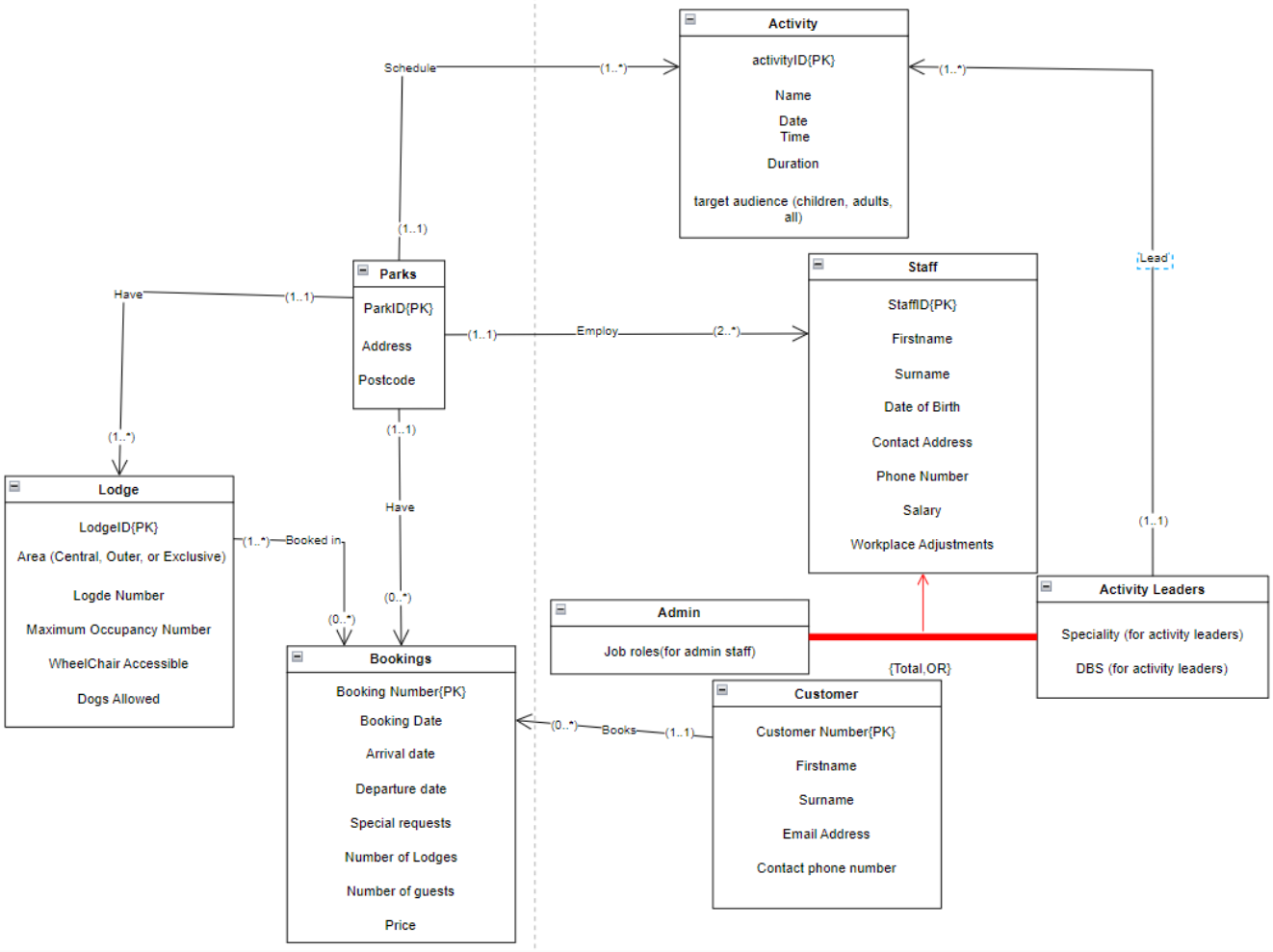
Made By RS898

1a.



1b.Assumptions necessary to resolve any ambiguities in the scenario:
Parks Employes Staff relationship:

- A Park must employ at least 2 members of Staff .They need atleast one administrative staff and atleast one Activity leader
- Each staff member can only work at one park at a time and cannot work at several parks at the same time but a park can employ multiple Staff members
- The participation for Staff is "2" which is greater than 0, this means that each Park must have at least two Staff members.The participation of Staff is mandatory.The participation for Parks is "1" which is also greater than 0 .The participation of Parks is mandatory.The cardinality for Park is "*", indicating that many Staff members can work at one Park. This creates a one-to-many relationship between Parks and Staff.

Parks Have Lodge relationship:

- Each park has at least one lodge, but may have multiple lodges.
- Each Lodge belongs to one park only. There can be no Lodge that belongs to different parks
- The relationship between Parks and Lodge is one-to-many, with Parks being the "one" side and Lodge being the "many" side.The cardinality for Parks is

denoted by "*", which means that many Lodges can be found at one Park.The participation for Parks is denoted by "1" ,which is greater than 0, which indicates that every Park must have at least one Lodge. The participation of Parks is mandatory.Similarly, the participation for Lodge is denoted by "1", which is greater than 0,which means that each Lodge must be associated with at least one Park.So the participation of Lodge is also mandatory.

Parks Schedule Activities relationship:

- Each park schedules at least one activity, but may schedule multiple activities.
- The participation for Parks is "1",which is greater than 0, which means that every Park must be associated with at least one Activity. The participation of Parks is mandatory.The participation for Activity is "1",which is greater than 0, which means that each Activity must be associated with at least one Park. The participation of Activity is also mandatory.The cardinality for Parks is "*", indicating that many Activities can take place in one Park. This creates a one-to-many relationship between Parks and Activity.

Activity Leader Lead Activities:

- Each activity is led by a single activity leader but an activity leader can lead multiple activities
- Each activity leader can lead at least one activity, or multiple activities. An activity must have one and only one activity leader.
- The participation for Activity is denoted by "1",which is greater than 0, which means that every Activity must be associated with at least one Activity Leader. The participation of Activity is mandatory.Similarly, the participation for Activity Leader is denoted by "1",which is greater than 0, which means that each ActivityLeader must be associated with at least one Activity. The participation of Activity Leader is also mandatory.The cardinality for Activity is denoted by "1", which means that each Activity can only be associated with one ActivityLeader.On the other hand, the cardinality for ActivityLeader is denoted by "*", indicating that one ActivityLeader can lead many Activities. This creates a one-to-many relationship between ActivityLeaders and Activity.

Customer Books Bookings:

- A customer can either have no bookings upon just registering , one booking, or multiple bookings.
- There must be one customer per booking.
- There is also an assumption that a single customer can do a group bookings
- Each customer can make a booking for lodges in one park at a time. In other words, a booking can only be made for one park, and not for multiple parks simultaneously.
- The participation for Customer is denoted by "1",which is greater than 0, which means that each Booking must be associated with one Customer. The participation of Customer is mandatory.The participation for Bookings is denoted by "0",The minimum is 0 which means that the participation of Bookings is optional.The cardinality for Customer is denoted by "*", indicating

that many Bookings can be associated with one Customer.On the other hand, the cardinality for Bookings is denoted by "1", which means that each Booking can only be associated with one Customer.Therefore, the type of relationship between Customer and Bookings is a one-to-many relationship, meaning that one Customer can have many Bookings.

Lodges Booked in Bookings:

- There must be atleast one lodge per Booking
- A Lodge can either have no bookings, one booking, or multiple bookings.
- The participation for Lodge is denoted by "0",which is the minimum, which means that the participation of Lodge is optional.The participation for Bookings is denoted by "1",Which is greater than 0,which means that the participation of Bookings is mandatory.The cardinality for Lodgeis denoted by "*", indicating that many Bookings can be associated with many Lodges.The cardinality for Bookings is denoted by "*", which means that each Booking can only be associated with many Lodges.Therefore, the type of relationship between Lodge and Bookings is a many-to-many relationship.

Parks Have Bookings:

- Each park can have no bookings, one booking, or multiple bookings.
- The bookings can only be associate to one park.
- The participation of Parks is 0,which is the minimum, which means that a Park may have zero Bookings associated with it.The participation for Parks is optional.The participation of Bookings is 1,which is greater than 0, which means that each Booking must be associated with one Park.The participation for Bookings is mandatory.The cardinality for Park is * which means that many Bookings can be associated with one Park. The cardinality for Bookings is 1 which means that each Booking can only be associated with one Park.Therefore, the type of relationship between Park and Bookings is a one-to-many relationship, meaning that one Park can have many Bookings.

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2a.
Parks(ParkID{PK}, Address, Postcode)

Staff{SuperClass for Activity and Admin}(StaffID{PK}, *ParkID*{FK}, FirstName, SurName,DateOfBirth,ContactAddress,PhoneNumber,Salary,WorkplaceAdjustments)

Activity(activityID{PK}, *ParkID*{FK}, *StaffID*{FK}, Name, Date, Time, Duration, target audience)

Activity Leader{Subclass of Staff}(StaffID {PK}, Speciality, DBS)

Admin{Subclass of Staff}(StaffID {PK}, JobRole)

Lodge(LodgeID{PK}, *ParkID* {FK}, Area, LodgeNumber, MaximumOccupancy, WheelchairAccessible, DogsAllowed)

Customer(CustomerNumber{PK}, FirstName, SurName, EmailAddress, ContactPhoneNumber)

Bookings(BookingNumber{PK}, CustomerNumber{FK}, ParkID{FK}, BookingDate, ArrivalDate, DepartureDate, SpecialRequests, NumberOfLodges)

LodgeBooking(LodgeBookingID{PK}, ParkID{FK}, BookingNumber{FK}, LodgeID{FK}, NumberOfGuests, Price)

Key:
Primary Key: Underlined
Foreign Key: *Italics*
Entities:**Bold**

Note:
Lodge and Booking have a Many to Many relationship,This needs to be broken down and placed into a new identity.This identity is called **LodgeBooking**.This new entity is linked to the tables through the use of *Booking Number* and *LodgeID* as the foreign keys.This new entity also requires a new Primary key which is LodgeBookingID.ParkID is also required as a foreign key because the customers can make a booking at one of the parks which may also determine the prrice .

2b.

- Staff.ParkID{FK}: A staff member must belong to a park, so a null value should not be allowed.

- Activity.ParkID{FK}: An activity must belong to a park, so a null value should not be allowed.
- ActivityLeader.StaffID{FK}: An activity leader must be a staff member, so a null value should not be allowed.
- Admin.StaffID{FK}: An administrator must be a staff member, so a null value should not be allowed.
- Lodge.ParkID{FK}: A lodge must belong to a park, so a null value should not be allowed.
- Booking.CustomerNumber{FK}: A booking must belong to a customer, so a null value should not be allowed.
- Booking.LodgeID{FK}: A booking must include at least one lodge, so a null value should not be allowed.
- LodgeBooking.BookingNumber{FK}: A lodge booking must be associated with a booking, so a null value should not be allowed.
- LodgeBooking.LodgeID{FK}: A lodge booking must be associated with a lodge, so a null value should not be allowed.
- LodgeBooking.ParkID{FK}: A lodge booking must be associated with a park, so a null value should not be allowed.

Summary:
StaffID (FK) - No Null Values allowed
ParkID (FK) - No Null Values allowed
CustomerNumber (FK) - No Null Values allowed
BookingNumber (FK) - No Null Values allowed
LodgeID (FK) - No Null Values allowed
Justification: Foreign keys connect two tables, and null values are not permitted because they would prevent the tables from being linked.

2c.

- Workplace Adjustments in the Staff table:This attribute may be null because not all employees require workplace modifications.

- Special requests in the Bookings table: customers may not have any special requests, it is not necessary to provide a value for this attribute.

2d.

- The Booking Date in the Bookings table must not be in the past.
- The Arrival Date in the Bookings table must be after the Booking Date.
- The Departure Date in the Bookings table must be after the Arrival Date.
- The Number Of Lodges in the Bookings table must be a positive integer.
- The Number of guests in the Bookings table must be a positive integer.
- The Price in the Bookings table must be a non-negative decimal value.
- The FirstName and SurName attributes in the Staff and Customer tables must not be null.
- The DateOfBirth attribute in the Staff table must not be in the future.

- The PhoneNumber attribute in the Staff and Customer tables must be in a valid phone number format.
- The Salary attribute in the Staff table must be a positive decimal value.
- The Lodge Number attribute in the Lodge table must be unique within a given ParkID.
- The Maximum Occupancy attribute in the Lodge table must be a positive integer.
- The Speciality attribute in the Activity Leader table must not be null.
- The Area attribute in the Lodge table must be one of the specified values (Central, Outer, Exclusive).
- The target audience attribute in the Activity table must not be null.
- The Date and Time attribute in the Activity table must be a valid date and time format.

Parks:

Attribute	Domain	Nullable?
ParkID	Unique identifier for Park. Could be Alphanumberic String(0-9,a-z,A-Z) E.g. p12	Not null
Address	Alphanumberic String(0-9,a-z,A-Z) E.g.12 Blank Ave	Not Null
Postcode	Alphanumberic String(0-9,a-z,A-Z) E.g. UZ12 8EN	Not Null

All attributes for the "Parks" entity are not nullable, meaning that every park record must have a value for each of these attributes.The Primary Key is ParkID.

Staff:

Attribute	Domain	Nullable?
StaffID	Unique identifier for Staff members. Could be Alphanumberic String.e.g.Stf21	Not null
ParkID	Unique identifier for Park. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key	Not null

	referencing Parks entity	
FirstName	String Letters	Not null
SurName	String Letters	Not null
Date of Birth	Only integers in the universal date format(YYYY-MM-DD)	Not null
Contact Address	Alphanumberic String(0-9,a-z,A-Z) E.g.12 Blank Ave	Not null
Phone Number	Integers (9-10 Digits). 07456917564	Not null
Salary	Decimal numbers.e.g.$24	Not null
Workplace Adjustment	Text	Nullable

All attributes for the "Staff" entity are not nullable except for the "WorkplaceAdjustments" attribute, which is nullable.

Activity:

Attribute	Domain	Nullable?
activityID	Unique identifier for Activity. Could be Alphanumberic String(0-9,a-z,A-Z).	Not null
ParkID	Unique identifier for Park. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key referencing Parks entity	Not Null
StaffID	Unique identifier for Staff members. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key referencing Staff entity	Not Null
Name	String	Not null
Date	Only integers in the universal date format(YYYY-MM-DD)	Not null

Time	Time	Not null
Duration	Integer	Not Null
Target Audience	String Text	Not Null

Activity Leader{Subclass of Staff}:

Attribute	Domain	Nullable?
StaffID	Unique identifier for Staff members. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key referencing Staff entity	Not Null
Specialty	String Text	Not Null
DBS	Boolean	Not Null

Admin{Subclass of Staff}:

Attribute	Domain	Nullable?
StaffID	Unique identifier for Staff members. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key referencing Staff entity	Not Null
Role	String Text	Not Null

Lodge:

Attribute	Domain	Nullable?
LodgeID	Unique identifier for Lodges. Could be Alphanumberic String(0-9,a-z,A-Z).	Not Null
ParkID	Unique identifier for Park.	Not Null

	Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key referencing Parks entity	
Area	String Characters	Not Null
LodgeNumber	Integers	Not Null
MaxOccupancy	Integers	Not Null
Wheelchair Accessable	Boolean	Not Null
Dogs Allowed	Boolean	Not Null

Customer:

Attribute	Domain	Nullable?
CustomerNumber	Unique identifier for Customer.Integer	Not Null
FirstName	String Text	Not Null
SurName	String Text	Not Null
EmailAddress	String with symbols	Not Null
ContactPhoneNumber	Integers (9-10 Digits). 07456917564	Not Null

Bookings:

Attribute	Domain	Nullable?
BookingNumber	Unique identifier for Bookings.Integer	Not Null
CustomerNumber	Unique identifier for Customers.Integer.Foreign key referencing Customer entity	Not Null
ParkID	Unique identifier for Park. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key	Not Null

	referencing Parks entity	
BookingDate	Only integers in the universal date format(YYYY-MM-DD)	Not null
ArrivalDate	Only integers in the universal date format(YYYY-MM-DD)	Not null
DepartureDate	Only integers in the universal date format(YYYY-MM-DD)	Not null
SpecialRequests	String Text	Nullable
NumberOfLodges	Integers	Not Null

LodgeBooking:

Attribute	Domain	Nullable?
LodgeBookingID	Unique identifier for Lodge Bookings. Could be Alphanumberic String(0-9,a-z,A-Z).	Not Null
ParkID	Unique identifier for Park. Could be Alphanumberic String(0-9,a-z,A-Z).Foreign key referencing Parks entity	Not Null
BookingNumber	Unique identifier for Bookings. Integer.Foreign key referencing Bookings entity	Not Null
LodgeID	Unique identifier for Lodges. Integer.Foreign key referencing Lodge entity	Not Null
NumberOfGuests	Integer	Not Null
Price	Decimal numbers.e.g.$24	Not null