# *Network and data protection methods*

**S.P.I.R.I.T**
- ✓ **Independence**
- ✓ **Perseverance**

**Monday, 04 April 2022**

## Learning Intention

***To develop knowledge*** by
Identifying methods used to protect networks and their data

***To secure understanding by***
describing key features of protection methods

***To achieve excellence by***
Evaluation protection methods for use in particular circumstances

Keywords

***Tier 2 word***

***Identify***
*To list key points*

***Describe***
*Give an explanation of a key point.*

# Protection methods

In order to reduce risks then the following can be utilised:

- Antivirus software
- Firewalls
- Two-factor authentication
- Access levels
- Encryption
- Passwords

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# Antivirus Software

**Install Virus protection software**, also called anti-virus software, is a program that can be loaded into memory when the computer is running. It monitors activity on a computer system for the signs of virus infection. Each virus has its own unique 'signature' that is known to virus protection software and stored in a database. Data stored on a computer system is scanned to see if any of the virus signatures within the database exist on the system.

**INTERESTING FACT**

Some advanced viruses attempt to evade the virus protection software by changing their own code so that they no longer match the "signature" in the virus signature database.

These are known as *polymorphic viruses*.

There are many thousands of known viruses, and new viruses are created daily. Virus protection software therefore needs to be updated regularly to combat these.

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# FIREWALL

- A firewall is a utility program (or it can also be a hardware device) that filters the information coming through the Internet connection into your personal computer or into a company's network.
- Its main aim is to try to stop any attempts by intruders to enter your system through the internet connection.
- It is set up to allow mainly one way access, i.e. you can go out onto the Internet and access pages, but it checks every data packet that either enters or leaves the computer against a set of rules. If the data coming back is from an unauthorised source then it is blocked.
- More complicated firewalls allow you to alter the rules.
- You may have heard people saying, 'I can't get on that site at school because it's been blocked'; that is the firewall in action.

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# Two-Factor Authentication

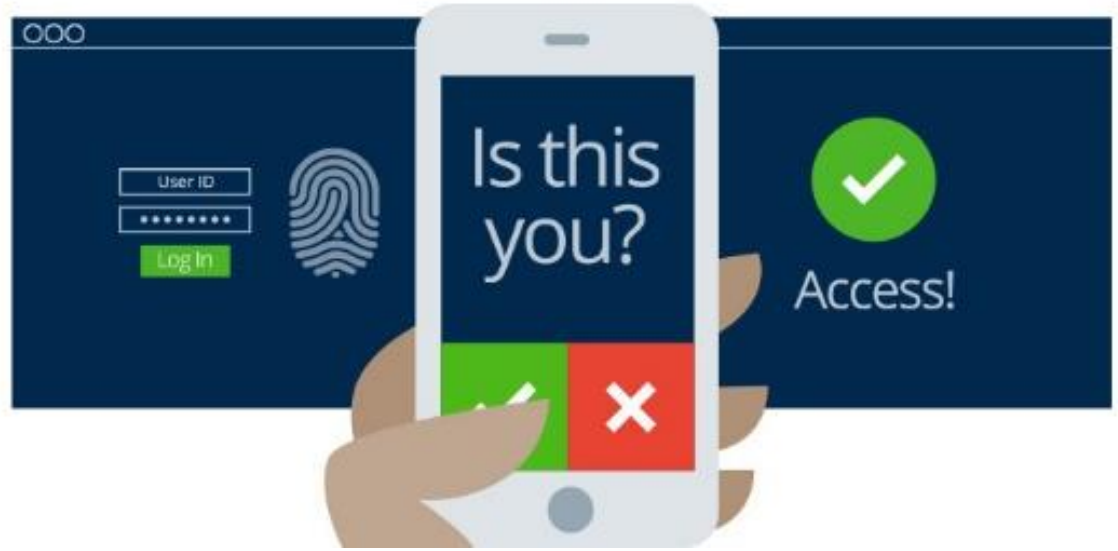
- https://www.youtube.com/watch?v=AIOUlQeQbNM

***Requires two ways of identifying someone.***

*Requires **not only a password and username**, but **also something that the user has on them (such as a phone or computer)***

*For example: a bank ringing an accepted phone number to confirm when a new payment is set up, or a PIN and a card having to be used together*

*If a password is guessed by someone else, they can't access any data without the 2nd factor (e.g physical phone)*

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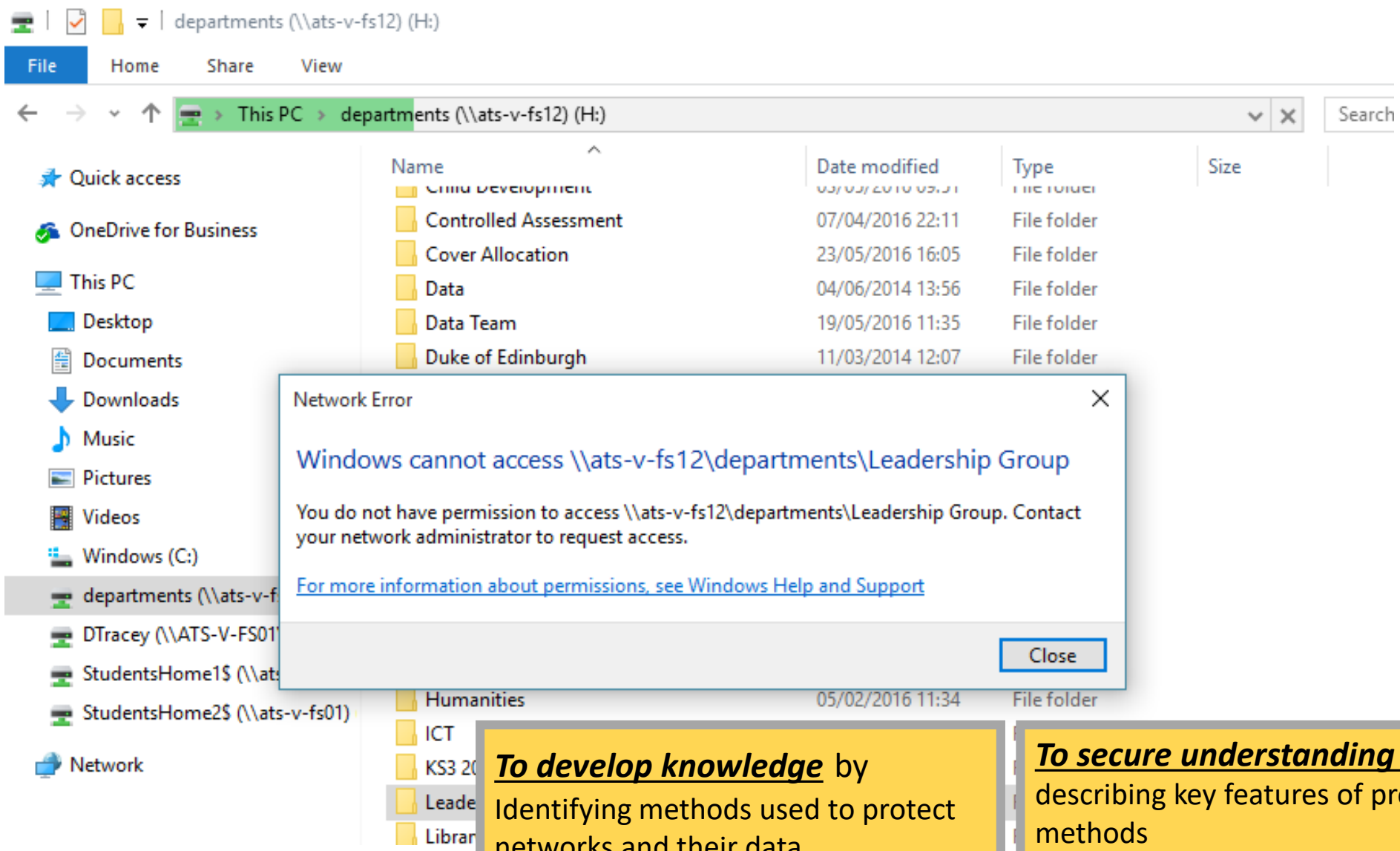
# Access Levels

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# Encryption

Watch the video: https://www.bbc.co.uk/bitesize/guides/zf3bcj6/revision/3

- Encryption is the conversion of data, using an algorithm, into a form, called ***cyphertext*** that cannot be easily understood by people without the decryption key.

- When data is encrypted, a logical operator is sometimes used, called the XOR logical operator.

| Input (A) | Input (B) | Output (A XOR B) |
|---|---|---|
| 0 | 0 | **0** |
| 0 | 1 | **1** |
| 1 | 0 | **1** |
| 1 | 1 | **0** |

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# Encryption

- When encrypting data, the XOR logical operator is performed on the original data and a *key*. The key is a secure binary number, known only to the sender and recipient.

- In this example, we will encrypt the data 10101010, using the key 11110000.

| | | |
|---|---|---|
| Original Data | 10101010 | |
| Key | 11110000 | XOR |
| Cyphertext | 01011010 | |

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# Encryption

- The original data, 10101010, is now encrypted and can be transmitted as 01011010.

- To recover the original data, the cyphertext is *XOR'ed* with the key.

| | | |
|---|---|---|
| Cyphertext | 01011010 | |
| Key | 11110000 | XOR |
| Original Data | 10101010 | |

***To develop knowledge*** by
being able to describe encryption

# Passwords

- Do you have one of the most common passwords?

- The 10 most common passwords
  1. 123456
  2. password
  3. 12345678
  4. qwerty
  5. 12345
  6. 123456789
  7. football
  8. 1234
  9. 1234567
  10. Baseball

**Rules**
How could we make passwords more secure?

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http://www.telegraph.co.uk/technology/2016/01/26/most-common-passwords-revealed---and-theyre-ridiculously-easy-to/

# Task

**Task 1:**

Answer the questions found here:

- See folder Network Security Questions.docx

- Using this:
  - See folder Network security - WJEC Notes.docx
- Make sure you write in FULL sentences!

**Task 2:**

- Redzone


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# You are entering the THE RED ZONE

Computer Science

**12.** A large organisation stores confidential data about its customers on its network.

Describe the dangers that can arise from the use of networks and discuss the importance of network security, giving suitable security preventions for the organisation. [10]

***Know it***

**List as many dangers and preventions [3 marks]**

***Grasp it***

**Identify 5 dangers and 5 preventions [5 marks]**

***Think it***

**Describe 5 dangers and 5 preventions [ 10 Marks]**

***To achieve excellence by***
Evaluating protection methods in for particular circumstances

**Keywords: User. Unauthorised access. Software. Program. System. Replicate. Corrupting. Malware. Confidential. Data. Servers.**

**A good answer will:**
- Use **appropriate technical terminology**
- Use **accurate grammar, punctuation and spelling**

**A great answer will:**
Have **detailed points** relating to **both dangers and preventions**
- 5 dangers/risks
- 5 preventions