

Introduction to Database Systems: CS305 SQLite3 and Python Primer

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Big Data

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to Database
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Big Data

Five steps

Basic Concatenation

Making Useful
Strings

Queries From Strings

Let's Code!

Multiples of bytes V•T•E					
Decimal			Binary		
Value		Metric	Value	IEC	JEDEC
1000	kB	kilobyte	1024	KiB kibibyte	KB kilobyte
1000 ²	MB	megabyte	1024 ²	MiB mebibyte	MB megabyte
1000 ³	GB	gigabyte	1024 ³	GiB gibibyte	GB gigabyte
1000 ⁴	TB	terabyte	1024 ⁴	TiB tebibyte	—
1000 ⁵	PB	petabyte	1024 ⁵	PiB pebibyte	—
1000 ⁶	EB	exabyte	1024 ⁶	EiB exbibyte	—
1000 ⁷	ZB	zettabyte	1024 ⁷	ZiB zebibyte	—
1000 ⁸	YB	yottabyte	1024 ⁸	YiB yobibyte	—
Orders of magnitude of data					

- Upwards of 2.7 Zetabytes of data exist in the digital universe
- YouTube users upload 48 hours of new video every minute
- Increase in unstructured data: text, photos, etc.
- <https://www.waterfordtechnologies.com/big-data-interesting-facts/>

Facebook's Daily Data Use

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Let's Code!

- Facebook processes:
 - 2.5 billion pieces of content
 - upwards of 500 terabytes of data each day from status and location details
 - Processing in 2.7 billion Like actions
 - 300 million photos per day,
 - Scans roughly 105 terabytes of data each half hour
 - 100 petabytes of data are stored in a single Hadoop disk cluster (a distributed system for data management)

Current Estimates for Users Online

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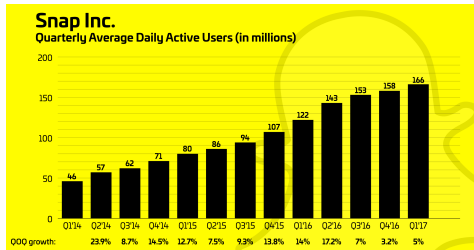
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Let's Code!



- Facebook: 2.7 Billion Active users
- Amazon: 112 Million (US users)
- SnapChat: 238 million daily active users worldwide
- Google: 4.39 Billion internet users (worldwide)
- Instagram: 1 Billion monthly active users, 500 Million each day.

Lots of names, photos, passwords and posts to record!

How are we to **manage** all this data?

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Automate the database management processes using software!!

Standardized Database Access with Python

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Let's Code!

PEP 0249

- Python Database API Specification v2.0
- <https://www.python.org/dev/peps/pep-0249/>
- A standard API to encourage similarity between the Python modules used for accessing databases.
- Does not provide a library nor a module, just specifications on how to make them
- Third party modules may adhere to these specifications

Steps to run a command in SQL using Python

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Let's Code!

Five basic steps to using a database according to the Python Database API Specification v2.0

- Building automated framework in Python3
 - Step 1: Defining the query
 - Step 2: Connecting to the database
 - Step 3: Execute the query
 - Step 4i, (SELECT): Analyze the result
 - Step 4ii, or (UPDATE): Commit the change
 - Step 5: Cleaning up; close the database connection

Nice tutorial: http://sebastianraschka.com/Articles/2014_sqlite_in_python_tutorial.html

Over all: Using Python3



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A concatenated string

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Let's Code!

Note the 'f' before the quotes to enable formatting

```
myCollege_str = "Allegheny"  
mesg_str = f"I go to {myCollege_str }!!"  
print(mesg_str)
```

```
myCollege_str = "Allegheny"  
myMajor_str = "CompSci"  
mesg_str = f"At {myCollege_str}, my major is {myMajor_str}"  
print(mesg_str)
```

Adding quotes: note the forward slashes in strings

```
iSay_str = "Cool"  
mesg_str = f"They say it is a \"{iSay_str}\" major"  
print(mesg_str)
```

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A concatenated string

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Let's Code!

- Queries are strings of code that can be created by Python.
- These queries can be sent to database management software

Making a Query Statement

```
a1_str = "deptName"  
a2_str = "course"  
name_str = "Miller"  
table_str = "Instructor"
```

```
myQuery_str = f"SELECT {a1_str}, {a2_str} FROM {table_str} WHERE name == \"{name_str}\""
```

```
print(myQuery_str)
```

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Let's Code!

Making An Insert Statement

```
myTable = "Instructor"  
PersonID = "10101"  
name_str = "Miller"  
student = "S1"
```

```
insert_str = f"INSERT INTO {myTable} VALUES({PersonID}, \"{name_str}\", \"{student}\")"
```

```
print(insert_str)
```

Choose variable names that make sense to your code!

Python: A Database Management System (DMS)

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Let's Code!

Let's Try It Out!

- Locate the sandbox database builder file `sandbox/campusDB_build.txt` and make your DB.
- Call up your favourite editor and let's begin programming.

THINK

Now Modify Your DMS!

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Let's Code!

Do Something Different!

- Try adding query code for other tables.
- What attributes can you query?
- Can you write code for a query involving two tables?



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