The Maze of Postgres Options

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This presentation explains the many decisions needed to deploy Postgres successfully.
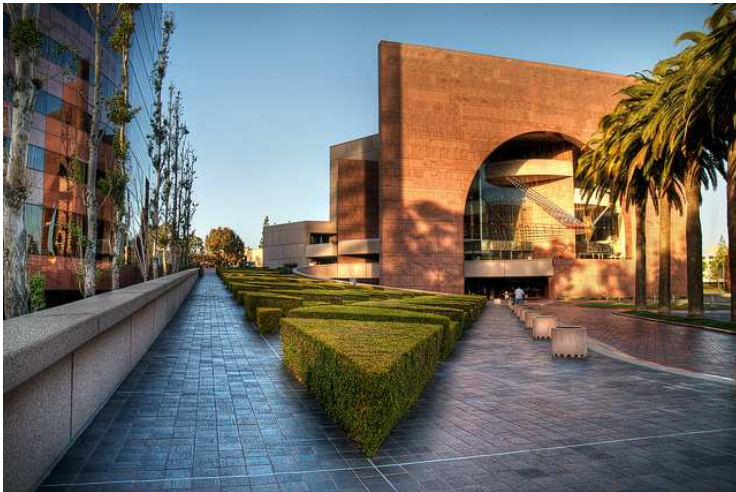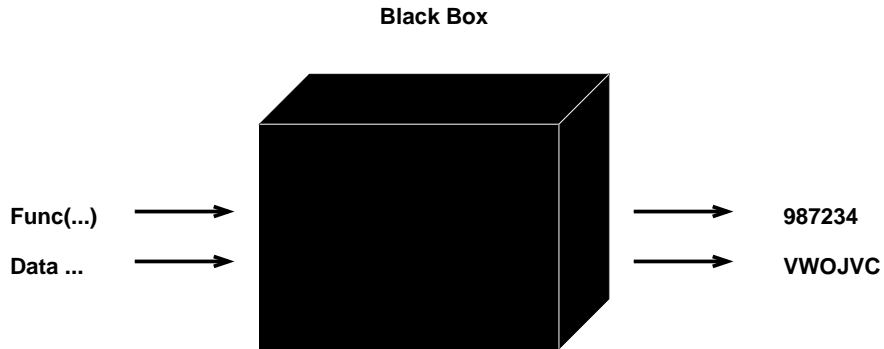
Outline

1. Open source's many options
2. Database server
3. Extensions
4. Deployment utilities
5. Monitoring options
6. Do you need a vendor?

1. Open Source's Many Options

Closed-Source Software

Black Box

Func(...) →

Data ... →

→ **987234**

→ **VWOJVC**

Support

Database
Company

Open-Source Software

Clear Box

Func(...) → **987234**

Data ... → **VWOJVC**
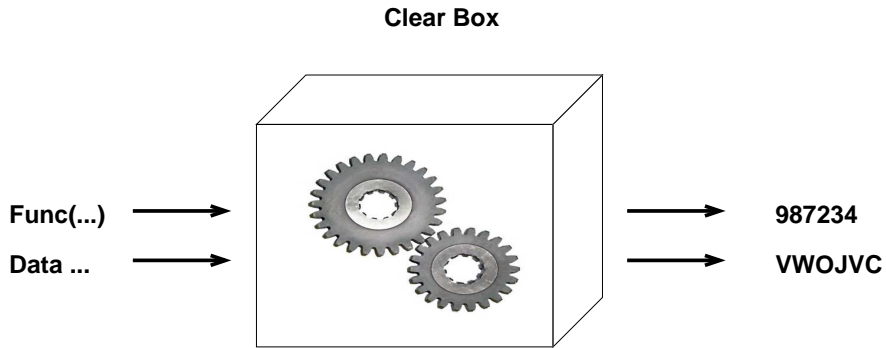
Support of Open-Source Software
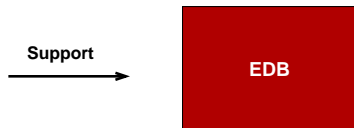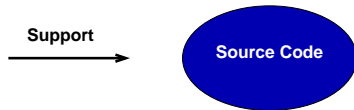
2. Database server

- Community server, www.postgresql.org
- Company-enhanced (closed-source) servers
    - EnterpriseDB (EDB Postgres Advanced Server)
    - Postgres Professional (Postgres Pro Enterprise)
    - 2nd Quadrant (purchased by EDB)
    - FUJITSU (FUJITSU Enterprise Postgres)
    - Amazon Web Services (RDS Postgres)

These products closely track Postgres community versions.

3. Extensions

As an object-relational open-source database, extensions are a rich source of features in Postgres. These include

- Extensions shipped with Postgres, e.g., *pgcrypto, postgres_fdw*
- Extension repositories, e.g., PGXN
- Independent extensions, e.g., PostGIS, Citus extensions

Server-Side Languages

- Included in the Postgres distribution
  - PL/Perl
  - PL/pgSQL
  - PL/Python
  - PL/Tcl
  - SPI
- External
  - PL/Haskell
  - PL/Java
  - PL/Lua
  - PL/R
  - PL/Rust
  - PL/sh
  - PL/v8

http://www.postgresql.org/docs/current/external-pl.html
https://wiki.postgresql.org/wiki/PL_Matrix

4. Deployment Utilities

- Deployment utilities shipped with Postgres, e.g., *vacuumlo*
- Tool repositories, e.g., PGXN
- Company produced

https://www.postgresql.org/docs/current/contrib-prog.html

Backup Utilities

- Shipped with Postgres: *pg_dump, pg_restore, pg_basebackup*
- pgBackRest
- Barman
- EDB Backup and Recovery Tool (BART)

Failover Utilities

- Patroni
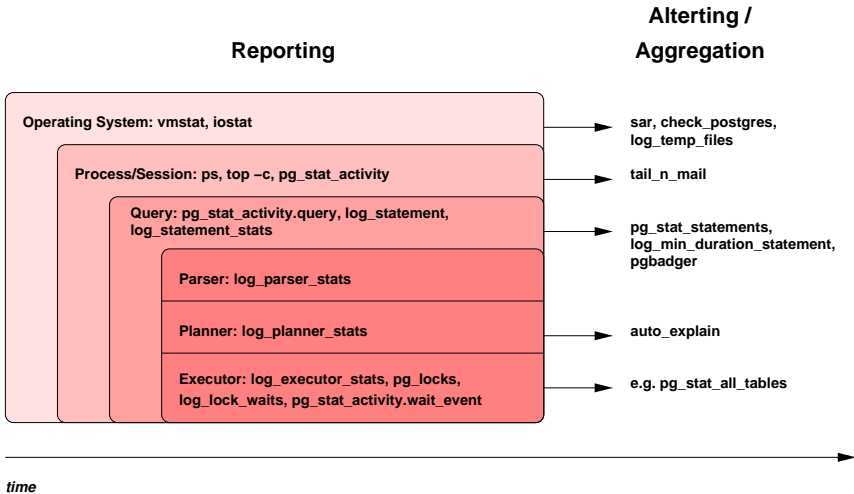- repmgr
- EDB Postgres Failover Manager (EFM)

Cloud/Container/VM Deployment

- Single-vendor cloud, e.g., Aws, Azure
- Multi-vendor cloud
- Docker deployment
- Kubernetes tools

5. Monitoring Options

- Shipped with Postgres, e.g., pg_stat_activity, pg_locks, statistic views, pg_stat_statements
- Independent, e.g., pgbadger, Nagios, Prometheus, Grafana
- Postgres Enterprise Manager (PEM)

Monitoring Capabilities

Reporting

Alterting / Aggregation

Operating System: vmstat, iostat → sar, check_postgres, log_temp_files

Process/Session: ps, top –c, pg_stat_activity → tail_n_mail

Query: pg_stat_activity.query, log_statement, log_statement_stats → pg_stat_statements, log_min_duration_statement, pgbadger

Parser: log_parser_stats

Planner: log_planner_stats → auto_explain

Executor: log_executor_stats, pg_locks, log_lock_waits, pg_stat_activity.wait_event → e.g. pg_stat_all_tables

time

6. Do You Need a Vendor?

- The database server and many extensions and tools are available for free
- Adding the missing parts is "a simple matter of programming"
- You can build your own Postgres open source support team

This is only possible because open source gives everyone the ability to become an expert.

Becoming an Expert Has Costs

- Payroll, management
- Testing, risk
- Delayed deployment
- Increased dependency on staff skills
- Deployment rigidity, but easy customization

Make or Buy Decision

Cook for yourself or go to a restaurant?

- Cook yourself
  - Ingredients
  - Cooking skills
  - Single dish
  - Less cost, more time
- Restaurant
  - Variety
  - Simplicity, flexibility
  - More cost, less time

Costs

Internal cost

Vendor cost

% of Work Done by Vendor
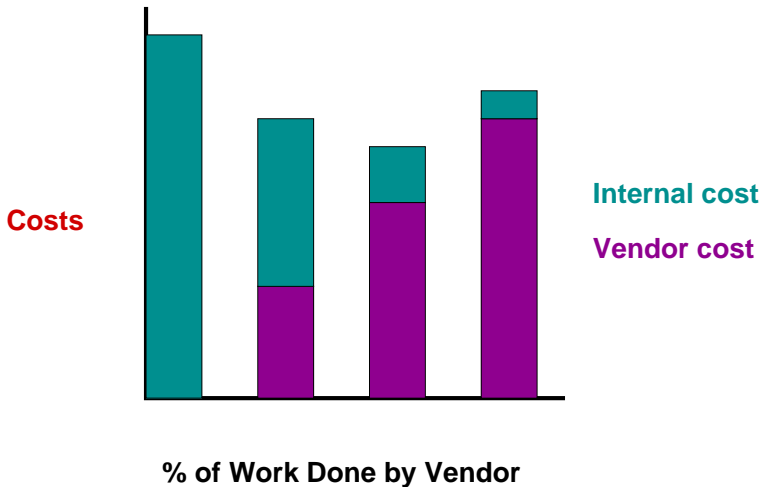
Choosing a Postgres Vendor (or Restaurant)

- A broad range of vendor-cost options are available, more than in proprietary software
- Are vendor expenses less than the value of increased efficiency and reduced in-house costs?
    - Paid vendor $400k but increased efficiency and reduced in-house costs by $700k
- More expensive vendors can sometimes increase efficiency and reduce in-house costs more than inexpensive vendors

Postgres Vendor Specialties

- Support
- Consulting
- Open-source products
- Closed-source products
- Cloud hosting
- Training
- Migration assistance
- System health check

Conclusion