OTAGO POLYTECHNIC Te Kura Matatini ki Otago

Auckland International Campus
IN PARTNERSHIP WITH FUTURE SKILLS ACADEMY

IA502001: Studio 1

Database Design and Build Instructions

Instructions Issued	Week 3
System is due	Minimum Viable Product - **Week 7** Final System - **Week 8/9**
Competency Based Mark	Meets Requirements / Does Not Meet Requirements (Pass/Fail)

Learning Outcomes Covered

- Communicate appropriately in informal and semi-formal written and verbal contexts.
- Discern functional and non-functional aspects within a problem domain in the context of data modelling.
- Use collaboration tools and workflows to contribute to a simple group project.

General

You will build an Information System in a Problem Domain of personal interest to you. You will implement this System using **SQLite** and create **Queries** to implement **various Use Cases** that you have previously identified in your written proposal.

The documentation for this assignment comprises of:

- This word document.
- A separate spreadsheet containing the marking rubric.

If you do not understand anything about this assignment you must see me.

It is expected that the subject of this assignment will be related to your Proposal Document that you submitted earlier. **If you wish to change from your original choice, you must obtain approval from me, and be prepared to submit a new proposal document.**

This assignment is a **substantial item of work** that builds on things you have learned with me, and in your other papers. **It showcases you!** It demonstrates your technical knowledge and your ability to think logically about a problem.

Due Dates – Week 7 and Week 8

In order to explain the two due dates for this task, it might help to give an example of the timeline you need to follow:

Week 5	Analysis of the system is completed. Create and finalise ERD (Logical and Physical). Begin Build!
Week 6	Start Data Dictionary and report. Build Database. **Core design settled. Simplest queries implemented. First review of your system by your lecturers!**
Week 7	Last DB workshop. Prep for PDR.
Week 8	PDR meetings all week. **Final evaluation of your system**.

Although you have 3 weeks to complete your task, the time we have to review what you building in class is minimal. Please make sure that **your design ideas are locked in by week 6.**

Task1: Construct a Written Blueprint.

You are to blueprint your system. You are to use the **report template** as found on Moodle. **Your report will have the following sections/Headings**:

1. **Summary**
2. **Design Analysis Process and Use Cases**
3. **Data Dictionary**
4. **Entity Relationship Diagram**

1 - The Data Dictionary

Table 1 - Example of Data Dictionary item for a single Entity

Entity Name	Entity Description				
Purchase	Customer purchases of Items. This table is an associative entity that implements a many-to-many relationship between CUSTOMERS and INVENTORY				
Field Name	Description	Datatype	Key Field?	Constraints	Example
Purchase ID	Unique ID for each purchase	Autonumber	PK	Unique, not null	001
Customer ID	From CUSTOMERS table	number	FK	Not null	10

ItemID	From INVENTORY table	number	FK	Not null	20

- Create a data dictionary for your database.
- Identify **all entities**.
- Identify **all attributes**. Full description for each attribute as per **Table 1 above.**
- Show appropriate **SQLite data-types** for each attribute.
- Identify **all candidate relationships**.

2 - Analysis of Design Process and Use Cases – Between 500 to 1000 words

You must **describe your design process**. You are expected to describe:

- Your **initial analysis of the Problem Domain**. What things became entities. How you defined the boundaries of the problem domain to control the scope of your project.
- What **Use-cases** you wanted to implement. Provide a bullet-point list.
- The process of building your system. Explain what entities or attributes you removed; what necessary ones you added (referring back to your original system proposal). **Why.**
- If your Design and Build assignment is substantially different from Proposal, you must include an explanation **in detail** why your delivered product differs from your promised.
- Anything else that logically supports and justifies the design you have created.

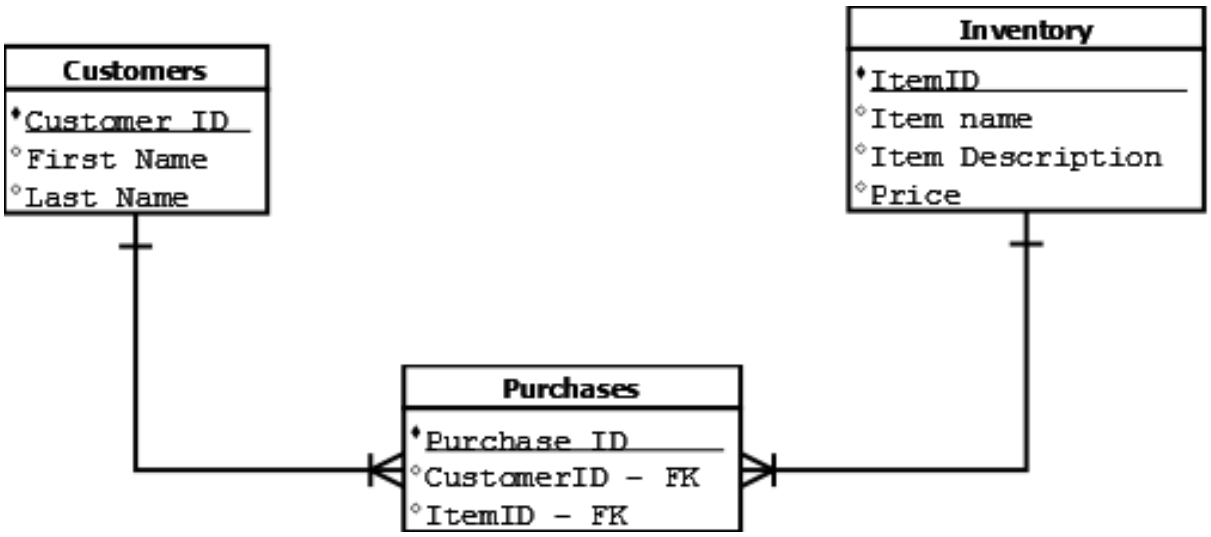
3 - An ERD

Using modelling software of your choosing, draw an Entity Relationship Diagram of the **Physical Model of your system**. (i.e.: you will map out many-to-many relationships, showing the joining table between.)

Your diagram must:

- Use **Crowsfoot notation**
- Be **legible** and **well organised**.
- Show **all relevant entities**, attributes and relationships.
- Show **correct cardinality** between entities.

Table 2 - Example of an ERD listing attributes for each entity



Create a professional document

Combine all of the above into a single document. Include a brief summary of your system written in plain English as your Executive Summary. The document should be of a **professional standard** so include a title page, be well structured and grammatically correct.

Task 2: Construct a Relational Database in SQLite.

Using SQLite, construct all tables and relationships for the information system.

The tables should

- Be relevant, necessary to the problem and **conform to the ERD**.
- Have **suitable relationships** with other tables which enforce referential integrity. (Use of the PRAGMA foreign_keys statement)
- Have suitable **primary** and **foreign keys**.
- Be populated with sensible data.
- Have sensible names.

The table fields should

- Be appropriate to the problem and conform to the ERD.
- Have sensible names.
- Be documented.
- Have suitable properties.

The system scope should fully cover the Problem Domain as agreed between you and your Lecturer. It will not be signed off until it does.

I will run your code by coping and pasting to the SQLite3.exe command prompt

You will save the SQL commands/database you use to build and populate your database in a separate file called "***yourname*_build.db**"

Task 3: Implement Use Cases as queries in SQLite.

You will construct queries for your information system. I will be comparing the use cases you have identified in your proposal and data dictionary, to the queries that you create. (There should be an approximate correspondence, or an increase, **not a decrease**.)

You also need to create sufficient queries to demonstrate the following technical skills:

1. You can make queries on **single tables**, using **selected fields**.
2. You can implement criteria on most of your queries (WHERE)
3. You can make queries on **two joined tables** (INNER JOIN, LEFT JOIN)
4. The use of aliases on field names in query output.
5. You can make queries on **more than two** joined tables (INNER JOIN only)
6. You can demonstrate **sorting** (ORDER BY).
7. You can apply **grouping** and **aggregate functions**
8. You can create **new calculated fields in query output.**

If you have use cases that are beyond your current technical capabilities to complete (Or can't be done purely in SQL):

1. Create the query that would produce the basic data needed.
2. Explain in a code comment the "algorithmic steps" you would need to process your query output to fulfil you use case

Each query should

- Be relevant to the needs of the user (Use Cases).
- Be user-friendly in layout.
- Operate correctly in terms of information creation and presentation.

There should be enough queries to fulfil all the use cases as defined in your proposal and to demonstrate the technical requirements as specified

You will save the SQL commands you use to query your database in a separate file called "***yourname*_queries.sqlite**"

Deliverables

You will upload **THREE FILES** to your repo:

One ASCII plain text file called "*yourname*_build.db"

- Linked tables as per your ERD ..... ☐
- Data inserted to create viable queries ..... ☐

One ASCII plain text file called "*yourname*_queries.sqlite"

- Queries cover all **technical requirements** ..... ☐
- Queries to cover all defined **Use Cases**..... ☐

One file, MS Word or PDF - Data Dictionary

- Fully Defined Data Dictionary for all Entities..... ☐
- Analysis of the design and build of your system

  Use cases identified and listed ..... ☐

  Analysis of the design and build process..... ☐
- Entity Relationship diagram using Crows-foot notation..... ☐

  Done using modelling software ..... ☐

Three files in total uploaded to Moodle.