**6-1 Journal: Emerging Technology and Artifact Update**

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**Part One**

In the dynamic field of computer science, emerging technologies like augmented and virtual reality (AR/VR) and cloud computing are not just new tools but potential game-changers. With their disruptive potential, these technologies are set to revolutionize the industry, creating new opportunities and reshaping existing norms. Technologies like augmented and virtual reality (AR/VR) make it possible to superimpose digital content on top of physical or digitally created settings. By superimposing digital elements—such as images, sounds, or data—on top of the user's view of their physical surroundings, Augmented Reality (AR) enhances the user's perspective of their surroundings. Conversely, VR uses headgear to transport people to a wholly artificial digital world. New ways of interacting with digital content and settings are made possible by augmented and virtual reality technologies used in gaming, education, healthcare, and training. Computing in the cloud refers to a paradigm for making available computer resources via the internet. Through the cloud, users have instantaneous and easy-to-manage access to a shared pool of configurable computing resources, including servers, storage, databases, networking, and applications. Developers and enterprises may increase their operations without spending money on physical infrastructure. Hosting as a Service, Software as a Service, and Infrastructure as a Service are all important service delivery paradigms. Everything about creating, releasing, and using software has been touched by cloud computing (Bnmit, 2023).

While new, revolutionary, or otherwise transformative technology has the potential to have far-reaching positive effects on my career in computer science and the discipline, it also brings with it potential risks and challenges. For instance, the widespread adoption of augmented and virtual reality technology could lead to privacy and data security concerns. Similarly,

increasing reliance on cloud computing could raise data ownership and control issues. However, these challenges also present opportunities for further research and innovation. Computer graphics, HCI, and real-time rendering are just a few of the disciplines that stand to benefit from advancements in augmented and virtual reality technology. Researchers and developers will investigate complex algorithms to build more lifelike and immersive settings. Advancements in specialized hardware, such as virtual reality goggles, augmented reality spectacles, and haptic devices, will test the limits of software hardware integration. You'll need knowledge of embedded systems, sensor technologies, and software optimization for these devices. Jobs for software engineers, user experience designers, and developers skilled in augmented and virtual reality will be on the rise due to the popularity of these technologies in many industries, including gaming, education, and training. 3D modeling, simulation, and rendering expertise are necessary to create augmented and virtual reality applications. Professional advancement may be possible with mastery of 3D modeling software and technologies like Unity and Unreal Engine. Software engineering concepts will change to accommodate the difficulties of creating immersive apps as augmented and virtual reality technologies advance. These difficulties include optimizing performance, handling massive datasets, and ensuring all devices work together (Cao et al., 2023).

Thanks to cloud computing, computer scientists are more interested in distributed systems, in which computing resources are in different physical places. Innovations in fault tolerance, data synchronization, and network protocols are needed to make this change. Scalable algorithms, especially in artificial intelligence, machine learning, and big data analytics, have been developed in response to the cloud's capacity to manage massive volumes of data. To make the most of cloud resources, research in these fields is constantly evolving. Strong cybersecurity

and data privacy safeguards are more important than ever due to the explosion in the popularity of cloud services. This sparked fresh investigations into methods for securing data stored on the cloud, including encryption and access control. Thanks to cloud computing, DevOps practices—which combine software development with IT operations—have become more mainstream. Automation tools and continuous integration/delivery pipelines have emerged due to this impact on software development, testing, and deployment. It will be more valuable to have knowledge of cloud platforms such as AWS, Azure, and Google Cloud in the future. New career doors may open for those with expertise in cloud-native development, serverless computing, and cloud architecture. The need for experts in cloud security is rising in tandem with the popularity of cloud computing. This involves being well-versed in data protection techniques, identity and access management, and cloud security frameworks. Thanks to cloud computing, it's now easier than ever to collaborate remotely with coworkers in different parts of the world. Nowadays, no job is complete without learning to use cloud-based communication tools and techniques. Professionals in the cloud computing field must be ever evolving to keep up with the ever-changing landscape of services, tools, and approaches. It can benefit your job to keep up with cloud advancements and get certifications in cloud technology (Powell & Smalley, 2024).

Enhanced training and learning are how augmented and virtual reality impacts people, communities, and the globe. By creating more engaging and immersive learning environments, augmented and virtual reality can transform how we learn. For instance, medicine students can hone their surgical skills in a simulated setting, while students of history or complex science can delve into these topics in three dimensions. However, using these technologies also raises ethical concerns, such as the potential for addiction to gaming or the need to ensure patient consent and privacy in healthcare applications. Conditions like post-traumatic stress disorder (PTSD),

anxiety, and phobias are being relieved through virtual reality therapy. Therapists can assist patients in safely confronting and managing their fears and anxieties by creating environments that mimic real ones. Virtual concerts, social interactions in virtual worlds, and immersive gaming are just a few ways AR/VR is changing the entertainment industry. No matter where you are, these events can unite people in unprecedented ways.

By simulating in-person meetings virtually, augmented and virtual reality technologies can make distant teams work together more effectively. More welcoming workplaces for all employees and less commuting time could result, which would be great for the environment. Augmented and virtual reality technologies can help protect and disseminate cultural heritage by producing digital replicas of historical sites and artifacts. Virtual tourism can enhance global understanding and appreciation of varied cultures by allowing individuals to virtually visit faraway destinations or immerse themselves in different cultures without leaving their homes. Urban planners can use augmented and virtual reality to help residents envision and engage with planned changes before they're executed to build virtual models of city projects. As a result, communities may become better educated and more interactive.

With the use of augmented and virtual reality technology, individuals from all over the globe may now work together in shared virtual environments, regardless of their physical location. This might democratize access to knowledge and education while also encouraging creativity and collaboration on a global scale. Environmental effects are associated with both the production and disposal of AR/VR devices, even if these technologies can lessen the need for physical travel and, by extension, carbon emissions. Sustainable production and recycling techniques will be required when these technologies gain traction. Several moral questions arise from the immersive character of AR/VR, including the possibility of addiction, the effect on

interpersonal relationships, and worries about privacy and monitoring in online environments. To overcome these obstacles, new ethical frameworks must be created.

Because it makes high-powered computer resources and software accessible to people and small companies who couldn't afford them, cloud computing has far-reaching effects on people, communities, and the planet. This can encourage creativity across various groups while also leveling the playing field. One benefit of cloud storage is the ease and connectivity it allows users to store, view, and manage their data from any device. However, since private information is kept on distant servers managed by outside organizations, it also brings up issues with data privacy. More efficient and individualized healthcare is possible thanks to cloud computing's storage and processing capabilities for massive healthcare databases. Access to healthcare, especially in underserved or faraway places, can be enhanced by cloud-based telemedicine services (DigitalDefynd, 2024).

By eliminating the need for costly infrastructure, cloud computing makes it easier for startups and small enterprises to enter the market. Boosting local economies, encouraging entrepreneurship, and generating new job possibilities are all possible outcomes. To ensure that essential data and systems are backed up and can be restored fast in case of a cyberattack or natural disaster, communities can utilize cloud-based services for disaster recovery. The continuity of services and the community's resilience are both improved by this. Although cloud computing has many advantages, it worsens the digital divide, especially in areas with limited internet connection. The disparity between communities with access to cloud-based resources and those without access may grow wider if communities with dependable connectivity are incorporated.

Thanks to cloud computing, international teams may work together more efficiently by sharing and accessing data in real-time and coordinating projects from anywhere worldwide. From scientific research to corporate development, this speeds up innovation and problem-solving worldwide. The move to cloud computing affects the environment in good and bad ways. On the one hand, cloud service providers can optimize the energy efficiency of their data centers. Conversely, the demand for large-scale data centers exacerbates energy consumption and electrical waste. To lessen these effects, sustainable cloud practices are essential. Cybercriminals find centralized data in the cloud to be an appealing target. Protecting data privacy and implementing strong security measures are becoming more crucial as sensitive information and critical infrastructure moves to the cloud. International rules and laws will have to change to tackle these worldwide issues (Madders, 2021).

Acquiring knowledge of both society and technology aligns with my career aspirations. Through studying history, the humanities, the scientific and practical sciences, and the social sciences, I have gained an extensive comprehension of the interplay between technology and these fields. This means you have succeeded in examining and comprehending technology's more extensive societal effects. Achieving results related to mastering secure coding practices, comprehending advanced programming techniques, and applying these skills in actual circumstances was made possible by my study in CS 405 (Secure Coding) and CS 340 (Advanced Programming Concepts). As for my understanding of software engineering and design, algorithms, data structures, and databases, I could showcase this knowledge while working on artifacts for my CS 499 project. Software engineering, system design, and problem resolution results have been met. Focusing on augmented reality/virtual reality and cloud computing will allow me to demonstrate my accomplishments in comprehending and assessing

the effects of evolving technology, which aligns with my interest in developing systems

architectures and technologies.

## Part Two

As far as computer science final projects go, I am satisfied. I plan to submit my

assignment this coming weekend and am already working on incorporating my feedback to gain

more detailed remarks from my teacher. Additionally, to demonstrate the practical application of

my education, I am incorporating references to this project into my online portfolio.

| Checkpoint | Software Design and Engineering | Algorithms and Data Structures | Databases |
|---|---|---|---|
| **Name of Artifact Used** | **Artifact name:** gpiointerrupt.c<br><br>**Origin:** CS 350: Emerging Systems Architectures and Technologies | **Artifact name:** BufferOverflow.cpp<br><br>**Origin:** CS 405: Secure Coding | **Artifact name:** AnimalShelter.py<br><br>**Origin:** CS 340: Advanced Programming Concepts |
| **Status of Initial Enhancement** | Improvements finalized | Improvements finalized | Improvements finalized |
| **Submission Status** | Finalized | Finalized | Finalized |
| **Status of Final Enhancement** | Finalized w/ instructor feedback | Finalized w/ instructor feedback | Finalized w/ instructor feedback |
| **Uploaded to ePortfolio** | Finalized | Finalized | Finalized |
| **Status of Finalized ePortfolio** | Planned but has not been finalized | Planned but has not been finalized | Planned but has not been finalized |

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