

‘SUMMER 2023 REASSESSMENT - Coursework (CWK)’

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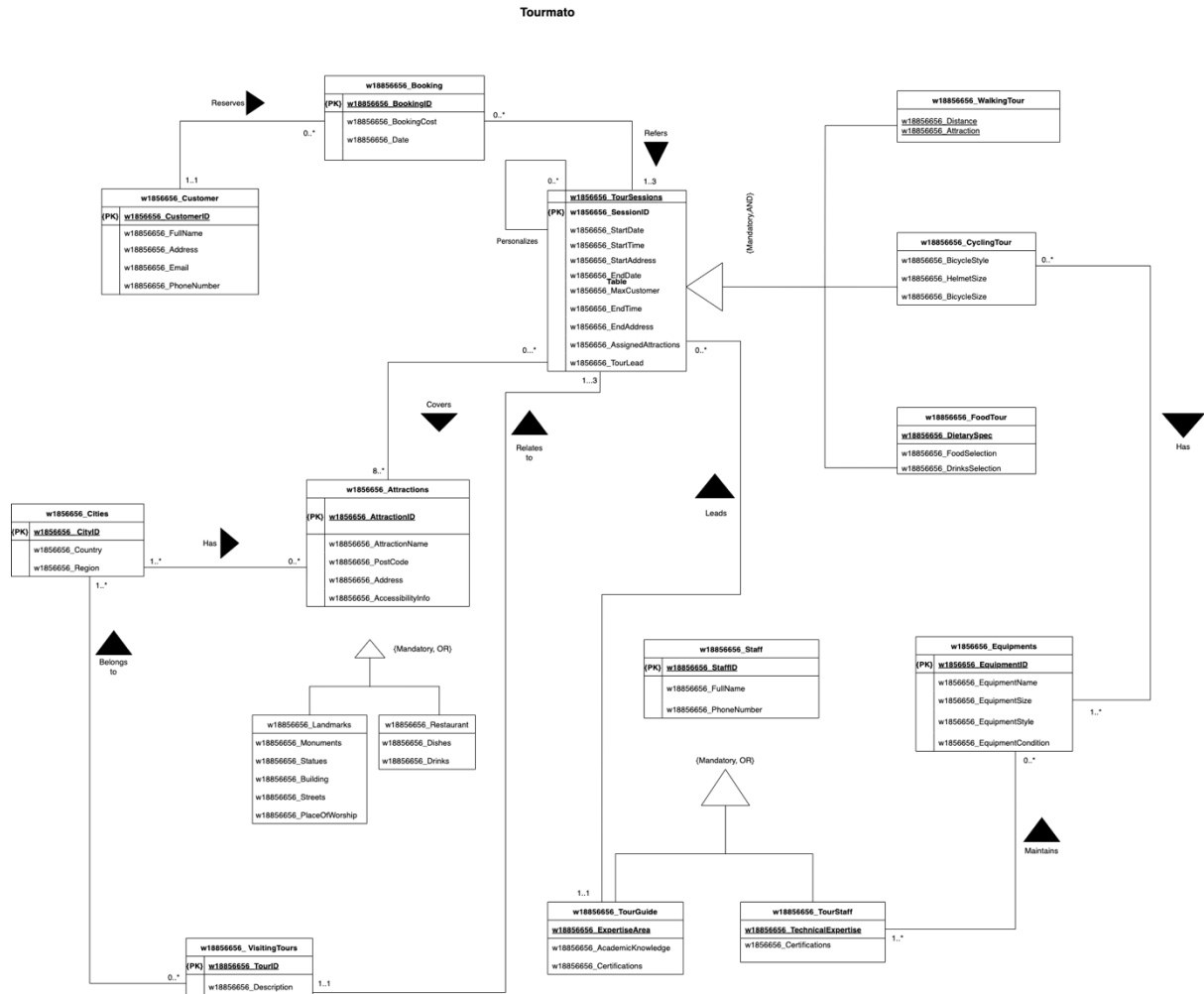
PART A + PART B

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Part A

Conceptual EERD



Question 2

Entity Name	Description
Customer	This entity contains a unique reference number about customers such as Customer ID. The rest are attributes such as Full Name, address, phone number, and email. The company needs all these information to identify the customers.
Booking	This entity contains a unique reference number about bookings such as Booking ID. The rest are details about the booking cost and date. Tourmato allows customers to book sessions, and they are related to different tour sessions.
TourSession	This entity contains a unique reference number about Sessions such as Session ID. There are attributes about Tour Sessions such as date, time, and address. We need this entity to keep a record of the tours offered by the company.
WalkingTour	This sub entity is a specialisation from Tour sessions containing attribute about walking distance and attractions.
CyclingTour	This sub entity is a specialisation from Tour sessions containing attributes about cycling tours equipment such as style and size.
FoodTour	This sub entity is a specialisation from Tour sessions containing attributes about the food tour such as food and drinks.
Attractions	This entity contains a unique reference number about Attractions such as Attraction ID. There are some attributes such as: Name, postcode, address, accessibility Info. We need this entity to identify every attraction.
Landmarks	This sub entity is a specialisation from Attraction, containing the type of landmarks.
Restaurant	This sub entity is a specialisation from Attraction, containing the type of food offered by a restaurant.
Cities	This entity contains a unique reference number about Cities such as City ID. We need this entity to identify the location where the company provides its services.
VisitingTour	This entity contains a unique reference number such as Tour ID. The main attribute is Description, and this is related to the sessions.
Staff	This entity contains a unique reference number such as Staff ID. The attributes are full name and phone number. We need this entity to identify the company's employee.
TourGuide	This sub entity is a specialisation from Staff containing attributes about Tour guides and certifications.
TourStaff	This sub entity is a specialisation from Staff containing attributes about Tour Staff and expertise
Equipments	This entity contains a unique reference number about Equipment such as Equipment ID. The attributes are name, size, condition, and style. We need this entity to keep a record of all the equipment provided by the company during the tours and their status.

General Entity	Specialised Entity	Explanation
Tour Sessions	WalkingTour, Cycling Tour, Food Tour	Tour sessions broken down into sub entities describing the different type of tours provided in a session. They can be combined.
Staff	TourGuide, TourStaff	Staff broken down into sub entities describing the different type of staff working in the company and their role. They can't be both at the same time.
Attraction List	Landmarks, Restaurant	Attraction list broken down into sub entities describing the different type of attractions in a specific city and the and restaurants.

Question 3

Entity Name	Multiplicity	Relationship	Multiplicity	Entity	Brief justifications for the multiplicity (4 statements for each relationship)
Customer	1..1	Reserves	0.. *	Bookings	<ul style="list-style-type: none"> • Customers can reserve no bookings because they are new customers. • Customers can reserve as many bookings as they want. • A booking to exist needs must be reserved at least by 1 customer. • A booking cannot be reserved by more than 1 customer.
Booking	0.. *	Refers to	1..3	TourSession	<ul style="list-style-type: none"> - A booking refers to at least 1 tour session. - A booking can refer to a maximum of 3 tour sessions. - A tour session can refer to no bookings. - A tour session can refer to many bookings.
Tour Session	0.. *	Covers	8.. *	Attraction	<ul style="list-style-type: none"> - A tour session must cover a minimum of 8 attractions. - A tour session can cover more than 8 attractions. - An attraction can be covered by no tour session. - An attraction can be covered by 1 or more tour sessions.
Visiting Tour	1..1	Relates To	1..3	TourSession	<ul style="list-style-type: none"> - A visiting tour must relate to 1 tour session. - A visiting tour cannot relate to more than 1 tour session. - A tour session must relate to at least 1 visiting tour. - A tour session can be related to 1 or more visiting tour.
Visiting Tour	0.. *	Belongs to	1.. *	Cities	<ul style="list-style-type: none"> - A visiting tour belongs to at least 1 city. - A visiting tour can belong to multiple cities. - A city can have 0 visiting tour. - A city can have many visiting tours.

Cities	1..1	Has	1.. *	Attraction	<ul style="list-style-type: none"> - A city has no attractions. - A city can have many attractions. - An attraction must have 1 city. - An attraction can have many cities.
Tour Guide	1..1	leads	0.. *	Tour Session	<ul style="list-style-type: none"> - A tour guide leads 0 tour session. - A tour guide leads many tour sessions. - A tour session is led by at least 1 tour guide. - A tour session cannot be led by more than 1 tour guide.
Tour Staff	1.. *	maintains	0.. *	Equipment	<ul style="list-style-type: none"> - A tour staff can maintain 0 equipment. - A tour staff can maintain much equipment. - An equipment needs to be maintained by at least 1 tour staff. - An equipment can be maintained by many tour staff.
Cycling tour	0.. *	has	1.. *	Equipment	<ul style="list-style-type: none"> - A cycling tour has at least 1 equipment. - A cycling tour can have more than 1 equipment. - An equipment has no cycling tour. - An equipment can have many cycling tours.

Question 4

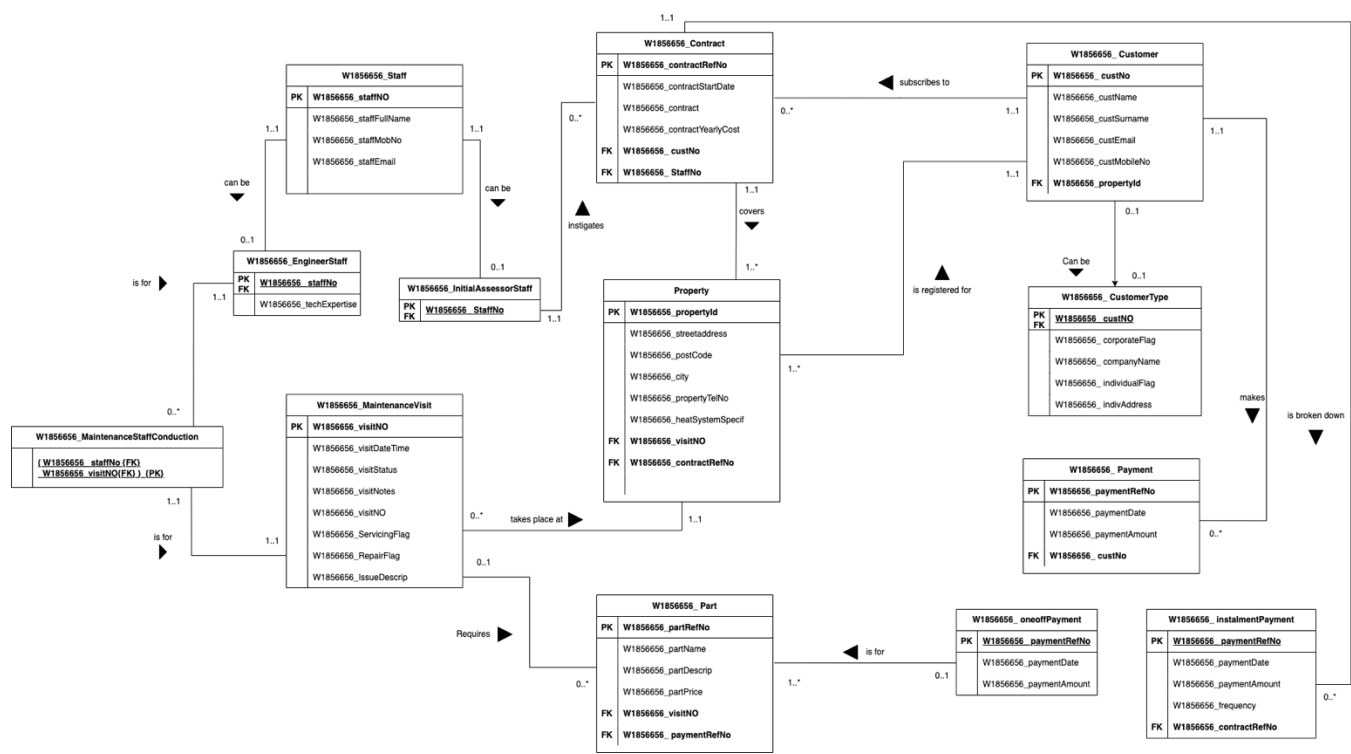
Entity Name	Attributes for this entity (Include PK)	Brief explanation
Customer	CustomerID (PK) Attributes: FullName, Address, Email, PhoneNumber	This entity contains all the useful information about the customers. The Primary key is used to associate uniquely each customer.
Booking	BookingID(PK) Attributes: BookingCost,Date	This entity contains all the useful information about the bookings. The Primary key is used to identify each booking. The attributes are the booking cost and the date of the booking.
TourSession (There is a specialisation, the sub-entities are WalkingTour, CyclingTour and Foodtour.) {This entity has a recursive relationship as it can be modified each time and become a completely new session.}	SessionID (PK) Attributes: StartDate, StartTime, StartAddress, EndDate, EndTime, EndAddress, MaxCustomer, Tour Lead, and assigned attraction.	This entity contains all the useful information about the tour session. The Primary key is used to identify each session. The attributes contain information about the time, date and location relative to the tour. There are a limited capacity so we have a max customer attribute , the staff leading the tour and the designated attraction.
Cities	CityID (PK) Attributes: Country, Region	This entity contains all the useful information about the city. The PK is CityID which identify uniquely the city. The other attributes are additional information about the city.
VisitingTour	TourID(PK) Attributes: Description	The Primary key is used to identify the TourID associated with the tour session.
Attraction (There is a specialisation, the sub-entities are WalkingTour, CyclingTour and Foodtour.)	ListID (PK) Attributes: AttractionName, AccessibilityInfo, Address, Postcode	This entity contains all the useful information about the Attractions. The Primary key is used to identify each attraction. The other attributes add additional details about the attractions.
Staff (There is a specialisation, the sub-entities are TourGuide and TourStaff)	StaffID(PK) Attributes: FullName, PhoneNumber	This entity contains all the useful information about the Staff. The Primary key is used to identify each staff member. The other attributes add additional details about the staff.

Equipment	EquipmentID (PK) Attributes: EquipmentName, EquipmentSize, EquipmentStyle, EquipmentCondition	This entity contains all the useful information about the Equipment. The Primary key is used to identify each Equipment. The other attributes add additional details about the different features of the equipment.
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Part B

QUESTION 5

Logical ERD



QUESTION 6

An **SQL query** to retrieve a list of maintenance visit dates and times, statuses, and notes for the visits that require boiler spare parts, along with the reference numbers, the names, the descriptions, and the prices of these required parts. The list should be restricted as follows: it should only show those visits that took place after the January 1st 2022 and that required parts which cost less than £123.99.

```
SELECT mv.w1856656_visitDateTime, mv.w1856656_visitStatus,  
mv.w1856656_visitNotes,  
pr.w1856656_partRefNo,  
pr.w1856656_partName, pr.w1856656_partDescrip,  
pr.w1856656_partPrice
```

```
FROM w1856656_Maintenancevisit AS mv
```

```
JOIN w1856656_Part AS pr ON mv.w1856656_visitNo = pr.  
w1856656_visitNo
```

```
WHERE mv. w1856656_visitDateTime > '2022-01-01'  
AND p. w1856656_partPrice < 123.99
```


QUESTION 7

Comparative Analysis Table to compare storage of Data in Relational model vs NoSQL model	Relational model or SQL model	No SQL model / JSON
1. Speed	Using the SQL queries, the user can quickly and efficiently retrieve a large number of records from a database.	A big JSON file can slow down the program if uploaded. <ul style="list-style-type: none"> • Ability to efficiently meet the needs for varying workloads. • Ability to scale up (add extra nodes) and down (remove nodes) to handle continuously evolving traffic (node = computer site).
2. Error Handling	Allows error handling. While retrieving the information from a database, if the query fails, the user gets an error message.	JSON has no error handling for JSON calls. If the dynamic script insertion works, you get called and will get the response perfectly. If not inserted, nothing happens. It just fails silently.
3. Schema	Database use based on the pre-defined schema. Schema on WRITE	Schema less data, usually collected in a Data Lake. Schema on READ No referential integrity, no joins. <ul style="list-style-type: none"> • Constraints on the data have to be programmed in the application programme.
4. Data Manipulation	CRUD operations allow to work on different tables. This is very powerful when we work with big volume of data that needs filtering and manipulation. SQL is structured data as collection of tables with fields, records, PKs and FKs. The data uses a high-level Structured Query Language (SQL) for CRUD operations.	<ul style="list-style-type: none"> • SCRUD (Search, Create, Read, Update, Delete) operations tend to involve one object stored in a single file using object key, no complex querying.
5. Syntax	SQL is a domain-specific language used in programming and designed for managing data held in a relational database management system (RDBMS). It is particularly useful in handling structured data where there are relations between different entities/variables of the data.	JSON is very easy to use. Since its syntax is very small and light weighted that's the reason that it executes the response in the faster way.