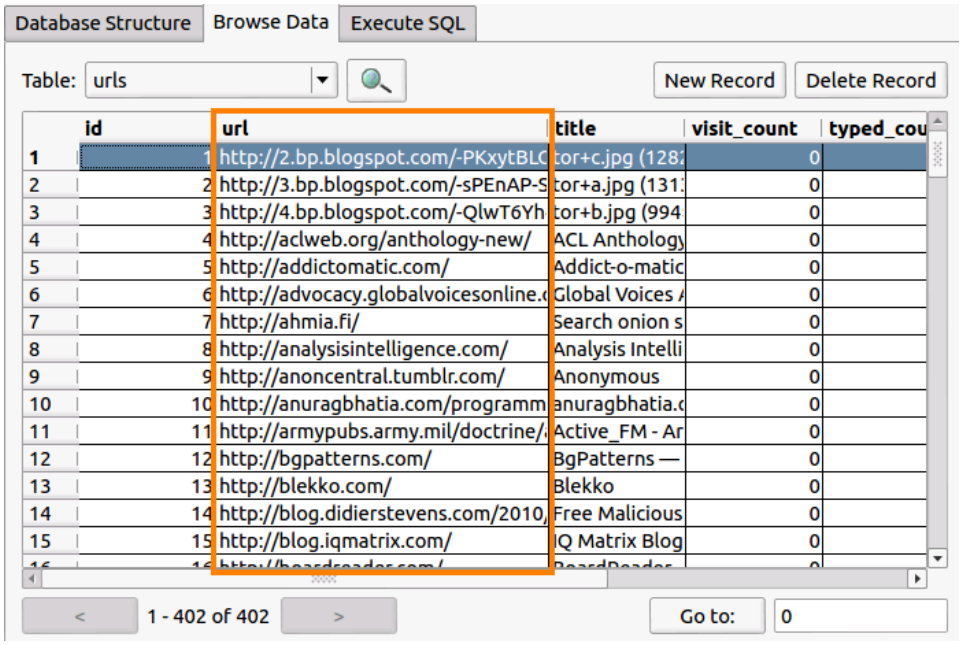
18. Once opened, click on the **Browse Data** tab.



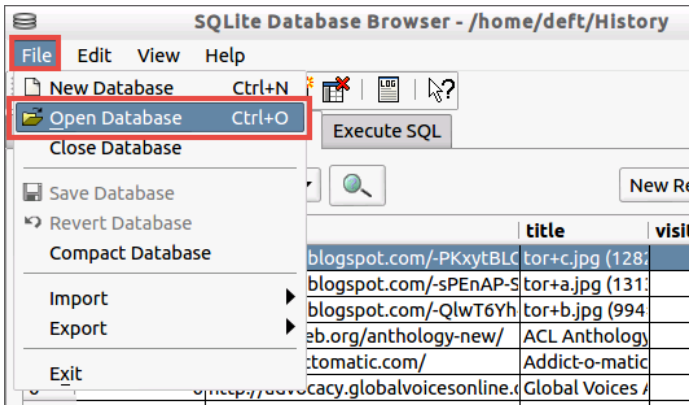
19. Click on the **drop-down menu** next to *Table:* and select **urls**.



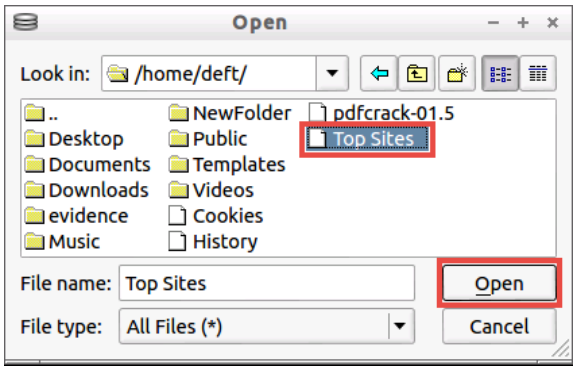
20. Expand the **url** column and briefly analyze the list of URLs shown.



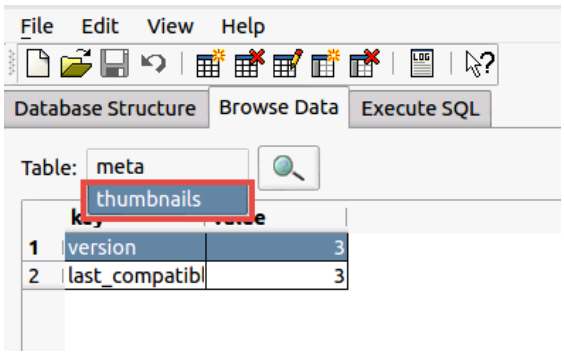
21. Switch to the *Top Sites* database. Click **File** and select **Open Database**.



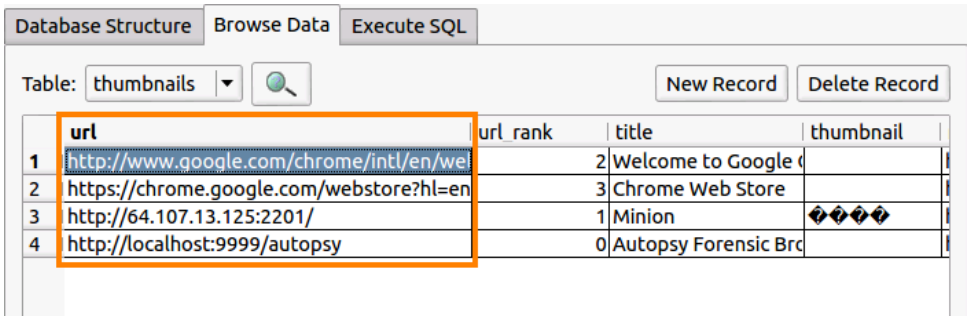
22. In the *Open* dialog window, change the location to **/home/deft/** and select the **Top Sites** file. Click **Open**.



23. Using *SQLite*, make sure that the *Browse Data* tab is selected and click on the **drop-down menu** next to *Table:*. Select **thumbnails**.

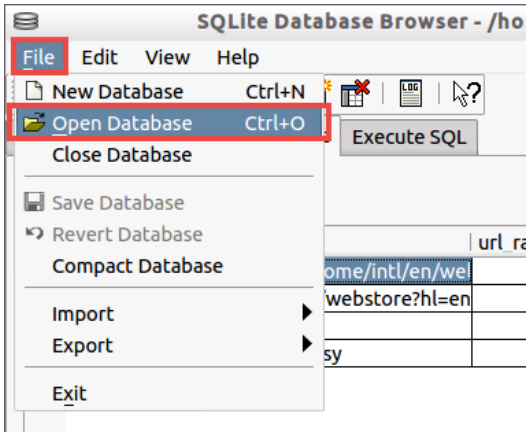


24. Expand the **url** column and analyze the *Top Sites* information.

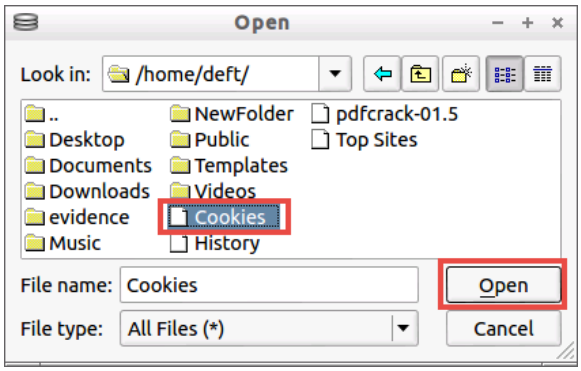


Notice that *Google Chrome* and the *Chrome Web Store* are listed as top sites.

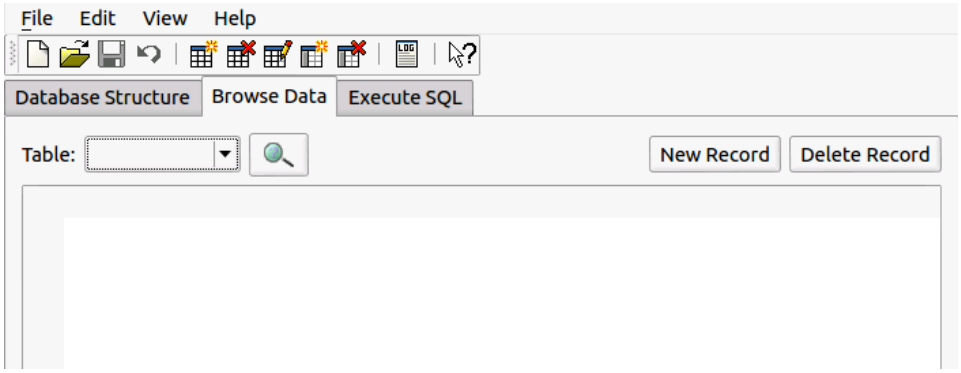
25. Switch to the *Cookies* database. Click **File** and select **Open Database**.



26. In the *Open* dialog window, change the location to **/home/deft/** and select the **Cookies** file. Click **Open**.



27. Using *SQLite*, make sure that the *Browse Data* tab is selected and take a look at the **drop-down menu** for database tables.



Notice that there is an empty table which signifies that the *Chrome* browser was either not used as much or thoroughly cleaned.

28. Close all **PC Viewers** and end the reservation to complete the lab.

