# Database Systems

**Part 1:** Develop a conceptual data model reflecting the following requirements:

a. Identify the main entity types

   **Client**, **Services**, **Employee**, and **Equipment**

b. Identify the main relationship types between the entity types identified in “a”.

   Client <Uses> Services = 1:* (one-to-many relationship)

   Service <Hires> Employee = *:* (many-to-many relationship)

   Service <Requires> Equipment = *:* (many-to-many relationship)

c. Determine the multiplicity constraints for each relationship identified in “b”.

   **Refer to diagram for easy to read multiplicity constraints (below part f)**

   Client multiplicity with Services = 1..*

   Services multiplicity with Client = 1..1

   Services multiplicity with Employee = 1..*

   Employee multiplicity with Services = 0..*

   Services multiplicity with Equipment = 0..*

   Equipment multiplicity with Services = 1..*

d. Identify attributes and associate them with entity or relationship types.

   **Client**: clientNo (Primary Key), clientfName, clientlName, clientAddress, clientTelNo

   **Services:** serviceID (Primary Key), startDate, startTime, duration, comments

   **Equipment:** equipID (Primary Key), description, usage, cost

   **Employee:** empNo (Primary Key), empfName, emplName, empAddress, salary, empTelNo

e. Determine candidate and primary key attributes for each (strong) entity type.

**Client:** clientNo (Primary Key), clientTelNo (Candidate Key)

Assumption: Each client has a unique telephone number

**Services:** serviceID (Primary Key)

**Equipment:** equipID (Primary Key)

**Employee:** empNo (Primary Key), empTelNo (Candidate Key)

Assumption: Each employee has a unique telephone number

f. Generate the E-R diagram for the conceptual level (no FKs as attributes)