

Assignment 2: Distributed Database System and Load Balancing on Cloud

(Issue Jan 29: Due: Feb 08)

- **TA:** Trishla Shah (trishla@dal.aa)
 - **Assignment 2 Tutorial:** Jan 29, 4:05 - 5:25 PM Chemistry 226
 - **Assignment 2 Help Hours:** Feb 1(2:00-3:30PM), Feb 5(4:00-5:30PM), Feb 7(2:00-3:30PM)
-

1. Objectives:

- 1) To learn concepts of Distributed Database Systems running on Clouds
- 2) To learn load balancing and scalability on mission critical applications
- 3) To learn fault tolerance and performance tuning using Clouds

2. Tasks:

- 1) Create an account on IBM Bluemix if you don't have an account.
- 2) You need to use Db2 Warehouse on cloud to store a data set.
- 3) Select a data set to work with:
 - a) Use the given Visitors Dataset with the Assignment. (metadata: <https://data.novascotia.ca/Business-and-Industry/Tourism-Nova-Scotia-Visitation-Jan-2006-July-2017/n783-4gmh>)
 - b) Load the database (Note: Check the by default data type of column otherwise change it. For example: Month/Year)
 - c) Write an application which retrieve Number of Visitors information. For that implement following Queries:
 - <your app url> - should Retrieve first 10 rows from the database
 - <your app url>/visitorsbycountry - should Retrieve number of Visitors per year by Country
 - <your app url>/visitorsbymode - should Retrieve number of Visitors per year by Mode
 - d) Create an application in Node.js or any other (No Restriction) and upload it on Bluemix.
- 4) Test your web service by calling it from UI (Postman/ Your own UI application/ browser, etc.) and comment on response time in the report.
- 5) By using "Multiple Threads" from UI application (JMeter/your application or any other tool), send simultaneous 10 REST service calls to your application url and observe response times. Increase number of threads to 20, 30, 40 and 50 and observe response time for all five sets of requests. You can use any one of the REST web service calls of your web service for this task. Create a graph with number of request on x-axis and response time on y-axis. Comment on performance and include graphs in the report.
- 6) **Scaling:** Do the Horizontal Scaling. Scale up the number of cloud/service instances to 2, and 3. Also, repeat step 5.

- 7) Create a graph with number of request on x-axis and response time on y-axis. Send 10, 20, 30, 40, 50 requests in sets and observe response times.
- 8) Comment on response time vs number of instances.

3. Write a report including the following sections:

- a) Task Description: Present the application scenario (i.e., the application and the requirements).
- b) Database: Provide an overview of what configuration steps are taken to setup database. Please use screenshots to verify implementation.
- c) Application Queries: Provide description of the search queries, sample output and response time (milliseconds) that it takes to fetch data.
- d) Test Results: Describe your test results and comparisons (Before and After Scaling) with the help of charts and graphs
- e) Summary: Provide a summary of your work & observations on the application (i.e. the DB), the developed web service and the experience of using the software tools (i.e. your comments & recommendations, etc.).

4. Submit your Ass2 report electronically:

1. Please use Bright Space to submit your assignment
2. In addition to the report, submit code and/or output files for web service and UI application in a zip file that contains a README.
3. Mention any additional / third party dependencies required for compilation and execution in README file.

*** Plagiarism and Intellectual Honesty:** (<http://plagiarism.dal.ca>)

Dalhousie University defines "plagiarism as the presentation of the work of another author in such a way as to give one's reader reason to think it to be one's own." Plagiarism is considered a serious academic offense which may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree.