Greenplum DB 5.0 Roadmap

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Safe Harbor

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Greenplum is Growing Steadily

- Operating in 34 countries globally
- Pivotal engineering investment growing
- Open source code contribution growing
- Customer count and revenue growing
- 1417 commits to the github repo in 2016
- 8 Greenplum Database releases in 2016

Greenplum DB (GPDB) 5.0

- Greenplum DB: Production Ready Open Source MPP Database
- 5.0: First stable release after open source since 2015/10/27
- Greenplum 5.0 release planned early 2017

Agile Development Methodology

- Test cases
  - ICG inherited from PostgreSQL
  - Cdbfast/TINC
- Pair programming
- Continuous Integration/Continuous Delivery
- Transform ourselves on how to build distributed MPP database

PostgreSQL Based

- Horizontal Merge: 8.2 -> 8.3 -> 8.4 -> 9.x
- Vertical Merge
    - JSON/JSONB
    - Full Text Search
    - UUID Type
    - Raster PostGIS
    - Extension Framework
    - …

ORCA Open Source Optimizer

- First Cost Based Optimizer for BIG data
- Complex workloads for analytics produce large gains with ORCA
- Improved analyze performance on partition
- Parallelizing Union and Union All Queries
- Expanding index support to larger class of predicates
- Reduce optimization time

Query Execution

- LLVM dynamic code gen for faster query execution
- Dispatcher for performance and scalability
- Resource management
- Catalog data caching in the optimizer to speed short running queries

Storage & Backup/Restore

- Protection for data and performance improvement for backup/restore
- PostgreSQL WAL replication for segment mirroring
- Distributed Snapshot
- Fine grain incremental backup

External Tables

- S3
- Azure
- GPHDFS
- FDW

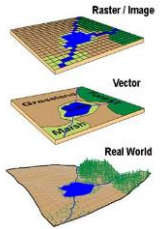
Greenplum Geospatial

Current Key Features:
- Geometry
- Geography
- Raster

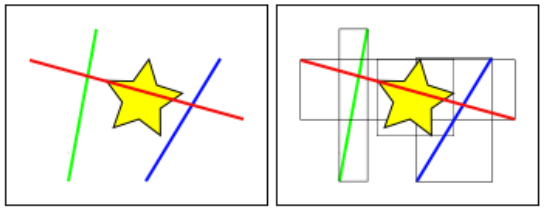
Ability to store geospatial data and query with with joins and operators

```
geodemo=# SELECT
nyc_subway_stations.long_name AS subway,
nyc_neighborhoods.name AS neighborhood
FROM nyc_neighborhoods
JOIN nyc_subway_stations
ON ST_Contains(nyc_neighborhoods.geom, nyc_subway_stations.geom)
WHERE nyc_neighborhoods.name = 'Greenwich Village';
                    subway                     |   neighborhood
-----------------------------------------------+------------------
 W 4th St (B,D,F,V) Manhattan                  | Greenwich Village
 14th St / Union Sq (4,5,6) Manhattan          | Greenwich Village
 14th St (1,2,3) Manhattan                     | Greenwich Village
 Bleecker St / Broadway-Lafayette St (6) Manhattan | Greenwich Village
 Christopher St / Sheridan Sq (1) Manhattan    | Greenwich Village
 Union Sq / 14th St (L,N,Q,R,W) Manhattan      | Greenwich Village
 6th Ave / 14th St (F,L,V) Manhattan           | Greenwich Village
 8th St / New York University (N,R,W) Manhattan | Greenwich Village
 Astor Pl (6) Manhattan                        | Greenwich Village
 W 4th St (A,C,E) Manhattan                    | Greenwich Village
(10 rows)
```

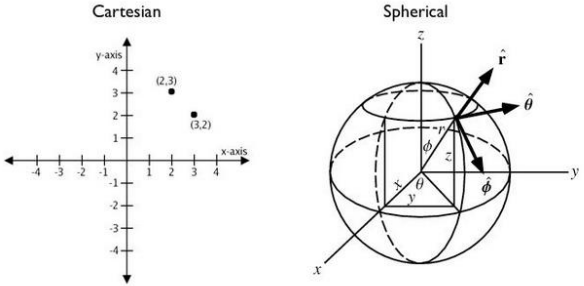
Raster Image Processing



Spatial Indexes & Bounding Boxes



Round earth calculations



Madlib: Scalable, in-Database Machine Learning

- Open source: http://madlib.incubator.apache.org/
- Supports PostgreSQL, Greenplum Database, Apache HAWQ
- Powerful machine learning, statistics and analytics for DS
  - Statistics
  - Supervised/Unsupervised Learning
  - Time Series Analysis
  - Text Analysis

Workload Management (WLM) (proprietary)

- Rule based query management to monitor/manager queries and resource queues
- More rules and actions

Command Center (GPCC) (proprietary)

- Redesign and reimplement of GPCC
- Integration with WLM

GPText: Full Text Search and Text Analysis (proprietary)

- Integrate GPDB with Solr Cloud
- Use SQL to perform full text search and text analysis
- Operation tools: recover, backup, restore, expand etc.

PL/Container (proprietary)

- Docker based containers
- Secure PL/Python and PL/R
- Flexible 3rd party libraries policy

G2C (Greenplum Gemfire Connector) (proprietary)

- Gemfire talk to GPDB
- GPDB talk to Gemfire
- Predicate pushdown and filtering
- Auto Synchronizer between GPDB and Gemfire

Greenplum DB Open Source Community

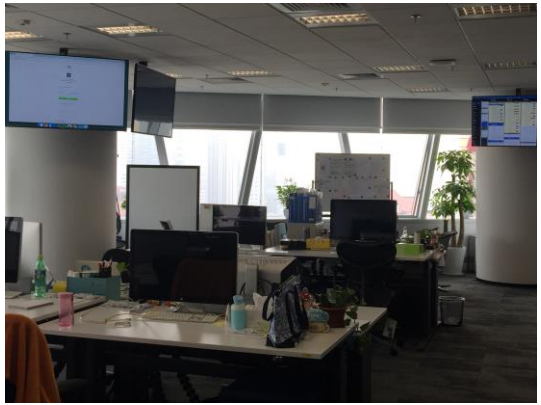
- Since open source from 2015/10/27
  - GPDB: 1630 stars, 458 fork, 300 watch
  - PostgreSQL: 2366 stars, 764 fork, 261 watch
- User groups
  - Wechat: 431
  - QQ: 131
- Greenplum DB Meetup at Beijing at 2016/11

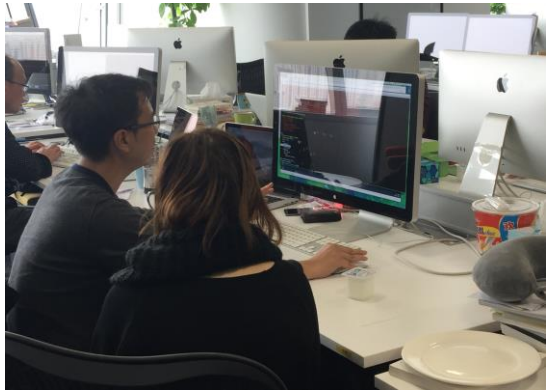
Contributions

- Pull Request (PR): 33 open, 942 closed within one year
- External Contributions from engineers of various companies: Aliyun, China Mobile, Inspur, Epam, …
  - More than 50% external contributions are from China

We are hiring

- MPP database kernel developers
- YOU will shape distributed MPP database technology trends





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THANKS

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