

Pearson BTEC Level 1/2 Tech Award



Digital Information Technology Component 3

LEVEL



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Component 3: Effective Digital Working Practices

Learning Aim A: Modern technologies

		Pack A	Pack B	Pack C	Pack D
A1	Modern technologies	✓			
A2	Impact of modern technologies	✓			

Learning Aim B: Cyber security

B1	Threats to data		✓		
B2	Prevention and management of threats to data		✓		
B3	Policy		✓		

Learning Aim C: The wider implications of digital systems

C1	Responsible use			✓	
C2	Legal and ethical			✓	

Learning Aim D: Planning and communication in digital systems

D1	Forms of notation				✓
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A

LEARNING AIM A

Modern technologies

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Chapter 1

Communication technologies

Objectives

- Describe:
 - setting up and using ad hoc networks
 - security issues with open networks
 - performance issues with ad hoc networks
 - issues affecting network availability

Wi-Fi and cell networks

There are two major types of wireless Internet access. **Cell networks** cover more than 97% of the population in the UK, although the connection may be poor or non-existent inside a building, near tall city buildings or in rural locations.

**Q1**

Suggest reasons why it may not be possible to get a mobile signal in a rural location.

Wi-Fi reception is available within a **Wi-Fi hotspot**, built into most mobile devices and into the wireless **router** commonly used at home or in a small office.

Setting up and using ad hoc networks

An **ad hoc network** is a temporary connection between two or more computing devices. For example, in ad hoc mode you can set up a wireless connection between your mobile phone and a laptop computer, or between a laptop and a PC.

For a more secure, wired connection, you can use a USB or ethernet cable to connect a laptop to the PC and configure settings on each computer.

Chapter 4

Modern teams and modern technologies

Objectives

- Describe changes to modern teams facilitated by modern technologies:
 - based worldwide, multicultural, inclusive, in different time zones, flexible
- Describe how modern technologies can be used to manage modern teams:
 - collaboration tools, communication tools, scheduling and planning tools
- Describe how organisations use modern technologies to communicate with stakeholders
 - communication platforms (website, social media, email, voice communication)
 - selection of appropriate communication channels for sharing information, data and media

World teams

Organisations in many different fields, for example technology, science and business do not always operate solely in their home countries. They have a global market, and they need offices or shops in many different cities around the world in order to fully understand local culture and local needs, and to sell in different countries.



Amazon is based in Seattle, Washington. It has separate retail websites for almost 20 different countries translated into most major languages from English, French and Spanish to Chinese, Japanese and Turkish. It has 613,000 employees around the world.

Changes to modern teams facilitated by modern technologies

Modern technology has facilitated changes to modern teams in different ways.

- **World teams:** internal communication by email, conference calls, video calls, messaging and online chat enables team members to keep in regular communication.
- Team members may be based anywhere in the world, which means that the best mix of talents and diversity can be represented.
- Although people may work in different **time zones**, an email sent from the UK to someone in Australia can easily be responded to by early the next working day. This is a good alternative to a phone call to someone in a different time zone with a large time difference.

Biometrics

Biometric authentication is the process of identifying someone based on a physical attribute that is unique to them. The shape of their face, their fingerprints, retina, voice and DNA can all be used to verify their identity.

Biometrics offer several advantages over other forms of authentication.

- **Convenience.** There's no need for a user to carry any other form of identification or to remember any passwords.
- **Speed.** It's much quicker to present your face to a screen than it is to type in a complex password.
- **Security.** A user who falls victim to a phishing attack can't give their fingerprint away.

If a password gets stolen it can easily be changed, but a fingerprint or an iris is part of a person's identity and cannot be replaced.

Case study: Finding ways to beat biometrics

Hackers have already found ways to beat many of the current biometric solutions. In 2015 the fingerprint data of 5.6 million US federal employees was stolen.



The following year, Jan Krissler, a famous German hacker, known to fellow hackers as Starbug, used high-resolution photos of the hands of Ursula von der Leyen, Germany's Minister of Defence (pictured), to beat fingerprint authentication technology. He also got the better of Apple's TouchID technology just a day after its release by creating a copy of a fingerprint smudge left on an iPhone screen and using it to hack into the phone.

Q2

What are the risks associated with biometric identification?

Using correct settings and levels of permitted access

One way an organisation can protect its digital systems and data from damage and theft is by applying the **principle of least privilege**. This gives employees only the bare minimum of permissions and administrative rights they need to do their job. Nothing more.

A low-level user will only be given access to a limited number of files and folders. Whereas, a super user will be able to access the most sensitive data on the system.

A large volume of water is also required. It takes around 2000 gallons of water to create just one computer chip. Chemical-polluted waste water is a bi-product of the process and can cause environmental damage if it is not handled carefully.

In the UK, the restriction on the use of certain hazardous substances (ROHS regulations 2012) used in the manufacture of electrical and electronic equipment, such as digital devices, encouraged manufacturers to use more environmentally-friendly alternatives. Unfortunately, some have responded by simply moving their production processes overseas to countries where environmental regulations are not so strict.

Transportation of raw materials, components and finished goods, often over huge distances, also impacts on the environment. A lot of packaging waste ends up in the oceans, with plastic being a major cause of concern.

Use

Keeping the world's IT systems and devices up and running, day in day out, requires a lot of electricity. A PC that is on for eight hours a day uses almost 600 kWh of electricity per year. A laptop uses around half that amount and a mobile phone considerably less.



Every Internet activity, from streaming a video to posting a comment on Facebook, requires huge amounts of data to be stored. Data centres are springing up all over the world and the amount of energy they consume is predicted to treble over the next ten years, putting a massive strain on energy supplies.

Q1

Bitcoin mining involves using your computer power to solve complicated logic problems. It is extremely energy-intensive. Why is this the case and what is its impact on the environment?

Case study: Facebook's eco-friendly data centre

Facebook has built a huge data centre in Lulea, northern Sweden, just 100km south of the Arctic Circle. Expansion plans announced in 2018 are set to make it one of the largest data centres in the world. The location was selected because of its access to renewable hydroelectricity and its cold climate, which helps to keep the servers cool. German car maker, BMW, also stores data in the region.

Chapter 16

Data Protection

Objectives

- Understand data protection principles
- Understand the use of data on the Internet:
 - right to be forgotten
 - appropriate and legal use of cookies and other transactional data
- To develop understanding of intellectual property

Data protection principles

Organisations collect and store huge quantities of personal data. Employee records, loyalty schemes, sales transactions and customer accounts all contain sensitive information.

The **Data Protection Act 2018** is the UK's implementation of the General Data Protection Regulation (GDPR), which is designed to protect individuals against misuse of their personal data. It contains a set of principles that organisations must adhere to.

Data protection principle	What this means for organisations
Lawfulness, fairness and transparency	They must have a legitimate reason for processing a person's data and must not use it for any other purpose. They must tell the person what they'll use their data for and get their consent.
Purpose limitation	They must only use the data for the specific purpose for which it was collected. For example, a supermarket that collects transactional data about a customer's purchases, can't use that data for marketing purposes without first getting the customer's consent.
Data minimisation	They must only obtain as much data about a person as is necessary for the specified purpose. For example, a seed company that wants to send out a catalogue to its customers, only needs their name and address. They don't need their date of birth or email address.
Accuracy	They must ensure that the data they collect is accurate and up-to-date. When notified of an error in the data, they must update it promptly.
Storage limitation	They must not keep data for any longer than is necessary.
Security	They must keep data secure and protect it against unauthorised or unlawful processing, accidental loss, destruction or damage.
Accountability	Organisations must be able to demonstrate that their data protection measures are sufficient .
Transfer	Data cannot be transferred to other countries with less protection.

D

LEARNING AIM D

Planning and communication in digital systems

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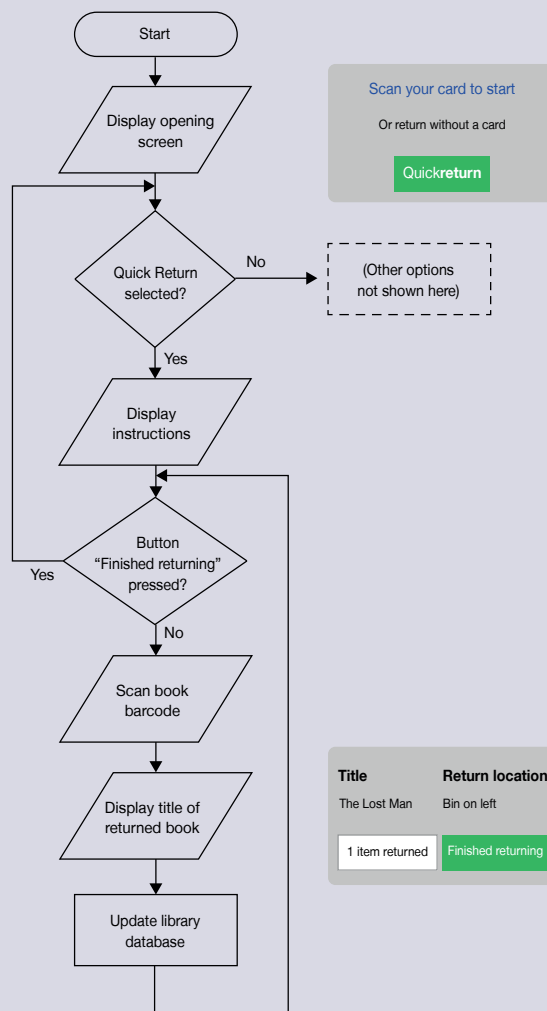
Flowcharting a loop

Some algorithms involve performing the same sequence of steps many times, until some condition is true. Some processes loop endlessly until the computer is switched off.

Example 2

Draw a flowchart representing the process of returning a book to a library.

In the flowchart below, the user chooses the option “Quick return” which does not require a library card to be scanned.



Q2

Users can generally be relied upon to do something unexpected. What will happen if the user tries to return the same book twice? How could the flowchart be amended to cope with this situation?

Does the flowchart allow for a user who presses the “Finished returning” button without scanning any book barcodes?

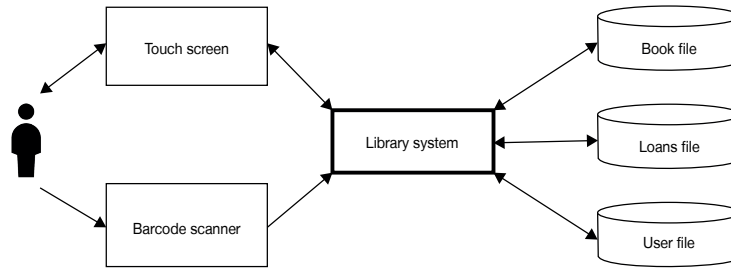
What other options would be displayed if the user presents their card to be scanned to start instead of pressing “Quick return”?

Exercises

1. A public library has registered users who have been issued with a library card displaying a bar code which holds the unique user ID.

Library users use one of the terminals to borrow or return a book.

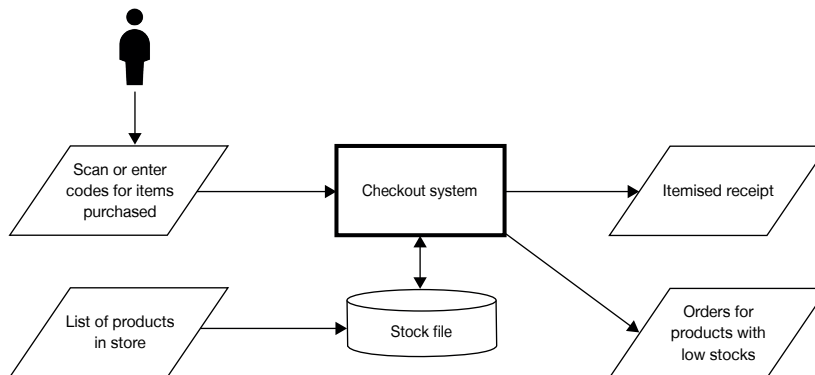
- (a) Interpret the system diagram shown below to explain how the borrowing system works. [4]



- (b) State **three** items of data that would be held on the Loans file. [3]

- (c) State **two** ways in which the library may use systems diagrams. [2]

2. The system diagram below shows the input, output and data store used in a supermarket system.



- (a) Describe **two** data processing events in the checkout system that will take place when a customer at the checkout scans an item they have purchased. [4]

- (b) Stock ID, description and quantity in stock are held on the Stock file.

State **two** other items of information that need to be held on the stock file in order to be able to produce orders for products which have low stocks. [2]

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Digital Information Technology Component 3

This is a brand new book covering all of the externally examined Component 3 of the Level 1/2 BTEC Tech Award. It provides comprehensive yet concise coverage of the component and includes numerous case studies and in-text questions for teaching and learning purposes. It will be invaluable both as a course text and as a revision guide for students nearing the end of their course.

It is divided into four sections covering each of Learning Aims A to D of the Component 3 specification. Solutions to all questions and exercises are provided to teachers only in a free pack available on our website.

To accompany this textbook, PG Online also publishes a series of four downloadable teaching units. Each topic in a unit consists of a PowerPoint presentation, teachers' notes, worksheets, homework sheets and a final assessment test with practice questions. Each topic within a unit is expected to be taught over several lessons in a week. Units are sold as a lifetime site licence and may be loaded onto the school's private network or VLE.

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**This book has been endorsed
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