**Flood modelling for cities using Cloud computing**

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**Summary**

In the featured article “Flood modelling for cities using Cloud computing,” the authors, Glennis et al (2013) presented a cloud model architecture to handle a parameter sweep on a large scale. They did this to provide a cost effective option for businesses who needs to perform this type of operations within a limited time. This architecture was demonstrated by conducting a flood risk assessment using CityCat flood modelling tool. They also created a new version of a CityCat application to overcome the challenge of not being able to perform a parameter sweep with many invocations in the old version.

After conducting a cost testing analysis of using the system on the cloud and with local resources, they found that the cloud is the best solution for a project with a short time frame and limited budget in the short run. However, they also stated that it would be more efficient to use local resources in the long run.

**Questions**

1. Is the research qualitative, quantitative or mixed? Explain.

The research was mixed. It mostly consisted of quantitative research, this is because they used simulation results to prove cost-effective solutions and problems. The qualitative part is where they examined the short term effects vs long term effects; they stated that business would benefit more in the long term due to the collateral and ability to use resources at will.

1. Was deductive reasoning used? If so, explain.

Yes, deductive reasoning was used. They stated that small organizations may have difficulty covering the cost of high computational resources in a limited timeframe. Then explained that a specific small organization whose operations consists of performing a parameter sweep would have difficulty obtaining these resources.

1. What is the research problem?

High-end computational resources are very expensive to obtain by small organizations in a limited timeframe, and the cloud is not easily usable by people who doesn’t understand it.

1. What were the delimitations (boundaries) of this study?
2. A limited budget of $20,000
3. Project deadline of one month
4. small organizations
5. parameter sweep for only flood modelling
6. parameter sweep covers a whole city scale (pluvial flooding only)
7. batch processing parameter sweeps
8. What were some limitations/potential limitations of this study?
9. previous CityCat tool had limitations that prevented the parameter sweep to run with multiple invocations
10. architecture must be designed to suit the needs of an individual who doesn’t have much cloud technical experiences.
11. What were the initial hypotheses for this study?

If they can perform a batch parameter sweep on the cloud then that would allow for them to gain more computational power with a limited budget and timeframe.

1. Were the hypotheses rejected or accepted?

It was accepted. They built an architecture to prove that it can work with the delimitations given.

1. What was the overall conclusion of this paper?

A cloud based batch processing parameter sweep for flood modelling can be conducted in a short timeframe with a limited budget and on a larger scale. However, this is only advantages if this software would not be used often (short term use.) Attaining local resources would be better for an organization who intend to use this type of software often.

1. Comment(s) on data collection (if any)

All of the data collected was very well analyzed and clearly stated in formats the readers would be able to understand. Data collected were used to show the simulation results, costs and the memory requirements of the system. This was then used to prove the initial hypothesis.

1. Brief Comments on Literature Review (Also indicate two of the best references with reasons). (Maximum one page).

The literature review showed factors affecting the study and related work that had an impact on the authors decisions. Firstly, they did a review on “flood risk assessment using CityCat” using details from previous studies about flood modelling and techniques. One of the best reference was Neal et al (2009), they presented a flood modelling for a large city-scale assessment which relate to the feature article as they focused on city scale modelling. Secondly, They reviewed “cloud for computationally intense applications” using details from previous cloud studies that related to this study. However, most studies weren’t as similar but they did provide some information that was used. For example, palankar et al (2008) research showed the criticality of data storage location on the cloud, this was taken into consideration by Glennis et al (2013) to achieve the study’s objective.

1. Give an overall critical analysis of the paper (Maximum 2 pages)

In the featured article “Flood modelling for cities using Cloud computing,” the authors, Glennis et al (2013) presented a solution of a cloud architecture for a batch parameter sweep. This solution solves the problem of high-cost computational resources that is time consuming to obtain by small organizations. They evaluated this in a quantitative way, by providing tables showing the costs and time taken to obtain and utilize these resources. This was very persuasive as it accurately showed which instances cost more than the other and the amount of memory and hours they can be used within a time frame.

They then used a flood modeling tool utilizing the cloud parameter sweep to prove that the architecture provided can handle many invocations and provide reliable results; it can perform a batch performance sweep. The results of the simulations were then stated with their relative cost and time

Research Proposal for Cloud SaaS

Traffic modelling Software as a Service utilizing the cloud

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**Purpose:**

To predict traffic intensity with multiple parameters with the use of cloud computing as a Software as a Service. This will be done with the use of a batch type parameter sweep traffic modelling application and the cloud architecture proposed by Glennis et al (2013.) This can be offered as a software as a service (SaaS) to individuals or organizations who wish to predict traffic hours based on multiple reasons (parameters).

**Statement of the problem.**

Traffic infrastructure are used to help manage traffic congestion as well as aid citizens who uses the roadways of a particular country. However, vehicular traffic still exists. Reasons for traffic stems anywhere from errant drivers, bad weather conditions to a poor traffic plan. While vehicular traffic times are usually predictive, traffic sometimes tend to occur spontaneously. Traffic is usually identified by the “busy hours” and other common reasons like the type of street; one way, or if the city is densely populated or not.

Currently many traffic modelling software exists as well as many traffic modelling theories as identified by Hoogendoorn and Bovy (2001). Here a modified version of an existing traffic modelling software can be used on a cloud service such a Azure cloud as a software as a service. This solution would allow organizations or individuals to effectively create traffic plans which takes into consideration user identified factors.

**Literature Review/Previous work:**

Hoogendoorn and Bovy (2001) presented a method to achieve state of the art vehicular traffic flow modelling. It was explained that to fully understand the causes of traffic in congested networks a clear understanding of what causes traffic must exist, the time and location of traffic breakdown, and how does congestion propagate through the network. After understanding this then data for each of these can be recorded and analysed, the results produced will provide the different modelling technique based on years of research.

Due to the high amounts of computational resources required for performing parameter sweeps, a particular modelling technique was outsourced to the cloud in order to overcome the problems of stand-alone modelling software (Glennis et al, 2013). The paper presented an architecture that helps to simplify the process of performing parameter sweep on the cloud. Such a architecture was designed for small organizations who are unable to afford the necessary infrastructure needed for the stand-alone systems. They showed that in a particular case through the cloud, processing for large of data took up to 1/21th in which it would have taken if the cloud wasn’t used.

**Objectives.**

To produce a traffic prediction software that allows user to input other factors that may affect traffic with the use of the cloud architecture to provide an easy interface and limited cost. This can help individuals plan their day more accurately.

**Justification/Significance of the study.**

Vehicular traffic is one of the main factor affecting commuting and it is vital information used to help one plan their day. Some individuals like to prepare for “what if” scenarios when an important event such as an interview is on its way. These scenarios is very useful to prepare for unpredictable events and can help the individual avoid any unwanted delays. This study provides an option for individuals to input their “what if” factors into a traffic modelling system and gets a predicted traffic intensity output.

**Methodology:**

The following is the methodology to be followed to achieve my goal:

1. Select a specific city area to use as experiment for the system.
2. Conduct a critical literature review on vehicular traffic modelling, events that affect traffic, cloud computing architecture and parameter sweeps.
3. Find and/or modify a traffic modelling application to suit the needs of this system on the cloud.
4. Create the system and integrate it with the proposed cloud architecture (Glennis et al, 2003)
5. Analyse and compare data generated from the system to real world scenarios.

**References**

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