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CS-499-10450-M01

Professor Ramsey

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6-1 Journal Emerging Technology and Artifact Update.

**Part One:**

1. **What is the identification and description of each technology?**

**Zero Trust Architecture (ZTA):**

An idea in cybersecurity called "zero trust architecture" is found on the principle "never trust, always verify." Instead of assuming that users or devices within the network perimeter are trustworthy, zero-trust architecture (ZTA) requires continuous user identity and device health verification, regardless of device location. Modern technologies like multi-factor authentication (MFA), identity and access management (IAM), and network segmentation are used in this architecture to ensure that only authorized users can access vital data and systems (Chaudhary et al., 2021). In the current environment, where cloud services and remote work have expanded the attack surface for potential threats, the technique is extremely crucial.

**Homomorphic Encryption:**

Homomorphic encryption eliminates the need for pre-cryptographic decoding by enabling computations on ciphertexts, or encrypted data. By allowing sensitive data to be processed and analyzed while maintaining security, this lowers the likelihood of exposure. In industries where patient privacy is crucial, such as cloud computing, healthcare, and finance, this method is quite helpful. Businesses can use encrypted data for data analytics and machine learning while maintaining the privacy of sensitive data even while it is being processed (Rivest et al., 1978).

1. **What are the likely impacts on computer science or your career?**

**Zero Trust Architecture (ZTA):**

Demand for cybersecurity professionals skilled in establishing and managing Zero Trust Architecture (ZTA) frameworks is expected to rise significantly as a result of its implementation. A cybersecurity job will require an understanding of ideas like IAM, network segmentation, and continuous monitoring. Professionals with ZTA knowledge will have opportunities as firms seek ZTA expertise to improve their security posture as breaches continue to grow. My professional development in ZTA will make me a valuable contributor to organizations that place a high priority on cybersecurity.

**Homomorphic Encryption:**

The demand for experts in cryptographic techniques, especially homomorphic encryption, will increase due to the increased focus on data security and privacy. Cloud computing, cybersecurity, and data science jobs will require an understanding of how to apply and maximize this technology for real-world uses. My job chances will be improved and I will be able to make a significant contribution to companies that are dedicated to protecting user data since businesses are depending more and more on data analytics.

1. **How might the two technologies impact humans, communities, or the world?**

**Zero Trust Architecture (ZTA):**

Cybersecurity may be greatly improved at the corporate and social levels by implementing Zero Trust Architecture. ZTA can help prevent cyberattacks and data breaches by making sure that all access requests are validated, shielding private data from bad actors. People will have more faith in digital services as a result of businesses placing higher priority on protecting personal information. ZTA adoption can, on a broader scale, promote a security-conscious culture, resulting in safer online spaces and a lower risk of cybercrime overall.

**Homomorphic Encryption:**

The handling of sensitive data in a variety of industries, especially in the financial and medical fields, can be revolutionized by homomorphic encryption. Organizations can learn from data without putting it at risk of security breaches by providing safe calculations on encrypted data. With the help of this technology, users can safely exchange data for analysis and study, encouraging creativity while protecting privacy. The balance between data accessibility and privacy, as well as regulatory compliance, may become problematic if it is widely adopted.

1. **Which course outcomes have you achieved so far, and which ones remain?**

* learning the fundamentals of new security technologies and how they will affect computers in the future.
* Evaluating how disruptive technology might affect society, especially in light of data security and privacy.

**Remaining outcomes include:**

* Gaining hands-on experience through laboratories or projects in the implementation of homomorphic encryption and Zero Trust Architecture.
* Expanding my knowledge of the technical facets of these technologies, such as risk management, encryption techniques, and programming.

**References:**

“Chaudhary, R., Zafar, A., & Peddinti, S. (2021). A comprehensive survey on Zero Trust Architecture: Principles, frameworks, and security challenges.

Rivest, R. L., Adida, B., & Sipser, M. (1978). <https://luca-giuzzi.unibs.it/corsi/Support/papers-cryptography/RAD78.pdf>.”

Part Two:

Provide an update to your instructor on your progress with each category of artifacts for the ePortfolio:

* Software design and engineering
* Algorithms and data structures
* Databases

Maintaining a record of our progress and providing instructors with updates on our work on the ePortfolio's development and enhancement implementations for each of the artifact's primary categories.

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| **Checkpoint** | **Software Design and Engineering** | **Algorithms and Data Structures** | **Databases** |
| **Name of Artifact Used** | “3D Modeling and Scene Design from CS 330 (Computational Graphics and Visualization)” | IT-145 – Zoo Monitor System | “Database Project from CS 340: Using MongoDB for Animal Rescue” |
| **Status of Initial Enhancement** | Switch the 3D scene's visuals from OpenGL to Blender, a more industry-standard program. | Complete creation of pseudocode. Complete coding  The code has been thoroughly tested.  General cleanup of the code. | Playing with methods for indexing and aggregating in order to manage bigger datasets. |
| **Submission Status** | Final efforts to address animation problems before submission | Submitted and just making some final adjustments | Final push to fix bugs then ready to submit |
| **Status of Final Enhancement** | I'm now working on adding more realistic models, texturing, and simple motions with lighting effects. Not yet a final version. | Just making the finishing touches | Researching bug fixes |
| **Uploaded to ePortfolio** | Not yet uploaded. | Not yet uploaded. | Not yet uploaded. |
| **Status of Finalized ePortfolio.** | Improvements have been finished, therefore the ePortfolio will be posted shortly. | Improvements have been finished, therefore the ePortfolio will be posted shortly. | Improvements have been finished, therefore the ePortfolio will be posted shortly. |