Research Report on Emerging Trends in the Future of Cloud Computing

SIT233/SIT706 Cloud Computing

I. INTRODUCTION

In this task, you will perform research on a particular topic related to new advancements in cloud computing technologies and produce a comprehensive research report.

NOTE: Please indicate clearly whether you are a SIT233 or SIT706 student by including this sentence at the start of your Abstract section in your report:

"This research report forms part of the assessment for [SIT233 or SIT706] Cloud Computing".

II. AIM

The aim of this task is to help you gain and enhance the following communication skills:

- Written communication
- Research report writing
- Structured argument presentation
- Correct citation and referencing

and the following research skills:

- Locate relevant resources
- Assimilate information and prepare a critique of current work

III. FORMATTING REQUIREMENTS

Your submitted to OnTrack must meet the following basic requirements:

- Formatted using the **IEEE Conference Style Template** in two column mode (*Note: It is not required to create your report using LaTeX, but the report must be as per the IEEE Template*). The IEEE LaTeX and Microsoft Word RTF templates can be found at: https://www.ieee.org/conferences/publishing/templates.html.
- External sources are appropriately cited and referenced with the **IEEE Referencing Style**
- Between **6 to 10 pages** in length depending on the scope you cover (and your target grade). Although the page length does not necessarily reflect quality, but you will able to cover more with a longer page length and more comprehensively achieve the criteria specified in the rubric.
- Converted to **Portable Document Format (PDF)** format

IV. RESEARCH REPORT TOPICS

You are required to select one of the following trends in cloud computing as your topic for the research report.

A. Multi-cloud approaches will lead to a breakdown of barriers between providers

Currently, the big public cloud providers - Amazon, Microsoft, Google, and so on – take something of a walled garden approach to the services they provide. And why not? Their business model has involved promoting their platforms as one-stop-shops, covering all of an organization's cloud, data, and compute requirements. In practice, however, industry is increasingly turning to hybrid or multi-cloud environments (see below), with requirements for infrastructure to be deployed across multiple models.

What this means is that there are growing calls for the big providers to create bridges between their platforms. This runs contrary to their business models, which are reliant on an ability to upsell greater

cloud capacity as well as additional services as their customers scale. Adopting a more collaborative approach doesn't just enable customers to take greater advantage of the fast-growing multi-cloud trend, though. It will also benefit organizations needing to share data and access with partners in their supply chain, which may all be working across diverse applications and data standards. This is also a space where we are likely to see growing levels of innovation from startups, creating services that simplify the process of operating between different public cloud platforms.

B. AI will improve the efficiency and speed of cloud computing

As far as cloud goes, Artificial Intelligence (AI) is a key enabler of several ways in which we can expect technology to adapt to our needs. Cloud-based as-a-service platforms enable users on just about any budget and with any level of skill to access machine learning functions such as image recognition tools, language processing, and recommendation engines. Cloud will continue to allow these revolutionary toolsets to become more widely deployed by enterprises of all sizes and in all fields, leading to increased productivity and efficiency.

Autonomous vehicles, smart city infrastructure, and pandemic response planning are all fields of research where the effects of smarter algorithms delivered through cloud services will be felt. Machine learning also plays a big part in the logistics processes that keep cloud data centers up and running. Cooling systems, networks of hardware, and power usage in these delicate and expensive environments can all be monitored and managed by AI algorithms in order to optimize running efficiency and minimize their impact on the environment. Research and development in this field are likely to continue to lead to new breakthroughs in data center speed and efficiency.

C. Gaming will be increasingly delivered from the cloud, just like music and movies

Amazon most recently joined the ranks of tech giants and startups offering their own platform for cloud gaming. Just as with music and video streaming before it, cloud gaming promises to revolutionize the way we consume entertainment media by offering instant access to vast libraries of games that can be played for a monthly subscription. During 2020, services were launched by Google, Microsoft, and Nvidia, while Sony's has been available for several years now. Even though new Xbox and Playstation consoles are being developed, costing around $500, industry experts are predicting that the days when we need to spend hundreds on new hardware every few years to stay at the cutting edge of gaming may be drawing to a close, thanks to the coming-of-age of cloud gaming.

D. Hybrid and on-premise cloud solutions grow in popularity

Choosing between a public, private, or hybrid cloud environment has proved challenging for some organizations. Each route offers advantages and disadvantages when it comes to flexibility, performance, security, and compliance. But as cloud ecosystems have matured, many have found there's no magic one-size-fits-all solution on the shelves. Hybrid or multi-cloud environments, where users pick and choose the individual elements of service providers' offerings that suit their needs, have grown in popularity, leading to a situation where those providers have begun to reassess their models of delivery.

Amazon and Google, for example, have traditionally been market leaders that relied on selling their customers space on their public cloud platforms, whereas Microsoft and IBM have been more flexible with enabling users to deploy their cloud tools and technologies across their existing, on-premises networks. Now it seems that these providers have woken up to the need for different platforms and approaches within organizations – perhaps utilizing public cloud to provide content delivery while storing and processing customer data and other controlled information via private or on-premise solutions. There will also be a growing demand for "bare metal" cloud space – raw storage and compute power where businesses can simply "lift and shift" their existing systems into the cloud without having to adapt them to run on pre-installed software or services. The need to consolidate these user requirements will be a driving force behind the direction in which cloud services continue to evolve.

E. More of us will be working on Virtual Cloud Desktops

This is basically where the entire environment of our workstation is delivered as a managed cloud service to our laptop or desktop screen where we work. This means that organizations can take advantage of by-the-hour subscriptions for the time their employees spend working at their machines, eliminating the cost of hardware updates and the need to dispose of redundant technology.

Sometimes known as desktop-as-a-service, this model of computing is offered by Amazon via the Workspaces platform and Microsoft with Windows Virtual Desktop. Google also offers the functionality through its Chromebook devices. In practice, this can increase efficiency across a workforce by ensuring everyone is using up-to-date, synchronized technology. It also benefits security as all devices can be managed in a centralized way, rather than having to make sure everyone on the network is following best practice. When people join or leave a company, the cost simply scales up as the number of hours spent using the platform increases or decreases. This flexible functionality means virtual desktop services are likely to become increasingly popular in the coming years.

V. REPORT CONTENT

The report is quite open-ended and flexible – you are required to do some research on one of the following trends in cloud computing, define the technologies that enable and propel this trend, and include your thoughts and reflections on this trend.

You are also welcome to include real-world examples of such deployments. You are encouraged to use a range of diagrams, graphs and tables in your report to illustrate the impact of these technologies on the future of cloud computing.

You could use the following questions, but not limited to, as a guide:

- Why has this particular trend picked up the pace recently?
- What key pieces of technology (hardware, software, architecture, etc) does this trend involve?
- What motivated the development in this trend? What applications will it support?
- What does this trend mean for large cloud computing service providers?
- Are there any other similar technologies that did not quite picked up in the past?
- What are the benefits of this trend to consumers? What are the downsides?
- How would you evaluate the success of this trend?
- What do you think - will this trend of technology mature in the next five years?
- How would you promote awareness in cloud computing to your friends and family, who might have limited exposure to this area but are interested in learning more?

VI. ASSESSMENT

You will be graded according to the **Marking Rubric** on the last page of this task sheet.

VII. SUBMISSION

Please submit your document in PDF to OnTrack by the specified due date.

*** Please see the next page for Marking Rubric ***

Marking Rubric	Pass	Credit	Distinction	High Distinction
Format	• The submitted report is formatted using the IEEE Conference template • All figures/tables are appropriately labeled • The submitted report is in PDF format	All **Pass** requirements plus: • PDF fonts compiled into document • Images/figures in vector format	All **Credit** requirements plus: • Formatting is clean with no words/tables wrapping beyond the edge of a column/page	All **Distinction** requirements
Structure	• The submitted report is properly structured in the format of an IEEE paper including Abstract, Introduction, and Conclusion • The topic is divided into a simple but clear structure • The report is complete but some sections are lacking required detail • A reference list is provided and correct	All **Pass** requirements plus: • Clear use of sub-sections as required to clearly delineate different aspects of the laboratory tasks/results • All sections have a sufficient level of detail • The reference list is professionally structured and complete	All **Credit** requirements plus: • Suitable references have been located and used for all claims made by the student	All **Distinction** requirements
Research Analysis	• A flawed and incomplete evaluation of the problem requested to be researched • Minimal discussion on the issues raised	All **Pass** requirements plus: • A clear evaluation of the problem requested to be researched • Some discussion of the issues raised in relation to the rest of the report **SIT706 students only:** • Identify the specific products developed/assisting the discussed technology trend	All **Credit** requirements plus: • A detailed evaluation of the research problem • A complete analysis of the issues raised in the report • An attempt to use existing literature to support your argument **SIT706 students only:** • Critical analysis and categorisation of the existing literature	All **Distinction** requirements plus: • A detailed, in-depth evaluation of the research problem • A complex and thorough analysis of the issues raised in the report • Good use of existing literature to support your argument **SIT706 students only:** • Critical reflection on how the technologies and paradigms discussed can be used to further enhanced to support emerging advances, e.g., the pervasiveness of Machine Learning/Artificial Intelligence (ML/AI)
Language	• Basic language and grammatical skills	All **Pass** requirements plus: • Good grammatical structure and flow of argument	All **Credit** requirements plus: • A document suitable for reading by a professional audience	All **Distinction** requirements plus: • An excellent report suitable for reading by an professional Academic audience