

PARENTS & CHILDREN:

Creating a Relational Data Model
by Linking Tables

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Problem: A Table of Families

Last name	Mother	Father	Child1	Child2
Adams	Ann	Adam	Ava	
Beck	Barbara	Bob	Ben	Beverly

A “Flat File” Data Model

A Simple table — May also include address

What about the Cruz family?

- Parents:
 - Carol and Carl
- Children
 - Charles
 - Carly
 - Cathy

Have to Redesign Table

Last name	Mother	Father	Child1	Child2	Child3
Adams	Ann	Adam	Ava		
Beck	Barbara	Bob	Ben	Beverly	
Cruz	Cathy	Carl	Charles	Carly	Cathy

Question: What about families with 10+ children?



Problems with Flat File Models

Last name	Mother	Father	Child1	Child2	Child3
Adams	Ann	Adam	Ava		
Beck	Barbara	Bob	Ben	Beverly	
Cruz	Cathy	Carl	Charles	Carly	Carlotta

- Inflexible design: What if more children?
- Wasted space for **blank fields**

Better: A Table of Children

Child	Last Name	Age	Mother	Father	City
Ava	Adams	8	Ann	Adam	Ames
Ben	Beck	9	Barbara	Bob	Boston
Betty	Beck	7	Barbara	Bob	Boston
Charles	Cruz	11	Carol	Carl	Canton
Carly	Cruz	9	Carol	Carl	Canton
Cathy	Cruz	10	Carol	Carl	Canton

One record for each child

But, What's Wrong with This?

Child	Last Name	Age	Mother	Father	City
Ava	Adams	8	Ann	Adam	Ames
Ben	Beck	9	Barbara	Bob	Boston
Betty	Beck	7	Barbara	Bob	Boston
Charles	Cruz	11	Carol	Carl	Canton
Carly	Cruz	9	Carol	Carl	Canton
Cathy	Cruz	10	Carol	Carl	Canton

Redundant Repeated Data!

Child	Last Name	Age	Mother	Father	City
Ava	Adams	8	Ann	Adam	Ames
Ben	Beck	9	Barbara	Bob	Boston
Betty	Beck	7	Barbara	Bob	Boston
Charles	Cruz	11	Carol	Carl	Canton
Carly	Cruz	9	Carol	Carl	Canton
Cathy	Cruz	10	Carol	Carl	Canton

Wastes space; Wastes time; Possible errors

The Problems with Redundancy

- It wastes data storage space
- It lowers productivity
 - Have to type same data over and over
- It increases risk of errors
 - The more your type, the more errors

Solution: Separate Tables

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

Note: Fewer cells

Records Can Be Linked

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

Note the common field values

A "One to Many" Link

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

"Many"

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

"One"

One Parent
Many Children

Solution: Separate Tables

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

Note the
common field

Each Table Has a Primary Key

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

Uniquely identify records in each table

Child Tables Have a Foreign Key

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

Links to a
Primary Key in a
Parent table

Advantages of Linked Tables

Children

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

Parents

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

- Less Storage Space
- Little redundancy
- Flexible structure

In Excel, Two Types of Tables

**Fact Table
or Data Table**

First Name	Last Name	Age
Ava	Adams	8
Ben	Beck	9
Betty	Beck	7
Charles	Cruz	11
Carly	Cruz	9
Cathy	Cruz	10

**Dimension Table
or Lookup Table**

Last Name	Mother	Father	City
Adams	Ann	Adam	Ames
Beck	Barbara	Bob	Boston
Cruz	Carol	Carl	Canton

Relationships

- Linked tables called **Related** tables
- Data Models with linked tables called **Relational Data Models**
- Most commercial database programs use a Relational Data Model
- MS Access and Oracle are relational

Planning a Data Model

- Requires careful thought
- How many tables?
- Which data fields in which table?
- Sketch out with pencil & paper

Question:

How would you divide up this simple table?

Company	City	ST	Zip
Beantown Tours	Malden	MA	03456
Rose's Diner	Malden	MA	03456
Eddie's Cycles	Malden	MA	03456
Rose Inn	Groton	CT	02467

Question:

How would you divide up this table?

Company	City	ST	Zip
Beantown Tours	Malden	MA	03456
Rose's Diner	Malden	MA	03456
Eddie's Cycles	Malden	MA	03456
Rose Inn	Groton	CT	02467

Hint: Where is the redundant data?

Answer

Companies

Company	Zip
Beantown Tours	03456
Rose's Diner	03456
Eddie's Cycles	03456
Rose Inn	02467

Zip Codes

Zip	City	ST
03456	Malden	MA
02467	Groton	CT

Zip code is now
the **common field**

Answer

Fact Table

Company	Zip
Beantown Tours	03456
Rose's Diner	03456
Eddie's Cycles	03456
Rose Inn	02467

Primary Key

Foreign Key

Dimension Table

Zip	City	ST
03456	Malden	MA
02467	Groton	CT

Primary Key