

Introduction to IBM DB2 UDB

Keith T. Weber
GIS Director- Idaho State
University



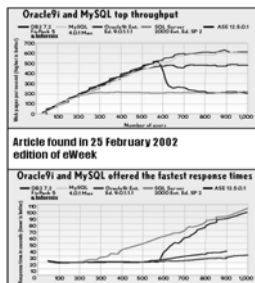
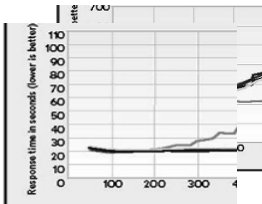
What is it?

- IBM
- DB2 (Database 2)
- UDB (Universal database)
- A fully relational database:
 - No software limitations (e.g., size of database, number of tables, number of entities per table).
 - Very scalable (it can grow to fit your needs).
 - Efficient for numerous concurrent clients



Concurrent Clients

- Enterprise GIS
 - Potential concurrent clients



Installation

- Server installation: the amount of random-access memory (RAM) that required to run DB2 server depends on the size of your databases and on the administration tools you will use. For example, if you plan to use the DB2 GUI tools to administer and configure your DB2 databases, the minimum amount of RAM we [IBM] recommends is 128 MB.

Client installation

- To run a DB2 Run-Time Client or an DB2 Application Development Client, you need a minimum of 16 MB of RAM.
- If you are planning to run a DB2 Administration Client, you need a minimum of 32 MB of RAM.

Hard drive requirements

Server

- A *typical* installation of DB2 requires a minimum of 245 MB of disk space. This amount includes the online product documentation, tools, and the Java Runtime Environment.

Client

- DB2 Run-Time Client 25 MB DB2
- Application Development Client 325 MB, including the JDK DB2
- Administration Client 125 MB

Professional Tips



- Administration password
 - DBADMIN
 - ADMINISTRATOR

Satellite Configuration

- **Satellite Edition**
 - DB2 UDB Satellite Edition is a single-user, small footprint version of DB2 available for Windows 32-bit operating systems. It is designed for occasionally connected remote systems, such as laptop computers.
 - Typically, many instances of DB2 UDB Satellite Edition are managed centrally by the same server.

Personal Configuration

- **Personal Edition**
 - DB2 UDB Personal Edition is a single-user version of the full DB2 product. It contains:
 - An object-relational database engine
 - Business intelligence support, through the **OLAP Starter Kit**
 - Data warehouse support, through the Data Warehouse Center
 - Multimedia support, through DB2 Extenders
 - Access to a variety of IBM data sources, through DB2 DataJoiner
 - Replication support, through DataPropagator
 - **Extended GUI administration tools, through DB2 Control Center**
 - An application development client
 - An administration client

Workgroup Configuration

• Workgroup Edition

– DB2 UDB Workgroup Edition is a multi-user version of the DB2 product, designed for a small business or departmental environment. It contains all the functionality of the Personal Edition, plus:

- The ability for remote clients to access data and perform administration on a DB2 workgroup server
- Web access, through Net.Data
- IBM WebSphere Application Server

Enterprise Configuration

• Enterprise Edition

– DB2 UDB Enterprise Edition is designed for large databases with many users. It contains all the functionality of the Workgroup Edition, plus:

- A license for an unlimited number of client connections
- A license for an unlimited number of web client connections
- DB2 Connect support

Extended Enterprise Configuration

• Enterprise - Extended Edition

– DB2 UDB Enterprise - Extended Edition is designed for the largest databases. It is ideal for scaling to very large databases for warehousing, data mining, and large-scale OLTP applications. It contains all the functionality of the Enterprise Edition, plus:

- Support for clusters of servers

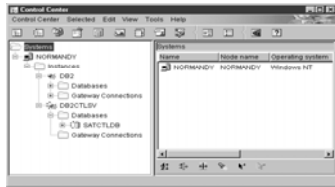
Professional Tips



- DB2 licensed per CPU in your server
 - Our Geoprocessing/SDE server is a quad-processor.
- Consider DBA overhead
 - Oracle is DBA intensive
 - SQL Server least overhead
 - DB2 to date...

DBA

- GUI based database administration
- Alternatively, command prompt can be used.



Creating Databases/tables

- Use the Control Center
- A database can be a new **instance** of DB2
- The name you specify can *only* contain 1 to 8 characters.
- To avoid potential problems:
 - do not use the special characters @, #, and \$ in a database name if you intend to have a client remotely connect to a host database.
 - Also, because these characters are not common to all keyboards, do not use them if you plan to use the database in another country.
- On Windows NT, Win2K, Vista, etc systems, ensure that no instance name is the same as a service name.

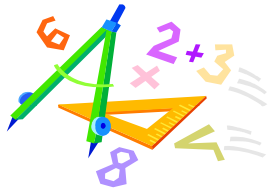
How do you check this?

DB2 Specifics

- Pre-fetch
- Buffer pools
- Table data pages



DB2 Data Types (Numeric)



- FOR BIT DATA (boolean)
- SMALLINT (0-255)
- INTEGER (-32,768 to 32,767)
- BIGINT (-2,147,483,648 to 2,147,483,647)
- FLOAT <n>
- DECIMAL <n_p,n_s>

DB2 Data Types (Character)

- CHARACTER <n>
- VARCHAR <n>
- LONG VARCHAR



DB2 Data Types (Special)

- BLOB<n[K|M|G]>
- CLOB<n[K|M|G]>
- DBCLOB<n[K|M|G]>
- GRAPHIC<n>
- VARGRAPHIC<n>
- LONG VARGRAPHIC
- DATE
- TIME
- TIMESTAMP
- DATALINK<n>

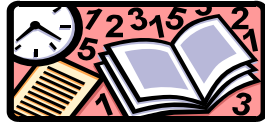
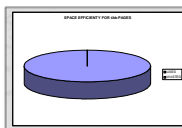


Table Data Pages

- All fields with standard data types for each record are contained within a single data page.
- There is a maximum of 255 records that are stored on each page.
- The ART of efficient data modeling is to minimize wasted pages while maximizing the proportion of each page written.

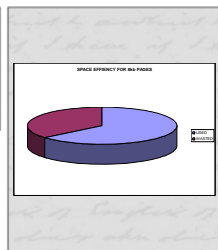
An Instance Example



one 4kb page

Each record contains 10 fields
Each record needs 20 bytes (0.02kb)
How many records will fit into a 4k page?

What percentage of a page is written?
-based on available space?
-based on available records?



one 8kb page

DB2 for GIS

- **DB2 Spatial Extender** lets you integrate geographical data with your existing business data. It includes:
 - Data types such as points, lines, and polygons
 - Functions such as area, endpoint, and intersect
 - An indexing scheme for spatial data
 - This product is available for DB2 UDB Enterprise Edition and Enterprise - Extended Edition systems.

Questions?



Key Concepts

- Understand that while data is stored in tables, the tables span TABLE PAGES
- Understand what PRE-FETCH and CACHE are...and how they differ.
- Understand DB2 specific data types

Your Assignment

- Read IBM DB2 Ref (21pg. PDF).
- Read Spatial Data Ext (8 pg. PDF).
- Complete the exercise
 - Design table pages with the “DB2 Database Administration” exercise
