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NSA: Network services
Online course specification

Target audience:
This course is designed for those who will be responsible for the management and maintenance of computer networks.
This course supports the attainment of some of the technical knowledge and understanding requirements of the following digital apprenticeships:
Infrastructure Technician, Unified Communications Troubleshooter, Network Engineer.

Course aim:
To introduce the elements of computer networks and software that provide services to network users and the measures that can be taken to ensure the fast recovery of network services from disruptive events with the least amount of lost data.

Course level: Intermediate
An explanation of PTT course levels is given at the end of this document

Pre-requisites:
A basic understanding of binary data, computer architecture, and local area networks. It is suggested that the PTT course "Ethernet networks" is studied before attempting this course.

Course structure:
The course consists of the following three modules:
1. Servers
2. Data storage
3. Disaster recovery

Module 1: Servers

Module aim: To introduce the role of the various types of server and software involved in the delivery of network services and the measures taken to ensure the availability and protection of those service.

After completing this module, a trainee will be able to:

- describe the principles and benefits of client-server operation.
- describe and compare the characteristics, role and benefits of thin and thick client operation.
- describe the role of the various types of server involved in service delivery including application server and database server.
- describe the role of a DNS server and a DHCP server and the relationship between them.
- explain that service delivery often depends on the interaction between various types of server.
- describe the role of an operating system (OS) and compare the requirements for client and server OS, giving examples of those OS commonly employed in computer networks.
- describe the role, and operation of middleware in distributed systems with reference to the role of drivers and driver managers and the use of middleware in services depending on access to databases.

- describe the role, principles of operation, and applications of load balancers.

Module 2: Data storage

Module aim: To introduce the various types of data storage employed in computer networks and the methods that are employed to mitigate the effects of disruptive events on the integrity of stored data.

After completing this module, a trainee will be able to:

- explain the concept and purpose of a 3-2-1 backup strategy.
- describe how the formatting of hard disks allow stored files to be located and retrieved by an operating system.
- define, and describe the relationship between, partitions, volumes and images as applied to hard disk data storage.
- describe various ways in which RAID technology can protect data stored on hard disk arrays.
- describe and compare methods of data storage including direct attached storage, network attached storage, storage area networks and cloud storage.
- explain how a storage area network enables the fast transfer of data between application servers and storage media.
- describe the role and benefits of mirroring and failover clustering in ensuring the availability of data and network services.
- describe and compare the advantages of full, incremental, and differential backup.

Module 3: Disaster recovery

Module aim: To describe the purpose and development of a disaster recovery plan with emphasis on the recovery of access to network services and the data stored on a computer network.

After completing this module, a trainee will be able to:

- describe the purpose of, and types of information in, a disaster recovery plan.
- explain the role and relevance of, and relationship between, business impact analysis and risk analysis.
- explain that the risk analysis will influence the chosen protection and recovery strategies.
- explain the significance of the risk factor of a threat and explain how it is determined.
- define, and explain the relevance of, recovery time objective (RTO) and recovery point objective (RTO).
- design an appropriate backup strategy for given RTO and RPO objectives.
- explain the need for the testing and ongoing management of a disaster recovery plan.

Course access requirements:
To access the course, a computer running a browser such as Google Chrome, Safari etc is required. The computer should have Internet access. A screen resolution of at least 1024x768 is necessary.

Learning facilities:
This online course employs interactive simulations, hypertext links to an online glossary and multiple-choice question sessions to fully involve the trainee in the learning experience. Each module provides revision links to previously studied, relevant topics. A record of progress and level of achievement is recorded for each trainee. Once studied as a structured, assessed course, the content can be browsed for revision or reference.

PTT course levels:
PTT online courses are categorised by one of three levels according to the depth of treatment they provide:

1. **Introductory:**

   PTT Introductory courses are designed for those with no previous experience or knowledge of digital technology. These courses provide an overview of telecommunications or discuss the fundamentals of electronic communications and ICT. The study of general science at secondary (high) school is a typical pre-requisite for PTT Introductory courses.
   PTT Introductory courses are suitable for those joining the ICT sector particularly those in an apprenticeship programme.

2. **Intermediate:**

   PTT Intermediate courses are designed for technicians and engineers requiring an understanding of a certain aspect of digital technology. Those planning to study an Intermediate course should understand the basic principles of computing or electronic communications.
   The depth of treatment provided by Intermediate courses is typically equivalent to level 3 of a UK national vocational qualification (NVQ). PTT Intermediate courses can be used to support level 3 digital apprenticeships.

3. **Advanced:**

   PTT Advanced courses are designed for those who require an in-depth treatment of a certain aspect of digital technology. Such courses are suitable for system designers as well as those who will be responsible for the maintenance of the system described in the course. Those planning to study a PTT Advanced course should have a background in ICT or telecommunications, and an understanding of the fundamentals and principles of the type digital technology system described in the course.
   PTT Advanced courses can be used to support level 4 digital apprenticeships.

PTT
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