# Introduction

Island Dreams is a travel-based company that wants a centralized database system where data can be accessed and represented in a structured, organized and standardized way. Parts of this assignment include designing a database and an evaluation of the entire system based on the company’s requirement.

# Task 1a, 1b- Normalization

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Customer and Purchase | | | | | |
| ENTITIES | UNF | 1NF | LEV | 2NF | 3NF |
| Customer  Purchases  ProductType  Product  Location | CustomerId  CustomerName  CustomerAddress  CustomerTelephone  ReturningCustomer  CustomerNotes  PurchasesId  PurchasesDate  PurchasesDuration  ProductTypeId  ProductTypeName  ProductId  ProductName  LocationId  LocationName | CustomerId  CustomerName  CustomerAddress  CustomerTelephone  ReturningCustomer  CustomerNotes  PurchasesId  PurchasesDate  PurchasesDuration  CustomerId\*  ProductTypeId  ProductTypeName  ProductId  ProductName  LocationId  LocationName | 1  1  1  1  1  1  2  2  2  2  2  2  2  2  2 | CustomerId  CustomerName  CustomerAddress  CustomerTelephone  ReturningCustomer  CustomerNotes  **Purchases**  PurchasesId  CustomerId\*  PurchasesDate  LocationId\*  ProductId\*  **ProductType**  ProductTypeId  ProductTypeName  **Product**  ProductId  ProductName  ProductTypeId\*  **Location**  LocationId  LocationName | **Customer**  CustomerId  CustomerName  CustomerAddress  CustomerTelephone  ReturningCustomer  CustomerNotes  **Purchases**  PurchasesId  CustomerId\*  PurchasesDate  LocationId\*  ProductId\*  **ProductType**  ProductTypeId  ProductTypeName  **Product**  ProductId  ProductName  ProductTypeId\*  **Location**  LocationId  LocationName |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Compatibility of Products and Outcomes | | | | | |
| ENTITIES | UNF | 1NF | LEV | 2NF | 3NF |
| ProductType  Outcomes | ProductTypeId  ProductTypeName  OutcomesId  OutcomesName | ProductTypeId  ProductTypeName  OutcomesId  OutcomesName | 1  1  2  2 | **ProductType**  ProductTypeId  ProductTypeName  **ProductTypeOutcomes**  ProductTypeOutcomesId  ProductTypeId\*  OutcomesId\*  **Outcomes**  OutcomesId  OutcomesName | **ProductType**  ProductTypeId  ProductTypeName  **ProductTypeOutcomes**  ProductTypeOutcomesId  ProductTypeId\*  OutcomesId\*  **Outcomes**  OutcomesId  OutcomesName |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A Complaint Record | | | | | |
| ENTITIES | UNF | 1NF | LEV | 2NF | 3NF |
| Complaints  Purchases  Staff  ProductTypeOutcomes | ComplaintsId  ComplaintsDate  ComplaintsDetails  PurchasesId  PurchasesDate  StaffId  StaffName  ProductTypeOutcomesId | ComplaintsId  ComplaintsDate  ComplaintsDetails  StaffId\*  PurchasesId  PurchasesDate  ProductTypeOutcomesId  StaffId  StaffName | 1  1  1  1  1  1  2  2 | ComplaintsId  ComplaintsDate  ComplaintsDetails  StaffId\*  PurchasesId  PurchasesDate  ProductTypeOutcomesId  ComplaintsStaff  ComplaintsStaffId  StaffId  ComplaintsId  Staff  StaffId  StaffName | Complaints  ComplaintsId  ComplaintsDate  ComplaintsDetails  PurchasesId\*  PurchasesDate  ProductTypeOutcomesId\*  Purchases  PurchasesId  PurchasesDate  ProductTypeOutcomes  ProductTypeOutcomesId  ComplaintsStaff  ComplaintsStaffId  StaffId\*  ComplaintsId\*  Staff  StaffId  StaffName |

# Diagram of Entity Relationship Model

Product

ct

1...\*

1

1

0...\*

Customer

ComplaintsLocation

ation

Complaints

Product

t

omer

1

0...\*

1

0...\*

0...\*

1...\*

Location

Complaints

n

ation

Outcomes

ProductTypeOutcomes

ProductType

Purchases

Product

ses

Complaints

ComplaintsStaff

1

1

1...\*

Staff

1

0...\*

1

1

1...\*

# Task 1c- Data Dictionary

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Customer Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| CustomerId | Varchar | 10 | Yes |  |  |
| CustomerName | Varchar | 100 |  |  |  |
| CustomerAddress | Varchar | 200 |  |  |  |
| CustomerTelephone | Varchar | 20 |  |  |  |
| ReturningCustomer | Char | 3 |  |  |  |
| CustomerNotes | Varchar | 100 |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ProductType Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| ProductTypeId | Varchar | 10 | Yes |  |  |
| ProductTypeName | Varchar | 100 |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| LocationId | Varchar | 50 | Yes |  |  |
| LocationName | Varchar | 100 |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Staff Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| StaffId | Varchar | 5 | Yes |  |  |
| StaffName | Varchar | 100 |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outcomes Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| OutcomesId | Varchar | 10 | Yes |  |  |
| OutcomesName | Varchar | 100 |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Product Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| ProductId | Varchar | 50 | Yes |  |  |
| ProductName | Varchar | 100 |  |  |  |
| ProductTypeId | Varchar | 10 |  | Yes | ProductType |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ProductTypeOutcomes Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| ProductTypeOutcomesId | Varchar | 50 | Yes |  |  |
| OutcomesId | Varchar | 10 |  | Yes | Outcomes |
| ProductTypeId | Varchar | 10 |  | Yes | ProductType |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Purchases Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| PurchasesId | Varchar | 10 | Yes |  |  |
| PurchasesDate | Date |  |  |  |  |
| PurchasesDuration | Varchar | 100 |  |  |  |
| CustomerId | Varchar | 10 |  | Yes | Customer |
| ProductId | Varchar | 50 |  | Yes | Product |
| LocationId | Varchar | 50 |  | Yes | Location |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Complaints Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| ComplaintsId | Varchar | 10 | Yes |  |  |
| ComplaintsDate | Date |  |  |  |  |
| ComplaintsDetails | Varchar | 100 |  |  |  |
| PurchasesId | Varchar | 10 |  | Yes | Purchases |
| ProductTypeOutcomesId | Varchar | 50 |  | Yes | ProductTypeOutcomes |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ComplaintsStaff Table | | | | | |
| Attributes | **Data Type** | **Length** | **Primary Key** | **Foreign Key** | **Reference Table** |
| ComplaintsStaffId | Varchar | 10 | Yes |  |  |
| StaffId | Varchar | 5 |  | Yes | Staff |
| ComplaintsId | Varchar | 10 |  | Yes | Complaints |

# Task 2a

## ProductType Table Screenshots

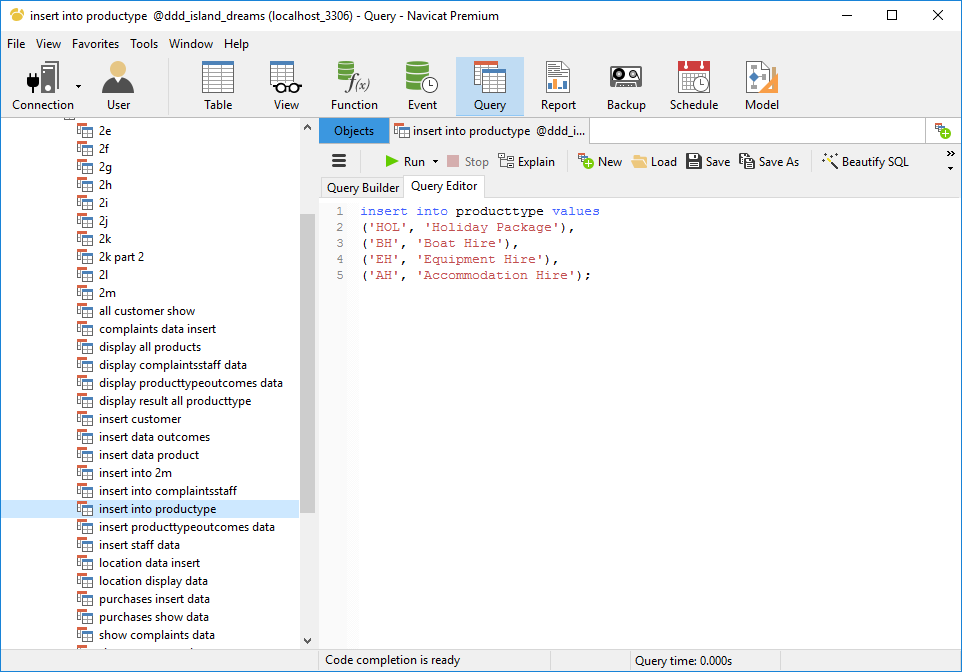


Figure 1: product type data insert

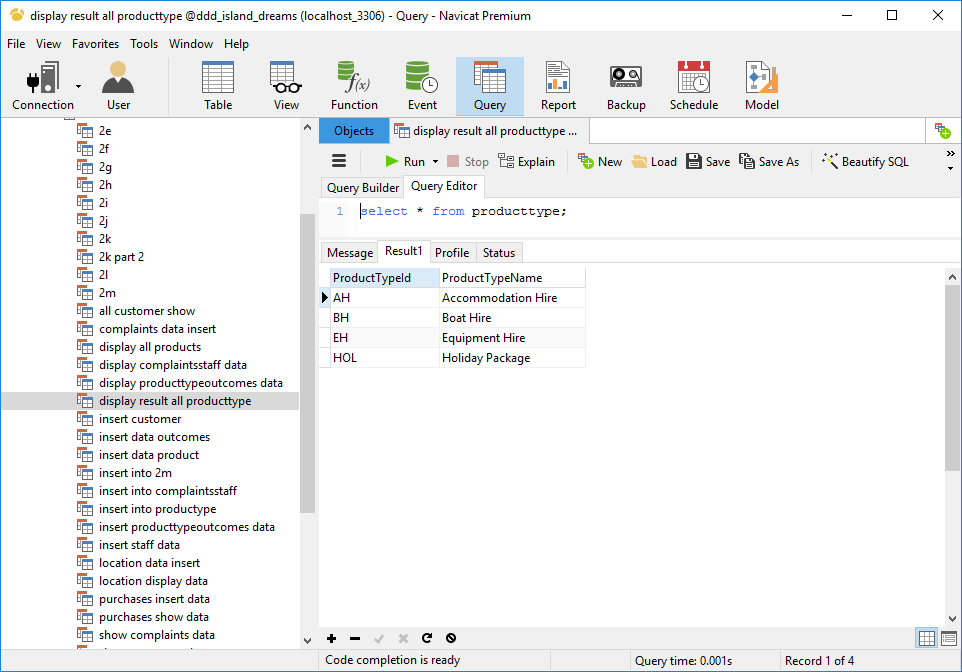


Figure 2: display data of product type

## Product Table Screenshots

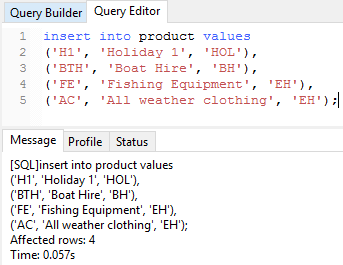


Figure 3: Sample product data insert

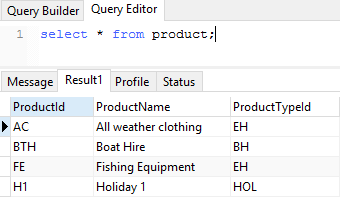


Figure 4: Sample product data display

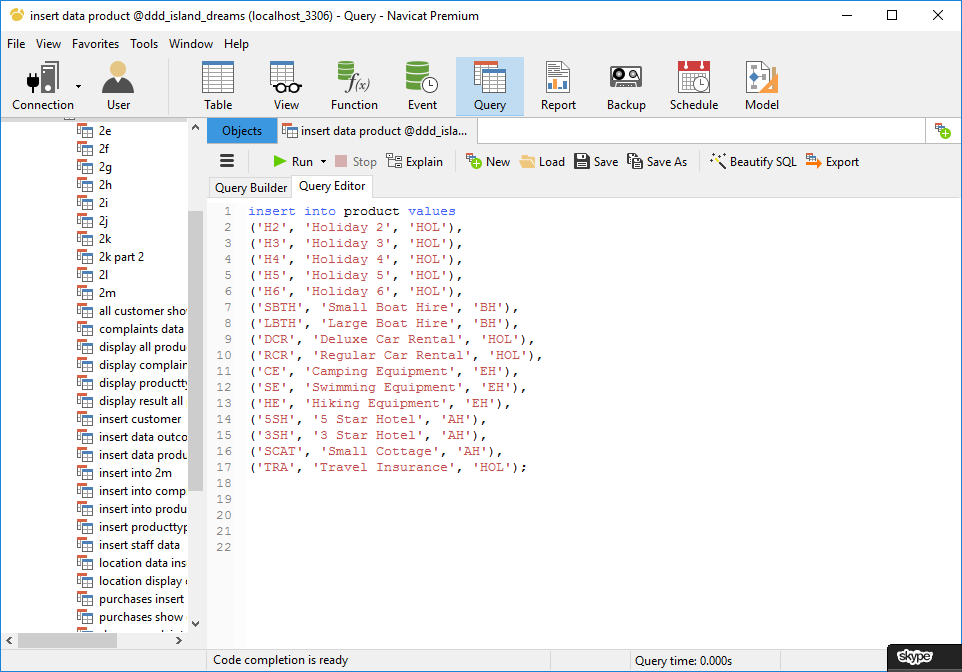


Figure 5: Additional product data insert

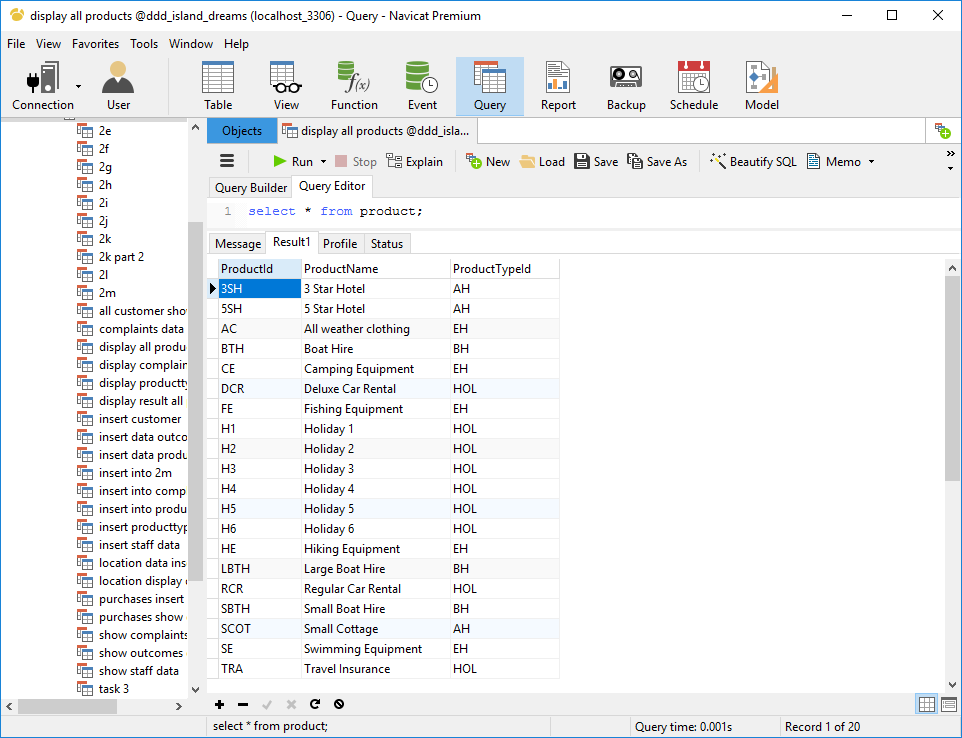


Figure 6: Product data display

# Task 2b

## Customer Table Screenshots

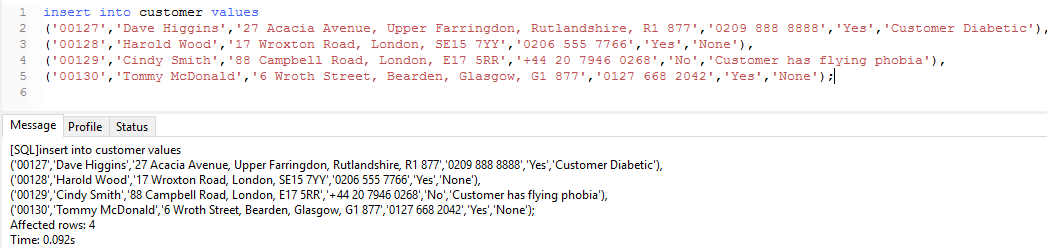


Figure 7: Customer sample data insert

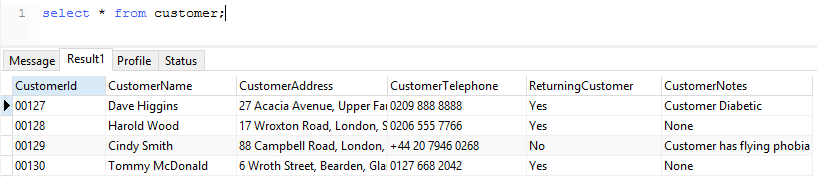


Figure 8: Data display of sample customer

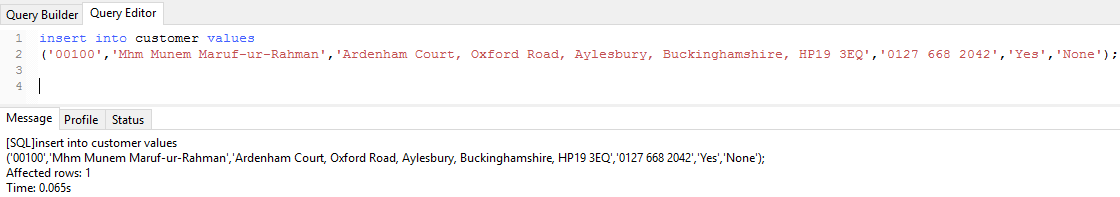


Figure 9: Myself as customer data insert

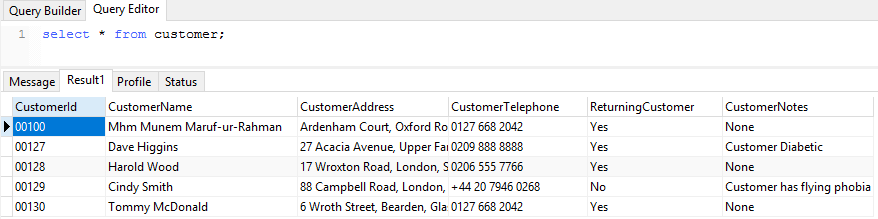


Figure 10: Display data of myself as customer

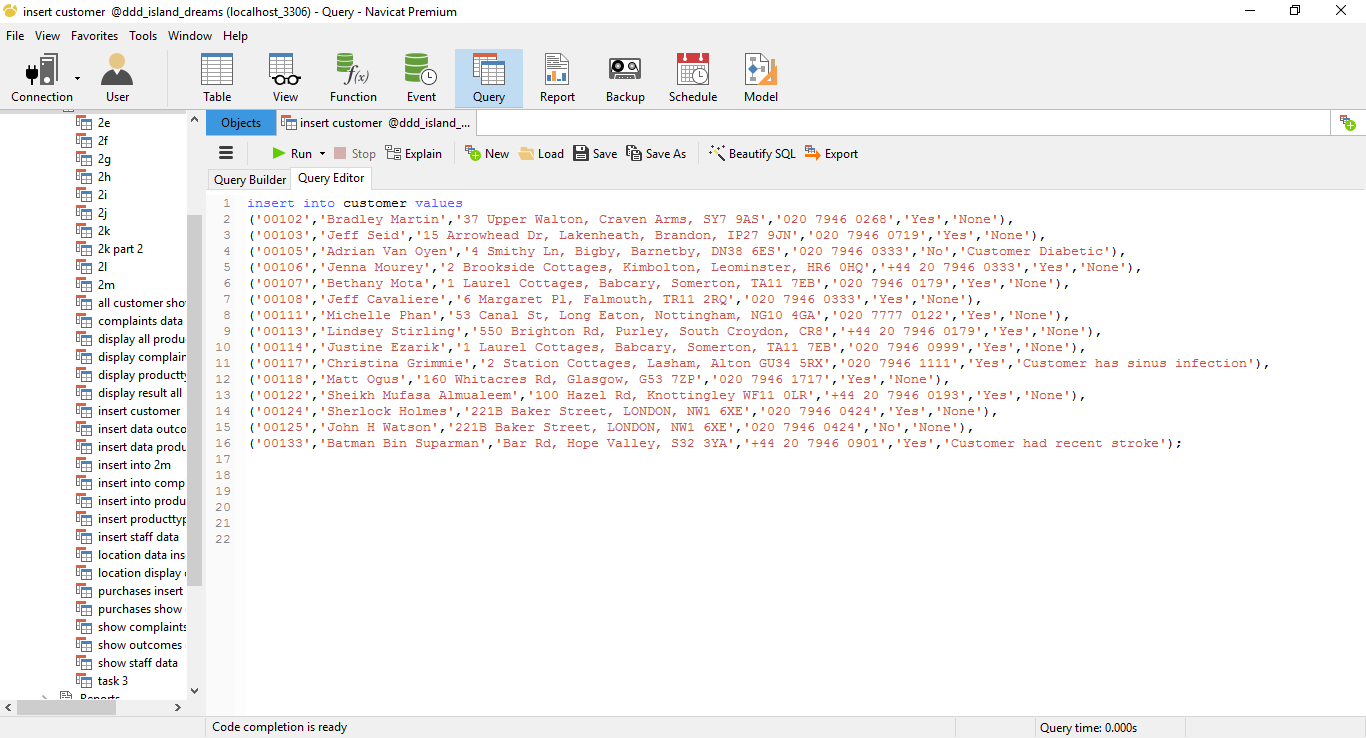


Figure 11: Additional customer data insert

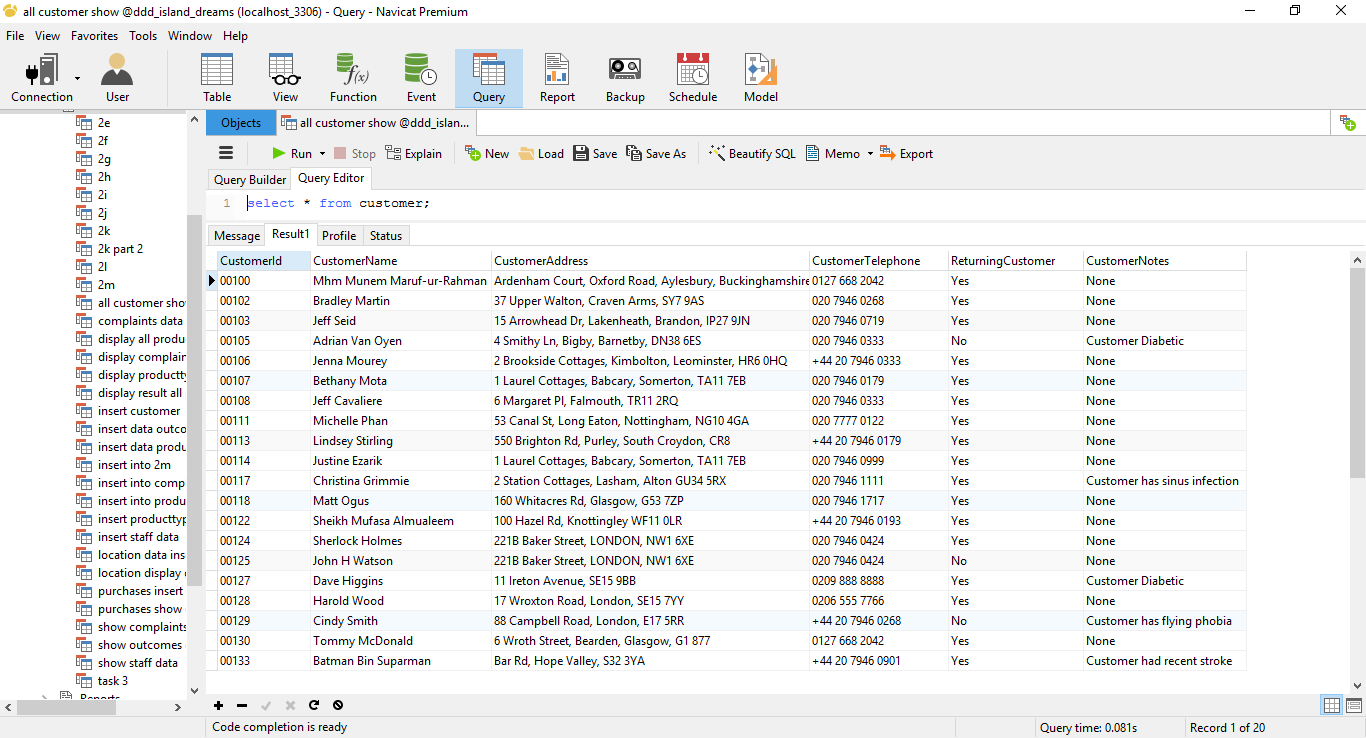


Figure 12: Display data of all 20 customers

# Task 2c

## Location Table Screenshots

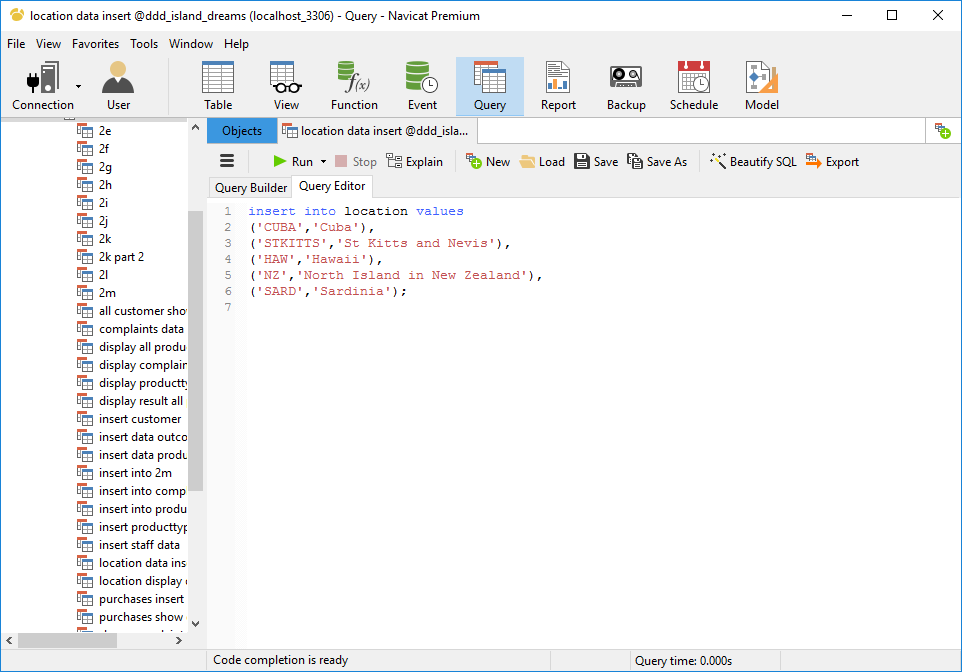


Figure 13: location data insert

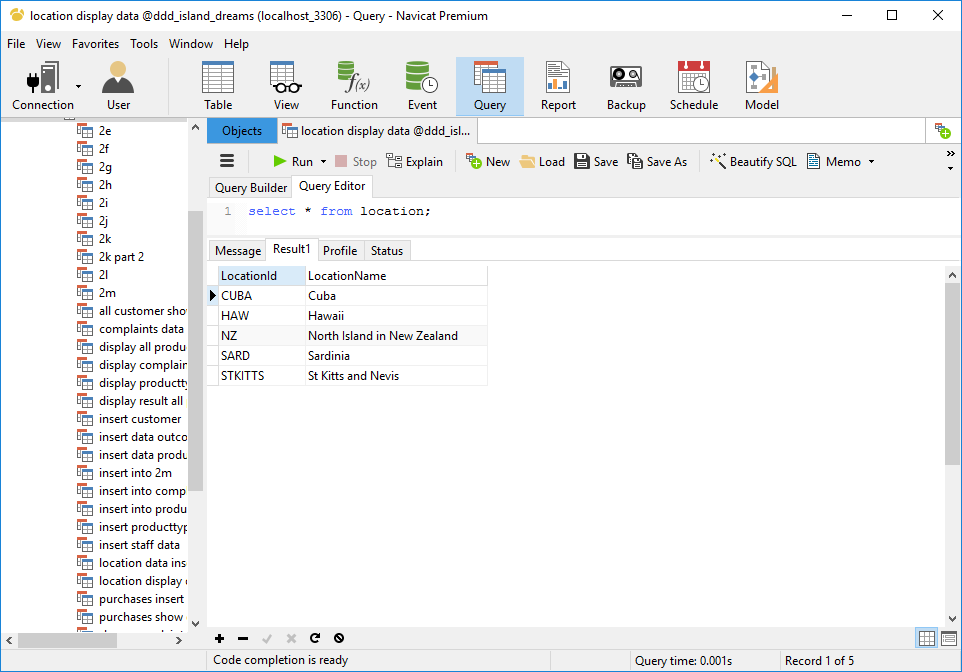


Figure 14: display location data

## Purchases Table Screenshots

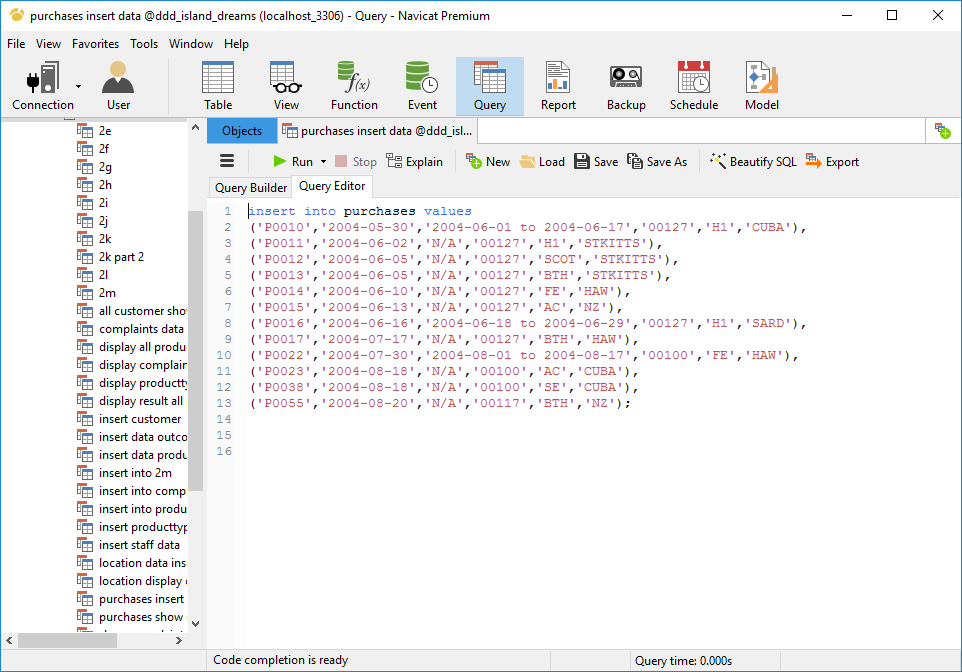


Figure 15: purchases table data insert

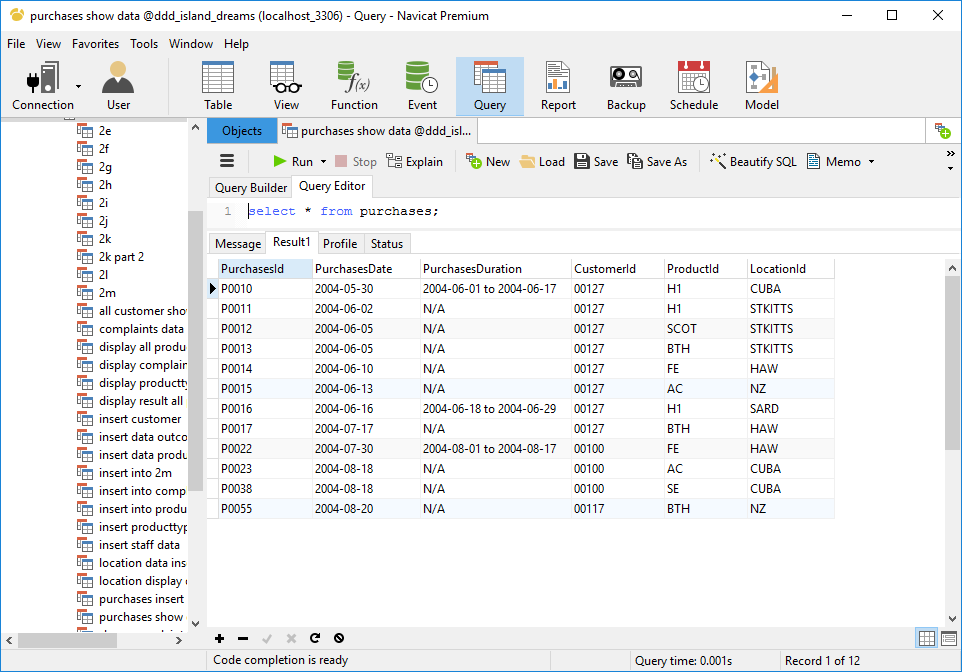


Figure 16: purchases table data display

## Outcomes Table Screenshots

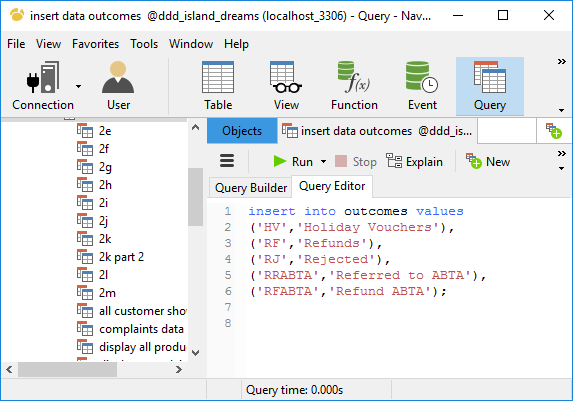


Figure 17: outcomes data insert

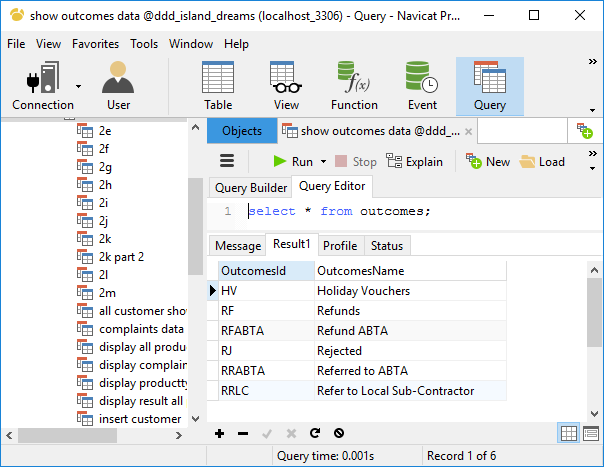


Figure 18: outcomes data display

## ProductTypeOutcomes Table Screenshots

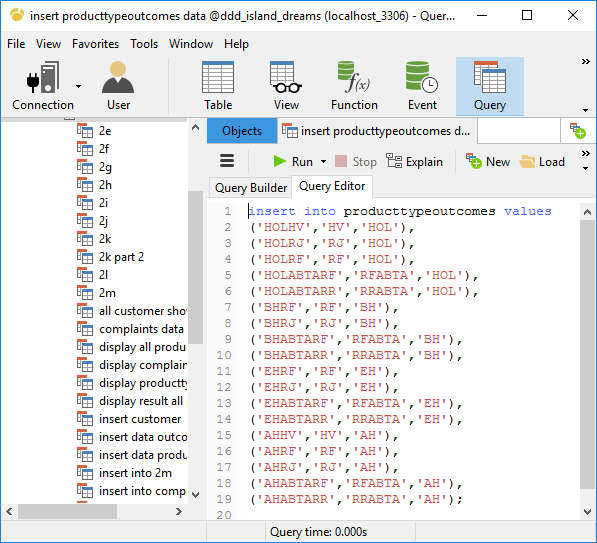


Figure 19: producttypeoutcomes data insert

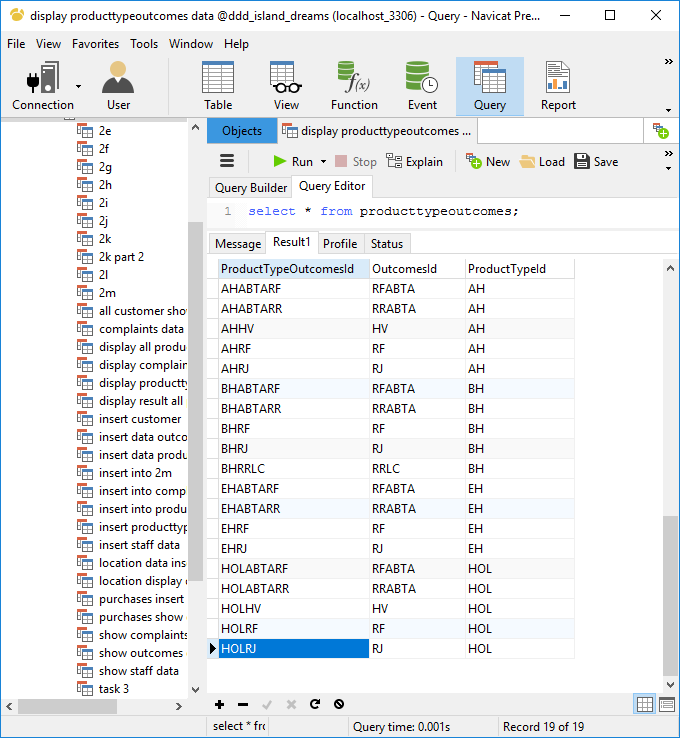


Figure 20: producttypeoutcomes data display

## Complaints Table Screenshots

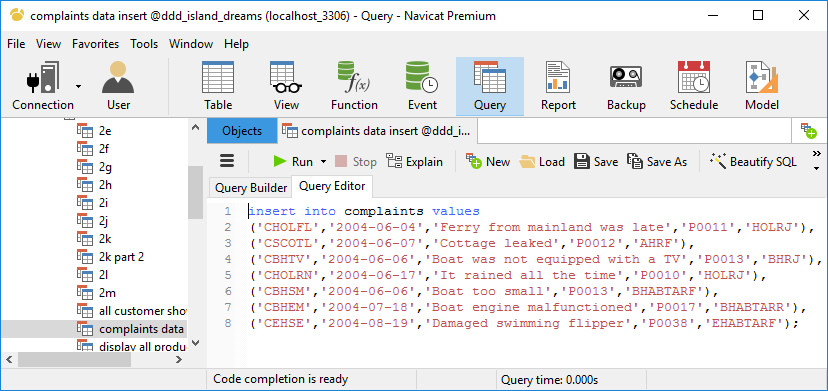


Figure 21: complaints data insert

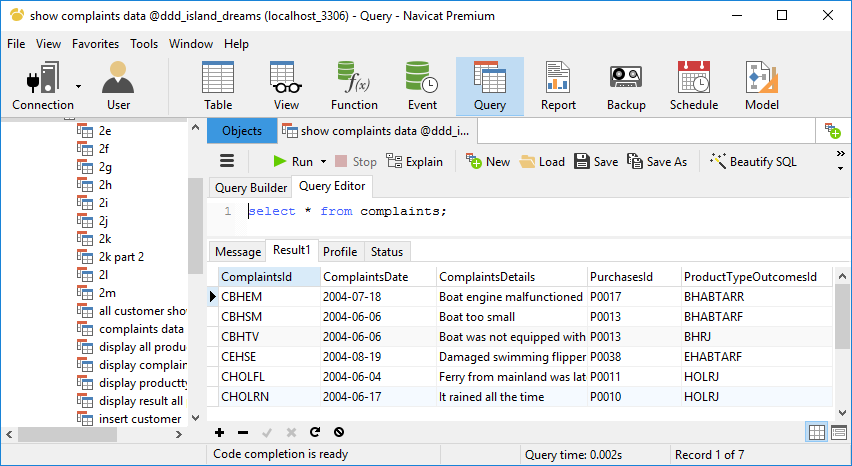


Figure 22: display complaints data

## Staff Table Screenshots

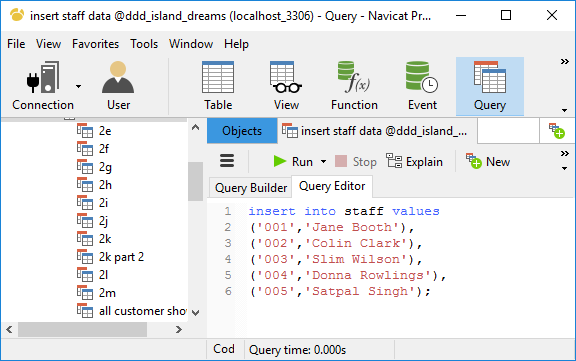


Figure 23: insert staff data

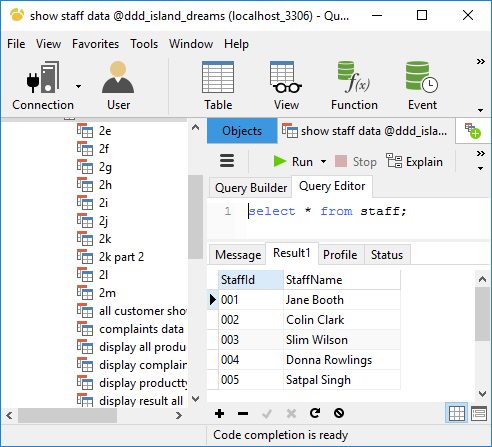


Figure 24: display staff data

## ComplaintsStaff Table Screenshots

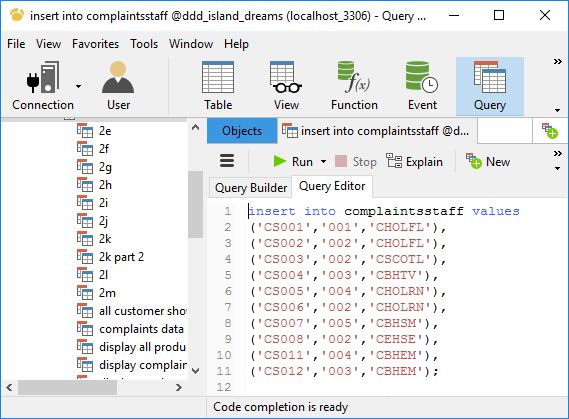


Figure 25: insert complaintsStaff data

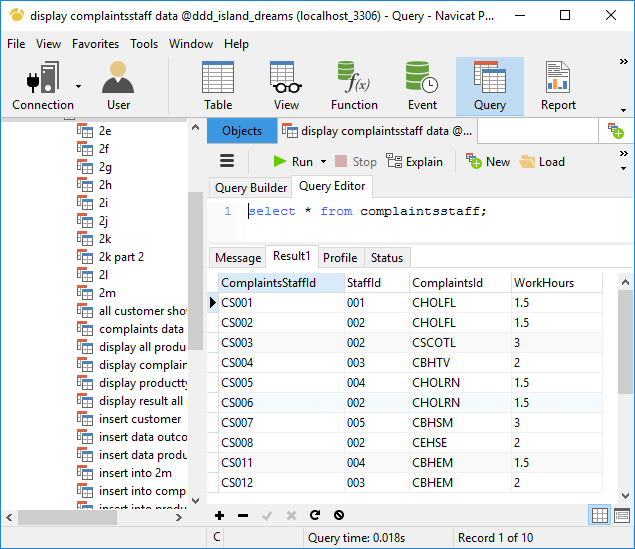


Figure 26: display complaintsStaff data

# Task 2d

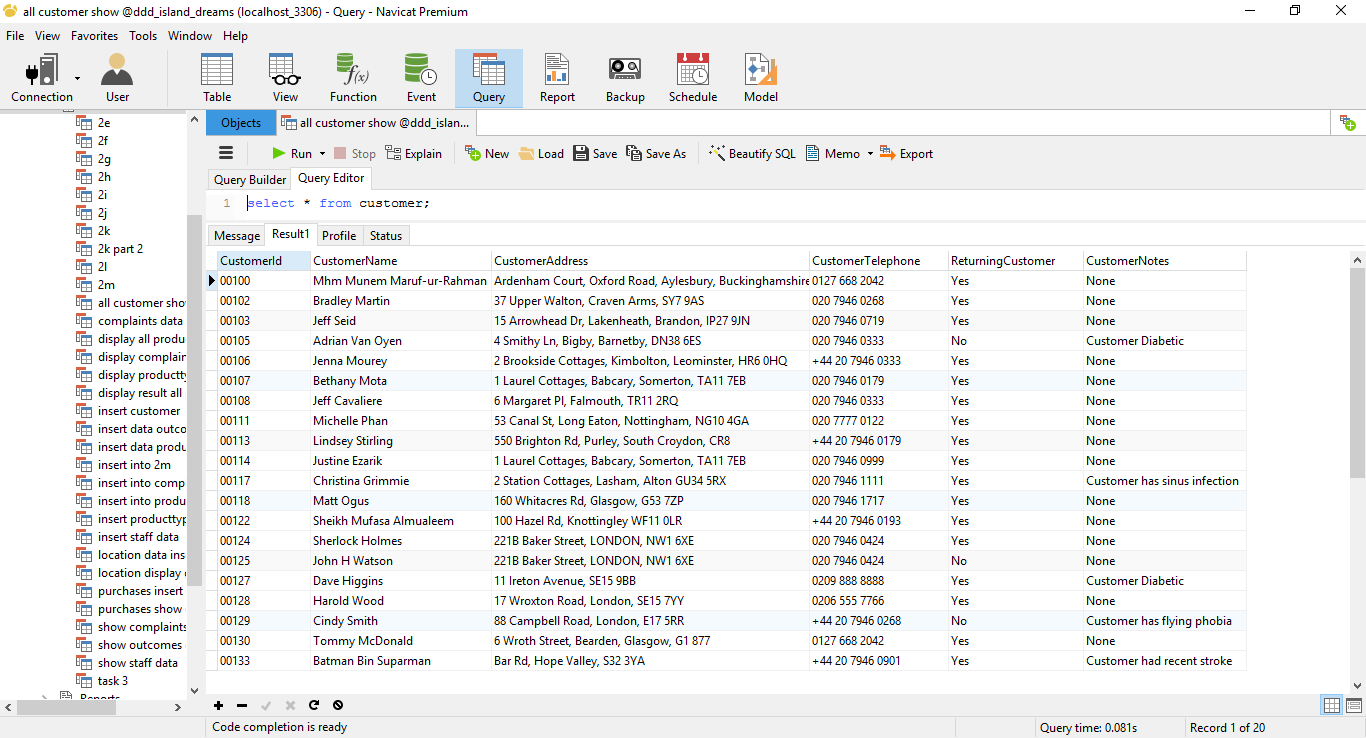


Figure 27: All customers selected

# Task 2e

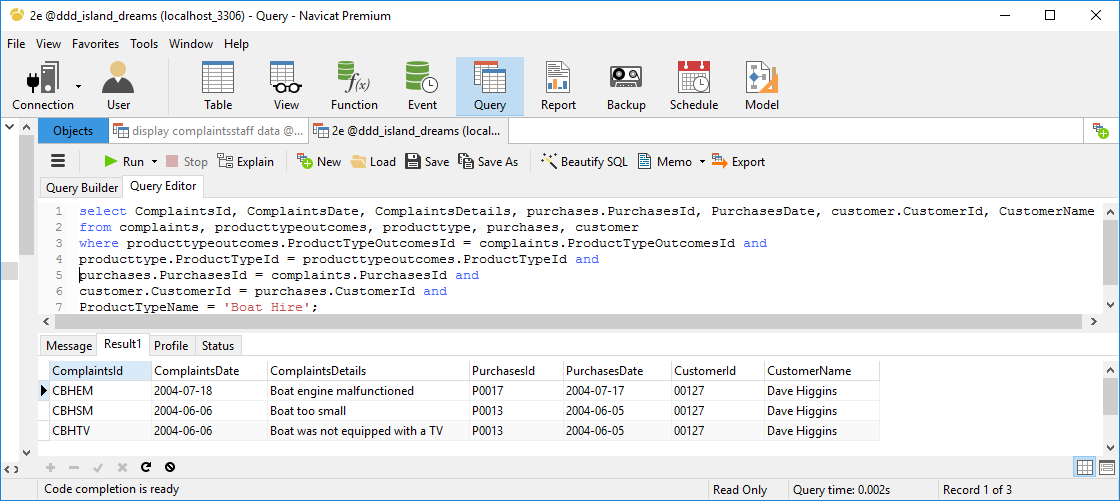


Figure 28: all complaints related to boat hires

# Task 2f

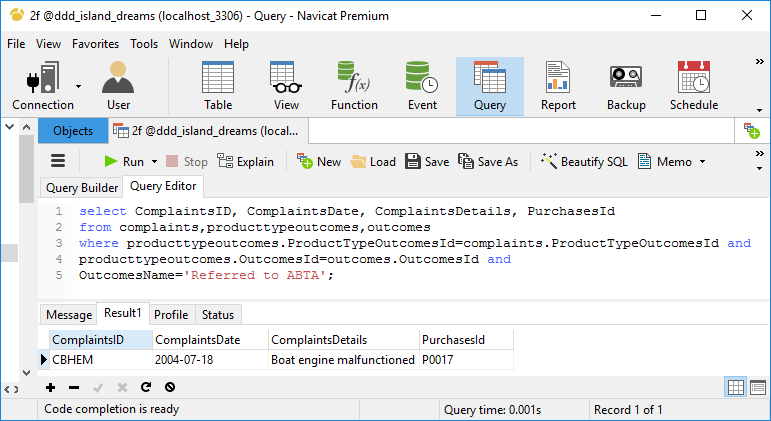


Figure 29: all complaints referred to ABTA

# Task 2g

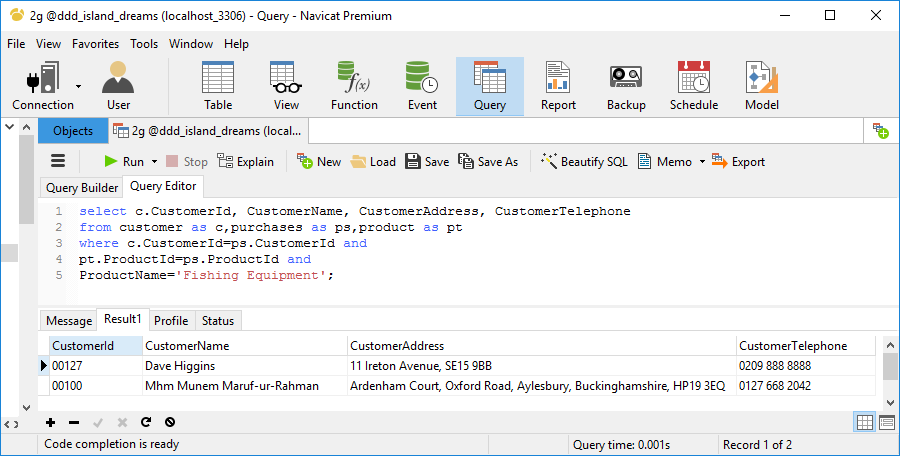


Figure 30: all customers who hired fishing gear

# Task 2h

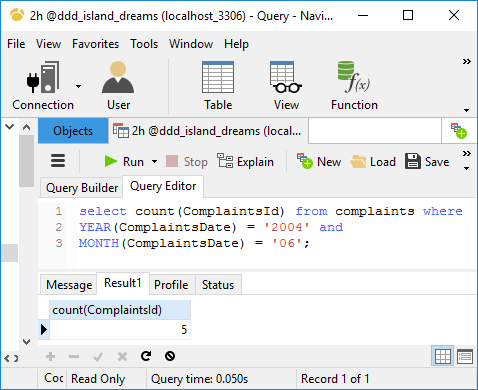


Figure 31: number of complaints in a given month

# Task 2i

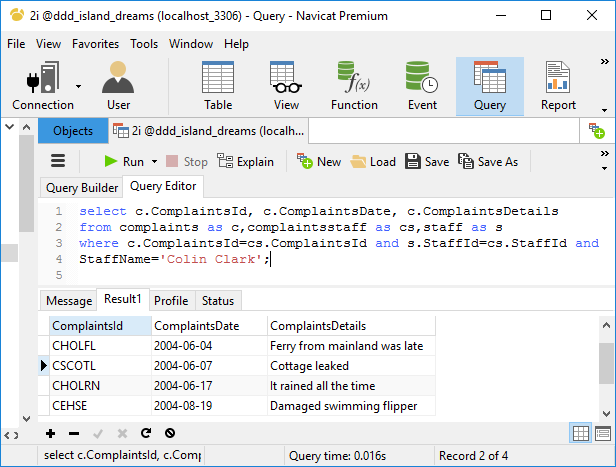


Figure 32: all complaints dealt by Colin Clark

# Task 2j

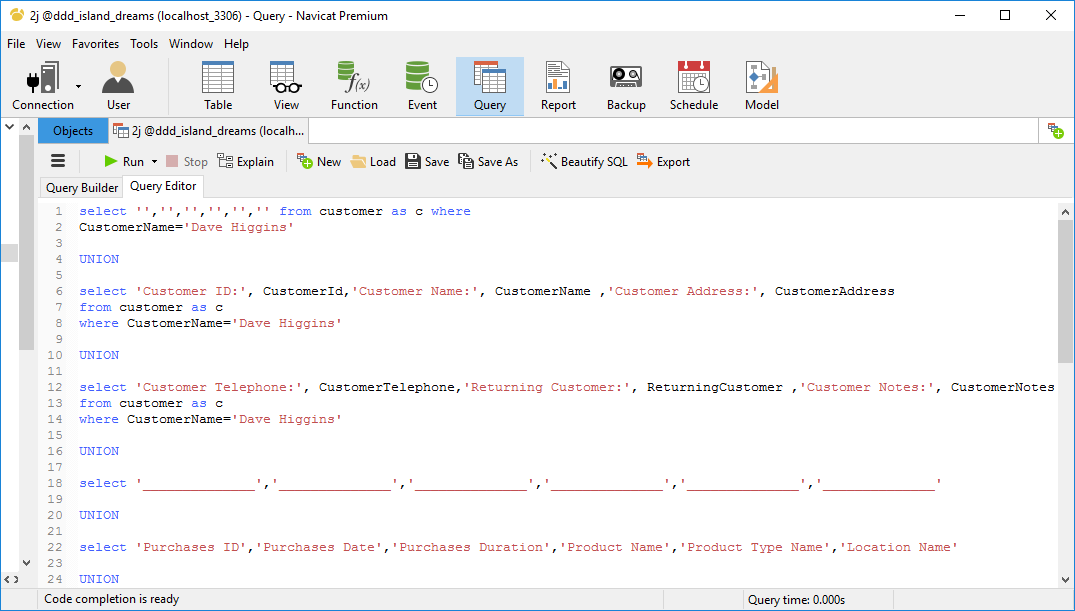


Figure 33: customer, purchase and related complaints

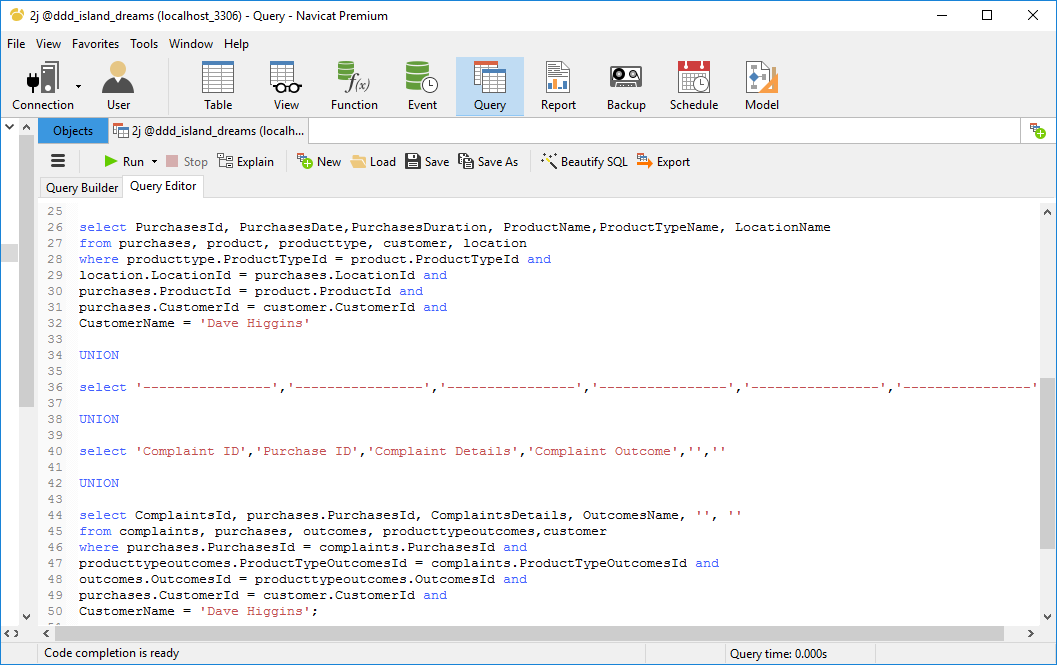


Figure 34: customer, purchase and related complaints continued

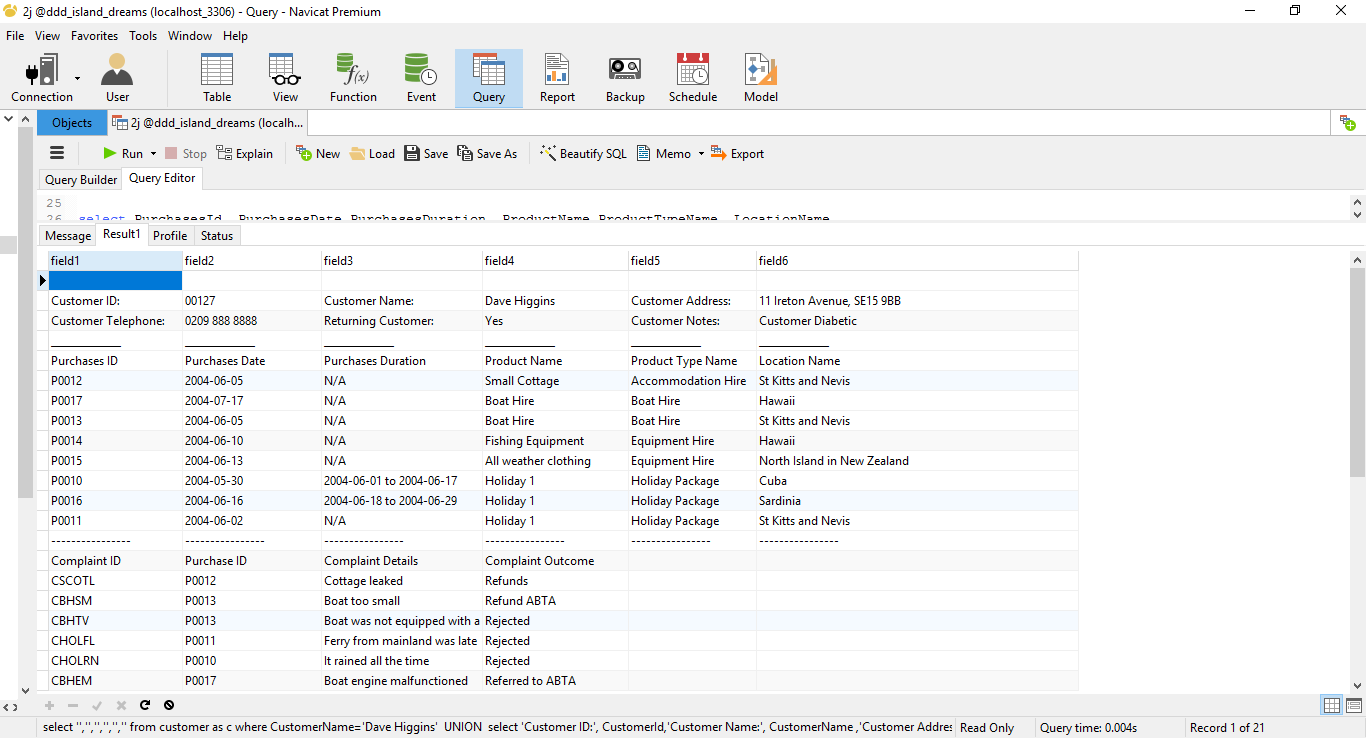


Figure 35: customer, purchase and related complaints output

# Task 2k

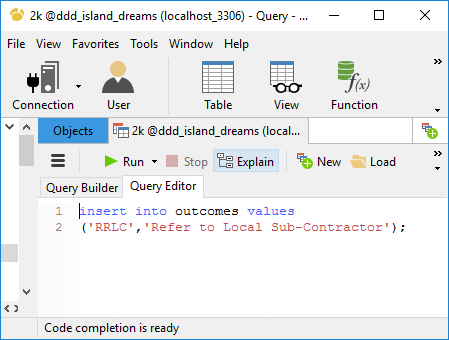


Figure 36: boat hire outcome update

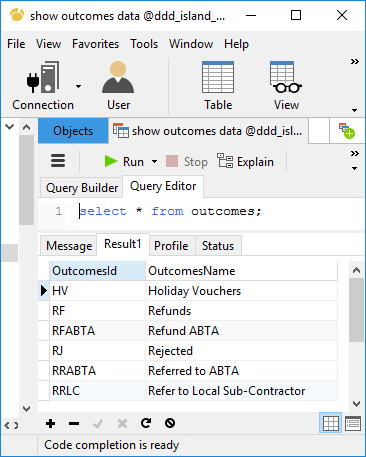


Figure 37: boat hire outcome updated display

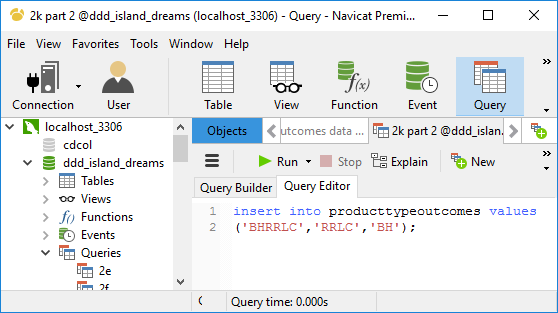


Figure 38: boat hire outcome update in product type outcomes

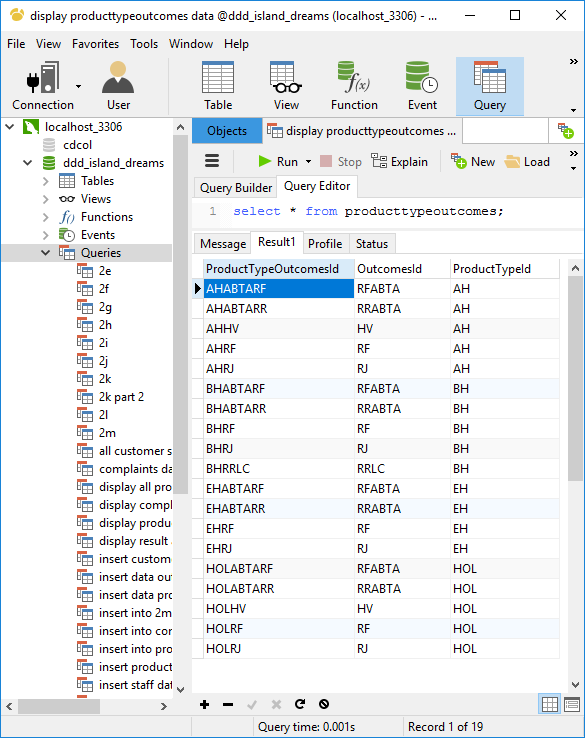


Figure 39: boat hire outcome updated

# Task 2l



Figure 40: previous address of Dave Higgins

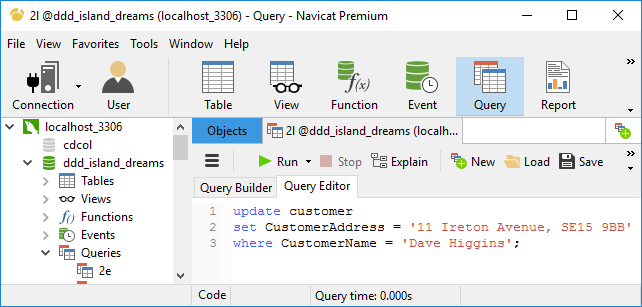


Figure 41: Customer Address update

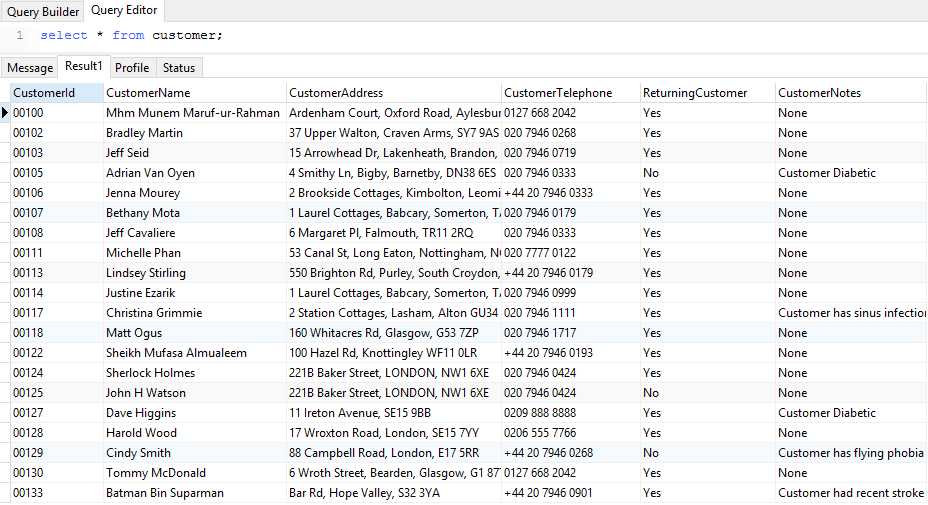


Figure 42: Customer (Dave Higgins) address updated

# Task 2m

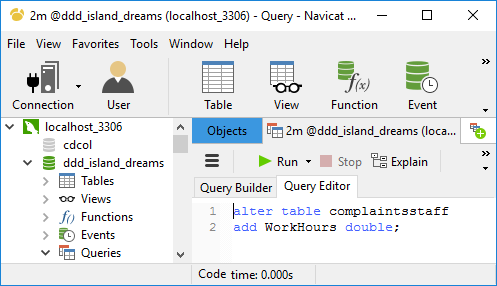


Figure 43: include column for working hours

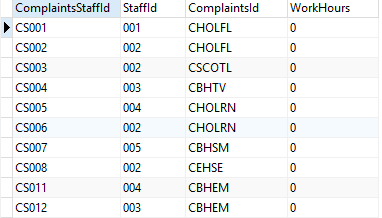


Figure 44: WorkHours column added



Figure 45: work hours data entry

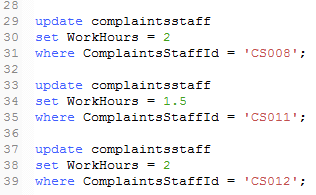


Figure 46: work hours data entry continued

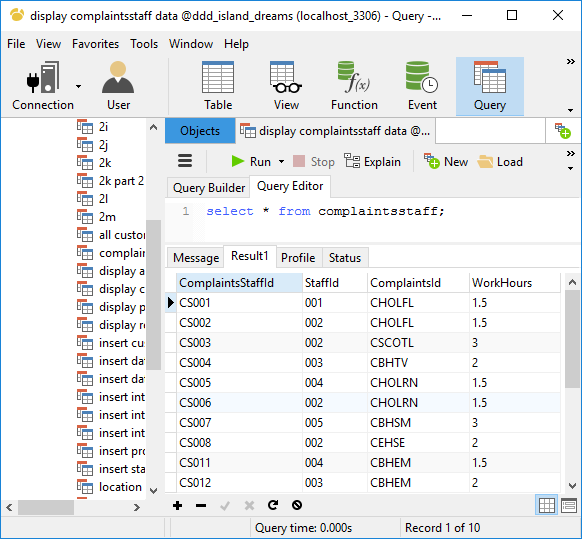


Figure 47: working hour’s data display

# Task 3

# 

Figure 48: staff wages information

|  |  |  |
| --- | --- | --- |
|  | | Reason for use |
| Functions | **COUNT** | To count the number of complaints that were handled by each staff. |
| **BETWEEN** | A range of dates were used with this function to find out the number of complaints made in a given month. |
| **GROUP BY** | This function was used on the COUNT function to find out how many complaints were handled by each staff. |
| Calculation | **COUNT \* Pay per complaint + Standard Monthly fee** | To find out the total monthly salary of each staff, number of complaints handled that were previously found by using COUNT function was multiplied with per complaint rate (given) and added to the standard monthly salary (given). |

# Task 4

|  |  |  |
| --- | --- | --- |
| Original Requirement | Initial Requirement | Overall Assessment |
| Island Dreams wanted all data to be stored centrally. | To store all data in one place I have designed a central database. | I was able to meet the requirement using link entity. |
| Island Dreams wanted to avoid duplicity of data. | I have done normalization to break many-to-many relationships in order to avoid data redundancy. | I have performed up to 3rd normalization to successfully remove data redundancy. |
| Island Dreams wanted to have all data organized. | I have designed a normalized entity relationship model so that they get central accessibility to all the data. | I was able to meet this requirement successfully by performing normalization followed by designing an entity relationship model ([referred to diagram of entity relationship model](#_Diagram_of_Entity)). |
| Island Dreams wanted a standardized storage and representation of data where both searching of data and display of search result follows one specific way and not in a random way (for e.g. according to scenario, purchases are searched using product code, complaints searched using customer number). | I have used Primary key and Foreign key to store data in a standardized way. I have used Primary key to uniquely identify data and used Foreign key so data can be shared and accessed. | I was able to meet the requirement by adding attributes to use them as Primary key and Foreign key ([referred to Outcomes table](#_Task_1c-_Data)). |
| Island Dreams wanted a structured representation of data. | I have designed data dictionary based on the relational model for the structured representation of data. | I have added additional attributes for each table, as needed. |
| Island Dreams wanted to generate reports. | I have performed various queries to generate reports as required. | All queries were performed successfully to generate reports. |
| Island Dreams wanted to generate staff salary report. | I have implemented the concept of derived data so that the database performs the required calculation to represent data for the user ([referred to task 3](#_Task_3)). | Calculation worked as needed and report was generated successfully. |

# Conclusion

In conclusion, the assignment allowed me to learn how to design a more reliable database and perform advanced queries to generate reports and more specifically learn about derived data.