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CIA Triad

The CIA Triad — Confidentiality, Integrity, and Availability — is a foundational model in cybersecurity that helps organizations protect information and systems. In addition, the concepts of authentication and authorization are critical to enforcing the CIA Triad in practice.

The CIA Triad

According to Chai (2022), the CIA Triad is a model designed to guide security policies within organizations. It consists of three interrelated principles:

Confidentiality

Confidentiality ensures that sensitive information is accessible only to authorized individuals. Encryption, multi-factor authentication, and access control lists are common tools to maintain confidentiality. For example, online banking platforms require strong passwords and two-factor authentication to prevent unauthorized access.

Integrity

Integrity refers to maintaining the accuracy, consistency, and trustworthiness of data throughout its lifecycle. Checksums, hashing, and version control are techniques used to detect or prevent unauthorized modifications. For instance, digital signatures help verify that an email or software update has not been altered in transit.

Availability

Availability ensures that data and systems are consistently accessible to authorized users. Redundancy, backups, and disaster recovery planning are essential. A real-world example is cloud service providers using geographically distributed data centers to ensure uptime even during outages.

Authentication vs. Authorization

While the CIA Triad provides the foundation, security also depends on correctly handling authentication and authorization. Authentication is the process of verifying the identity of a user or system. Common methods include passwords, biometrics, and multi-factor authentication. For example, when you log into Gmail, you prove your identity with your username and password. Authorization occurs after authentication and determines what resources or actions the authenticated user is permitted to access. Continuing the Gmail example, authorization dictates whether you can only check your email or also access administrative settings. In short: • Authentication = “Who are you?” • Authorization = “What are you allowed to do?”

The CIA Triad remains a vital model for cybersecurity, focusing on protecting data through confidentiality, integrity, and availability. At the same time, authentication and authorization ensure that access to resources is both properly verified and appropriately restricted. Together, these concepts create a

robust framework for securing information systems. References Chai, W. (2022, June 28). What is the CIA Triad? Definition, Explanation, Examples. TechTarget. <https://www.techtarget.com/whatis/definition/Confidentiality-integrity-and-availability-CIA> Stallings, W. (2018). Foundations of Cybersecurity. Pearson. NIST. (2013). Security and Privacy Controls for Federal Information Systems and Organizations (SP 800-53). National Institute of Standards and Technology.