THE WAIKIKI AQUARIUM

INTRODUCTION

The Waikiki Aquarium, which started life as the Honolulu Aquarium, is the 2nd oldest public aquarium in the United States. It is located in Kapiolani Park in Honolulu, Hawaii. While the current Waikiki Aquarium building is small when compared to modern developments such as the Monterey Bay Aquarium, it has fairly a good selection of marine organisms. Because of the abundance of aquatic animals that the aquarium now contains, it requires a special kind of dedication to provide care to these animals. The aquarium has long stressed that the health of its aquatic animals it its primary concern. However, the aquarium's staff have recently noticed many warning signs that their animals may be sick, including clamped fins, irregular behavior, losing weight, fading color, and floating. The aquarium thinks that this unusual behavior is due to the poor record keeping and information management among its staff members. To address this issue, the aquarium has decided to neglect using their daily "feeding, maintenance, and treatment" schedule that is printed out, carried, and shared among the employees and substitute it for a database that can be shared among its employees. As you can see, aquariums consist of several parts all working together to keep the fish alive and a database system will help make the staff's job easier.

DESCRIPTION OF DATABASE DESIGN

The database will contain information on the animals, the staff members, the enclosures the animals live in, and the services the staff members perform for the animals, in addition, the database will monitor the health of each individual animal.

First off, the database will contain information on each of the aquarium's 10 staff members, including their name, phone number, and date of hire, and their full address (street, city, state, postal code). The aquarium employs two types of staff members – curators and veterinarians. A curator is a keeper or custodian of the aquarium that manages a certain portion of the aquarium's animal collection. While a veterinarian is responsible for the healthcare program for the animal collection and the maintenance of health records. Both are entered the same way into the database. Staff members will be entered into the database when hired, before undergoing their training. A staff member may manage up to as many staff members and each staff member may be managed by at most one other staff member.

Since all staff members must be able to recognize any abnormal behavior and clinical signs of illness, as well as understand the diets, and restraint procedures for the animals under their care, each newly hired staff member is required to complete a series of training courses, each designed to cover a different aspect required for the job, and is identified by a course number and described by a title and description. Since the aquarium continues to add different training courses, each training course may be taken by zero or many staff members. When a staff member completes a training course, this date is recorded.

Upon completing their training, a curator member is then assigned to work at a single exhibit area. When this assignment is made, the starting date, starting time, ending date, and ending time in which, the employee is responsible for managing that respective area is recorded. Each exhibit is denoted by a number and described by its name and location in the building. Each exhibit contains multiple tanks and all of the tanks regardless of their work center location, are treated the same way in terms of feeding and maintenance procedures. Since all of the aquarium's habitat galleries and its quarantine facility are mutually exclusive, a tank belongs in a single work center. Each tank is identified by a tank number and described by its water temperature, fluid capacity, ambient temperature, and ambient humidity.

New animals are arriving at the aquarium frequently and are entered into the database upon arriving at the aquarium. Each animal is given a unique identification number, and described by a name, species group, approximate birth date, and the date acquired. Each animal is supplied by a single supplier and a supplier may supply zero or many animals. Every supplier that supplies animals to the aquarium it is identified by supplier number and described by the company's name and address (street, state, city, postal code). The information of each shipment is recorded at the time the aquarium receives it, including the shipment's arrival date, arrival note, and the number of animals in the batch.

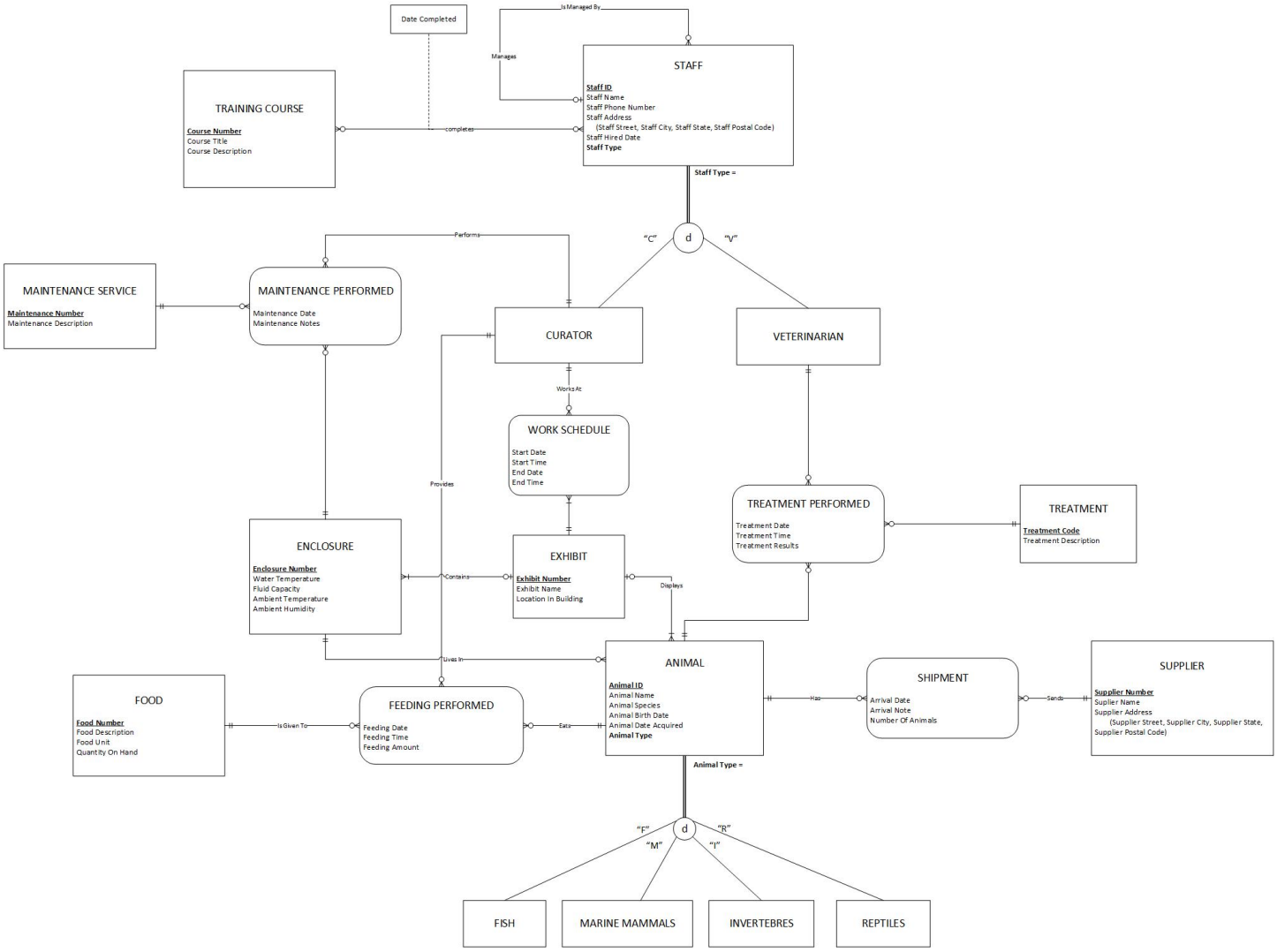
Each animal has a different nutrition regime. An animal may never require food, while most need a single type of food to survive. A type of food can be shared and eaten by among multiple animals. Information regarding the type of food consumed by an animal includes a description of the food, a unit of measurement, and quantity on hand. Each time a curator feeds a tank of animals, the specific amount of food given as well as the date and time are recorded.

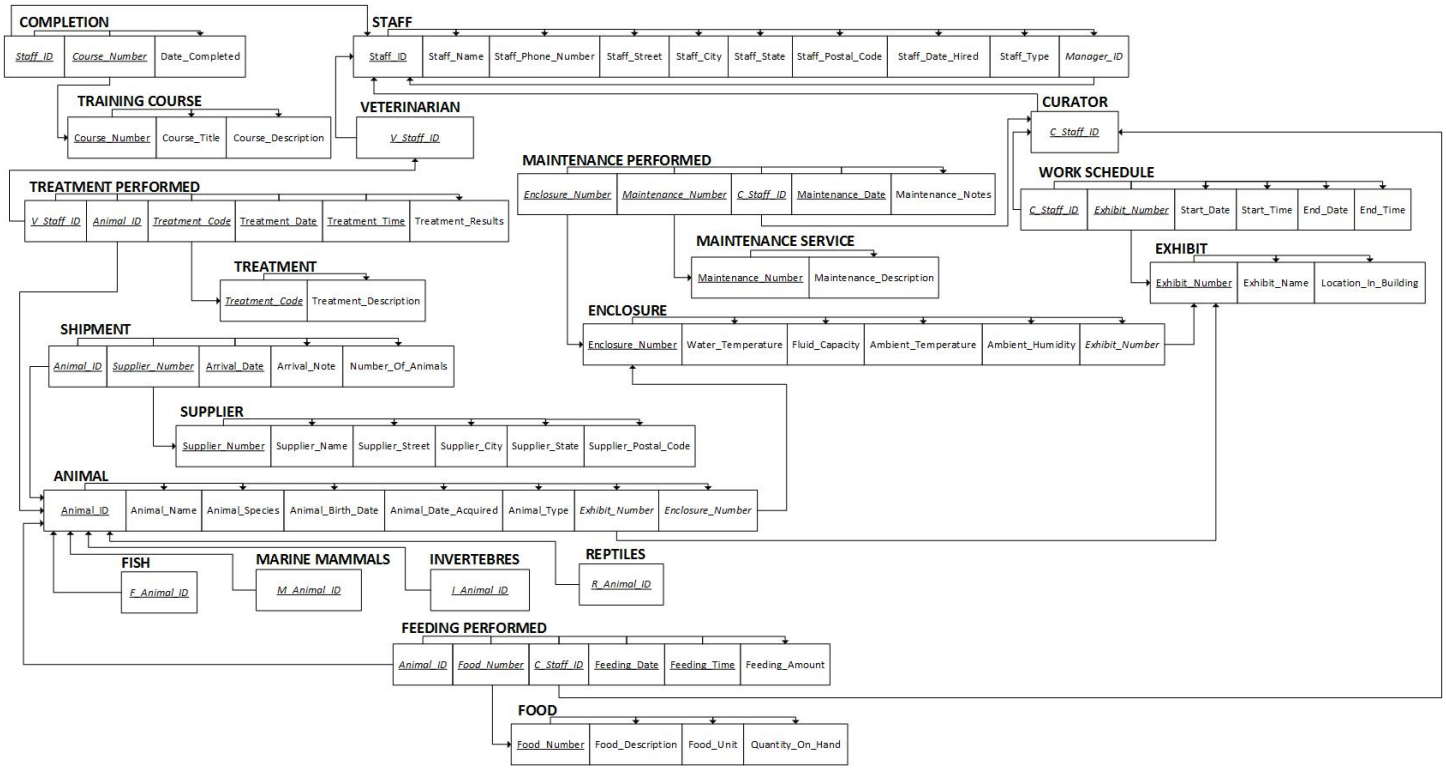
Since animals rely on their enclosure for their existence they must live in a single enclosure. Every enclosure at the aquarium is described by a number, the water temperature, fluid capacity, ambient temperature, and ambient humidity. An enclosure is home to one or many animals that can survive under the same conditions, thus it may contain multiple animals. While not all enclosures no on display for visitors yet, an enclosure may be displayed in at most a single exhibit. At least one animal is displayed in each exhibit.

A maintenance service is conducted for zero or more enclosures. Because there is a variety of maintenance services, a service is denoted by a unique number and description of the respective activity. A curator may never perform a maintenance service or perform many. When a curator conducts a maintenance service for an enclosure, the date and any additional notes are recorded.

If any of the animals appear to be diseased, injured, or stressed a curator is responsible for reporting them promptly to a veterinarian so that they can be treated. The

details of each Treatment type are stored and include a treatment code and a description. The date and time of the treatment and their results of it is recorded when an animal undergoes a treatment procedure by a veterinarian. and a full description of the examination results.


Date Completed
Is Managed By
Manages
STAFF
Staff ID
Staff Name
Staff Phone Number
Staff Address
(Staff Street, Staff City, Staff State, Staff Postal Code)
Staff Hired Date
Staff Type
TRAINING COURSE
Course Number
Course Title
Course Description
completes
Staff Type =
"C"
d
"V"
Performs
MAINTENANCE SERVICE
Maintenance Number
Maintenance Description
MAINTENANCE PERFORMED
Maintenance Date
Maintenance Notes
CURATOR
VETERINARIAN
Works At
WORK SCHEDULE
Start Date
Start Time
End Date
End Time
Provides
TREATMENT PERFORMED
Treatment Date
Treatment Time
Treatment Results
TREATMENT
Treatment Code
Treatment Description
ENCLOSURE
Enclosure Number
Water Temperature
Fluid Capacity
Ambient Temperature
Ambient Humidity
Contains
EXHIBIT
Exhibit Number
Exhibit Name
Location In Building
Displays
Lives In
ANIMAL
Animal ID
Animal Name
Animal Species
Animal Birth Date
Animal Date Acquired
Animal Type
Has
SHIPMENT
Arrival Date
Arrival Note
Number Of Animals
Sends
SUPPLIER
Supplier Number
Supplier Name
Supplier Address
(Supplier Street, Supplier City, Supplier State, Supplier Postal Code)
FOOD
Food Number
Food Description
Food Unit
Quantity On Hand
Is Given To
FEEDING PERFORMED
Feeding Date
Feeding Time
Feeding Amount
Eats
Animal Type =
"F"
"M"
d
"R"
"I"
FISH
MARINE MAMMALS
INVERTEBRES
REPTILES


COMPLETION
Staff_ID
Course_Number
Date_Completed
STAFF
Staff_ID
Staff_Name
Staff_Phone_Number
Staff_Street
Staff_City
Staff_State
Staff_Postal_Code
Staff_Date_Hired
Staff_Type
Manager_ID
TRAINING COURSE
Course_Number
Course_Title
Course_Description
VETERINARIAN
V_Staff_ID
CURATOR
C_Staff_ID
MAINTENANCE PERFORMED
Enclosure_Number
Maintenance_Number
C_Staff_ID
Maintenance_Date
Maintenance_Notes
WORK SCHEDULE
C_Staff_ID
Exhibit_Number
Start_Date
Start_Time
End_Date
End_Time
TREATMENT PERFORMED
V_Staff_ID
Animal_ID
Treatment_Code
Treatment_Date
Treatment_Time
Treatment_Results
MAINTENANCE SERVICE
Maintenance_Number
Maintenance_Description
EXHIBIT
Exhibit_Number
Exhibit_Name
Location_In_Building
TREATMENT
Treatment_Code
Treatment_Description
ENCLOSURE
Enclosure_Number
Water_Temperature
Fluid_Capacity
Ambient_Temperature
Ambient_Humidity
Exhibit_Number
SHIPMENT
Animal_ID
Supplier_Number
Arrival_Date
Arrival_Note
Number_Of_Animals
SUPPLIER
Supplier_Number
Supplier_Name
Supplier_Street
Supplier_City
Supplier_State
Supplier_Postal_Code
ANIMAL
Animal_ID
Animal_Name
Animal_Species
Animal_Birth_Date
Animal_Date_Acquired
Animal_Type
Exhibit_Number
Enclosure_Number
FISH
F_Animal_ID
MARINE MAMMALS
M_Animal_ID
INVERTEBRES
I_Animal_ID
REPTILES
R_Animal_ID
FEEDING PERFORMED
Animal_ID
Food_Number
C_Staff_ID
Feeding_Date
Feeding_Time
Feeding_Amount
FOOD
Food_Number
Food_Description
Food_Unit
Quantity_On_Hand

DATA DICTIONARY

STAFF

Name	Data Type	Key	Description	Example Value
StaffID	CHAR(4)	PK	Unique identifier for a staff member	1234
StaffName	VARCHAR(30)		First and last name of a staff member	Justin Bieber
StaffPhoneNumber	VARCHAR(10)		Phone number of a staff member	8081234567
StaffStreet	VARCHAR(15)		Street address where the a staff member lives	286 Manoa Rd
StaffCity	VARCHAR(15)		Name of the city where a staff member lives	Honolulu
StaffState	VARCHAR(2)		Name of the state where the staff member lives	HI
StaffPostalCode	CHAR(5)		Postal code for the street address	96821
StaffHiredDate	DATE		Start date of employment at the Aquarium	05/30/2015
StaffType	VARCHAR(12)		A staff member is either a Curator or Veterinarian	Curator
ManagerID	CHAR(4)	FK	Manager who is in charge of the employee; Unique identifier for a manager	1234

CURATOR

Name	Data Type	Key	Description	Example Value
CStaffID	CHAR(4)	FK	Unique identifier for a curator	1234

VETERINARIAN

Name	Data Type	Key	Description	Example Value
VStaffID	CHAR(4)	FK	Unique identifier for a veterinarian	1234

TRAINING COURSE

Name	Data Type	Key	Description	Example Value
CourseNumber	CHAR(4)	PK	Unique identifier for a training course	1234
CourseTitle	VARCHAR(30)		Title of a course	Animal Handing
CourseDescription	VARCHAR(255)		Description of a course	Discussing Animal rules and regulations and procedures

COURSE COMPLETION

Name	Data Type	Key	Description	Example Value
StaffID	CHAR(4)	FK	Staff member that completes a training course; Unique identifier for a staff member	1234
CourseNumber	CHAR(4)	FK	Training course that the employee completes; Unique identifier for a training course	1234
DateCompleted	DATE		Description of a course	05/20/2014

ANIMAL

Name	Data Type	Key	Description	Example Value
AnimalID	CHAR(4)	PK	Unique identifier for an animal at the aquarium	1234
AnimalName	VARCHAR(30)		English name of the animal	Justin Bieber
AnimalSpecies	VARCHAR(30)		The Species family/group that the animal belongs to	8081234567
AnimalBirthDate	DATE		Approximate date the animal was born	05/20/2015
AnimalDateAcquired	DATE		Date the animal arrives at the museum	05/20/2015
AnimalType	VARCHAR(15)		The aquarium carries 4 categories of animals: fish, invertebres, marine mammals, reptiles	Fish
ExhibitNumber	CHAR(4)	FK	The Unique identifier for the exhibit where the animal may be on display for visitors	1234
EnclosureNumber	CHAR(4)	FK	The Unique identifier for the enclosure where the animal lives	1234

FISH

Name	Data Type	Key	Description	Example Value
FAnimal_ID	CHAR(4)	FK	Unique identifier for a fish	1234

INVERTEBRES

Name	Data Type	Key	Description	Example Value
IAnimal_ID	CHAR(4)	FK	Unique identifier for an invertebre	1234

MARINE MAMMALS

Name	Data Type	Key	Description	Example Value
MAnimal_ID	CHAR(4)	FK	Unique identifier for a marine mammal	1234

REPTILES

Name	Data Type	Key	Description	Example Value
RAnimal_ID	CHAR(4)	FK	Unique identifier for a reptile	1234

CURATOR WORK SCHEDULE

Name	Data Type	Key	Description	Example Value
CStaffID	CHAR(4)	FK	Unique identifier for a curator (staff member)	1234
ExhibitNumber	CHAR(4)	FK	The Unique identifier for the exhibit where the staff member is assigned to work at	1234
StartDate	DATE		Date the curator is assigned to an specific exhibit area	05/25/2012
StartTime	TIME		Start time the curator is assigned to an exhibit area	08:45:12
EndDate	DATE		Date the curator's assignment to an exhibit area has ended	05/25/2012
EndTime	TIME		End time the curator is assigned to an specific exhibit area	08:45:12

EXHIBIT

Name	Data Type	Key	Description	Example Value
ExhibitNumber	CHAR(4)	PK	Unique identifier for an exhibit	1234
ExhibitName	VARCHAR(255)		Name of the exhibit	Deep Sea Animals
LocationInBuilding	VARCHAR(30)		Description of a course	West Wing

FOOD

Name	Data Type	Key	Description	Example Value
FoodNumber	CHAR(4)	PK	Unique identifier for a Food item that is fed to the animal(s)	1234
FoodDescription	VARCHAR(255)		Description of the food item	Fish Flakes
FoodUnit	CHAR(10)		Metric Unit that is a sufficient to measure quantities of the food	lbs
QuantityOnHand	DECIMAL(5,2)		A measure of the quantity in stock in the terms of the designated food unit	324.50

FEEDING PERFORMED

Name	Data Type	Key	Description	Example Value
AnimalID	CHAR(4)	FK	Unique identifier for a staff member	1234
FoodNumber	CHAR(4)	FK	First and last name of a staff member	1234
CStaffID	(CHAR(4)	FK	Unique identifier for curator (staff member)	1234
FeedingDate	DATE	PK	Date the curator feeds an animal	05/20/2017
FeedingTime	TIME	PK	Time the animal is feed	08:45:12
FeedingAmount	DECIMAL(5,2)		Amount of food that the animal is given in terms of the designated food unit of measurement	10.04

ENCLOSURE

Name	Data Type	Key	Description	Example Value
EnclosureNumber	CHAR(4)	PK	Unique identifier for an enclosure that creates a home for a animal(s)	1234
WaterTemperature	DECIMAL(5,2)		Title of a course	194.40
FluidCapacity	DECIMAL(5,2)		Temperature of the water in the enclosure	194.40
AmbientTemperature	DECIMAL(5,2)		The maximum fluid capacity of the enclosure	194.40
AmbientHumidity	DECIMAL(5,2)		The humidity surrounding the enclosure that is adequate for the animals to live in	194.40
ExhibitNumber	CHAR(4)	FK	Unique Identifier the exhibit number when a enclosure is displayed for visitors	1234

MAINTENANCE SERVICE

Name	Data Type	Key	Description	Example Value
MaintenanceNumber	CHAR(4)	PK	Unique identifier for a maintenance activity that aquarium is responsible for	1234
MaintenanceDescription	VARCHAR(255)		Description of the maintenance activity	Cleaning an enclosure

SUPPLIER

Name	Data Type	Key	Description	Example Value
SuplierNumber	CHAR(4)	PK	Unique identifier for a supplier of animals	1234
SupplierName	VARCHAR(30)		Name of the company or individual supplier of animals	Sam's Aquatic Animals
SupplierStreet	VARCHAR(15)		Street address where the supplier is located	286 Manoa Rd
SupplierCity	VARCHAR(15)		Name of the city where a supplier is based	Honolulu
SuplierState	VARCHAR(2)		Name of the state where the supplier is based	HI
SupplierfPostalCode	CHAR(5)		Postal code for the street address	96821

MAINTENANCE PERFORMED

Name	Data Type	Key	Description	Example Value
EnclosureNumber	CHAR(4)	FK	Unique identifier for an enclosure where the maintenance service is needed for	1234
MaintenanceNumber	CHAR(4)	FK	Unique identifier for a maintenance number that corresponds to the maintenance activity being performed	1234
CStaffID	CHAR(4)	FK	Unique identifier for a curator that conducts the maintenance service	1234
MaintenanceDate	DATE	PK	Date the maintenance activity is conducted	05/25/2013
MaintenanceNotes	VARCHAR(255)		Any additional comments that a staff member may think is important to record	Many leaks were found and fixed

TREATMENT PERFORMED

Name	Data Type	Key	Description	Example Value
VStaffID	CHAR(4)	FK	Unique identifier for a veterinarian that administers the treatment	1234
AnimalID	CHAR(4)	FK	Unique identifier for an animal that undergoes treatment	1234
TreatmentCode	CHAR(4)	FK	Description of treatment administered	1234
TreatmentDate	DATE	PK	Date the treatment is administered	05/23/2019
TreatmentTime	TIME	PK	Time the treatment is administered	08:23:12
TreatmentResults	VARCHAR(255)		Short summary of results from the treatment administered	Animal died

TREATMENT

Name	Data Type	Key	Description	Example Value
TreatmentCode	CHAR(4)	PK	Unique identifier for a treatment	1234
TreatmentDescription	VARCHAR(255)		Description of the treatment	Hepatitus

SHIPMENT

Name	Data Type	Key	Description	Example Value
AnimalID	CHAR(4)	FK	Unique identifier for an animal that is supplied	1234
SupplierNumber	CHAR(4)	FK	Unique identifier for a supplier of animals to the aquarium	1234
ArrivalDate	DATE	PK	Date the shipment of a batch of animals arrive	05/23/2012
ArrivalNote	VARCHAR(255)		Additional comments or notes attached with the shipment	These animals are sensitive to bright light
NumberOfAnimals	INTEGER		Total number of animals in the batch shipment	144

SQL QUERIES TO CREATE EACH TAB

```
-- Create Staff Table
CREATE TABLE Staff_T
(
                                        StaffID CHAR(4) NOT NULL,
                                        StaffName VARCHAR(30) NOT NULL,
                                        StaffPhoneNumber VARCHAR(10),
                                        StaffStreet VARCHAR(15),
                                        StaffCity VARCHAR(15),
                                        StaffState VARCHAR(2),
                                        StatePostalCode CHAR(5),
                                        StaffHiredDate DATE,
                                        StaffType VARCHAR(12),
                                        ManagerID CHAR(4),
CONSTRAINT Staff_PK PRIMARY KEY (StaffID),
CONSTRAINT ManagerID_FK FOREIGN KEY (ManagerID) REFERENCES Staff_T(StaffID)
);

-- Create Curator Table
CREATE TABLE Curator_T
(
                                        CStaffID CHAR(4) NOT NULL,
CONSTRAINT Curator_PK FOREIGN KEY (CStaffID) REFERENCES Staff_T(StaffID)
);

-- Create Veterinarian Table
CREATE TABLE Veterinarian_T
(
                                        VStaffID CHAR(4) NOT NULL,
CONSTRAINT Veterinarian_PK FOREIGN KEY (VStaffID) REFERENCES Staff_T(StaffID)
);

-- Create Training Courses Table
CREATE TABLE TrainingCourses_T
(
                                        CourseNumber CHAR(4) NOT NULL,
                                        CourseTitle VARCHAR(30),
                                        CourseDescription VARCHAR(255),
CONSTRAINT TrainingCourses_PK PRIMARY KEY (CourseNumber)
);

-- Create Course Completion Table
CREATE TABLE TrainingCourseCompletion_T
(
                                        StaffID CHAR(4) NOT NULL,
                                        CourseNumber CHAR(4) NOT NULL,
                                        DateCompleted DATE,
CONSTRAINT TrainingCoursesCompletion_PK PRIMARY KEY (StaffID, CourseNumber),
CONSTRAINT TrainingCourseCompletion_FK1 FOREIGN KEY (StaffID) REFERENCES Staff_T(StaffID),
CONSTRAINT TrainingCourseCompletion_FK2 FOREIGN KEY (CourseNumber) REFERENCES TrainingCourses_T(CourseNumber)
);

-- Create Supplier Table
CREATE TABLE Supplier_T
(
                                        SupplierNumber CHAR(4) NOT NULL,
                                        SupplierName VARCHAR(30) NOT NULL,
                                        SupplierStreet VARCHAR (15),
                                        SuplierCity VARCHAR (15),
                                        SupplierState VARCHAR(2),
                                        SupplierPostalCode VARCHAR(5),
CONSTRAINT Supplier_PK PRIMARY KEY (SupplierNumber)
);
```

```
-- Create Food Table
CREATE TABLE Food_T
(
                                        FoodNumber CHAR(4) NOT NULL,
                                        FoodDescription VARCHAR(255),
                                        FoodUnit CHAR(10),
                                        QuantityOnHand DECIMAL(5,2),
CONSTRAINT Food_PK PRIMARY KEY (FoodNumber)
);

-- Create Exhibit Table
CREATE TABLE Exhibit_T
(
                                        ExhibitNumber CHAR(4) NOT NULL,
                                        ExhibitName VARCHAR(255),
                                        LocationInBuilding CHAR(6),
CONSTRAINT Exhibit_PK PRIMARY KEY (ExhibitNumber)
);

-- Create Enclosure Table
CREATE TABLE Enclosure_T
(
                                        EnclosureNumber CHAR(4) NOT NULL,
                                        WaterTemperature DECIMAL(5,2),
                                        FluidCapacity DECIMAL(5,2),
                                        AmbientTemperature DECIMAL(5,2),
                                        AmbientHumidity DECIMAL(5,2),
                                        ExhibitNumber CHAR(4),
CONSTRAINT Enclosure_PK PRIMARY KEY (EnclosureNumber),
CONSTRAINT Enclosure_FK1 FOREIGN KEY (ExhibitNumber) REFERENCES Exhibit_T(ExhibitNumber)
);

-- Create Curator Work Schedule Table
CREATE TABLE CuratorWorkSchedule_T
(
                                        CStaffID CHAR(4) NOT NULL,
                                        ExhibitNumber CHAR(4) NOT NULL,
                                        StartDate DATE,
                                        StartTime TIME,
                                        EndDate DATE,
                                        EndTime TIME,
CONSTRAINT CuratorWorkSchedule_PK PRIMARY KEY (CStaffID, ExhibitNumber),
CONSTRAINT CuratorWorkSchedule_FK1 FOREIGN KEY (CStaffID) REFERENCES Staff_T(StaffID),
CONSTRAINT CuratorWorkSchedule_FK2 FOREIGN KEY (ExhibitNumber) REFERENCES Exhibit_T(ExhibitNumber)
);

-- Create Animal Table
CREATE TABLE Animal_T
(
                                        AnimalID CHAR(4) NOT NULL,
                                        AnimalName VARCHAR(30),
                                        AnimalSpecies VARCHAR(30),
                                        AnimalBirthDate DATE,
                                        AnimalDateAcquired DATE,
                                        AnimalType VARCHAR(15) NOT NULL,
                                        ExhibitNumber CHAR(4),
                                        EnclosureNumber CHAR(4) NOT NULL,
CONSTRAINT Animal_PK PRIMARY KEY (AnimalId),
CONSTRAINT Animal_FK1 FOREIGN KEY (ExhibitNumber) REFERENCES Exhibit_T(ExhibitNumber),
CONSTRAINT Animal_FK2 FOREIGN KEY (EnclosureNumber) REFERENCES Enclosure_T(EnclosureNumber)
);

-- Create Fish Table
CREATE TABLE Fish_T
(
                                        FAnimalID CHAR(4) NOT NULL,
CONSTRAINT Fish_PK FOREIGN KEY (FAnimalID) REFERENCES Animal_T(AnimalID)
);
```

```
-- Create Invertebres Table
CREATE TABLE Invertebres_T
(
                                        IAnimalID CHAR(4) NOT NULL,
CONSTRAINT Invertebres_PK FOREIGN KEY (IAnimalID) REFERENCES Animal_T(AnimalID)
);

-- Create Marine Mammals Table
CREATE TABLE MarineMammals_T
(
                                        MAnimalID CHAR(4) NOT NULL,
CONSTRAINT MarineMammals_PK FOREIGN KEY (MAnimalID) REFERENCES Animal_T(AnimalID)
);

-- Create Reptiles Table
CREATE TABLE Reptiles_T
(
                                        RAnimalID CHAR(4) NOT NULL,
CONSTRAINT Reptiles_PK FOREIGN KEY (RAnimalID) REFERENCES Animal_T(AnimalID)
);

-- Create Feeding Performed Table
CREATE TABLE FeedingPerformed_T
(
                                        AnimalID CHAR(4) NOT NULL,
                                        FoodNumber CHAR(4) NOT NULL,
                                        CStaffID CHAR(4) NOT NULL,
                                        FeedingDate DATE,
                                        FeedingTime TIME,
                                        FeedingAmount DECIMAL(5,2),
CONSTRAINT FeedingPerformed_PK PRIMARY KEY (AnimalID, FoodNumber, CStaffID, FeedingDate, FeedingTime),
CONSTRAINT FeedingPerformed_FK1 FOREIGN KEY (AnimalID) REFERENCES Animal_T(AnimalID),
CONSTRAINT FeedingPerformed_FK2 FOREIGN KEY (FoodNumber) REFERENCES Food_T(FoodNumber),
CONSTRAINT FeedingPerformed_FK3 FOREIGN KEY (CStaffID) REFERENCES Staff_T(StaffID)
);

-- Create Maintenance Service Table
CREATE TABLE MaintenanceService_T
(
                                        MaintenanceNumber CHAR(4) NOT NULL,
                                        MaintenanceDescription VARCHAR(255),
CONSTRAINT MaintenanceService_PK PRIMARY KEY (MaintenanceNumber)
);

-- Create Maintenance Service Performed Table
CREATE TABLE MaintenancePerformed_T
(
                                        EnclosureNumber CHAR(4) NOT NULL,
                                        MaintenanceNumber CHAR(4) NOT NULL,
                                        CStaffID CHAR(4) NOT NULL,
                                        MaintenanceDate DATE,
                                        MaintenanceNotes VARCHAR(255),
CONSTRAINT MaintenancePerformed PRIMARY KEY (EnclosureNumber, MaintenanceNumber, CStaffID),
CONSTRAINT MaintenancePerformed_FK1 FOREIGN KEY (MaintenanceNumber) REFERENCES MaintenanceService_T(MaintenanceNumber),
CONSTRAINT MaintenancePerformed_FK2 FOREIGN KEY (EnclosureNumber) REFERENCES Enclosure_T(EnclosureNumber),
CONSTRAINT MaintenancePerformed_FK3 FOREIGN KEY (CStaffID) REFERENCES Staff_T(StaffID)
);

-- Create Treatment Table
CREATE TABLE Treatment_T
(
                                        TreatmentCode CHAR(4) NOT NULL,
                                        TreatmentDescription VARCHAR (255),
CONSTRAINT Treatment_PK PRIMARY KEY (TreatmentCode)
);
```

```
-- Create Treatment Performed Table
CREATE TABLE TreatmentPerformed_T
(
                                        VStaffID CHAR(4) NOT NULL,
                                        AnimalID CHAR(4) NOT NULL,
                                        TreatmentCode CHAR(4) NOT NULL,
                                        TreatmentDate DATE,
                                        TreatmentTime TIME,
                                        TreatmentResults VARCHAR(255),
CONSTRAINT TreatmentPerformed_PK PRIMARY KEY (VStaffID, AnimalID, TreatmentCode, TreatmentDate, TreatmentTime),
CONSTRAINT TreatmentPerformed_FK1 FOREIGN KEY (VStaffID) REFERENCES Staff_T(StaffID),
CONSTRAINT TreatmentPerformed_FK2 FOREIGN KEY (AnimalID) REFERENCES Animal_T(AnimalID),
CONSTRAINT TreatmentPerformed_FK3 FOREIGN KEY (TreatmentCode) REFERENCES Treatment_T(TreatmentCode)
);

-- Create Shipment Table
CREATE TABLE Shipment_T
(
                                        AnimalID CHAR(4) NOT NULL,
                                        SupplierNumber CHAR(4) NOT NULL,
                                        ArrivalDate DATE,
                                        ArrivalNote VARCHAR(255),
                                        NumberOfAnimals INTEGER,
CONSTRAINT Shipment_PK PRIMARY KEY (AnimalID, SupplierNumber, ArrivalDate),
CONSTRAINT Shipment_FK1 FOREIGN KEY (AnimalID) REFERENCES Animal_T(AnimalID),
CONSTRAINT Shipment_FK2 FOREIGN KEY (SupplierNumber) REFERENCES Supplier_T(SupplierNumber)
);
```

SQL FOR EXTERNAL VIEWS WITH JUSTIFICATIONS

This view will be useful for curators to look at to check the time interval between the last time each animal was fed. This view also filters out the feeding time for the day so that curators can check the feeding tracker daily and not have to filter throughout a variety of date and time entries.

```
--View Number 1
CREATE VIEW TimeSinceLastFeedingPeriod  V AS
SELECT FeedingPerformed_T.AnimalID, DATEDIFF(HOUR,
CURRENT_TIMESTAMP,FeedingPerformed_T.FeedingTime) AS TimeSinceLastFeedingPeriod,
                    FeedingPerformed_T.CStaffID AS LastFedBy,
                    FeedingPerformed_T.FeedingAmount, FeedingPerformed_T.FoodNumber,
Food_T.FoodDescription, Enclosure_T.EnclosureNumber
FROM FeedingPerformed_T, Food_T, Enclosure_T
WHERE DAY(FeedingPerformed_T.FeedingDate) = DAY(Current_TimeStamp)
```

Similarly to the above view, this view will be useful for curators as well. They will be able to filter the maintenance services performed within the current year and also see the time to date since the last service was performed.

```
--View Number 2
CREATE VIEW TimeSinceLastMaintenanceService_V AS
SELECT MaintenancePerformed_T.EnclosureNumber, DATEDIFF(DAYOFYEAR, CURRENT_TIMESTAMP,
MaintenancePerformed_T.MaintenanceDate) AS TimeSinceLastMaintenanceService,
                    MaintenancePerformed_T.CStaffID AS LastServicePerformedBy,
                    MaintenanceDescription, MaintenanceNotes
FROM MaintenancePerformed_T, MaintenanceService_T
WHERE YEAR(MaintenancePerformed_T.MaintenanceDate) = YEAR(Current_TimeStamp)
```

This view will be helpful to curators to be able to see which animals are not on display in an exhibit. Animals may not be on display for two reasons – they have just arrived at the aquarium and they have not yet been assigned an exhibit yet, or they are diseased or sick are being treated in the quarantine enclosure by the veterinarians.

```
--View Number 3
CREATE VIEW AnimalsNotOnDisplay_V AS
SELECT AnimalID, AnimalName
FROM Animal_T
WHERE ExhibitNumber IS NULL
```

This view will be helpful to both curators and veterinarians to be able to easily see the number of animals located in each enclosure. This not only helps the curators assign animals to different enclosures ensuring that the enclosures are not overpopulated but it also helps the veterinarians check how many animals are under their care to give everyone a clear picture of the aquariums health.

```
--View Number 4
CREATE VIEW NumberOfAnimalsPerEnclosure_V AS
SELECT EnclosureNumber, COUNT(EnclosureNumber) AS NumberOfAnimals
FROM Animal_T
GROUP BY EnclosureNumber
```