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Relational Databases Unit

Lesson 1 - Intro to Databases

Objectives

- Define relational databases
- Identify advantages of relational databases
- Explain tables relationships

What is a database?

- Most simply, a database is a collection of related data.
- A database management system (DBMS) is a system designed to:
 - Add, delete, and update data in the database
 - Provide ways to view data in the database

Example: Library Database

ISBN	Title	AuName	AuPhone	PubName	PubPhone	Price
1-1111-1111-1	C++	Roman	444-444-4444	Big House	111-222-3333	\$29.95
9-9999-9999-9	Emma	Austen	111-111-1111	Big House	111-222-3333	\$20.00
9-2222-3333-4	Faerie Queene	Spenser	777-777-4444	Big House	111-222-3333	\$15.00
7-4444-2222-4	Hamlet	Shakespeare	444-345-2222	Apha Press	888-888-8888	\$20.00
1-3456-8890-1	The Walk	Jones	222-453-6780	Small House	444-675-2345	\$23.95
1-3456-8890-1	The Walk	Sally	333-564-7891	Small House	444-675-2345	\$23.95
1-3456-8890-1	The Walk	Smith	454-667-2345	Small House	444-675-2345	\$23.95

Flat Table Design

- Small tables, such as this one, can be managed in Word
- Sorting, adding, updating, and deleting are easy
- Views can be created by copying the table and deleting any unwanted rows

Advantages of Relational Design

- Reduces redundancy
 - The example table has a lot of duplicate data.
- Multiple value problem
 - How can you accommodate books with multiple authors in a flat design?
 - Multiple rows
 - Multiple columns
 - Multiple values in one column

Advantages of Relational Design (continued)

- Update problems
 - Must change publisher phone numbers in multiple places
- Insertion problem
 - How to add a publisher with no books?
- Deletion problem
 - How to delete all books from a given publisher?
 - What are the side effects?

Example of Relational Design

- This one table can be split into four tables:
 - Books
 - Authors
 - Publishers
 - Book_Author

Books

ISBN	Title	PubID	Price
12345	Macbeth	2	\$12.00
224456	Emma	1	\$15.00
1324567	Hamlet	1	\$20.00
1238769	Main Street	3	\$20.00

Authors

AuID	AuName	AuPhone
1	Austen	111-222-3333
12	Grumpy	222-444-5555
3	Homer	111-444-2323
10	Jones	333-565-4477

Publishers

PubId	PubName	PubPhone
1	Big House	111-111-1111
2	Alpha Press	222-222-2222
3	Small House	333-333-3333

Book_Author

ISBN	Auld
12345	3
224456	28
1324567	1
1238769	6
3456879	11

Complications of Relational Design

- Avoiding data loss
 - Tables must be carefully divided so that no data is left out
- Maintaining referential integrity
 - Dangling references
- Create view
 - Must piece data back together to view it

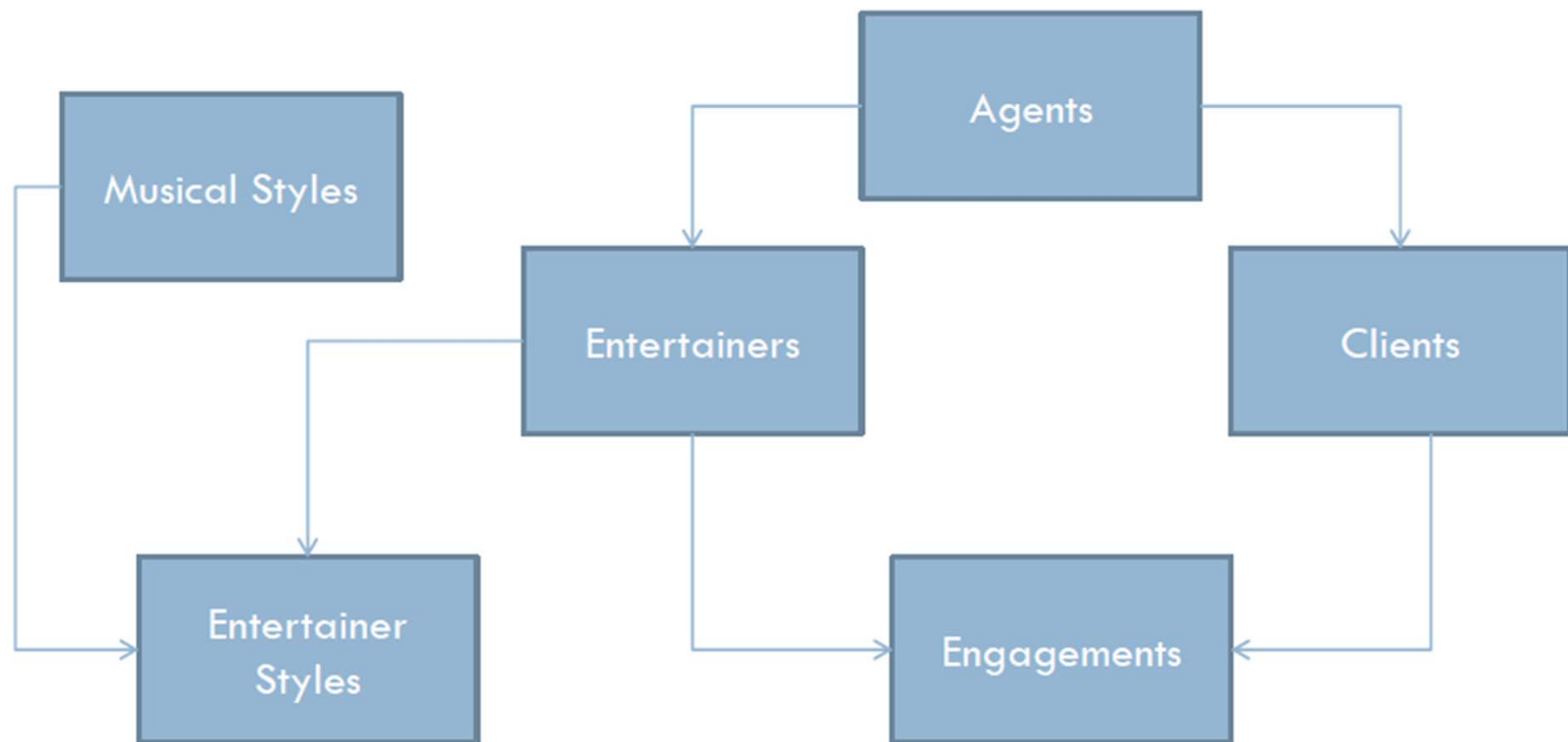
Exercise

- Split the following flat table into two or more tables to make it a relational design.

Attendance Database

Lname	School	Sch_Phone	Tardy	Absent	Date
Smith	CS	330-111-1234	No	No	10/2/2011
Jones	Perry	330-444-3333	No	No	10/2/2011
Kelly	SV	330-222-5555	Yes	No	10/2/2011
Lee	SV	330-222-5555	No	Yes	10/2/2011
Smith	CS	330-111-1234	No	Yes	10/3/2011
Jones	Perry	330-444-3333	No	No	10/3/2011
Kelly	SV	330-222-5555	Yew	No	10/3/2011

Example: Agent Database



Agents/Clients Relationship

Agents

AgentId	Agent Fname	Agent Lname	Date of Hire	Agent Phone
100	Jim	Smith	1/1/99	555-1212
101	John	Doe	2/5/01	444-2233
102	Sally	Jones	3/6/05	233-2424

Clients

ClientId	AgentId	Client Fname	Client Lname	Client Phone	...
9001	100	James	Stewart	555-8989	...
9002	102	Jonathon	Swift	444-7878	...
9003	102	Charles	Bentree	333-5757	...

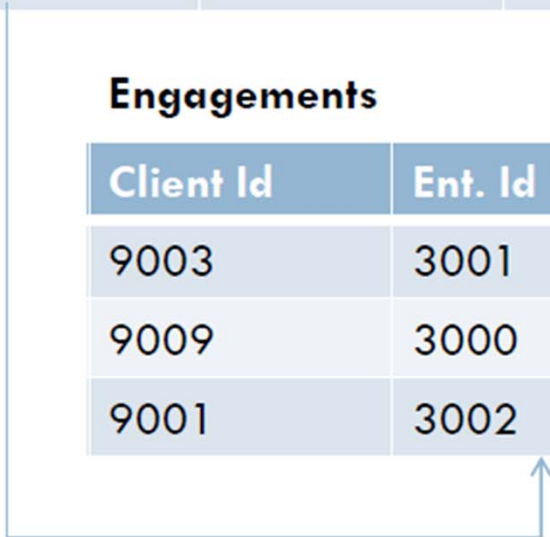
Entertainers/Engagements Relationship

Entertainers

Ent. Id	Agent Id	Ent. Fname	Ent. Lname	...
3000	100	Mark	Jones	...
3001	101	Peter	Smith	...
3002	102	George	Watson	...

Engagements

Client Id	Ent. Id	Eng. Date	Start Time	Stop Time
9003	3001	1/5/05	1:00PM	6:00PM
9009	3000	3/9/09	10:00PM	1:00AM
9001	3002	7/14/11	4:00PM	8:00PM



Relationships

- Types:
 - One-to-one
 - One-to-many
 - Many-to-many
- If you are familiar with the relationships, you can access data in almost any way.
 - Ex: Find a list of a particular client's musical preferences

Relational Database Model

- Can build in data integrity
- Independent of physical representation of data
 - If relationships are known, data can be accessed regardless of how it is stored.
- Can eliminate redundant data
- Easy data retrieval