What is Microsoft SQL Server?

- **Windows database management system**
  - Originally developed by Sybase
  - Microsoft / Sybase partnership through late 80's
  - All Microsoft product since early 90's

- **Versions and Editions**
  - Early (obsolete) versions:
    - SQL Server 6.5
    - SQL Server 7
    - SQL Server 2000
  - Current versions:
    - SQL Server 2005
    - **SQL Server 2008**
    - SQL Server 2008 R2
    - Soon: SQL Server 2012

- **Editions**
  - SQL Server CE (Compact Edition) – used for embedded applications
  - **SQL Server Express** – no charge edition (does not include Analysis Services, Integration Services, Agent)
  - SQL Server Web – used for web servers
  - SQL Server Workgroup – used for small-office workgroups
  - SQL Server Standard – used for SMB
  - SQL Server Developer – contains all features of Enterprise, licensed only for development
  - **SQL Server Enterprise** – also available in Evaluation Edition (180 day limit)

Primary reference:
http://www.microsoft.com/sql
**SQL Server Features**

- **SQL Server Database Services**
  - Core database engine
  - Replication – distribute data to multiple databases

- **SQL Server Analysis Services (SSAS)**
  - Online Analytical Processing (OLAP)
  - Data mining / Business Intelligence
SQL Server Features

- **SQL Server Reporting Services (SSRS)**
  - Report Manager / Report Server
  - Create / Manage / Distribute reports
  - Web option for distribution

- **SQL Server Integration Services (SSIS)**
  - Extract / Transform / Load (ETL) processing
  - Integrate data from multiple sources / to multiple destinations
  - **Express Edition** – can run but not create SSIS packages
Connection Options, IBM i Access for Windows

- **IBM i Access for Windows**
  - Licensed Program Products
    - 57xx-XW1 – IBM i Access Family
    - 57xx-XE1 – IBM i Access for Windows
  - These providers are no-charge components of IBM i Access
  - Can be installed independently of other IBM i Access components
  - 3 OLE DB Providers are installed:
    - **IBMDA400** – SQL support
    - IBMDARLA – Record Level Access
    - IBMDASQL – SQL, transactions

<table>
<thead>
<tr>
<th>Provider</th>
<th>IBM i Access VRM</th>
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<tbody>
<tr>
<td>ODBC</td>
<td>V5R1+</td>
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<tr>
<td>OLE DB</td>
<td>V5R1+</td>
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<tr>
<td>.NET</td>
<td>V5R3+</td>
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Direct connection to IBM i using IBMDA400 OLE DB Provider

This is the SQL Server Management Studio. You can use it to develop and run queries, both in SQL Server and connected to your IBM i (as shown here).
Linked Server

- Persistent object in SQL Server
- Represents a connection to another data source
  - Can be to another SQL Server
  - Can be to another type of database server that has an OLE DB Provider
  - OLE DB Provider is installed on the server where SQL Server is installed
Configure the Linked Server

Name that will be used within SQL Server for the Linked Server

Select the IBMDA400 Provider

TCP/IP Host Name of IBM i to link to

Valid Provider String for IBMDA400

http://www.connectionstrings.com

Microsoft SQL Server Features
Populate a table in SQL Server with `SELECT INTO` from a Linked Server table.

```sql
SELECT CUSNUM, LSTNAM, INIT, STREET INTO SQL400.dbo.QCUST
FROM M270.S105HMNM.ADVWORKS.QCUSTCDT
```

**Table name:** SQL400.dbo.QCUST
**Linked Server name:** WRKRDBDIRE
**Library name:** M270.S105HMNM.ADVWORKS
**RDB name:** QCUSTCDT
Saving a script in SQL Server

The script to be saved

Use the File, Save As menu to prompt for a save-to directory and name

Conventional extension: .sql

You can open the saved script file in SQL Server Management Studio. Click the Execute button to run it.
The SQL Server Agent is used to describe "jobs" to be run by SQL Server. It includes a Job Schedule feature that can be used to run SQL tasks.
The `sqlcmd` command can be used to run a script file. The syntax for the command is:

```
sqlcmd -S server_name\instance_name -i c:\script_file_name.sql
```

where

- `-S` identifies the following values as the server name and instance name
  - `server_name` - name of the SQL Server where the script is to be run
  - `instance_name` - is the instance of the SQL Server

- `-i` identifies the following value as the name of the input file (the script)

- `c:\script_file_name.sql` is the complete path and file name of the script file
The Microsoft SQL Server JDBC driver

- No-charge download from Microsoft


  (or go to Microsoft.com, search for "SQL Server JDBC")

- Download

  Microsoft SQL Server JDBC Driver 3.0
  sqljdbc.jar - Java 1.x, Java 5
  sqljdbc4.jar - requires Java 6.0

- Install the .jar file to a directory in the IFS

- Set CLASSPATH to the .jar
private static ResultSet createResultSet(String customer) {

    ResultSet rs = null;

    try {
        Properties p = new Properties();
        p.put("user", "SQLTEST");
        p.put("Password", "sqltest");
        p.put("DatabaseName", "Northwind");

        conn = DriverManager.getConnection("jdbc:sqlserver://host_name:1433", p);

        stmt = conn.createStatement();

        rs = stmt.executeQuery("SELECT * FROM Northwind.dbo.Customers");
    }
    catch (Exception e) {
        System.err.println("Exception: " + e.getMessage());
        System.exit(EXIT_ERROR);
    }

    return rs;
}
Connect to SQL Server from RPG

• Primary reference:
  • Scott Klement’s work and articles on System iNetwork
  • www.systeminetwork.com
  • Search for JDBC R4

• How it works
  • Download / install JDBC driver from Microsoft
  • Download / install Scott’s service program code, examples
  • Configure Java environment
  • Create RPG programs using the service program
Connect to SQL Server from RPG

• Another tool:
  • Dieter Bender’s AppServer4RPG and ArdGate (Application Request Driver)
  • sourceforge.net/projects/appserver4rpg
  • Also uses JDBC driver

• How it works
  • Download / install JDBC driver from Microsoft
  • Download / install AppServer4RPG code, samples
  • Configure Java environment
  • Create RPG programs using ArdGate API
What is SQL Server Reporting Services used for?

- **Managed Reporting**
  - Recurring reports
  - Often collation of data from multiple data sources

- **Ad-Hoc Reporting**
  - Typically end-user driven
  - Generally one-time, relatively simple, time-dependent

- **Embedded Reporting**
  - Reports embedded within business apps / portals
  - Examples
    - Reports linked to SharePoint Server
    - Reports output to Excel
A Sample Report

This is a typical list-style report. It can be output to several different output types.
Microsoft SQL Server Features

Composite report that includes

- Parameters
- Summarized data
- Graphs

The summarized data and graphs can be drilled-into to show the backing detail data.
What is SQL Server Integration Services used for?

- Historically known as Data Transformation Services (DTS)
  - SQL Server 7.0, SQL Server 2000
  - SSIS first released with SQL Server 2005

- Data Import / Export
  - Flat file / database -> database / flat file

- Extract, Transform, Load (ETL)
  - Typically associated with database -> data warehouse
  - Transform, clean, de-dupe, data conformance

- Control Flow Engine
  - Control sequential / scripted execution of sequence of events
  - Supports conditional processing, error handling
  - Examples
    - Download / upload
    - Rename, drop, create, index builds, backup
SSIS Package – Data Flow tasks

SSIS Package includes 1..many Control Flow tasks.

Dependencies between tasks can be set.

Example: Task 1 must complete successfully before Task 2 runs.
SQL Server Lab

- Lab handout (PDF) provided for today’s presentation

- Requires SQL Server Express Edition or any of the other SQL Server editions
  - SQL Server 2008R2 Express / Enterprise Evaluation is used in the lab
  - Should also work for SQL Server 2008, SQL Server 2005

- Lab shows
  - How to create a **Linked Server** from SQL Server to your IBM I
  - How to run SELECT, INSERT, UPDATE, DELETE statements on SQL Server that affect the IBM I
  - Create / save / run a **T-SQL batch program**
  - Use the **SQLCMD** program to run T-SQL from a command prompt
  - Use **SQL Server Agent** to run a T-SQL batch

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