

Steps to Develop EMPLOYEE database

(data from Welling & Thomson)

1) Real World Problem → Conceptual Model

determine **Entities**: Employee, Department, Client
determine **Attributes** (for each Entity):
for Employee: id, name, job, department, skills (1 or more skills), hours (for a specific client) (0, 1 or more clients), workDate (for a specific client) (0, 1 or more clients)
for Department: number, name
for Client: id, name, address, contactPerson, contactNumber
determine **Relationships** (between entities) (1:1 or 1:M or M:1 or M:M):
Employee **worksFor** Department (Many to 1)
Employee **assignedTo** Client (Many to Many)
(hours & workDate really apply to an assignment)
RESULT: Describe Conceptual model as: **ER Diagram & Attribute List**
(not shown here)

2) Data Model Mapping (of Conceptual Model) → Initial DB Schema

select **PrimaryKey** (PK) attribute(s) for each entity (which may be Composite Keys)
determine **ForeignKey** (FK) attributes & what PK they reference in the other table
RESULT: Describe DB Schema as a set of **Relations**:

EMPLOYEE (empID, name, job, skill, deptNum, clientID, hours, workDate)

DEPARTMENT (deptNum, deptName)

CLIENT (clientID, name, address, contactPerson, contactNumber)

NOTE: PK's are underlined, FK's are highlighted & italic.

3) Normalization (of Initial DB Schema) → Final Logical DB Schema (Tables)

EMPLOYEE (empID, name, job, deptNum)

EMPLOYEE_SKILL (empID, skill)

ASSIGNMENT (clientID, empID, workDate, hours)

DEPARTMENT (deptNum, name)

CLIENT (clientID, name, address, contactPerson, contactNumber)

NOTE: EMPLOYEE_SKILL and ASSIGNMENT relations have Composite PK's.
All data (attributes) can be connected (related) to all other data (attributes)

Tables (Relations) [File] with **Columns** (Attributes) [Fields]
including sample data in **Rows** (Tuples) [Records]

EMPLOYEE

<u>empID</u>	name	job	deptNum
7513	Nora Edwards	Programmer	128
9842	Ben Smith	DBA	42
6651	Ajay Patel	Programmer	128
9006	Candy Burnett	Systems Administrator	128

EMPLOYEE_SKILL

<u>empID</u>	skill
7513	C
7513	Perl
7513	Java
9842	MySQL
6651	VC#
6651	Java
9006	Windows
9006	Linux

ASSIGNMENT

<u>clientID</u>	<u>empID</u>	workDate	hours
1	7513	2009-10-20	8.5

DEPARTMENT

<u>deptNum</u>	deptName
42	Finance
128	Research and Development
NULL (<i>auto_increment</i>)	Human Resources
NULL (<i>auto_increment</i>)	Marketing

CLIENT

<u>clientID</u>	name	address	contactPerson	contactNumber
NULL (<i>auto_increment</i>)	Telco Inc	1 Collins St., Kalamazoo, MI 49008	Fred Smith	269 387 1234
NULL (<i>auto_increment</i>)	The Bank	100 Bourke St., Portage, MI 49024	Jan Tristan	269 276 9876