UNIVERSITÀ DEGLI STUDI DI PADOVA

DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

Foundations of Databases A.Y. 2021-2022
Homework 2 – Conceptual and Logical Design

Master Degree in Computer Engineering
Master Degree in Cybersecurity
Master Degree in ICT for Internet and Multimedia

Deadline: November 26, 2021

Team acronym	TAGMS	
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Conceptual Design

Variations to the Requirement Analysis

There are no relevant variations to Requirements Analysis.

Entity-Relationship Schema

Data Dictionary

Entities Table

Entity	Description	Attributes	Identifier
Employee	Represents data of an employee who works in the company and needs access to the system	• Badge_number • First_name • Last_name • Phone_number • Email • Password • ID_role • ID_department	Badge_number
Role	Represents data on the role of employees who work in the company	• ID_role • Name • Description	ID_role
Department	Represents data on the departments in which employees work	• ID_department • Name • Description	ID_department

Customer	Represents data about a customer of the company	• ID_customer • First_name • Last_name • Phone_number • Email • Address	ID_customer
Contract	Represents data about a contract stipulated between a supplier and a manager for the supply of items	• ID_contract • aaa	ID_contract
Order	Represents the order placed by the customer through the seller	• Date_order • ID_order • Sub_total • Product_name • Product_type • Product_quantity	ID_order
Payment	Represents the type of payment used by the customer to pay	• Method_payment • ID_payment	ID_payment
Inventory	Represents the inventory of the products that have been produced and ready to be sold	• Element_quantity • ID_storage • ID_inventory • ID_product	ID_inventory
Storage	Represents all the types of elements present in the inventory	• ID_storage • Name	ID_storage

Product	Represents the final product that is marketed	• Product_name • Description • ID_product • Item_list • Product_category	ID_product
Item	Represents the raw material from which the final products will be produced	• Item_type • Description • ID_item • Nutritional_values	ID_item
Invoice	Represents the invoice associated with the order placed by the customer	• Total_amount • Product • Quantity • ID_invoice • Nutritional_values	ID_invoice

Relationships Table

Relationship	**Description**	**Component Entities**	**Attributes**
Has	Relates each employee to a role	• Employee (0,1) • Role (0,N)	None
Belongs to	Assigns each employee to a department	• Employee (0,1) • Department (0,N)	None

Stocked into	Specifies the items and product stocked in the inventory	• Item (0,1) • Product (0,1) • Inventory (0,N)	None
P_belongs_to_c	Links product to the category	• Product (0,1) • Product category (0,N)	None
I_belongs_to_c	Links item to the category	• Item (0,1) • Item category (0,N)	None
Made up of	Describes which items are involved into creation to the product	• Item (0,N) • Product (0,1)	None
Agree	Represent the contract between the supplier and the company	• Supplier (0,1) • Employee (0,N) • Item (0,N) • (Contract (1,1) (da vedere))	(date_contract da vedere)
Ships	Relates the employee shipping the order with the order itself and the shipment details	• Employee (0,1) • Shipment (1,1) • Order (0,1)	None

External Constraints

Functional Requirements Satisfaction Check

The DBMS has to be able to:

- **store all the details of the employees, customers and suppliers in the organization:** Entities Employee and Role store data related to the employees. Entity Customer has info about the customers and entity Supplier has data related to the Supplier.

- **allow the employees to update their personal information:** Entity Employee has some attributes as Email, Password or Phone Number which can be changed.
- **store details of all on-hand products in the warehouse such as item code, item description, quantity and expiration date:** Entities Product, Item and Inventory and the relationship Stocked store this data.
- **allow the employees to log into the system and enter the inbound items they received with information item code, item description, quantity, expiration date and supplier:** With attributes Email and Password employees log in the application and insert this data in Entities Product,Item and Inventory.
- **show and generate the list of inbound and outbound transactions:**
- **allow the employees to log into the system and enter the outbound transaction needed for the issuance of the products in the production and shipment to the customers:**
- **inventory stocks will be automatically updated whenever there are inbound and outbound transactions:**
- **show and generate the current inventory balance or stock inquiries:**
- **receive and process the Customers order, specifying which products they want and respective quantity:**
- **modification and cancellation of orders:**
- **allow users to view order and shipment status of finished products:**
- **generate invoice whenever payment has been made**
- **permit transfer of items and products:**
- **grant Cycle Counting in order to validate the accuracy of inventory:**
- **re-ordering the previous orders is allowed:**
- **create tracking code for orders:**

The system must store

- Customer data:
- Employee data with its activity:
- Any action of the employee on the order will be stored on the Order entity.

The system must allow Customers to:

- View orders and shipping specifications
- Customer will be able to check where the order is with the tracking number.

The system must allow Employee to:

- Login to system using the email address and password
- Modify/delete the order
- modify their personal information

Logical Design

Transformation of the Entity-Relationship Schema

Redundancy Analysis

Choice of Principal Identifiers

Analysis of Database Load

Relational Schema

Data Dictionary

Relation	Attribute	Description	Domain	Constraints
Relation 1				
Relation 1				

External Constraints

Group Members Contributions