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Cloud Computing: A Computer Science and Engineering Lab's Perspective

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ABSTRACT

For the researcher, cloud computing in education is a brand-new topic of study. Technology is developing quickly. For both instructors and kids, being digital savvy is crucial. It is crucial for all students, not only those studying engineering (such as those interested in science, the arts, or commerce). Work in the lab is a requirement for engineering students. In laboratory work, they must manage several data kinds. Working with many sorts of data is crucial, especially for computer science and engineering students (CSE). Although CSE uses a variety of data and tools, for instance, researchers in the bioinformatics section work with DNA, RNA, protein, and other types of data, while researchers in the graph theory section work with a variety of real and simulated network data, and researchers in the image processing section work with a variety of image data. As a result, different types of data are used depending on the part. Nonetheless, they all employ the same kinds of techniques, such as data mining, data manipulation, and data aggression. On the other hand, certain sections may employ hybrid types of data, such as graph theory researchers who may use DNA data for graph colouring or bioinformatics researchers who may use picture data. These sections are also connected to other study areas in the CSE field in some way. In this article, we suggest a brand-new and ground-breaking method for utilising cloud data as a research tool within different CSE department study sections.

KEYWORDS: *Cloud Computing; Information Technology; Education Chain; Data Integration; Internet Security; Dead lock*

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INTRODUCTION

Google first unveiled cloud computing as a novel technology in 2007. As cloud computing was introduced, researchers used it as a supporting tool and integrated it into their work. Another new area of development is the use of cloud computing in higher education. Developing nations are currently utilising a variety of ways to provide safe, simple, affordable, and productive methods in their research laboratories [1]. One method for allowing many data sets to be used by the same research team is cloud computing. While using data from a source, the data must communicate in a way that the researcher can keep the data safely and securely. Google unveiled the breakthrough technology of cloud computing in 2007. Yet, the other user cannot influence the researcher who is utilising the data. Thus, it is crucial that we use effective data transmission methods when working with different data sets [2]. Several sources are used to outsource data. If a research group has three or four separate sections that collaborate on the same data they create, it suggests that another research group needs that data or that they need the same data from a cloud source, in which case outsourcing is required. First and foremost, business continuity and service availability; maintaining a cloud is expensive; if a cloud is developed for commercial purposes, then it must offer some beneficial features for the clients. The company must have some customers, and over a specific length of time, that number must be steadily raised. We believe that the only realistic solution to extremely high availability is multiple cloud computing providers, and the service is very expensive. Assume that a large data section service provider uses multiple copies of the same data section at a time while the data section service provider is providing so that failure by a single data holder will not take them off while using. Second, data lock-in; the information we use must be protected by security measures. Assuming that a training dataset was used for a certain experiment. The same dataset will be used throughout the whole trial, said the researcher.

Nonetheless, the data was cloud-sourced. Unexpected findings will be obtained if the cloud data changes while the experiment is ongoing. It must be kept locked when in use in order to fix the issue. But it is not very simple because the experiment may take a long time, the cloud is tied to the same researcher the entire time, and it is highly expensive. There is a workaround for the issue where users must first download all linked data from a cloud server before using it. Nevertheless, this might cause issues if the size of the data is greater than the researcher's storage capacity. The issue may be resolved by the cloud classifying the data by running distinct sequences and giving one user a sequence at a time. Moreover, some other users could use the rest sequences. Finally, data security and auditability are issues with outsourcing data, therefore data warehouses and cloud computing are keen to find a solution. Such an issue is highly expensive to solve. But it can be reduced by performing specific actions. First of all, the cloud simply provides the requested data to the controller, who then works to provide the required data to the user.

All clouds are connected to the controller, and any type of cloud will only respond to the controller's request. To prevent a client from altering the cloud's content, every client must pass through a controller. because there is a one-to-one relationship and the client is connected to the controller. The auditing capability is merely one step more for outsourced data communication. Assuming we have a medium to access an operating system, we may utilise it as an additional layer or step to prevent unauthorised access to cloud data by users. This brand-new function supports the cloud computing theory that we should shift our attention from outsourced data to the virtualized capabilities being offered. The fourth is the bottleneck in data transport. Working with clouds frequently leads to issues like these. Since cloud data is spread across several machines and every system is kept running by a distant system. As a result, data transmission between machines or from one machine to another is crucial. When large amounts of data are being transferred, the link speed must be taken into consideration. However, setting up a dedicated connection between two links is very expensive. Therefore, when large amounts of data are being transferred, any link may use a protocol from the network, data link layer, or physical layer. A protocol from the list might be used for priority-based scheduling. When a certain quantity of data is requested, the link will follow the network's priority for the data to transit, however it must be remembered that due to priority scheduling, no data or connection links will become inoperable. Large-Scale Distributed System Problems comes in fifth. When several data clouds are connected to a single system, such as when a graph theory research team is combining data from bioinformatics, graph theory, and image processing, extensive data integration and manipulation are required. Big data integration is a difficult challenge for both the user network and the clouds. Performance Unpredictability, Scalable Storage, Scaling Fast, Reputation Fate Sharing, and Software Licensing are some other issues [3, 5, 6]. Another element of cloud computing that we considered was its potential as an e-Learning tool to further the practise of remote learning. For remote learning, we need to transport and consume a lot of data in e-learning. The primary idea of electronic learning is based on a dataset and data model. It is simple to get data from the cloud if we can incorporate an acceptable data model in a distant server. For those who live in rural areas, it is crucial [4].

E-learning has a high upfront cost, but as time passes, those expenses start to decline. When one system is shut down, we reuse the data. For instance, a website uses cloud data to enable class five distance learning in a particular rural location of Bangladesh. The same cloud data is used for distant learning for class five at a different location after the programme has ended. In the thesis, we examine how the CSE laboratory uses data from various sources and how we might improve its efficiency. While every organisation connected to it may quickly access data, we strive to incorporate the cloud into the same platform in our study. We suggest a paradigm in which a single controller served as the communication channel for all clouds and research groups.

MODEL OVERVIEW

In this study, we offer a model that is based on the several research groups in CSE that deal with different kinds of data and can also make use of the information and findings from other groups [Fig. 1]. Initially, we separate our model into three different categories of entities, such as (I) clouds (II) research groups (III), and so on. The data collection from different fields is represented as a cloud in our model. The cloud containing the homogeneous data may separate into smaller clouds. Each kind of cloud has a unique entity, such as the data from a graph network, which are in the same cloud network, and the data from a bioinformatics cloud, which are in distinct clouds [Fig. 2]. Clouds are connected to a controller-named system. Cloud serves for the request through the controller after receiving it in both directions from the controller. This concept explains how a study group may not enjoy a particular user. Every research group has many group members since each user in a group may work with various types of data and must utilise a separate cloud at the same time. If they are employed in the same setting, the controller assists in classifying them into one group. Yet, in order to maintain the data integrity restrictions, it must be accounted for as a separate usage when a member of one research group uses the same data as a member of another research group. So, there are two categories of usage that we may distinguish. One research group wants to obtain data from another research group because (a) various users in different research groups want the same types of cloud (b) users in the same research group seek data for different types of cloud (c). In our architecture, a single platform, the controller, performs all three types of communication.

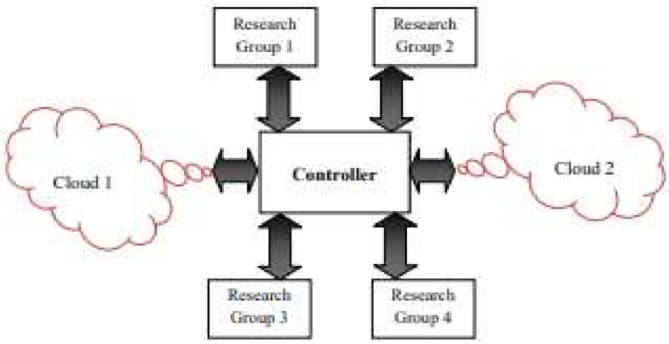

Figure 1: PROPOSED MODEL

Controller is connected to both the research group's area and the cloud. Each researcher in the study group and every cloud component were in communication with the controller. The information about the study group as well as the records of each user's data access are kept by the controller in a log file. On the cloud end, the controller works with little data blocks. The primary data unit in which clouds are organised is the little data block.

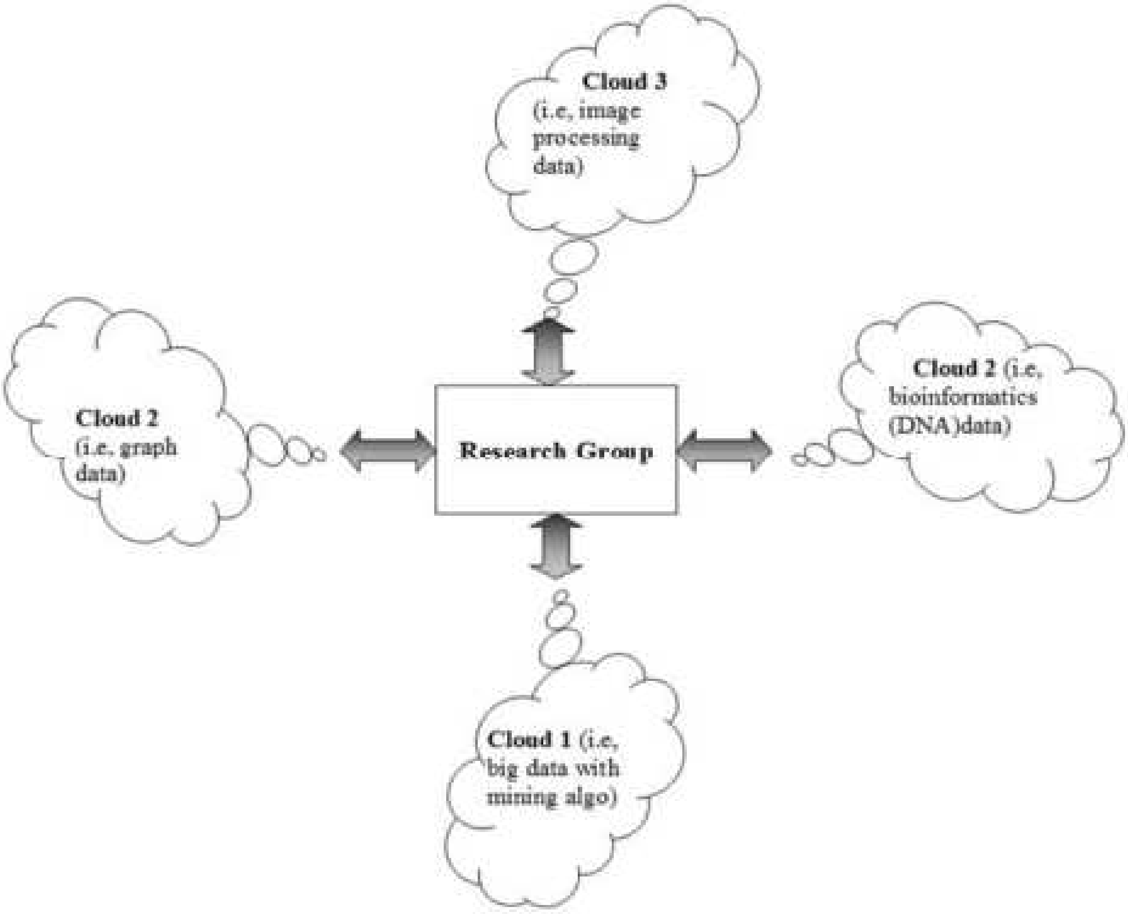

Figure 2: PROPOSED MODEL

CONCLUSION

In every practical setting where external data and tools are employed, cloud computing is growing in popularity. In this essay, we provide a methodology for the successful and efficient lab work among CSE students using data clouds. Our model only describes the research team in CSE-based works, but with small tweaks, the same experiment can be used to multiple laboratories. Our next goal is to build a general model that makes any type of data access over the cloud conceivable. The model was exclusively created for the individual group member. Nonetheless, in many studies, interdisciplinary teams of researchers (hybrid researchers) collaborate on specific experiments. Researchers should work on this in the near future. We suggest a reliable controller for handling connection creation, release, and data transport. In our description but not in our model, the controller is strong. In our subsequent trial, the controller has to be more analytical.

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