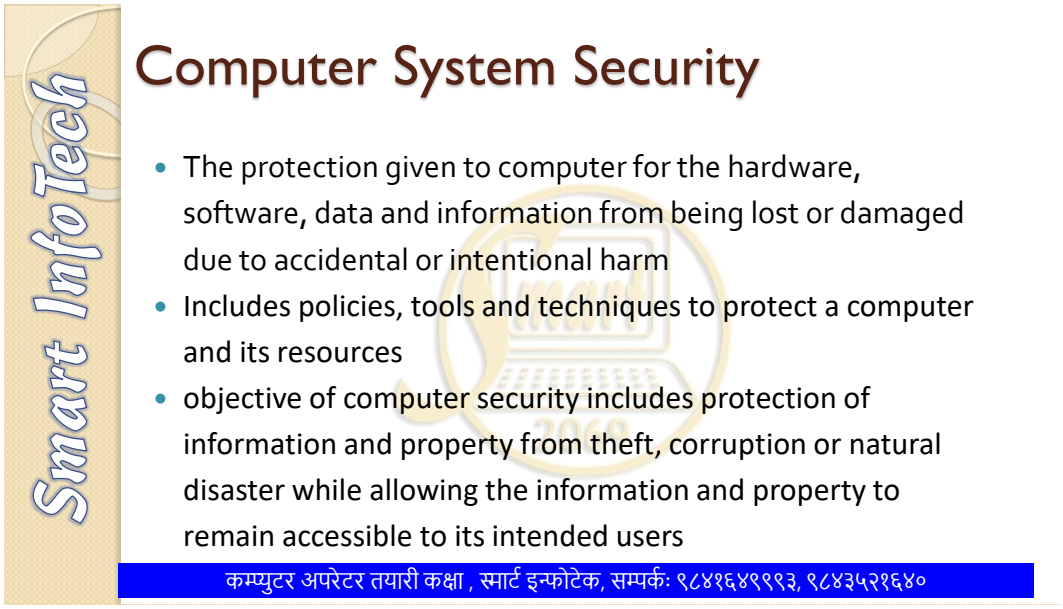

कम्प्युटर अपरेटर तयारी कक्षा
स्मार्ट इन्फोटेक
गुणस्तरीय कम्प्युटर तालिमको अर्को नाम
सम्पर्कः कीर्तिपुर, काठमाडौं । ९८४१६४९९९३, ९८४३५२१६४०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Computer System Security
The protection given to computer for the hardware, software, data and information from being lost or damaged due to accidental or intentional harm
Includes policies, tools and techniques to protect a computer and its resources
objective of computer security includes protection of information and property from theft, corruption or natural disaster while allowing the information and property to remain accessible to its intended users
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3 Aspects of computer security

- 3 aspects of computer security can be termed as CIA which stands for
  - Confidentiality
  - Integrity a
  - Availability.

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3 Aspects of computer security

- **Confidentiality**
  - Information should be available only to authorized user- 'the right people' and should be prevented by unauthorized one- 'the wrong people'.
  - This is possible by using username and password

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3 Aspects of computer security

- **Integrity**
  - Information should not be modified due to unauthorized access.
  - Receiver should receive the information exactly as it was sent by sender.

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3 Aspects of computer security

- **Availability**
  - Information should be available in complete form when it is required by the authorized user.

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Types of security measure / Ways of security

1. Hardware and Environmental Security
2. Software and Data Security

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Hardware and Environmental Security

The protection of all hardware components used in computer system

Hardware Security Measure

- Regular Maintenance
- Insurance
- Dust free environment
- Protection from fire
- Building construction
- Protection from theft
- Power protection devices (UPS, Volt Guard)
- Air conditioner System
- Access Control

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Software and Data Security

- The protection of data and programs used in computer system
- The means which ensures that data and software are kept safe from corruption and loss

Software Security Measure

- Password Protection
- Backup System
- Avoid pirated software
- Use of anti-virus software
- Use of anti-spyware soft.
- Use scandisk, CHKDSK and defragmentation tool

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Identity and Access Control

- Security discipline that makes it possible for the right people to use the right resources whenever required.
- Provides online security and increases employee productivity

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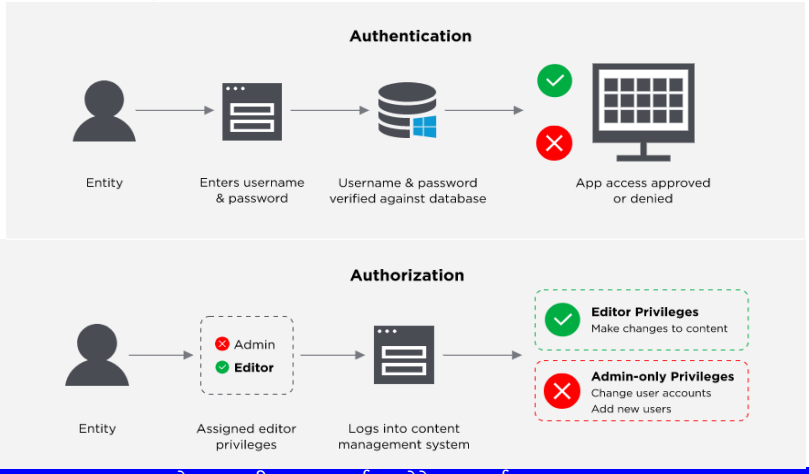
Identity and Access Control



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IDS and IPS

IDS

- Intrusion Detection System is device or software application used for monitoring computer network for malicious activity, security violations and threats.

Types of IDS

- Network based
- Host based
- Protocol-based
- Application protocol-based
- Hybrid

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IDS and IPS

IDS can detect problem with

- Patterns. The technology flags unusual requests
- Prior attacks. The technology flags anything on server that's been used in a known and successful attack on another server.
- Machine learning. The system picks up information about everything that happens on your server in an average day

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IDS and IPS

IPS

- Intrusion Prevention System is the process of stopping the security threats and incidents in computer network detected by Intrusion detection system.
- Types of IPS
- Network based
- Wireless based
- Host-based

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IDS and IPS

Actions of IPS

- **Close sessions**: It includes terminating the TCP session, blocking an IP address etc.
- **Strengthen firewalls**: Identifies gap in the firewall and makes necessary changes.
- **Clean up:** Scans for damaged or malicious content and removes

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Firewall

- Network security device that monitors incoming and outgoing network traffic and decides whether to allow or block specific traffic based on a defined set of security rules.
- A first line of defense in network security
- Establishes a barrier between secured trusted network and untrusted outside networks, such as the Internet.
- Can be both hardware or software

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Email Filtering

- Process of analyzing incoming emails which filters and separates email into different folders based on specified criteria
- Provides a way to organize email into different categories automatically
- Helps to identify spam, phishing message

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Email Filtering Techniques

- Reputation-Based Email Filters
  - Based on RBL (Reputation Block List)
- Safelisting
  - Adding in trusted list by organization
- Blocklisting
  - Addling in block list by organization
- Greylisting
  - Temporarily rejecting email by a sender
- Antivirus: protecting against virus
- Content Analysis: Ability to block based on email content

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Some Important terms

- **Backup:**
  - Process of copying data and programs to another location or creating duplicate copy of it in a secured location
  - Backup is essential to save the important data and programs from accidental or intentional harm

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Some Important terms

- Password
  - Secret word or sequence of characters that gives a user access to particular programs or computer system.
  - Helps to protect the files and programs from being used by an unauthorized person.

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Some Important terms

- **CHKDSK (Check Disk)**
  - Utility program/system tool that helps to keep a disk in good working condition
  - Checks files, folders, bad sectors, lost clusters, lost chains and any errors of the specific disk and it can fix them if it is possible.

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Some Important terms

- **UPS:**
  - UPS (Uninterruptible Power Supply) is a battery supported power protect device that controls the electric voltage and supplies clean and continuous power to the computer system even during power failure.

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Some Important terms

- **Fragmentation and Defragmentation:**
  - The spreading of the parts of the same disk file over different location is called fragmentation. It makes slow disk access and breakdown the overall performance of the disk operation
  - Defragmentation is the process of rearranging the fragmented files in the continuous spaces on the disk.

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Computer Viruses and Computer Threats

- Computer Virus
  - Computer program that can execute itself by making copies of itself and infect a computer without permission or knowledge of the user.
  - It is developed by the programmer with the intent of destroying or damaging the data, information and programs residing in the computer system.

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Types of Viruses

- Boot Sector Virus
- Script Virus
- Macro Virus
- Multipartite Virus
- Stealth Virus
- Polymorphic and
- Metamorphic Virus
- Resident Virus
- Web Scripting Virus
- File Infector Virus
- System Infector Virus
- Application Infector Virus
- Message Carrying Virus

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Boot sector virus

- Infects the boot sector or Master Boot Record (MBR) of disk
- It is transferred when the computer is booted from the infected disk
- E.g. Disk Killer, Stone, Danish etc. are the examples of boot sector viruses.

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Script Virus

- Script Virus infects programs written in high level scripting languages like Visual Basic Script and JavaScript.
- These viruses can be spread through e-mails and office automation documents.

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Macro Virus

- Infects the macros within a documents or template.
- It is activated when we open the word or excel program.
- Microsoft applications have the feature called "Macro Virus Protection".

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Multipartite Virus

- Infects and spreads in multiple ways
- Hybrid of Boot Sector and Program Viruses and infects both Boot sectors and files
- E.g.Ghostball

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Stealth Virus

- Virus that tries to fool antivirus software by hiding itself and files infected by it
- Examples: 4096, Brain.

Stealth Virus

- The viruses that reside on website and infect the computer through the website.

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Polymorphic and Metamorphic Virus

- **Polymorphic Virus:**
  - Changes its appearance with every infection.
  - Also known as encrypted virus because it uses encryption technique to hide from antivirus software
  - E.g. Cascade, Evil, Phoenix

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Polymorphic and Metamorphic Virus

- **Metamorphic Virus**
  - Rewrites itself completely each time if infects the system
  - Also called body-polymorphic viruses
  - Polymorphic and Metamorphic virus are also known as self-modifying viruses

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Resident Virus

- Resides on system's memory
- Can make number of actions and run independently of the file that was originally infected.

File Infector Virus

- The viruses which attaches itself to executable files or systems (.EXE or .COM).
- E.g. Jerusalem and Cascade Virus.

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Other Destructive Program and Security Threats

- **Computer Worms**
  - A destructive malware program that replicates itself in order to spread to other computers
  - Often, it uses a computer network to spread itself.

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Other Destructive Program and Security Threats

- **Trojan Horse**
  - A type of malware that steal information with the purpose of granting hacker unauthorized access to computer.

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Other Destructive Program and Security Threats

- **Logic Bomb**
  - A piece of code intentionally inserted into a software system that will set off a malicious function when specified conditions are met.
  - Most common activator for a logic bomb is date and time, which is activated in the specified time.

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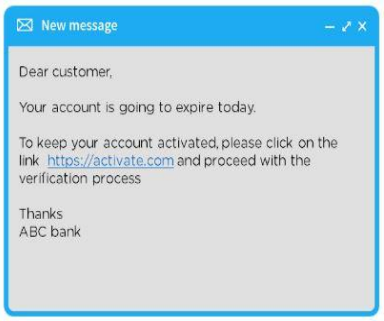
Other Destructive Program and Security Threats

- **Phishing**
  - Attacker sends bait, often in the form of an email.
  - It encourages people to share their details.



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Other Destructive Program and Security Threats

- **Eavesdropping**
  - Attacker observes activities on computer.
  - The attacker can monitor you in three ways:
    - Email monitoring
    - Which websites you visit
    - What items you download

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Other Destructive Program and Security Threats

- **SQL injection**
  - Allows an attacker to inject malicious input into a SQL statement.
  - Happens only on websites
  - Hackers get into that database and sign in using someone else's username and password.

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Other Destructive Program and Security Threats

- **Social engineering**
  - Attackers create social situations that encourage you to share your password.
- **Ransomware**
  - A type of malware that prevents users from accessing their system or personal files and demands ransom payment in order to regain access.

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Other Destructive Program and Security Threats

- **DoS Attack**
  - Denial of service attack
  - Type of cybercrime in which an Internet site is made unavailable, typically by using multiple computers to repeatedly make requests.

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Symptoms/Effects of a Virus Infection

How to know that computer is infected with virus

- Programs take long time to load.
- Computer is slower than normal.
- Computer stops responding.
- Disks or disk drives are inaccessible.
- Corrupts the system's file and data.
- Programs open automatically without instruction.
- Renames files
- Changing in the size of files.
- Appearing of unusual error message

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Symptoms/Effects of a Virus Infection

How to know that computer is infected with virus

- Restarts or shutdown automatically.
- Programs disappear from computer.
- Antivirus programs get disabled.
- Errors occur in printing.
- Generation of files and folders automatically.
- Duplication of files.
- Decrease disk space
- Home Page Redirection
- Decrease in download speed

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Spreading of computer viruses

How does virus spread from one computer to another?

- Using pirated software
- Sharing portable disk among the computers.
- Downloading files/programs from unsecured sites.
- Exchanging of data or files over a network.
- Opening virus infected email or attachments without scanning

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Protection / Prevention from virus

How to protect computer from virus?

- Install Internet Security Software like firewall
- Stop using pirated software
- Use updated antivirus software scan computer regularly
- Use password to protect computer from unauthorized users
- Do not open suspicious email attachment
- Scan portable disk before opening it
- Always maintain proper back up system
- Do not download from unsecured sites

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Antivirus Software

- Utility software that is designed to detect and remove viruses from computer system to make virus free environment.
- E.g. Norton, Kaspersky, McAfee, Avg, Avira, Avast, Bit Defender, e-Scan, Quick Heal

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Cyber Law and Ethics

- Cyber Law is the standard rules and regulation (law) to control the computer crime and it is related to the use of inter-networked information technology.
- These laws are formed by keeping several issues into consideration such as our society, morals, computer ethics, etc
- Also referred to as the Law of the Internet.

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Cyber Law and Ethics

- Cyber law deals with
  - Intellectual Property Right
  - Privacy and Data protection
  - Computer (Cyber) Crime
  - Digital Signature system
  - Freedom of expression
  - Electronic Transaction Act
  - Telecommunication Law

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Intellectual Property Right (IPR)

- The rights given to persons over the creations of their minds.
- Preserves the intellectual property of individuals like artists, authors, musicians etc.
  - Copyrights
  - Patent Rights
  - Trademark

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Intellectual Property Right (IPR)

- **Copyright**
  - Right to copy
  - Covers "tangible" forms of creations and original work
  - Includes art, music, architectural drawings, or even software codes.
- **Patent Right**
  - A patent is used to prevent an invention from being created, sold, or used by another party without permission
- **Trademark**
  - A distinctive sign which allows consumers to easily identify the particular goods or services that a company provides

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Cyber Crime

- Computer crime, cyber crime, e-crime or electronic crime refers to any criminal activity that uses a computer or network as source, tool, target or place of a crime. It includes:
- Unauthorized access and modification of hardware and software
- Unauthorized release of information
- Unauthorized copying of software
- Using computer to facilitate illegal work

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Digital Signature

- A digital signature is a mathematical technique for validate the authenticity of a digital message, digital document or software
- It is a convenient way to authenticate an identity electronically with a high level of security for online transactions

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Application of Digital Signature

- To send and receive encrypted emails, that are digitally signed and secured
- To carry out secure online transactions
- To identify participants of an online transaction
- To apply for tenders, efiling with Registrar of Companies (MCA), efiling of income tax returns and other relevant applications
- To sign and validate Word, Excel and PDF document formats

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Cyber Law in Nepal

- The government of Nepal passed "The Electronic Transaction and Digital Signature Act-Ordinance" popularly known as "Cyber Law" on Bhadra 2061 B.S. (15 September, 2004)

Electronic Transaction Act

- It deals with controlling and monitoring the electronic transaction like e-business, e-payment, online payment, electronic fund transfer etc.

ICT Policy

- ICT Policy 2072 BS (2015 AD)

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Computer Ethics

- The moral principles that guides the computer user for his/her social and professional conduct/behavior related to the use of computer and internet is known as computer ethics.

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Computer Ethics

- Important issues of computer ethics
  - Technological impact on society
  - Plagiarism (stealing idea or work)
  - Intellectual Property Law
  - Piracy
  - Hacking
  - Internet Pornography
  - Harassment and Stalking

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Computer Ethics

- Plagiarism (stealing idea or work)
  - Presenting someone else's work or ideas as your own, without full acknowledgement.
- Piracy
  - Illegal copying, distribution, or use of software and other creations
- Hacking
  - The unauthorized access and use of networked computer system
  - Unauthorized access to or control over computer network security systems for some illicit purpose

Smart Info Tech

Computer Ethics

- **Pornography**
  - Sexually explicit videos, photographs, writings, or the like, whose purpose is to elicit sexual arousal
- **Stalking**
  - Unwanted and/or repeated surveillance by an individual or group toward another person

कम्प्युटर अपरेटर तयारी कक्षा , स्मार्ट इन्फोटेक, सम्पर्कः ९८४१६४९९९३, ९८४३५२१६४०