**Topic 14: Database Development**

**Formative Assessment 14**

**Database Development (114048 & 114049)**

*Hello and welcome to the assessment. Here you’ll prove to the world just how much you know and understand about what you’ve just learnt in the learner guides. This is an important part of your time at Umuzi because once this is done, you’ll be certified! So please, take this time to learn everything you can! Take a look at some pointers below with regard to answering the questions…*

* *Be specific*
* *Write professionally - no shorthand!*
* *Your answers must be original and come from your brain and your brain only.*
* *No copy/paste tricks! Our markers have seen it all and will know if you’re taking shortcuts.*
* *Remember, sloppy or poor work will be sent back to you to do again, so do it properly the first time and you’ll be done in no time.*
* *Ask for help at any time. Ask your friends, a manager, anybody!!*
* *Don’t skip any questions! You must do them all!*
* *You’ll see two boxes after each question - one for your answer and one for the marker’s comments. DO NOT delete the marker’s comments if you are required to resubmit your work after the first attempt. Should you have to do it again you will see a new box* ***under*** *the marker’s comments, so fill that one out in* ***BLUE****. Remember!! It’s not the end of the world if you have to resubmit. You’re here to learn, so don’t beat yourself up if you don’t get it right on the first go. Obviously, try your best to get it right on the first attempt, but if not, you have another chance to do it properly!*

*Ok, and that’s that! Time to get to it! Good luck, have fun and enjoy! :)*

**Enter your name and surname below**

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| **Luvo Spofana** |

**1. Define Data Independence [4 Marks](4 SO:1 AC:1-2)**

**Your answer below**

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| Data independence means that the data structures of a database are separated from the application program that used the data, allowing the user to easily change the structure of a database without modifying the application program. |

**Marker’s Comments**

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**2. List and describe three advantages of a Database Management System [6 Marks](6 SO:2 AC:1-2)**

**Your answer below**

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| * Data integrity and security - A DBMS enforces integrity constraints and access controls on the data, these constraints prevent erroneous data, while access controls govern what data is visible to a user, administrator, or group of users. * Data administration - Centralized administration enables experienced DBMS administrators to manage data, tune the DBMS in accordance to its usage, and minimize data redundancy. * Concurrent access and crash recovery - A DBMS enables concurrent access to data, thus two simultaneous actions will not influence each other.   Further, the DBMS has built-in fault tolerance and fault isolation that prevent further propagation of eventual failures or erroneous data. |

**Marker’s Comments**

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**3. List 4 types of DBMS’s [4 Marks](4 SO:3 AC:1-2)**

**Your answer below**

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| * Relational Database Management Systems * Hierarchical Database Management Systems * Network Database Management Systems * Object-oriented Database Management Systems |

**Marker’s Comments**

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**4. When you modify a database object, explain one of the three things you can do, provide an example of how this is done. [4 Marks] (4 SO:4 AC:1-3)**

**Your answer below**

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| You can discard your changes.  In Query and View Designer, discarding modifications is straightforward; simply close the window without saving your work. |

**Marker’s Comments**

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**5. List four advantages of using SQL and relational databases [4 Marks](4 SO:1 AC:1-4)**

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| * Allows users to describe the data. * Allows users to define the data in a database and manipulate that data. * Allows embedding within other languages using SQL modules, libraries & pre-compilers. * Allows users to create and drop databases and tables. |

**Marker’s Comments**

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**6. Describe database index structures and their usefulness [4 Marks](4 SO:3 AC:1-8)**

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| A database index is a data structure that improves the speed of data retrieval operations on a database table at the cost of additional writes and storage space to maintain the index data structure.  They are used to quickly locate data without having to search every row in a database table every time a database table is accessed, and they can be created using random lookups and efficient access of ordered records |

**Marker’s Comments**

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**7. Summarise the debugging process for when you encounter errors in your database scripts [5 Marks](5 SO:4 AC:1-5)**

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| Normally the first step in debugging is to attempt to reproduce the problem. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. Also, specific user environment and usage history can make it difficult to reproduce the problem. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. For example, a bug in a compiler can make it crash when parsing some large source file. However, after simplification of the test case, only few lines from the original source file can be sufficient to reproduce the  same crash. Such simplification can be made manually, using a divide-and-conquer approach. The programmer will try to remove some parts of original test case and check if the problem still exists. When debugging the problem in a GUI, the programmer can try to skip some user interaction from the original problem description and check if remaining actions are sufficient for bugs to appear. After the test case is sufficiently simplified, a programmer can use a debugger tool to examine program states (values of variables, plus the call stack) and track down the origin of the problem(s). Alternatively, tracing can be used. In simple cases, tracing is just a few print statements, which output the values of variables at certain points of program execution. |

**Marker’s Comments**

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