

MONICALIAN SILVERSILY

DDL - Data Definition Language

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Defining Tables & Views

Defining Tables

- DDL: Data Definition Language
 - A language that defines your relational schema
- Includes syntax for creating, modifying and deleting tables, views, indexes, etc.

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER

);
```

Defining Tables

- CREATE TABLE creating tables in a database
- Syntax:

```
CREATE TABLE <name> (
    <col name> <col type>...
    ...
)
```

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER
);
```

Defining Columns

- Column Definitions
 - A unique name within the table
 - A type
 - Additional metadata about the column

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER
);
```

Column Types

- Databases typically support many types of data
 - Integers
 - Strings
 - Decimal Numbers
 - Dates
 - Booleans
 - Binary (Blobs)

```
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER

);
```

Column Types - Integer

- Integer types will often specify a size (number of bytes)
 - o INT
 - SMALLINT
 - BIGINT
- In SQLite these all map to the type INTEGER
 - o 64 bit (8 byte) signed int

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER

);
```

Column Types - String

- Like integers, string types will often specify a size
 - CHARACTER(20)
 - VARCHAR(255)
 - NVARCHAR(100)
- In SQLite these all map to the type TEXT
 - No size limit even if you specify one with VARCHAR

```
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER

(1);
```

Column Types - Decimal

- Decimal types usually specify a precision and scale
 - DECIMAL(5, 2)
 - NUMERIC(10, 5)
- Precision: total number of decimal numbers to store
- Scale: number of decimal numbers to the right of the decimal point

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER
);
```

Column Types - Decimal

- Note that database can have very high precision decimal numbers
 - May be "lossy" when converting to things like a double

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER
);
```

Column Types - Decimal

- SQLite has two decimal related types:
 - REAL double precision floating point number
 - NUMERIC I believe double precision as well, hard to tell

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER
);
```

Column Types - Dates

- Typically multiple Date types
 - o DATE
 - DATETIME
 - TIMESTAMP
- Careful with timezones!
- Typically stored in GMT
- SQLite stores these as NUMERIC

```
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER

1);
```

Column Types - Booleans

- Usually
 - BOOLEAN
- SQLite, again, stores these as NUMERIC
 - KISS

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER
);
```

Column Types - Blobs

- Used to store raw binary data
 - o BLOB
- SQLite actually has a BLOB data type
- A common alternative:
 - Write to disk or the cloud
 - Store URL for blob
 - Databases usually aren't very good with binary data

```
CREATE TABLE albums(
AlbumId INTEGER,
Title NVARCHAR(160),
ArtistId INTEGER

);
```

Altering Tables

- ALTER TABLE statement
- Syntax:

```
ALTER TABLE <name> <alterations>
```

Here is a table rename

```
ALTER TABLE
albums_bak
RENAME TO albums_backup;
```

Altering Tables - Add Col

- To add a column you use the ADD COLUMN clause
- Common operation as your application grows
- Some web frameworks
 manage these sorts of
 changes with a migration
 management system

```
ALTER TABLE
albums_backup
ADD COLUMN NEW_COL TEXT;
```

Altering Tables - Rename Col

- To rename a column you use the RENAME COLUMN clause
- Uncommon in my experience

```
ALTER TABLE
albums_backup
RENAME COLUMN NEW_COL to NewColumn;
```

Altering Tables - Drop Col

- Some databases support a DROP COLUMN clause
- SQLite does not
- You will need to
 - create a copy table
 - move data to the copy
 - rename tables
 - The ol' LeadDyno gambit

```
ALTER TABLE
albums_backup_
DROP COLUMN NewColumn;
```

Dropping Tables

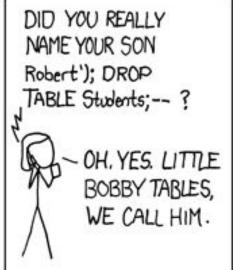
- SQLite does support dropping tables
- Careful!
- Remember to sanitize all user input!

```
DROP TABLE albums_backup;
```

DDL - Tables & Views

HI, THIS IS
YOUR SON'S SCHOOL.
WE'RE HAVING SOME
COMPUTER TROUBLE.







Views

- A View is a result set of a stored query
- A view allows you to embed a query directly in the database
 - The DBMS may be able to optimize access to this data
 - Can encapsulate complex queries and joins to simplify data access
- Views are Read Only

```
CREATE VIEW tracksPlus AS

SELECT tracks.*,
    albums.Title as AlbumTitle,
    artists.Name as ArtistName

FROM tracks

JOIN albums ON
    tracks.AlbumId = albums.AlbumId
    JOIN artists ON
    albums.ArtistId = artists.ArtistId;
```

Views - Creating

- We use the CREATE VIEW statement to create views
- Here we are doing some joins to display more friendly data when we look at tracks

```
CREATE VIEW tracksPlus AS

SELECT tracks.*,
    albums.Title as AlbumTitle,
    artists.Name as ArtistName

FROM tracks

JOIN albums ON
    tracks.AlbumId = albums.AlbumId
    JOIN artists ON
    albums.ArtistId = artists.ArtistId;
```

Views - Using

- You can run queries against views
- Here we find all tracks by AC/DC in this view

```
SELECT *
from tracksPlus
WHERE ArtistName = "AC/DC";
```

Views - Deleting

Same as tables

DROP VIEW tracksPlus;

Views

- In my experience, database administrators love views
 - Let's them create the SQL just right...
- Developers not so much
 - o Inflexible
 - Difficult to update

```
CREATE VIEW tracksPlus AS

SELECT tracks.*,
    albums.Title as AlbumTitle,
    artists.Name as ArtistName

FROM tracks

JOIN albums ON
    tracks.AlbumId = albums.AlbumId
    JOIN artists ON
    albums.ArtistId = artists.ArtistId;
```

DDL - Tables & Views

- We looked at how to create tables with the CREATE TABLE statement
- We looked at the common database column types
 - SQLite has a simplified set of data types
 - Commercial database have much more extensive data types available
- We looked at how to alter and delete tables and columns
- Finally, we took a look at Views
 - A way to encapsulate queries in a database so that they look like tables



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