SQA Advanced Unit Specification: general information

Unit title: Self Describing Data (XML)

Unit code: HP2H 48

Superclass:	CB
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Source:	Scottish Qualifications Authority
Version:	01

Unit purpose

This Unit is designed to provide candidates with the knowledge of the use of self describing data in communicating data between a wide range of applications. The candidate will learn practical skills in the generation of XML documents and the use of tools such as XML editors and XML generation tools to produce these documents.

The Unit introduces the syntax of well formed XML documents, the use of validation techniques and concludes with the transformation and styling of XML documents, suitable for publication in a desired format.

On completion of the Unit the candidate should be able to:

1 Create well formed XML documents.
2 Validate XML documents.
3 Transform XML documents.

Recommended prior knowledge and skills

Access to this Unit will be at the discretion of the centre.

Credit points and level

1 SQA Credit at SCQF level 8: (8 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 National 1 to Doctorates.

Core Skills

There are opportunities to develop the Core Skill(s) of *Communication (*Written Communication) and *Problem Solving* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment

Evidence is required that candidates have achieved all Outcomes.

It is possible to assess candidates either on an individual Outcome basis, or by combinations of Outcomes.

Candidates are encouraged to use the internet in any research, etc, however, the evidence produced must be the candidate's own words. Assessors should assure themselves of the authenticity of candidates' evidence.

Sufficient time should be allowed within the teaching and learning process to allow assessments to be carried out. It should be noted that candidates must achieve all minimum evidence specified for each Outcome in order to pass the Unit.

All assessments are open-book.

Written and/or oral recorded, performance and product evidence is required which demonstrates that the candidate has achieved the requirements of all of the Outcomes showing that the candidate has appropriate knowledge and understanding of the content of this Unit.

This Unit should be assessed by the assessment tasks detailed as follows:

Outcome 1 — is an open-book assessment and is designed to demonstrate the candidate's knowledge and/or skills in describing the structure of a single file XML data document and in creating an XML document from a given data set.

The candidate is required to create an XML data document from a given data set. This could be performed using an XML generator application or by using an XML editor. The candidate will also produce an illustrated report to explain the XML structure of a given single file XML data document.

Outcome 2 — is an open-book assessment and takes the form of a practical assessment designed to demonstrate the candidate's knowledge and/or skills in validating and debugging a given XML data document that imports a given XML validation document (schema or DTD).

The candidate will use an XML validator to ensure that the XML data file is both well formed and that it abides by the XML validation document. The given XML data file must contain some minor errors that allow the candidate to firstly ensure the file is well formed and secondly ensure that the file abides by the given validation document. The candidate should also produce a short report that explains the identified errors and how they were fixed.

Outcome 3 — is an open-book assessment and will take the form of a practical assessment designed to demonstrate the candidate's knowledge and/or skills in transforming a given XML data file into a desired format.

The candidate will create an XML stylesheet that transforms an XML data file into a format that is suitable for the intended medium. The candidate must be given a copy and location of the validation document that the data file must abide by as well as the location of the XML data file to be transformed.

Assessors should ensure themselves of the authenticity of the candidate's evidence.

Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

(If you think holistic assessment is the best assessment strategy for the Unit and you wish to state *Knowledge and/or Skills* and *Evidence Requirements* for the Unit as a whole, please add the following statement here: 'Please refer to *Knowledge and/or Skills for the Unit* and *Evidence Requirements for the Unit* after the Outcomes.')

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

Create well formed XML documents.

Knowledge and/or Skills

- ♦ An understanding of the XML element hierarchy
- ♦ Appropriate use of elements and nested elements
- ♦ An understanding of the XML elements, attributes and special characters
- ♦ An understanding of the XML document prologue
- ♦ An understanding of the role of XML creation applications

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

Produce a single file XML data document and a short report explaining the structure of the XML document.

The candidate must be provided with a dataset which must be turned into a well formed XML document using either an XML editor or an XML generator application.

The data set must include data with a clear grandparent, parent, child relationship and data with a clear sibling relationship. The candidate must identify the structure of the data and supply appropriate mark-up.

The following evidence must be provided in the report:

♦ A graphical representation of the XML document showing the overall structure and element hierarchy.
♦ An explanation of 'grandparent, parent, child' and sibling relationships between elements.
♦ Identification and explanation of the root element.
♦ Identification and explanation of any element attributes present.
♦ An explanation of any directives within the document prologue.
♦ The role and benefits of XML generator applications.

The XML document produced must be included as an appendix to this report.

Assessment Guidelines

The assessment of this Outcome will be the production of an illustrated report that explains the structure of the XML data document produced from the given data set. The report must be supported by a diagram of the XML document structure and copy of the XML data document produced. This assessment is open-book.

Outcome 2

Validate XML documents.

Knowledge and/or Skills

♦ An understanding of internal and external validation documents
♦ An understanding of the role of validation documents

♦ An understanding of the syntax of validation schemas including:
  – Declaration of meta information and their default values
  – Declaration of alternative child elements
  – Declaration of occurrence indicators

♦ Using an external validation document to debug an XML data file

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

Validate and debug a given XML data document that imports a given XML validation document.

The candidate must be supplied with an XML data document that has at least one minor breach of the 'well formed' requirement, at least one minor breach of the alternative child requirements of the validation document and at least one minor breach of the occurrence indicator requirements of the validation document.

The candidate must also be supplied with the XML validation document, such as an XML DTD or an XML schema file. The validation document must define the following:

♦ Elements:
  – Elements that can appear in a document
  – Whether an element is empty or can include text
  – Parent elements
  – Order of child elements
  – Optional child elements
  – Mandatory child elements
  – Alternative child elements

The candidate should use an XML validator to ensure that the XML data file is both well formed and that it abides by the XML validation document.

The candidate should also produce a short report that explains the identified errors and how they were fixed.

Assessment Guidelines

The assessment of this Outcome will be the production of a short report that describes the identified errors and how they were fixed. The report should also clearly distinguish between a well formed XML document and a validated XML document.

Outcome 3

Transform XML documents.

Knowledge and/or Skills

♦ XML Transformation Applications
♦ Transform an XML document
♦ Distributed XML documents

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

Provide evidence of an implementation of the transformation of an XML document using an XML Stylesheet Language Transformation (XSLT).

The evidence must include:

♦ The style template produced, which must include the following features:
  – Selection of XML element values
  – Iteration over XML element values
  – Sorting of XML element values
  – Conditional testing of XML element values

♦ The result of the application of the style template
♦ A diagram of how the XML files involved in the process are interlinked

The candidate must be supplied with an XML document and associated validation document.

Assessment Guidelines

The candidate should be supplied with the location of an XML data file that is linked to an external XML schema file. They should also be supplied with a copy of the validation schema or DTD. Candidates are required to create an XML stylesheet that includes all of the bulleted points in the Evidence Requirements. They should then apply their stylesheet to output the XML data file in an appropriate format. This could be performed by editing a given simple XML application.

This assessment is open-book.

Unit specification: support notes

Unit title: Self Describing Data (XML)

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 40 hours.

Guidance on the content and context for this Unit

This Unit has been written in order to allow candidates to develop knowledge, understanding and practical skills in the role of XML documents in distributing data in a common standardised format. The candidate will develop practical skills in XML production, validation and transformation.

Outcomes 1 and 2 have been designed to provide the candidates with the underpinning knowledge required to use XML data documents in a distributed environment. In Outcome 3, the candidate learns how to use a distributed XML document within the production of an XHTML page.

Outcome 1 — is designed to give the candidates knowledge and/or skills of the XML structure in a single file XML data document. Candidates should understand the use of elements, element attributes and data types. They should be introduced to the function of the document prologue (this should be expanded upon in later Outcomes).

The candidates should be made aware of the role of XML in distributing data in standardised format and should be introduced to some of the XML production technologies currently used.

Outcome 2 — is intended to give the candidate knowledge and/or skills to understand how XML DTD and/or XML schema files are used to define the acceptable XML structure for related data sets. They should be made aware of how this enables XML application developers produce applications that can display or manipulate the data.

The candidate should understand how a validation document can be used to specify rules governing the acceptable structure of data elements. The candidate should be made aware that validation documents can also be used to define acceptable data types.

Outcome 3 — is intended to give the candidate knowledge and/or skills in the use of XML files in the production of dynamic web pages linked to XML data files. The crux of the Outcome is to learn how to develop XML stylesheets to define how XML data is displayed on a web page. The stylesheet should be applied to a given XML data document to produce an XHTML page in an appropriate format.

The candidate should also be made aware of alternative methods of displaying XML data in web pages.

Guidance on the delivery and assessment of this Unit

A suggested delivery sequence to this Unit would be the following:

Outcomes 1 and 2 should be taught and assessed first so the candidate has the underpinning knowledge of the XML document structure and validation process.

Outcome 3 should take the form of a small project.

Recommended duration of Outcomes 1 and 2 is 20 hours. Recommended duration of Outcome 3 is 20 hours.

Outcome 1

Candidates should initially be made aware of the role and importance of XML in online applications. Given that many of the candidates may well have limited knowledge of data analysis, it makes sense to provide them with small data sets and let them see how these can be defined using an XML editor that includes error recognition. This should help them understand how well formed XML documents are structured. They can then use an XML creation application to produce an XML data document from a much larger data set.

There is a wide range of XML editors currently available including those built into integrated web development environments such as Adobe's Dreamweaver CS5 and Microsoft's Visual Web Developer. There are also many online and client based XML generator applications including the databases provided with common Office applications.

Outcome 2

In this Outcome the candidates should initially be introduced to the syntax of inline data type definitions and/or schemas and then see how these can be shared as external documents that are loaded using the XML document prologue. This introduces the idea of multi file XML documents. It is also possible to let the candidates see how schemas can be produced automatically from XML data files.

Outcome 3

It is highly probable that candidates will find this Outcome the most interesting and rewarding as it allows them to see how to use XML data files without having to use any programming. They are also likely to already understand the use of cascading stylesheets and hence it might make sense to let them see the limitations of using CSS files when displaying XML data files.

The candidates should then be introduced to XSL transformation files, allowing them to learn how to display repeating data from XML data files in web pages. A very simple JavaScript loader application could be used to let the candidates see how an XSLT file and an XML data file can be loaded from different locations. The candidates could simply edit this for the final part of the assessment.

Open learning

This Unit could be delivered by distance learning that may incorporate some degree of online support.

However it would require planning by the centre to ensure the sufficiency and authenticity of candidate's evidence. Agreements would have to be made to ensure the assessment for Outcome 1 is delivered in a supervised environment under controlled conditions.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skill(s) of *Communication* (Written Communication) and *Problem Solving* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

History of changes to Unit

Version	Description of change	Date

General information for candidates

Unit title: Self Describing Data (XML)

This Unit is designed to teach you the underpinning knowledge required for developing XML based applications in an online environment.

This Unit introduces the fundamentals of XML, including how to structure a basic XML document, validate XML documents, link XML documents and transform XML documents into a variety of formats.

This Unit will introduce the role of XML documents in distributing data in a common standardised format.

XML documents can be transformed into many different formats for many platforms. This Unit will introduce you to transforming XML into XHTML for the publication of web pages. However, the fundamental knowledge will provide you with skills to develop XML based technologies such as:

♦ RSS (Really Simple Syndication)
♦ SMIL(Synchronised Multimedia Integration Language)
♦ SVG (Scalable Vector Graphics)
♦ VXML (VoiceXML)

On completion of the Unit you should be able to:

1 Create well formed XML documents.
2 Validate XML documents.
3 Transform XML documents.