

IT420: Database Management and Organization

Data Modeling with the Entity-Relationship Model

1

ER Model

- Entities, attributes, identifiers
- HAS-A Relationships
 - Degree: binary, ternary
 - Maximum cardinality
 - Minimum cardinality
- Weak entities
 - ID-dependent entities; identifying relationships
- IS-A Relationships
 - Inclusive, Exclusive

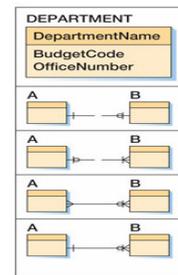
2

Goals of This Lecture

- Create ER model from user requirements

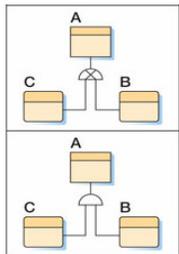
3

ERwin Symbol Summary



4

ERwin Symbol Summary (Continued)



6

Forms, Reports and ER Model

- User input:
 - Forms
 - Reports
 - Discussions
- DB modeler: Entity-Relationship model
- Same entities, relationships under the surface

8

1:1 Strong Entity Relationships

(a) Club Membership Data Entry Form

MEMBER_LOCKER

MemberNumber: 1000
 MemberName: Jones
 Phone: 123-456-7777
 Email: Jones@somewhere.com
 LockerNumber: 2100
 LockerRoom: Mens

Record: 1 of 4

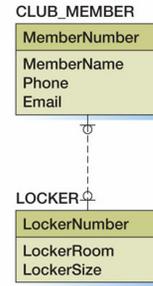
(b) Club Locker Report

CLUB_LOCKERS

LockerRoom	LockerNumber	MemberNumber	MemberName	LockerSize
Mens	2100	1000	Jones	Med
Mens	2115	3000	Yiu	Large
Womens	2200	2000	Abernathy	Large
Womens	2217	4000	Liu	Small

9

1:1 Strong Entity Relationships



10

1:N Strong Entity Relationships

Company Departments

CompanyName: Ajax Manufacturing
 City: Sydney

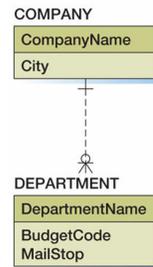
Departments

DepartmentName	BudgetCode	MailStop
Accounting	A-100	MS-100
Production	P-100	MS-400
Information Systems	IS-200	MS-417
Sales	S-1400	MS-500

Record: 4 of 5

11

1:N Strong Entity Relationships



12

N:M Strong Entity Relationships

SUPPLIERS

CompanyName: Forest Supplies
 City: Denver
 Country: US
 Volume (USD): \$177,990.00

PARTS

PartNumber	PartName	SalesPrice	ReOrderQuantity	QuantityOnHand
1000	Cedar Shakes	\$22.00	100	200
2000	Garage Heater	\$1,750.00	3	4
3000	Utility Cabinet	\$55.00	7	3

Record: 3 of 3

13

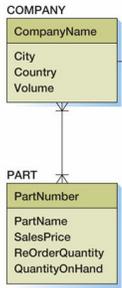
N:M Strong Entity Relationships

PART

Number	PartName	SalesPrice	ROQ	QOH	CompanyName	City	Country
1000	Cedar Shakes	\$22.00	100	200	Forest Supplies	Denver	US
2000	Garage Heater	\$1,750.00	3	4	Forest Supplies	Denver	US
3000	Utility Cabinet	\$55.00	7	3	Forest Supplies	Denver	US
					Bristol Systems	Machester	England
					ERS Systems	Vancouver	Canada
					Hydro Importers	Kyoto	Japan
					Forest Supplies	Denver	US
					Bristol Systems	Machester	England
					ERS Systems	Vancouver	Canada
					Hydro Importers	Kyoto	Japan
					Forest Supplies	Denver	US
					Ajax Manufacturing	Sydney	Australia
					Forest Supplies	Denver	US

14

N:M Strong Entity Relationships

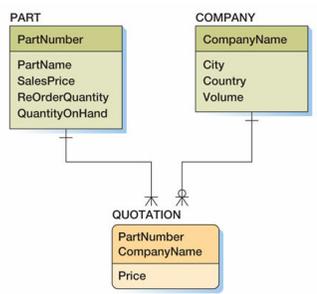


The Association Pattern

Price column

Number Name	SalesPrice	ROQ	QOH	Company	City	Price
1000 Cedar Shakes	\$22.00	100	200	Brilo Systems	Machester	\$14.00
				ERS Systems	Vancouver	\$12.50
				Forest Supplies	Denner	\$15.50
2000 Garage Heater	\$1,750.00	3	4	Brilo Systems	Machester	\$950.00
				ERS Systems	Vancouver	\$875.00
				Kylo Importers	Kylo	\$1,100.00
				Forest Supplies	Denner	\$915.00
3000 Utility Cabinet	\$55.00	7	3	Aju Manufacturing	Sydney	\$37.50
				Forest Supplies	Denner	\$42.50

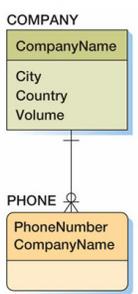
Association Class



Entity vs. Attribute

The screenshot shows a database form for the COMPANY entity. Fields include: CompanyName (Ajax Manufacturing), City (Sydney), Country (Australia), and Volume (USD) (\$187,500.00). There is a section for PHONE with a list of phone numbers: 1.100.334.8000, 1.100.444.9988, and 800-123-4455. The form also shows record navigation controls.

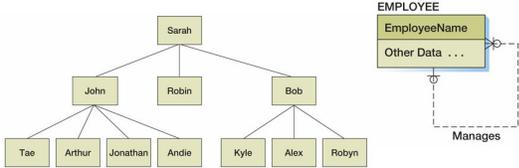
Multi-valued Attribute → Entity



Recursive Relationships

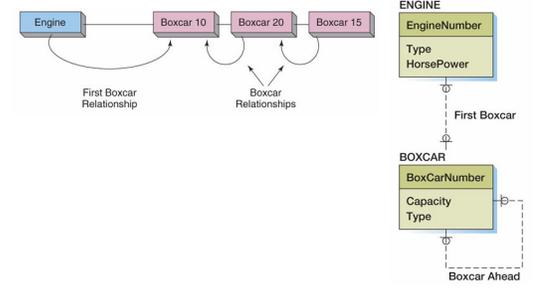
- **Recursive relationship:** an entity has a relationship to itself

1:N Recursive Relationship



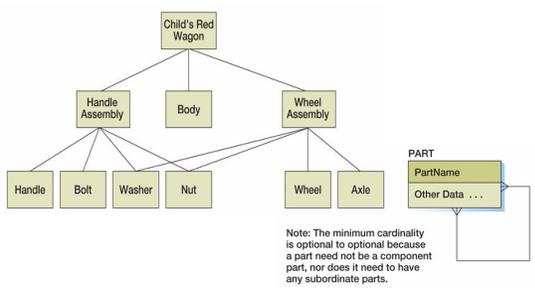
21

1:1 Recursive Relationship



22

N:M Recursive Relationship



23

Class Exercise

- Draw ER diagram for a database used to manage IT420 class (at least 3 entities)
 - Specify entities, attributes, identifiers
 - Specify relationships
 - Specify cardinalities for relationships

24

Class Exercise

- Drugwarehouse.com has offered you a free life-time supply of prescription drugs (no questions asked) if you design its database schema. Given the rising cost of health care, you agree. Here is the information that you gathered:
 - Patients are identified by their SSN, and we also store their names and age
 - Doctors are identified by their SSN, and we also store their names and specialty
 - Each patient has one primary care physician
 - Each doctor has at least one patient
 - Doctors prescribe drugs for patients.

25