Full Text Search with Sphinx

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Sphinx in a nutshell

- Free, open-source full-text search engine
- Fast indexing and searching
- Scales well
- Lots of other (unique) features

Sphinx

http://sphinxsearch.com

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Some figures

- Biggest Sphinx instance –**boardreader.com**, with **3,000,000,000** documents
  - Yes, that's billions
  - Over 3 TB of source text (documents aren't tweets)
- Busiest Sphinx instance – **craigslist.org**, with **50,000,000 queries/day**
- Sphinx also powers searches on a number of other top-N sites such as Meetup, Wikimapia, DailyMotion, Scribd, etc

Plain old features

- Sphinx does everything you would expect from a search engine...
  - Quick indexing
  - Quick searching
  - Distributed searching
  - Full-text query language (field limits, phrase queries, etc)
  - Per-field weights
  - Non-text search constraints (WHERE authorid=123)
  - Snippets builder
  - Native APIs for a bunch of languages – PHP, Perl, Python, Ruby, Java, etc

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Shiny new features

- ...but it also has a number of not-your-typical-run-of-the-mill features

  - Different relevance rankers
  - Multi-queries (with advanced optimizations)
  - Support for non-full-text "full scan" queries
  - Advanced result set processing (WHERE, ORDER BY, GROUP BY, expressions)
  - SELECT syntax support (SQL plus own extensions)
  - MySQL wire protocol support (in searchd server)

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Rankers

- Let you choose different relevance ranking functions
  - Slower but with phrase match boost (default)
  - Or faster but w/o phrase match boost (BM25)
  - Or skip ranking at all for boolean searching
- 8 existing rankers at this point
- New rankers will be gradually developed
  - Generic ones to generally improve searching quality
  - Custom ones for specific customer tasks

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Multi-queries

- Let you pass a batch of queries to Sphinx
- That lets searchd perform batch optimizations
- Superset of so-called faceted searching
- Common query optimization (added in 0.9.8)
  – When only sorting/grouping modes differ, expensive full text query is only computed once
  – Particularly important for faceted searching
- Subtree caching (added in bleeding edge 0.9.10)
  – When full text queries have common parts, those common parts (subtrees) are only computed once and cached

Scan queries

- Sphinx can store additional attributes attached to every searchable document – as in SQL columns
- Sphinx can do search result set filtering, sorting, grouping – as in SQL WHERE, ORDER, GROUP
- So it was natural to allow doing this w/o text query
- If you keep the full text query empty, Sphinx will enumerate all indexed documents – and apply filtering, sorting, grouping, etc
- Faster than MySQL on some kinds of queries
- And easier to parallelize, too

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SELECT support

- Anything that can be done with single table SELECT using an SQL server – can be done to full text search (or scan) result using Sphinx

    – Plus a few special perks (on the next slide)

- It can compute arbitrary arithmetic expressions (a*b+c*log(@weight+1.234)-5)

- It can do WHERE, ORDER BY, GROUP BY, COUNT(*)/COUNT(DISTINCT), SUM()/AVG()...

- There still are certain syntax kinks to iron out – however all the core functionality is there

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SELECT support – special perks

- Perk 1 – pretty quick expressions engine
- MySQL
  - Integer: 21.2 M/sec
  - Float: 4.0 M/sec

```
mysql> set @a:=1; set @b:=2; select benchmark(100000000,@a*@b+3);
1 row in set (4.73 sec)
mysql> set @a:=1.2; set @b:=3.4; select benchmark(100000000,@a*@b+5.6);
1 row in set (24.52 sec)
```

- Sphinx
  - Integer: 51.7 M/sec
  - Float: 24.0 M/sec

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SELECT support – special perks

- Perk 2 – pretty quick full scan + sort/group
- On an identical 2.5 Mrow test table
- SELECT id FROM test1 ORDER BY touched DESC
  - MySQL: 1.87 sec
  - Sphinx: 0.87 sec
- SELECT flet, COUNT(*) AS q FROM test1 GROUP BY flet ORDER BY q DESC
  - MySQL: 1.10 sec
  - Sphinx: 0.33 sec
- Details in Piotr Biel's paper from OpenSQLCamp

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SELECT support – special perks

- Perk 3 – WITHIN GROUP ORDER BY extension
  - Lets you control specifically which "best" row to choose to represent the entire group when doing GROUP BY
  - For example GROUP BY gid ORDER BY date WITHIN GROUP ORDER BY @weight DESC will order the result set by date, and pick the most relevant rows within groups
- Perk 4 – enforces LIMIT and always optimizes for it
  - Queries that scan 10M rows and return 1K best rows will store at most 1K rows in RAM any given moment
  - Known deficiency in MySQL unless you do an index scan

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MySQL wire protocol

- We used SQL in the examples a lot
- And as mentioned Sphinx can run it, literally
- But moreover, starting from 0.9.9 you can use any MySQL client to talk to searchd
- Because we now support MySQL wire protocol in addition to Sphinx protocol

```
searchd { # sphinx.conf section
    listen = localhost:3312:sphinx # native protocol
    listen = localhost:3307:mysql41 # mysql protocol
    ...
```

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MySQL wire protocol

```
$ mysql -P 3307
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 1
Server version: 0.9.9-dev (r1734)

Type 'help;' or '\h' for help. Type '\c' to clear the buffer.

mysql> SELECT * FROM test1 WHERE MATCH('test')
    -> ORDER BY group_id ASC OPTION ranker=bm25;
+------+--------+----------+-------------+
| id   | weight | group_id | date_added  |
+------+--------+----------+-------------+
|    4 |   1442 |        2 | 1231721236  |
|    2 |   2421 |      123 | 1231721236  |
|    1 |   2421 |      456 | 1231721236  |
+------+--------+----------+-------------+
3 rows in set (0.00 sec)
```

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Roadmap

- Even more cool stuff coming in the future
- Short term
  - Support for string attributes
  - Preforked workers (helps "lots of quick queries" scenario)
  - Some index size/speed optimizations
- Mid term
  - Realtime full-text index updates (real-time attribute updates are already in place)

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Support and Consulting

- By Sphinx Technologies
  - Annual Support and Consulting Services
  - Custom feature implementation
  - http://www.sphinxsearch.com
- By Percona
  - Support and Consulting
  - http://www.percona.com

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Questions?

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