# Student Version

| Section A – Program/Course details | | | |
| --- | --- | --- | --- |
| **Qualification code:** | ICT40120 | **Qualification title:** | Certificate IV in Programming |
| **Unit code:** | The following two units are clustered as Create Database:  ICTDBS416 ICTPRG431 | **Unit title:** | (Create Database)  Create basic relational databases Apply query language in relational databases |
| **Department name:** | BDIT, Computing & Information Technology | **CRN number:** | 55790 |

| Section B – Assessment task details | | | |
| --- | --- | --- | --- |
| **Assessment number:** | 1 of 1 | **Semester/Year:** | 2/2022 |
| **Due date:** | Session 16 | **Duration of assessment:** | 8 hrs |
| **Assessment method** | Project/Report/Portfolio | **Assessment task results** | Ungraded result |
| Other: Click here to enter text. |

| Section C – Instructions to students |
| --- |
| **Task instructions:** |
| This assessment task is divided into three parts.   Part A: Database Modelling Part B: Database Implementation Part C: Research / Knowledge Questions  Refer to the Subject Outline as to when each part is due.  Initially (Part A) you will be required to analyse and design a relational database as per business requirements, according to the scenario given at the end of this document. For the purposes of this task, your teacher is your client. After being given some feedback, you will be required to implement the revised database (Part B) that you designed in Part A. You will also need to write various queries.   Finally, you will be required to research and answer some questions about databases. (Research questions can be found below.) You must NOT simply copy and paste. Answer each question in your own words. |

| Section D – Conditions for assessment | |
| --- | --- |
| **Conditions:**  Student to complete and attach Assessment Submission Cover Sheet to the completed Assessment Task. | |
| This task is to be completed individually | |
| **Equipment/resources students must supply:** | **Equipment/resources to be provided by the RTO:** |
| USB drive/External hard drive / cloud storage to save project work | Computer and Internet Access  MS Word, Uniform Server) |

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| Section E – Marking Sheet - Student Answer Sheet | | | |
| **Student ID:** |  | **Student name:** |  |
| **Unit code:** | The following two units are clustered as Create Database:  ICTDBS416 ICTPRG431 | **Unit title:** | (Create Database)  Create basic relational databases Apply query language in relational databases |
| **Date:** |  | | |

**Project/Report/Portfolio task**

| **Criteria for assessment** | | **Satisfactory** | | **Comment** |
| --- | --- | --- | --- | --- |
| **Yes** | **No** |
| **The following has been submitted for assessment:** | | | | |
| Part A: Relational Database Design | |  |  | **See feedback files** |
| Part B: Relational Database implementation and queries | |  |  | **See feedback files** |
| Part B: SQL File (.sql) | |  |  | **Please submit as SQL files** |
| Part C: Knowledge Questions | |  |  | **Q6. Not answered** |
| **Marking criteria for each product document/s supplied:** | | | | |
| 1. | Met with client, analysed and documented business requirements including business domain, business data, scope/boundaries of the system |  |  | **Good** |
| 2. | Established business rules |  |  | **See Part A Feedback File** |
| 3. | Developed a logical model of the system as per the business rules clearly indicating cardinality and participation (ERD) |  |  | **Concept is very good.** |
| 4. | Developed a detailed ER diagram (identifying primary / foreign key relationships and attributes) |  |  | **Some errors.** |
| 5 | Listed attributes for each table (data dictionary clearly indicating primary and foreign key relationships) |  |  | **Some errors.** |
| 6 | Explanation of integrity types (entity, domain and referential) |  |  | **Good** |
| 7. | Update and deletion rules explained |  |  | **Good** |
| 8 | Validated the data model, reviewed business rules and resolved issues with the client |  |  | **Some errors.** |
| 9. | Listed revised scope and boundaries |  |  | **Good** |
| 10. | Finalised ERD |  |  | **Some errors.** |
| 11. | Wrote SQL to create tables with correct data types and constraints, indexes and inserted a small amount of data |  |  | **It doesn't match ERD** |
| 12. | SQL Queries:   * Sort and selectively retrieve records from one table. * Write at least two statements to selectively retrieve and sort records from at least two tables. * Use an aggregate function to aggregate records and sort them. * Write a statement to selectively retrieve and sort records from two or more tables by using an expression. * Write a statement which includes a subquery. * Write a query that performs a calculation on a numeric data type. * Write a query that performs an operation on field that has a date data type. |  |  | **No subquery usage, otherwise very good. Other criteria met.** |
| 13. | Created, ran and dropped views |  |  | **Excellent** |
| 14. | Stored procedures:   * Retrieve data using your stored procedure. * Insert data using your stored procedure. * Modify data using the stored procedure. * Run a stored procedure by supplying it with one or more parameters. * Drop a stored procedure. |  |  | **Excellent** |
| 15. | Created and ran at least two triggers |  |  | person\_log not identified in ERD, otherwise this seems good |

**Part C Knowledge Questions  
Question: Provide your responses in the boxes below each question.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Questions to be answered by the student** | | | | |
| **Q1.** | Why is it important to gather client requirements? Give five examples of information gathering methods. | **Satisfactory response** | | |
| Yes | No | |
| **Answer:**  Gathering requirement ensure the software development team understand all stakeholders requirement and successfully meet project goals.   1. Active listening 2. Speak with real users 3. Document discussion 4. One to one interviews 5. Questionnaires | |  | | |
| **Q2.** | What do we mean by data modelling? What tools are used in data modelling? | **Satisfactory response** | | |
| Yes | No | |
| Data modelling is the **process** of creating a simplified diagram of a software system and the data elements. It uses text and symbols to represent the data and how it flows.  The tools used in data modelling could be   * Draw.io * Lucidchart | |  | | |
| **Q3.** | What are the steps you should undertake when designing a database? You may wish to use examples. | **Satisfactory response** | | |
| Yes | No | |
| 1. Determine the purpose of the database. The very first thing must to be done is decide the purpose of the database. 2. Find and organize the information 3. Create tables for the information 4. Establish relationships between the tables 5. Redefine your design. | |  | | |
| **Q4.** | What is meant by normalisation? | **Satisfactory response** | | |
| Yes | No | |
| Normalization is a database design technique which organizes tables in order to reduce data redundancy, dependency of data, data anomalies, and to improve data integrity. It divides larger tables into smaller tables and links them using relationships. | |  | | |
| **Q5.** | What is the difference between a logical and a physical (functional) database? | **Satisfactory response** | | |
| Yes | No | |
| The logical design provides no details about implementation issues for a specific database management system. it is only concerned about what information is going to be stored in the database and is not committed to one physical DBMS implementation.  The physical design contains details that are very specific to a hardware platform and database management system. It contains information on how the data is stored in a particular DBMS; this information includes the names and structure of tables fields to be used, data types, column lengths, database constraints and data storage structures. | |  | | |
| **Q6.** | Read the following article: https://vertabelo.com/blog/naming-conventions-in-database-modeling/  What naming conventions are recommended when creating a physical database. Give examples. | **Satisfactory response** | | |
| Yes | No | |
|  | | No response | | |
| **Q7.** | How is security implemented in a database? | **Satisfactory response** | | |
| Yes | No | |
| The base of an organization’s information and data security is laid upon 3 principles: availability, integrity, and confidentiality.  **Availability**: Data should be available at all the necessary times and to the appropriate users only. It should be tracked who accesses and what data he accesses.  Moreover, the data should be kept up-to-date.  **Integrity**: The verification should be done whether the external data has correct formatting and the input data is accurate. The data should be according to the workflows of the organization and the data changes should be reported.  **Confidentiality**: confidential data should only be available to the right people only. Encryption should be done to secure database from internal and external breaches. | |  | | |
| **Q8.** | What is a Database Management System. Give at least two examples of popular DBMS’s. | **Satisfactory response** | | |
| Yes | No | |
| A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a centralized database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.   * Oracle * SQL Server * MySQL | |  | | |
| **Q9.** | Explain the difference between:   * Data definition language (DLL), * Data manipulation language (DML) and * Data control language (DCL) | **Satisfactory response** | | |
| Yes | No | |
| DDL deals with database schemas and descriptions, of how the data should reside in the database.  DML deals with data manipulation and includes most common SQL statements such SELECT, INSERT, UPDATE, DELETE, etc., and it is used to store, modify, retrieve, delete and update data in a database.  DCL includes commands such as GRANT and mostly concerned with rights, permissions and other controls of the database system. | |  | | |
| **Q10.** | What is meant by an information system? Give an example of an information system with listing some of its features. | **Satisfactory response** | | |
| Yes | | No |
| An information system (IS) is a formal, [sociotechnical](https://en.wikipedia.org/wiki/Sociotechnical), organizational system designed to collect, process, [store](https://en.wikipedia.org/wiki/Information_storage), and [distribute](https://en.wikipedia.org/wiki/Information_distribution) [information](https://en.wikipedia.org/wiki/Information). For example “my gov” is the information system to present or track the people’s   * General personal information * Assets and incoming * Vaccination situation * Annual tax claim and so on. | |  | | |
| **Q11.** | Discuss how you would implement security on a database. | **Satisfactory response** | | |
| Yes | | No |
| We can implement security using tokenization, encryption, firewalls and virtual private networks. To:   1. Control access to the database 2. Identify sensitive and critical data 3. Encrypt information 4. Anonymize non productive databases 5. Monitor the database activity. | |  | | |
| **Q12.** | What do we, mean by data mining? Give an example. | **Satisfactory response** | | |
| Yes | No | |
| data mining is using math and computer to find the hided pattern or rules which is stored in data.it is the process of sorting through large data sets to identify patterns and relationships that can help solve business problems through data analysis. Data mining techniques and tools enable enterprises to [predict future trends](https://www.techtarget.com/searchbusinessanalytics/feature/Top-5-predictive-analytics-use-cases-in-enterprises) and make more-informed business decisions.  Banks use data mining to better understand market risks. It is commonly applied to credit ratings and to intelligent anti-fraud systems to analyse transactions, card transactions, purchasing patterns and customer financial data. Data mining also allows banks to learn more about people’s online preferences or habits to optimise the return on their marketing campaigns, study the performance of sales channels or manage regulatory compliance obligations. | |  | | |

| Section F – Feedback to Student | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Has the student successfully completed this assessment task?** | | | | | **Yes** | **No** |
|  |  |
| **Additional Assessor comments (as appropriate):** | | | | | | |
|  | | | | | | |
| **Resubmission allowed:** | **Yes** | **No** | **Resubmission due date:** |  | | |
| **Assessor name:** | Harley Calvert | | | | | |
| **Assessor signature:** |  | | | | | |
| **Student signature:** |  | | | | | |
| **Date:** | **16/09/2022** | | | | | |

**Supporting document**

# Scenario

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| --- | --- | --- | --- |
| **Unit code**: | The following two units are clustered as Create Database:  ICTDBS416 ICTPRG431 | **Unit title:** | (Create Database)  Create basic relational databases Apply query language in relational databases |
| **Student ID:** | 100264349 | **Student name:** | ZHAN SUN |
| **Date of submission:** | 17/09/2022 | **Student signature**: |  |

Scenario

Holmesglen is one of the largest providers of vocational and higher education in Victoria. A department wants to create a database to manage its student, teachers, and subjects. Students may enrol in different subjects and teachers may teach different subjects. This department teaches a number of courses. A subject, however, can only belong to one course. Each teacher can teach more than one subjects a student can enrol in many subjects and each subject can have many students.  
  
You are to design and report on the system above,

**Part A: Relational Database Design**

Using the template provided (DatabaseTemplatePartA.docx) complete the following:

1. Give a brief overview of the scope and boundaries of the database.
2. List the business rules of the system.
3. Draw a top-level Entity Relationship Diagram (ERD - one which names the tables and displays the relationships between these tables). These diagrams can be created in either Lucid Charts (<https://www.lucidchart.com/pages/>) or Draw.io (<https://app.diagrams.net/>) and exported as a diagram to be inserted into your document.
4. Provide a detailed entity relationship diagram. (An ERD for your database indicating attributes and cardinality – this ERD shown not have any many to many relationships). Make sure that you clearly identify primary and foreign keys. *Ensure that you use naming standards*.
5. A list of attributes and data types for **each** table to be implemented:  
   * Indicating the primary key field(s) as well as field data types and sizes (if applicable).
   * Description of the field if applicable eg name doesn’t need to be explained.
   * Any constraints (or range of acceptable values)
   * Specify which fields have default (or acceptable) values or can be left null.

*The above can be summarized for each table as shown below:*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table Name *– tblTableName* (tblTable \_ Name) | | | | | | |
| Attribute | Description | Data Type | Length | Acceptable Values | Default | Null Values Allowed |
| *fldFieldName* |  | int / varchar etc |  |  |  | Y / N |
|  |  |  |  |  |  |  |

1. Explain each type of integrity (domain, entity and referential) and how each will be enforced.
2. Explain the various update and deletion rules you have specified and explain why you selected what you did.
3. Review your design and ensure that it satisfies all the business rules.

**Part B: Relational Database Implementation**

Using the template provided (DatabaseTemplatePartB.docx) complete the following:

1. Give a brief overview of the revised scope and boundaries of the database.
2. List the revised business rules of the system.
3. Draw a detailed Entity Relationship Diagram (ERD - one which names the tables and displays the relationships between these tables). These diagrams can be created in either Lucid Charts (<https://www.lucidchart.com/pages/>) or Draw.io (<https://app.diagrams.net/>) and exported as a diagram to be inserted into your document.
4. Write SQL to create the tables using naming standards. Insert a few records into each table (make sure that you read all requirements of this task before you populate your database).  
   1. Make sure that you select the appropriate data types for each field.
   2. Ensure that one field in your database is a date data type.
   3. Make sure that you have primary and foreign key constraints on your tables.
   4. Create an additional index on one of the tables.
   5. Create a check constraint on at least one table.
5. Prepare a screen dump of SQL queries and their respective result sets and include this in your submitted documentation. Use a table like the one shown below (provided in your template).

|  |  |  |  |
| --- | --- | --- | --- |
| **Purpose** | **Tables Involved** | **Command(s) Involved** | **Result** |
| *Eg List all students in alphabetical order* | *Student* | *A screen dump of the query* | *Screen dump of the results of the query* |

For each query verify that your returned recordset is correct (check your data set). Prepare a screen dump of all statements and their respective results and include this in your submitted documentation.   
  
You MUST include the following types of queries:

* 1. Sort and selectively retrieve records from one table.
  2. Write at least two statements to selectively retrieve and sort records from at least two tables.
  3. Use an aggregate function to aggregate records and sort them.
  4. Write a statement to selectively retrieve and sort records from two or more tables by using an expression.
  5. Write a statement which includes a subquery.
  6. Write a query that performs a calculation on a numeric data type.
  7. Write a query that performs an operation on field that has a date data type.

1. Using one of your queries above, create a view. State the purpose of this view  
   * Run your view and do a screen dump.
   * Write code to drop the view. Do a screen dump of the result.
2. Write stored procedures to satisfy the following and do screen dumps of all your results with explanations as to what you were trying to achieve:  
   * Retrieve data using your stored procedure.
   * Insert data using your stored procedure.
   * Modify data using the stored procedure.
   * Run a stored procedure by supplying it with one or more parameters.
   * Drop a stored procedure.
3. Create at least two database triggers and do screen dumps of all your results with explanations as to what you were trying to achieve. Test your trigger and include a screen dump
4. In the Appendix of the document, include your starting data for the system. Do not include too much data as it will be difficult to test a large data set if implemented. This is so your teacher can run and test your queries.
5. Make sure that you export the SQL of your entire database and submit the .sql file.

# Assessment Submission Cover Sheet (VET)

Student to complete relevant sections and attach this cover sheet to each assessment task for submission.

|  |  |  |  |
| --- | --- | --- | --- |
| Student information | | | To be completed by Student |
| **Student name:** | ZHAN SUN | **Student ID:** | 100264349 |

| Program/Course details | | | |
| --- | --- | --- | --- |
| **Qualification code:** | ICT40120 | **Qualification title:** | Certificate IV in Programming |
| **Unit code:** | The following two units are clustered as Create Database:  ICTDBS416 ICTPRG431 | **Unit title:** | (Create Database)  Create basic relational databases Apply query language in relational databases |
| **Department name:** | BDIT, Computing & Information Technology | **CRN number:** | 55790 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Assessment information | | | To be completed by Student | | | | |
| **Teacher name:** | HARLEY | | | | | | |
| **Due date:** | Session 16 | **Date submitted:** | | | 16/09/2022 | **Re-submission:** |  |
|  | | | | | | | |
| **Student declaration** | | | |  | | | |
| By submitting this assessment task and signing the below, I acknowledge and agree that:   1. This completed assessment task is my own work. 2. I understand the serious nature of plagiarism and I am aware of the penalties that exist for breaching this. 3. I have kept a copy of this assessment task. 4. The assessor may provide a copy of this assessment task to another member of the Institute for validation and/or benchmarking purposes. | | | | | | | |

|  |  |
| --- | --- |
| **Student signature**  For electronic submissions: By typing your name in the student signature field, you are accepting the above declaration. | **ZHAN SUN** |

**Note:**

**Assessor to attach a photocopy of the completed Marking Guide (Section E) from the Student version of the Assessment Task.**

**Final result of the subject/unit will be entered on Banner by the teacher/assessor once all assessment tasks have been assessed.**