

# B.Tech, 6<sup>th</sup> Sem., Computer Networking: Security(CLASS NOTE)

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# Compare and contrast concepts and strategies to protect data

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## Chapter 12

Introduction

Data Types

Data Classifications

Methods to Secure  
Data

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# Introduction/Motivation

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### Objectives of this chapter

Safeguarding valuable information is critical. This chapter explores the complex challenge of data protection, covering various types such as regulated data, trade secrets, and intellectual property, each requiring different security levels. Data exists in multiple states—at rest, in transit, and in use—raising concerns like sovereignty and geolocation. To address these, organizations use techniques like encryption, hashing, masking, and tokenization, along with location-based and permission-based access controls. In the face of cyber threats, an organization-specific blend of these measures is essential for effective data security.

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### Data Types

- Data is vital to modern business and must be protected from malicious actors.
- Regulated data refers to data governed by laws and regulations to ensure privacy, security, and legal compliance.
- Types of Regulated Data:
  - Personally Identifiable Information (PII): Unique personal details (e.g., social security number, email, phone, biometric data).
  - Protected Health Information (PHI): Medical data like history, treatments, test results (e.g., X-rays, MRIs).
  - Financial Data: Includes bank details, credit card info, payment records; governed by anti-fraud and privacy laws.
  - Legal Data: Information on legal proceedings; strictly confidential.

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### Data Types

- Intellectual Property (IP): Includes patents, copyrights, and trade secrets; protected by IP laws.
- Consumer Data: Purchase history, preferences, online behavior; covered by consumer privacy laws.
- Government Data: Sensitive information handled by government bodies; subject to strict access and disposal rules.
- Trade Secrets: Confidential business info; protected via NDAs, contracts, and access control.
- Customer Data: Includes client profiles and sensitive account data; must be protected to maintain trust and compliance.
- Proprietary Data: Internal company data like research and product development; often overlaps with trade secrets.
- Biometric Data: Fingerprints, facial scans; requires strong protection.

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## Data Types

- Data Classifications:
  - Human-readable data: Text, images, audio — secured via encryption.
  - Non-human-readable data: Binary, machine code, encrypted info — protected via cryptography and secure hardware.
- Key Regulations:

Regulation	Description
GDPR	EU law protecting personal data and digital privacy rights
HIPAA	U.S. law ensuring privacy of health data
CCPA	California law granting consumer control over personal data
SOX	U.S. law promoting financial accountability for public companies
GLBA	U.S. regulation requiring financial institutions to safeguard consumer data
Data Protection Act	UK law for regulating and securing personal data

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### Data Types

- Data Classifications w.r.t. human:
  - Human-readable data: Text, images, audio — secured via encryption.
  - Non-human-readable data: Binary, machine code, encrypted info — protected via cryptography and secure hardware.
- Key Regulations:

Regulation	Description
GDPR	EU law protecting personal data and digital privacy rights
HIPAA	U.S. law ensuring privacy of health data
CCPA	California law granting consumer control over personal data
SOX	U.S. law promoting financial accountability for public companies
GLBA	U.S. regulation requiring financial institutions to safeguard consumer data
Data Protection Act	UK law for regulating and securing personal data



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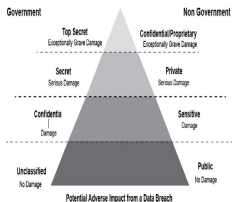
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## Data Classifications

- Objective:
  - Foundation for data protection strategies.
  - Categorizes data by sensitivity, access control, and risk impact.
  - Determines how data is handled, accessed, stored, and destroyed.
- Government vs. Non-Government Classification (Pyramid Model):



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### Data Classifications

<b>Government</b>	<b>Non-Government</b>
Top Secret	Confidential/Proprietary
Secret	Private
Confidential	Sensitive
Unclassified	Public



- Types of Data Classifications:

- Sensitive Data:

- Privileged information (personal, financial, etc.).
    - Exposure can cause harm.
    - Requires strong protection.

- Confidential Data:

- Includes R&D, legal documents.
    - Unauthorized disclosure can harm the company.
    - Legally protected (e.g., attorney-client privilege).
    - Access needs authorization.

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## Data Classifications

- Public Data:
  - Freely available to anyone.
  - Examples: news, brochures.
- Restricted Data:
  - Similar to confidential but with stricter usage/access controls.
  - Often legally/regulatorily restricted.
- Private Data:
  - Personal information not meant for public.
  - Breach can cause significant harm to individuals.
- Critical Data:
  - Essential to business continuity (e.g., backups, encryption keys).
  - Loss/corruption can lead to operational failure.
  - Should be encrypted and securely stored.

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### Methods to Secure Data

Data is a company's most valuable asset, making its protection essential. Various strategies—from geographic restrictions to tokenization—offer distinct advantages in safeguarding information. Common methods include:

- Geographic Restrictions:
  - Restrict data access by location (region/country).
  - Ensures compliance with jurisdictional laws.
  - Challenge: Limits remote/global collaboration.
- Encryption:
  - Converts plaintext to unreadable ciphertext.
  - Requires a decryption key to access.
  - Use: Essential for data confidentiality in transit and storage.

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### Methods to Secure Data

- Hashing:
  - One-way conversion of data to fixed-length values.
  - Ensures data integrity, not confidentiality.
  - Common algorithms: MD5, SHA-1, SHA-256, SHA-512, SHA-3.
- Masking:
  - Hides sensitive data using fake but structurally similar data.
  - Example:
    - Original SSN: 123-45-6789
    - Masked: XXX-XX-X789
- Tokenization:
  - Replaces sensitive data with a random token.
  - Real data stored securely in a vault.
  - Used in: Credit card processing.

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### Methods to Secure Data

- Obfuscation:
  - Makes code/data hard to interpret.
  - Techniques:
    - XOR: Binary comparison logic (0/1).
    - ROT13: Alphabet shift cipher (rotate 13 letters).
- Segmentation:
  - Divides networks into isolated segments.
  - Reduces lateral threat movement.
  - Enhances breach containment.
- Permission Restrictions:
  - Limits data access/modification by user roles.
  - Enforces role-based access control (RBAC).

# References

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<https://www.ebooks.com/en-ag/book/210192090/comptia-security-sy0-601-certification-guide/ian-neil/>

# Question ??



# The End