



BCS Level 3 IT Solutions Technician Digital IT Apprenticeship End-point Assessment Knowledge Unit

Software Syllabus

**Version 1.1
May 2020**

BCS Level 3 IT Solutions Technician Digital IT Apprenticeship End-point Assessment Knowledge Unit - Software

Contents

- Introduction4
- Objectives4
- Eligibility for the Examination.....4
- Format and Duration of the Examination5
- Additional Time for Apprentices Requiring Reasonable Adjustments Due to a Disability ...5
- Additional Time for Apprentices Whose Language is Not the Language of the Examination5
- Syllabus6
- Levels of Knowledge / SFIA Levels10
- Question Weighting10
- Format of Examination10
- Recommended Reading List11

Change History

Any changes made to the syllabus shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and changes made. The purpose is to identify quickly what changes have been made.

Version Number	Changes Made
V1.0 February 2020	Document created.
V1.1 May 2020	Removal of "Training Criteria" and "Classroom size" sections as not applicable.

Introduction

This is the third unit of the four knowledge units required for the Level 3 IT Solutions Technician Apprenticeship Software route and forms part of the end-point assessment. It covers the range of concepts, approaches and techniques that are applicable to software, for which apprentices are required to demonstrate their knowledge and understanding.

Objectives

Apprentices should be able to demonstrate knowledge and understanding of software principles and techniques. Key areas are:

1. Understands the principles of Solution Architecture as applied to software.
2. Understands why there is a need to follow good coding practices and have good coding standards.
3. Understands the main categories of computer languages and the main features and benefits of each.
4. Understands how to implement software solutions including simple programming to a given a set of requirements and how to connect code to data sources.
5. Understands the purpose and usage of document mark-up languages including XML (extensible mark-up language) and html (hypertext mark-up language).
6. Understands the use of relational databases, including tables, views, joins and indexes.
7. Understands the use of Big Data Environments for storage and analysis of non-relational structured and unstructured data and the purpose of database normalization - organising the attributes and relations of a relational database to reduce data redundancy and improve data integrity.
8. Understands how to develop, test and implement code following a logical approach.

Evidence of lessons learnt in these key areas should be collected and reflected upon when the apprentice is compiling the portfolio as the apprentice could identify how the task might be done better / differently with knowledge subsequently gained.

Target Audience

The syllabus is relevant to anyone enrolled on the Level 3 IT Solutions Technician Software route apprenticeship programme.

Eligibility for the Examination

Apprentices must be enrolled on the level 3 IT Solutions Technician Digital IT apprenticeship and have entered end-point assessment gateway. Level 2 English and Maths will need to be achieved, if not already, prior to taking the end-point assessment.

Format and Duration of the Examination

The format for the examination is a 1-hour multiple-choice examination consisting of 40 questions. The examination is closed book (no materials can be taken into the examination room). The pass mark is 26/40 (65%).

Additional Time for Apprentices Requiring Reasonable Adjustments Due to a Disability

Apprentices may request additional time if they require reasonable adjustments. Please refer to the [reasonable adjustments policy](#) for detailed information on how and when to apply.

Additional Time for Apprentices Whose Language is Not the Language of the Examination

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to 25% extra time.

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to use their own **paper** language dictionary (whose purpose is translation between the examination language and another national language) during the examination. Electronic versions of dictionaries will **not** be allowed into the examination room.

Syllabus

For each top-level area of the syllabus a percentage and K level is identified. The percentage is the exam coverage of that area, and the K level identifies the maximum level of knowledge that may be examined for that area.

1 Principles of Solution Architecture (7.5%, K2)

In this topic, the apprentice will gain an understanding in the principles of Solution Architecture as applied to software. The successful apprentice should be able to:

- 1.1 Explain what a solution is and describe the main principles of solution architecture.
 - Establish a clear definition of the business problem to be solved by the software;
 - Design the structure, characteristics and behaviour of the solution;
 - Identify the constraints of the solution;
 - Implement the agreed solution;
 - Maintain communication with stakeholders during the project.

2 Coding Practices and Standards (12.5%, K2)

In this topic area, the apprentice will understand why there is a need to follow good coding practices and have good coding standards. The successful apprentice should be able to:

- 2.1 Explain the importance of following good coding practice.
 - quality of coding development;
 - keeping documentation;
 - structure of code;
 - consistent design and structure;
 - use of version control;
 - testing of code;
 - agreeing standards with team.
- 2.2 Describe good software coding principles and practices.
 - good naming conventions;
 - don't repeat yourself (DRY);
 - defensive programming;
 - commenting;
 - refactoring;
 - patterns / anti-patterns.

3 Languages (15%, K2)

In this topic area, the apprentice will understand the main categories of computer languages and their uses. The successful apprentice should be able to:

- 3.1 List and describe the main categories of modern programming languages and the key features and benefits of each.
 - procedural vs. object-oriented vs. functional programming;
 - compiled vs. interpreted languages.
- 3.2 Classify modern programming languages into the main categories.
 - Javascript / ECMA8;
 - Java;
 - C#;
 - PHP;
 - Python.
- 3.3 Explain the purpose and use of markup languages.
 - XML;
 - HTML;
 - XHTML.

4 Developing Code (20%, K2)

In this topic area, the apprentice will understand how to develop, test and implement code following a logical approach. The successful apprentice should be able to:

- 4.1 Describe the main activities undertaken in the following stages of developing code.
 - feasibility;
 - requirements analysis;
 - design;
 - code development;
 - testing;
 - deployment / implementation.
- 4.2 Describe the main activities for the following roles when developing code.
 - requirements engineer;
 - business analyst;
 - software designer;
 - software developer;
 - software tester;
 - software release engineer.

4.3 Understand how team-working contributes to the effective delivery of code

- decision making;
- conflict resolution;
- collaboration;
- communication;
- peer review and retrospectives.

5 Implementing Software Solutions (30%, K2)

In this topic area, the apprentice will understand how to implement software solutions including simple programming to a given a set of requirements and how to connect code to data sources. The successful apprentice should be able to:

5.1 Describe and explain how data structures are used and how data is represented in software code. Data types include:

- integer
- floating
- Boolean
- character
- string
- variable;
- lists, stacks, arrays.

5.2 Describe the core constructs used when writing software code.

- classes;
- objects;
- methods, functions;
- variables;
- control structures;
 - sequence;
 - selection;
 - iteration.

5.3 Describe how software code should be written in order to solve problems.

- pseudocode;
- sub-routines;
- data definitions;
- comments.

- 5.4 Describe the main business concepts and artefacts that must be considered when implementing a software solution.
- processes and procedures;
 - business process management;
 - release management;
 - documentation;
 - training;
 - support;
 - service levels.
- 5.5 Explain the purpose and use of data sources when implementing software solutions.
- create a connection to data;
 - to perform CRUD operations;
 - query data;
 - update data;
 - delete data;
 - insert data.

6 Data and Databases (15%, K3)

In this topic area, the apprentice will understand the use of relational databases and big data environments. The successful apprentice should be able to:

- 6.1 Explain the purpose and importance of effective data modelling and data normalisation.
- 6.2 Demonstrate the principles of data normalisation and redundancy.
- 6.3 Describe the concepts and key features of databases and data stores.
- relational databases;
 - SQL;
 - data structures (tables, records, fields, definitions);
 - big data environments;
 - NoSQL;
 - data files;
 - document;
 - key-value;
 - column family;
 - graph.

Levels of Knowledge / SFIA Levels

This syllabus will provide apprentices with the levels of difficulty / knowledge skill highlighted within the following table, enabling them to develop the skills to operate at the levels of responsibility indicated. The levels of knowledge and SFIA levels are explained on the website www.bcs.org/levels. The levels of knowledge above will enable apprentices to develop the following levels of skill to be able to operate at the following levels of responsibility (as defined within the SFIA framework) within their workplace:

Level	Levels of Knowledge	Levels of Skill and Responsibility (SFIA)
K7		Set strategy, inspire and mobilise
K6	Evaluate	Initiate and influence
K5	Synthesise	Ensure and advise
K4	Analyse	Enable
K3	Apply	Apply
K2	Understand	Assist
K1	Remember	Follow

Question Weighting

Syllabus Area	Target Number of Questions
1. Principles of Solution Architecture	3
2. Coding Practices and Standards	5
3. Languages	6
4. Developing Code	8
5. Implementing Software Solutions	12
6. Data and Databases	6
Total	40 Questions

Format of Examination

Type	40 Question Multiple Choice.
Duration	1 Hour. An additional 25% will be allowed for apprentices sitting the examination in a language that is not their native / mother tongue.
Pre-requisites	Training from a BCS accredited training provider is strongly recommended but is not a pre-requisite.
Supervised	Yes.
Open Book	No.
Pass Mark	26/40 (65%).
Calculators	Calculators cannot be used during this examination.
Delivery	Online.

Recommended Reading List

Title: [Software Developer](#)

Author: Jill Clarke

Publisher: BCS, The Chartered Institute for IT

Publication Date: May 2020

ISBN-13: 9781780175010