

Computing IDs: *mtv2eva, mcc5bp, jnm9aba, jhv9wsz, trn8cwf*

## Objectives

- Apply computing tools and techniques to solve problems at multiple levels of abstraction.
- Collaborate with others to gain insight, interpret data, and solve problems using computation.

## Part 0: Connecting to SQLite

Please install  [DB Browser for SQLite](#) on your computer.

In order to complete today's lab, you will need to open SQLite databases found in your Firefox profile folder. The location of your profile folder depends on your operating system:

- **Linux:** `~/.mozilla/firefox/<profile folder>`
- **macOS:** `~/Library/Application Support/Firefox/Profiles/<profile folder>`
- **Windows:** `%APPDATA%\Mozilla\Firefox\Profiles\<profile folder>`

If you can not find the folder at first, search for firefox within your finder type window.

The name of your `<profile folder>` will look something like `xxxxxxxx.default` or `xxxxxxxx.default-release`, where `xxxxxxxx` are random letters and numbers. See the support article "[where firefox stores user data](#)" for more details.

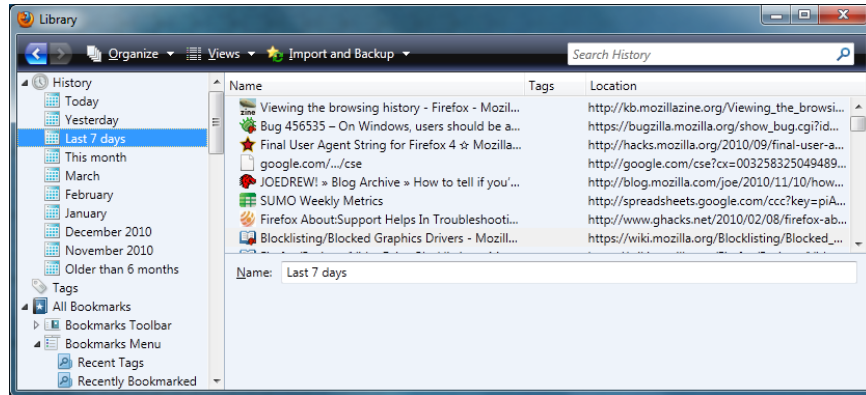
## Part 1: Your Firefox Profile

### PRE-WORK.

If you are not a firefox user, make sure you download it. Go to some sites and navigate and make some bookmarks first. If you are a firefox user...you can skip this.

1. Run the DB Browser app, and click the "Open Database" button on the toolbar. Navigate to your profile folder (see Part 0), and look for files like `cookies.sqlite` and `places.sqlite`. Use the "Database Structure" and "Browse Data" tabs to view the contents of each table stored in these files. Explore the other databases using this same process. *Answer #1 and #2 in your worksheet.*

2.



Sometimes you will need to query two or more tables that have columns with the same name (e.g., id). You need to use the table name in that case so that SQL can tell which column you want. For example, in `places.sqlite`:

```
SELECT *
FROM moz_historyvisits, moz_places
WHERE moz_historyvisits.place_id = moz_places.id
```

Because the `table.column` syntax makes the code harder to read, SQL allows you to rename tables within the query. Often developers use a single letter name for this purpose, like this:

```
SELECT h.visit_type, h.visit_date, p.url
FROM moz_historyvisits h, moz_places p
WHERE h.place_id = p.id
```

Note how `p.url` in the `SELECT` clause makes it easy to tell what table that column comes from. *Answer #3 in your worksheet.*

3. In addition to `SELECT`, `FROM`, and `WHERE`, there are many other clauses in SQL. For example, you can sort the query results:

```
4. SELECT *
5. FROM moz_places
6. ORDER BY visit_count DESC, url
```

In this query, the output is first sorted by `visit_count` in descending order and then sorted by `url` in ascending order (for records that have the same `visit_count`). *Answer #4 in your worksheet.*

7. One of the most interesting features of SQL is *grouping and aggregation*, which allows you to do more than just filter data. For example, this query shows which servers you visit most:

```
8. SELECT rev_host, sum(visit_count)
9. FROM moz_places
10. GROUP BY rev_host
```

```
11.ORDER BY sum(visit_count) DESC
```

GROUP BY essentially means "for each." This query finds all rows with the same rev\_host, and then calls the `sum` function to add up all their visit\_count values. The query then outputs a single row for each rev\_host with its total number of visits. *Answer #5 in your worksheet.*

## Part 2: Other Data Sets



5. Download the [LAB 2 Data](#) database and open it in DB Browser. Explore the tables via the "Structure" and "Browse" tabs.
6. Write SQL statements to *answer the remaining questions* in your worksheet. For each one, include both your SQL code and the result.

To learn more about SQL, check out some of the many free [tutorials online](#). The one at [w3schools.com](#) is a great place to start.

## Part 3: Using Python

1. Access the Lab  
<https://towardsdatascience.com/python-sqlite-tutorial-the-ultimate-guide-fdcb8d7a4f30>
2. Complete this lab and upload a link to your Py file in Git

## Submission Instructions

- Submit your GIT LINK to me and Dylan by Sunday Evening @11:00PM with your Worksheet answers.

## WORKSHEET

**Computing IDs: mtv2eva, mcc5bp, jnm9aba, jhv9wsz, trn8cwf**

1. What types of information does Firefox manage using SQLite? Briefly explain the contents of two or three databases.

*For places.sqlite, Firefox stores information such as the id of a site you visit (id), where you are visiting from (from\_visit), the date you visit (visit\_date), and more. Additionally, Firefox catalogs the URL of visited sites (url), the origin host (rev\_host), and the hashed URL (url\_hash).*

*For formhistory.sqlite, Firefox stores information about your deleted history (timeDeleted), your formal history using the name of the website (value) and times used (timesUsed), and the source of your history like Google (source).*

*For cookies.sqlite, Firefox stores a variety of information about the cookies from each of the host websites.*

2. In what database and tables are your bookmarks stored? Why do you think Firefox stores the title and url separately?

**Database: places.sqlite**

**Tables: moz\_bookmarks , moz\_bookmarks\_deleted, moz\_places**

*The titles are stored in moz\_bookmarks, whereas the urls are stored in moz\_origins*

*moz\_bookmarks stores a foreign key (fk) along with the titles of the bookmarked sites. These sites can then be accessed using an ID that matches the fk in the moz\_places table.*

3. Write an SQL statement that selects your bookmarks. For each one, display only the title, url, date added (as an integer), and visit count.

```
SELECT moz_bookmarks.title, moz_places.url, moz_bookmarks.dateAdded,  
moz_places.visit_count FROM moz_bookmarks JOIN moz_places  
ON moz_places.id = moz_bookmarks.fk;
```

	title	url	dateAdded	visit_count
1	Get Help	https://support.mozilla.org/en-US/products/firefox	1644423414829000	0
2	Customize Firefox	https://support.mozilla.org/en-US/kb/customize-firefox-...	1644423414829000	0
3	Get Involved	https://www.mozilla.org/en-US/contribute/	1644423414829000	0
4	About Us	https://www.mozilla.org/en-US/about/	1644423414829000	0
5	Getting Started	https://www.mozilla.org/en-US/firefox/central/	1644423415229000	0
6	Data science - Wikipedia	https://en.wikipedia.org/wiki/Data_science	1644424119918000	1

4. Write an SQL statement that lists the base domain, name, and value for each of your cookies in order of expiration date.

```
SELECT host, name, value FROM moz_cookies ORDER BY expiry DESC;
```

	host	name	value
1	.google.com	NID	511=S_hzbiWtiu7kfRibX_16-...
2	en.wikipedia.org	WMF-Last-Access	09-Feb-2022
3	.wikipedia.org	WMF-Last-Access-Global	09-Feb-2022
4	login.wikimedia.org	WMF-Last-Access	09-Feb-2022
5	meta.wikimedia.org	WMF-Last-Access	09-Feb-2022
6	intake-analytics.wikimedia.org	WMF-Last-Access	09-Feb-2022
7	en.wikipedia.org	enwikiwmE-sessionTickTickCount	1
8	en.wikipedia.org	enwikiel-sessionId	03b5da9ee2f6e79b7320
9	.google.com	1P_JAR	2022-02-09-16
10	en.wikipedia.org	enwikiwmE-sessionTickLastTickTime	1644424118999

5. Write an SQL statement to show how many cookies you have for each domain. Note that you will need to use the "count" function instead of sum.

```
SELECT host, COUNT(*) FROM moz_cookies GROUP BY host;
```

	host	COUNT(*)
1	.google.com	2
2	.wikipedia.org	1
3	en.wikipedia.org	4
4	intake-...	1
5	login.wikimedia....	1
6	meta.wikimedia....	1

6. What are the top five movies since the year 2000, in terms of adjusted gross income?

```
SELECT title, adjusted FROM movie
WHERE year >= 2000
ORDER BY adjusted DESC
LIMIT 5;
```

	title	adjusted
1	Avatar	801.5
2	Marvel's The Avengers	621.79
3	The Dark Knight	591.31
4	Shrek 2	564.14
5	Spider-Man	552.66

7. What are the title, author, and year of books from Russia in the top 100?  
(For convenience, you can right-click the results and "Copy Rows as CSV.")

```
SELECT title, author, year FROM book
WHERE country = 'Russia';
```

	title	author	year
1	Stories	Anton Chekhov	1886
2	Crime and Punishment	Fyodor Dostoevsky	1866
3	The Idiot	Fyodor Dostoevsky	1869
4	The Possessed	Fyodor Dostoevsky	1872
5	The Brothers Karamazov	Fyodor Dostoevsky	1880
6	Dead Souls	Nikolai Gogol	1842
7	War and Peace	Leo Tolstoy	1865?1869
8	Anna Karenina	Leo Tolstoy	1877
9	The Death of Ivan Ilyich	Leo Tolstoy	1886

8. What are the names and symbols of the periodic elements with an atomic mass of more than 280? Display the results from lightest to heaviest.

```
SELECT name, symbol FROM periodic
WHERE mass > 280
ORDER BY mass ASC;
```

	name	symbol
1	Ununtrium	Uut
2	Ununbium	Uub
3	Ununpentium	Uup
4	Ununquadium	Uuq
5	Ununhexium	Uuh
6	Ununoctium	Uuo

9. Which of the top 15 songs were featured in the top 100 movies? (Hint: Figure out how to join the two tables, and then use AND clauses to filter by rank.)

```
select song.title
FROM song
join movie on song.film=movie.title
where song.rank<=15 and movie.rank<=100;
```

	title
1	Mrs.Robinson
2	When You Wish upon a Star
3	The Sound of Music
4	My Heart Will Go On

10. Do you Python Lab

\*\*Used under the open commons from JMU CS101 Labs