

02. Relational Schema – examples

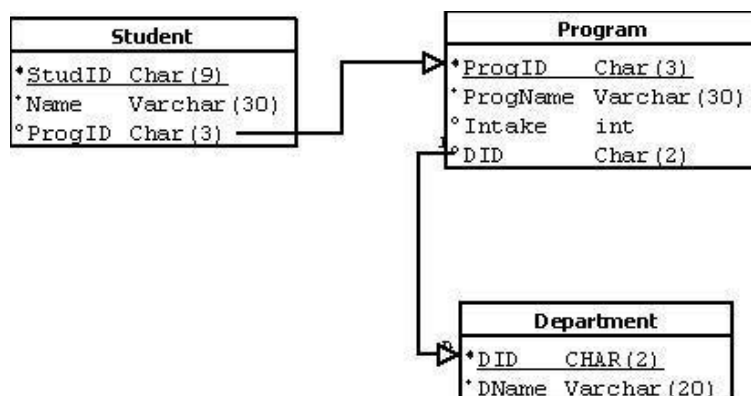
[PM Jat, DAIICT, Gandhinagar]

For all following database schema examples, try doing following

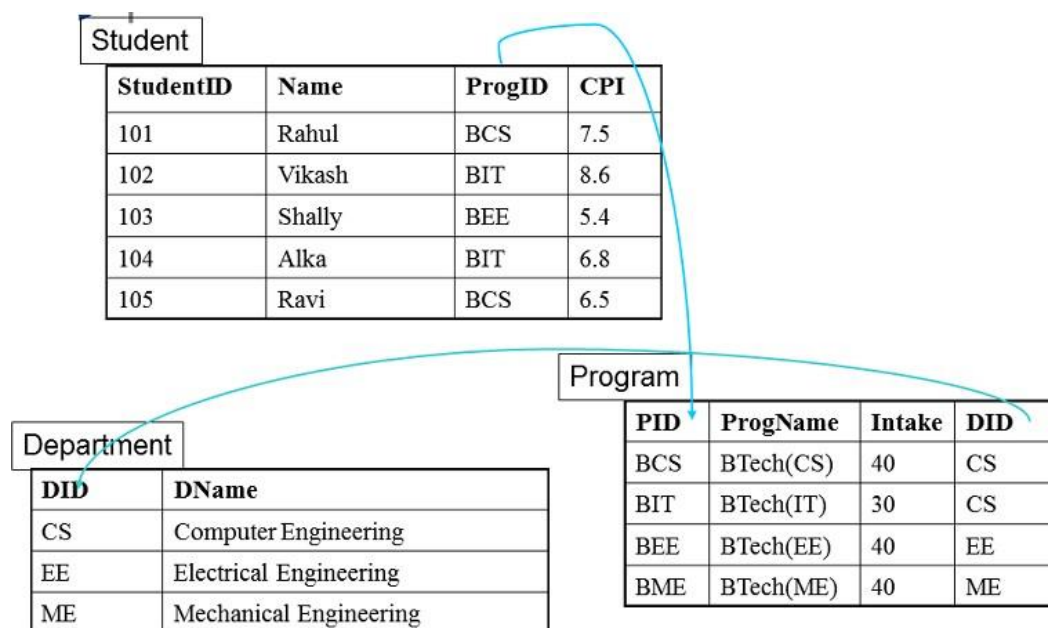
- (1) Interpretation of each tuple in the relation
- (2) What is Primary Key; validate that.
- (3) What are Foreign Keys; what does each association, FK represents
- (4) Any other constraints

#1 XIT Database

Here is complete schema of XIT database:



An instance XIT schema:



Student Relation

1. Each tuple represents a student entity
2. Primary Key is StudID
3. ProgID is Foreign Key referring to PID attribute of Program Relation. This foreign key associates a student entity with a program entity; a value in this FK is ID of the department in which the student studies.

Program Relation

1. Each tuple represents a program entity
2. Primary Key is PID
3. Prog Name is constrained to be Unique and Not Null
4. DID is Foreign Key referring to DID attribute of Department Relation. This foreign key associates a program entity with a department entity that is department that offers the program. A value in this FK is ID of the department in that offers the program

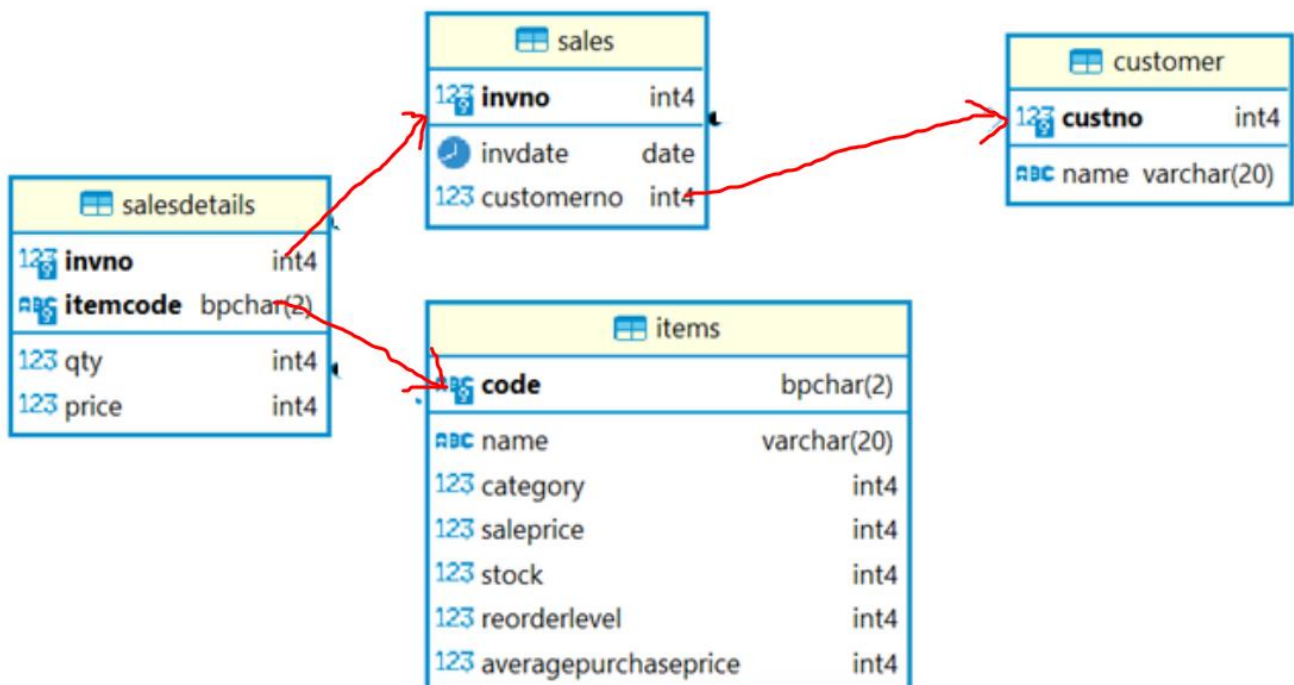
Department Relation

1. Each tuple represents a department entity
2. Primary Key is DID
3. Department Name is constrained to be Unique and Not Null

#2 Sales Database

InvoiceDetails				Invoices			Customers	
InvNo	ItmCode	Qty	Price	InvNo	InvDate	CustNo	CustNo	Name
1	c1	20	10000	1	30-06-2010	5	1	John
1	c2	30	6000	2	05-07-2011	4	2	Smith
1	c3	100	25000	3	26-07-2011	3	3	Allen
2	c2	50	10000	4	21-08-2011	2	4	Russel
2	c3	50	12500	5	23-08-2011	5	5	Harry
3	c3	100	25000	6	23-08-2011	1		
3	c4	40	8000					
4	c2	25	5000					
4	c5	15	82500					
5	c1	20	10000					
5	c2	70	14000					
6	c3	100	25000					
6	c4	100	20000					

Items				
Code	Name	Category	SalePrice	Stock
c1	Printer	1	5000	100
c2	Pen Drive	2	200	200
c3	Key Board	3	250	500
c4	Mouse	4	200	200
c5	Monitor	5	5500	100



Customer Relation

1. Each tuple represents a customer entity
2. CustNo is Primary Key

Item Relation

1. Each tuple represents an item entity
2. Primary Key is item “code”

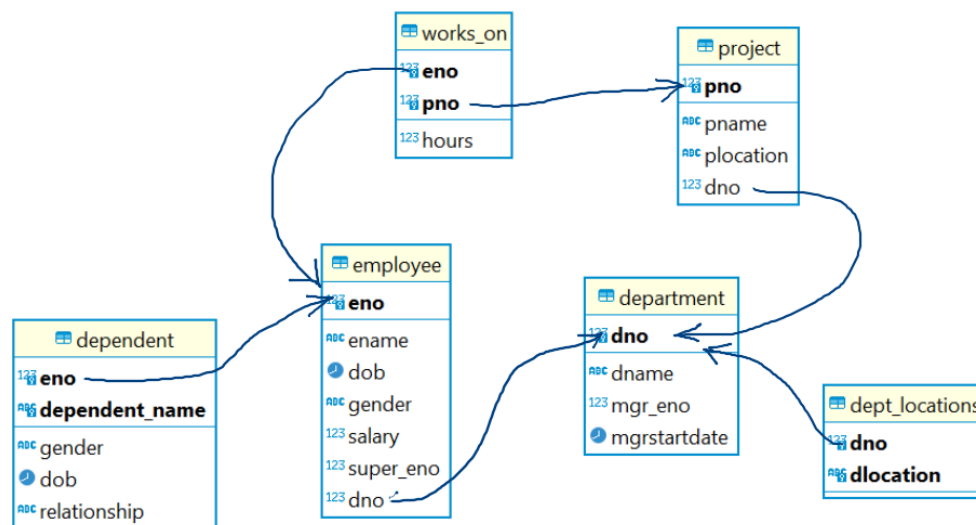
Invoice Relation

1. Each tuple represents an invoice
2. Primary Key is “InvNo”
3. “CustNo” is a foreign key referring into customer table. This foreign key associates the invoice with the customer (person who has ordered the items)

InvoiceDetails Relation

1. This relation is used to records details of an invoice. A tuple of this relation represents an item entry in an invoice.
2. Primary Key: Composite Key {invno, itemcode}
3. Two foreign keys here: InvNo, and “ItmCode”. Note these are two FKs and not a composite.
4. FK “InvNo” refers to “InvNo” in invoice relation. The foreign key here associates an entry with a corresponding invoice.
5. FK “ItmCode” refers to “code” in item relation. The foreign key here associates an entry with a corresponding item.

#3 Company Database



Employee Relation

eno	ename	dob	gender	salary	super_eno	dno
105	Jayesh	10-11-1967	M	55000		1
102	Sanna	23-07-1982	F	35000	105	5
106	Vijay	20-06-1971	M	53000	105	4
101	Sanjay	09-11-1955	M	70000		
108	Priya	19-07-1978	F	45000	106	4
104	Ramesh	15-09-1972	M	38000	106	5
103	Kalpesh	31-07-1982	F	25000	102	5
107	Ahmad	29-03-1979	M	25000	106	4
111	Kirit	08-12-1985	M	40000	102	5

1. Each tuple represents an employee entity
2. Primary Key is “ENO”
3. “dno” is foreign key refers to “dno” in the department relation. This FK associates the employee with the department to which this employee works. A value in FK here is ID of the department for the employee works.
4. “supe_eno” is another foreign key referring into employee table itself. This FK captures supervision association; a value in this foreign is eno of the employee’s supervisor.

Department Relation

1. Each tuple represents a department entity
2. Primary Key is “DNO”
3. “mgr_eno” is foreign key refers to “eno” in the employee relation. A value in thisFK is ENO of employee, who is manager of the department.

dno	dname	mgr_eno	mgrstartdate
5	Research	102	22-05-1998
4	Administration	106	01-01-2007
1	Headquater	104	19-06-2001

dno	dlocation
1	Hydrabad
4	Chennai
5	Bangalore
5	Delhi
5	Chennai

DLocation Relation

A department be located at multiple locations. We record name of all locations of a department.

1. A tuple here records one location with reference to corresponding department
2. Primary Key is composite: {DNO, dlocation}
3. FK: dno having reference to corresponding department

Project Relation

1. Each tuple represents a Project entity
2. Primary Key is “PNO”
3. Each project is managed by some department. “DNO” is foreign key refers thatrefers to the managing department.

pno	pname	plocation	dno
1	ProductX	Bangalore	5
2	ProductY	Sigapore	5
3	ProductZ	Houston	5
10	Computerization	London	4
20	Reorganization	Houston	1
30	SentAnalysis	London	4

WorksOn Relation

This relation records the fact of employees working on different projects. An employee can work any number of projects and a project can have many employees working on. While we do this, we also record how many hours employee works on a project.

1. Every tuple here records one instance of an employee working on a project along with the number of hours
2. Primary Key is composite: {EENO, PNO}
3. Two foreign keys: EENO, and PNO
4. FK refers to the ENO in to employee relation, where as PNO refers to PNO of project relation.

eno	pno	hours
101	1	32.5
101	2	7.5
104	3	40
103	1	20
103	2	20
102	2	10
102	3	10
102	10	10
102	20	10
102	1	32.5
108	30	30
108	10	10
107	10	35
107	30	5
106	30	20
106	20	15
105	20	

Dependents Relation

This relation records all dependents of employees. An employee may have multiple dependents. We record few details of dependents along with their names.

1. A tuple here records one dependent with reference to corresponding employee
2. Primary Key is composite: {EENO, dependent_name}
3. “eeno” is foreign key refers to “eno” in the employee relation.

eno	dependent_name	gender	dob	relationship
102	Ananya	F	05-04-1996	DAUGHTER
102	Samir	M	25-10-1996	SON
102	Anuradha	F	03-05-1980	SPOUSE
106	Reena	F	27-02-1972	SPOUSE
101	Shobhit	M	11-01-1991	SON
101	Isha	F	31-12-1998	DAUGHTER
101	Janvi	F	05-05-1962	SPOUSE

#3 DA-Acad Database

We have following tables

Student(StudetID, StdName, ProgID, Batch)

Course(CourseNo, CourseName, Credit)

Faculty(FacultyID, FacultyName)

Offers(AcadYear, Semester, CourseNo, FacultyID)

Registers(StudetID, AcadYear, Semester, CourseNo, grade)

Result(StudetID, AcadYear, SemesterType, SPI, CPI)

Semester(AcadYear, SemesterType)

==> Observe Primary Keys here?

==> What are Foreign Keys here?

Identify what refers what in diagram below?

Instructor			
instructorid	instructorname		
character vary	character varying (30)		
I0005	P M Jat		
I0007	Sanjay Srivastava		

CourseOffering			
acadyear	semester	courseno	instructorid
integer	character va	character v	character var
2007	Autumn	CS101	I0005
2007	Winter	CS102	I0005
2007	Summer	CS103	I0007

Course		
courseno	coursename	credit
character varying (5)	character varying (35)	numeric (3,1)
CS101	C Programming	4.0
CS102	Algorithm	4.0
CS103	Basic Computers	3.0
CS104	Probability	3.0
CS105	Calculus	3.0

Identify what refers what in diagram below?

CourseOffering				
acadyear	semester	courseno	instructorid	
integer	character va	character v	character var	
2007	Autumn	CS101	I0005	
2007	Winter	CS102	I0005	
2007	Summer	CS103	I0007	

CourseRegistration				
studentid	acadyear	semester	courseno	grade
character va	integer	character va	character va	charac
200711001	2007	Autumn	CS101	AA
200711001	2007	Winter	CS102	CC
200711001	2007	Summer	CS103	AA
200711002	2007	Autumn	CS101	AA
200711002	2007	Winter	CS102	CC
200711002	2007	Summer	CS103	CC
200711003	2007	Autumn	CS101	AA
200711003	2007	Winter	CS102	CC

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