PostgreSQL & SQLite

Adobe AIR

Dropbox

Mozilla Firefox

Adobe Acrobat

McAfee

Google Chrome

Adobe Photoshop LIGHTROOM

Microsoft Excel

iTunes

Skype

QuickBooks

Safari

# The most widely used SQL engine

- More than 2,000,000,000 running instances

- More than 500,000 applications
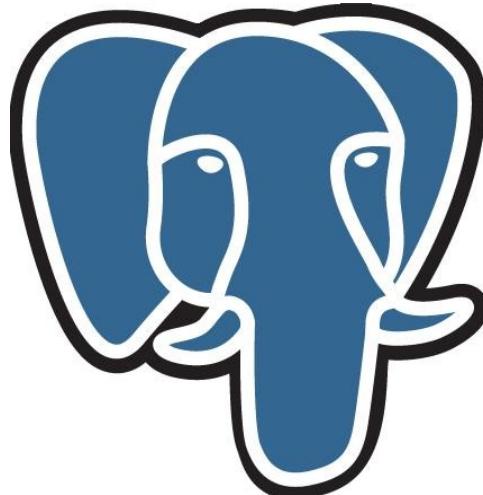
PostgreSQL

Spin-off

SQLite

PostgreSQL

Depends On

SQLite

WWPD

http://www.sqlite.org/sqllogictest
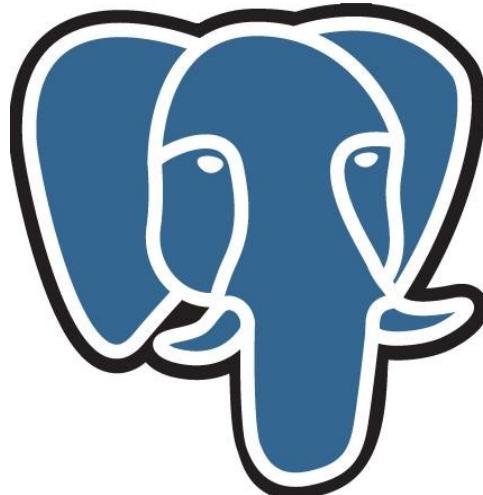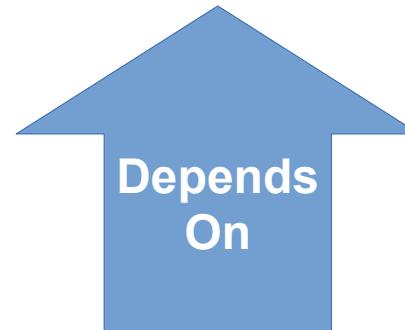
- SQLite

- MySQL

- Oracle

- SQL Server

Crashes and/or incorrect answers
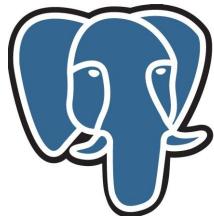
- PostgreSQL ← Never crashed and always correct

PostgreSQL   versus   SQLite

PostgreSQL	SQLite
Enterprise Data Depot	Application File Format
Client and Server	Serverless
Scale Up	Scale Down
Hidden Files	Single Disk File
Dump and Restore	Backwards Compatible
Multiple binaries	One file of ANSI-C

C,S,V

1001101
0010111

Pile of
files

Ubercool.app ☒

File   Edit   View   Tools   Help

| | ste | Shell | Search | > | < | Quote | Unquote | Wrap | 1..24

Reload
Open…
New
Save
Save as…
Shell

Quit

/home/drh/Ubercool.app   line 1 of 1
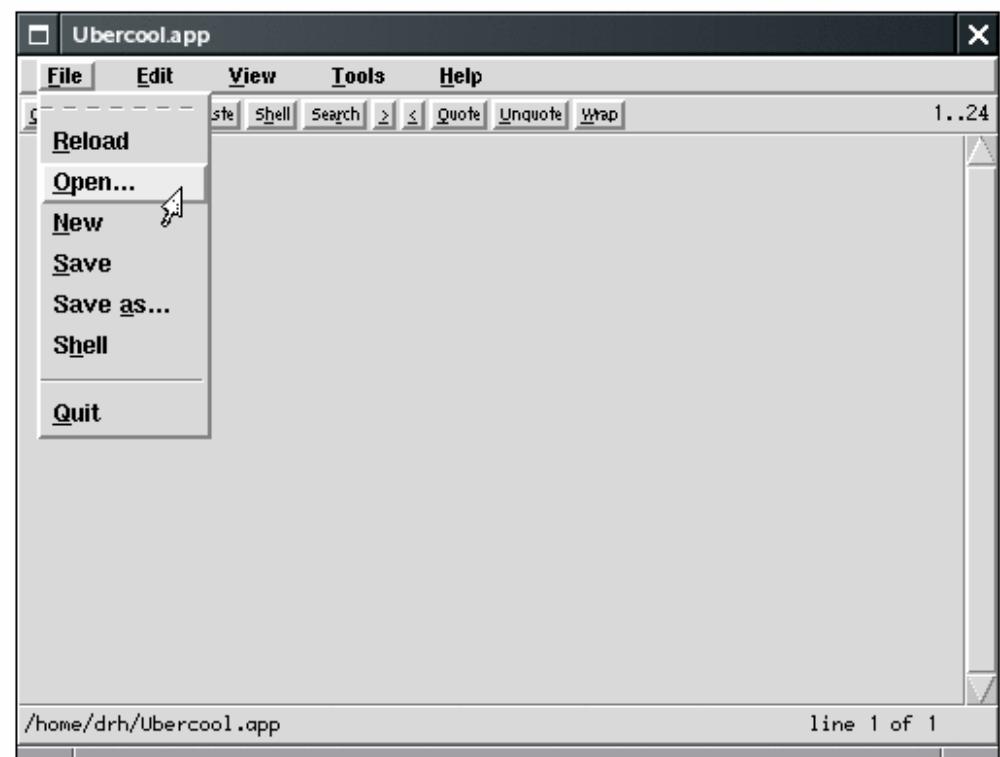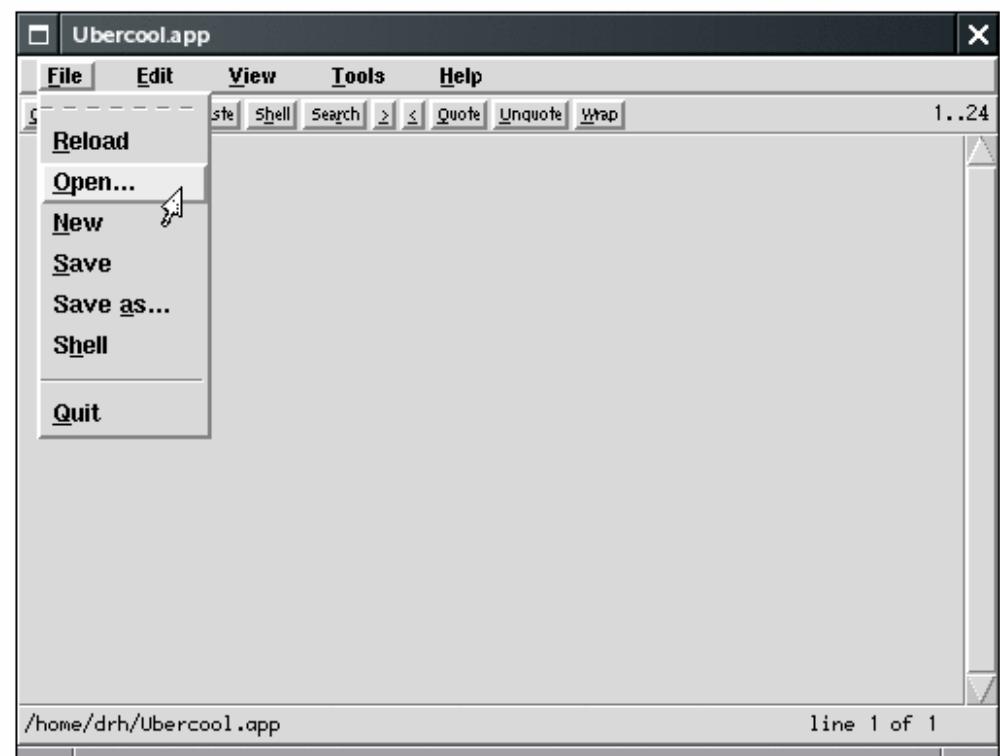
SQLite as Application File Format

- No parsing code to write and debug

- Single-file documents

- High-level query language

- Accessible content

- Cross-platform and cross-language

- Atomic transactions

- Incremental and continuous updating

- Easily extensible

- Multi-process and multi-thread safe

- Improved performance

Real Example: MicroStation
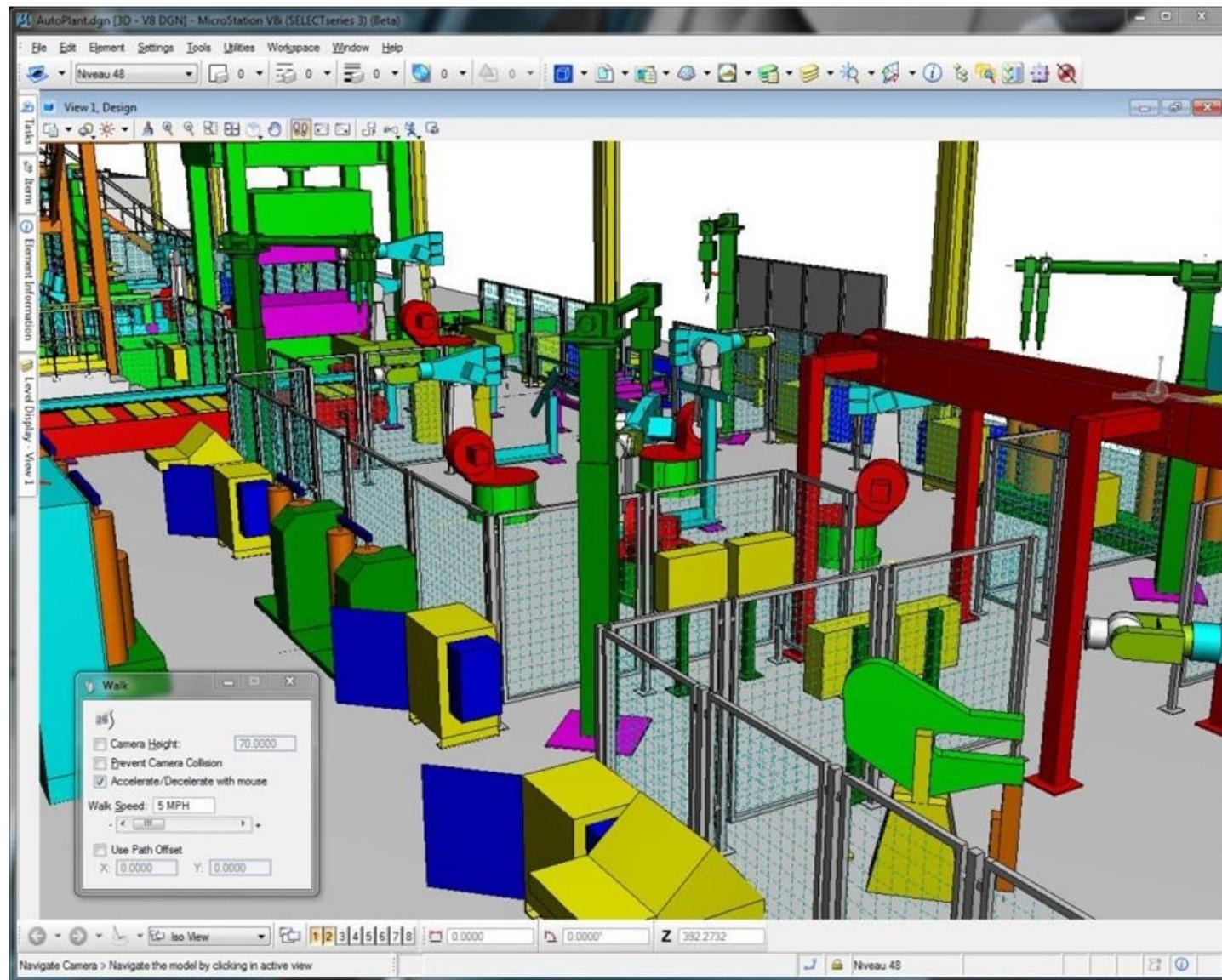
Real Example: Adobe Lightroom

What If....

OpenDocument was an SQLite database Instead of a ZIP archive of XML files...

_____

- Fast and low-I/O save of small changes

- Fast startup

- Reduced memory usage (no need to hold the entire presentation in memory at once)

- No need for "recovery" after a crash

- No need to "file save"

- Undo across sessions

- Large searchable database of slides

What If....

ePub was an SQLite database
Instead of a ZIP archive of XML files...

_____

- Full text search

- Faster open of large documents

- Multiple image resolutions

SQLite Archiver

```
CREATE TABLE sqlar(
  name TEXT PRIMARY KEY,  -- name of the file
  mode INT,               -- access permissions
  mtime INT,              -- last modification time
  sz INT,                 -- original file size
  data BLOB               -- compressed content
);
```

- http://www.sqlite.org/sqlar
- Size similar to ZIP
- Transactional
- Concurrent & random access

SQLAR is 0.47% larger than ZIP

```
-rw-r--r-- 1 drh drh 9677708 May 17 12:44 pgcon2014.odp
-rw-r--r-- 1 drh drh 9722880 May 17 12:46 pgcon2014.sqlar
```

What If….

Git stored content in an SQLite database instead of in a pile-of-files under the ".git" folder.

___

- Advanced queries for a richer user interface
- Proof against crashes
- Wiki and Tickets
- Concurrent access
- Coding errors less likely to corrupt repository
- On-the-fly repository compression
- Single-file repository

PostgreSQL   versus   SQLite

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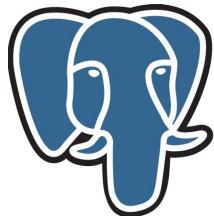
PostgreSQL versus SQLite

Enterprise Data Depot | Application File Format

"SQLite is *not* a replacement for PostgreSQL.

SQLite is a replacement for fopen()."
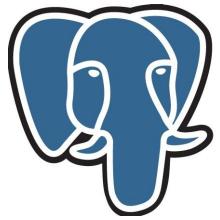
PostgreSQL versus SQLite

OK
CREATE TABLE abc(xyz INT);
INSERT INTO abc VALUES('123');
OK

OK
CREATE TABLE abc(xyz TEXT);
INSERT INTO abc VALUES(123);
OK

NO!
CREATE TABLE abc(xyz INT);
INSERT INTO abc VALUES('Hello!');
OK
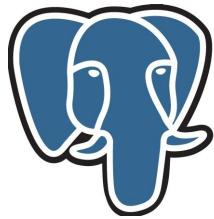
PostgreSQL versus SQLite

NO!	CREATE TABLE abc(xyz);	**OK**
NO!	CREATE TABLE abc(xyz ANY);	**OK**
OK	CREATE TABLE abc(xyz TEXT);	**OK**
NO!	CREATE TABLE abc(xyz BLOB); INSERT INTO abc VALUES(x'FEDC');	**OK**

United by SQL

- The SQL front-end is the secret sauce

- Most widely known programming language

- Let the engine figure out the algorithm

- Representation is the essence of programming

"Representation is the essence of computer programming."

"Show me your flowcharts and conceal your tables, and I shall continue to be mystified. Show me your tables, and I won't usually need your flowcharts; they'll be obvious."

- Fred Brooks, *The Mythical Man-Month*, pp102-103

"Data dominates. If you've chosen the right data structures and organized things well, the algorithms will almost always be self-evident. Data structures, not algorithms, are central to programming."

- Rob Pike: Rule of Programming #5

"Bad programmers worry about the code. Good programmers worry about data structures and their relationships."

- Linus Torvalds, on the Git mailing list, 2006-06-27

United by SQL

- The SQL front-end is the secret sauce
- Most widely known programming language
- Let the engine figure out the algorithm
- Representation is the essence of programming

*Key/value and "eventually consistent"
data stores are a passing fad.*

SQL is here for the long term.

Postmodern Databases

- Absence of objective truth

- Queries return opinions rather than facts
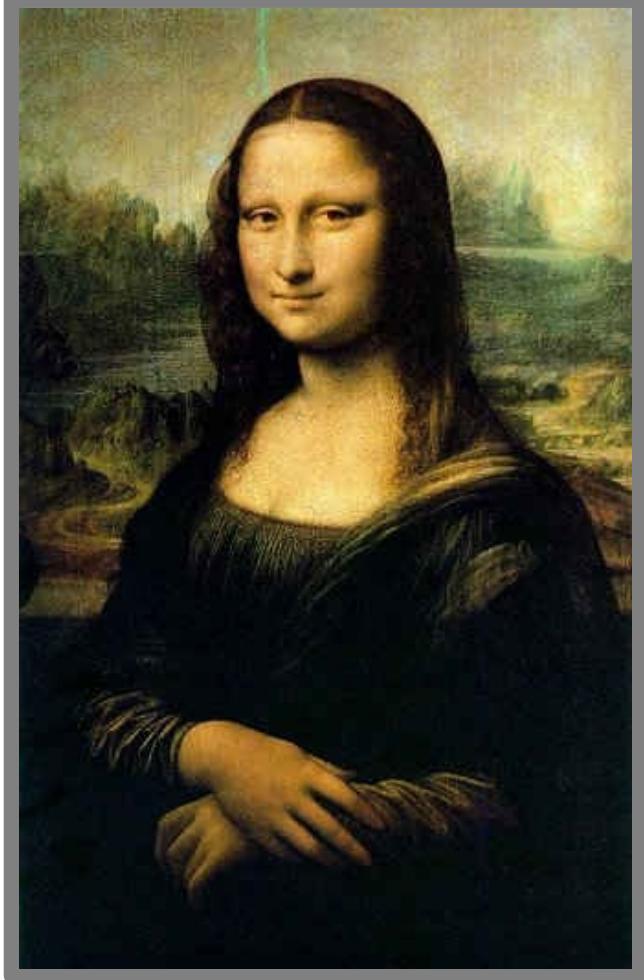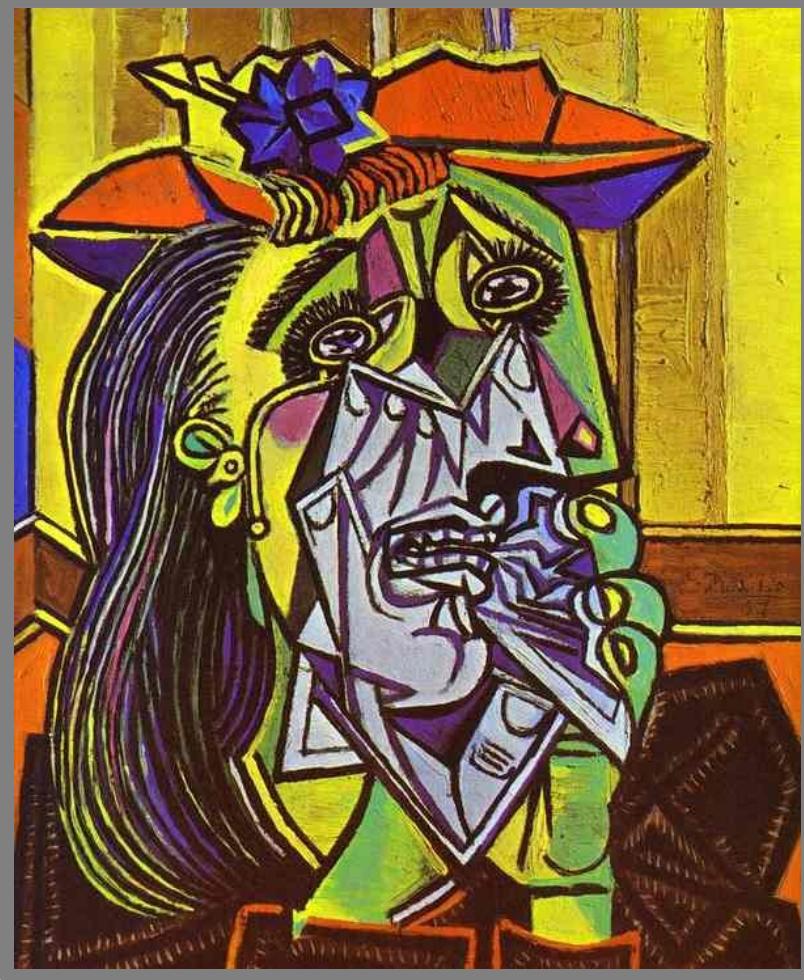
PostgreSQL	Cassandra
SQLite	MongoDB
Oracle	CouchDB
SQL Server	BigTable
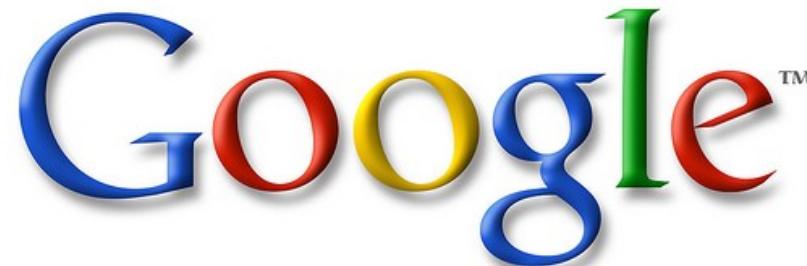
Alexander Lloyd at Berlin Buzzwords, 2012

There was another big cultural shift at Google...
The SQL-based analytics system, Dremel... made a lot
of SQL converts at Google. People realized it is incredibly
powerful to just push the semantics of your query down into
the storage system and let it figure out what to do.

NoSQL databases that only have weak consistency
are enforcing a broadly applied premature optimization
on the entire system.
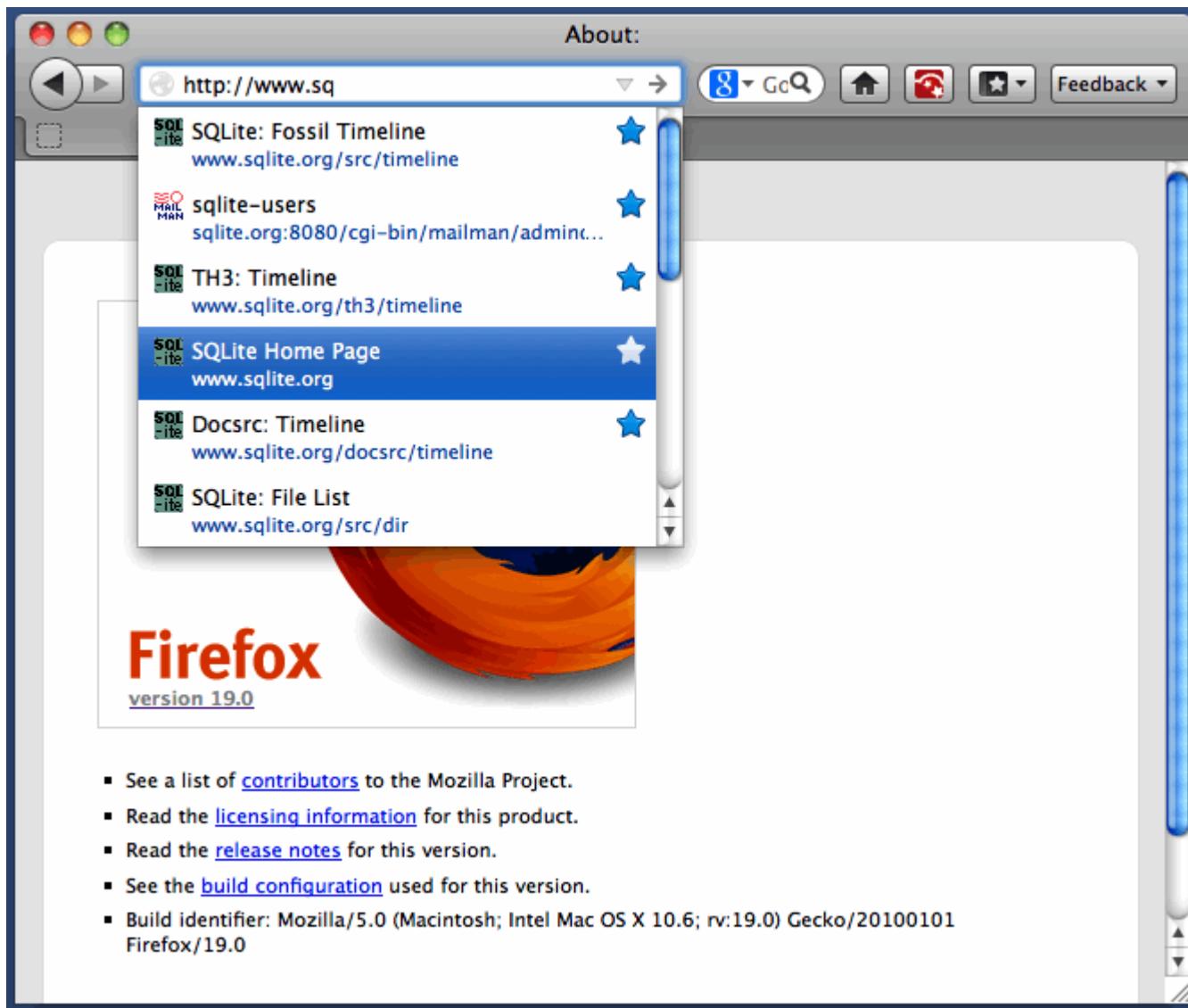
PostgreSQL: Timeline   ✕

← → C   🗋 www.sqlite.org/postgresql/timeline?c=2000-05-29&nd&n=8&y=ci   ☆ ≡

🗀 News   🗀 Projects   🗀 Local   🗀 Docs   🗀 Banks   🗀 Biz   🗀 Admin   M Gmail   🗀 Imported From Fi...

PostgreSQL
Timeline

Not logged in

| Home | Timeline | Files | Branches | Tags | Tickets | Wiki | Login |

| 200 Entries | All Types | Events Only | Show Files | Tags Only | Tickets Only | Unhide | Wiki Only |

8 checkins occurring around 2000-05-29.

2000-05-29

05:45   [066817db9f] Generated header files parse.h and fmgroids.h are now copied into the src/include tree, so that -I backend is no longer necessary anywhere. Also, clean up some bit rot in contrib tree. (user: tgl@sss.pgh.pa.us, tags: trunk)

01:59   [b217cf4879] Second round of fmgr changes: triggers are now invoked in new style, CurrentTriggerData is history. (user: tgl@sss.pgh.pa.us, tags: trunk)

01:55   [6b557e0be0] More vacuum cleanups (user: bruce@momjian.us, tags: trunk)

01:46   [db61612e01] More vacuum renaming. (user: bruce@momjian.us, tags: trunk)

2000-05-28

20:34   [c3b6308a07] Miscellaneous cleanups of places that needed to account for new pg_language entries. (user: tgl@sss.pgh.pa.us, tags: trunk)

20:33   [64c3574441] Constant-expression simplifier now knows how to simplify strict functions that have at least one constant-NULL input, even if other inputs are not constants. (user: tgl@sss.pgh.pa.us, tags: trunk)

18:06   [f3535636ed] Install fmgr rewrite doc as README file. Need to update user docs still ... (user: tgl@sss.pgh.pa.us, tags: trunk)

```sql
SELECT blob.rid AS blobRid,
       uuid AS uuid,
       datetime(event.mtime) AS timestamp,
       coalesce(ecomment, comment) AS comment,
       coalesce(euser, user) AS user,
       blob.rid IN leaf AS leaf,
       bgcolor AS bgColor,
       event.type AS eventType,
       (SELECT group_concat(substr(tagname,5), ', ')
          FROM tag, tagxref
         WHERE tagname GLOB 'sym-*'
           AND tag.tagid=tagxref.tagid
           AND tagxref.rid=blob.rid
           AND tagxref.tagtype>0) AS tags,
       tagid AS tagid, brief AS brief,
       event.mtime AS mtime
  FROM event CROSS JOIN blob
 WHERE blob.rid=event.objid
   AND NOT EXISTS(SELECT 1 FROM tagxref
                   WHERE tagid=5 AND tagtype>0
                     AND rid=blob.rid)
   AND event.type='ci'
   AND event.mtime>=2451693.500000
 ORDER BY event.mtime ASC
   LIMIT 8
```

PostgreSQL: Activity Repc ×

www.sqlite.org/postgresql/reports?view=byuser

News   Projects   Local   Docs   Banks   Biz   Admin   M Gmail   Imported From Fi...

PostgreSQL
Activity Reports

Not logged in

| Home | Timeline | Files | Branches | Tags | Tickets | Wiki | Login |

| By Month | By User | By Week | By Weekday | By Year |

Event types: **all** checkins tickets tags wiki

Timeline Events (all types) by User

User	Events	
tgl@sss.pgh.pa.us	15723	
bruce@momjian.us	14066	
peter_e@gmx.net	3476	
scrappy@hub.org	1774	
heikki.linnakangas@iki.fi	1326	
rhaas@postgresql.org	1198	
lockhart@fourpalms.org	1114	
magnus@hagander.net	982	
meskes@postgresql.org	951	
alvherre@alvh.no-ip.org	860	
neilc@samurai.com	727	
andrew@dunslane.net	692	
vadim4o@yahoo.com	526	
ishii@postgresql.org	463	
teodor@sigaev.ru	399	
simon@2ndQuadrant.com	384	
inoue@tpf.co.jp	183	

http://www.sqlite.org/postgresql

Concluding Thoughts

- Think of PostgreSQL as a programming language

- PostgreSQL is the best available reference platform for SQL

- Use PostgreSQL as an enterprise data depot, and use SQLite for application files.