The (un)known Super Ant

Advantages

- **Zero conf, serverless**
- **Free** for all use (public domain)
- **Compact** and **fast**
- The most **implemented** in the world, **standard**
- **Reliable**, very well tested

SQLite uses

When use SQLite?

- Data analysis
- As proprietary file format
- Cache, temporary, in memory
- Single user version, education or experimental
- Embedded, mobile, IoT

When NOT use SQLite?

- Many concurrent writes
- GIANT databases (more than 281 Tb)
- Accessed by network

Best practices with Python

SQLite y Python: **Connecting**

```
con = sqlite3.connect(database[,...])
con.row_factory = sqlite3.Row
row = con.execute("SELECT 1 as a")
      .fetchone()
col1 = row["a"]
```

SQLite y Python: **Use context managers**

```
con = sqlite3.connect(database[,...])
with con:
   con.execute("sql")
```

SQLite y Python: ***PLACE HOLDERS***

- **Place holders**,

```
sql = "INSERT INTO tb (a, b) VALUES (?, ?)"
con.execute(sql, (var_A, var_B))
```

- Avoid conversion errors.
- Prevent sql injection.

SQLite y Python: **Optimize**

- Prefer using connection to cursors

```
con.execute("sql", (variables,))
con.executemany("sql", [n-tuples])
con.executescript("sql; sql; ...")
```

SQLite y Python: **PRAGMAS**

```
con.execute("PRAGMA
                schema.option = value")
```

- To see and configure
- Schema refers to default database.

Transactions
Isolation
Concurrency

Transactions

- All or none.
  - Writes all the data in the transaction or nothing.

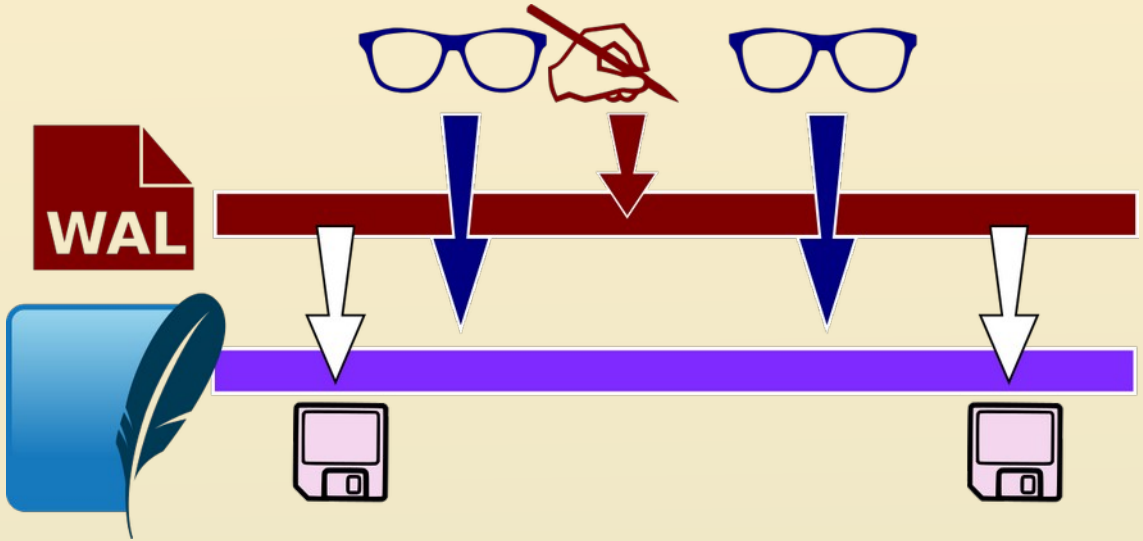
BEGIN

Modifications

COMMIT or ROLLBACK

Journal Mode: **W**RITE **A**HEAD **L**OGGING

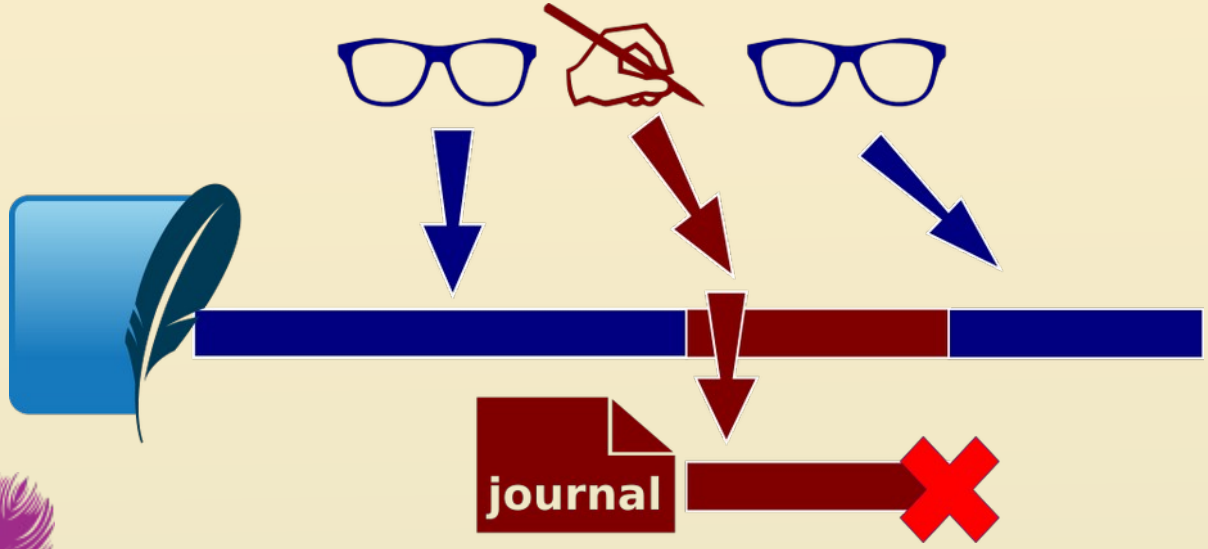
- Writes a logging file. Sync afterwards.



PRAGMA
journal_mode= WAL;

Journal Mode: **Rollback**

- Rollback files.



PRAGMA
journal_mode=
DELETE;
TRUNCATE;
PERSIST;

Journal Mode: **In memory or disabled**

- Maximize performance
- Higher risk of corruption

PRAGMA
journal_mode=
MEMORY;
OFF;

Isolation levels

- Determines when changes become visible to other connections

Default:

```
con = sqlite3.connect(database,
check_same_thread=True, isolation_level=None)
```

Isolation levels: **EXCLUSIVE**

- Use only one connection.
- Only one reader and one writer.

Isolation levels: **INMEDIATE**

- Request writing
- Complete pending operations
- Lock DB and write.
- Release the DB.

Isolation levels: **DEFERRED**

- Request permission to write
- Use read-only mode. Allow readings
- Finish writing
- Free the DB for writing

Indexing

Indexing: When?

- Fields used for searches.
- Fields that will be used for relationships
- ✕ AVOID over indexing
  - Decreases performance

Partial index

- Index only some rows in a table

```
CREATE UNIQUE INDEX leaders
  ON members(id_team)
  WHERE is_team_leader;
```

Expression index.

- Index by the result of **deterministic functions.**

```
CREATE INDEX t2xy ON t2(x+y);
SELECT * FROM t2 WHERE y+x=22;
```

FTS Full Text Search

- Split words from text data.
- Generate VIRTUAL TABLES
- Use MATCH operator.

```
CREATE VIRTUAL TABLE email USING fts5(sender, title, body);

SELECT * FROM email WHERE email MATCH 'search';
```

Data types

Date & Time

Data types: standard

- Str
- Int
- Float
- None

- Bytes

  BLOB: Large binary objects
- JSON

Date and time: SQLite functions.

Convert str to date

- Date, Time,
- Datetime
- Julianday
- Strftime

Modifiers

Adding o changing dates

- `Start of período`
- `*/- x período`

Date and time: SQLite functions

```
>>> cur = con.execute("select date('now')")
>>> cur.fetchall()
[('2021-07-23',)]
```

Date and time: SQLite functions

The 3rd sunday on October's.

```
date('now', 'start of year',
'+9 months', '+14 days', 'weekday 0')
```

Date and time

```
con = sqlite3.connect('db',
detect_types=sqlite3.PARSE_DECLTYPES)


con.execute('CREATE TABLE foo (bar, baz timestamp)')


con.execute('INSERT INTO foo VALUES (?, ?)',
            (23, datetime.datetime.now()))
```

Date and time

```
>>> cursor = con.execute("select * from foo")
>>> cursor.fetchall()
[(23, datetime.datetime(2021, 7, 22, 22, 24, 17, 561061))]
```

Content

- SQLite and Python: best practices
- Transactions, Isolation and Concurrency
- Indexing
- Data types, date & time

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