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Introducing Databases

- A database is a collection of one or more related tables
- A table is a collection of one or more rows of data
- A row is a collection of one or more data items, arranged in columns

Structured Data

| | |
|----------------|---------------------------------------|
| 1960-12-21 | P. Barry |
| 1954-6-14 | M. Moorhouse |
| ----- | |
| Discovery_Date | Scientist |
| ----- | |
| 1960-12-21 | P. Barry |
| 1954-6-14 | M. Moorhouse |
| 1970-3-4 | J. Blow |
| 2001-12-27 | J. Doe |
| ----- | |
| Column name | Type restriction |
| ----- | |
| Discovery_Date | a valid Date |
| Scientist | a String no longer than 64 characters |

Relating tables

| | | |
|----------------|--|-----------------------|
| ----- | ----- | ----- |
| Discovery_Date | Scientist | Discovery |
| ----- | | |
| 1960-12-21 | P. Barry | Flying car |
| 1954-6-14 | M. Moorhouse | Telepathic sunglasses |
| 1970-3-4 | J. Blow | Self cleaning child |
| 2001-12-27 | J. Doe | Time travel |
| ----- | | |
| Column name | Type restriction | |
| ----- | | |
| Discovery_Date | a valid Date | |
| Scientist | a String no longer than 64 characters | |
| Discovery | a String no longer than 128 characters | |

Relating tables, cont.

| | | | | |
|------------------|--|------------------------|---------------|-------------------|
| ----- | ----- | | | |
| Column name | Type restriction | | | |
| ----- | | | | |
| Discovery_Date | a valid Date | | | |
| Scientist | a String no longer than 64 characters | | | |
| Discovery | a String no longer than 128 characters | | | |
| Date_of_birth | a valid Date | | | |
| Telephone_number | a String no longer than 16 characters | | | |
| ----- | | | | |
| Discovery_Date | Scientist | Discovery | Date_of_birth | Telephone_number |
| ----- | | | | |
| 1960-12-21 | P. Barry | Flying car | 1966-11-18 | 353-603-555-91910 |
| 1954-6-14 | M. Moorhouse | Telepathic sunglasses | 1970-3-24 | 00-44-81-555-3232 |
| 1970-3-4 | J. Blow | Self cleaning child | 1955-8-17 | 555-2837 |
| 2001-12-27 | J. Doe | Time travel | 1962-12-1 | - |
| 1974-1-17 | M. Moorhouse | Memory swapping toupee | 1970-3-24 | 00-44-81-555-3232 |
| 1999-12-31 | M. Moorhouse | Twenty six hour clock | 1958-7-12 | 416-555-2000 |

Solving the one table problem

| | |
|------------------|--|
| ----- | ----- |
| Column name | Type restriction |
| ----- | |
| Discovery_Date | a valid Date |
| Scientist_ID | a String no longer than 8 characters |
| Discovery | a String no longer than 128 characters |
| ----- | |
| Column name | Type restriction |
| ----- | |
| Scientist_ID | a String no longer than 8 characters |
| Scientist | a String no longer than 64 characters |
| Date_of_birth | a valid Date |
| Address | a String no longer than 256 characters |
| Telephone_number | a String no longer than 16 characters |

Solving the one table problem, cont.

| Discovery_Date | Scientist_ID | Discovery |
|----------------|--------------|------------------------|
| 1954-6-14 | MM | Telepathic sunglasses |
| 1960-12-21 | PB | Flying car |
| 1969-8-1 | PB | A cure for bad jokes |
| 1970-3-4 | JB | Self cleaning child |
| 1974-3-17 | MM | Memory swapping toupee |
| 1999-12-31 | MM2 | Twenty six hour clock |
| 2001-12-27 | JD | Time travel |

| Scientist_ID | Scientist | Date_of_birth | Address | Telephone_number |
|--------------|--------------|---------------|-------------|-------------------|
| JB | J. Blow | 1955-8-17 | Belfast, NI | 555-2837 |
| JD | J. Doe | 1962-12-1 | Sydney, AUS | - |
| MM | M. Moorhouse | 1970-3-24 | England, UK | 00-44-61-555-3232 |
| MM2 | M. Moorhouse | 1958-7-12 | Toronto, CA | 416-555-2000 |
| PB | P. Barry | 1966-11-18 | Carlow, IRL | 353-503-555-91910 |

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Database system: a definition

- A database system is a computer program (or group of programs)

– that provides a mechanism to define and manipulate

- one or more databases

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Available Database Systems

- Personal database systems:
 - Designed to run on PCs
 - Access, Paradox, FileMaker, dBase
- Enterprise database systems:
 - Designed to support efficient storage and retrieval of vast amount of data
 - Interbase, Ingres, SQL Server, Informix, DB2, Oracle
- Open source database systems:
 - Free!!! (Linux!!!)
 - PostgreSQL, MySQL

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SQL: The Language of Databases

- Defining data with SQL (structured query language)
- SQL provides two facilities:
 - A database definition Language (DDL)
 - provides a mechanism whereby databases can be created
 - A Data Manipulation Language (DML)
 - provides a mechanism to work with data in tables

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Understand the data before designing the tables

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Why Program Databases?

- Customised output handling
- Customized input handling
- Extending SQL
- Integrating MySQL into custom applications

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Web Technologies

Using the Internet to publish data and applications

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The Web Development Infrastructure

- The web server-
 - a program that when loaded onto a computer system, provides for the publication of data and applications
 - Examples (apache, Jigsaw, and Microsoft's IIS)
- The web client-
 - a program that can request content from a web server and display content within a graphical window, providing a mechanism whereby user can interact with the contents
 - The common name for the web client is web browser (Mozilla, MS Internet Explorer, KDE Konqueror, Opera and Lynx)
- Transport protocol-
 - the "language" that the web server and web client use when communicating with each other
 - The transport protocol employed by the WWW is called HyperText Transport Protocol (HTTP)
- The content-
 - the data and applications published by the web server
 - HyperText Mark-up Language(HTML).

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Additional components

- Client-side programming-
 - a technology used to program the web client, providing a way to enhance the user's interactive experience.
 - Java applets, JavaScript, macromedia Flash
- Server-side programming-
 - a technology used to program the web server, providing a mechanism to extend the services provided by the web server.
 - Java Servlets, JSP, Python, ASP, PHP, and Perl
- Backend database technology-
 - a place to store the data to be published, which is accessed by the server-side programming technology.
 - MySQL

These additional components turn the standart web development infrastructure into a dynamic and powerful application development environment.

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Creating Content For The WWW

There are a number of techniques employed to create HTML:

- Creating content manually-
 - Any text editor can be used to create HTML
 - time consuming
- Creating content visually-
 - Special purpose editors can create HTML pages visually.
 - Netscape Composer, MS Frontpage, Macromedia Dreamweaver...
 - unnecessary tags added, HTML pages are larger
- Creating content dynamically-
 - Since HTML is text, it is also possible to create HTML from a program.
 - needs a web page creator

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Static creation of WWW content

- If the web page is put on a web server it always appear in exactly the same way every time it is accessed.
 - It is static, and remains unchanged until someone takes the time to change it.
- It rarely makes sense to create such a web page with a program unless you have a special requirement.

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Create static web pages either manually or visually

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The dynamic creation of WWW content

- When the web page includes content that is not static, it is referred to as **dynamic** web page.
 - For example a page including current date and time
- It is not possible to create a web page either manually or visually that includes dynamic content, and
 - this is where server side programming technologies come into their own.

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Test your web-site on localhost prior to deployment on the Internet

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