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The Final Project

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The database being designed is for a **Computer Maintenance and Repair Company**. It aims to streamline operations by efficiently storing and managing data related to customers, technicians, repair services, products, tools, inventory, and vendors. This database serves as the backbone for handling the company's day-to-day activities, from scheduling repair services to tracking inventory and managing vendor relationships.

### **Purpose and Objectives**

The primary purpose of this database is to support the core functions of a computer maintenance company, enabling it to:

1. **Track Customers and Repair Requests:** Easily store customer details and the repair services they request.
2. **Manage Technician Details:** Maintain information on technicians, including their skills and certifications.
3. **Schedule Services:** Enable easy scheduling and assignment of services to technicians.

4. **Inventory Management:** Efficiently manage the tools, spare parts, miscellaneous items, and products available for sale and repair.
5. **Vendor Management:** Track the suppliers that provide parts, tools, and products.
6. **Generate Reports:** The database structure supports generating reports about services, technician performance, inventory levels, and vendor relationships.

### **Entities and Their Relationships**

The database consists of the following main entities, each representing a core aspect of the business:

1. **Company:** Contains general information about the company, such as its name, address, and contact details. Although the database could support multiple companies, it is designed primarily for a single company.
2. **Customer:** Stores data on customers, including their contact information. Each customer can request multiple services over time.
3. **Technician:** Contains details about the technicians performing the repairs. Technicians are linked to specific services, skills, and tools.
4. **Repair Services:** Represents the different repair services offered by the company, such as hardware repairs, virus removal, and data recovery. Each service has a price associated with it.
5. **Service Schedules:** This entity links customers, services, and technicians to track when and which technician will provide a particular service to a customer.
6. **Tools and Equipment:** This table stores the tools and equipment used by technicians during repairs. These items are part of the company's inventory and are critical for ensuring that repairs are done properly.

7. **Products:** Tracks products sold by the company, such as laptops, monitors, and accessories. These items are also stored in the inventory.
8. **Spare Parts:** Stores spare parts used during repairs (e.g., hard drives, RAM), which are linked to services through the Inventory table.
9. **Miscellaneous:** Stores small or miscellaneous items not easily classified as tools, products, or spare parts. These may include cleaning materials, adhesives, and other consumables.
10. **Inventory:** The core table that links products, tools, spare parts, and miscellaneous items to track stock quantities and their suppliers (vendors).
11. **Vendor:** Stores vendor information, including the suppliers of the tools, products, and parts used in repairs.
12. **Technician Products and Technician Tools:** These tables track which products and tools are used by which technicians during repairs, allowing the company to monitor usage and manage inventory effectively.

### **Relationships Between Entities**

The relationships between these entities reflect the operational flow of the company.

#### **1. Company ↔ Customers**

**Relationship:** A company serves multiple customers.

**Type:** One-to-Many (1:N)

#### **2. Company ↔ Repair Services**

**Relationship:** A company offers multiple repair services.

**Type:** One-to-Many (1:N)

### **3. Customers ↔ Service Schedules**

**Relationship:** Customers schedule multiple services.

**Type:** One-to-Many (1:N)

### **4. Technicians ↔ Technician Skills**

**Relationship:** Technicians have multiple skills.

**Type:** One-to-Many (1:N)

### **5. Technicians ↔ Service Schedules**

**Relationship:** A technician is assigned to multiple service schedules.

**Type:** One-to-Many (1:N)

### **6. Repair Services ↔ Service Schedules**

**Relationship:** A repair service can be scheduled multiple times.

**Type:** One-to-Many (1:N)

### **7. Inventory ↔ Products**

**Relationship:** Products are part of inventory.

**Type:** One-to-Many (1:N)

### **8. Inventory ↔ Tools and Equipment**

**Relationship:** Tools and equipment are part of inventory.

**Type:** One-to-Many (1:N)

## 9. Inventory ↔ Spare Parts

**Relationship:** Spare parts are part of inventory.

**Type:** One-to-Many (1:N)

## 10. Inventory ↔ Miscellaneous

**Relationship:** Miscellaneous items are part of inventory.

**Type:** One-to-Many (1:N)

## 11. Inventory ↔ Vendor

**Relationship:** Vendors supply inventory items.

**Type:** One-to-Many (1:N)

## 12. Technician ↔ Technician Tools

**Relationship:** Technicians use multiple tools.

**Type:** Many-to-Many (N:M) (via Technician Tools)

## 13. Technician ↔ Technician Products

**Relationship:** Technicians use or manage multiple products.

**Type:** Many-to-Many (N:M) (via Technician Products)

## Design Considerations

1. **Normalization:** The database is designed to avoid redundancy and ensure data integrity. It follows **Third Normal Form (3NF)** to ensure that each piece of information is stored only once and is easily accessible through relationships.

2. **Scalability:** The database is designed to handle the needs of a single company but can be adapted for multiple branches or franchises by modifying the Company table.
3. **Efficiency:** The database design ensures that common tasks like retrieving customer data, scheduling services, and tracking inventory are efficient and can be done with minimal effort.
4. **Security:** Sensitive information like customer data and service details are stored securely, with proper use of foreign keys and constraints to maintain data integrity and prevent invalid data entry.