CS-499 Computer Science Capstone

Module 6-1 Journal: Emerging Technology and Artifact Update

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Emerging Technology

Technology One: *Cloud Computing*

One technology of interest is cloud computing. Cloud computing refers to providing computing services, comprising storage space, database servers, networking, software, and analytics, over the internet, which is "the cloud." Cloud computing providers provide dynamic IT infrastructure scaling for enterprises by providing on-demand access to computing resources where users only pay for the resources they use. It has a deployable model, which includes public, private, and hybrid models. It also has three primary models: Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS). "Cloud Computing allows users and companies to access digital information over the internet from any location, instead of requiring physical servers in a network closet in the back office" (Kerner, 2024).

Cloud computing has transformed the field of computer science and has completely changed how businesses develop, implement, and maintain their software programs. With cloud computing, an organization can operate without the need for its own hardware. Instead, it offers the benefits of flexible, compute-on-demand and consumption-based storage capacity. From a career perspective, professionals in cloud computing have a higher chance of receiving job offers in the industry than many other professionals. The demand for engineers skilled in cloud technologies is increasing as more companies adopt cloud services. This includes becoming proficient with systems such as Google Cloud Platform (GCP), Microsoft Azure, and Amazon Web Services (AWS). It also involves understanding concepts such as optimizing Software for cloud computing environments and using multi-program management tools. Cloud computing accelerates and reduces the cost of work for businesses by enabling developers to quickly create new products and ensure they can support large numbers of users.

Cloud computing has influenced individuals, communities, and the world. It has simplified the use of advanced technology for people and organizations, which has helped foster innovation. More people can test their ideas and launch new ventures since adopting cloud services doesn't necessitate a large initial investment. Moreover, cloud-based solutions promote remote collaboration, which is particularly beneficial in the current trend where many people are working from home. Cloud computing can also contribute to solving significant issues, such as ensuring universal access to quality healthcare and promoting energy efficiency.

Technology Two: *Quantum Computing*

Quantum computing is a new way of completing computer tasks that is super-fast and can handle complicated problems. “Quantum computing is a type of computing that utilizes the concepts from quantum physics to make a computer run faster than traditional computers" (Mohn, 2022). It utilizes specialized technologies, such as computer hardware and algorithms, that take advantage of quantum mechanics to solve complex problems that classical computers or supercomputers cannot solve or cannot solve quickly enough. Instead of regular computer bits like 0s and 1s, quantum computers use qubits that can do lots of things simultaneously because they are super tiny and follow strange rules from quantum physics. This lets quantum computers solve problems that regular computers would take forever.

Quantum computing will greatly change computer science and what we would do as software engineers! As quantum computers become common, developers will need to know how to write programs for them and ensure they work correctly. Future technological developments may be impacted by quantum computing. For example, "the era of quantum computing may make it easy to breach encryption techniques that are nearly impossible to break with the existing

technology" (Mohn, 2022). As this evolves rapidly, there will be the need to learn new ways of thinking about problems and how to write code that works with these super-fast computers. It is like learning a new language but opens up many exciting opportunities for solving big problems faster.

Quantum computing could help us solve tough problems, like finding new medicines in healthcare or making better materials for building things. It also helps us better predict the weather or how diseases spread. This could make life better for many people, but we also need to ensure everyone can benefit from this new technology and use it responsibly. Quantum computing is now considered a 'game-changer' technology; therefore, public, and private sector researchers are now looking into it to explore its potential. "Many educational institution research labs have been attempting to solve the difficulty of quantum computing, and several universities have units dedicated to studying the subject" (Mohn, 2022). Moreover, quantum encryption techniques could enhance cybersecurity and safeguard sensitive information in an increasingly interconnected world. However, there are also concerns about the societal implications of quantum computing, such as making inequalities worse if access to quantum technology is unevenly distributed.

PART TWO

Artifacts 1: *Software Engineering and Design*

I am currently on status checkpoint 6 for the Software Engineering and Design artifact, and to make it ready for review in module seven. I have incorporated the instructor’s feedback by cleaning up and polishing my in-line comments including showing intent and decisions for the overall functionality of each code file. In the narrative of this artifact, I have identified the course

outcomes I have achieved and have demonstrated how I met each outcome. I have uploaded it to my ePortfolio for final review in module seven.

Artifact 2: ***Algorithms and Data Structures***

For the Algorithms and Data Structures artifact, I am currently at status checkpoint five. I have applied my instructor's feedback to polish the artifact. I am polishing the narrative, uploading it to my ePortfolio, and confirming the navigation on the GitHub Pages site to make it ready for review in module seven.

Artifact 3: ***Databases***

For the Databases artifact, I am also working on checkpoint five by applying the feedback from my instructor to polish the artifact. I am working on my commenting style to demonstrate an intent and decision for the overall functionality of the code. I am also polishing the narrative to make it ready to upload it to my ePortfolio. I intend to confirm its navigation on the GitHub Pages site and make it ready for review by week seven.

As at now, I am incorporating all the feedback I have receive from my instruction of each artifact to polish each one. I do not have issues or questions now, but I will reach out to my instructor when I encounter any issue, or I have any question or clarification.

Checkpoint Table

Checkpoint	Software Design and Engineering	Algorithms and Data Structures	Databases
Name of Artifact Used	**Artifact name:** Treasure Hunt Game: Human Brain and Artificial Neural Network **Origin:** CS 370: Current/Emerging Trends in Computer Science	**Artifact name:** Android Mobile App – Inventory App **Origin:** CS360 Mobile Architect and Programming	**Artifact name:** Traveler Website **Origin:** CS465: Full Stack Development I
Status of Initial Enhancement	Enhancements completed	Enhancements completed	Enhancements completed
Submission Status	Submitted with feedback from the instructor	Submitted with feedback from the instructor	Submitted with feedback from the instructor
Status of Final Enhancement	Feedback was applied, and the final polish was applied	Feedback was applied, and the final polish was applied	Feedback was applied, and the final polish was applied
Uploaded to ePortfolio	Completed with polished narrative and confirmed navigation on GitHub Pages site	Completed with polished narrative and confirmed navigation on GitHub Pages site	Planned but not yet completed
Status of Finalized ePortfolio	Ready for review in Module Seven	Planned but not yet completed	Planned but not yet completed

References:

Kerner, S. M. (2024, January 5). *Top 10 cloud computing careers of 2024 and how to get started*. WhatIs. https://www.techtarget.com/whatis/feature/Top-7-cloud-computing-careers-and-how-to-get-started

What is Quantum Computing? | *IBM*. (n.d.). https://www.ibm.com/topics/quantum-computing

Mohn, E. (2022). Quantum Computing. Salem Press Encyclopedia of Science.