Business Description

Gas Station Network

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1. BUSINESS DESCRIPTION

1.1. Business background

Gas-Point is a leading company in the Silesia region of Poland that operates a network of 50 gas stations. Our stations provide customers with a wide range of products and services, including petrol, food, small toys, and car devices. Additionally, we offer a car wash facility, making Gas-Point a one-stop shop for all client automotive needs.

The petrol stations are strategically located in key areas across the Silesia region, making it convenient for drivers to access fuel and other services whenever they need them. Gas-Point offer an exceptional service by hiring a group of over 200 employees on different level positions.

Each Gas-Point station is staffed by a team of employees, including a station manager, cashiers, and attendants, cleaning staff. The station manager is responsible for overseeing the day-to-day operations of the station, ensuring that all employees are performing their duties efficiently and effectively. The cashiers are responsible for handling customer payments, issuing invoices when necessary, and keeping accurate records of all transactions. The attendants are responsible for filling petrol, cleaning vehicles, and assisting customers with any inquiries they may have. The cleaning staff is responsible for keeping the station area in a good shape.

Each employee is not assigned to one dedicated station – employees can be moved among stations according to current needs and their preferences.

1.2. Software and system in place

Gas-Point has a computer system connected to the company's network and database at each station. This system allows us to keep track of all purchases made at the station, including the sale of petrol, food, toys, car devices, and car wash services. Each transaction is recorded in the system/database, along with the payment details.

The software also allows the employees to issue invoices when necessary (if applicable), which are saved in the database. The system saves the customer's company data so that when an invoice is issued more than once, the employee does not have to populate all fields regarding the customer again. This ensures that the invoicing process is efficient and accurate, saving our customers and employees time and effort.

In the database also data regarding each station facility, current staff, and store products are kept.

1.3. Data insertion and updates

Gas-Point's computer system called GPsys is designed to automatically insert data regarding purchases and services provided into our database in real-time (when a purchase is being completed at each station).

The client company data needed to issue an invoice are populated once by staff members and kept in the database in case they would be re-used in another invoice.

However, the data relating to staff, facilities, and assortment is maintained by our database administrators. They are responsible for overseeing the management and maintenance of our database, ensuring that it is always up-to-date and functioning properly. Our database administrator ensures that all non-transactional information is accurately recorded and kept up-to-date.

1.1. Database description

The primary table within the database is the Transaction table, which contains comprehensive information about each purchase made, including a unique transaction ID number generated automatically for each transaction, the date and time of the purchase, the station ID at which the transaction occurred, the staff ID of the employee responsible for conducting the transaction, and payment_id related with the transaction.

The Payment table captures essential information about payments, including a unique payment ID, the date of the payment, the amount paid, the payment method, and an invoice number (if applicable). This information is critical for tracking and managing financial transactions accurately. Also, it is important to highlight that payment for one transaction cannot be splited – meaning to each transaction one payment is assigned (1-to-1 relation).

The Payment table is connected to the Invoice table, which contains comprehensive information about each invoice issued, including the invoice number, the date of issue, the customer information, payment terms (always 7, 21, 30 or 90 days), and taxes (percentage).

In addition, the Station table provides valuable data regarding each Gas-Point facility, including its name, full address (city, street, number, postal code in one cell), and capacity. Capacity refers to the maximum number of cars that can be served at any given time.

2. MODEL DESCRIPTION

2.1. Definitions & Acronyms

Business Definitions

Station – a retail facility that sells fuel for vehicles and in addition to fuel, it also provide a range of other products and service.

GPsys - an app used by staff to save all transaction and payment details, customer data, product data.

Database Definitions

Entity - the table in a database, which contains data referring to a specific object or concept, e.g., the entity Passengers contains data describing every single passenger.

Record - a row in a table.

Attribute - an attribute is a characteristic or a property of an entity that is being represented by the table. It is a column or a field that describes some aspect of the data that is being stored in the table, e.g., in a table that represents a passenger, attributes include name, address, and phone number. Attributes are stored in the columns.

Relation - (also relationship or link) is a connection or an association between the data in one table and the data in another table, usually based on a common field (called PK and FK) in the two tables. The relationship allows data to be retrieved or manipulated across the tables using queries or other database operations.

One-to-one - a type of relationship between two tables in which each record in one table is associated with at most one record in the other table.

One-to-many - a type of relationship between two tables in which each record in one table can be associated with one or many records in the other table, but each record in the second table can only be associated with one record in the first table.

Many-to-Many - a type of relationship between two tables in which each record in one table can be associated with one or many records in the other table, and vice versa. This means that for each record in the first table, there may be one or more corresponding records in the second table, and for each record in the second table, there may be one or more corresponding records in the first table.

Data Type - a classification of data that specifies the type of values that can be stored in a particular column of a table. The data type determines how the data is stored, processed, and retrieved, and it defines the set of operations that can be performed on the data.

Acronyms

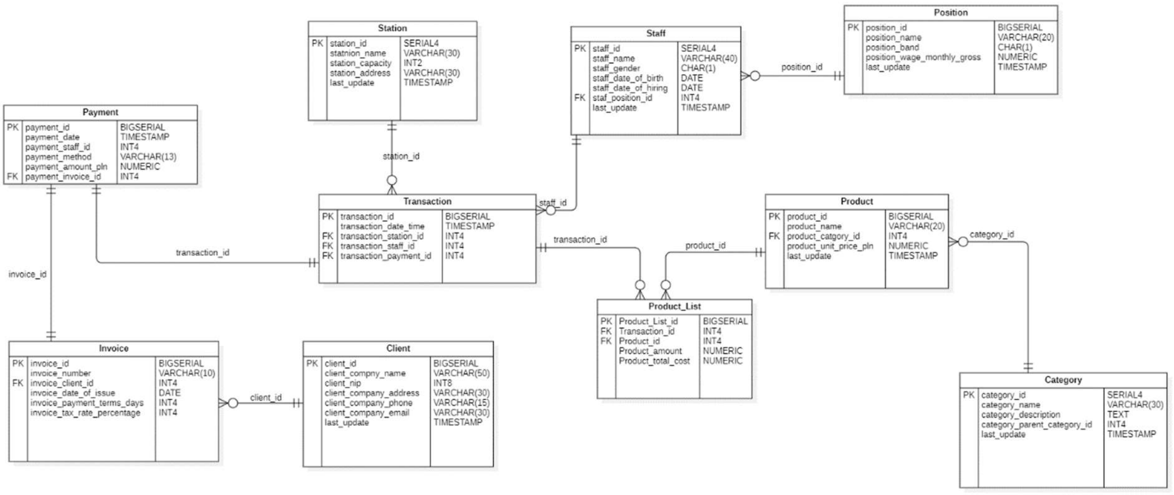
PK - Primary Key – a unique identifier that is used to identify a record or a row in a database table.

FK - Foreign Key - a field in a database table that references the primary key of another table, establishing a link between the two tables.

AK - Alternate Key – a column with unique values, which could act as a Primary Key.

N - Nullable – column which may keep the null values (e.g., when a passenger does not agree for sharing his personal data, an inspector leaves the relevant field in the Incident base App empty – that will cause the null value occurs in the relevant record in the database).

2.2. Logical Scheme



Station		
PK	station_id	SERIAL4
	statnion_name	VARCHAR(30)
	station_capacity	INT2
	station_address	VARCHAR(30)
	last_update	TIMESTAMP

Staff		
PK	staff_id	SERIAL4
	staff_name	VARCHAR(40)
	staff_gender	CHAR(1)
	staff_date_of_birth	DATE
	staff_date_of_hiring	DATE
FK	staf_position_id	INT4
	last_update	TIMESTAMP

Position		
PK	position_id	BIGSERIAL
	position_name	VARCHAR(20)
	position_band	CHAR(1)
	position_wage_monthly_gross	NUMERIC
	last_update	TIMESTAMP

Payment		
PK	payment_id	BIGSERIAL
	payment_date	TIMESTAMP
	payment_staff_id	INT4
	payment_method	VARCHAR(13)
	payment_amount_pln	NUMERIC
FK	payment_invoice_id	INT4

Transaction		
PK	transaction_id	BIGSERIAL
	transaction_date_time	TIMESTAMP
FK	transaction_station_id	INT4
FK	transaction_staff_id	INT4
FK	transaction_payment_id	INT4

Product		
PK	product_id	BIGSERIAL
	product_name	VARCHAR(20)
FK	product_catgory_id	INT4
	product_unit_price_pln	NUMERIC
	last_update	TIMESTAMP

Product_List		
PK	Product_List_id	BIGSERIAL
FK	Transaction_id	INT4
FK	Product_id	INT4
	Product_amount	NUMERIC
	Product_total_cost	NUMERIC

Invoice		
PK	invoice_id	BIGSERIAL
	invoice_number	VARCHAR(10)
FK	invoice_client_id	INT4
	invoice_date_of_issue	DATE
	invoice_payment_terms_days	INT4
	invoice_tax_rate_percentage	INT4

Client		
PK	client_id	BIGSERIAL
	client_compny_name	VARCHAR(50)
	client_nip	INT8
	client_company_address	VARCHAR(30)
	client_company_phone	VARCHAR(15)
	client_company_email	VARCHAR(30)
	last_update	TIMESTAMP

Category		
PK	category_id	SERIAL4
	category_name	VARCHAR(30)
	category_description	TEXT
	category_parent_category_id	INT4
	last_update	TIMESTAMP

2.3. Objects

Table Description

The below table contains the description of all the entities (tables) designed in the database.

Each table consists of several columns (attributes).

Each attribute has a specific data type declared to ensure the data's consistency, integrity, and accuracy in the database.

No	Table Name	Name of Fields Included in a Table	Field Description	Data Type
1	Transaction	transaction_id	The unique name of every transaction(purchase) made e.g. 1,2,3... PK	BIGSERIAL
		transaction_date_time	The time and date when the transaction took place e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
		transaction_station_id	The id of the station where the transaction was made e.g. 1,2,3…; FK	INT4
		transaction_staff_id	The id of the staff member who conducted the transaction e.g. 1,2,3…; FK	INT4

		transaction_payment_id	The id of a payment assigned to the transaction e.g. 1,2,3… FK	INT4
2	Payment	payment_id	The unique name of every payment made e.g. 1,2,3... PK	BIGSERIAL
		payment_date	The time and date when the payment was done e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
		payment_staff_id	Id of the staff member who issued an invoice.	INT4
		payment_method	The method of payment - only values as follows: cash, bank transfer, card, coupon	VARCHAR(13)
		payment_amount_PLN	The amount of the payment in PLN e.g. 100.00, 250.00.	NUMERIC
		payment_invoice_id	The invoice id assigned to the payment - can be NULL since not every purchase requires an invoice. E.g. 1.2.3. FK	INT4
3	Invoice	invoice_id	The unique name of every invoice issued e.g. 1,2,3... PK	BIGSERIAL
		invoice_number	The unique number of the invoice e.g. 202304/001 candidate key, unique	VARCHAR(10)
		invoice_client_id	The id of the client who the invoice was issued for e.g. 1,2,3 FK	INT4
		invoice_date_of_issue	The time and date when the invoice were issued e.g. 5/15/2023 8:30:52 AM	DATE
		invoice_payment_terms_days	The terms of payment for the invoice in days - always 7,21, 30 or 90 days. E.g. 7,21,30,90.	INT4
		invoice_tax_rate_percentage	The tax rate of the purchase in percentage e.g. 10, 15,13…	INT4
4	Client	client_id	The unique client id e.g. 1,2,3... PK	BIGSERIAL
		client_company_name	The name of the company (as in the national enterprises register)e.g. Pirotox, BeautyNails	VARCHAR(50)
		client_nip	Unique taxpayer identification number	INT8

		client_company_address	The company address - street, house number, postal code, city e.g. Wolna 5, 44-200, Katowice	VARCHAR(30)
		client_company_phone	The contact phone number to the company representative e.g. +48 123456789	VARCHAR(15)
		client_company_email	The contac email address to the company representative e.g. john_doe@companydomain.com	VARCHAR(30)
		last_update	The time and date when the data in the row was updated last time e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
5	Station	station_id	The unique gas station id e.g. 1,2,3... PK	SERIAL4
		station_name	The unique name of every station e.g. Katowice center, Bytom Crossroad unique, candidate key	VARCHAR(30)
		station_capacity	The number of car stations available on each gas station e.g. 5,10,10	INT4
		station_address	The station address (Street, hous number, postal code, city) e.g. Mila, 6, 43-100, Bytom	VARCHAR(30)
		last_update	The time and date when the data in the row was updated last time e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
6	Staff	staff_id	The unique staff member id e.g. 1,2,3... PK	SERIAL4
		staff_name	Name and Surname of every staff member e.g. John Doe	VARCHAR(40)
		staff_gender	Staff member's gender - female/male/diverse, e.g. F, M, D	CHAR(1)
		staff_date_of_birth	Staff member's date of birth, e.g. 1990-12-15	DATE
		staff_date_of_hiring	Staff member's date of hiring, e.g. 1990-12-15	DATE
		staff_position_id	The position_Id which the staff member work at e.g. 1,2,4.. FK	INT4
		last_update	The time and date when the data in the row was updated last time e.g. 5/15/2023 8:30:52 AM	TIMESTAMP

7	Position	position_id	The unique number given to each position type available in the company sturcture, e.g. 1,2,3,4... **PK**	BIGSERIAL
		position_name	The position which the staff member work at e.g. manager, assistant, cleaning	VARCHAR(20)
		position_band	The corporate band assigned to the specific position e.g. A,B,C,D,E	CHAR(1)
		position_wage_monthly_gross	Monthy salary on each position (pln gross) e.g. 1500, 2500, 5000	NUMERIC
		last_update	The time and date when the data in the row was updated last time e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
8	Product	product_id	The unique number given to each product available in the statnions (in store products), e.g. 1,2,3,4... **PK**	BIGSERIAL
		product_name	The name of the product e.g. Nestle chocolate 100g, BigMilk_50g, water bottle 1l, unique, candidate key	VARCHAR(20)
		product_category_id	The id of the category each product is assigned to e.g. 1,2,3,4 FK	INT4
		product_unit_price_pln	The unit price in PLN each unit of the product, e.g. 13.99, 10.50, 3.45	NUMERIC
		last_update	The time and date when the data in the row was updated last time e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
9	Category	category_id	The unique id of category of the products e.g. 1,2,3,4... PK	SERIAL4
		category_name	The name of the category - distuinguish 3 main types with their subtypes: - petrol (gas, PB95, PB98, diesel) - food (beverages, snacks, meal, ice cream, alcohol) - car device (tool, washer fluid, oil)	VARCHAR(30)
		category_description	Description of each category Can be null	TEXT

		category_parent_category_id	The catgory_id of the category which includes the considered category e.g. for Ice Cream the parent category is Food can be null	INT4
		last_update	The time and date when the data in the row was updated last time e.g. 5/15/2023 8:30:52 AM	TIMESTAMP
10	Product_List	product_list_id	The order number assigned to every tuple - serves as a PK for an Aproduct_List table, e.g. 1,2,3 **PK**	BIGSERIAL
		tramsaction_id	The transacion_id FK	INT4
		product_id	The product_id FK	INT4
		product_amount	The number or amonut of products bought in the defined unit (according to product description) e.g. 1,2, 30.50 etc	NUMERIC
		product_total_cost	The total price of the products of specific types bought in the transaction in PLN ; e.g. 100,200, 300 cannot be null	NUMERIC

Tables Relations Comments

Entities are linked to each other in a logical way. There are different types of relationships, such as one-to-one, one-to-many, and many-to-many, which determine how the data is related and how it can be accessed.

In the schema, the many-to-many relationship occurs between the *product* table and *Transaction* table since during each transaction several products could be bought and in parallel, each product can be linked to many transactions. Therefore, a link table was designed – *Product_list.*