University of British Columbia, Vancouver
Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: __1_____

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Group Number: ____65_____

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

CPSC 304 Project Milestone 1: Aquarium Database

Project idea: **Aquarium Database Management system**

1) A brief project description answering these questions:
   a. What is the domain of the application?

   Answer: We are making an application for an aquarium, so the domain is Aquarium management/Animal Care/Logistics. Our database models core entities of an aquarium with respect to animal care by tracking the food, medical care, and living area provided. It also maintains information on logistics of management such as the individuals responsible for smooth operations.

   b. What aspects of the domain are modeled by the database?

   Answer: Our database is designed to comprehensively model the many aspects of an aquarium exhibition, capturing both its internal and external components. Our database models core entities of an aquarium which are water tanks, devices within the tanks/maintenance equipment, marine animals, aquatic plants, the supply chain of curated animal diet, and the individuals responsible for operations and maintenance. Our database also captures the structure and layout by describing specific sections where these exhibits are located. Our project aims to address and represent the intricacies of the aquarium domain. As an example of a real-life situation, the database can be applied to efficiently manage large-scale aquariums.

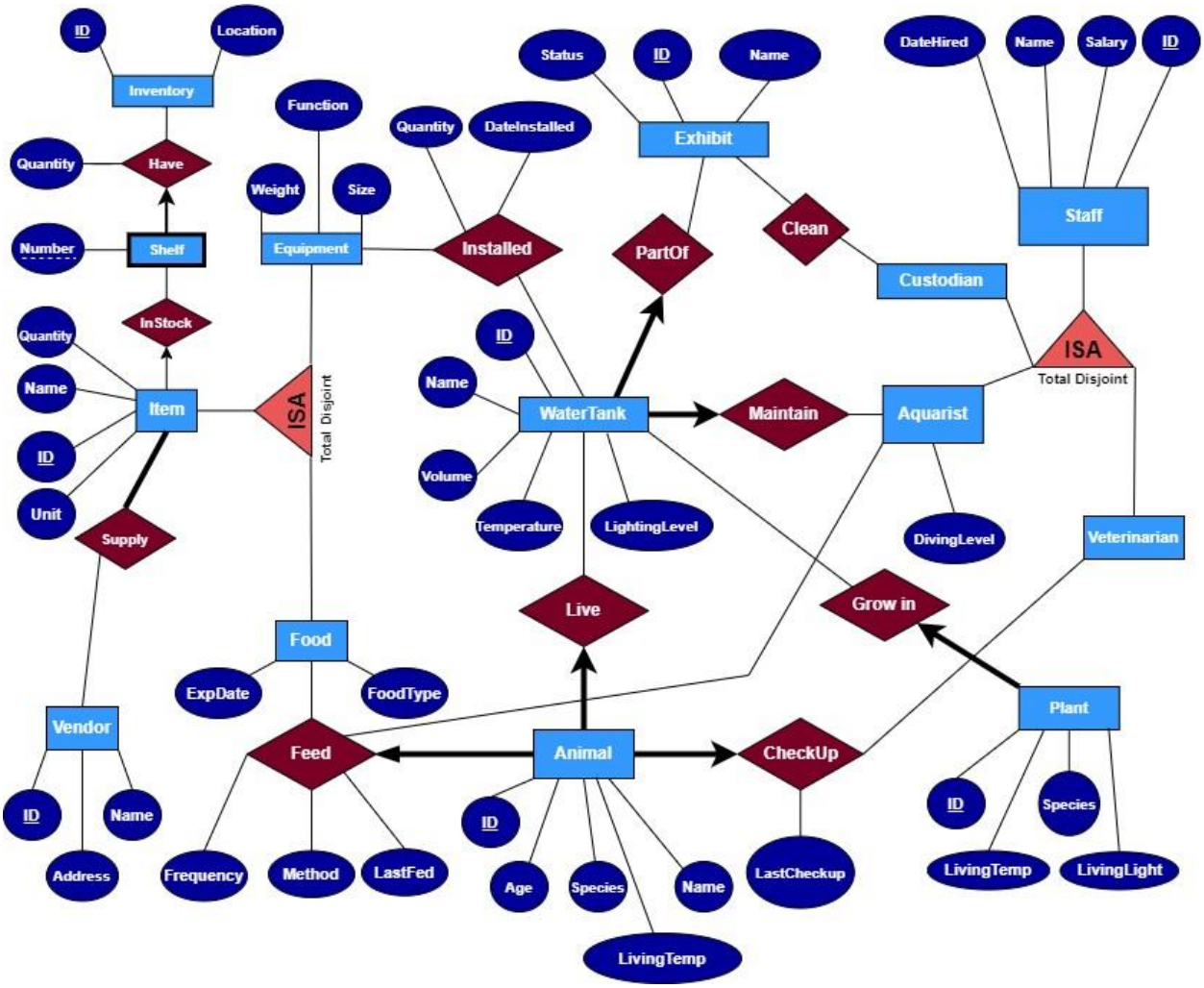
2) Database specifications: (3-5 sentences)

   Answer: The database provides a solution for effective aquarium management. It prioritizes the wellbeing of marine animals by tracking their food intake and medical records. Additionally, the system oversees inventory management, ensuring consistent availability of food, supplies, and equipment, while also facilitating maintenance of tanks and their components. Personnel management is also integrated, enabling managers to determine staff responsibilities for specific animals and enclosure. This database provides crucial information for the aquarium management operations which allows for easy identification of any changes or modifications needed for the successful management of the aquarium.

3) Description of the application platform:

Answer: We intend to use the UBC CS department's Oracle for our project database. Our anticipated application technology stack comprises Java and PHP. Some of the key libraries we intend to utilize include PDO (for PHP) and JDBC (Java Database Connectivity) for Java.

4) An ER diagram for the database that your application will use.



5) Other comments, as appropriate, to explain your project.

Our database consists of 9 entities, 11 relationships, 2 IsA relationships and one weak-entity relation. A clear and concise description of our project is listed below:

*All examples provided is not the final design but more so to describe our diagram

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Entities

WaterTank: The cornerstone of our aquarium database, the water tank is the home of our marine animals where they spend their days taken care of by our esteemed professionals. The attributes describing this entity are Name, ID, Volume, Temperature, and LightingLevel. The primary key for this entity is the ID. An example would be:

Name	ID	Volume	Temperature	LightingLevel
Dolphin Tank	SE00234	20H Gallons	25°C	MEDIUM

Animals: The animals are the life and soul of our aquarium. Different types of animals will be housed in different water tanks depending on their needs. The attributes describing this entity are ID, Age, Species, LivingTemp, and Name. The primary key for this entity is the ID. An example would be:

Name	ID	Age	Species	LivingTemp
Dolphin	SD7643	5 years	Spinner Dolphin	25°C

Exhibit: The water tanks in our aquarium will be located in different exhibits throughout our aquarium following a structured format. The attributes for this entity would be Name, ID and Status. An example would be:

Name	ID	Status
Dolphin Exhibit	AE56	OPEN

Item: This is the first entity in our diagram that has an IsA hierarchy. These are the building blocks of the aquarium which can be of two total disjoint types: food and devices. The attributes for this entity are ID, Name, Quantity, and Unit. The primary key for this entity is the ID.

- Devices are installed in our water tanks for their functionality. The additional attributes for devices are Weight and Size. An example would be:

ID	Name	Quantity	Unit	Weight	Function	Size
D123	Temperature Sensor	4	each	90g	Temperature Regulation	XSMALL

- Food is essential for our animals to remain healthy. The additional attributes for food are FoodType and ExpiryDate. An example would be:

ID	Name	Quantity	Unit	FoodType	ExpiryDate
F123	Fish Flakes	4	packets	Vegetarian	2023-10-09

Vendor: Our items are supplied by our trusted vendors which guarantee high quality and consistent stock. The attributes for this entity are ID, Address and Name. The primary key for this entity is the ID. An example would be:

ID	Name	Address
V45	ReelData	200-2085 Maitland Street, Halifax, NS B3K 2Z8, Canada

Shelf and Inventory: Inventory management is one of the focuses in our aquarium design. This is the weak entity relationship in our data. Inventory is an entity that has the attributes ID and Location. The key for this entity is the ID. An example would be:

ID	Location
I235	Section 2

The shelf where the inventory is stored is an entity that has the attribute Number. In order to identify the shelf, we need the inventory ID and the shelf number. The key for this entity is ID and Number. An example would be:

ID (from Inventory)	Number
I235	45

Plant: Plants are essential components of our water tanks as they help improve water quality and prevent algae growth. This entity has the attributes ID, Species, LivingTemp and LivingLight. An example would be:

ID	Species	LivingTemp	LivingLight
P456	Coontail	25°C	MEDIUM

Staff: This is the second entity in our diagram with an IsA hierarchy. The staff are what keep the aquarium up and running. The attributes for this entity are ID, Name, Salary and DateHired. There are three total disjoint types: Custodian, Veterinarian and Aquarist.

- Custodians are responsible for keeping our exhibits clean. There are no additional attributes. An example would be:

ID	Name	Salary	DateHired
E123	James Bond	$40000	2022-09-10

- Aquarists are in charge of maintaining our water tanks. There are no additional attributes. An example would be:

ID	Name	Salary	DateHired
E124	Robert Oppeinheimer	$60000	2022-09-11

- Veterinarians make sure our animals remain healthy by performing regular checkups. There are no additional attributes. An example would be:

ID	Name	Salary	DateHired
E124	Adnan Siddiqui	$80000	2022-09-12

Relationships

Have: This is a relationship between the entities Shelf and Inventory. There is a total participation constraint on Shelf and partial participation constraint on Inventory for this relationship. This relationship has an attribute called Quantity. There is a key constraint from shelf to inventory. Every shelf has some inventory in it. The cardinality of this relationship is many to one. Different inventory can be on one shelf.

InStock: This is a relationship between the entities Item and Shelf. There is a partial participation constraint on both entities. There is a key constraint from item to shelf. All items are in stock at their respective shelves. The cardinality of this relationship is many to one. Several items can be in stock on one shelf.

Supply: This is a relationship between the entities Vendor and Item. There is a partial participation constraint on both entities. There is no key constraint. The cardinality of this relationship is one to one as one vendor is responding for supplying one item.

Installed: This is a relationship between the entities Device and WaterTank. There is a partial participation constraint on both entities. There is a key constraint from water tank to device. This relationship has an attribute DateInstalled. The cardinality of this relationship is many to many. Several devices can be installed in many water tanks. The total quantity of item should match with the quantity of item Installed and the quantity of time InStock.

Feed: This is a relationship between the entities Food and Animal. There is a total participation constraint on Animal and a partial participation constraint on Food. There is a key constraint from animal to food. The cardinality of this relationship is many to one. Several types of food can be eaten by one animal.

Live: This is a relationship between the entities WaterTank and Animal. There is a total participation constraint on Animal and a partial participation constraint on WaterTank. There is

a key constraint from animal to water tank. The cardinality of this relationship is many to one. Several marine animals can live in one water tank.

CheckUp: This is a relationship between the entities Animal and Veterinarian. There is a total participation constraint on Animal and a partial participation constraint on Veterinarian. There is a key constraint from animal to veterinarian. The cardinality of this relationship is many to one. Several marine animals can be checked up on by one veterinarian.

GrowIn: This is a relationship between the entities Plant and WaterTank. There is a total participation constraint on Plant and a partial participation constraint on WaterTank. There is a key constraint from plant to water tank. The cardinality of this relationship is many to one. One veterinarian can check up on several marine animals.

Maintain: This is a relationship between the entities WaterTank and Aquarist. There is a total participation constraint on water tank and a partial participation constraint on Aquarist. There is a key constraint from water tank to aquarist. The cardinality of this relationship is many to one. Several water tanks can be maintained by an aquarist.

PartOf: This is a relationship between the entities WaterTank and Exhibit. There is a total participation constraint on WaterTank and a partial participation constraint on Exhibit. There is a key constraint from the water tank to exhibit. The cardinality of this relationship is many to one. Several water tanks can be part of one exhibit.

Clean: This is a relationship between the entities Exhibit and Custodian. There is a partial participation constraint on both entities. There is no key constraint. The cardinality of this relationship is one to one (could be many to one as well). One custodian is in charge of cleaning one exhibit.