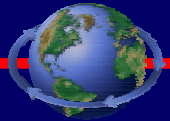


SQL Server 7.0 Data Warehousing

Anil Desai, QuickArrow, Inc.

anil@quickarrow.com

<http://home.austin.rr.com/akdesai>



SQL Server 7.0 Data Warehousing

April 11th, 2000

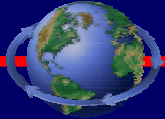
Written and Presented by:
Anil Desai, MCSE, MCSD, MCDBA

Introduction and Purpose



- ◆ To describe and demonstrate how advanced features in SQL Server 7.0 can be used to for building and analyzing a data warehouse

Presentation Overview



- Overview of Data Warehousing Challenges
- Using Data Transformation Services
- Performance Optimization and Data Management
- Analyzing Data with OLAP Services
- More SQL Server 7.0 Features

Data Warehousing Challenges: Step #1



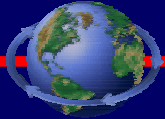
- ◆ Designing a Data Warehouse
- ◆ Online Transaction Processing (OLTP)
 - Normalized
 - Optimized for Inserts, Updates and Deletes
- ◆ Online Analytical Processing (OLAP)
 - Denormalized
 - Optimized for reporting
 - “Star” schema structure

Data Warehousing Challenges: Step #2



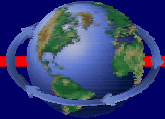
- ◆ Populating the Data Warehouse
- ◆ Challenges:
 - Dealing with inconsistencies
 - Performance and storage issues
 - Political Issues
 - Heterogeneous sources

Data Warehousing Challenges: Step #3



- ◆ Analyzing the Data
 - Perform complex analyses
 - Manage complex data relationships in a way users can understand
 - Use client-side tools that are simple to learn and customize

Microsoft Data Warehousing Components



◆ Server-Side:

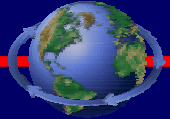
- SQL Server 7.0 Data Transformation Services (data population)
- SQL Server 7.0 (data storage)
- OLAP Services (data aggregation and analysis)

◆ Client-side:

- Excel 2000 Pivot Tables
- Office 2000 web tools

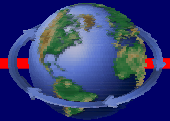
SQL Server 7.0 Data Transformation Services (DTS)

Using DTS to organize and manage data between heterogeneous platforms and formats



Data Transformation Services

- ◆ Goal: Transfer data between heterogeneous sources
- ◆ DTS is used to graphically create “packages” for importing and exporting data
 - Packages can be run once or scheduled to execute regularly
- ◆ Common Application: Decision Support Services and Data Warehousing



DTS Overview

- ◆ Uses any ODBC or OLE-DB compatible data source for import / export
 - “Flat” files: Text File, CSV, Excel Files
 - Workgroup / Desktop databases: Microsoft Access, Visual FoxPro
 - RDBMS's: SQL Server, Oracle, Sybase, Informix, etc.
 - Other Data Sources: Exchange Server, Mainframes

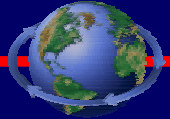


Using DTS to Move Data

- ◆ Types of Tasks:
 - Active Scripts
 - Executing program code, SQL Tasks, etc.
 - Transfer database objects
 - Send E-Mail notifications to administrators
- ◆ Schedule packages to run once or on a predefined schedule
- ◆ DEMO: Creating a DTS Package

Optimizing SQL Server 7.0 Performance and Storage

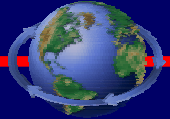
Using built-in tools to improve performance and
manage large data stores



Performance Monitoring Basics

- ◆ Goal: To *move* the bottleneck
 - Reduce response times
 - Increase throughput

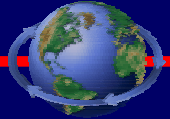
- ◆ Overall Process:
 - Establish a baseline and find bottleneck
 - Make one change at a time
 - Measure performance again and isolate bottleneck
 - Repeat, as desired



Performance: Server Level

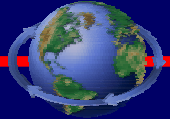
- ◆ Performance: Server Level
 - Performance Monitor

- ◆ Useful Counters:
 - Buffer Cache Hit Ratio
 - Total Server Memory
 - Page reads/writes per second



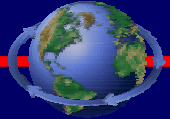
Performance: Database Level

- ◆ Using SQL Server Profiler
 - Generates “trace” files that capture events specified by an administrator
- ◆ Index Tuning Wizard
 - Can use trace files created by SQL Server Profiler



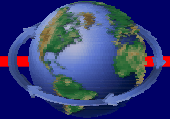
Performance: Query Level

- ◆ Using SQL Query Analyzer
 - Shows query optimizer plans for queries
 - Find reasons for slow-running queries
- ◆ Setting the Query Cost Governor
 - Prevents running of queries that exceed a maximum resource threshold



Data Management

- ◆ SQL Server Data Storage Architecture
 - File Architecture (dynamic resizing of files)
 - Can use files and file groups to distribute information across multiple physical devices
 - Horizontal and Vertical partitioning of data



Data Protection

- ◆ Backup and Recovery Mechanisms:
 - Online (“Hot”) backups
 - File and file group backups
 - RAID
 - Media sets and media families

- ◆ Reliability and Scalability
 - Standby Servers (“log-shipping”)
 - SQL Server Clustering
 - Fail-Over Support
 - Load-Balancing

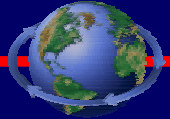
Analyzing Data

Use the OLAP Services, Web-based tools and other methods for analyzing complex data relationships

Web-Based Three-Tier Architecture Overview

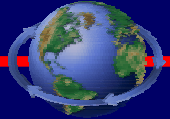


- ◆ Presentation:
 - Web Server and/or Web Browser
- ◆ Business Objects:
 - Microsoft Transaction Server
 - Oracle Application Server
 - Microsoft Active Server Pages
 - ActiveX / COM Objects
 - Allaire ColdFusion
 - Other “middle-ware”
- ◆ Data Storage:
 - SQL Server, Oracle
 - Other RDBMS's



Publishing Data on a Web

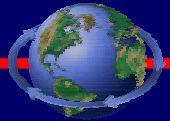
- ◆ SQL Server 7.0 Web Assistant can create static pages
 - Special HTML tags can be used within a template file
 - Can be scheduled to occur automatically
- ◆ Use Visual Interdev to make ASP-based dynamic web pages, including ad-hoc queries
- ◆ Middle-ware and other web software can use OLE-DB or ODBC



OLAP Overview

◆ Purpose

- To quickly analyze large data sets
- To speed the accessing of aggregate data
- Other Decision-Support Features
 - “What-If?” Analysis
 - Interactive display and charting options



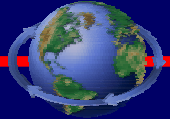
SQL Server OLAP Services

◆ Architecture

- Independent of SQL Server
- Storage methods: MOLAP, HOLAP, ROLAP
- Depends on “star” or “snowflake” schema
- Supports Pivot Table Service and MDX queries
- Administered with MMC Snap-in

◆ Updates:

- DTS Task Kit: Allows refreshes of OLAP data
- OLAP Update: Allows archiving of data cubes

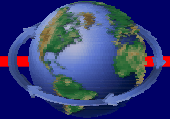


OLAP Services: Client-Side

- ◆ Excel 2000 Pivot Tables
 - Includes Office 2000 web integration features
- ◆ Third-Party Tools
 - OLAP@Work (www.appsource.com)
 - Brio (www.brio.com)
 - Cognos (www.cognos.com)

More SQL Server 7.0 Features

Use Full-Text Search, English Query and SQL
Server 2000 features to better manage data



English Query

- ◆ Allows forming relationships between database parts
 - E.g.: “Customers place orders”; “Stores are located in regions”
- ◆ Allows users to query in “natural language”
 - E.g.: “Which stores in Region 12 had sales of over \$50,000 this year?”



Full-Text Search

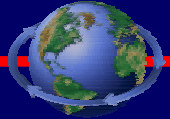
- ◆ Allows users to easily search text data
 - May be in “text” columns types, or
 - Microsoft Word, Excel files

- ◆ Special queries using CONTAINS ...
FREETEXT syntax can be used



SQL Server Agent / SQL Mail

- ◆ Can be used to schedule almost any task
 - Can occur on predefined schedule, or
 - When system activity is low
 - Can manage all tasks and jobs via a central server
- ◆ SQL Mail can be used to send alerts or automatic notification of process status

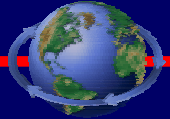


SQL Server 2000

- ◆ New features in SQL Server 2000:
 - Cascading deletes
 - Materialized Views
 - Multiple instances per server
 - Support for XML
 - Enhanced UI and Administrative Tools
 - Enhanced OLAP functionality
 - Performance and reliability features

Conclusion

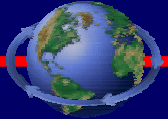
Features in SQL Server 7.0 can be used to better populate, manage and analyze information for Decision Support Systems



For More Information

- ◆ **Microsoft TechNet / Microsoft Support Online**
(<http://support.microsoft.com>)
- ◆ **Microsoft SQL Server Web Site**
(<http://www.microsoft.com/sql>)
 - White papers on SQL 7.0 / 2000 architecture
 - Technical walkthroughs of new features
- ◆ **Microsoft Seminar Online**
(<http://www.microsoft.com/seminar>)
 - Multimedia lectures/demonstrations of SQL 7.0 features

For More Information

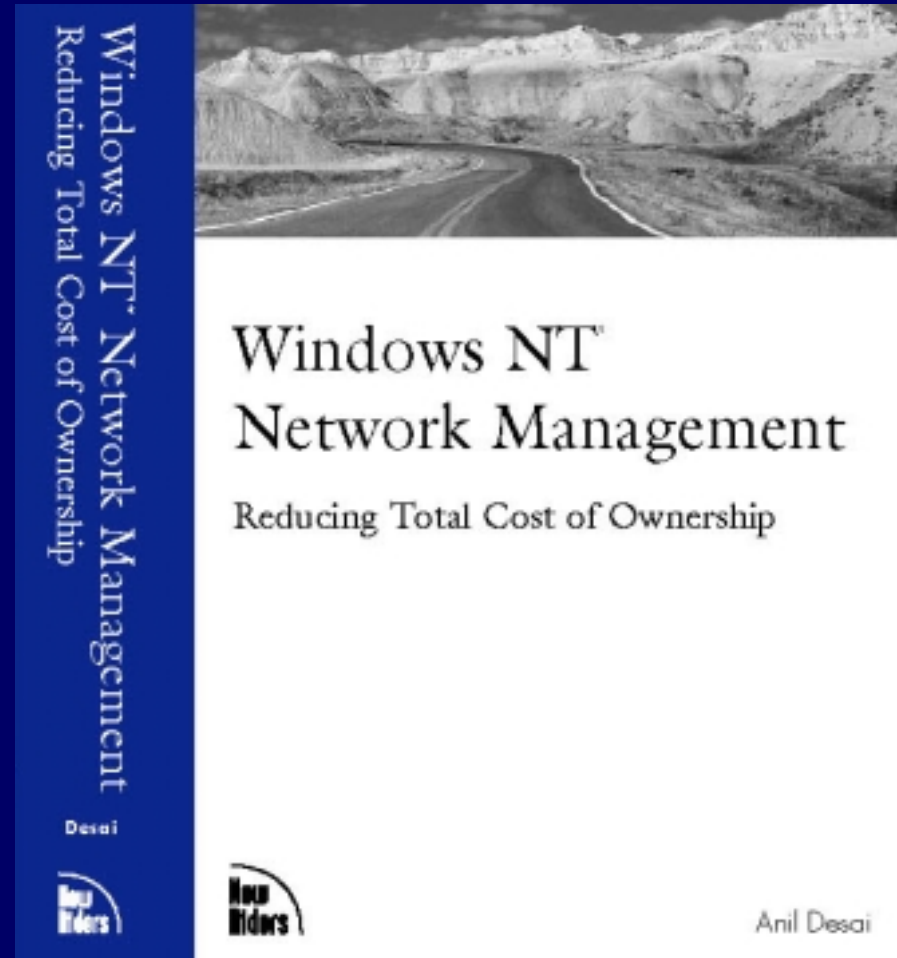


- ◆ Desai, Anil. *SQL Server 7 Backup and Recovery* (February, 2000, Osborne/McGraw-Hill)

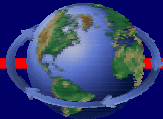
For More Information



- ◆ Desai, Anil. “*Windows NT Network Management: Reducing Total Cost of Ownership*” (May, '99; New Rider's Press)
 - Chapter #9, “Performance Monitoring”
 - Chapter #10, “Performance Optimization”
 - Chapter #15, “Web-Based Publishing”
 - Chapter #16, “Web Applications”



For More Information



- ◆ Andy Ruth and Anil Desai.
MCSE Fast Track: SQL Server 7.0 Administration Exam Guide

(New Riders Press, 1999)