Software Installation Guide

To get some hands-on experience with relational databases and SQL, we will be using two relational database management systems (RDBMSs), MariaDB and SQLite, as well as a cross-DBMS database for a digital media store, Chinook.

MariaDB (`https://mariadb.org`) is a widely used, open-source RDBMS based on MySQL (pronounced "My S-Q-L"; `http://www.mysql.com`). Both are popular choices when developing web applications, and are a central component of AMP software stacks (Apache MySQL/MariaDB Perl/PHP/Python; LAMP = Linux, WAMP = Windows, MAMP = Mac OS).

SQLite (pronounced "S-Q-L-ite"; `http://sqlite.org`) is a relational database management system contained in a C library. Whereas most DBMSs are standalone processes, to which clients connect, SQLite is part of the client program. SQLite is rather ubiquitous, with bindings in many programming languages and used in most browsers, many operating systems (particularly embedded), and a slew of other applications.

Chinook is a database, released under the MIT License, that has been developed for a number of leading RDBMSs, including MySQL, SQLite, PostgreSQL, Oracle, SQL Server, and DB2. The structure of Chinook (see Figure 1) represents a digital media store, including tables for artists, albums, media tracks, invoices, and customers, and it has more than 15k rows of data.
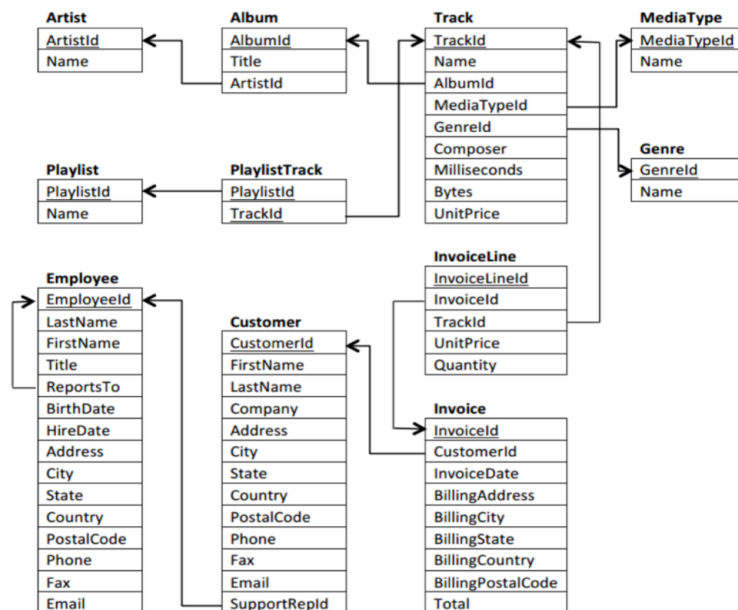

Figure 1: The relational schema for the Chinook database.

1 Chinook Database

First, download version 1.4 of the Chinook Database. In particular, you should download the following files:

- `Chinook_MySql_AutoIncrementPKs.sql` (∼1.7MB)

- `Chinook_Sqlite_AutoIncrementPKs.sqlite` (∼1.1MB)

- `Chinook_Sqlite_AutoIncrementPKs.sql` (∼1.7MB)

2 MariaDB [via XAMPP]

MariaDB runs as its own process, and thus requires an external client program. For this class, we will be using PHPMyAdmin (`http://www.phpmyadmin.net`), which is a free tool written in PHP for web-based administration of MySQL databases.

To use PHPMyAdmin, you will need (1) a web server (2) configured to use the PHP interpreter and (3) MySQL/MariaDB. Most major platforms now have one-or-more instances of an AMP stack: **A**pache (a webserver), **M**ariaDB/ySQL, and one-or-more-of **P**erl/**PHP**/**P**ython. For this class we will use XAMPP (X = cross-platform), which is a free distribution.

First, download and install **XAMPP v5.6.32** for your platform. Once installed, run the XAMPP Control Panel and click the `Start` buttons next to both Apache and MySQL (see Figure 2; actually runs MariaDB). **IMPORTANT**: when you are done using XAMPP, it is crucial that you stop both of these modules – leaving them running can pose a serious security threat to your computer.

To verify that your web server (Apache) is running correctly, open a web browser and type `localhost` as the URL. Now click the "phpMyAdmin" link – if it loads correctly, you have verified both MySQL and PHP are working correctly.

In phpMyAdmin, towards the top of the page, click the "Import" tab, which will allow you to provide a file for MariaDB to execute. Click the button to choose a file and select `Chinook_MySql_AutoIncrementPKs.sql` in the directory with your Chinook files. Now click "Go" and wait a few moments – if your import was successful, you should get a confirmation (with 15,642 queries executed) and then will see `chinook` in the listing of databases in the left column. (If the script runs too long, you will run into a problem – you will
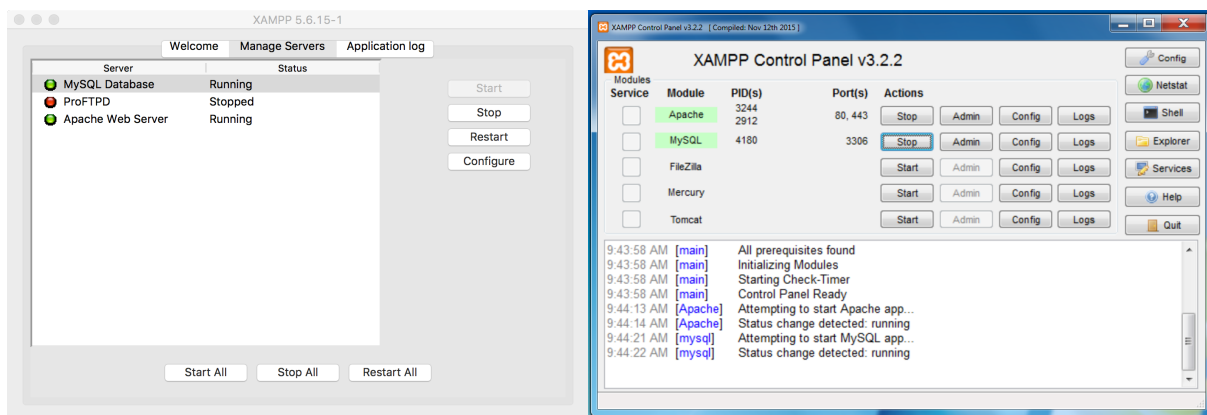

Figure 2: XAMPP Control Panel running both Apache and MySQL on Mac (left) and Windows (right).

likely need to increase the `max_execution_time` parameter in your `php.ini` file, ask for help.)
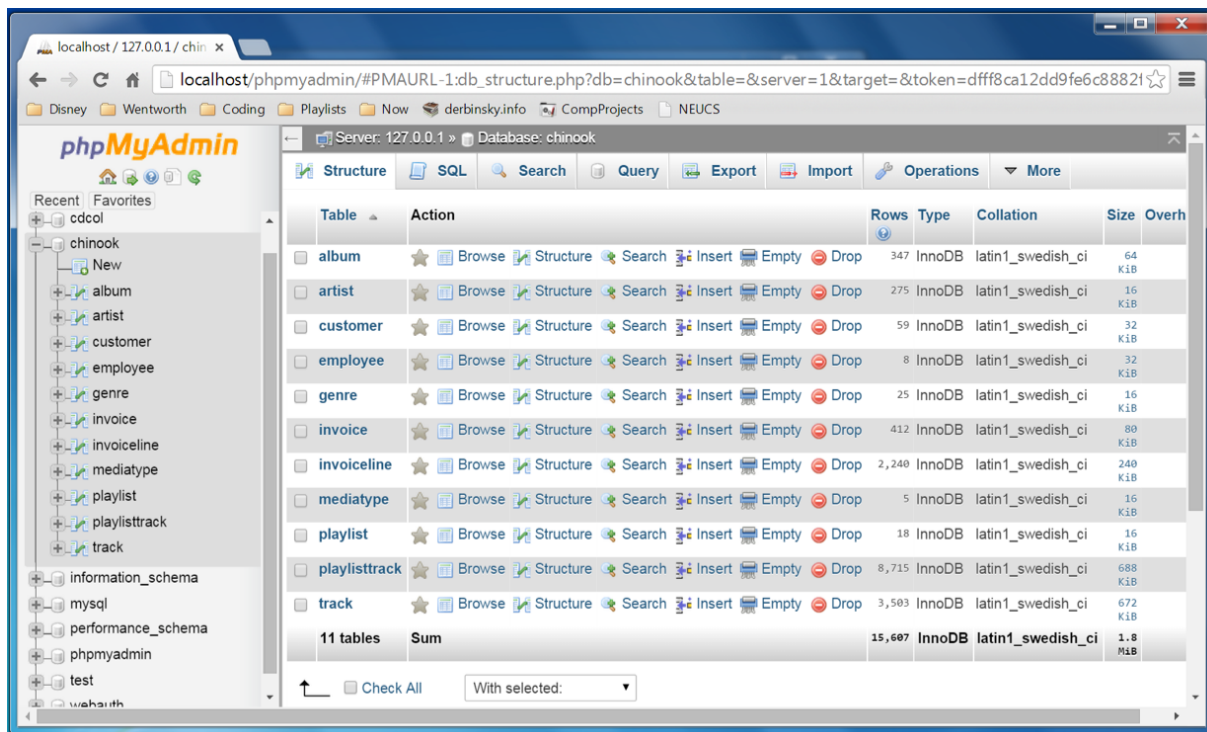
Click on `chinook` on the left to see a summary of all the data in the database. Confirm that your screen matches that in Figure 3, including the total number of rows. If so, you can click each of the names of the tables (e.g. `album`, `artist`, `track`) in order to see the included data.

We are now done importing Chinook into MariaDB. Close the browser, stop both MariaDB and Apache in the XAMPP Control Panel, and exit XAMPP.

3 SQLite [via DB Browser]

Since SQLite by itself is a C library, we need some client program in order to interact with SQLite databases. Later in the semester you may choose to write your own client, but for now we will use a pre-built GUI. There are several options available, but for this class we will use DB Browser for SQLite – download and install the appropriate version for your platform (for Windows, choose 64-bit unless you have good reason; for Linux you may have to build from source if packages are out of date).

Open DB Browser for SQLite and click the "Open Database" button. In the resulting dialog, find the `Chinook_Sqlite_AutoIncrementPKs.sqlite` file in the directory with your Chinook files. The "Database Structure" tab on the left, as well as the "DB Schema" tab on the right, shows you the tables of Chinook (as depicted in Figure 1). The "Browse Data" tab allows you to see the data in these tables (e.g. Figure 4). Lastly, the "Execute SQL" tab will allow us to provide our own SQL to be run on this database.

Figure 3: Chinook database imported into MariaDB as viewed with phpMyAdmin.

3.1 Optional: Building a SQLite Database from Source/DDL

The `.sqlite` file we opened was a pre-made SQLite database. In order to create this file, you would first need a SQLite3 binary (`http://www.sqlite.org/download.html`). You would then execute a command-line statement to use the `Chinook_Sqlite_AutoIncrementPKs.sql` file as input and produce a database as output. For example, the command in Windows would be. . .

```
sqlite3.exe -batch -init path\to\Chinook_Sqlite_AutoIncrementPKs.sql anywhere\your_db.db
```

Note: (1) `your_db.db` should be the name of a new file, (2) the extension for the resulting database is not important, (3) the path for the new database file need not have anything to do with the location of the executable nor the `.sql` file, and (4) this command may take a few minutes to execute.
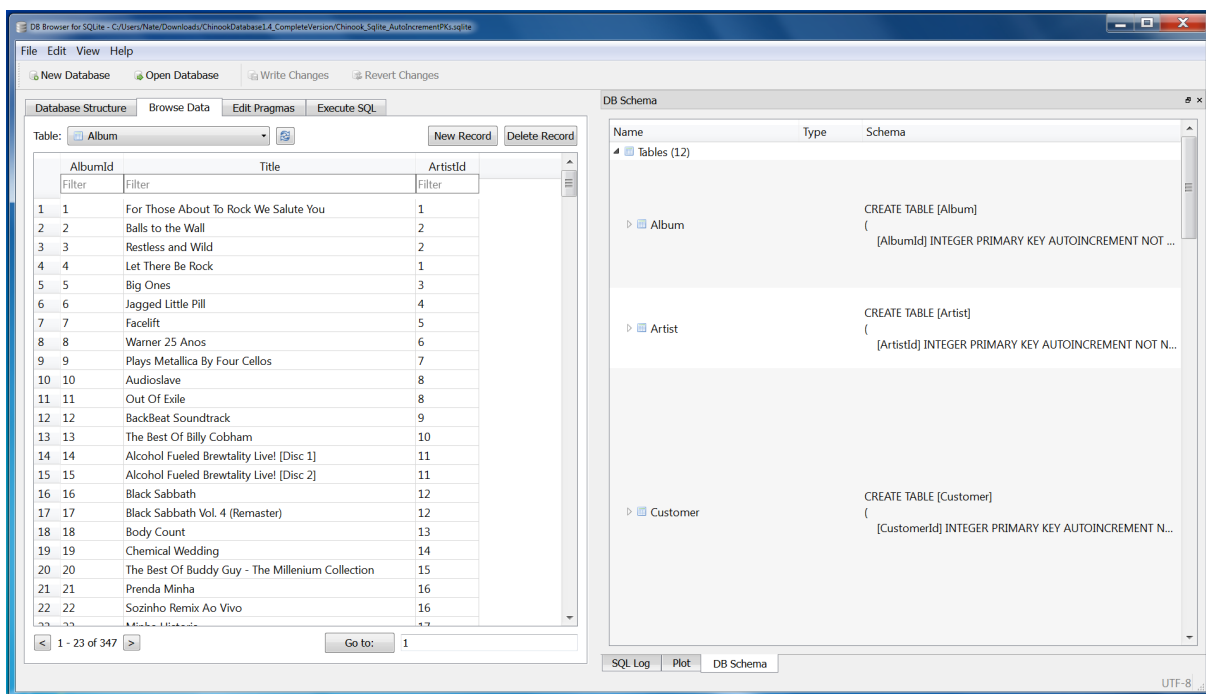

Figure 4: Chinook database opened with DB Browser for SQLite.