

## Question 1

Find 3 papers on the topic of using Cloud AI services (do not repeat any articles that appear in learning modules). Give full references using the style explained in <https://guides.library.queensu.ca/apsc/cite>.

For each paper, provide a 1-sentence summary of what it is about.

- Besides the title, which usually gives a good idea what a research paper is about, I'll provide a 1-sentence summary.

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D. Gannon (2018). "A Brief Survey of Cloud AI Services," *ResearchGate*. [Online]. Available: [https://www.researchgate.net/publication/322836257\\_A\\_Brief\\_Survey\\_of\\_Cloud\\_AI\\_Services](https://www.researchgate.net/publication/322836257_A_Brief_Survey_of_Cloud_AI_Services).

This article presents information for several Cloud AI Services (such as those provided by IBM, Google, Microsoft, and Amazon), explores how they all cover the same fundamentals when compared (although each provider has some services that are more innovative and stand out more), and concludes with a brief discussion of current trends and the future of cloud AI services.

S. Kumari, R. Abhishek, and B. S. Panda (2013). "Intelligent Computing Relating to Cloud Computing," *ResearchGate*. [Online]. Available: [https://www.researchgate.net/publication/266023699\\_Intelligent\\_Computing\\_Relating\\_to\\_Cloud\\_Computing](https://www.researchgate.net/publication/266023699_Intelligent_Computing_Relating_to_Cloud_Computing).

This research paper discusses advanced artificial intelligence and affective computing regarding the advancement of cloud computing via the fusion of natural and artificial intelligence, and implanting such AI to improve efficiency, so cloud services can go beyond automation and be able to anticipate situations and react accordingly by making decisions in real time autonomously.

M.M. E. Khatib, A. Al-Nakeeb, and G. Ahmed (2019). "Integration of Cloud Computing with Artificial Intelligence and Its Impact on Telecom Sector-A Case Study," *iBusiness*. [Online]. Available: <https://www.scirp.org/journal/paperinformation.aspx?paperid=90167>.

This paper documents findings about the integration of cloud computing and artificial intelligence in the leading telecom MGA-MENA Company in the Middle-East, where the application of the twin-technologies leads to increases for operational services, product efficiencies, better products, and customer satisfying services of a Smart MGA-MENA Company; suggesting that telecoms must be technologically dynamic and updated for companies with a large customer base and many transactions.

## Question 2

Find 3 news articles on security issues with/in the Cloud (do not repeat any articles that appear in the learning modules). Provide a link to each article and a 1-sentence summary of the security issue.

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[https://ca.insight.com/en\\_CA/content-and-resources/2019/02242019-cloud-computing-security-issues.html](https://ca.insight.com/en_CA/content-and-resources/2019/02242019-cloud-computing-security-issues.html)

This article talks about numerous security issues and risks regarding cloud computing in 2019, emphasizing that the data security and safety for cloud falls upon each organization to ensure they are protecting themselves and their customers against attacks from malicious actors.

<https://www.securitymagazine.com/articles/91807-cloud-security-risks-will-be-a-top-concern-for-organizations-in-2020>

In this article from early 2020, the author speculates six predictions about cloud before concluding overall that businesses are heavily dependent on advanced technologies (such as cloud computing, cybersecurity, and data privacy), while also noting that there are more benefits than risks, so organizations need to be responsible and prudent with risk management in order to prevent full-scale disaster when breaches inevitably occur.

<https://www.helpnetsecurity.com/2020/08/31/critical-cloud-security-challenges-how-to-overcome/>

With today's organizations desiring the accessibility and flexibility of the cloud, this article from summer 2020 outlines five critical cloud security challenges and how to overcome them, while also highlighting the importance of security and minimizing risks, as well as explaining that this is achievable as long as you understand, anticipate, and address the most significant challenges posed by migration and operation.

### Question 3

What is Edge Computing and why is this an important topic in Cloud Computing? Restrict your answer to 400 words or less and reference where you got your information. Use the same reference formatting as you used in Question 1.

--- (397 words, see next page for references used) ---

Edge computing is defined as “a part of a distributed computing topology in which information processing is located close to the edge – where things and people produce or consume that information.” In other words, computing is done at or near the source of data, instead of relying on the cloud at one of many data centers to do all the work. This brings computation and storage closer to the devices, so that data doesn’t suffer latency issues that can affect performance. Also, this is an important topic for cloud computing because they’re related.

In general, it was developed due to the growth of Internet of Things (IoT) devices, which connect to the internet for receiving/delivering information from/to the cloud. Notably, many IoT devices generate lots of data and companies can benefit by having the processing done locally, in turn reducing the amount to be processed in a centralized or cloud-based location. Furthermore, companies discovered the costs in bandwidth were higher than expected. Since devices at the edge constantly consume data coming from the cloud, many companies were consequently forced to build content delivery networks to decentralize data and service provisioning, leveraging physical proximity to the end user. For instance, instead of a facial recognition app using the algorithm through a cloud-based service (which would take a lot of time to process), by using an edge computing model, the algorithm can run locally on an edge server/gateway (or even the smartphone itself, given the increasing power of smartphones).

With regards to edge computing, there are typically three issues: latency, privacy, and bandwidth. Any applications (VR, AR, self-driving cars, smart cities, building-automation systems, etc.) that require fast processing and response can benefit from edge computing rather than cloud computing alone. Moreover, most AI algorithms require lots of processing power, explaining why most of them run via cloud services; however, AI chip-sets’ growth that can handle processing at the edge will enable better real-time responses within applications that need instant computing. For example, consider self-driving cars and their numerous sensors and data. Even if a trip could survive the latency of sending and receiving info from the cloud, the network is too inconsistent and unreliable as the car moves (especially some areas). Furthermore, it almost needs to be managed centrally since it must be updated automatically, and it needs to send processed data back to the cloud to improve algorithms.

**Q3 References**

- K. Shaw (2019). "What is edge computing and why it matters," *Network World*. [Online]. Available: <https://www.networkworld.com/article/3224893/what-is-edge-computing-and-how-it-s-changing-the-network.html>.
- P. Miller (2018). "What is edge computing?" *The Verge*. [Online]. Available: <https://www.networkworld.com/article/3224893/what-is-edge-computing-and-how-it-s-changing-the-network.html>.
- S. Fulton III (2020). "What is edge computing? Here's why the edge matters and where it's headed," *ZDNet*. [Online]. Available: <https://www.zdnet.com/article/where-the-edge-is-in-edge-computing-why-it-matters-and-how-we-use-it/>.
- Wikipedia (2020). "Edge computing," *Wikipedia*. [Online]. Available: [https://en.wikipedia.org/wiki/Edge\\_computing](https://en.wikipedia.org/wiki/Edge_computing)