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Page finder

This page finder gives you the page number for all the objectives from each section in the new CSEC® Information Technology syllabus at your fingertips.
About this book

This book isn’t just words on a page.

This book contains a range of different features to introduce, teach and highlight key information throughout the course. These pages explain how to use them. The larger column contains the main text and diagrams; you can read straight down it without interruption.

The smaller column contains other useful facts, so make sure you use it to check your understanding. You should remember to spend time studying the figures and diagrams as well as the text.

A list of objectives at the beginning of each chapter tells you what topics you will be covering. They will help you to plan and measure your learning.

The concept maps represent knowledge organisation visually to help you learn more meaningfully and enhance your knowledge integration. You can use them as tools to help connect prior knowledge with new information.

The expanded IT Portfolio now provides more opportunities for you to extend and reinforce the knowledge and skills introduced throughout the chapter. Most of the activities involve field or web-based investigations.

A wide assortment of game-based and real-world problems is presented for small groups to complete. You and your classmates can improve on ideas as you share in finding solutions in an environment where the group evaluates its own success.

This is the style of question you may come across in your exam. Your teacher will suggest how you can use them, but they will measure what you have learnt and help to identify any gaps in your knowledge so you can revisit the relevant sections of the book.

Examination-style questions

Multiple-choice questions

Instructions: Each of the following questions has four suggested responses labelled (A), (B), (C) or (D). Read each question carefully then select the most suitable response.

1. [question]

   (A) Memory
   (B) Storage
   (C) Output
   (D) Input

7. The component that stores the program and data currently being executed is:

   (A) arithmetic logic unit
   (B) floppy diskette
   (C) main memory
   (D) secondary storage

8. Which of the rows in the following table does NOT contain the correct information?

<table>
<thead>
<tr>
<th>Computer specification</th>
<th>Hardware component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There are a wide variety of activities to complete so that you can reinforce and extend your knowledge and skills that are covered in each chapter.

Operational procedures

Backing up data

It is too easy to rely on a single storage device for storing important data. The device and the data it contains may fall prey to one of the accidental or deliberate actions or events mentioned earlier. To safeguard data, it is good practice to copy data to another storage device or media.

A regular backup system such as the Grandfather-Father-Son system means that if disaster should strike the organisation can recover almost all of its data quickly and business can continue as usual. It is important to keep such generation of backup separate from the rest. The son can be kept in the computer room, the father in a desktop cabinet and the grandfather in another building. For a fast-moving business backups may be taken every day rather than every week. If a hard disk drive fails the most recent backup, the son, can be used to restore the data. In the event of a fire in the computer room destroying the son backup and the computer system, the father backup can be used to restore the company data. In the worst case, a whole building may be flooded but the grandfather backup can still be used to restore the data.

Archiving data

An archive comprises the files created or received by an institution or organisation during the course of routine business that are stored because of their value.

Depending on the nature of the data, some companies may archive data monthly, others quarterly or annually. These files are usually stored on removable media such as DVDs or magnetic tapes and kept in a secure location. Files in an archive will be kept for a period of time and then destroyed.

Summary

- Data loss is all about identifying and assessing computer system risks.
- A computer security risk is any event, action or situation – intentional or not – that could lead to the loss of computer systems and the data they contain.
- Data loss is concerned with ensuring the accuracy, completeness and internal consistency of the data stored in a database.
- Physical access restrictions can prevent unauthorized personnel from damaging the computer hardware.
- Access to IT systems can be restricted by requiring all legitimate users to input a valid username and password before being able to gain access to the system.
- A firewall acts as a barrier between a computer system and an external network.
- Encryption, ownership protection, password, and making a file read-only access are mechanisms that may be used to help maintain file integrity.
- Individual files can be protected using encryption techniques that require the reader to have a correct password to decrypt the file.
- Viruses, Trojans and worms are malicious programs that may infect and do harm to a computer system and its data;
- Computer fraud involves the use of computers to illegally obtain money, grades or services. There are many types of computer fraud including identity theft, credit card fraud, electronic wiretapping and surveillance.
- Backup copies of files that can be restored in the event that the original files are lost through hardware failure, accidental deletion or computer fraud whereas an archive comprises the files created, received and accumulated over time and retained for historical value.

Each image has a caption and a figure number to help with cross-referencing.

Summary of the key facts from each module will help you check your understanding.

Answers to ITQs

Each image has a caption and a figure number to help with cross-referencing.

The following are SOME possible incursions: (a) hard disk failure caused by intermittent power surges causes partial data loss; (b) hard disk failure caused by a power surge causes total data loss; (c) copying the data stripped from a parked motor vehicle; (d) the file with the data is copied by an unauthorised person without the knowledge of the owner; (e) an employee copies data from the file for his/her personal use.

(a) The file containing the credit card details OR the file containing the student’s assignment. (b) The file with credit card details may have been accidentally selected and copied to the USB drive; the file with the assignment may have been intentionally copied to the USB flash drive by the accounting clerk. (c) Any reasonable explanation consistent with the answer in (b).
By the end of this chapter you should be able to:

- identify common threats to the security of data
- identify common threats to the integrity of data
- outline ways by which information can be misused
- describe measures to secure data
- describe measures to maintain data integrity.

**Concept map**

**Data**

subject to

misuse:
- computer fraud
- credit card fraud
- electronic eavesdropping
- identity theft
- industrial espionage
- propaganda
- software piracy
- storage of inaccurate information
- surveillance
- violation of privacy

may be protected using

laws

software restrictions:
- encryption
- firewall
- overwrite protection
- passwords
- read-only access
- restricted access
- virus protection

hardware access restrictions:
- biometric systems
- guards
- locks
- fire/waterproof cabinets

procedures:
- archiving
- backup and recovery
- disaster recovery mechanisms

---

**Introduction to data security**

**Why is there a need for data security?**

Existing manual systems are often computerised to improve the efficiency of an organisation. As the system becomes operational, data is captured, processed, stored and disseminated. Organisations and their customers – other organisations and individuals – become dependent on computer systems and the information they provide. There are some drawbacks to computerisation. These include:

- data theft or loss
- loss of data integrity
- increased exposure of data and information to misuse

**Data security** is all about identifying and assessing computer security risks.
A computer security risk is any event, action or situation – intentional or not – that could lead to the loss of computer systems and the data they contain.

Data security allows individuals and organisations to assess the risks to which their computer systems and data is exposed, and determine and implement suitable countermeasures. It is important that an organisation protects its data adequately. Data that is damaged, lost, stolen or misused can cost the business money, its reputation or even the life of the business itself. The business may eventually have to close!

What are the main elements of data security?

<table>
<thead>
<tr>
<th>Element</th>
<th>Meaning</th>
<th>Example # 1 ABC Pharmacy</th>
<th>Example # 2 Customer Jan Doyle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerability</td>
<td>Exposure to the possibility of being attacked or harmed</td>
<td>Computer system is connected to a wide area network. It is also used to access their insurance company’s extranet.</td>
<td>Customer fills prescriptions at the pharmacy and makes payments using credit and debit cards.</td>
</tr>
<tr>
<td>Threat</td>
<td>A statement of an intention to inflict damage</td>
<td>Data may be intercepted as it transmitted from the pharmacy to the insurance company.</td>
<td>Credit card data and personal data may be accessed by an unauthorised person.</td>
</tr>
<tr>
<td>Attack</td>
<td>Actual action that causes damage</td>
<td>Credit card data stolen over a period of weeks by an eavesdropper.</td>
<td>Unauthorised purchases made with credit card.</td>
</tr>
<tr>
<td>Countermeasure</td>
<td>An action taken to prevent an attack or minimise its effect</td>
<td>Encrypt data before transmission.</td>
<td>Use a credit or debit card with chip-and-pin technology.</td>
</tr>
</tbody>
</table>

Table 8.1 Main elements of data security.

What kind of data is at risk?

Data in every format and at every stage of the processing cycle is vulnerable.

- Data being captured
- Data collected and awaiting processing
- Data being processed
- Data stored on removable media
- Data stored on networks
- Data in file libraries
- Data being transmitted over a communications network
- Data that has been backed up
- Data that has been archived

How are data security and integrity related?

Data security and data integrity are two different concepts. Whereas data security is concerned with identifying and assessing risk, data integrity is concerned with ensuring the accuracy, completeness and internal consistency of the data stored in a database.

Data security plays a key role in maintaining data integrity as it provides the mechanism to safeguard files from corruption and unauthorised access.

Consider the following scenario.

An accountant creates an electronic spreadsheet containing the credit card details of 500 customers and saves this file on the desktop of his computer. He leaves his desk for a few hours to attend to company business. In his absence, an accounting clerk seizes the opportunity to use the computer to complete a school assignment. She creates a few files in the process and saves them on the desktop. When she is finished, she copies the assignment files, and