

# BUSINESS DATABASE DESIGN

Database - CMP020C106S COURSEWORK 1

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**The contribution from my partner has  
been removed to maintain their privacy**

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## **Introduction**

The purpose of this report is to outline the conceptualization and design of a relational database management system (DBMS) tailored to the needs of Visual-Studio Prime (VS Prime), a visionary movie theatre company. This DBMS aims to streamline operations, enhance customer experiences, and facilitate data-driven decision-making within the organization.

Visual-Studio Prime envisions itself as a pioneering force in the global cinema industry, committed to delivering unparalleled movie-watching experiences across its multiple locations worldwide. The company's business model revolves around providing a unique blend of cutting-edge technology, immersive entertainment, and personalized services to its customers.

### **Key elements of Visual-Studio Prime's business idea include:**

- a. Detailed Description: Visual-Studio Prime sets out to redefine the traditional movie theatre experience by offering state-of-the-art facilities, the latest film releases, themed shops, and gourmet food and beverage options. The company also introduces a VS Prime membership program and exclusive offers to foster customer loyalty.
- b. Work Objectives: The primary objectives of Visual-Studio Prime encompass customer satisfaction, revenue growth, membership program expansion, operational efficiency, employee satisfaction, community engagement, and legal compliance.

### **Entity-Relationship Diagram (ERD):**

An ER diagram is a flow chart that illustrates how entity sets are related to each other in a system [1]. The proposed ERD presents a logical schema of the Visual-Studio Prime's DBMS, featuring 14 distinguishable entity sets. Each entity set is accompanied by key attributes, relationship cardinalities, and entity participation indicators, providing a comprehensive overview of the database structure.

### **Physical Data Model Diagram:**

In a physical data model diagram, data get stored and organized. This framework gives developers an overview of the structure, schema, data type, and relationship before they design the database [2]. The physical data model diagram complements the ERD by offering a visual representation of the database's tables, columns, and constraints. It accurately depicts the data types, primary keys, and foreign keys associated with each table, ensuring alignment with the conceptual ERD.

These principles will facilitate the design of a blueprint of a robust database system tailored to the unique requirements of Visual-Studio Prime.

### **A Detailed Outline of Visual Studio Prime.**

Visual-Studio Prime is a visionary movie theater company that seeks to revolutionize the cinema experience across multiple global locations. Here's a detailed breakdown of its various components and unique offerings:

1. **Multiple Locations:** Visual-Studio Prime aims to establish its presence in key cities worldwide, providing accessibility to a diverse audience.
2. **Unique Viewing Experience:** The company prioritizes offering a distinctive movie-watching experience, showcasing the latest films in state-of-the-art theaters equipped with cutting-edge technology for optimal sound and picture quality.
3. **Special Offers and Events:** Visual-Studio Prime regularly introduces special promotions and events to enhance customer engagement. These could include discounted ticket prices, advanced screenings, themed movie nights, or interactive experiences.
4. **Food & Drink:** Complementing the cinematic experience, Visual-Studio Prime offers a range of gourmet food and beverage options, including traditional cinema snacks, gourmet popcorn flavors, artisanal cocktails, and a selection of international cuisine.
5. **Themed Shops:** Within the theater premises, customers can explore themed shops stocked with immersive memorabilia and merchandise related to popular movies, providing them with a unique shopping experience.
6. **VS Prime Memberships:** Visual-Studio Prime offers exclusive membership programs, such as VS Prime, to reward loyal customers with stacked discounts, priority booking privileges, special screenings, and other benefits tailored to enhance their movie-going experience.

Overall, Visual-Studio Prime aims to redefine the movie-going experience by offering a blend of cutting-edge technology, immersive entertainment, and personalized services, all while fostering a sense of community and excitement among its customers.

### **Work Objectives at Visual Studio Prime.**

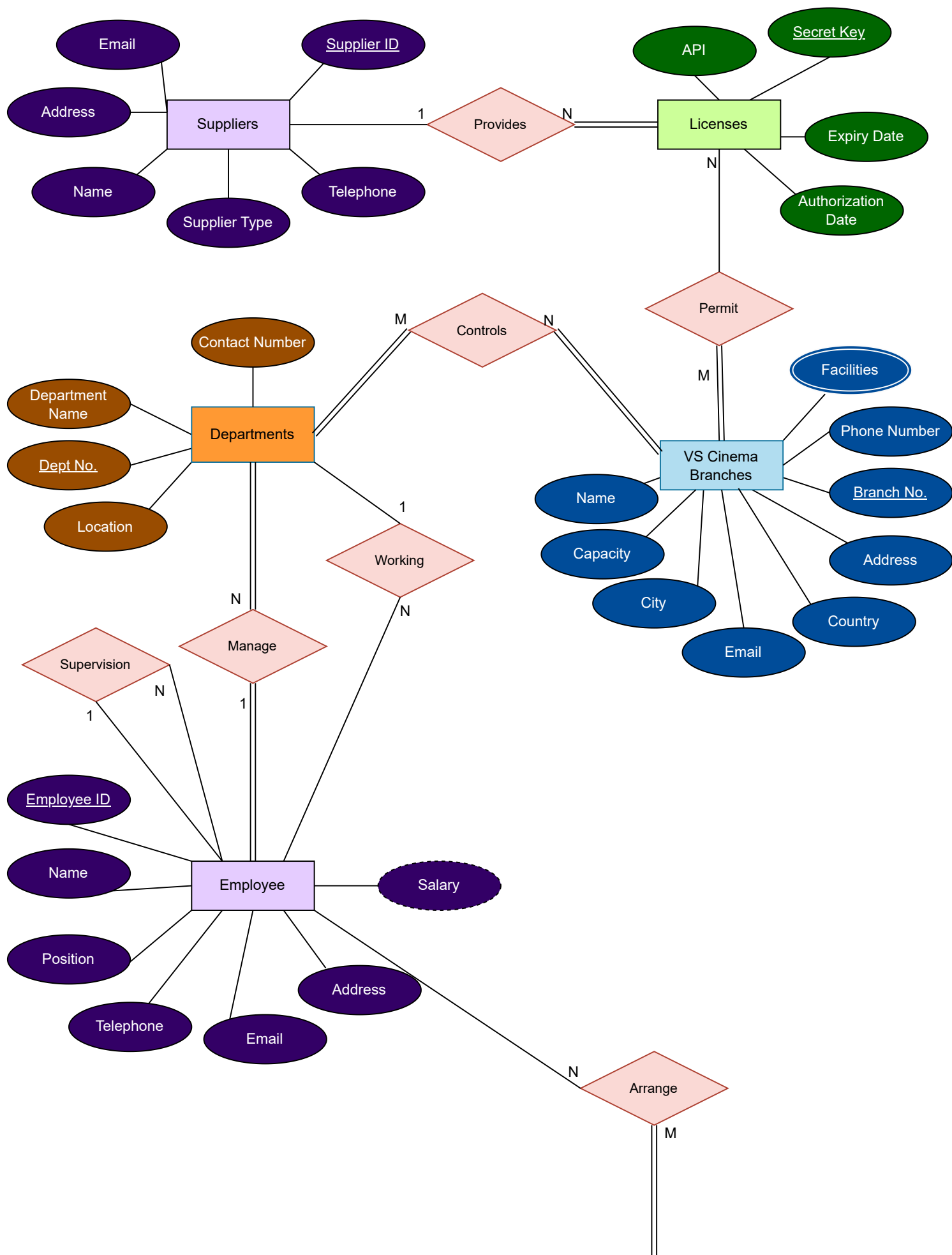
We ensure a seamless and enjoyable movie-going experience for our customers while maintaining legal compliance and operational efficiency. A Typical day at VS Prime is as follows:

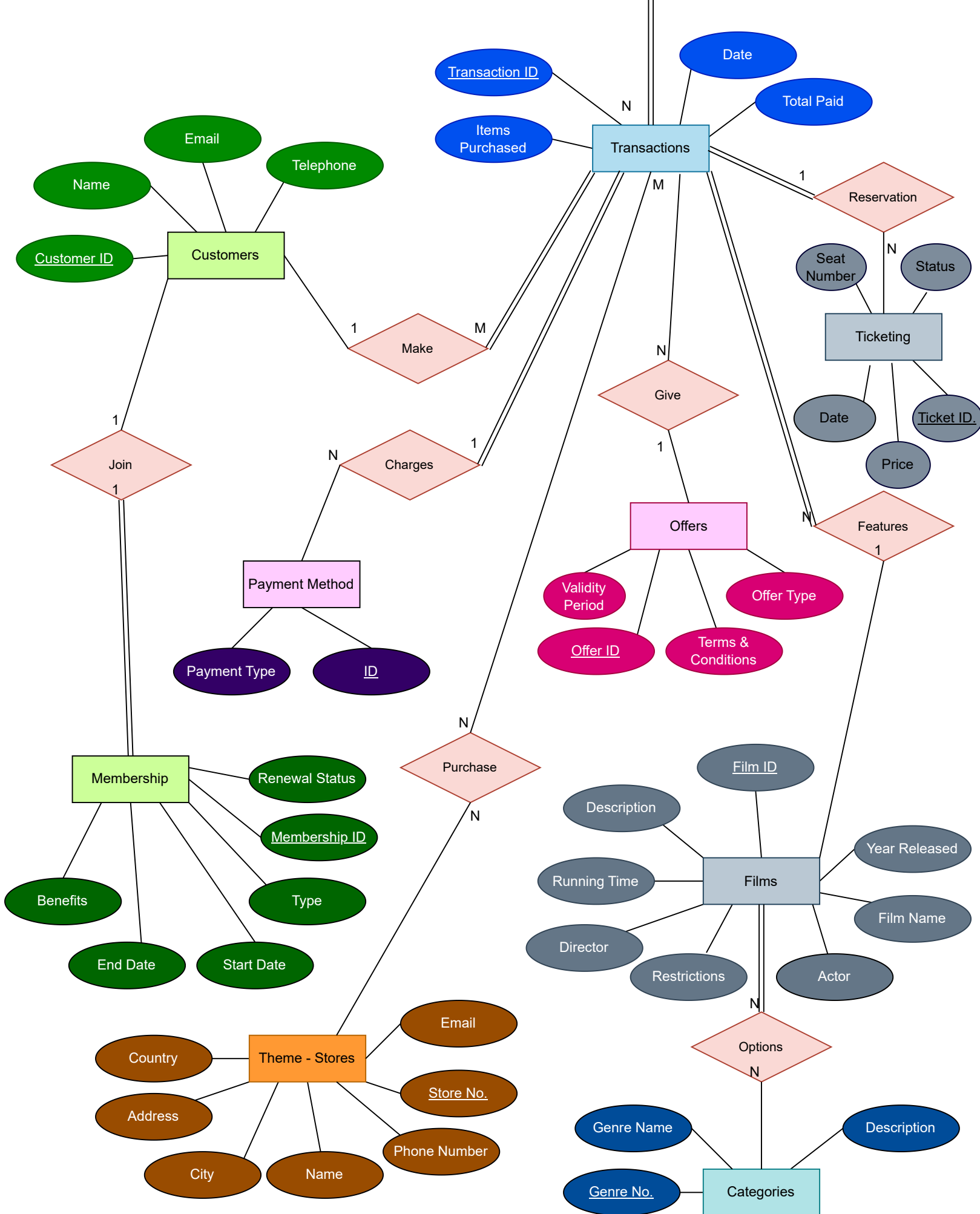
1. **Supplier Management:** Each day, the operations team interacts with various suppliers to procure necessary licenses for distributing films in different regions. They maintain a database of suppliers, including their Supplier ID, Name, Address, email address, and Contact Number, to facilitate communication and transactions.
2. **Film Distribution (legal compliance):** The operations team ensures that each film's license is up to date by managing the Secret key, API, Authorization Date, and expiring date associated with each license. They coordinate with suppliers to access the streaming archive of films based on the distributor licenses held by each location.
3. **Film Catalog Management:** The team regularly updates the database of films, including details such as Film Title, Description, Running Time, Year of release, Director, Actors, and Genre. The Genre field categorizes films into various categories, facilitating easy navigation and selection for customers.
4. **Customer Interactions:** Customer interactions involve processing transactions for ticket purchases, memberships, and offers/gifts. The team maintains records of customer information and transaction history to personalize services and promotions.
5. **Employee & Management:** Employee scheduling and task assignments are managed based on departmental needs and event schedules.
6. **Location and Store Operations:** Each location's operational activities, including ticket sales, concessions, and merchandise sales, are coordinated to ensure smooth functioning. Store inventory management is maintained for the facilities ensuring sufficient stock of immersive memorabilia and merchandise.
7. **Offers:** Special promotions are planned and executed to enhance customer engagement and drive ticket sales. The team coordinates with marketing and promotions departments to create awareness and excitement around upcoming events.
8. **Membership Management:** The Membership department manages VS Prime memberships, including sign-ups, renewals, and member benefits. Special offers and discounts are tailored to members to enhance loyalty and retention.
9. **Ticket Status Tracking:** The team monitors the status of ticket sales and availability for each screening, ensuring accurate reporting and analysis for future planning.

## The Entity Relation Diagram

An entity is a real-world object that becomes a table where data is stored while attributes are characters or properties that define and describe the details of an entity [3]. In identifying the entities and attributes for our business description, our thought process revolved around Visual-Studio Prime's operations and customer interactions. We examined elements of the business model in stages, from film distribution and customer memberships to concessions and employee management. By breaking down the business idea into its bite-sized parts, we identified key entities and their attributes that would ensure that our database system would accurately capture and manage essential information:

1. **Suppliers:** Supplier ID(Key), Supplier Type, Name, Address, email address and Contact Number.
2. **Licenses:** Secret key(key), API, Authorization Date and expiring date.
3. **VS Cinema Branches:** Branch Number, Name, Email, Address, City, Country, Facilities, Capacity
4. **Departments:** Department Number (Key), Location, Contact, Name
5. **Employee:** Employee ID (Key), Name, Position, Email, Phone Number Salary
6. **Transaction:** Transaction ID (Key), Date, Items Purchased, Total Amount
7. **Ticketing:** Ticket ID (Key), Seat Number, Date, Status (booked, sold, canceled), Price
8. **Offers:** Offer ID (Key), Offer Type, Terms and Conditions, Validity Period
9. **Payment Method** – ID, Payment Type
10. **Films:** Film ID, Film Name, Director, Actor, Restriction, Category, Year Released, Running Time, Description
11. **Customers:** Customer ID (Key), Name (First Name and Last Name), Email Address, Phone Number
12. **Membership:** Membership ID (Key), Type (Prime or plus), Benefits, Subscription Start Date, Subscription End Date, Renewal Status
13. **Categories:** Genre Number (Key), Genre Name, Description
14. **Theme Store:** Store Number (Key), Address, City, Country, Name, Email, Phone Number

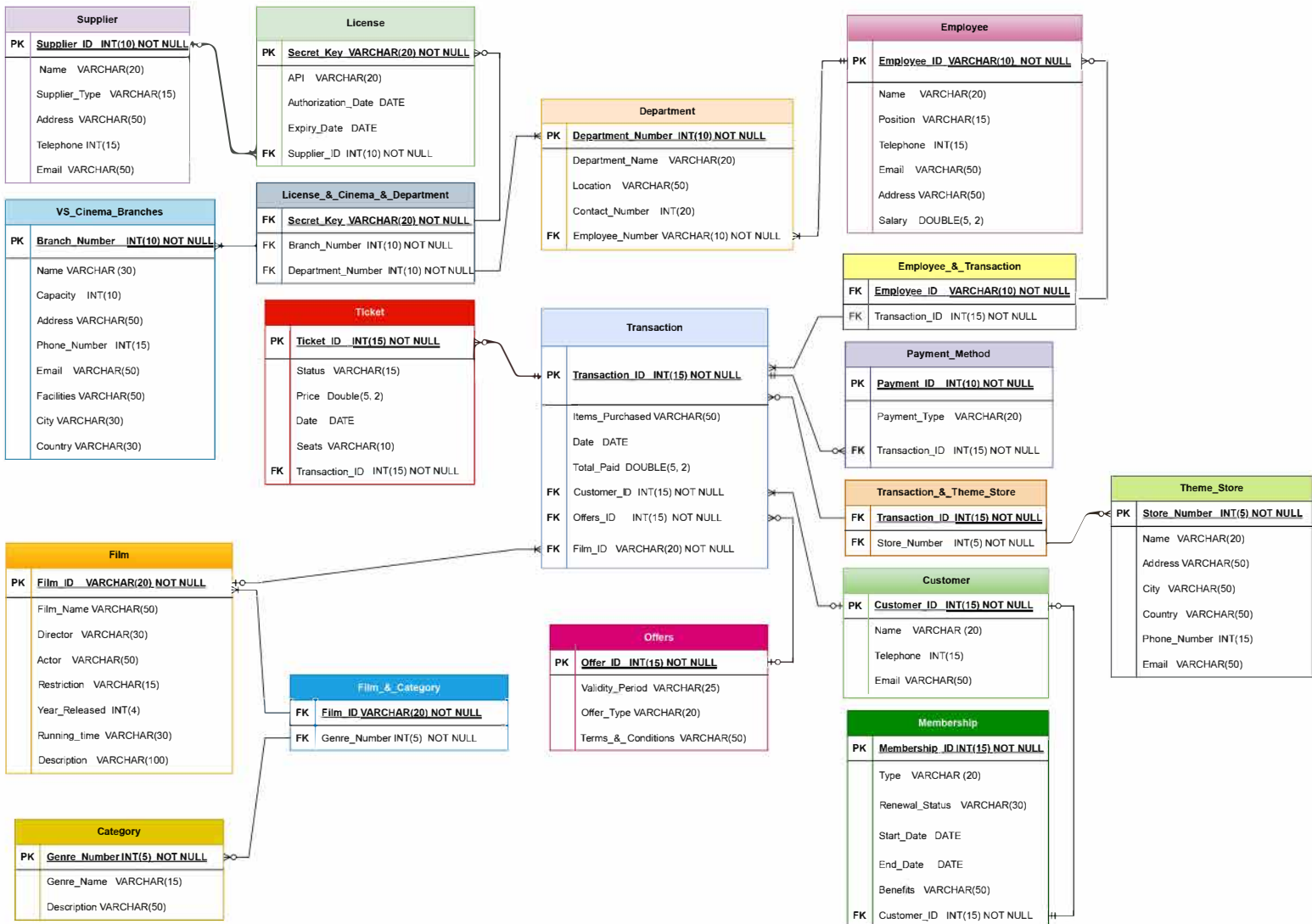






## The Physical Data Model Diagram:

In translating our conceptual Entity-Relationship Diagram (ERD) into a Physical Data Model Diagram, we aimed to provide a tangible representation of the database structure for Visual-Studio Prime. Building upon the identified entities and attributes derived from our business description, our approach focused on refining the conceptual framework into a detailed and organized schema. Each entity, ranging from suppliers and films to customers and transactions, was mapped out with their corresponding attributes, ensuring that no vital information was overlooked. Additionally, the relationships between entities were translated into concrete table structures, complete with primary keys, foreign keys, and constraints, to accurately reflect the interconnectivity within the database. By visualizing the physical layout of tables and columns, we aimed to create a clear and comprehensive framework that serves as the backbone of our relational database management system for Visual-Studio Prime.



## **Findings & Conclusion**

The entity relation diagram has provided valuable insights into the interdepartmental interactions within our organization. By analyzing this diagram, we have established robust connections between various entities [4].

Suppliers are linked to licenses, facilitating the distribution of films across multiple branches. This relationship allows for multiple licenses to be provided by a single supplier, ensuring efficient film distribution and accurate record-keeping in the database.

VS Cinema branches establish a many-to-many connection with licenses, reflecting the global reach of the organization and the diverse film offerings at each location. Licenses exhibit partial participation with branches, indicating their association with specific locations, while branches demonstrate total participation with licenses.

Each department within Visual-Studio Prime requires employees to operate effectively. The relationships between departments and employees include a many-to-one connection with total participation, ensuring adequate staffing levels, as well as a partial participation relationship where multiple employees may work within a single department, thus indicating partial participation. Additionally, employees can supervise their peers, establishing another layer of a one-to-many hierarchical structure within the organization.

Employees play a crucial role in arranging transactions within Visual-Studio Prime. This relationship establishes a many-to-many connection between transactions and employees, with every transaction requiring association with at least one employee for accountability and tracking purposes.

Transactions serve as a central point connecting various entities within the database. Each transaction is intricately linked to films, expressing a many-to-one relationship, indicating that multiple films may be featured in a single transaction. This connection ensures accurate record-keeping and seamless coordination of film-related transactions.

Films are further categorized into various genres, forming a many-to-many relationship with categories. However, films exhibit a distinct total to partial participation, where all films must be associated with a category, but not all categories may have an association with a film. This relationship allows for efficient categorization and organization of films based on genre.

Offers play a crucial role in incentivizing customer transactions within Visual-Studio Prime. This relationship establishes a partial relation between transactions and offers, allowing many transactions to be associated with a single offer. Offers serve as an essential component of the organization's marketing strategy, driving customer engagement and sales.

Themed stores offer an immersive retail experience for customers, with each transaction being intricately linked to these retail spaces. This relationship establishes a partial participation connection between themed stores and transactions, allowing many transactions to be associated with multiple themed stores.

Payment methods are essential for processing transactions within Visual-Studio Prime. This relationship ensures that every transaction is associated with a payment method, establishing total participation from transactions and allowing for multiple payment methods to be used for a single transaction.

The relationship between customers and transactions underscores the significance of customer transactions within Visual-Studio Prime. Each customer can engage in multiple transactions, with every transaction requiring association with a customer. This relationship reflects the customer-centric approach of the organization and facilitates personalized service delivery.

Customers can become members of Visual-Studio Prime, establishing a one-to-one partial participation relationship. Each customer can create only one membership account, underscoring the personalized nature of the membership program and fostering customer loyalty.

The reservation process within Visual-Studio Prime is intricately connected to ticketing and transactions. When a ticket is reserved, it establishes a one-to-many total participation relationship with transactions, indicating that one transaction can be associated with many tickets. This relationship ensures that all reserved tickets are accurately recorded and managed within the database.

Supervisors play a crucial role in overseeing and managing the performance of employees within Visual-Studio Prime. This relationship establishes a one-to-many partial participation connection between supervisors and employees, indicating that one supervisor can supervise multiple employees. This relationship reflects the hierarchical structure within the organization and ensures effective management and supervision of staff.

The relationship between employees and departments is vital for ensuring efficient workflow and operations within Visual-Studio Prime. Employees are assigned to work within specific departments, forming a one-to-many total participation connection between employees and departments. This relationship ensures that each employee is associated with a department, facilitating streamlined operations and task allocation.

Each department within Visual-Studio Prime is responsible for managing and overseeing its assigned employees. This relationship establishes a one-to-many total participation connection between departments and employees, indicating that each department manages multiple employees. This relationship ensures effective supervision, task allocation, and performance management within each department.

This defined relational diagram sets the foundation for the Physical Data Model. The inclusion of these cardinalities and participation levels will introduce various benefits to our database system such as increased data accuracy, efficient use of data storage and ensure that data is accessible throughout the organization.

### **References:**

- [1] LucidChart, "What is an Entity Relationship Diagram (ERD)?", LucidChart, 2017, [Online], available: <https://www.lucidchart.com/pages/er-diagrams>, [Accessed: Feb 28, 2024].
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- [4] S, Glen, "E-R Diagram Cardinality and Participation", Data Science Central, 2021, [Online], Available: <https://www.datasciencecentral.com/e-r-diagram-cardinality/>, [Accessed: Feb 28, 2024].

### **Inspiration**

5. <https://www.cineworld.co.uk>
6. <https://www.odeon.co.uk/>
7. <https://www.myvue.com/>