The Advantages of PostgreSQL

Bruce Momjian

PostgreSQL offers companies many advantages that can help their businesses thrive.

Creative Commons Attribution License  http://momjian.us/presentations

Last updated: February, 2019
Introduction

- Why use databases?
- Why use open-source?
- PostgreSQL history
- PostgreSQL in the real world
Why use databases?
Non-SQL Database Applications
SQL Database Applications
Database Transaction Protection (ACID)

- Multiple changes either all take place, or none of them
- Data always in a consistent state
- In-process changes invisible to outside users
- Data reliably stored

- High level of concurrency and reliability
Why use Open Source Software?
Closed-Source Software

Black Box

Func(...)

Data ...

987234

VWOJVC
Open-Source Software

Clear Box

https://www.flickr.com/photos/ajc1/
Support of Close-Source Software

Support → Database Company
Support of Open-Source Software

Support

Source Code

Support

EnterpriseDB

Support

Mailing Lists
The Future of Open Source

- Features
- Performance
- Reliability

Time

Open Source
Closed Source
Use for any purpose, including sale of customized versions with your closed-source modifications. PostgreSQL supports custom:

- Functions
- Operators
- Data Types
PostgreSQL History
The University of California at Berkeley
Postgres

Michael Stonebraker

Postgres95

Jolly Chen and Andrew Yu
PostgreSQL Code Base History

- **Ingres** — research prototype, spawned Relational Technologies, purchased by Computer Associates
- **Postgres** — research prototype, spawned Illustra, purchased by Informix
- **Postgres95** — added SQL, spawned PostgreSQL
1977-1985  Ingres
1986-1994  Postgres
1994-1995  Postgres95
1996-      PostgreSQL
Developer’s Globe
PostgreSQL Core Team

Top row: Thomas Lockhart, Jan Wieck, Tom Lane, Marc Fournier
Bottom row: Vadim Mikheev, Bruce Momjian
## Release Dates and Sizes

<table>
<thead>
<tr>
<th>Date</th>
<th>Release</th>
<th>Lines of code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996-08-01</td>
<td>1.02.1</td>
<td>244,581</td>
</tr>
<tr>
<td>1996-10-27</td>
<td>1.09</td>
<td>178,976</td>
</tr>
<tr>
<td>1997-01-29</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>1997-06-08</td>
<td>6.1</td>
<td>200,709</td>
</tr>
<tr>
<td>1997-10-02</td>
<td>6.2</td>
<td>225,848</td>
</tr>
<tr>
<td>1998-03-01</td>
<td>6.3</td>
<td>260,809</td>
</tr>
<tr>
<td>1998-10-30</td>
<td>6.4</td>
<td>297,918</td>
</tr>
<tr>
<td>1999-06-09</td>
<td>6.5</td>
<td>331,278</td>
</tr>
<tr>
<td>2000-05-08</td>
<td>7.0</td>
<td>383,270</td>
</tr>
<tr>
<td>2001-04-13</td>
<td>7.1</td>
<td>410,500</td>
</tr>
<tr>
<td>2002-02-04</td>
<td>7.2</td>
<td>394274</td>
</tr>
<tr>
<td>2002-??-??</td>
<td>7.3</td>
<td>453282</td>
</tr>
</tbody>
</table>
Release 1.02
Date: 1996-08-01
- Initial release by PostgreSQL Global Development Team
- Apply all outstanding email patches.
Release 1.09
Date: 1996-11-04

- Fixes for server and command failures.
Release 6.0
Date: 1997-01-29

- Unique indexes
- GIST added
- Improved authentication
- IN/BETWEEN added
Release 6.1
Date: 1997-06-08

- New data types: DATETIME, TIMESPAN, CIRCLE
- GEQO
- Improved optimizer statistics
- Libpq++ overhauled
- Multi-column btree indexes
- new SET/SHOW/RESET commands
- New SEQUENCE feature
Release 6.2
Date: 1997-10-02

- New Java JDBC driver
- Triggers added
- Server Programming Interface (SPI) added
- NOT NULL constraint
- DEFAULT and CONSTRAINT added
- ANSI functions added for DATE/TIME and PRECISION
Release 6.3
Date: 1998-03-01

- Subselects
- Unix domain socket support for performance
- Improved user password configuration
- Much improved documentation
- Separate permissions for views
- PRIMARY KEY support
- PL/TCL procedural language added
- UNION added
- Python added
- ECPG added
- New ODBC driver
- Pgaccess added
Release 6.4
Date: 1998-10-30

- Improved RULEs and VIEWs
- PL/PgSQL added
- Multi-byte character support
- Internet address data types
- HAVING added
Release 6.5
Date: 1999-06-09

- MVCC
- Live backups
- NUMERIC data type
- Temporary tables
- CASE
- INTERSECT
- EXCEPT
- LIMIT/OFFSET
- SELECT...FOR UPDATE
- Optimizer overhaul
Release 7.0
Date: 2000-05-08

- Foreign keys
- More optimizer improvements
- ANSI JOIN syntax
- PL/Perl
- Oracle compatibility functions
Release 7.1
Date: 2001-04-13

- Write-ahead Log (WAL)
- TOAST
- Outer Joins
- Overhauled function manager
Release 7.2
Date: 2001-12-??

- Non-locking VACUUM
- Fix for Transaction id / OID wraparounds
- Security fixes
- Optimizer improvements
- Error message internationalization
Performance - AS3AP

![Graph showing performance test results for 1-100 users.
Lines represent different performance levels.
Legends include Postgres, MySQL 5.2.2, MySQL tuned, Interbase 6.0, Proprietary 1, and Proprietary 2.
Y-axis represents transactions per second, ranging from 0 to 1400.
X-axis represents users ranging from 1 to 100.]
PostgreSQL in the Real World
Database Migration

- Oracle
- IBM’s DB2
- Microsoft-SQL
- Microsoft Access
- Informix
- Interbase
- Dbase/FoxPro
- MySQL
Database Languages

- C
- C++
- Embedded C
- Java
- Perl
- Python
- Tcl/Tk
- Php
- Odbc
<table>
<thead>
<tr>
<th>PostgreSQL Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX</td>
</tr>
<tr>
<td>BeOS</td>
</tr>
<tr>
<td>BSD/OS</td>
</tr>
<tr>
<td>FreeBSD</td>
</tr>
<tr>
<td>HP-UX</td>
</tr>
<tr>
<td>IRIX</td>
</tr>
<tr>
<td>Linux</td>
</tr>
<tr>
<td>MacOS</td>
</tr>
<tr>
<td>NetBSD</td>
</tr>
<tr>
<td>OpenBSD</td>
</tr>
<tr>
<td>SCO UnixWare</td>
</tr>
<tr>
<td>Solaris</td>
</tr>
<tr>
<td>SunOS</td>
</tr>
<tr>
<td>Tru64</td>
</tr>
<tr>
<td>Windows NT/2000</td>
</tr>
</tbody>
</table>
PostgreSQL Usage

- Order Entry, Inventory, Billing
- Customer Relations Management (CRM)
- Data warehouse, data analysis
- Medical/Hospital Records Storage
- Genetics
- Financial Accounting, Banking, Payroll
- Military
- Government, Social services, Elections
- Education
- Publishing
- Geography (GIS)
- Hotel Reservations, Restaurants
- Telephone billing, call tracking
- Helpdesk problem report tracking
- Sales Tracking
- Business to business commerce
PostgreSQL Web Site Usage

- Product purchase
- User preferences
- Job listings
- Auctions
- Real Estate listings
- Community building
- Dynamic content
- Text indexing
Future Directions

https://www.flickr.com/photos/143948408@N03/
Conclusion

http://momjian.us/presentations