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| **FURTHER EDUCATION AND TRAINING CERTIFICATE: INFORMATION TECHNOLOGY: SYSTEMS DEVELOPMENT**  **ID 78965 LEVEL 4 – CREDITS 165** |
| **LEARNER WORKBOOK**  **SAQA: 14930**  **DEMONSTRATE AN UNDERSTANDING OF THE PRINCIPLES OF DEVELOPING SOFTWARE FOR THE INTERNET** |

**Learner Information:**

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| **Details** | **Please Complete this Section** |
| Name & Surname: | Mila Ngewu |
| Organisation: | Loomee Group |
| Unit/Dept: | ICT |
| Facilitator Name: | Anneline Nombeko |
| Date Started: | 05/10/2023 |
| Date of Completion: | 06/11/2023 |

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**OVERVIEW**

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| **About the Learner Workbook** | This Learner Exercise Workbook has been designed and developed to evaluate learners’ level of understanding of the  **Demonstrate an understanding of the principles of developing software for the internet.** It forms part of a series of Learner Workbooks that have been developed for **FURTHER EDUCATION AND TRAINING CERTIFICATE: INFORMATION TECHNOLOGY: SYSTEMS DEVELOPMENT ID 78965 LEVEL 4 – CREDITS 165** | | |
| **Purpose** | The purpose of this Learner Exercise Workbook is to evaluate learners understanding on the specific outcomes and/or assessment criteria of the following SAQA Registered Unit Standards: | | |
| **US No** | **US Title** | **Level** | **Credits** |
| **14930** | **Demonstrate an understanding of the principles of developing software for the internet** | **4** | **3** |
| **Context** | This assessment represents the Formative Assessment component of the **FURTHER EDUCATION AND TRAINING CERTIFICATE: INFORMATION TECHNOLOGY: SYSTEMS DEVELOPMENT ID 78965 LEVEL 4 – CREDITS 165** and should be completed in the classroom/training room. | | |
| **Resources** | The following are resources needed for this assessment:   1. Learner Guide; and 2. Assessment Preparation. | | |
| **Instructions to Facilitators** | Facilitators will be required to:   * Explain the completion of the workbook to each learner; and * Interview the learner on similar questions, should he/she not be able to write. | | |
| **Instructions to Learners** | Learners will be required to:   * Complete the workbook as per the instructions; * Ensure that all questions are completed; * Ensure that the completion of the workbook is their own work; * Ensure that all annexure are attached to the workbook and clearly referred to; | | |
| **Assessment Time** | Learners are required to complete this assessment within the allocated time frame of.... hours. | | |
| **Total Mark** | This formative assessment carries a total mark of **\_ points**. In order to meet the pass mark, learners are required to achieve a minimum of **80%** of the total marks. | | |
| **Equipment** | Learners are required to have the following equipment in order to complete this workbook:   * Pen and Pencil; * Ruler; and * Exam Pad – for additional paper. | | |

# **GENERAL INFORMATION**

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| **LEARNER DETAILS** | | |
| **Learner Full Names** | **Mila Mihlali Ngewu** | |
| **Learner ID No.:** | **9909106615084** | |
| **Organisation:** | **Loomee Group** | |
| **Unit/Dept:** | **ICT** | |
| **Contact Details:** | **Telephone /Cell Numbers:** | **Email Address:** |
| **0823655804** | **Ngewumila007@gmail.com** |
| **WORKSHOP DETAILS** | | |
| **Workshop Venue:** | **NMB iHUB** | |
| **Facilitator Name:** | **Anneline Nombeko** | |
| **Date Started:** | **05/10/2023** | |
| **Date Completed:** | **06/10/2023** | |

# **ASSESSMENT PREPARATION CHECKLIST**

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| **DESCRIPTION** | **YES** | **NO** | **COMMENTS/CONTINGENCY** |
| This assessment is a formative assessment and it is based on the outlined unit standard/s for the **Demonstrate an understanding of the principles of developing software for the internet** module. | ✓ |  |  |
| Your assessment evidence for **Demonstrate an understanding of the principles of developing software for the internet** module needs to be submitted on....... (day) of...............(month)...........(year) at the following address/place................................................................ | ✓ |  |  |
| You will be assessed based on the outlined Unit Standards. The assessment activities are linked to specific outcomes/assessment criteria of the outlined Unit Standards. | ✓ |  |  |
| To determine your competence level, the following are the methods to be used for this assessment:   1. ..................................................... 2. ..................................................... | ✓ |  |  |
| To be declared competent on **Demonstrate an understanding of the principles of developing software for the internet** module (formative assessment), you should have obtained at least 80% of the total mark of this assessment. | ✓ |  |  |
| You will be provided with detailed feedback on your performance of this assessment as follows:   1. Written Feedback 2. Verbal Feedback | ✓ |  |  |
| Should you be declared “not yet competent” on this assessment, you will be entitled for re-assessment opportunity/ies. | ✓ |  |  |
| You will be required to re-submit evidence (only for areas) you were declared not yet competent. A date for re-submission will be agreed with the assessor. | ✓ |  |  |
| You will be entitled to lodge an appeal should you not be satisfied with the assessment decision of your assessment. | ✓ |  |  |
| You will be required to provide the assessor feedback on assessment procedure – this is to assist in improving the assessment practices. | ✓ |  |  |
| Your results of assessment and portfolio of evidence information will not be provided to any person without your written consent. | ✓ |  |  |

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| **Learner’s Declaration** | | | |
| I Mila Mihlali Ngewu herewith declare that I am ready for the assessment, that we have reviewed the assessment preparation and plan, I understand the assessment process and I am happy that the assessment will be conducted in a fair manner. | | | |
| **Learner Signature:** | **Date:** | **Facilitator Signature:** | **Date:** |
|  | **05/10/2023** |  | **06/10/2023** |

Learning Unit1

**UNIT STANDARD NUMBER :** 14930

**Demonstrate an understanding of the principles of developing software for the internet**

**LEVEL ON THE NQF :** 4

**CREDITS :** 3

**FIELD :** Physical, Mathematical, Computer and Life Sciences

**SUB FIELD :** Construction Information Technology and Computer Sciences

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| **PURPOSE:** | This unit standard is intended:  to demonstrate fundamental of knowledge of the areas covered  for those working in, or entering the workplace in the area of systems development  People credited with this unit standard are able to:  Review the requirements for a web-based computer application  Design a web-based computer application  Present the design of a web-based computer application  The performance of all elements is to a standard that allows for further learning in this area |
| **LEARNING ASSUMED TO BE IN PLACE:** | |
| Open.  The credit value of this unit is based on a person having the prior knowledge and skills to:  demonstrate an understanding of fundamental English (at least NQF level 3)  demonstrate PC competency skills (End User Computing unit standards up to level 3). | |

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| **SESSION 1.**  **Explain the network issues related to Internet applications.** |
| **Learning Outcomes** |
| * 1. The explanation identifies the Internet uses a session-less network protocol. * 2. The explanation lists the implications of session-less application development. * 3. The explanation identifies the Internet uses limited band-width. * 4. The explanation lists the implications of slow wand-width to application design. |

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| http://3.bp.blogspot.com/_0EodaYtqevU/TMun5XOj03I/AAAAAAAAAIU/lzrnWelQjgc/s1600/group-discussion.jpg | **Answer the following questions according to the instructions provided** |

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| **Activity** | **Questions Description** | **Mark** |
| **1** | **Define a network protocol** | **5** |

A network protocol is a set of rules and conventions that govern how data is transmitted and received over a computer network. It defines the format and sequence of messages exchanged between devices, ensuring that they can communicate effectively.

* Protocols define various aspects of communication, including how data is formatted, transmitted, addressed, routed, and received.
* Network protocols operate at different layers of the OSI (Open Systems Interconnection) model, which is a conceptual framework that standardizes the functions of a telecommunication or computing system into seven abstraction layers.

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| **Activity** | **Questions Description** | **Mark** |
| **2** | **Distinguish between TCP/IP and ISO OSI network models** | **4** |

**TCP/IP Model:**

**Number of Layers:**

The TCP/IP model has four layers: Link, Internet, Transport, and Application.

**Adoption**:

The TCP/IP model is the basis for the Internet and is widely used in practice. It was developed by the U.S. Department of Defense.

**OSI Model:**

**Number of Layers:**

The OSI model has seven layers: Physical, Data Link, Network, Transport, Session, Presentation, and Application.

**Conceptual vs. Practical:**

While the OSI model is a more comprehensive conceptual framework, the TCP/IP model has gained wider practical adoption, particularly in the context of the Internet.

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| **Activity** | **Questions Description** | **Mark** |
| **3** | **What Is Network Bandwidth?** | **4** |

Network bandwidth refers to the maximum rate at which data can be transmitted over a communication channel or network.

* It is often expressed in bits per second (bps) or a higher unit like kilobits per second (Kbps), megabits per second (Mbps), or gigabits per second (Gbps).
* Bandwidth is a crucial factor in determining the speed and capacity of a network.

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| **Activity** | **Questions Description** | **Mark** |
| **4** | **What is the implications of slow band-width to application design** | **5** |

* Slow bandwidth contributes to increased latency, the delay between sending a request and receiving a response. Applications may feel sluggish and less responsive, affecting the overall user experience.
* . Applications that require high throughput, such as video streaming or large file transfers, may suffer from buffering or extended download times.
* Applications that rely on real-time communication, such as video conferencing or online gaming, can experience disruptions, lag, and reduced audio/video quality.

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| **SESSION 2.**  **Demonstrate an understanding of different user interface methods used for Internet applications.** |
| **Learning Outcomes** |
| * 1. The demonstration identifies different user interface methods used for Internet application development. * 2. The demonstration explains each of the user interface methods identified in 1, indicating the implication of each method. |

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| **Activity** | **Questions Description** | **Mark** |
| **5** | **Explain the benefits and drawbacks of rich clients and browser-based clients as deployed in a typical Java EE application.** | **8** |

**Rich Clients:**

**Benefits:**

1. Enhanced User Experience:

Rich clients typically offer a more interactive and visually appealing user interface. They can provide features like drag-and-drop, real-time updates, and complex UI interactions, leading to a more engaging user experience.

1. Offline Capabilities:

Rich clients can be designed to have offline capabilities, allowing users to continue using certain features or accessing cached data even when the device is not connected to the internet.

**Drawbacks:**

1. Platform Dependency:

Rich clients often require platform-specific development, which can increase development time and costs. Maintaining consistency across different operating systems may pose a challenge.

1. Installation and Updates:

Users need to install and update the client application on their devices. This can be a barrier for some users and may introduce additional steps for deployment and maintenance.

**Browser-Based Clients:**

**Benefits:**

1. Cross-Platform Compatibility:

Browser-based clients are inherently cross-platform, running on any device with a compatible web browser. This reduces the development effort required for different platforms.

1. No Installation Required:

Users can access the application simply by navigating to a URL, eliminating the need for installation. This makes deployment and updates more straightforward.

1. Easier Maintenance:

Updates and bug fixes are centralized on the server, ensuring that users always access the latest version of the application without requiring individual updates on each device.

**Drawbacks:**

1. Limited User Interface Capabilities:

Browser-based applications may have limitations in terms of UI interactivity and responsiveness compared to rich clients. Achieving complex UI interactions may be more challenging.

1. Offline Limitations:

While technologies like Progressive Web Apps (PWAs) are addressing this, browser-based applications traditionally have limitations when it comes to offline capabilities compared to rich clients.

1. Dependence on Browser Compatibility:

Ensuring compatibility across various web browsers can be challenging. Developers may need to address browser-specific quirks and differences.

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| **SESSION 3.**  **Demonstrate an awareness of the implications of copyright, ownership and royalties.** |
| **Learning Outcomes** |
| * 1. The demonstration shows an awareness of copyright issues related to Internet development. * 2. The demonstration shows an awareness of ownership issues related to Internet development. * 3. The demonstration shows an awareness of royalty issues related to Internet development. |

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| **Activity** | **Questions Description** | **Mark** |
| **6** | **Demonstrate an awareness of the implications of copyright, ownership and royalties.** | **12** |

**Copyright:**

Protection of Intellectual Property: Copyright safeguards software intellectual property, covering code, design, and documentation to prevent unauthorized use, reproduction, or distribution. Licensing is common, dictating how users can use and distribute the software while requiring compliance to avoid copyright infringement. Copyright protection has a limited duration, typically lasting the creator's lifetime plus a specified number of years, after which the work becomes part of the public domain.

**Ownership:**

Ownership of software or intellectual property involves legal rights and control. Here are the key implications:

1. Employment Contracts:

- Software created during employment is typically governed by employment contracts.

- In many cases, employers may have ownership rights to work created by employees within their job roles.

2. Independent Contractors:

- When hiring independent contractors, it's crucial to establish clear ownership rights in contracts.

- Without clear agreements, disputes can arise over who owns the software or intellectual property.

3. Open Source Collaboration:

- Developers collaborating on open-source projects should understand licensing agreements.

- Ownership in open source often depends on the specific licenses used, which dictate how contributions are treated among project contributors.

**Royalties:**

Royalties are payments given to the owner of intellectual property in exchange for the use or sale of that property. This is particularly relevant in the context of commercial software sales, where developers can earn royalties based on a percentage of revenue generated from the sale of proprietary software. Additionally, developers may enter licensing agreements, allowing others to use their software for a fee or royalty payment, with clear terms specified in contracts. The advent of digital distribution platforms has further expanded the scope, enabling developers to receive royalties for software sold or downloaded through these platforms, as outlined in agreements with the platform provider.

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| **SESSION 4.**  **Explain version control and security issues related to Internet Applications.** |
| **Learning Outcomes** |
| * 1. The explanation identifies version control issues related to Internet development. * 2. The explanation identifies security issues related to Internet development, and explains ways of handling each. |

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| **Activity** | **Questions Description** | **Mark** |
| **7** | **Identify security issues related to Internet development, and explain ways of handling each.** | **10** |

1. Information Privacy and Security:

Concerns: Involves safeguarding personal and sensitive data from unauthorized access, disclosure, or misuse.

Handling:

Encryption: Utilize encryption techniques for securing data during transmission and storage.

Access Controls: Implement strict access controls to permit only authorized users to access sensitive information.

1. Provision of Services:

Security Issue:

Ensuring the availability, reliability, and security of services is crucial. Denial of Service (DoS) attacks and other disruptions can impact service delivery.

Handling:

DDoS Protection: Implement Distributed Denial of Service (DDoS) protection mechanisms to mitigate attacks.

1. Critical Roles and Missions:

Security Issue:

Certain Internet-connected systems may be critical for essential roles and missions, and their compromise can have severe consequences.

Handling:

Isolation: Physically or logically isolate critical systems from less secure networks.

Security Training: Ensure that personnel with critical roles receive regular security training.

1. Electronic Commerce:

Security Issue:

E-commerce involves the exchange of sensitive financial information, making it a target for cybercriminals.

Handling:

Secure Sockets Layer (SSL) / Transport Layer Security (TLS): Use SSL/TLS for secure communication between clients and servers.

1. National Infrastructure:

Security Issue:

Critical national infrastructure, such as power grids and transportation systems, is increasingly connected to the Internet, making it a potential target for cyberattacks.

Handling:

Network Segmentation: Isolate critical infrastructure networks from public networks, Use IDPS to detect and prevent unauthorized access.