

Future Postgres Challenges

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This presentation explores possible challenges to Postgres's success in the coming years.

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Outline

1. Current status
2. Project challenges
3. Competitive challenges
4. Technical challenges

1. Current Status



<https://www.flickr.com/photos/snikologiannis/>

Consistent Development

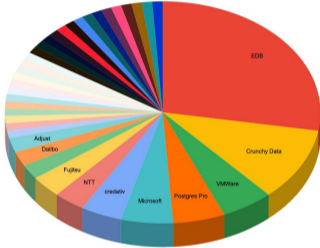
- 35+ years of development
- 25+ years of annual major releases
- ~180 features per major release
- Quarterly minor releases

Healthy Community Structure

- BSD license guarantees software will be available forever, including for proprietary use.
- Development and leadership is diversified geographically, culturally, and is multi-company.

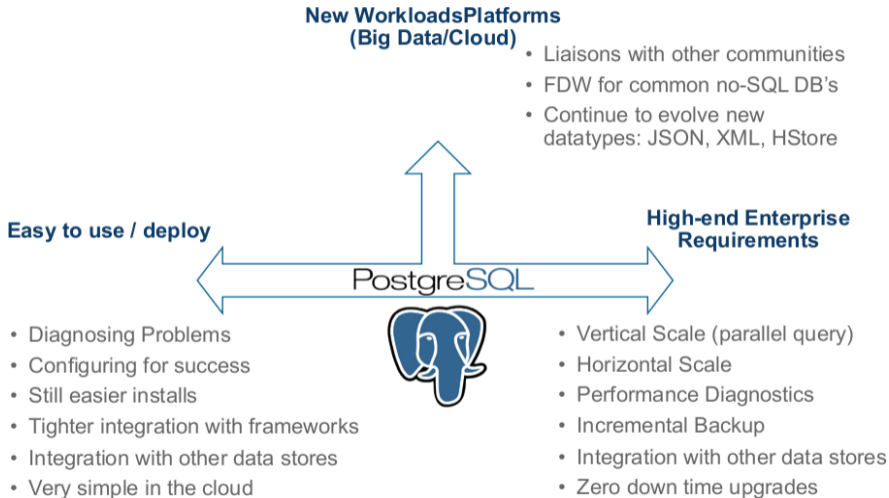
Strong Diversified Assistance

Postgres contributors (PostgreSQL.org + PG 13 Release Notes) w.o. personal or freelancers



- EDB
- Crunchy Data
- VMware
- Postgres Pro
- Microsoft
- credativ
- NTT
- Fujitsu
- PeopleDoc
- Dalibo
- Adjust
- Yandex
- University of Cambridge
- True Software
- Swarm64
- SRA OSS
- Rakuten
- Postgres Experts
- Playtech
- Paragon
- Open Standards Promotion Center, Japan
- Ongres
- MongoDB
- Minsait
- Iovation
- ILande
- Huawei
- HeteroDB
- Google
- Facebook
- Deriv.com
- Cybertec
- conova communications GmbH
- Brandwatch
- Basefarm AS
- Appen
- Amazon
- Afilias

Innovative Features



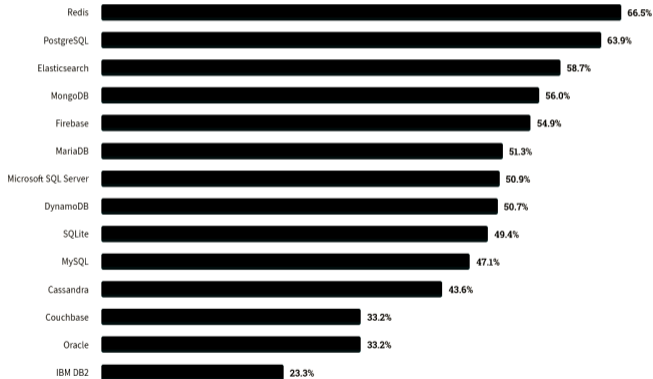
Most Loved Relational Database in 2020

Loved

Dreaded

Wanted

% of developers who are developing with the language or technology and have expressed interest in continuing to develop with it



<https://insights.stackoverflow.com/survey/2020#technology-most-loved-dreaded-and-wanted-databases-loved4>

2. Project Challenges



<https://www.flickr.com/photos/croydonclicker/>

Leadership Disruption

- Gimp was abandoned by its lead developers, later resurrected
- Red Hat took over CentOS, changed stability

Poor Reputation

- Security flaws
- Buggy releases
- Instability
- Poor performance
- Data corruption

Patent Attacks

- Developer with patents, Rambus
- Competitor with patents, Microsoft
- Patent trolls, Rothschild Patent Imaging LLC
- Open Invention Network

Identity Challenges

- Domain name
- Website
- Trademark

Cloud Vendor Starvation

- Cloud vendors use open source as upsell
- Already have infrastructure-as-a-service relationship with customers
- Company-controlled open source already impacted, changed licenses
- Red Hat challenged by cloud vendors

https://momjian.us/main/blogs/pgblog/2020.html#September_25_2020

https://momjian.us/main/blogs/pgblog/2020.html#September_28_2020

3. Competitive Challenges



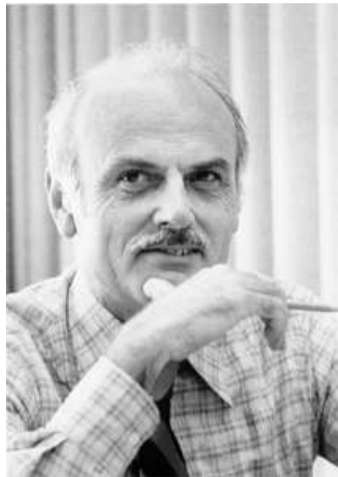
<https://www.flickr.com/photos/oui-ennui/>

Other Solutions

- Relational (e.g., MySQL, MariaDB)
- Embedded (SQLite)
- Document (MongoDB)
- Columnar (Cassandra)
- Data warehouse (Hadoop)
- Full text search (Elasticsearch)
- Time series (InfluxDB)

Decline of Relational

- Relational storage was proposed by E. F. Codd in 1970
- 50+ years still in use
- Very flexible
- Resisted challenges
 - XML databases
 - Object databases
 - NoSQL



https://en.wikipedia.org/wiki/Edgar_F._Codd

4. Technical Challenges



<https://www.flickr.com/photos/afc16/>

Write Amplification

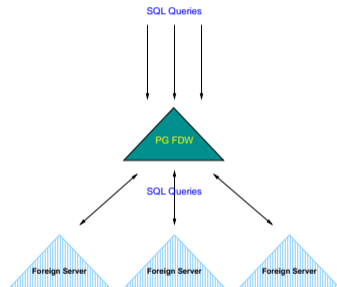
- Non-HOT updates can cause massive index updates
- Dead and old row version cleanup can become expensive for certain workloads
- Writes cause full page image and hint WAL writes
- Freezing of old transaction ids
- Incremental improvements
 - Are radical improvements needed?

Cluster File Encryption, TDE

- Newer versions of the PCI DSS specification make storage-only encryption less acceptable
- This is a check-box requirement for many financial deployments
- Development is in progress

Horizontal Scaling

- Allows data storage larger than possible on a single server
- Allows write scaling
- Enables large CPU and memory scaling
- Development is in progress



Obsolete Toolchain

Difficulty replacing obsolete or abandoned:

- Programming languages
- Support libraries
- Testing frameworks

Drastic Technology Changes

- New language, architecture, or storage that are difficult for Postgres to adopt
- Technology changes have happened before
 - SSDs, added `random_page_cost` to tablespaces
 - virtual machines, containers, cloud

Conclusion



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