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# CENG491 PROJECT PROPOSAL

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# SCALABLE AND RESPONSIVE RESULT SERVER FOR HIGH NETWORK TRAFFIC SITUATIONS

## Description of problem

Organizations, like OSYM, MEB and KYK and Universities announce the result of some exams, result of some designations, result of some scholarships' appointments or letter grades of courses at certain times via their web sites. During these certain times, because of "the high network traffic" there are some errors occur such as "Service Unavailable" and/or "Service Temporarily Overloaded". This overloading does not occur because of the largeness of the database nor the largeness of the result to be presented but it occurs because of the vast number of requests to the small amount of data which are included in the database. Another main reason why these errors occur is that those web sites use general purpose web servers and Relational Database Systems which sometimes do not scale very well.

Although, for the time being such organizations are well-known examples of this unfortunate situation, in the future it is possible that other web applications will confront with this problem and we believe that our solution is going to be a valid solution. So what is this magic solution?

## Solution to be proposed

Since the problem is related with usage of general purpose web servers and Relational Database Systems, what is required to solve the problem is highly optimized server implementation and NoSQL Datastore based solutions which are dedicated to this special purpose (solving the problem).

Major components of the project can be listed as follows:

- i) A result server which handles "Query Page" and "Result Page" traffic which works under a specialized Linux environment.
- ii) An administration tool for :
  - 1) Data Translation which exports DBMS based data to a NoSQL Datastore System.
  - 2) Generating of Result Page and Query Page templates.

## Motivation

Our team members as well as university students and teacher candidates have been confronting this unfortunate situation for a long time. This project will end up a better solution to serve results of exams etc... than we have now. This lack of good service is one of our main motivations. Another

main motivation, even more important one, is that this project will provide a great experience to our team members who want to be expert on multi-user web technologies. Also this project will be the infrastructure of future web projects which will probably have some parts showing some data that are not related to other data strongly. (Comments of videos in YouTube or tweets in Twitter etc...). This project also has a property that it is strongly related to academic research. The tools (Technologies) that we are going to use are the products of some academic research.

## Market search

Currently, there are two approaches over web based systems.

One of them is traditional solution which uses Relational Database Systems (Oracle, MySQL etc...) and server software (web servers like Microsoft IIS, Apache or application servers like Glassfish, IBM Websphere).

The other one is trendy solution which uses their own specific server and NoSQL Datastore (Membase, BigTable, HBase) for whole system. The main area of usage of this approach is the domains that not contain complex entity structure.

Our solution is kind a hybrid solution which designed for first approach systems and will bring the performance of the second approach on some part of the legacy system. Therefore, our approach is innovative and for now there is no similar solution to this problem. It means that there is not any product related with the problem or the solution.

## Detailed characteristics of project

### Coverage of Project

This project covers the solutions of the following problems:

i)The high response time getting the result of HTTP requests.

We will solve this problem by providing a new specific server which runs on Linux. We will use JBoss Netty API to produce this specific server.

ii)Data Transportation from Relational Database (Oracle,MySQL etc...) to NoSQL Datastore (Membase).

At the time being there is no generic solution to this problem. We will produce an administration tool for this task. This tool provides administrators easy usage of both Database (any of the Relational Database and Membase).

iii)Generating of Query Page and Result Page.

There are many tools and technologies including JSF for solving this problem, however our concern is just solving the overloading of the server at some certain times. Since we provide a tool for managing the databases we must add a tool for generating of the pages that is compatible with this mechanism.

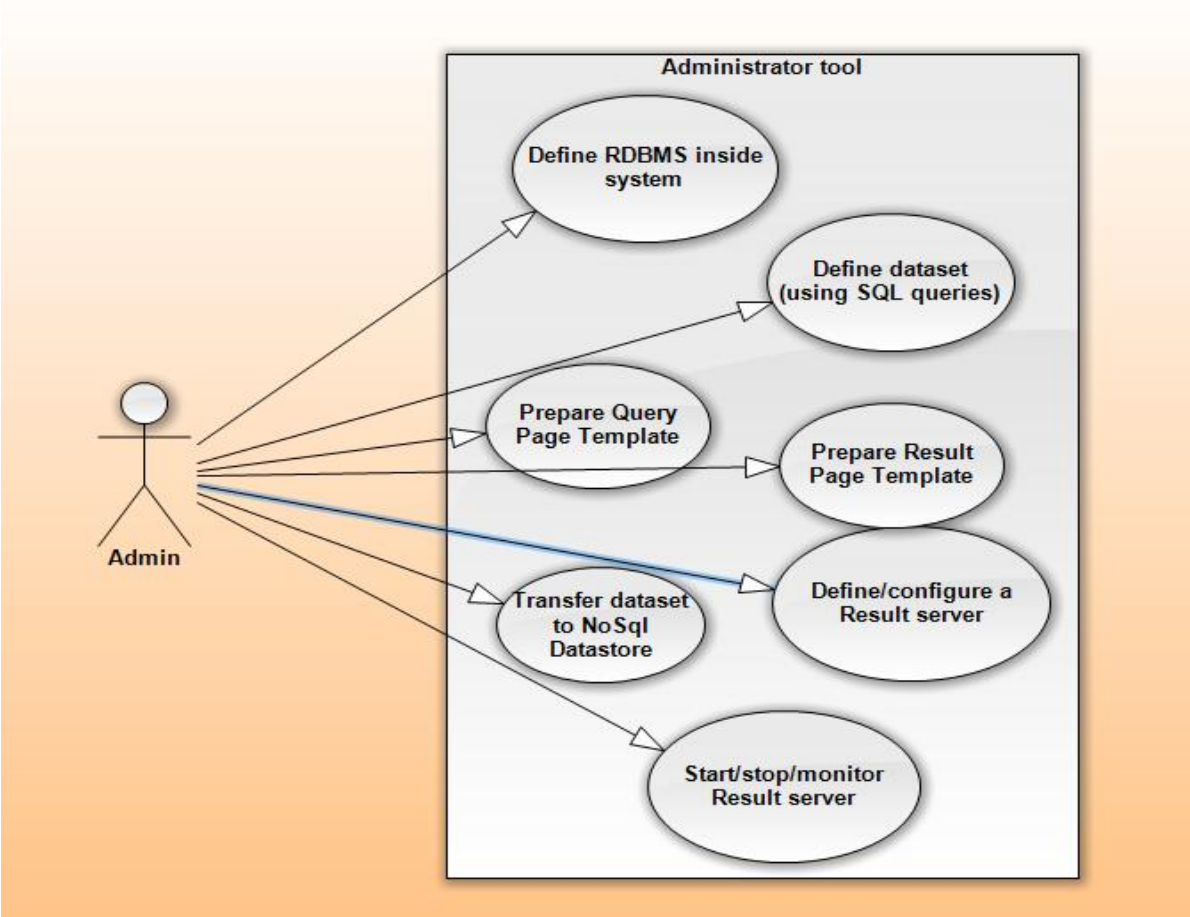
### Limitations

Although our solution will make server at least as ten times fast as it is now, it will not be like this fast always. We concern only the overloaded times when end users want to get little information from database. The meaning of little information is that this information is not strongly related with the rest of data. Otherwise, Membase cannot be used because the requested part of data can not fit into the memory of the server.

### Users of Product

There are two types of users.

**User group 1(Administrator):** These users are the IT people or administrators of the web application. This group is the main group that will use the product of this project.



As it is seen above, administrators can choose the relevant Relational Database via this tool. They can prepare Query Page Template and Result Page Template. Also they can transport data from Relational Database to NoSQL Datastore System.

**User group 2:** These users are ordinary web application users. In our case those users will be student or teacher candidates. What they want is just getting the result of their exam or learning the letter grades and they want to learn this information in a reasonable time.

## Final Product

We will prepare a system which is based on MySQL to demonstrate our product. This legacy system is an imaginary exam result system quite similar to OSYM's web based LGS(lisans giris sinavi) result announce system.

We will demonstrate our solution over this system which contains imaginary data via using administrator tool to translate data from this database to NoSQL Datastore and to generate Result and Query Pages. Also we will create imaginary clients for benchmarking.

## Related Terms

- Scalability, High Network Traffic
- Membase: A NoSQL Distributed key-value storage systems we'll use for high performance data access.
- JBoss Netty: An asynchronous event-driven network application framework for rapid development of maintainable high performance and high scalability protocol servers. We'll use for developing our result server.
- HTML, CSS : For generating result and query pages.
- JSF(2.0) - Glassfish: GlassFish is an open source application server project led by Sun Microsystems for the Java EE platform. JavaServer Faces (JSF) is a Java-based Web application framework intended to simplify development integration of web-based user interfaces. We'll use these technologies to develop our administration tool.