

Proposta de dissertação - PPGSC/UFRN:
Using SLA to guide software migration to the cloud:
An empirical study

Fabio Leal

Professor: Martin A. Musicante

Agenda

- Introduction(Cloud Computing, Polyglot Persistence, Systematic Mappings, SLAs)
- Systematic Mapping
- The problem
- The solution
- Example
- Roadmap
- Schedule

Introduction

- Brief story
 - Cloud Computing
 - Polyglot Persistence
 - SLAs
 - Systematic Mappings

Systematic Mapping

- Objective: assess the use of SLAs in database transition scenarios, specifically on migrations from relational databases to NoSQL ones;
- 47 publications: 3 migration experiment reports;

Systematic Mapping

- Questions:
 - 1) What are the reasons to change from RDBMSs to NoSQL solutions?
 - 2) How can we measure the overall improvements promised by this change?
 - 3) Is there a standard representation of SLAs in cloud services?

Systematic Mapping

- What are the reasons to change from RDBMSs to NoSQL solutions?
 - Segments of the data to be read and processed in parallel using a MapReduce framework, such as Hadoop
 - Schema-less data model
 - Support for large files
 - ...

Systematic Mapping

- How can we measure the overall improvements promised by this change?
 - Several benchmarking frameworks, such as TPC-H, TPC-DS and YCSB were identified during our survey.
 - No publication was found addressing the problem of measuring the overall improvements after a database transition.

Systematic Mapping

- Is there a standard representation of SLAs in cloud services?
- The selected publications did not present a standardized and common representation for SLAs
- DSLs, Tables, Automated tests...

The problem

- Lack of a systematic way to justify migration from RDBMS to NoSQL
- No publication was found addressing the problem of measuring the overall improvements after a database transition.
- The systematic mapping revealed no open source solution to monitor Application SLAs in a user-centered view (application level)

The proposed solution

- Assess the use of a SLA-Guided process to support the migration/replacement of relational databases with NoSQL ones.
- This process will be developed and assessed with case studies.

Step 1

| Phase | Title | Description |
|-------|---------------------------------------|---|
| 1 | Identification of Case Studies & SLAs | On this step we aim to identify examples where a Database transition is needed or recommended in order to satisfy a SLA. We will try to work on production-ready and open-source softwares. If the complexity of these projects is too large for our scope, we will design and develop our own scenarios. |

Step 2

| | | |
|---|--------|--|
| 2 | Plan | After the scenarios have been identified, we will propose architectural changes that could satisfy the SLA. These changes will be proposed by literature reviews and survey of industry experts. |
| 3 | Design | Generate a design that meets the identified scenarios. |

Step 3

| | | | |
|---|----|---|--|
| | | Step 1 | |
| 3 | Do | On this step we implement the architecture proposed on the previous step. | |

Step 4

| | | |
|---|-------|---|
| 4 | Check | On the check step we will verify if the proposed architecture and implementation satisfies the SLAs identified on the first step. |
|---|-------|---|

Step 5

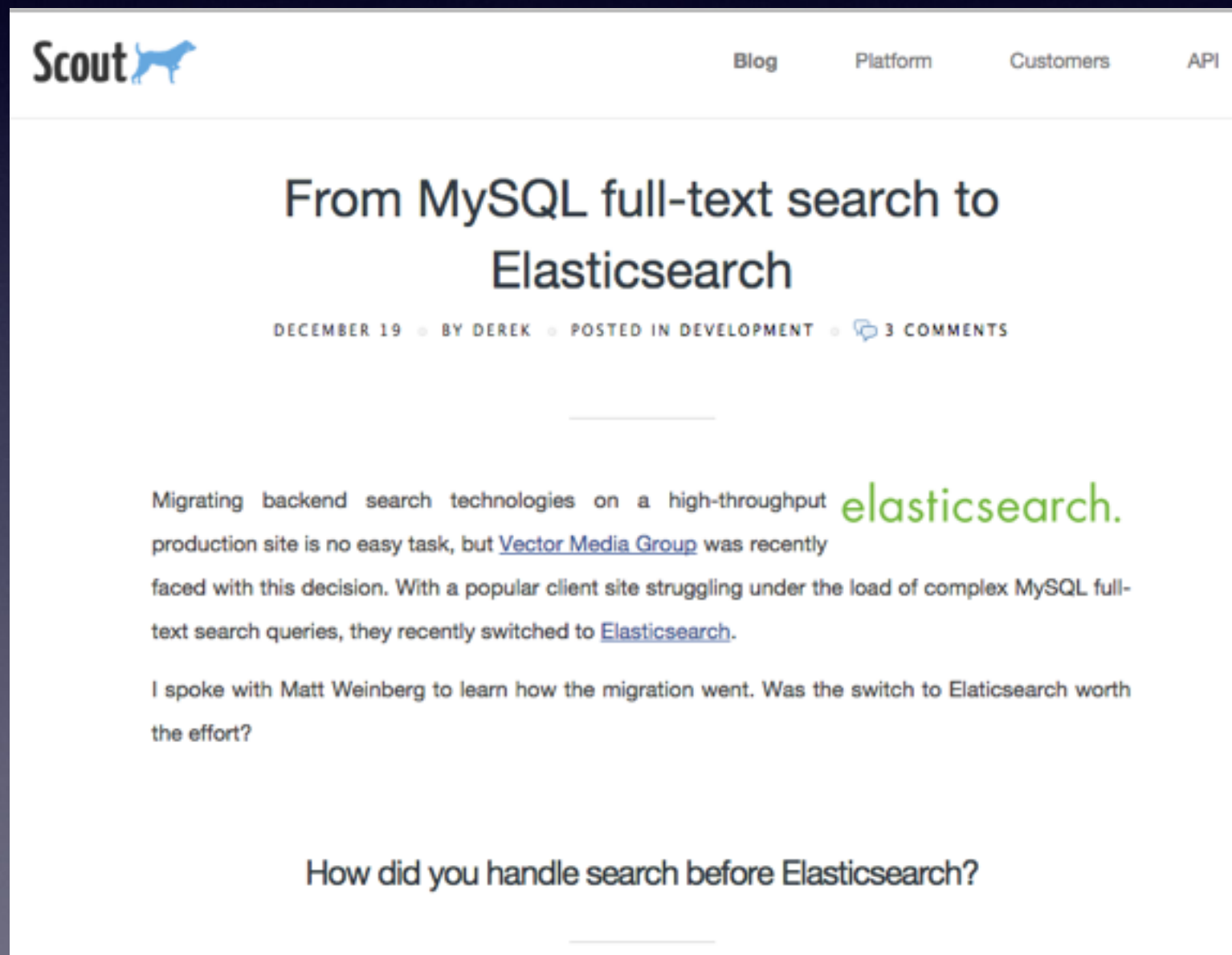
| | | |
|---|-----|---|
| 5 | Act | Tweaks can be needed on the proposed architecture and implementation if the SLA is still not satisfied by the changes made on the previous step. On the act phase we investigate what else can be done to satisfy the SLA and refine the process defined on step 2. |
|---|-----|---|

Step 6

| | | |
|---|---------------|---|
| 6 | Final Results | On the final step we aim to publish the results of our work on relevant database-related conferences and workshops. |
|---|---------------|---|

Example: Full Text Search

MySQL vs Lucene / Elasticsearch



Example: Full Text Search

- Define user-centered SLA (“I want my queries to return in < 10s”)
- Retrieve 1KK posts from twitter/facebook
- Build non-normalized (no need to perform joins, only “LIKE” queries) tables on MySQL;
- Create Elasticsearch Mappings and indexes based on document structure;
- Assess SLA satisfaction (MySQL vs Elasticsearch) using identified benchmark frameworks

Example 2: Graph Analytics



- Graph Analytics
- MySQL/PostgreSQL vs Neo4j
- Newtwork Calculations

The Roadmap

| A | B | C | D | E | F | G | H | I | J |
|---------|--|------------|------------|----------|------------|------------|-----------|------------|------------|
| Phase | Step Description | 25/07/2015 | 15/08/2015 | 5/9/2015 | 26/09/2015 | 17/10/2015 | 7/11/2015 | 28/11/2015 | 19/12/2015 |
| Phase 1 | Scenario identification / Implementation | x | | | | | | | |
| | Identification of broken SLAs | | x | | | | | | |
| | Implementation of "runnable SLAs" | | x | | | | | | |
| | Execution reports | | x | | | | | | |
| Phase 2 | Literature Review for each scenario | | | x | | | | | |
| | Survey of industry experts | | | x | | | | | |
| Phase 3 | Planning of changes | | | x | | | | | |
| | Implementation | | | x | x | x | | | |
| Phase 4 | New Execution Reports | | | | | x | | | |
| | Comparison of Results | | | | | x | | | |
| Phase 5 | Tweaks on the proposed architecture | | | | | x | x | | |
| Phase 6 | Publish the results | | | | | | x | x | x |
| | Write the final results | | | | | | x | x | x |

Dúvidas

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