

# Research principles and practice of cloud computing

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## BACKGROUND OF STUDY

Cloud computing has become a new trend of advancement in the world of information technology today in which information technology resources are delivered as a service via the internet (Yao et al, 2010). From this, it is assumed that it is the newest internet-based technology. The increasing growth of this new technology coupled with its imminent productivity and benefit has made most organisations turn to the cloud. The reason being that most organisations can now deploy and manage their IT services via a virtual machine in the cloud, this reduces the enormous cost being spent on setting up, managing and maintaining previous local systems and infrastructure.

Through adoption, the benefits gained from the use of cloud computing has geared most organisations now not tend not to only move their application services but also their databases. Hogan (2008) said in his published article on ' Cloud Computing & Databases' that " Cloud database usage patterns are evolving, and business adoption of these technologies accelerates that evolution". Also, there is now absolute control over data being migrated from internal IT infrastructure to external cloud. A framework that would enable organisation migration to cloud was proposed by Guo (2010). However, there are bottlenecks such as storage capacity, performance and ease of report generation when data is being moved from local infrastructure to the cloud. There is the issue of capacity when migrating data to the cloud (Stacy, 2009). How do we then know which of these emerging cloud-based database technologies would serve the desired needs and wants of various organisation planning to migrate their data to the cloud.

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It is in view of this, that this research would examine the present adoption state of cloud-based database technologies and their uses, analyse the issues involved in moving data (BSMS) from local infrastructure to different cloud-based DBMS, perform an experiment to differentiate performance prospects of the alternative cloud-based DBMS, present the findings and make recommendations on suitable cloud-based DBMS technology choice based on optimum performance level.

## **RESEARCH QUESTION**

Considering this age of global technological advancement, the use of cloud-based DBMS has become a more viable option for business and research organisations. Instead of deploying and maintaining internal IT/database infrastructure which is quite expensive, organisations now outsource their IT services including database management to cloud computing service providers on contract basis. The full adoption of cloud computing services is imminent; and the awareness of both business and research organisations to which cloud-based DBMS offers optimum performance is what prompted the research question discussed below.

### **What is the difference in performance of different cloud-based DBMS technologies?**

The scope of the research will be limited to testing the performance of three (3) widely adopted cloud-based DBMS technologies using BSMS data source as case study. Cloud-based DBMS technologies such as SimpleDB, Database.com and OracleCloud would be taken into consideration and performance analysis would be carried out on them.

## **RESEARCH AIM AND OBJECTIVES**

The aim of this project research is to carry out performance investigation and through that means offer credible performance information on the selected cloud-based DBMS technologies. This would stand as a pedagogical material for both business and research organisation in the business of migrating to the newly emerged technology of cloud computing. The under listed objectives would serve as an aid to achieving this sole aim.

To investigate what cloud-based DBMS is and its adoption: The will help to shed more lights on what cloud-based DBMS is and its present stage of adoption.

To investigate how databases are being used in the cloud for business and research purposes: This is to enable all stakeholders especially business oriented organisations to be aware of how databases are being used in the cloud and probably there might be some specific functionality that will help enhance their business or researchgoals.

To analyse the issues involved in moving data (BSMS) from local infrastructure to different cloud-based DBMS technologies: An analysis of issues involved in moving data from local system to the cloud would be carried out. Issues such as capacity, compatibility and so on would be accessed here. The BSMS data would be used as a case study in analysing this migration issues.

To carry out an experiment to differentiate the performance of the different cloud-based DBMS technologies: A scientific experiment would be carried out

to test the performance of two or three cloud-based DBMS technologies. The experiment would be based on testing certain performance criteria such as indexing, fast data query, report generation and so on.

To present the findings and make recommendations on suitable cloud-based DBMS technology choice based on optimum performance level: The findings from the scientific experiment would be used to draw out possible conclusions and necessary recommendations that would enlighten all stakeholders opting for a move to cloud-based database technology on the best choice of such system based on their performance.

## LITERATURE REVIEW

### **RESEARCH METHODS, TOOLS AND TECHNIQUES**

This research would be delivered using a deductive approach which is also known as top down approach. This approach offers a deductive reasoning from a general point of view to a more specific one. Considering the fact that the research would be a performance comparison between different technologies, then it is suitable. Koen et al (2005) says “ it applies a theoretical, actor decision framework to derive relations deductively using detailed field data”. It uses a water fall model design of deriving a premise from an observation. A hypothesis in form of a research question would be derived, an experimental design inform of an observation would be used to analyse the data and the specified conclusion would be drawn from the findings.

Therefore, the proposed research will be conducted within a framework of cross-sectional research design and methodology. This research would be in form of a scientific experiment because a survey based analysis would be inadequate to test the performance of the different cloud-based DBMS technologies. The experiment would be carried out using the Scientific Method in order to obtain precise and accurate conclusions from the hypothesis and observation drawn. Considering the research question, an experiment which serves as a quantitative method of gathering data would be most appropriate to generate premises and findings that could be analysed to draw conclusions and recommendations to answering the research question. Although, it is a time consuming method but it is relevant to achieving the stated objectives of the proposed research.

Three cloud-based DBMS technologies namely SimpleDB, Database. com and OracleCloud are would serve as the specimen in conducting this research experiment. A scientific method would be employed in order to derive a hypothesis to give a clear description about the performance of each cloud-based DBMS. There are other types of experiment methods such as the Pseudoscientific Method that can be used in carrying out an experiment. In this research, the chosen method will be a scientific method which is more appropriate because it is the most productive and suitable for analysing the samples specimen selected for the research. It is more reliable, consistent and non-arbitrary for the representation of a real world scenario than the Pseudoscientific Method. “ The Scientific Method helps to organize thoughts and procedures so that scientists can be confident in the answers they find” (ScienceMade Simple, 2009).

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Alternatively, a quantitative approach in form of a self administered questionnaire could also be used to collect primary data. This research method is cheap, quick and very easy to administer compared to other methods. (Bryman, 2008) The quantitative questionnaire will collect information on the respondent demographic characteristics such as the age, gender, area of study, level of study, job responsibilities, and work experience. In addition, their opinion on cloud-based DBMS computing in terms of perception and adoption will be collected. However, this form of quantitative approach would not be sufficient in determining the performance of this existing technology as this is the sole aim of this research. This is due to that fact that, this emerging technology has not being fully implemented by most organisations. As recommendation for future work, self administered questionnaire could also be used to collect primary data on individuals and organisational opinion for adopting a cloud-based DBMS technology.

Relevant existing literature such as books, journals, articles, newspapers magazine and other acceptable and reliable sources will also be used to generate secondary data. These secondary data would serve as a basis of literature review and evaluation of cloud-based DBMS technology.

## **RESEARCH PROCESS**

As stated earlier on, the research would be carried out using a scientific experimental method to gather required information. A dummy data source would be used to perform the experiment. The BSMS data would be used in studying and analysing the performance of these different cloud-based

DBMS. The BSMS data would be moved into the different cloud-based systems. Series of performance test would be carried out on each of them as a standalone and a comparison analysis would follow using some criteria such as indexing, fast retrieval of data, report generation.

Furthermore, the method of analysing the data collected from the experiment would be microanalysis as proposed by Strauss et al (1990). The process of microanalysis involves that the data collected will be coded into probable emergent themes which will be based on personal judgement and supported by relevant evidences. When a new data is been collected, the same method of microanalysis by coding is applied, these new codes will then be compared with the previous codes. This process is known as ‘ constant comparison’ which is done when a new data is collected, it continues until no new insights can be obtained from the collected data. Consequently high level factors and inter-relationship will be abstracted, thus premises can be derived based on these factors.

## Conclusion

The issue of ethics would be duly considered in the course of this research. Some necessary factors such as experimental condition, subjective interpretation of data and proper derivation of a unified conclusion would be taken into consideration. Other issues such as control experiment, data protection and copyright would be considered adequately. All the laws of confidentiality and data protection would be duly complied with during the process of this research.