

Figure 9.1 Mapping the n-ary relationship type SUPPLY from Figure 4.13(a).

SUPPLIER

<u>SNAME</u>	...
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PROJECT

<u>PROJNAME</u>	...
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PART

<u>PARTNO</u>	...
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SUPPLY

<u>SNAME</u>	PROJNAME	<u>PARTNO</u>	QUANTITY
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Figure 9.2 Options for mapping specializations (or generalizations) to relations.

(a) Mapping the EER schema of Figure 4.4 to relations by using Option A. (b) Mapping the EER schema of Figure 4.3(b) into relations by using Option B. (c) Mapping the EER schema of Figure 4.4 by using Option C, with JobType playing the role of type attribute. (d) Mapping the EER schema of Figure 4.5 by using Option D, with two Boolean type fields Mflag and Pflag.

(a) EMPLOYEE

<u>SSN</u>	FName	MInit	LName	BirthDate	Address	JobType
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SECRETARY

<u>SSN</u>	TypingSpeed
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TECHNICIAN

<u>SSN</u>	TGrade
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ENGINEER

<u>SSN</u>	EngType
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(b) CAR

<u>VehicleId</u>	LicensePlateNo	Price	MaxSpeed	NoOfPassengers
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TRUCK

<u>VehicleId</u>	LicensePlateNo	Price	NoOfAxles	Tonnage
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(c) EMPLOYEE

<u>SSN</u>	FName	MInit	LName	BirthDate	Address	JobType	TypingSpeed	TGrade	EngType
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(d) PART

<u>PartNo</u>	Description	MFlag	DrawingNo	ManufactureDate	BatchNo	PFlag	SupplierName	ListPrice
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Figure 9.3 Mapping the EER specialization lattice shown in Figure 4.7 using multiple options.

PERSON

<u>SSN</u>	Name	BirthDate	Sex	Address
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EMPLOYEE

<u>SSN</u>	Salary	EmployeeType	Position	Rank	PercentTime	RAFlag	TAFlag	Project	Course
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ALUMNUS

<u>SSN</u>

ALUMNUS_DEGREES

<u>SSN</u>	Year	<u>Degree</u>	<u>Major</u>
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STUDENT

<u>SSN</u>	MajorDept	GradFlag	UndergradFlag	DegreeProgram	Class	StudAssistFlag
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Figure 9.4 Mapping the categories of Figure 4.8 to relations.

PERSON

<u>SSN</u>	DriverLicenseNo	Name	Address	OwnerId
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BANK

<u>BName</u>	BAddress	OwnerId
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COMPANY

<u>CName</u>	CAddress	OwnerId
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OWNER

<u>OwnerId</u>

REGISTERED_VEHICLE

<u>VehicleId</u>	LicensePlateNumber
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CAR

<u>VehicleId</u>	CStyle	CMake	CModel	CYear
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TRUCK

<u>VehicleId</u>	TMake	TModel	Tonnage	TYear
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OWNS

<u>OwnerId</u>	<u>VehicleId</u>	PurchaseDate	LienOrRegular
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Figure 9.5 The relational schema of Figure 7.6 as it may be displayed by QBE.

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
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DEPARTMENT	DNAME	DNUMBER	MGRSSN	MGRSTARTDATE
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DEPT_LOCATIONS	DNUMBER	DLOCATION
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WORKS_ON	ESSN	PNO	HOURS
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PROJECT	PNAME	PNUMBER	PLOCATION	DNUM
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DEPENDENT	ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
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Figure 9.6 Four ways of specifying the query Q0 in QBE.

(a)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	John	B	Smith	_123456789	P_9/1/60	P_100 Main, Houston, TX	_M	_25000	_123456789	_3

(b)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	John	B	Smith		P_9/1/60	P_100 Main, Houston, TX				

(c)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	John	B	Smith		P_X	P_Y				

(d)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	John	B	Smith		P.	P.				

Figure 9.7 Specifying complex conditions in QBE. (a) The same query Q0A. (b) The query Q0B with a condition box. (c) The query Q0B without a condition box.

(a)

WORKS_ON	ESSN	PNO	HOURS
	P.		>20

(b)

WORKS_ON	ESSN	PNO	HOURS
	P.	_PX	_HX

CONDITIONS

_HX>20 AND (_PX = 1 OR _PX = 2)

(c)

WORKS_ON	ESSN	PNO	HOURS
	P.		>20

Figure 9.8 Specifying EMPLOYEES who work on both projects. (a) Incorrect specification of an AND condition. (b) Correct specification.

(a)

WORKS_ON	ESSN	PNO	HOURS
	P._ES	1	
	P._ES	2	

(b)

WORKS_ON	ESSN	PNO	HOURS
	P._EX	1	
	P._EY	2	

CONDITIONS

_EX = _EY

Figure 9.9 Illustrating JOIN and result relations in QBE.

(a) The query Q1. (b) The query Q8.

(a)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	_FN		_LN			_ADDR				_DX

DEPARTMENT	DNAME	DNUMBER	MGRSSN	MGRSTARTDATE
	Research	_DX		

RESULT			
P.	_FN	_LN	_ADDR

(b)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	_E1		_E2						_XSSN	
	_S1		_S2	_XSSN						

RESULT				
P.	_E1	_E2	_S1	_S2

Figure 9.10 Functions and grouping in QBE. (a) The query Q23. (b) The query Q23A. (c) The query Q24. (d) The query Q26.

(a)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
								P.CNT.		

(b)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
								P.CNT.ALL		

(c)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
				P.CNT.ALL				P.AVG.ALL		P.G.

(d)

PROJECT	PNAME	PNUMBER	PLOCATION	DNUM
	P.	_PX		

WORKS_ON	ESSN	PNO	HOURS
	P.CNT._EX	G._PX	

CONDITIONS

CNT._EX>2

Figure 9.11 Illustrating negation by the query Q6.

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	P.		P.	_SX						

DEPENDENT	ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
¬	_SX				

Figure 9.12 Modifying the database in QBE. (a) Insertion. (b) Deletion. (c) Update in QBE.

(a)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
I.	Richard	K	Marini	653298653	30-DEC-52	98 Oak Forest, Katy, TX	M	37000	987654321	4

(b)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
D.				653298653						

(c)

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
	John		Smith					U_S*1.1		U.4

Figure 9.13 An ER schema for a SHIP_TRACKING database.

