

THE UNIVERSITY OF ALABAMA

touching lives



Using Relational Databases for Digital Research



Definition

“(using a) relational database is a way of recording information in a structure that maximizes efficiency by separating information into different tables which are linked by reference keys (in relational database speak, foreign keys and primary keys).”

-George Green *Scrapeana*



What are Relational Databases?

- An RDBMS is a tool for storing and manipulating information efficiently and effectively.
- RDBMS store data in tables with rows and columns
- Each row in table is a record, or 'Tuple'
- Allows you to easily (efficiently) find specific information within many, many records
- Allows you to quickly compare data because of data arranged in columns



What are Relational Databases?

- In an RDBMS, the data stored in these different tables, and these tables have specific **relationships** with each other.
- Is named 'Relational' because mathematical relationships between data (Relational Algebra, Set Algebra) and between multiple tables
- Relationships take many forms, including many to one, one to many, many to many and so on.



company table

company_name	company_num	address	phone
Big deal, Ltd.	13	14 Grand Blvd.	875-2934
Pickles, Inc.	14	59 Cucumber Dr.	884-2472
Real Roofing Co.	17	928 Shingles Rd.	882-4173
GigaFred & Son	23	2572 Family Ave.	847-4738

ad table

company_num	ad_num	hit_fee
14	48	0.01
23	49	0.02
17	52	0.01
13	55	0.03
23	62	0.02
23	63	0.01
23	64	0.02
13	77	0.03
23	99	0.03
14	101	0.01
13	102	0.01
17	119	0.02

hit table

ad_num	date
49	July 13
55	July 13
48	July 14
63	July 14
101	July 14
62	July 14
119	July 14
102	July 14
52	July 14
48	July 14
64	July 14
119	July 14
48	July 14
101	July 14
63	July 15
49	July 15
77	July 15
99	July 15



RDBMS - use

“The power of a relational DBMS lies in its capability to pull data from those tables conveniently and to join information from related tables to produce answers to questions that can’t be answered from individual tables alone.” – MySQL, 4th Edition



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About SQL

- Use a standardized syntax for data retrieval and manipulation (Standard Query Language or SQL)
- ANSI Standardized language
- SQL is foundation of all DBS from MySQL to Access to Oracle
- If you use an RDBS, you need to learn SQL!
Sorry!

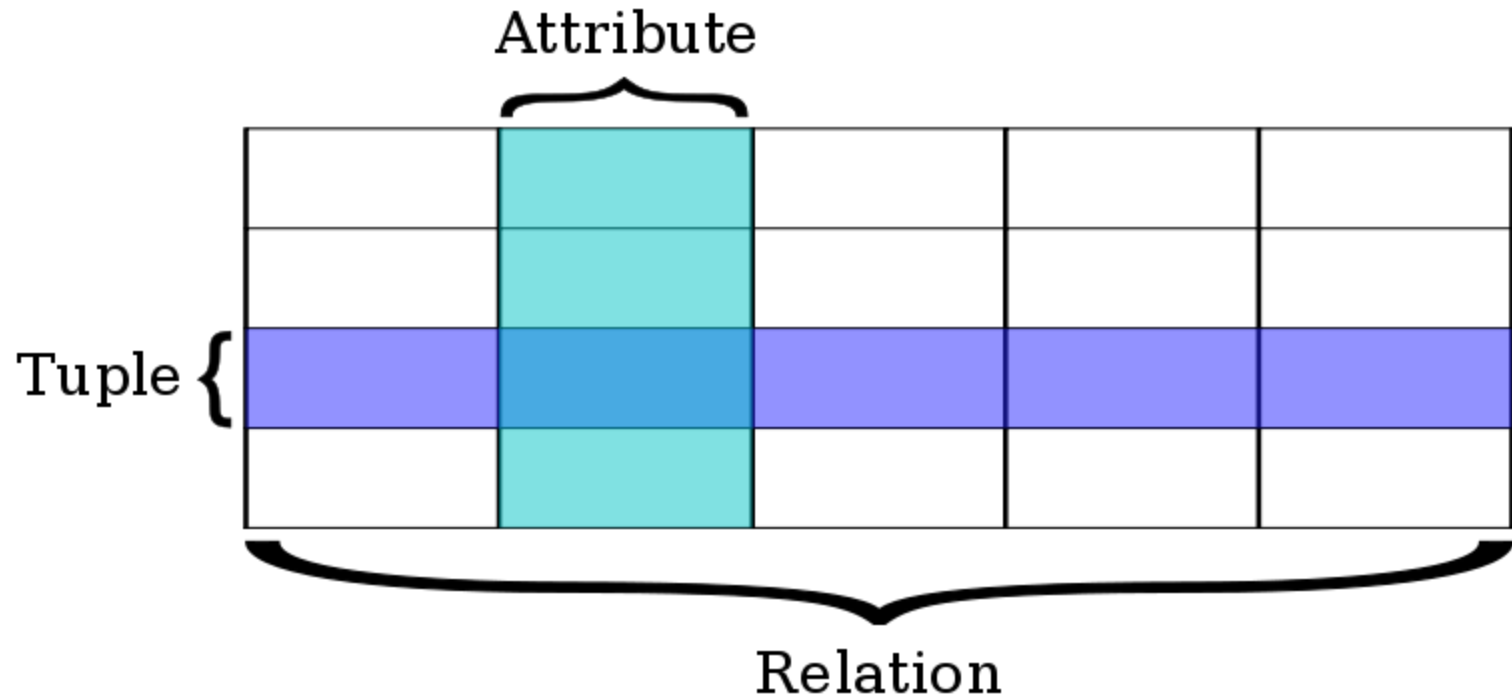


Basic Concepts

- A relation is defined as a set of tuples that have the same attributes.
- A tuple usually represents an object and information about that object.
- Objects are typically physical objects or concepts. (**All of the Web librarians named Steve**)
- A relation is usually described as a table, which is organized into rows and columns.



Basic Concepts - Tuple



Basic Concepts -Usage

- Applications access data by specifying queries using SQL syntax
- Queries use operations such as *select* to identify tuples and *join* to combine relations
- Relations can be modified using the *insert*, *delete*, and *update* operators.



Basic Concepts - terms

- Data Type - for example, Text or Integer or Blob (binary data, such as an image)
- Primary Key - Unique identifier for data
- Foreign Key -The Primary Key of one table, inside another table.
- RDBM's basic operations: select, update, delete, insert, alter, show, describe, etc.
- `SELECT librarian from librarian_table where name = "steve"`
- Joins - Related tables are combined using joins– left join, right join, cross join, full join, etc.



How Are Dbs used in websites?

- Databases store data
- Web Applications pull this data from different tables, create new tables based on the relationships of similar data
- Web Applications manipulate new table data, and present it to user through the browser



How Are RDBMs used in websites?

- Data in relational databases is the backbone of the web
- The “Cloud” is a huge, decentralized collection of database tables & applications and server space
- Almost ALL data on websites these days is pulled from a relational databases



Access and MySQL

- If you are using Access, then you are already using a relational DB!
- Using MySQL, a bit harder to work with but more flexible
 - Can move stuff to web easily
 - Can be used as a ‘back-end’ for web applications
 - Technically, could add stuff straight from desktop interface into web-sever-based DB



Tools for Your Desktop

- MySQL!

<http://dev.mysql.com/downloads/mysql/5.6.html>

- MySQL Workbench (GUI desktop query, modeling, admin, import/export tool)

http://www.mysql.com/common/images/products/MySQL_Workbench_Mainscreen_Windows.gif



MySQL Workbench

- For Desktop Environment
- Graphical GUI
- Can help you create queries, visually design databases, perform import and export of data, assist with data migration



Workbench Central



Welcome to MySQL Workbench

What's New in This Release?
Read about all changes in this MySQL Workbench release.

- MySQL Doc Library
- MySQL Bug Reporter
- Workbench Team Blog
- Planet MySQL
- Workbench Forums
- Scripting Shell

Workspace

SQL Development
Connect to existing databases and run SQL Queries, SQL scripts, edit data and manage database objects.

Data Modeling
Create and manage models, forward & reverse engineer, compare and synchronize schemas, report.

Server Administration
Configure your database server, setup user accounts, browse status variables and server logs.

Open Connection to Start Querying
Or click a DB connection to open the SQL Editor.

Open Existing EER Model
Or select a model to open or click here to browse.

Server Administration
Or click to manage a database server instance.

- builddb**
User: readonly Host: bugs.mysql.com:3306
- dl**
User: mikef Host: web-admin2.mysql.com:3306
- mysockerconnect**
User: root Host: Localhost via pipe MySQL
- number3server**
User: root Host: 127.0.0.1:3306
- mjfsrver**
User: mysqluser Host: 192.12.0.13:3306 (ssh tunnel)
- dlserver**
User: root Host: US-MF228072-01.swds.sun.com:3306
- dl2server**
User: root Host: US-MF228072-01.swds.sun.com:3306

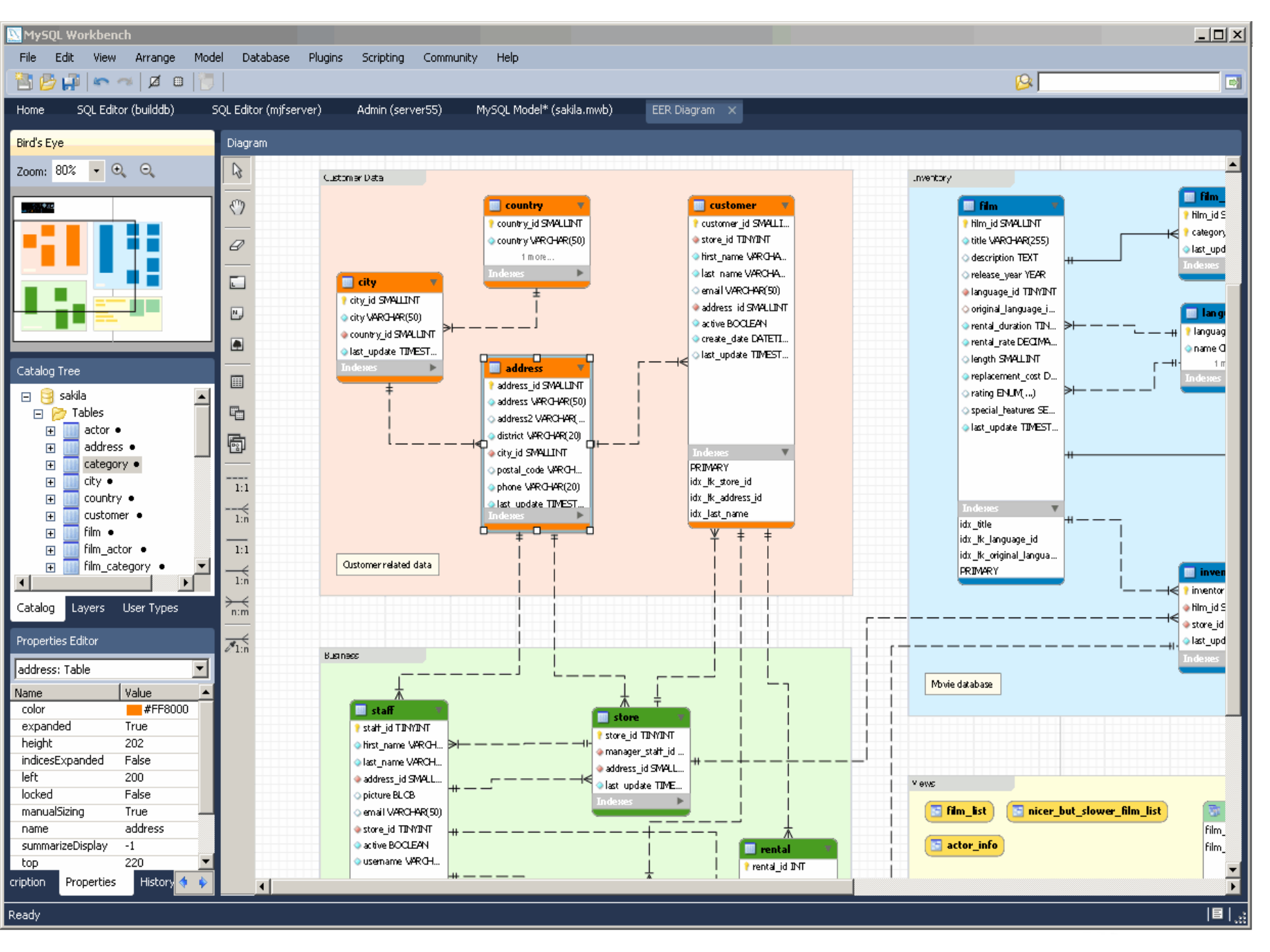
- PartnerDesign**
Last modified Thu Jun 17 17:02:21 2010
- WebSite**
Last modified Thu Jun 17 17:01:34 2010
- sakila**
Last modified Tue Jun 02 18:07:58 2009
- newmodel**
Last modified Mon May 24 14:40:22 2010

- webserver**
Host: 192.12.0.13 Type: DB Only
- empdbserver**
Local Type: Windows
- crmserver1**
Local Type: Windows
- qatest2**
Local Type: Windows
- dl2server**
Host: US-MF228072-01.swds.sun.com Type: DB Only
- dlserver**
Host: US-MF228072-01.swds.sun.com Type: DB Only
- qatest2**
Local Type: Windows

- New Connection**
Add a new database connection for querying.
- Edit Table Data**
Select a connection and schema table to edit.
- Edit SQL Script**
Open an existing SQL Script file for editing.
- Manage Connections**
Modify connection settings or add connections.

- Create New EER Model**
Create a new EER Model from scratch.
- Create EER Model From Existing Database**
Create by connecting and reverse engineering.
- Create EER Model From SQL Script**
Import an existing SQL file.

- New Server Instance**
Register a new server instance to manage.
- Manage Import / Export**
Create a dump file or restore data from a file.
- Manage Security**
Manage user accounts and assign privileges.
- Manage Server Instances**
Add, delete and update server instance settings.



Citations

- About.com. *What Are relational Databases.*
<http://computer.howstuffworks.com/question599.htm>
- http://en.wikipedia.org/wiki/Relational_database
- <http://www.sqlwatchmen.com/blogs/jim/2011/03/28/best-practices-for-database-schema-design/>
- <http://www.onextrapixel.com/2011/03/17/the-basics-of-good-database-design-in-web-development/>
- http://blogs.warwick.ac.uk/ggreen/entry/untitled_entry/

