

Higher National Unit Specification

General information for centres

Unit title: Directory Services Infrastructure

Unit code: DG01 35

Unit purpose: This Unit is designed to introduce candidates to the issues involved in planning, implementing and maintaining directory services infrastructure. It is intended for candidates undertaking an HNC or HND in Computing, Computer Networking or a related area who require a detailed understanding of directory services.

On completion of the Unit candidates should be able to:

1. Plan and implement a directory services infrastructure.
2. Manage and maintain a directory services infrastructure.
3. Plan and implement user, computer, and group strategies.
4. Plan and implement group policy.
5. Manage and maintain group policy.

Credit value: 2 HN credits at SCQF level 8: (16 SCQF credit points at SCQF level 8)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. There are no specific requirements but candidates would benefit from knowledge of network servers. This may be demonstrated by the possession of HN Units such as DF9N 34 Network Server Operating System, DF9R 35 Network Infrastructure 1 and DG00 35 Network Infrastructure 2.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: This Unit is included in the framework of a number of HNC and HND group awards. It is recommended that it should be taught and assessed within the context of the particular group award to which it contributes.

Assessment: Evidence for the knowledge and/or skills for the entire Unit must be produced using a set of 50 restricted-response questions to assess candidates' knowledge and understanding. This may be administered as a single end-of unit test, or as several subtests, each covering one or more outcomes.

General information for centres (cont)

Candidates must answer at least 70% of the questions correctly in order to obtain a pass. If subtests are used, they must also score at least 70% in each subtest.

Testing must take place in a closed-book environment where candidates have no access to books, handouts, notes or other learning material. Testing can be done in either a machine-based or paper-based format and must be invigilated by a tutor or mentor. There must be no communication between candidates and communication with the invigilator must be restricted to matters relating to the administration of the test.

If a candidate requires to be reassessed, a different selection of questions must be used. At least half the questions in the reassessment must be different from those used in the original test.

If an outcome has a practical component, this must be assessed by having the candidate use a logbook to record the practical tasks successfully completed. The logbook can be in paper or electronic form and must be authenticated by the tutor or mentor.

For some outcomes only a sample of the practical tasks needs to be completed and recorded for assessment purposes, e.g. three out of five. This is clearly indicated in the logbook instructions for the outcomes involved. Where this occurs, tutors must inform candidates of the tasks to be completed.

An Assessment Exemplar and Guidelines on the Delivery of the Unit have been produced to indicate the national standard of achievement required at SCQF level 8.

Higher National Unit specification: statement of standards

Unit title: Directory Services Infrastructure

Unit code: DG01 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Plan and implement a directory services infrastructure

Knowledge and/or skills

- ◆ Plan a strategy for placing global catalog servers.
- ◆ Plan flexible operations master role placement.
- ◆ Implement a directory services forest and domain structure.
- ◆ Implement a directory services site topology.
- ◆ Plan an administrative delegation strategy.

Evidence requirements

Restricted response test

The knowledge and skills component of Outcome 1 must be examined by fifteen questions, three derived from the each of the five items listed below. Each question must be derived from a different item.

1. Plan a strategy for placing global catalog servers

Network traffic considerations, universal group caching

2. Plan flexible operations master role placement

Business continuity, operations master role dependencies

3. Implement a directory services forest and domain structure

Root domain, child domain, data partitions; directory services domain controller, trust relationships

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

4. Implement a directory services site topology

Site links, bridgehead servers

5. Plan an administrative delegation strategy

Organizational unit (OU) structure, delegation requirements

The test may be administered on its own as a subtest or be combined with other outcome subtests in the Unit.

Alternatively, the 15 questions for this outcome may contribute towards a single end-of-unit test of 50 questions.

Logbook

The logbook for Outcome 1 must record successful completion by the candidate of at least **three** of the five tasks listed below. The tasks to be completed must be selected by the tutor.

1. Plan a strategy for placing global catalog servers

A written description of a strategy for placing global catalog servers, taking account of network traffic considerations and universal group caching.

2. Plan flexible operations master role placement

A written plan for flexible operations master role placement, taking account of business continuity and operations master role dependencies.

3. Implement a directory services forest and domain structure

A record of the tasks carried out by the candidate to implement a directory services forest and domain structure, taking account of root domain, child domain, data partitions, directory services domain controller and trust relationships.

4. Implement a directory services site topology

A written description of a directory services site topology, taking account of site links and bridgehead servers.

5. Plan an administrative delegation strategy

A written description of an administrative delegation strategy, taking account of organizational unit (OU) structure and delegation requirements.

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

Assessment guidelines

It is suggested that all the above concepts be presented and explained within the context of current real-world practice and applications.

The suggested time allocation for a restricted response test is 2 minutes for each question plus 5 minutes starting-up time and 5 minutes finishing-off time, thus a total of 110 minutes should be allocated for a 50-question end-of-unit test.

Although individual outcome tests are permissible, it is suggested that if subtests are to be used, outcomes should be combined to produce tests of no fewer than 10 questions. A 10-question test would therefore have a time allocation of 30 minutes.

Outcome 2

Manage and maintain a directory services infrastructure

Knowledge and/or skills

- ◆ Manage a directory services forest and domain structure
- ◆ Manage a directory services site
- ◆ Monitor directory services replication failures
- ◆ Restore directory services
- ◆ Troubleshoot directory services

Evidence requirements

Restricted response test

The knowledge and skills component of Outcome 2 must be examined by fifteen questions, three derived from the each of the five items listed below. Each question must be derived from a different item.

1. Manage a directory services forest and domain structure
Trust relationships, schema modifications
2. Manage a directory services site
Replication schedules, site link costs, site boundaries
3. Monitor Directory services replication failures
Use system tools

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

4. Restore directory services

Authoritative restore, nonauthoritative restore

5. Troubleshoot directory services

Replication, operations master role failure, directory services database

The test may be administered on its own as a subtest or be combined with other outcome subtests in the Unit.

Alternatively, the 15 questions for this outcome may contribute towards a single end-of-unit test of 50 questions.

Logbook

The logbook for Outcome 2 must record successful completion by the candidate of **at least three** of the five tasks listed below. The tasks to be completed must be selected by the tutor.

1. Manage a directory services forest and domain structure

A record of the tasks carried out by the candidate to manage a directory services forest and domain structure, taking account of trust relationships and schema modifications.

2. Manage a directory services site

A record of the tasks carried out by the candidate to manage a directory services site, taking account of replication schedules, site link costs and site boundaries

3. Monitor directory services replication failures

A record of the tasks carried out by the candidate to monitor directory services replication failures by using system tools.

4. Restore directory services

A record of the steps taken by the candidate to restore directory services, including authoritative restore and nonauthoritative restore.

5. Troubleshoot directory services

A record of the steps taken by the candidate to troubleshoot directory services, including replication, operations master role failure and directory services database problems.

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

Assessment guidelines

It is suggested that all the above concepts be presented and explained within the context of current real-world practice and applications.

The suggested time allocation for a restricted response test is 2 minutes for each question plus 5 minutes starting-up time and 5 minutes finishing-off time, thus a total of 110 minutes should be allocated for a 50-question end-of-unit test.

Although individual outcome tests are permissible, it is suggested that if subtests are to be used, outcomes should be combined to produce tests of no fewer than 10 questions. A 10-question test would therefore have a time allocation of 30 minutes.

Outcome 3

Plan and implement user, computer and group strategies

Knowledge and/or skills

- ◆ Plan a security group strategy
- ◆ Plan an organisational unit structure
- ◆ Implement an organisational structure

Evidence requirements

Restricted response test

The knowledge and skills component of Outcome 3 must be examined by nine questions, three derived from the each of the three items listed below. Each question must be derived from a different item.

1. Plan a security group strategy

User authentication, smart cards, password policy

2. Plan an organisational unit structure

Administrative requirements, group policy requirements

3. Implement an organisational unit structure

Create an organisational unit, delegate permissions, move objects

The test may be administered on its own as a subtest or be combined with other outcome subtests in the Unit.

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

Alternatively, the 9 questions for this outcome may contribute towards a single end-of-unit test of 50 questions.

Logbook

The logbook for Outcome 3 must record successful completion by the candidate of **at least two** of the three tasks listed below. The tasks to be completed must be selected by the tutor.

1. Plan a security group strategy

A written security group strategy which takes account of user authentication, smart cards and password policy.

2. Plan an organisational unit structure

A written organizational unit structure that takes account of administrative requirements and group policy requirements.

3. Implement an organisational unit structure

A record of the steps taken by the candidate to implement an organisational unit structure including creating organisational units, delegating permissions and moving objects

Assessment guidelines

It is suggested that all the above concepts be presented and explained within the context of current real-world practice and applications.

The suggested time allocation for a restricted response test is 2 minutes for each question plus 5 minutes starting-up time and 5 minutes finishing-off time, thus a total of 110 minutes should be allocated for a 50-question end-of-unit test.

Although individual outcome tests are permissible, it is suggested that if subtests are to be used, outcomes should be combined to produce tests of no fewer than 10 questions. A 10-question test would therefore have a time allocation of 30 minutes.

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

Outcome 4

Plan and implement group policy

Knowledge and/or skills

- ◆ Plan group policy strategy
- ◆ Configure the user environment by using group policy
- ◆ Deploy a computer environment by using group policy

Evidence requirements

Restricted response test

The knowledge and skills component of Outcome 4 must be examined by nine questions, three derived from the each of the three items listed below. Each question must be derived from a different item.

1. Plan group policy strategy

Resultant Set of Policy (RSOP) planning mode; configuring user environment and computer environment

2. Configure the user environment by using group policy

Distribute software, enrol user certificates, redirect folders, configure user security settings

3. Deploy a computer environment by using group policy

Distribute software, enrol computer certificates, configure computer security settings

The test may be administered on its own as a subtest or be combined with other outcome subtests in the Unit.

Alternatively, the 9 questions for this outcome may contribute towards a single end-of-unit test of 50 questions.

Logbook

The logbook for Outcome 4 must record successful completion by the candidate of **each** of the two tasks listed below. The tasks to be completed must be selected by the tutor.

1. Plan group policy strategy

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

A written group policy strategy which takes account of RSoP planning mode, configuring the user environment and configuring the computer environment.

2. Configure the user environment by using group policy

configure the user environment by using group policy including distributing software, enrolling user certificates, redirecting folders and configuring user security settings

3. Deploy a computer environment by using group policy

A record of the steps taken by the candidate to deploy a computer environment by using group policy, including distributing software, enrolling computer certificates and configuring computer security settings.

Assessment guidelines

It is suggested that all the above concepts be presented and explained within the context of current real-world practice and applications.

The suggested time allocation for a restricted response test is 2 minutes for each question plus 5 minutes starting-up time and 5 minutes finishing-off time, thus a total of 110 minutes should be allocated for a 50-question end-of-unit test.

Although individual outcome tests are permissible, it is suggested that if subtests are to be used, outcomes should be combined to produce tests of no fewer than 10 questions. A 10-question test would therefore have a time allocation of 30 minutes.

Outcome 5

Managing and maintaining group policy

Knowledge and/or skills

- ◆ Troubleshoot issues related to group policy application deployment
- ◆ Troubleshoot the application of group policy security settings

Evidence requirements

Restricted response test

The knowledge and skills component of Outcome 5 must be examined by two questions, one derived from each of the two items listed below. Each question must be derived from a different item.

Higher National Unit specification: statement of standards (cont)

Unit title: Directory Services Infrastructure

1. Troubleshoot issues related to group policy application deployment

Use system tools, maintain installed software, distribute software updates, configure automatic updates for network clients

2. Troubleshoot the application of group policy security settings

Use system tools

The test may be administered on its own as a subtest or be combined with other outcome subtests in the Unit.

Alternatively, the 2 questions for this outcome may contribute towards a single end-of-unit test of 50 questions.

Logbook

The logbook for Outcome 5 must record successful completion by the candidate of **at least one** of the two tasks listed below. The tasks to be completed must be selected by the tutor.

1. Troubleshoot issues related to group policy application deployment

A record of the steps taken by the candidate to troubleshoot issues related to group policy application deployment by using system tools, maintaining installed software, distributing software updates and configuring automatic updates for network clients.

2. Troubleshoot the application of group policy security settings

A record of the steps taken by the candidate to troubleshoot the application of group policy security settings by using system tools.

Assessment guidelines

It is suggested that all the above concepts be presented and explained within the context of current real-world practice and applications.

The suggested time allocation for a restricted response test is 2 minutes for each question plus 5 minutes starting-up time and 5 minutes finishing-off time, thus a total of 110 minutes should be allocated for a 50-question end-of-unit test.

Although individual outcome tests are permissible, it is suggested that if subtests are to be used, outcomes should be combined to produce tests of no fewer than 10 questions. A 10-question test would therefore have a time allocation of 30 minutes.

Administrative Information

Unit code:	DG01 35
Unit title:	Directory Services Infrastructure
Superclass category:	CD
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Higher National Unit specification: support notes

Unit title: Directory Services Infrastructure

This part of the Unit specification is offered as guidance.

The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 80 hours.

The suggested time allocation for each outcome (including assessment) is as follows:

Outcome 1:	20 hours
Outcome 2:	20 hours
Outcome 3:	16 hours
Outcome 4:	16 hours
Outcome 5:	8 hours

Guidance on the content and context for this Unit

During the delivery of this unit it is important that every opportunity is taken to introduce real-world examples, opportunities for whole-class and group discussion and practical demonstrations wherever possible. Concepts and terminology should be presented in context throughout the Unit. Video presentations should be used where appropriate for providing an alternative explanation of a difficult topic, or as a focus for class discussion or group work.

Given the theoretical nature of this Unit, it is intended that a significant amount of time will be made available as a central part of the course for revision, tutorials and formative assessment exercises. Candidates should be strongly encouraged to undertake further reading, and opportunities for individual or group research should be provided.

The most important overall emphasis should be on the relevance and currency of content in such a rapidly-evolving field.

The following notes assume that the unit will be delivered using the Active Directory facility of a recent Microsoft operating system, such as Windows 2000/2003 Server. However, no restriction is placed on the operating system to be used and centres are free to choose alternative operating systems such as Linux/Unix, although this may require significant changes in terminology.

This Unit may assist candidates in preparing for Microsoft examination 70-294: Planning, Implementing, and Maintaining a Microsoft Windows Server 2003 Active Directory Infrastructure. Vendor certifications can change rapidly and candidates should be encouraged to check the current details at www.microsoft.com/traincert to ensure that all objectives have been covered. This examination can contribute towards the Microsoft Certified Systems Administrator (MCSA) or Microsoft Certified Systems Engineer (MCSE) awards.

Higher National Unit specification: support notes (cont)

Unit title: Directory Services Infrastructure

This unit may assist candidates to prepare for sitting vendor-certified examinations, such as the Microsoft Certified Professional examinations. Candidates should ensure that they have obtained the appropriate practical experience before attempting such examinations and should check the current version of the examination syllabus to ensure that all topics have been completely covered.

The content of this unit may be delivered using relevant vendor-supplied materials, such as Microsoft Official Curriculum (MOC). As these materials are under continuous development, centres should check carefully to ensure that such materials meet all the requirements for the unit. If MOC materials are used, some of the practical tasks may contribute towards the assessment requirements for the unit.

Outcome 1: Plan and implement a directory services infrastructure

1 Plan a strategy for placing global catalog servers

Candidates should be able to evaluate network traffic considerations when placing global catalog servers and evaluate the need to enable universal group caching

2 Plan flexible operations master role placement

Candidates should be able to plan for business continuity of operations master roles and identify operations master role dependencies

3 Implement a directory services forest and domain structure

Candidates should be able to create the forest root domain and child domain, create and configure Application Data Partitions and install and configure an Active Directory domain controller. They should also be able to set an Active Directory forest and domain functional level based on requirements and establish trust relationships (external trusts, shortcut trusts, cross-forest trusts).

4 Implement a directory services site topology

Candidates should be able to configure site links and preferred bridgehead servers

5 Plan an administrative delegation strategy

Candidates should be able to plan an organizational unit (OU) structure and a security group hierarchy based on delegation requirements.

Outcome 2: Manage and maintain a directory services infrastructure

1 Manage a directory services forest and domain structure

Higher National Unit specification: support notes (cont)

Unit title: Directory Services Infrastructure

Candidates should be able to manage trust relationships and schema modifications and add or remove a UPN suffix

2 Manage a directory services site

Candidates should be able to configure replication schedules, site link costs and site boundaries

3 Monitor directory services replication failures

Candidates should be able to use system tools such as Replication Monitor and Event Viewer. They should be able to monitor Active Directory replication and File Replication service (FRS) replication

4 Restore directory services

Candidates should be able to perform authoritative and nonauthoritative restore operations.

5 Troubleshoot directory services

Candidates should be able to diagnose and resolve issues related to Active Directory replication, operations master role failure and the Active Directory database

Outcome 3: Plan and implement user, computer and group strategies

1 Plan a security group strategy

Candidates should be able to plan a user authentication strategy and a smart card authentication strategy. They should also be able to create a password policy for domain users

2 Plan an OU structure

Candidates should be able to analyse the administrative requirements for an OU and the Group Policy requirements for an OU structure

3 Implement an OU structure

Candidates should be able to create an OU, delegate permissions for an OU to a user or to a security group and move objects within an OU hierarchy

Higher National Unit specification: support notes (cont)

Unit title: Directory Services Infrastructure

Outcome 4: Plan and implement group policy

1 Plan group policy strategy

Candidates should be able to plan a Group Policy strategy by using Resultant Set of Policy (RSoP) Planning mode, plan a strategy for configuring the user environment by using Group Policy and plan a strategy for configuring the computer environment by using Group Policy.

2 Configure the user environment by using group policy

Candidates should be able to distribute software, automatically enrol user certificates, redirect folders and configure user security settings by using Group Policy

3 Deploy a computer environment by using group policy

Candidates should be able to distribute software, automatically enrol computer certificates and configure computer security settings by using Group Policy

Outcome 5: Managing and maintaining group policy

1 Troubleshoot issues related to group policy application deployment

Candidates should be able to use system tools such as RSoP and the gpresult command. They should also be able to maintain installed software, distribute updates to software and configure automatic updates for network clients by using Group Policy

2 Troubleshoot the application of group policy security settings

Candidates should be able to use system tools such as RSoP and the gpresult command.

Guidance on the delivery and assessment of this Unit

This Unit is likely to form part of a group award which is primarily designed to provide candidates with technical or professional knowledge and skills related to a specific occupational area. It is highly technical in content and should not be adopted by group awards in other areas or delivered as a stand-alone Unit without careful consideration of its appropriateness.

It is a Unit which candidates are unlikely to find accessible at an introductory level; it is suggested that it be delivered only as part of an HNC/HND program in Computing or a related area. It should be delivered in tandem with other Computing Units and opportunities for teaching and assessment integration explored.

Higher National Unit specification: support notes (cont)

Unit title: Directory Services Infrastructure

To minimise assessment overhead, one or more sets of restricted-response questions, totalling 50 questions in all, should be used to provide evidence of candidates' knowledge for all Outcomes. It is suggested that multiple-choice questions should be used as the preferred assessment method – as well as reducing the time required for assessment and marking, these reduce the need for candidates to memorise details and encourage understanding. 70% of the questions must be answered correctly to pass each assessment. Candidates must also complete a log book or checklist recording the practical work undertaken for each outcome.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Directory Services Infrastructure

This is a 2-credit Unit at Level 8 intended for candidates undertaking a Computing or IT-related qualification who require an understanding of directory services infrastructure. It is designed to develop an understanding of the issues involved in planning, implementing and maintaining a directory services infrastructure. On completion of the Unit you should be able to:

- Plan and implement a directory services infrastructure
- Manage and maintain a directory services infrastructure
- Plan and implement user, computer and group strategies
- Plan and implement group policy
- Manage and maintain group policy

In the first part of the course, you will study planning and implementing a directory services infrastructure, including strategy for placing global catalog servers, flexible operations master role placement, implementing a directory services forest, domain structure and site topology and planning an administrative delegation strategy

The second section covers managing and maintaining a directory services infrastructure, including managing a directory services forest and domain structure, managing a directory services site, monitoring replication failures, restoring directory services and troubleshooting directory services.

The third section covers planning and implementing user, computer and group strategies, including planning a security group strategy, planning an OU structure and implementing an OU structure.

The fourth section covers planning and implementing group policy, including planning group policy strategy, configuring the user environment by using group policy and deploying a computer environment by using group policy.

The final section covers managing and maintaining group policy, including troubleshooting issues related to group policy application deployment and troubleshooting the application of group policy security settings.

There will be one or more closed-book restricted-response assessments covering all outcomes. You will be presented with a total of 50 questions and expected to answer 70% of these correctly. You will also be expected to keep a log book recording the practical tasks you have carried out during the Unit. You must satisfy the requirements for these assessments in order to achieve the Unit.

General information for candidates (cont)

This Unit may assist you in preparing for Microsoft examination 70-294: Planning, Implementing, and Maintaining a Microsoft Windows Server 2003 Active Directory Infrastructure. Vendor certifications can change rapidly and you should check the current details at www.microsoft.com/traincert to ensure that all objectives have been covered. This examination can contribute towards the Microsoft Certified Systems Administrator (MCSA) or Microsoft Certified Systems Engineer (MCSE) awards.