

Description	Max Marks	Marks Obtained
Correct requirement identified from the case study given	30	
Reasonable Assumptions	10	
Identifying Entities with a proper unique identifier	20	
Identifying the Relationship, Generalisation/Specialisation hierarchies	20	
Multiplicity	20	
Total	100	

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1.1 User Requirement

Pond Management

- The system should allow adding, editing, deleting, and tracking information about each pond including ID, location, size, stocking density.
- Each pond only has one species of fish, and each pond has one or more fish.

Fish Species Management

- Add and edit information about each fish species including species name, size, weight, age, health status, and market value.
- The system should access fish populations, habitats, and fishing operations to track catch information, evaluate population trends, and identify patterns in fish distribution and abundance.

Feeding Activities

- Record feeding activities for each pond including date, time, feed type, quantity, and cost.
- Evaluate feeding schedules and production plans considering the resources that are available and the anticipated demand.

Equipment

- Manage aquafarming equipment such as air blowers, pipes, and water pumps.

Inventory Tracking

- Record the inventory information including inventory ID, inventory name, inventory expired date, inventory purchase date.
- Track the inventory of fingerlings, fish feed, medications, and other aquafarming equipment.

Vendor Management

- The system should allow to manage information of vendors, including supply name, fingerlings, feed, equipment, contact details, products or services offered and payment terms.

Employee

Record the employee's name, ID, age, contact information, and job task.

- Two employees should be distinguished by the system according to their tasks such as fish feeding, and dirty water replacement, and other related activities.
- The system should allow to record one employee specifically work on marketing to sell the growth fish to end customers, agents, and the fish seller at market.
- One employee should use the system to record their marketing tasks, specifically selling growth fish to end customers, agents, and fish sellers at the market.
- Report on fish mortality, growth, inventory levels, and other expenses such as water and electricity, and analyse to enhance feeding tactics, inventory control, and resource allocation to facilitate more informed choices.

Sales Tracking

- Record daily sales transactions for selling grown fish to consumers.
- Generate an online invoice sent by email to customers to become proof of sales.

Customer Details

- The system should allow record information about customers including ID, name, contact details, purchase date, and purchase history.
- The system allows record customer feedback or market demand data to better align with customer preferences and market trends.

Monitoring and Control

- Monitor PH, oxygen level, salinity, and water conditions are crucial since aquatic organisms are highly sensitive to their surrounding environment.

Payment Method

- Vendor can either use online banking or cash for their payment.

Medicine

- The history of treatment provided to the aquatic organisms can be track if we record the medication.
- In order to prevent any health risks to consumers since there are certain medication in aquafarming have withdrawal period and cannot sell to the consumers.

Mortality

- Record the mortality help aquafarmer identify which batches or areas are affected.
- Record the mortality date and the quantity of the fish.
- Record the mortality fish species can help aquafarmer identify which fish species mortality rate high.

Aquafarming Operation

- Record water and electricity help aquafarmer their expenses on water and electricity.
- Record water litre and watt usage.

1.2 Assumptions

Pond Management

- Each pond is assumed to contain only one species of fish to simplify data management and tracking.
- Each pond is assigned a unique identifier (ID) to distinguish it from other ponds in the system in order to avoid data conflicts and confusion within the system.
- Size of each pond is assumed to be measured and stored using a standardized unit, such as pond size (square meter), temperature (Celsius), and dissolved oxygen (mg/l=ppm).
- Stocking density is assumed to be measured in terms of fish per square meter and is recorded to optimize the fish growth and health within each pond.
- Water quality parameters such as temperature, pH, and dissolved oxygen levels are assumed to be tracked, measured, and updated periodically for each pond.
- Assumed that each pond contains a sufficient water volume to support the aquatic ecosystem and fish population without significant fluctuations.
- The system tracks historical data for each pond, allowing users to view past records of pond information, fish stocking, and water quality parameters.

Fish Species Management

- Fish species information such as size, weight, and age of each fish are tracked in the system and measured in standardized units, such as length (centimetres), weight (kilogram), and age (year).
- Information about the health status of each fish species is recorded, including indicators such as disease status, parasite infestation, or health condition.
- The market value is recorded of each fish species, allowing users to track changes in value over time.
- The system tracks catch information, including details such as species caught, quantity, location, and date of catch.
- Data analysis tools or algorithms are implemented within the system to evaluate population trends based on catch information.

Feeding Activities

- Each feeding activity is assigned a unique identifier (ID) to distinguish it from other feeding activities in the system.
- Feeding activities are scheduled and logged regularly to maintain accurate feeding records and ensure proper nutrition for the fish.
- Feed type and quantity are recorded accurately for each feeding session.
- Information about available resources for feeding activities, such as feed inventory and equipment availability, is tracked in the system to inform production planning.

Equipment

- Each equipment item is assigned to a unique identifier (ID) to distinguish it from other equipment in the system.
- Information about each equipment item is stored in the system, including attributes such as equipment type, brand, model, capacity, and installation date.
- The system tracks maintenance activities for each equipment item, including scheduled maintenance, repairs, replacement of parts, and usage logs.
- The system includes functionality for managing equipment inventory, such as tracking stock levels and monitoring usage.

Inventory Tracking

- Each inventory item is assigned a unique identifier (ID) to distinguish it from other inventory items in the system.
- Information about each inventory item is stored in the system, including attributes such as inventory name (fingerlings, fish feed, medications, and equipment), expiration date, and purchase date.
- The system tracks the expiration dates of inventory items, allowing users to monitor and manage the use of fresh supplies to prevent wastage and ensure product quality.
- The system tracks the usage of inventory items, including quantities used and dates of usage, enabling users to monitor inventory consumption.

Vendor Management

- Each vendor is assigned a unique identifier (ID) to distinguish them from other vendors in the system.
- Information about each vendor is stored in the system, including attributes such as vendor name, contact details (address, phone number, and email), and products or services offered (fingerlings, fish feed, and equipment).
- The system allows users to record payment terms of each vendor, including details such as payment due dates, delivery schedules, and penalties for non-compliance.
- Contract details are recorded in the system, including information such as contract start and end dates, renewal options, and terms of termination.
- The system tracks vendor performance metrics, such as delivery reliability, product quality, and customer service satisfaction ratings, to evaluate performance over time.
- Vendors supplying fingerlings, feed, equipment, and other supplies are reliable and provide high-quality products.

Employee

- Each employee is assigned a unique identifier (ID) to distinguish it from other employees in the system.
- Employee information is recorded in the system, including attributes such as name, ID, age, contact information, and job task.
- Employees are assigned specific tasks based on their expertise, skills, and job roles.
- Employees are categorized based on their assigned tasks such as fish feeding, dirty water replacement, and marketing to facilitate organization and management.
- The system includes reporting functionality to generate reports on various metrics, such as fish mortality, growth, inventory levels, and expenses (water electricity), and analyzed the report to enhance the feeding tactics, inventory control, and resource allocation, enabling more informed decision-making.
- Employee performance is evaluated based on key performance indicators (KPIs) related to their assigned tasks and responsibilities.

Sales Tracking

- Each daily sales transaction for selling grown fish to consumers is logged with details in the system, including transaction date, customer information, quantity of fish sold, sales prices, and payment method.
- The system calculates profits for HIT company after selling the fish based on sales transactions recorded, where the profit calculation takes into account factors such as cost of production, including expenses related to fish rearing, feeding, equipment maintenance, and utilities (water and electricity).
- The system generates online invoices for each sales transaction and sends them to the customers via email and this invoice serves as a proof of sales and includes details such as transaction date, customer information, items sold, quantity, unit price, total amount, and payment terms.
- The system automatically sends invoices to customers via email upon completion of sales transactions.
- The system tracks the status of invoices, including whether they have been sent, viewed, paid, or overdue to monitor payment status and follow up with customers as needed.
- The system tracks payment status for each invoice, including payment due dates, payment received, and outstanding balances.
- Payment reminders via email sent automatically to customers for overdue invoices to facilitate timely payment.

Customer Details

- Each customer is assigned a unique identifier (ID) to distinguish them from other customers in the system.
- The system records information about customers, including attributes such as customer ID, name, contact details (address, phone number, and email), purchase date, and purchase history.
- The system tracks the purchase history of each customer, recording details such as transaction dates, items purchased, quantities, and total amounts spent, which provides insight into customer buying behavior and preferences.
- The system allows recording of customer feedback (comments, suggestions, or surveys related to products, services, or overall customer experience) or market demand data to better align with customer preferences and market trends.

- The system includes tools for analyzing customer feedback and market demand data to identify trends, preferences, and opportunities for products or services improvement or expansion.

Monitoring and Control

- The system integrates with sensors capable of monitoring key water parameters such as pH, oxygen level, salinity, and temperature and record the data.
- The system collects real-time data on water parameters from the integrated sensors, ensuring that the information is up-to-date and accurate.
- The system monitors water parameters against predefined threshold values and triggers alerts or notifications if any parameter exceeds or falls below the acceptable limits.
- The system retains historical data on water parameters to allow aquafarm operators to analyze trends, patterns, and fluctuations over time which helps to identify long-term environmental changes and make informed decisions regarding aquafarming practices.

Payment Method

- The system records the payment methods (online banking and cash) used when purchasing items from vendors.
- The system records details for each purchase transaction such as the vendor, purchase date, items purchased, total amount, and payment method used.
- The system integrates with online banking platforms to facilitate secure and seamless payment processing for transactions using online banking.
- The system records details for transactions using cash payments such as the amount of cash tendered, the change given, and any other additional notes or comments related to the transaction.
- The system tracks the status of each transaction to indicate whether the transaction has been paid in full, partially paid, or remains unpaid.
- Upon completion of a transaction, the system generates receipts of both HIT company and the vendor to provide proof of the transaction and payment method used.
- The system verifies the payment confirmation from the bank or financial institution before updating the transaction status as paid for the online transactions.

Medicine

- The system records the details of medications administered to aquatic organisms, including the medication name, dosage, administration date, duration of treatment, and the target species.
- Each instance of medication administration is logged in the system to monitor health trends and track the effectiveness of treatments over time.
- The system records the duration of the withdrawal period after treatment for medications that have withdrawal periods.
- The system generates alerts or notifications to remind aquafarm operators when aquatic organisms are still within the withdrawal period medication and administration to prevent accidental sale.
- Medications used are tracked to monitor medication stock levels, usage, and expiration dates in order to ensure timely replenishment and prevent stockouts.

Mortality

- The system records instances of mortality among aquatic organisms and each mortality event are logged with details such as date, quantity of fish affected, and any other relevant observations or notes.
- Mortality events are associated with species batches or areas within the aquafarm to identify the patterns and trends in mortality occurrence across different production batches or areas.
- The system records the species of fish affected by each mortality event, helping to identify which fish species are more susceptible to mortality and allows for targeted interventions or adjustments to management practices.
- The system provides reporting and analysis tools to generate insights into mortality trends, species-specific mortality rates, and factors contributing to mortality, in order to support data-driven decision-making and continuous improvement.

Aquafarming Operation

- The system records usage of water and electricity in aquafarming operations and each usage event is logged with details such as date, quantity of water used in liters, and electricity consumed in watt-hours.

- Aquafarm operators can track their expenses related to water and electricity based on the recorded resource usage and the system calculates expenses using predefined rates or tariffs for water and electricity.
- The system provides tools for analyzing resource usage efficiency such as water and electricity consumption per unit of production or per area of aquafarm to identify opportunities for improving resource efficiency and reducing operational costs.
- The system records the usage data of water and electricity over time, allowing the aquafarm operators to track usage patterns, monitor trends, and compare current usage with historical data.

1.3 Entity Relationship Diagram (ERD)

