

BUILDING A SYSTEM WITH NO SQL APPROACH (CASE STUDY: ENGLISH WRITING APPLICATION)

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ABSTRACT

As the complexity of business process, the need for implementing information systems also grows. A number of companies have built sophisticated system to fulfill operational. To maximize the benefit of the system, the data has to be stored in database for long time period so it can be used for analysis in the future. There are many models Database Management System (DBMS) architecture that can be applied, one of them are NoSQL architecture. NoSQL and relational model are two models that are very different. Relational model concept store data in the table, which consists of column and row. Each table interconnected by using foreign key (FK) which is an attribute. When the developer wants to consolidate data from all existing table, then the developer must combine a table with another table, through a foreign key that has defined in the first time, so it can certainly be combined data. Nowadays it's often be problem for a developer, given the massive data growth, with a fairly high degree of scalability that will be very difficult for a developer to provide the required data in a short time. Therefore, NoSQL approach comes as a solution. In NoSQL, data will be stored in the form of documents and data integration will be done using programming language format. Each document can be likened to a programming language object that can be used in applications that are built. So that access to the data can be done efficiently and effectively despite the huge amount of data. In this research focuses on implementation NoSQL in English Writing Application based on JavaScript Platform.

Keywords: *Data, Nosql, Document, English Writing, JSP*

1. INTRODUCTION

Nowadays, most of business process in company already integrated with information technology. Many technologies were introduced to bring effectiveness to an organization. The huge growth in business process pushes a new challenges, new systems, and new concept to organization increases their performance. One of them is NoSQL approach. No SQL as a popular name for a part of structured storage software that is designed to optimize performance [1]. This optimization comes at the realization of ACID (Atomicity, Consistency, Isolation, and Durability) concept [2]:

- Atomicity. The “all or nothing” property. A transaction is an indivisible unit that is either performed in its entirety or is not performed at all. It is the responsibility of the recovery subsystem of the DBMS to ensure atomicity.
- Consistency. A transaction must transform the database from one consistent state to another consistent state. It is the responsibility of both

the DBMS and the application developers to ensure consistency.

- Isolation. Transaction execute independently of one another. In other words, the partial effects of incomplete transactions should not be visible to other transactions.
- Durability. The effects of a successfully completed (committed) transaction are permanently recorded in the database and must not be lost because of a subsequent failure.

NoSQL as term was first used in 1998 by Carlo Strozzi as name of file-based database, since that time it has being used for the relational database [3]. NoSQL encompasses a large variety of different database technologies and were developed to response a huge volume of data. Definition of data refer to [4] are the raw facts relating to or describing an event.

Characteristics of NoSQL approach are [5] :

- NoSQL does not use the relational data model thus does not use SQL language.

- NoSQL stores large volume of data.
- In distributed environment (spread data to different machines), we use NoSQL without any inconsistency.
- If any faults or failures exist in any machine, then in this there will be no discontinuation of any work.
- NoSQL is open source database, i.e. its source code is available to everyone and is free to use it without any overheads.
- NoSQL allows data to store in any record that is it is not having any fixed schema.
- NoSQL does not use concept of ACID properties.
- NoSQL is horizontally scalable leading to high performance in a linear way.
- It is having more flexible structure.

NoSQL is different with the structure of a relational model. The relational model is mainly given by relations, attributes, records, primary keys and foreign keys. Relations are visualized as table, consist of attributes and rows. Basic operations defined by the relational model are SQL query, like SELECT operations to retrieve data, as well as manipulative operations, such as UPDATE, INSERT, and DELETE. But in NoSQL, it provides declarative access to the object database without using SQL syntax. It does not provide explicit declaration, but use this to the operations defined on object types. As with SQL, NoSQL can be used as a standalone language. In merging mechanism NoSQL, there will be the possibility of duplication of information because data is stored no longer follow the concept of Primary Key and Foreign Key that can identify row uniquely within table. This fact has been realized by many companies, because at this time the storage media company is not a significant problem for implementation system, because the most important orientation in a company today is how to generate the data model flexible, scalable, efficient distribution, and easily managed to support business function.

2. RESEARCH METHOD

This study tries to implement No SQL model into the English Writing Application in order to increase scalability of the data. A large scale of organization today needs to comprise the data, so that the application can retrieve the information in short term. The analysis and design of English Writing System using object oriented approach that use Unified Modeling Language diagram to describe

about the functionality of the systems and how the systems interacts with the user.

3. RESULT AND DISCUSSION

The information explosion over the past decade has a number of data not in terabytes, but in zeta bytes. With such data growth, it becomes challenging for computing models to handle such large volumes [6]. Database as a media to keep data and generate information has to accommodate these large volumes of structured or unstructured data. A major aim of a database is to provide users with an abstract view of data, hiding certain details of how data is stored and manipulated [2]. Therefore, the starting point for the design of a database must be an abstract and general description of the information requirements so the data can be extracted to provide opportunities and deep insight from decision maker to make more intelligent business perspective in market.

English writing application is the systems that help to test the writing competency of the user. This test measures the ability of user to write in English language structure. So user can use this application to input their writing and the system will validate and give the remarks as result in point. This application consists of: Login interface, schedule interface, question interface, and participant test interface to handle English Writing Test.

Based on the requirement identification, this research refer to NoSQL technique because there are many limitations in relational database, such as lacked handling exponential growth of data, problem on connectivity, and semi structure (it has few mandatory attributes but many optional attributes) [7]. With NoSQL technique, interface query based on id from users table. This Id is automatically indexed refer to NoSQL concept, so the query becomes faster. We don't need to identify index exclusively. From application perspective, if the application will be designed object oriented, it does not need to convert the data into object. Otherwise, if we use relational database we need to convert the table into object.

The following NoSQL implementation in English Writing Application:

1. Login Page

Users need to entry their identity into English Writing Application. Every users have user_id and password to enter the systems. User_id and password will be validated in back end system according to data that saved before.



Figure 1 Login Form

For the validation, English Writing Application will translate the object id to get user data. The systems will synchronization between user id and password. If the data valid, user can enter to the system, otherwise the system shows pop up message.

The following list of NoSQL script to get user data for login page:

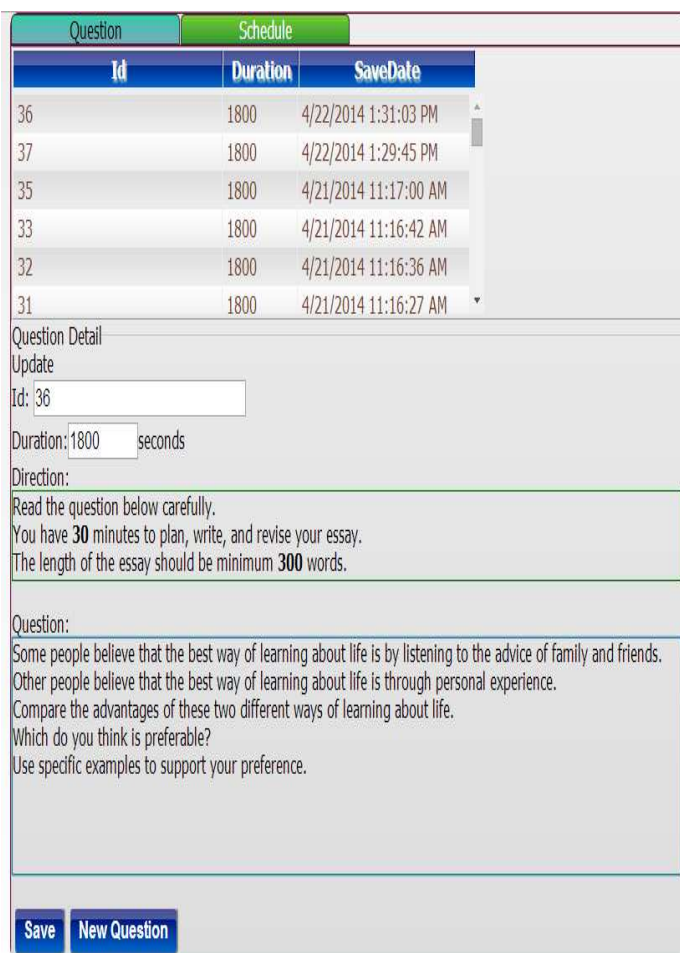
```
db = mongojs();
db.users.findOne({_id:userId});
```

2. Question Page

This page is use to arrange the question detail. We need to identify Id for the question, the question topic itself, and duration to answer the question in essay form. The question detail can be varied depending on the degree of difficulty.

The following list of NoSQL script to identify question page:

- To get questions data: `db.questions.find()`;
- To update question: `db.question.save(questionobject)`;



Id	Duration	SaveDate
36	1800	4/22/2014 1:31:03 PM
37	1800	4/22/2014 1:29:45 PM
35	1800	4/21/2014 11:17:00 AM
33	1800	4/21/2014 11:16:42 AM
32	1800	4/21/2014 11:16:36 AM
31	1800	4/21/2014 11:16:27 AM

Question Detail
Update
Id: 36
Duration: 1800 seconds
Direction:
Read the question below carefully.
You have 30 minutes to plan, write, and revise your essay.
The length of the essay should be minimum 300 words.

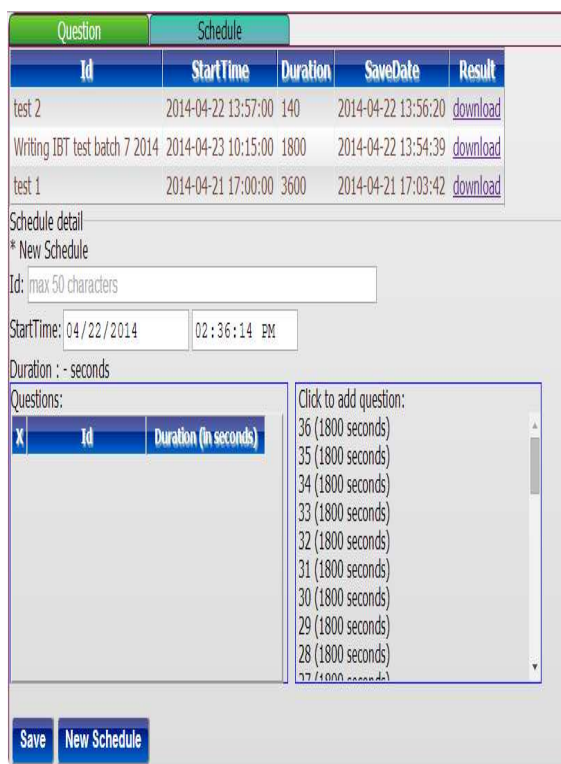
Question:
Some people believe that the best way of learning about life is by listening to the advice of family and friends. Other people believe that the best way of learning about life is through personal experience. Compare the advantages of these two different ways of learning about life. Which do you think is preferable? Use specific examples to support your preference.

Save New Question

Figure 2 Question Form

3. Schedule Page

This page is use to set the schedule of test. User should identify how long the test will be executed in day and time and also user can identify what variation will be used, which has been entered before in question page.



Id	StartTime	Duration	SaveDate	Result
test 2	2014-04-22 13:57:00	140	2014-04-22 13:56:20	download
Writing JBT test batch 7 2014	2014-04-23 10:15:00	1800	2014-04-22 13:54:39	download
test 1	2014-04-21 17:00:00	3600	2014-04-21 17:03:42	download

Id:

StartTime:

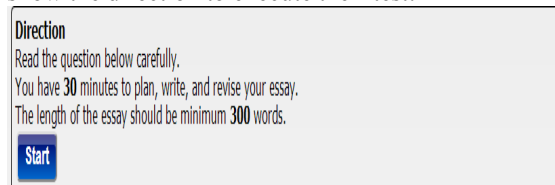
Duration : - seconds

X	Id	Duration (in seconds)
		36 (1800 seconds)
		35 (1800 seconds)
		34 (1800 seconds)
		33 (1800 seconds)
		32 (1800 seconds)
		31 (1800 seconds)
		30 (1800 seconds)
		29 (1800 seconds)
		28 (1800 seconds)
		27 (1800 seconds)

Buttons: Save, New Schedule

Figure 3 Schedule Form

The mechanism to download question begin with get users id by schedule_id using regex format: schedule_id+'*'. After that this application will show the direction to execute their test.

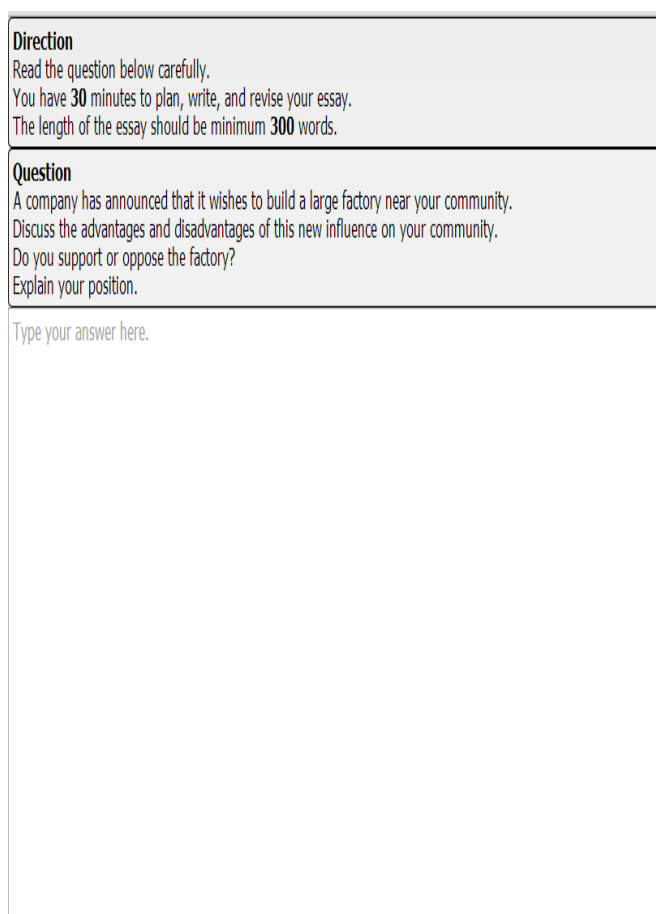


Direction
 Read the question below carefully.
 You have 30 minutes to plan, write, and revise your essay.
 The length of the essay should be minimum 300 words.

Start

Figure 4 Direction Message

After this application start, the question will show :



Direction
 Read the question below carefully.
 You have 30 minutes to plan, write, and revise your essay.
 The length of the essay should be minimum 300 words.

Question
 A company has announced that it wishes to build a large factory near your community. Discuss the advantages and disadvantages of this new influence on your community. Do you support or oppose the factory? Explain your position.

Type your answer here.

0 words

Last saved: Tue Apr 22 2014 16:19:12 GMT+0700 (SE Asia Standard Time)

Save Done

Figure 5 Test Form

The following list of NoSQL script to identify schedule page:

- To get schedules data: `db.schedules.find();`
- To save schedule: `db.schedule.save(scheduleobject);`
- To generate result:
 - o Getting schedule: `db.schedule.findOne({_id: scheduleId});`
 - o Getting answers by schedule: `db.answers.find({Id: {$regex: scheduleid + '*'}});`

The following are the tables used in this English Writing Test application:

Table 1 List Of Table

Answers:	Questions:
{ Id: string ((_id of schedules) + "(_id of users),	{ _id: ObjectId, Id: string, Question: string,



<pre> Reg :string, Ans: {question_id*: { A: string, T: ISODate, H: string, Start: ISODate, End:ISODate } }}, SaveDate: ISODate, Host: string, _id: ObjectId } </pre>	<pre> Duration: int, SaveDate: ISODate, Host:string } </pre>
<pre> Schedules: { _id: ObjectId, Id: string, StartTime: ISODate, Question: [{ _id: string, Duration: int }], Duration: int, SaveDate: ISODate, Host: string } </pre>	<pre> Users: { _id: string, Name: string, Role: string } </pre>

- The query does not need to implement the index to increase query performance.
- This research describes the limitations of traditional databases and the advantages of NoSQL database and objective analysis of their strengths and weaknesses respectively. Companies need to consider the following options when deciding which properties NoSQL: Data model, CAP Support, Multi Data Center Support, Capacity, Performance, Query API, Reliability, Data Persistence, and Business Support [7]. The above conclusions are based on experiment design application. According to these results, user can identify how to implement NoSQL technique in order to support design application.

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4. CONCLUSION

The main purpose of this study is to give explanation about No SQL technique, and how it different with relational model in many aspects, like transaction management, complexity, capacity, etc.

Based on the study, the following facts that can be identified:

- In terms of the English Writing Application, the No SQL method can be applied simpler than relational method.
- All the function can be parsed effectively, so only need short instruction to build English Writing Application.



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