

Zoo Database Management System

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Table of Content

I. Project Description	3
II. Use Cases	4
III. Existing Software Tools	6
IV. Database Requirements	7
IV.I Functional Database Requirements	7
IV.II Non-Functional Requirements	10
V. Entity Relationship Diagram (ERD)	11
VI. Entity and Attributes Description	12
VII. Entity Establishment Relationship Diagram (EER)	15
VIII. Business Requirements Description	16

I. Project Description

I will be building a zoo management database system that collects any animal that arrives in this zoo. I will be going with this sort of database system because to give these animals a healthy life and prosper, scientists and researchers need to know all there is to each of the creatures being displayed in these zoos. With the database system that I will be building, these analysts can let the managers as well as the employees know the special traits and features that each of the animals in the zoo has. From a management and visitor's point of view, this system will act as a point of sale, or POS. Managers will be able to track ticket sales for visitors and make sure the inventory the zoo has is in stock. If there needs to have a restock in a particular category, then the manager will be able to order more of that product to keep the zoo stock for any situation. Managers will also be able to view the database of the animals to maintain the zoo and keep it under control, adding any new animals that might be arriving at the zoo. On the visitor side, they will be able to view the prices for tickets as well as purchase tickets. The system will also have a calendar system where visitors will be able to schedule those tickets on a specific day. This might be in later implementations of the database, but visitors would be able to get an overview of a particular animal they find interesting. On the other hand, analysts such as official zoo researchers and scientists will be able to make edits to the animal database. That means they'll be able to edit any comments about the animal such as specific traits, enrichment, and food type. Regular zoo employees will be able to view the animal database as well as search for a particular species in order to find the details of an animal. This might be added later on, but employees would be able to group up a representation of what animals they're taking care of.

II. Use Cases

1. Getting a new animal; Actor: Nick (Head Director)
 - a. Nick is the head director who is responsible for the operation of the zoo as well as any future plans for development. He just got a new mountain lion named Geno that was transferred from a different zoo. After getting all the details from the previous zoo, he will use the data he gained to add Geno to the zoo animals database.
2. Geno's checkup; Actors: Mariah (Veterinarian), John (Veterinarian Technician)
 - a. After Nick gets Geno into the animal database, He and a few other workers get him to see Mariah, who is a veterinarian. Mariah does a detailed checkup on Geno to make sure he's been treated well. During the process, she has John, her assistant, take notes of anything she found as well as help her in any case. After the checkup, Mariah had John add any comments and health records into the database where Geno was located in the system.
3. Getting Geno situated; Actors: Nick (Head Director), Ben (Curator of Exhibits), Abel (Keeper)
 - a. Once Geno was checked up by Mariah and the vet crew, Nick and Ben built an exhibit for Geno to be located within the zoo. After the success of the exhibit design and creation, Abel, who is a keeper, was assigned to take care of Geno. Before Geno was placed, Abel used the database system to view the contents of Geno. She viewed things like food choices, enrichment, and specific toys that Geno was interested in. Once she gained all the information she needed, she

prepared the exhibit for Geno with the things that are included in the database system. After that, Geno was successfully placed inside his exhibit.

4. Checking on stock and back stocking; Actors: Peter (Finance Director), Nick (Head Director)
 - a. In order to maintain the inventory of the zoo, Nick checked in with the curators on what needed to be stocked. Once Nick had a list of things to be ordered, he met up with Peter, the finance director, and made sure that financially, the zoo was alright. Once everything was checkmarked, Nick then used the POS part of the database system to order the things that were in that list.
5. Visiting the zoo; Actors: Leah (customer/visitor), David (Visitor Service Manager)
 - a. Leah was interested in taking the opportunity on her off day to spend some quality time with her family at the zoo. Using the database system, she was able to view the pricing for the tickets, but she had questions. Therefore, she called the Visitor Service and David took the call. David answered all of the questions Leah had and she was able to buy the tickets with David using the database system to do so.

III. Existing Software Tools

One Software tool that zoos use is ZIMS. The Zoological Information Management Software, or ZIMS, is a software used by over 1000 zoos that helps zoos achieve the best management practice in zoos. ZIMS also has features such as breeding and aquatics that really benefits every zoo using it. This tool would benefit from my database system because it would also give more information about the animals from zoos that are using my system. It will give them much more research opportunities for their own software.

Another software tool that would benefit from my database system is the Association of Zoos and Aquatics. This will also give this tool more details on the behavior of animals as well as research on the unique aspects of the animal.

IV. Database Requirements

IV.I Functional Database Requirements

1. User
 - 1.1. A user shall make zero or one account
 - 1.2. A user can request for many ticket prices
 - 1.3. A user can buy many tickets
 - 1.4. A user can contact zero or many Visitor Service centers
 - 1.5. A user can be a visitor
 - 1.6. A user shall be answered by a Visitor Service worker
2. Head Director
 - 2.1. A head director shall work for one zoo
 - 2.2. A head director shall add zero or many animals
 - 2.3. A head director shall blueprint many exhibits
 - 2.4. A head director shall restock zero or many inventories
 - 2.5. A head director shall operate a zoo
 - 2.6. A head director shall maintain a zoo
3. Veterinarian
 - 3.1. A veterinarian shall checkup on zero or many animals
 - 3.2. A veterinarian shall make notes of zero or many animals' health?
 - 3.3. A veterinarian shall make zero or many comments?
 - 3.4. A veterinarian shall add zero or many health records?
4. Exhibit Curator
 - 4.1. An exhibit curator shall design many exhibits
 - 4.2. An exhibit curator shall assemble many exhibits
5. Keeper
 - 5.1. A keeper shall take care of many animals
 - 5.2. A keeper can view many inventories
 - 5.3. Keepers can talk to many visitors
 - 5.4. A keeper shall put out many food choices
 - 5.5. A keeper shall put out many enrichments
 - 5.6. A keeper shall put out zero or many toys
 - 5.7. A keeper shall maintain many exhibits
6. Finance Director
 - 6.1. A finance director can see many inventories
 - 6.2. A finance director shall manage many financial decisions
 - 6.3. A finance director can view many sales

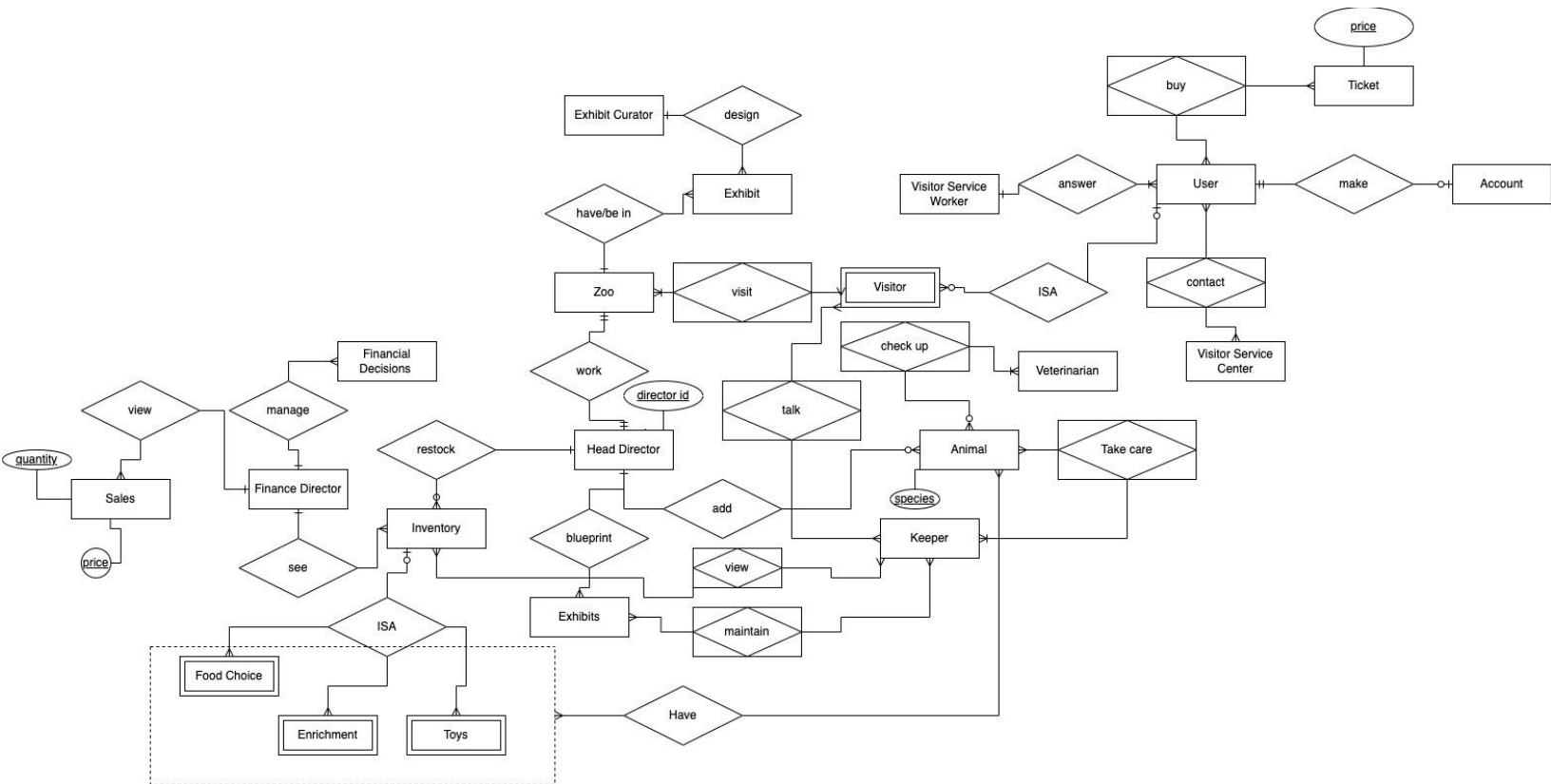
7. Visitor
 - 7.1. Visitors shall visit at least one zoo
 - 7.2. A visitor can be a user
 - 7.3. A visitor can talk to many keepers
8. Account
 - 8.1. An account shall be made by only one user
9. Ticket price
 - 9.1. Ticket prices can be requested by many users
10. Ticket
 - 10.1. Tickets can be bought by many users
11. Visitor Service centers
 - 11.1. A Visitor Service center can be contacted my many users
12. Visitor Service worker
 - 12.1. A Visitor Service worker shall answer at least one user
13. Zoo
 - 13.1. A zoo shall have only one head director
 - 13.2. A zoo shall have many visitors
 - 13.3. A zoo shall be operated by a head director
 - 13.4. A zoo shall be maintained by a head director
 - 13.5. A zoo shall have many exhibits
14. Animal
 - 14.1. An animal shall be added by a head director
 - 14.2. An animal shall be checked up by at least one veterinarian
 - 14.3. An animal shall be taken care of by at least one keeper
 - 14.4. An animal can have many food choices
 - 14.5. An animal can have multiple enrichments
 - 14.6. An animal can have many toys
15. Animal's health
 - 15.1. An animal's health shall be noted by many veterinarians
16. Exhibit
 - 16.1. An exhibit shall be planned out by a head director
 - 16.2. An exhibit shall be designed by an exhibit curator
 - 16.3. An exhibit shall be assembled by at least one exhibit curator
 - 16.4. An exhibit shall be maintained by many keepers
 - 16.5. An exhibit shall be in one zoo.
17. Inventory
 - 17.1. An inventory can be viewed by many workers
 - 17.2. An inventory shall be restocked by a head director
18. Financial decisions
 - 18.1. Financial decisions shall be managed by a financial director

- 19. Sales
 - 19.1. Sales can be viewed by directors
- 20. Food Choice
 - 20.1. A food choice can be put out by a keeper
 - 20.2. A food choice can be used by many animals
- 21. Enrichment
 - 21.1. An enrichment can be used for multiple animals
 - 21.2. An enrichment shall be placed out by a keeper
- 22. Toys
 - 22.1. A toy can be given out to many animals
 - 22.2. A toy shall be put out by a keeper
- 23. Health record
 - 23.1. A health record shall be added by multiple veterinarians

IV.II Non-Functional Requirements

1. Security
 - 1.1. Passwords need to be encrypted
 - 1.2. Account will be locked after 5 attempts
 - 1.3. Backup file shall be reset every day at 11:59pm
2. Legal
 - 2.1. Keep regular checks with PETA
 - 2.2. Must comply with animal welfare regulation
3. Performance
 - 3.1. Query response must return data in 1ms or more
 - 3.2. Query shall be able to handle multiple operations effectively
4. Capability
 - 4.1. Each table shall assign no more than 3mb of memory
 - 4.2. System shall accommodate for all sorts of animal species and classifications
5. Backup
 - 5.1. Database shall be backed up once every day
 - 5.2. Database shall back up all data and will alert if an issue is detected
6. Environmental
 - 6.1. Database system shall be kept at cool temperatures
 - 6.2. System shall minimize energy consumptions and shall consider the use of eco-friendly hardware.
7. Usability
 - 7.1. Interface shall be creative, but easy to use
 - 7.2. System shall include searching and filtering
8. System Requirements
 - 8.1. System shall require the use of Ryzen 7
 - 8.2. System shall be provided 16 GB of memory
9. Storage
 - 9.1. Storage shall be big enough to cover all data volume
 - 9.2. System shall be able to utilize compression if necessary
10. Organizational
 - 10.1. System shall have a FAQs or help desk for support
 - 10.2. Provide training for all staff
11. Scalability
 - 11.1. The system shall support an increasing amount of concurrent users simultaneously
 - 11.2. The system shall support a growing volume of animal data

V. Entity Relationship Diagram (ERD)



VI. Entity and Attributes Description

1. User (Strong)
 - a. user_id: key, numeric
 - b. name: composite, alphanumeric
2. Head Director (Strong)
 - a. zoo: key, alphanumeric
 - b. director_id: key, numeric
 - c. age: numeric
 - d. email: alphanumeric
 - e. name: composite, alphanumeric
3. Veterinarian (Strong)
 - a. vet_id: key, numeric
 - b. email: alphanumeric
4. Exhibit Curator (Strong)
 - a. curator_id: key, numeric
 - b. curator_name: alphanumeric
 - c. age: numeric
5. Keeper (Strong)
 - a. keeper_id: key, numeric
 - b. name: alphanumeric
 - c. age: numeric
6. Finance Director (Strong)
 - a. director_id: key, numeric
 - b. name: alphanumeric
 - c. age: numeric
 - d. email: alphanumeric
7. Visitor (Weak)
 - a. user: key, numeric
 - b. zoo: key, numeric
 - c. visitor_id: key, numeric

- d. age: numeric
 - e. Ticket: key, numeric
8. Account (Weak)
- a. user: key, numeric
 - b. account_id: key, numeric
 - c. email: alphanumeric
9. Ticket (Strong)
- a. price: numeric
 - b. ticket_id: key, numeric
10. Visitor Service Center (Strong)
- a. center_id: key, numeric
11. Visitor Service worker (Strong)w
- a. Visitor_Service_Center: key, numeric
 - b. worker_id: key, numeric
 - c. name: alphanumeric
 - d. age: numeric
12. Zoo (Strong)
- a. zoo_id: numeric
 - b. zoo_name: alphanumeric
13. Animal (Strong)
- a. animal_id: key, numeric
 - b. name: alphanumeric
 - c. species: alphanumeric
 - d. health: alphanumeric
 - e. age_in_years: numeric
 - f. sub_species: alphanumeric
 - g. height: numeric
 - h. Food_choice: key, numeric
 - i. enrichment: key, numeric
 - j. toys: key, numeric
 - k. type: alphanumeric

- l. vet: key, numeric
 - m. keeper: key, numeric
14. Exhibit (Strong)
- a. animal: key, numeric
 - b. Exhibit_id: key, numeric
 - c. zoo: key, numeric
 - d. exhibit_curator: key, numeric
15. Inventory (Strong)
- a. inventory_id: key, numeric
 - b. name: alphanumeric
 - c. quantity: numeric
16. Sales (Strong)
- a. sales_id: key, numeric
 - b. name: alphanumeric
 - c. quantity: numeric
 - d. quantity_sold: numeric
 - e. total_money_made: numeric
17. Food choice (Strong)
- a. food_id: key, numeric
 - b. name: alphanumeric
 - c. quantity: numeric
18. Enrichment (strong)
- a. enrichment_id: key, numeric
 - b. name: alphanumeric
 - c. quantity: numeric
19. Toys (strong)
- a. toy_id: key, numeric
 - b. name: alphanumeric
 - c. quantity: numeric

VII. Entity Establishment Relationship Diagram (EER)

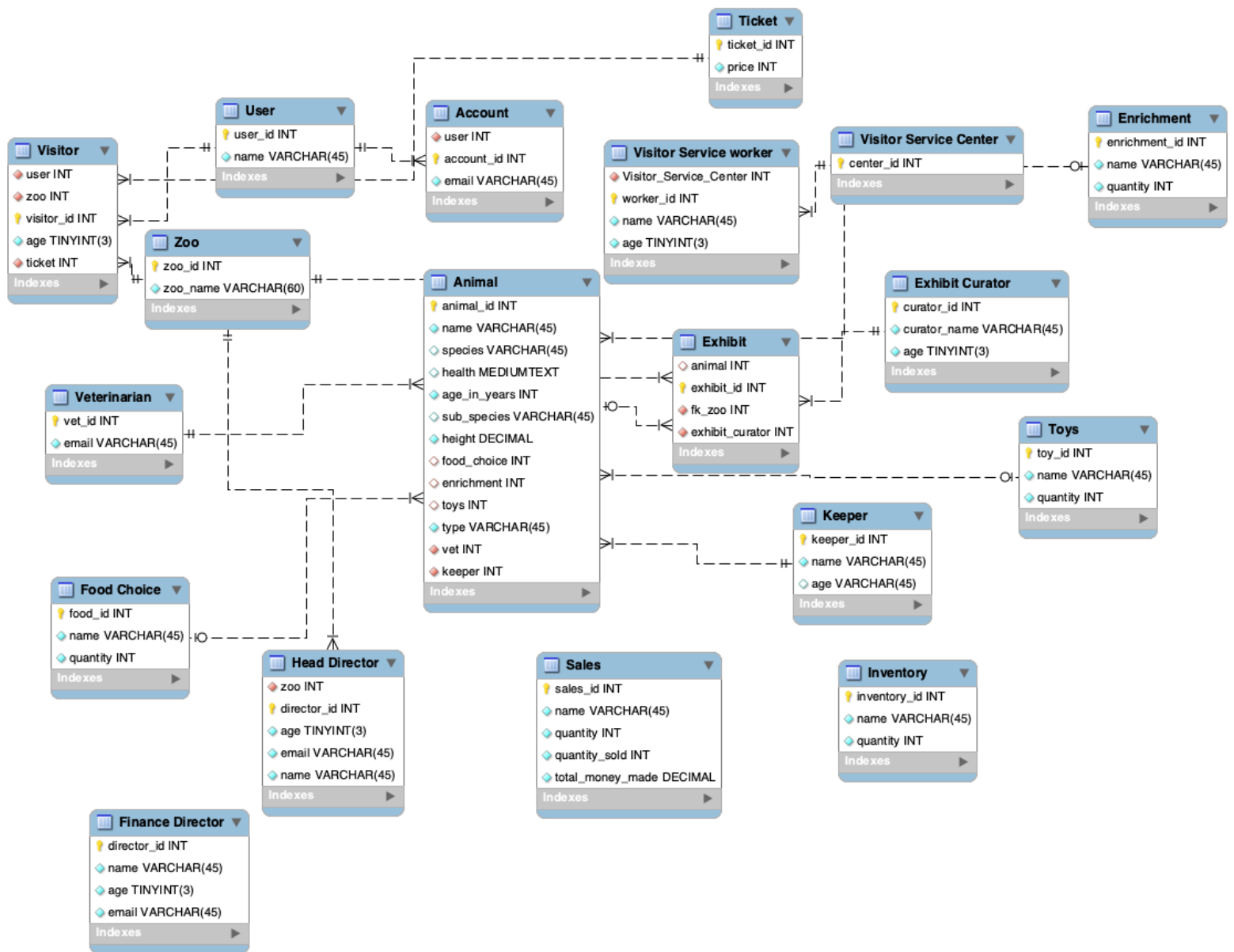


Table	FK	On Delete	On Update	Comments
Account	user	ON CASCADE	ON CASCADE	If a user is deleted, that user's account will also be deleted

VIII. Business Requirements Description

1. The user shall find every animal that is a big cat and is older than <X>
2. The user shall be able to calculate the average profit of sales in a day
3. The user shall see the number of keepers taking care of animals who are mammals who are <X>years old.
4. For each food choice, the user shall be able to find which animals have the same food choice, are taller than <X> feet, and are land animals.
5. The user shall calculate the average sales of food products in a day
6. The user shall be able to find all of the sea animals who have been in the zoo for less than <X> months and who have been checked on by the same vet
7. The user shall find all of the animals who had their exhibit built by the same exhibit curator for no less than <X> years.
8. The user shall find which birds that have been in the zoo for <X> months and eat <X> pounds of food a day
9. The user shall calculate which land animals get the most attractions and who have been in the zoo for less than <X> months
10. The user shall find all of the keepers who are taking care of the reptiles who the same vet is checking up
11. The user shall find all staff members who have been working for <X> years and starts with the letter "T"
12. The user shall be able to see the number of animals that are mammals that uses the same enrichment items.
13. For each animal, the user shall see all the land animals that use the same toys.
14. For each sale, the user shall calculate the total amount of money made in a day
15. The user shall find all sea animals treated by the same vet who has been a vet for less than <X> years.
16. The user shall find all the users who have spoken to the same Visitor Service worker.
17. The user shall find the number of birds that can fly that are <X> years old and have been checked up by the same vet
18. The user shall be able to find the number of reptiles that have been in their exhibit for more than <X> years and have been taken care of by the same keeper
19. The user shall find all fishes that eat the same food choice that is <X> years old that has been taken care of by the same keeper.

20. The user shall find all mammals that have not been checked up by a vet and is more than <X> years old