CSC-20002 Database Systems, Coursework Assignment.

Table of Contents.

Section 1.

Main entity types and their relationships.

List of Main Entity Types:

Below I have chosen to list some of the potential features I will need based on my understanding of the specification given. These are my starting points, and will change throughout.

- Product
  - Size of products
    - Delivery or,
      - ^needs dimensions of the product
    - Collection
      - ^needs weight of the product
  - Price
  - Description
  - Etc…
- Store
  - Where in the country
  - Number of employees
    - Name
    - Employee ID
    - Online shipping?
      - Organising and posting
    - In-store pickup?
  - What products?
- Customer
  - Unique accounts
    - Holds past orders made online (marketing)
      - Date made
      - Price
      - For delivery
        - Address
  - For pickup
        - ^needs collection arrangements with customer
    - Customer ID
- Employee
  - Employee ID
  - Name
  - Employee ID
  - Online shipping?
    - Organising and posting
  - In-store pickup?
- Order
  - Order ID/number
    - Customer to ordered it (Customer ID)
  - Delivery
  - Collection
  - Delivery
    - Length,
    - Width,
    - Height
  - Collection Details
- Suppliers
  - Product being supplied
  - Delivery dates

Conceptual Entity Relationship Diagram.

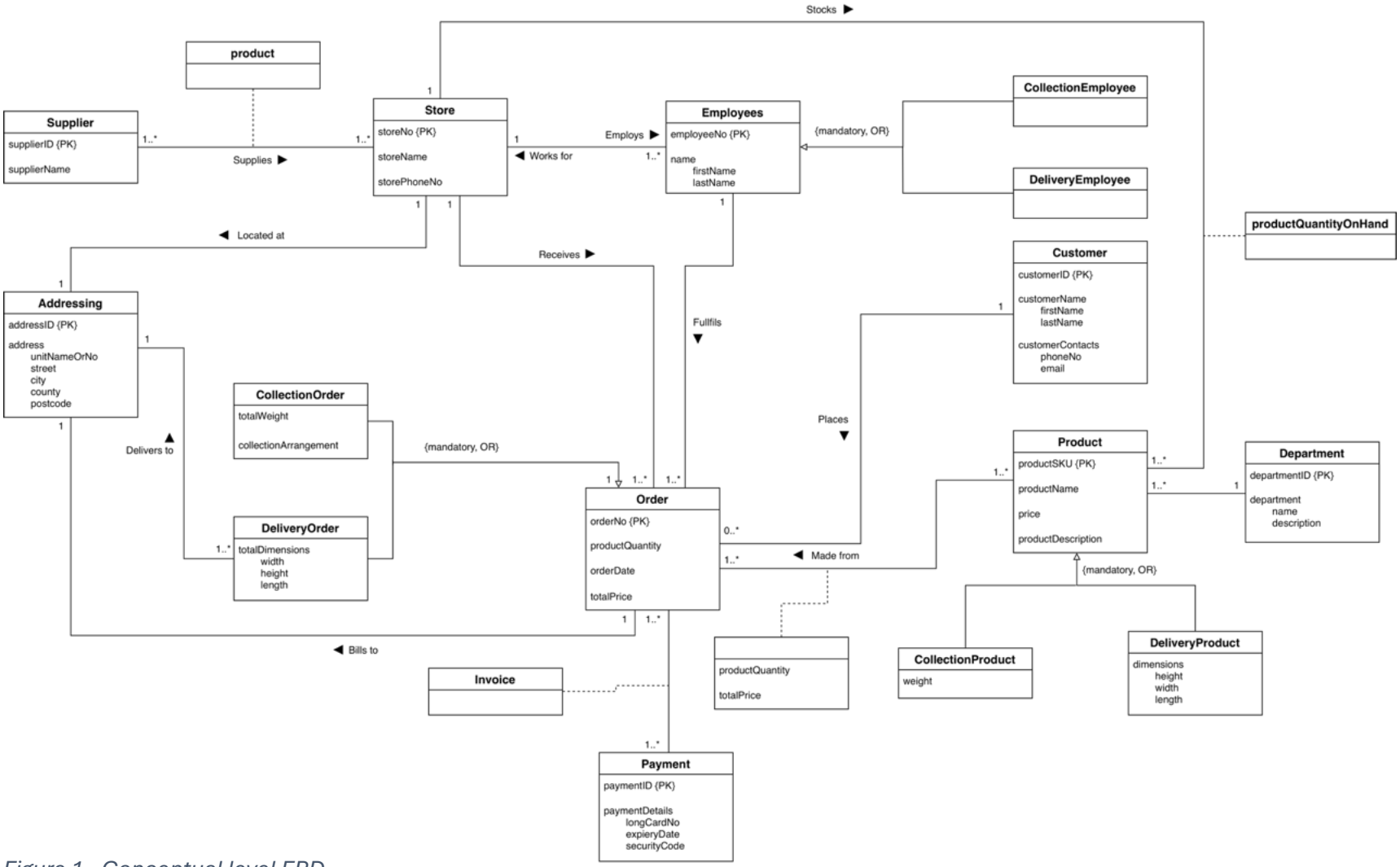


Figure 1 - Conceptual level ERD.

Logical Entity Relationship Diagram.

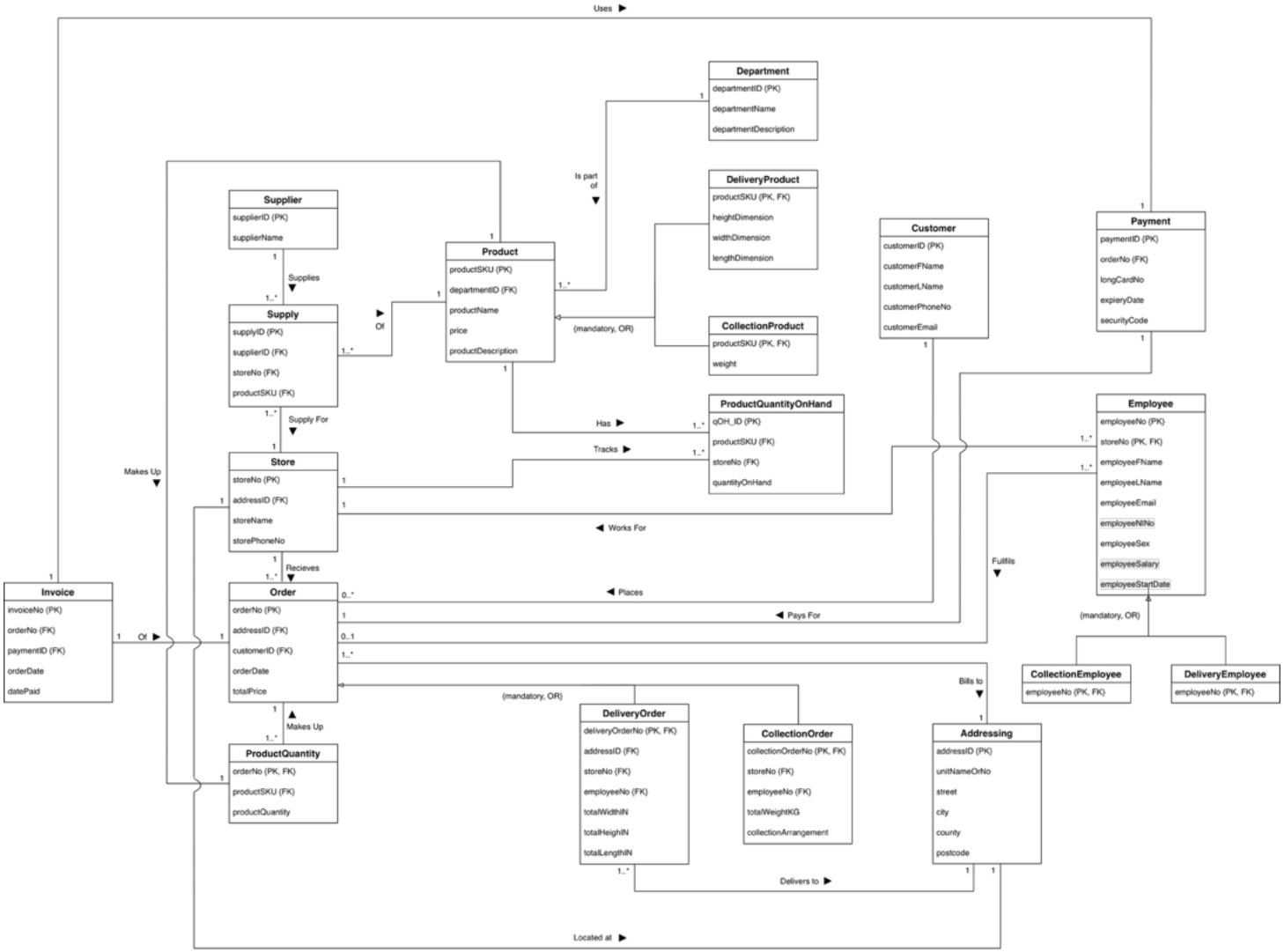


Figure 2 - Logical Level ERD.

Section 2.

The tables have been generated by the scripting in the .sql file “generateTables.sql”.

All dummy data which I had inserted are in the .sql file “insertDummyData.sql”.

Section 3.

All web-interface scripting of the assignment is in these files: “index.php”, “updatingTables.php”, “grabTables.php”, and “grabTablesChange.php”.

Section 4.

Web-interface link and ORACLE Credentials.

The link for my web-interface is as follows:

https://teach.cs.keele.ac.uk/users/x9b80/databaseSystems/index.php

My login credentials for Keele’s Oracle DBMS are used in plaintext inside the PHP scripting while using the OCI8 statements, but they are as follows:

Username: x9b80,
Password: x9b80.

There is no login system used in the web-interface.

Report.

Functional Requirements of the Company.

The IDEA Furniture company requires a web-based “portal” to access their database of products. They would need to be able to work with their records, in way such as searching, updating, and adding. Deleting records is a job for the Data Manager in the business and should only be carried out by qualified Mangers as to prevent damages to the Database and shan’t be included in front end.

IDEA needs to have their products spilt into Delivery Products and Collection Products, and assign Orders made of only one or the other to Collection or Delivery Employees. IDEA also requires each product’s information, i.e.: dimension (height, width, length) for Delivery Products, and product weight for Collection Products, to determine how much space a Delivery Order will take, and how much a Collection Order weighs. Other details they may benefit from would be what Department each Product is in.

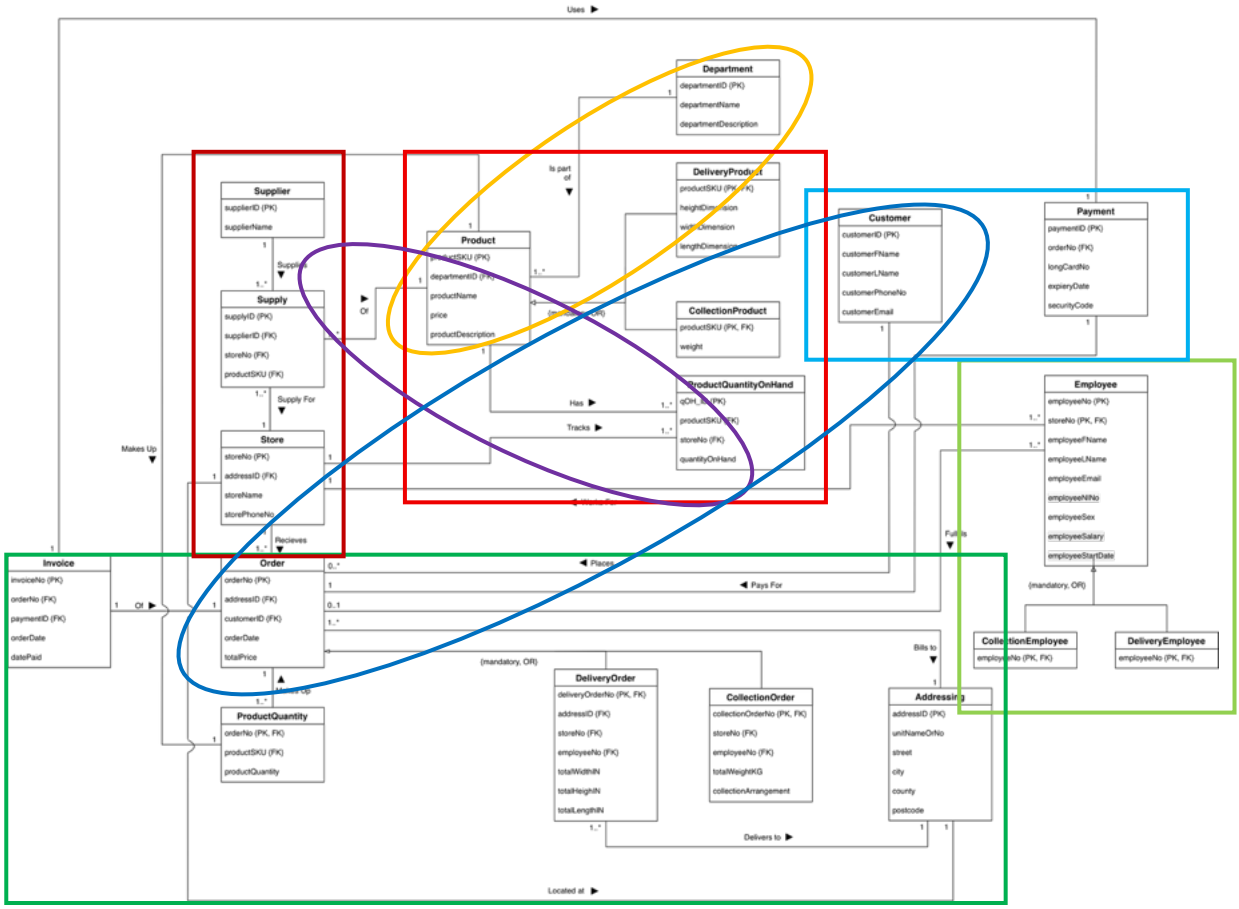
Employees are part of Order fulfilling, and each of IDEA’s locations will need to have a list of Employees, and their information, such as National Insurance Number for taxation, employment date, first and last name, and contact information. IDEA also assigns each employee to either Delivery, or Collection, Orders only, and will need a

way to split each Employee into either Collection or Delivery Orders. Each Order will also require a sum of the total price, with an address in which payment is made from to know where to send the Invoice, and a link to which Customer placed the Order.

Across IDEA's chain of stores nationally, each need Suppliers, who will supply different, and the same, products as other Suppliers to select stores. Each store may or may not be supplied by the same supplier as another, which dictates what Products each Store sells.

Every IDEA Store will serve many unique Customers and will need to hold their information to allow communications, addressing of Delivery Products, and to allow the specific store to contact on fulfilment of a Customer's Order; be it Delivery or Collection.

To go with each Customer and each Order, a form of Payment would be needed by IDEA to pay for the Products, including card numbers, dates, and security PINs for a payment card; all of which are added to an Invoice so the Customer can make this Payment for an Order/s.



My Design and Implementation.

I have added conjunction tables in all the following sections to maintain “ACID”, and to enable my Scheme to exist in the Relational Model, by removing Many to Many relationships for One to Many, or One to One.

Supply Chain:

- Supplier to Store was Many to Many. In the Brief each given store, more than one across the country, will have multiple Suppliers for each of their Products they sell.
- I made a Supply table to make One to Many for Suppliers to what they Supply and Stores to their Supply, as each store is different.
- Product is linked to Supply, as many Supply records to hold one Product per record.

Product Line:

- According to the brief, each product is only assigned to Delivery or Collection, based on weight and dimension, which is why I made a MANDATORY OR inheritance, as a Product must be either one, but not in both.
- I have included Product Department as the “other information” mentioned in the brief, as Many to One, as more than one Product may exist in one department.

Product Quantity On Hand:

- Each product requires a “stock level”, per product SKU, per store; a One to Many for Product and Store into Product Quantity On Hand, as each Store may have the same Product in different Quantities.

Customers at Stores, Orders, and Payments:

- Every Store may have many unique customers, so the Customer is not linked to a Store, but an Order.
- A Customer may make a new account but cannot use the same combination of contact information.
- Payment information is also not connected to a single customer, as many Orders can use the same Payment option, as to avoid putting the details in each Customer and/or Order.
- It is not common for normal Customers to split Payments, so is not and available option.

Employee and Work Sections:

- Every Store has many Employees. An Employee may only work at one store, which is a Many to One relationship.

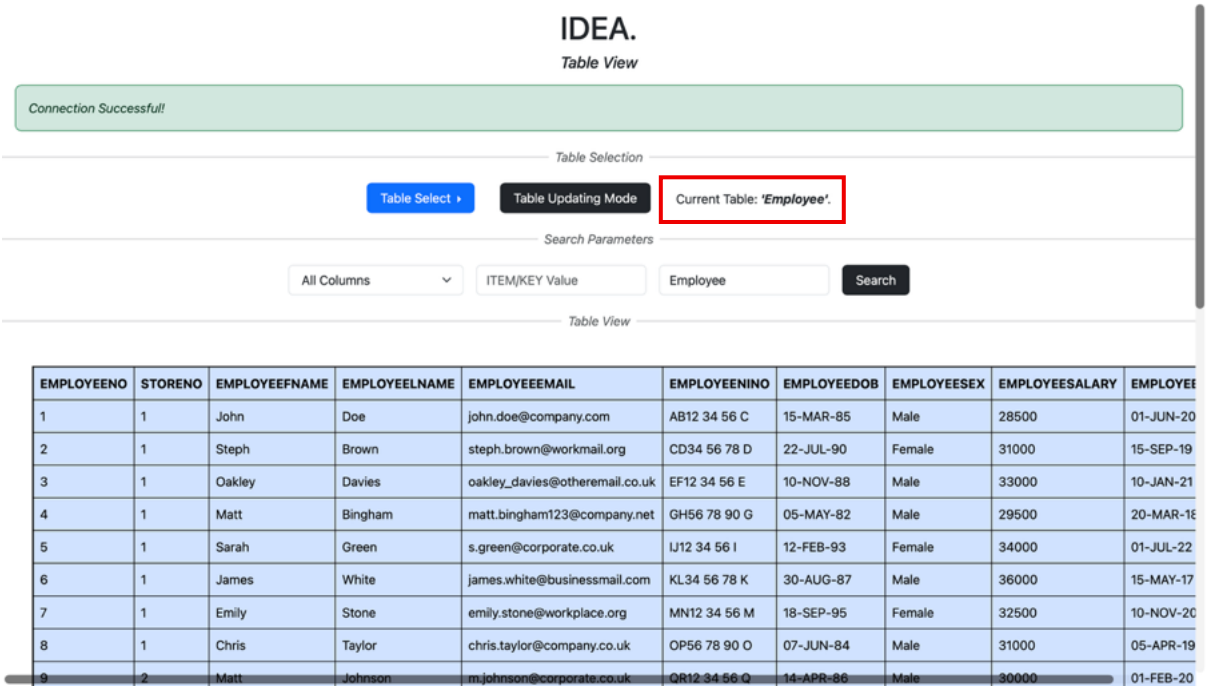
- An Employee MUST be either assigned to Collection or Delivery Orders, not both, and become a Delivery/Collection Employee, shown in the MANDATORY inheritance relationship.

Store, Orders, Addressing, and Invoicing:

- There are many addresses, over Orders, Invoices, Stores, and Deliveries.
    - There is one centralised table of Addresses, as the same address can be used more than once, as this prevents duplication of records.
    - Store, Delivery and Billing Addresses.
- Each Order must be spilt into Collection or Delivery, as an Order cannot be both (MANDATORY OR relationship).
- With Product and Product Quantity, one Product has one Quantity of itself, to show how many of it is included, in its respective Order.
- One Store may have many Orders, and an Order may only be related to a single Store (One to One).
- Only a Delivery Order may have a Delivery Address, while ANY Order needs a Billing Address for where to send an Invoice.
- Every Order also has an Invoice, Including the Order and Payment information sent to the Billing Address.
- Not every Order requires immediate Payment.
- Invoices table was made to conjoin Order and its Payment.

Application Features.

Table View:



EMPLOYEENO	STORENO	EMPLOYEEFNAME	EMPLOYEELNAME	EMPLOYEEEMAIL	EMPLOYEENINO	EMPLOYEEDOB	EMPLOYEESEX	EMPLOYEESALARY	EMPLOYEE
1	1	John	Doe	john.doe@company.com	AB12 34 56 C	15-MAR-85	Male	28500	01-JUN-20
2	1	Steph	Brown	steph.brown@workmail.org	CD34 56 78 D	22-JUL-90	Female	31000	15-SEP-19
3	1	Oakley	Davies	oakley_davies@otheremail.co.uk	EF12 34 56 E	10-NOV-88	Male	33000	10-JAN-21
4	1	Matt	Bingham	matt.bingham123@company.net	GH56 78 90 G	05-MAY-82	Male	29500	20-MAR-18
5	1	Sarah	Green	s.green@corporate.co.uk	IJ12 34 56 I	12-FEB-93	Female	34000	01-JUL-22
6	1	James	White	james.white@businessmail.com	KL34 56 78 K	30-AUG-87	Male	36000	15-MAY-17
7	1	Emily	Stone	emily.stone@workplace.org	MN12 34 56 M	18-SEP-95	Female	32500	10-NOV-20
8	1	Chris	Taylor	chris.taylor@company.co.uk	OP56 78 90 O	07-JUN-84	Male	31000	05-APR-19
9	2	Matt	Johnson	m.johnson@corporate.co.uk	QR12 34 56 Q	14-APR-86	Male	30000	01-FEB-20

Figure 3 - Table View, with responsive table.

My application has a view of each table, which scrolls horizontally if it is large, like the one shown here (Figure 3). It also shows the current table name, and number of rows and columns fetched (Figure 5).

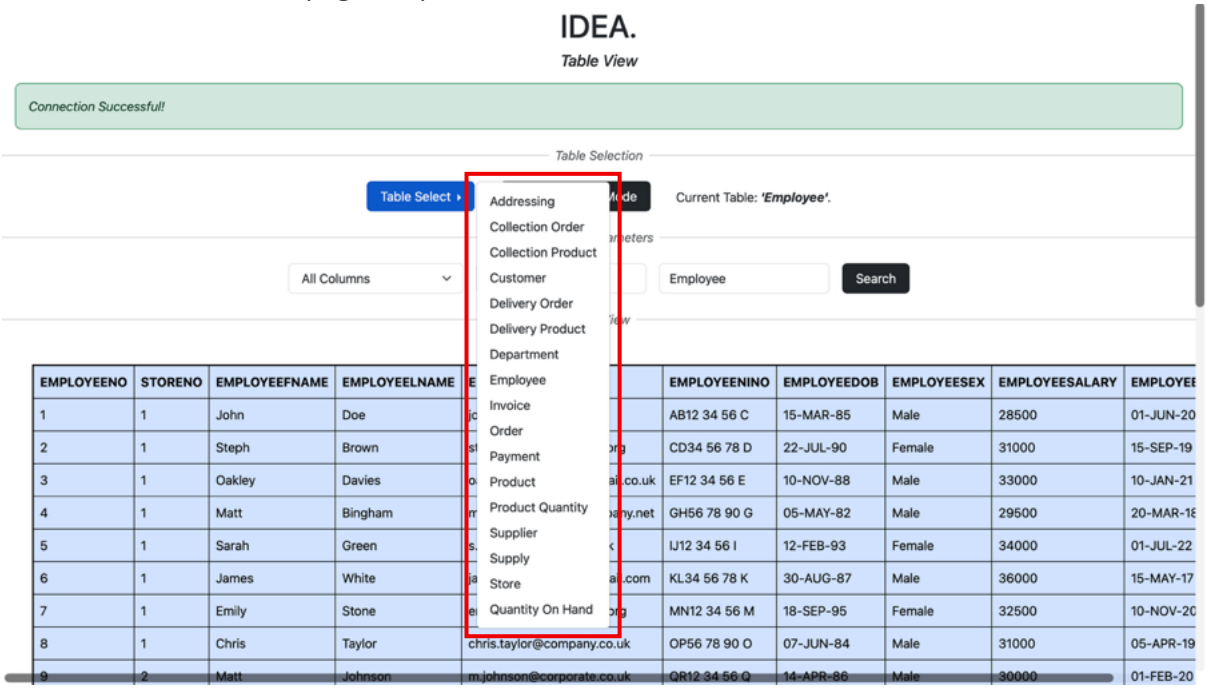


Figure 4 - Selecting Table to view.

My web-application also has a dropdown menu to select the table currently viewing.

Record Filtering:

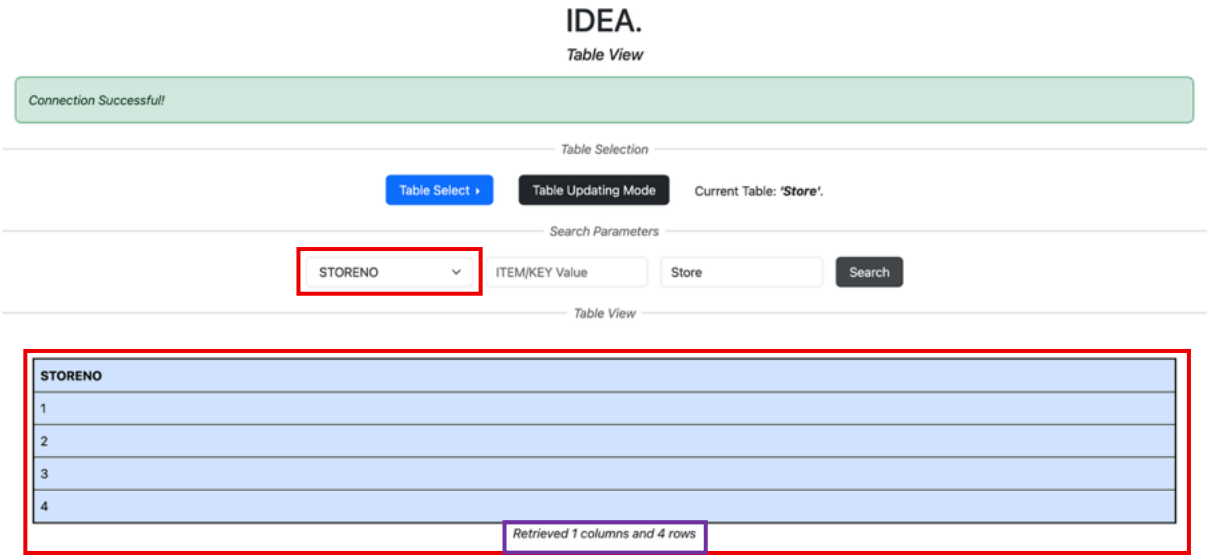


Figure 5 - Filtering by Column only.

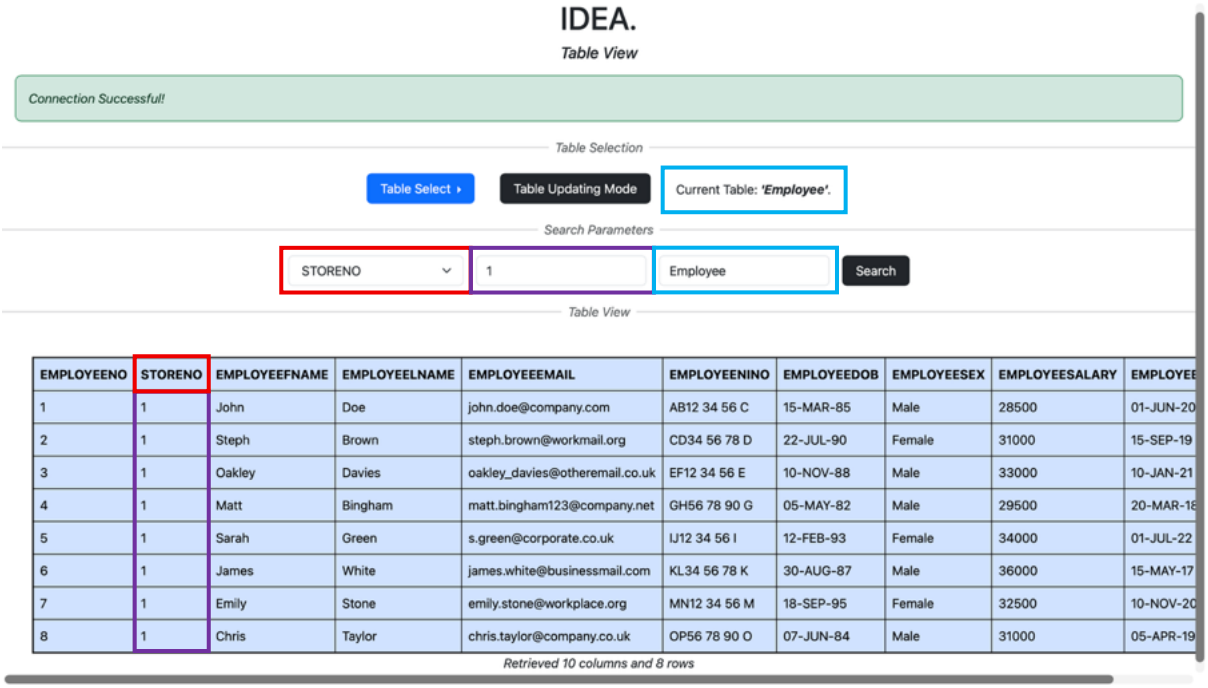


Figure 6 - Full search filters.

The web-interface give the ability to filter the records in the Database. It allows you to pull single column information, a list of all a single column; it also allows you to search the entire currently selected table where a selected column is a 'provided value'.

Record Updating:

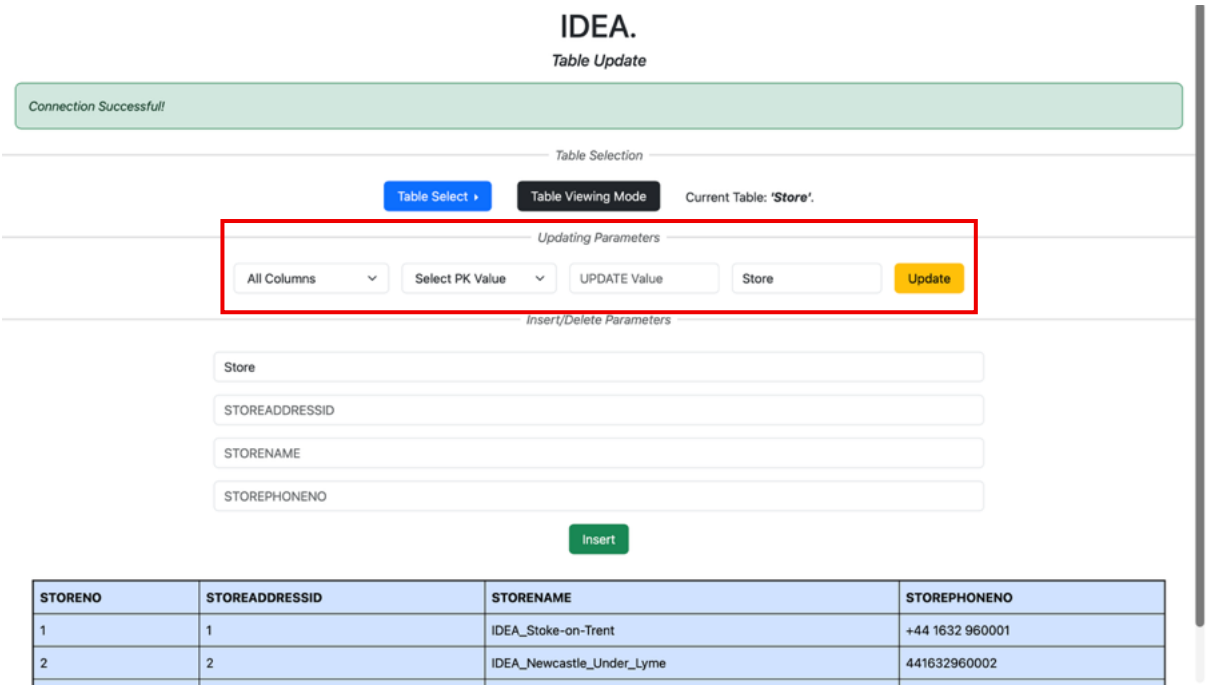


Figure 7 - Table Updating View.

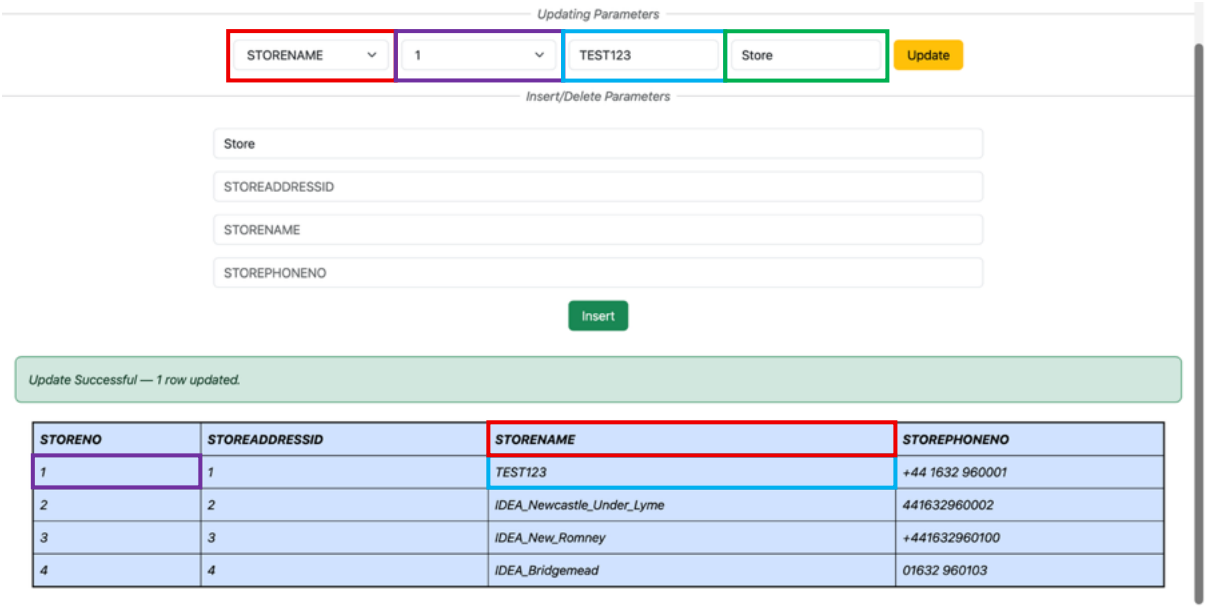


Figure 8 - Updating a Record Attribute.

I have also included Record, attribute, Updating (Figure 7)(Figure 8). So certain aspects can be updated in the table. The Primary Key has been blanked out in the dropdown of "Select Column" (Figure 9) to prevent the changing of it, and an error is given if a Foreign Key is updated where it does not exist or hits a CHECK constraint, to prevent changing if an invalid Foreign Key too. The Primary Key is used to select the specific Record to update.

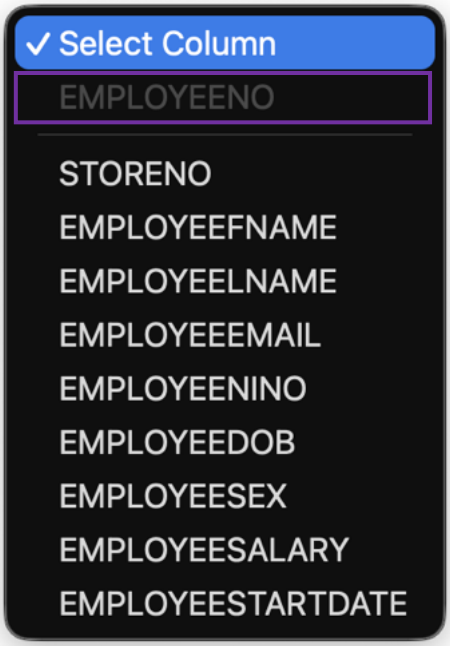


Figure 9 - "Select Column" dropdown, for Employee Table.

Error Messages:

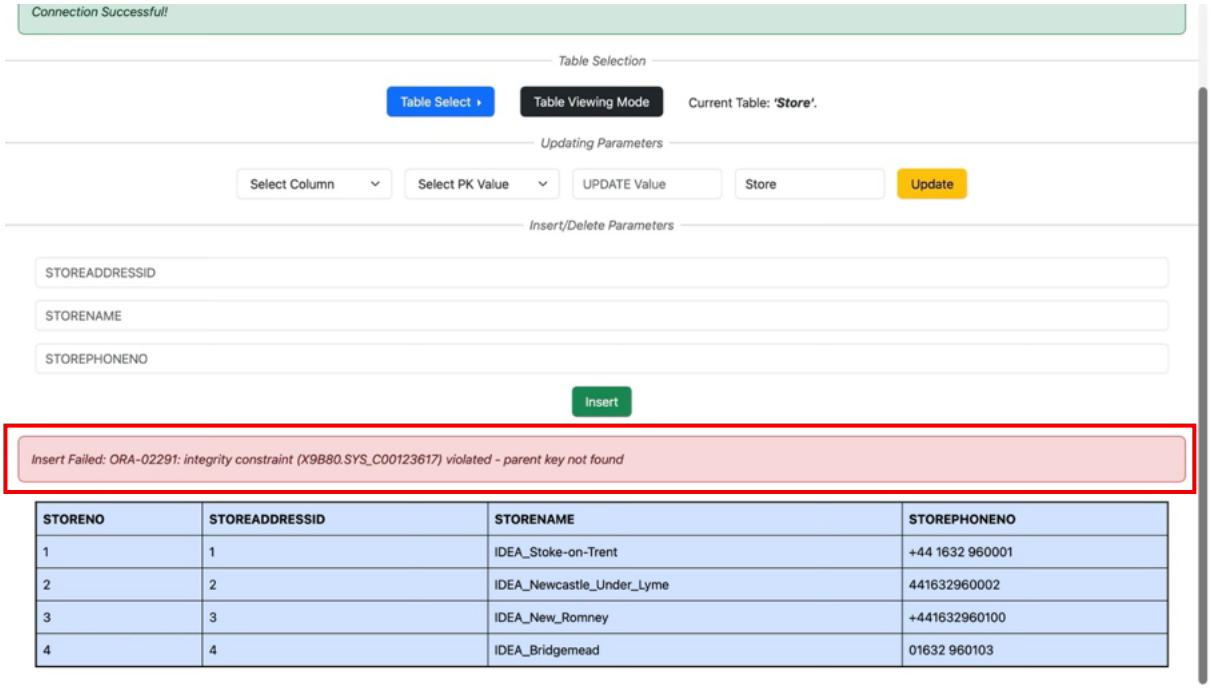


Figure 10 - Error Message Example 1.

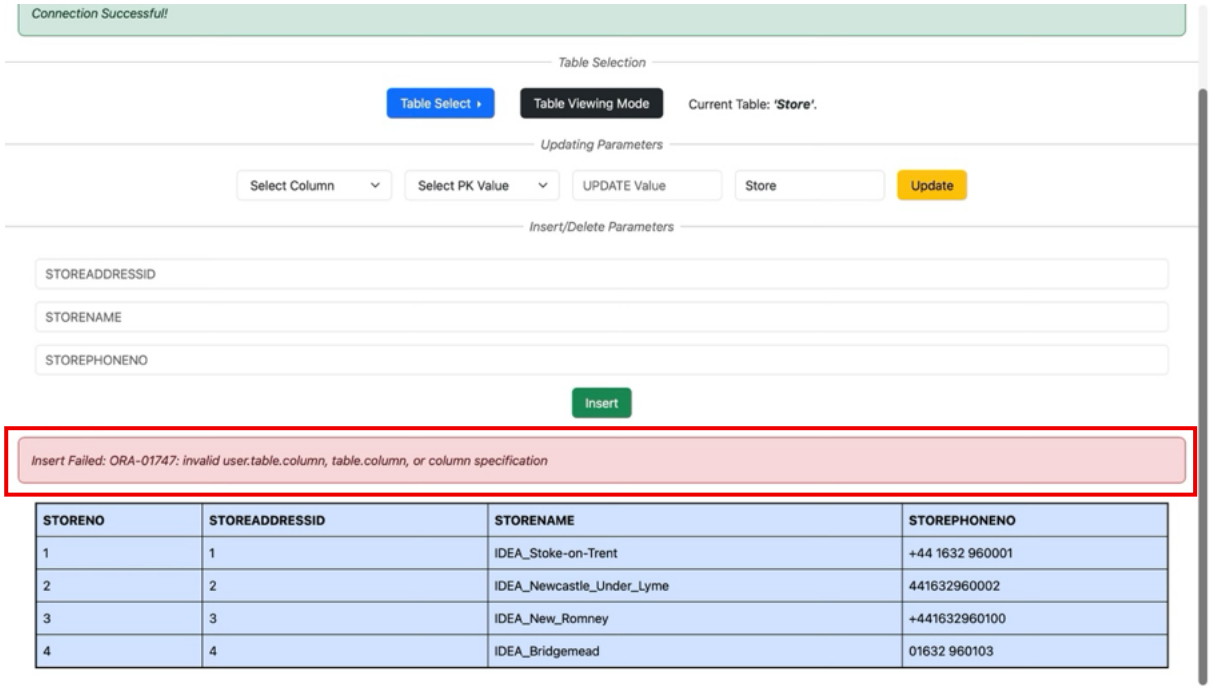


Figure 11 - Error Message Example 2.

References.

All works cited have been use in some way to improve personal knowledge and/or assist with sections in this assignment.

RANDOM.ORG(2025) Available at: https://www.random.org/sequences/?min=1&max=50&col=10&format=html&rnd=new (Accessed: December 3rd, 2025).

Regular Expression to validate UK National Insurance Number(2012) *Stack Overflow,* May 12th. Available at: https://stackoverflow.com/questions/10204378/regular-expression-to-validate-uk-national-insurance-number (Accessed: December 1st, 2025).

Connolly, T. (2015a) *Database Systems: A Practical Approach to Design, Implementation, and Management, Global Edition* Pearson Education UK, pp. 282–286.

Connolly, T. (2015b) *Database Systems: A Practical Approach to Design, Implementation, and Management, Global Edition*. 6th edn. Pearson Education UK.

GOV.UK Design System team *Phone numbers*. Available at: https://design-system.service.gov.uk/patterns/phone-numbers/#:~:text=Using%20example%20phone%20numbers,mobile:%2007700%20900000%20to%20900999 (Accessed: November 29th, 2025).

M365 and Microsoft *Chat | M365 Copilot*. Available at: https://m365.cloud.microsoft/chat/?auth=2&form=delve&origin=ProfileAboutMe&origindomain=microsoft365&redirectOrgId=2bbbf3ee-b668-4df9-b063-598945c3d466&redirectUserId=2775057c-6523-41fe-8914-76e6c2e9afd5&spocorrelationid=dd257ea1-c0b1-b000-a496-0023da114a92&from=PopupFailed (Accessed: December 2nd, 2025).

Oracle (a) *SQL Language Reference - Multilingual Regular Expression Syntax*. Available at: https://docs.oracle.com/en/database/oracle/oracle-database/19/sqlrf/Multilingual-Regular-Expression-Syntax.html (Accessed: November 26th, 2025).

Oracle (b) *SQL Language Reference - Pattern-matching Conditions*. Available at: https://docs.oracle.com/en/database/oracle/oracle-database/19/sqlrf/Pattern-matching-Conditions.html#GUID-D2124F3A-C6E4-4CCA-A40E-2FFCABFD8E19 (Accessed: November 26th, 2025).

Oracle (c) *SQL Language Reference - Perl-influenced Extensions in Oracle Regular Expressions*. Available at: https://docs.oracle.com/en/database/oracle/oracle-database/19/sqlrf/Perl-influenced-Extensions-in-Oracle-Regular-Expressions.html (Accessed: November 26th, 2025).

Ram (2023) *Checking the Input value is Number or not in oracle*. Available at: https://stackoverflow.com/questions/75317632/checking-the-input-value-is-number-or-not-in-oracle (Accessed: November 26th,2025).

w3schools (a) *Bootstrap 5 Tutorial*. Available at: https://www.w3schools.com/bootstrap5/index.php (Accessed: 10/12/2025).

w3schools (b) *HTTP Request Methods*. Available at: https://www.w3schools.com/tags/ref_httpmethods.asp (Accessed: 10/12/2025).

w3schools (c) *PHP implode() Function*. Available at: https://www.w3schools.com/php/func_string_implode.asp (Accessed: 10/12/2025).

WildWezyr (2024) *What characters are allowed in an email address?* Available at: https://stackoverflow.com/questions/2049502/what-characters-are-allowed-in-an-email-address (Accessed: November 26th, 2025).