



251201-001-00-00-KM-03, Fundamentals of
database design and Information Systems, NQF
Level 6, Credits 15

LEARNER WORKBOOK
MODULE THREE (3)

1.1. Document Version

Document Version	1.0
Date Published	
Publisher	

1.2. Document Change History

Date	Version	Initials	Description
	1.0		

Module #	251201-001-00-00-KM-03
NQF Level	6
Notional hours	150
Credit(s)	Cr 15
Occupational Code	251201
SAQA QUAL ID	119458
Qualification Title	Occupational Certificate: Software Engineer Level-6 (240 Credits).

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Purpose

The main focus of the learning in this knowledge module is to build a foundational understanding of information systems and database design.

The learning will enable learners to demonstrate an understanding of:

- KM-03-KT01: Introduction to information systems (20%)
- KM-03-KT02: Components of an information system (20%)
- KM-03-KT03: Principles of Database design (60%)

Entry Requirements

- NQF Level 4

Or

- Information Communication Technology related qualification

Or

- At least three years' experience in Software Development

Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Well-resourced, ventilated and illuminated training centre with adequate facilities in accordance with industry general practices including but not limited to: -
- A desk and chair for each learner
- Hygiene facilities with adequate capacity and privacy
- Fully functional Computer Laboratory with access to the internet
- Relatively current and relevant software

Human Resource Requirements:

- Facilitator / Learner ratio of not more than 1:25
- Facilitators should hold an ICT related qualification pertaining to software development
- Facilitators must have a minimum 2 years' relevant facilitation or work experience

Or

- Facilitators must have completed a facilitator course

Legal Requirements:

- Compliant with the relevant Legislations

Venue, Date and Time:

- Consult your facilitator should there be any changes to the venue, date and/or time.
- Refer to your timetable.

Assessments

Integrated Formative Assessment: The skills development provider will use the curriculum to guide them on the stipulated internal assessment criteria and weighting. They will also apply the scope of practical skills

and applied knowledge as stipulated by the internal assessment criteria. This formative assessment leads to entrance into the integrated external summative assessment.

Integrated Summative Assessment: The external summative assessment will be conducted through integrated written exercises and evaluation of a project and/or assignment by registered assessors at accredited assessment centres. Integrated written assessment will be conducted within a day. Candidates will be given a project to develop a solution over a period of three weeks. The project will be presented to a panel of assessors for a maximum of 3 hours. The overall summative assessment, which includes presentation of the project as well as written assessment, will take place over 2 days.

PURPOSE OF THE QUALIFICATION

The purpose of this qualification is to prepare a learner to operate as a Software Engineer. A Software Engineer researches, analyses and evaluates requirements for existing or new software applications and designs, develops, deploys, tests within scope of work(debugs) and maintains software applications.

A qualified learner will be able to:

- Design software to meet clients' needs, (NQF Level 6)
- Design and manipulate databases, (NQF Level 6)
- Develop software to add value to the organisation, (NQF Level 6)
- Test or debug source code to ensure client's needs are met, (NQF Level 5)

QUALIFICATION RULES

This qualification is made up of the following compulsory Knowledge and Practical Skill Modules:

Knowledge Modules:

- 251201-001-00-00-KM-01, Software Engineering, NQF Level 6, Credits 20
- 251201-001-00-00-KM-02, Programming, NQF Level 6, Credits 20
- 251201-001-00-00-KM-03, Database design and Information Systems, NQF Level 6, Credits 15
- 251201-001-00-00-KM-04, Fundamentals of Project Management in relation to Software Engineering, NQF Level 5, Credits 5
- 251201-001-00-00-KM-05, Digital and Business Mathematics, NQF Level 5, Credits 15

Total number of credits for Knowledge Modules: 75

Practical Skill Modules:

- 251201-001-00-00-PM-01, Document system design, NQF Level 6, Credits 25
- 251201-001-00-00-PM-02, Design and Manipulate Databases, NQF Level 5, Credits 5
- 251201-001-00-00-PM-03, Program and deploy applications, NQF Level 6, Credits 25
- 251201-001-00-00-PM-04, Test or debug source code to ensure client's needs are met, NQF Level 5, Credits 15

Total number of credits for Practical Skill Modules: 70

Work Experience Modules:

- 251201-001-00-00-WM-01, Software design, NQF Level 6, Credits 30
- 251201-001-00-00-WM-02, Database design and manipulation, NQF Level 5, Credits 20
- 251201-001-00-00-WM-03, Software development, NQF Level 6, Credits 30
- 251201-001-00-00-WM-04, Software testing, NQF Level 5, Credits 15

Total number of credits for Work Experience Modules: 95

EXIT LEVEL OUTCOMES

1. Design software to meet clients' needs
2. Design and manipulate databases
3. Develop software to add value to the organisation
4. Test or debug source code

KM-03-KT01: Introduction to information systems (20%)

1. Define what an information system.

Its a system that collect, process store and distribute data. It Process data from raw material into organised and meaningful insights used to guide decision making.

This system consist of components, with each component having its roll. These components

work together to provide value to an organization.

These components are hardware, software, data, people and process.

Hardware- The components we use too get input from the user. Its the physical things that we can touch and use, Mouse, keyboards, computers, Sensors and much more.

Software – Is a set of instructions that tells the hardware what to do. It's the programs we use to do this process.

Data – Collection of facts. Like names, addresses and more. Data is what we work with.

Organizations collect data and put them into databases to help them make decisions.

People – People is in control of all the components, they use everything to their advantage and to get the outputs they need do make decisions, and to make their work easier and faster.

Process – All this is done in a certain process, The people use all the components in certain steps.

- Distinguish between data and information.

Data is Facts and figures .Whereas information is news or knowledge received or given

Data and information are intricately tied together

Data is raw facts that doesn't mean much like a set of numbers. Information gives meaning, for example it can tell you that the set of numbers is the weather temperatures.

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KM-03-KT02: Components of an information system (20%)

2. Explain the role of people and procedures in an information system.

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The people are the users and managers of the system, they make the decisions, they input the data, and they interpret the information that is outputted.

The procedures are the rules, steps or guidelines to make sure the people know how to use the system and handle the data. It's important because it makes sure the people uses the system correctly, safely and consistently.

Together they ensure that the information systems are used effective, secure and useful.

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3. Define what a network is.

A network is two or more entities connected with some sort of communication between them.

Computers are connected to each other using wlan, lan, pan, wan, man, can, vpn or san to communicate with each other and share information and data.

It's like a spider web that connects different devices together giving them abilities to share information and data.

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KM-03-KT03: Principles of Database design (60%)

- Identify and describe different types of database design approaches.

There are two main approaches; Top down, Bottom up.

Top-down approach: Starts with identifying data sets and then defines the data elements for each of the identified sets. The top-down approach considers the company's goals, beginning with a thorough understanding of organizational requirements.

Bottom-up approach :Starts with examining the current data and systems, progressively developing a unified enterprise data model. It starts with gathering and ingesting available data sources and building domain specific data models. It can be beneficial if the organization already have a substantial data infrastructure. It is usually simpler to execute because because of this, potentially resulting in less disruption and more feasible solutions. This method allows for gradual development and integration, simplifying the process of tackling problems and making necessary adjustments. The downside of the bottom up approach is that it might not be in line with the business goals and strategic objectives.

- Taking the wrong approach for a particular business goal often ends in the strategy failing and requiring redesign from scratch. If the implementation process succeeds, it's possible that the result will not fully support the business's needs and potentially necessitate a restart; the legacy system could end up being better than the new system. Sticking to the three p's—people, process, and product—when developing a data strategy is fundamental to success.

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4. Identify and describe different database design phases or models.

There are two steps of designing an effective database: The first is making a rough skeleton of it. The second is reverting the skeleton to a relational schema.

To make this skeleton we use the ER - model.

In this model we use an Entity relationship diagram.

This diagram has 3 Relationships: Entity, Relationships and attributes.

Entities : Real word objectives easily identified.

Relationships are the association between these entities.

Attributes: the properties that represents these entities.

- When we are done with this we need to go to step two and start reverting it to an actual data base. We do so by converting it to relational models which can directly be implemented by any RDBMS _

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