



SQL Server 2005

Bridging the Gap between Development and Administration

Kimberly L. Tripp
President, SYSolutions, Inc.
Founder, SQLskills.com



Speaker – Kimberly L. Tripp

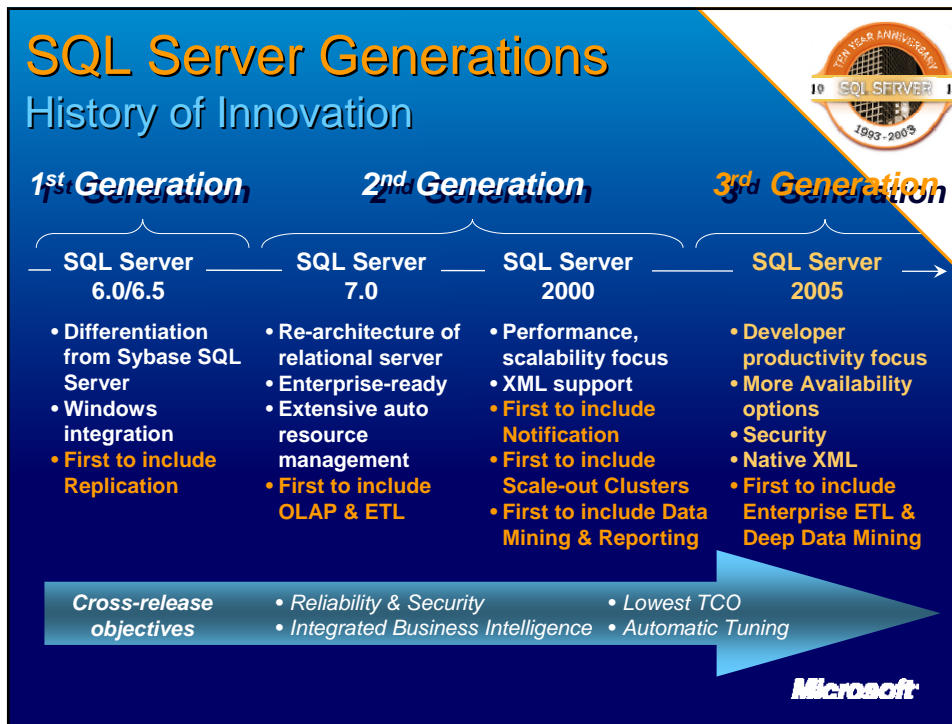
- Independent Consultant/Trainer/Speaker/Writer
- Founder, SYSolutions, Inc. www.SQLskills.com
email: Kimberly@SQLskills.com
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- SQL Server MVP <http://mvp.support.microsoft.com/>
- Microsoft Regional Director
<http://www.microsoftregionaldirectors.com/Public/>
- Writer/Editor for SQL Magazine www.sqlmag.com
- Coauthor MSPress: *SQL Server 2000 High Availability*
- Presenter/Technical Manager for SQL Server 2000 High Availability Overview DVD (MS Part# 098-96661)





Pace of Innovation

- SQL Server has grown from a team of 5 people (who liaised with Sybase)
 - To approx 400 (for the SQL Server 7.0 release in 1998)
 - To just under 1000 (for the SQL Server 2005 and WinFS projects)
- Microsoft continues to make massive, strategic investments in this area



SQL Server 2000

A Major Release


- XML support
 - SELECT ... FOR XML
 - OpenXML
 - XML Views
 - XML Updategrams
 - XML View Mapper
 - XML Bulk Load
- URL and HTTP db access
- HTTP access to cubes
- Multi-instance support
- Integrated Data Mining
- Full-Text Search in formatted docs
- English Query for the Web
- C2 security rating (NSA)
- Installation disk imaging
- Active Directory integration
- Self-management and tuning
- Distributed Partitioned Views
- Log Shipping
- Parallel CREATE INDEX
- Parallel scan
- Parallel DBCC
- Failover clustering
- Failover cluster management
- 32 CPU SMP system support
- 64 GB RAM support
- VIA SAN support
- Indexed views
- ROLAP dimension storage
- Distributed Partitioned Cubes
- Online index reorganization
- Differential backup
- User-defined functions
- Server-less snapshot backup
- SQL Query Analyzer debugger
- New data types
- Column-level collations
- Virtual Cube Editor
- Linked cubes
- MDX Builder
- Dimensions
- Security in Analysis Services
- OLAP Actions
- Custom rollups
- Cascading referential integrity and actions
- INSTEAD OF triggers
- Indexes on computed columns
- Queued replication
- DTS enhancements
- Copy Database Wizard

Microsoft

SQL Server 2005

<p>.NET Framework</p> <ul style="list-style-type: none"> □ Common Language Runtime Integration □ User-defined Aggregates □ User-defined Data Types □ User-defined Functions □ SQL Server .NET Data Provider □ Extended Triggers <p>Data Types</p> <ul style="list-style-type: none"> □ New XML Datatype □ n/varchar(max) <p>SQL Server Engine</p> <ul style="list-style-type: none"> □ New Message Service Broker □ HTTP Support (Native HTTP) □ Database Tuning Advisor □ Enhanced Read ahead & scan □ Online Index Rebuild □ Multiple Active Result Sets □ Persisted Computed Columns □ Queuing Support □ Snapshot Isolation Level □ Non-blocking Read Committed □ Table and Index Partitioning □ NUMA support <p>Database Availability and Redundancy</p> <ul style="list-style-type: none"> □ Fail-over Clustering (up to 8 node) □ Enhanced Multi-instance Support □ Database Mirroring □ Database Snapshots <p>XML</p> <ul style="list-style-type: none"> □ XQUERY Support (Server & Mid Tier) □ XML Data Manipulation Language □ FOR XML Enhancements □ XML Schema (XSD) Support □ MSXML 6.0 (Native) □ .Net XML Framework Support for XML and CLR integration <p>Notification Services</p>	<p>Replication</p> <ul style="list-style-type: none"> □ Auto-tuning Replication Agents □ Oracle Publication □ Improved Blob Change Tracking <p>OLAP and Data Mining</p> <ul style="list-style-type: none"> □ Analysis Management Objects □ Windows Integrated Backup and Restore □ UDM, multi-fact table support □ DTS and DM Integration □ Eight new DM algorithms □ Auto Packaging and Deployment <p>SQL Integration Services (SQLIS), replaces DTS</p> <ul style="list-style-type: none"> □ New Architecture (DTR + DTP) □ Complex Control Flows □ Control Flow Debugging □ For Each Enumerations □ Property Mappings □ Full Data Flow Designer □ Full DTS Control Flow Designer □ Graphical Package Execution □ Immediate Mode and Project Mode □ Package (Advanced) Deployment Tools □ Custom Tasks and Transformations <p>Reporting Services</p> <ul style="list-style-type: none"> □ Multiple Output Formats □ Parameters (Static, Dynamic, Hierarchical) □ Bulk Delivery of Personalized Content □ Support Multiple Data Sources □ STS (Web Parts, Doc Libraries) □ Visual Design Tool □ Charting, Sorting, Filtering, Drill-Through □ Scheduling, Caching □ Complete Scripting Engine □ Scale Out architecture □ Open XML Report Definition <p>Dynamic Management Views</p>	<p>Database Maintenance</p> <ul style="list-style-type: none"> □ Backup and Restore Enhancements □ Checksum Integrity Checks □ Dedicated Administrator Connection □ Dynamic AWE □ Fast Recovery □ Highly available Upgrade □ Online Index Operations □ Online Restore □ Parallel DBCC □ Parallel Index Operations <p>Management Tools</p> <ul style="list-style-type: none"> □ MDX Query Editor □ Version Control Support □ XML/A □ SQLCMD Command Line Tool □ SQL Service Manager <p>Performance Tuning</p> <ul style="list-style-type: none"> □ Profiler Enhancements □ Profiler/Perfmon Integration □ Profiling Analysis Services □ Exportable XML Showplan □ Exportable Deadlock Traces <p>Full-text Search</p> <ul style="list-style-type: none"> □ Indexing of XML Datatype □ Index files integrated with SQL backup <p>MDAC</p> <ul style="list-style-type: none"> □ Side by Side installation □ Microsoft Installer base setup □ Support for Active Directory Deployment <p>SQL Client .NET Data Provider</p> <ul style="list-style-type: none"> □ Server Cursor Support □ Bulk load support <p>Security</p> <ul style="list-style-type: none"> □ No metadata access, permissions Grantable □ Fine Grained Administration Rights □ Separation of Users and Schema □ Data Encryption Microsoft □ Code-signing □ SSL Encryption at installation
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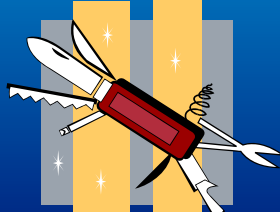
5 Years of Development



SQL Server 2000

- Initial XML support
- Feature Enhancements
- SQL extensions:
 - UDF
 - Indexed Views
 - Collation Support

DBA Focused



SQL Server 2005

- Deep XML support
- Deep CLR support
- Developer/DBA toolset
- Service Broker
- Security tools

Dev Focused

Microsoft

Developer/DBA Convergence

CLR Development
 - Procedures
 - Functions
 - Triggers
 - Types
 - Aggregates
XML Development

- Developers and DBA's have traditionally worked to an interface, defined by:
 - Table or View definition
 - Stored Procedure & result set definition

Microsoft

New & Revamped Tools

SQL Management Studio **BI Workbench** **Profiler** **SQL Computer Manager**

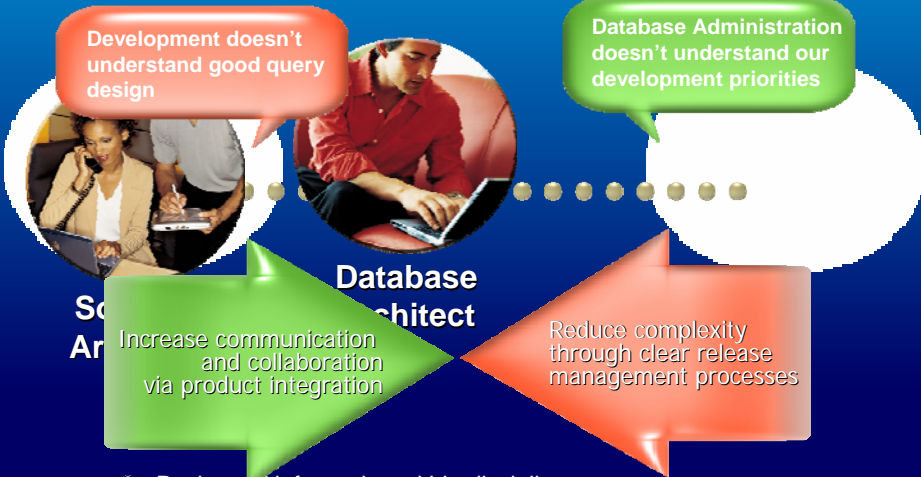
Microsoft

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Integrated Solutions



Communication Barriers



Development doesn't understand good query design


Database Administration doesn't understand our development priorities

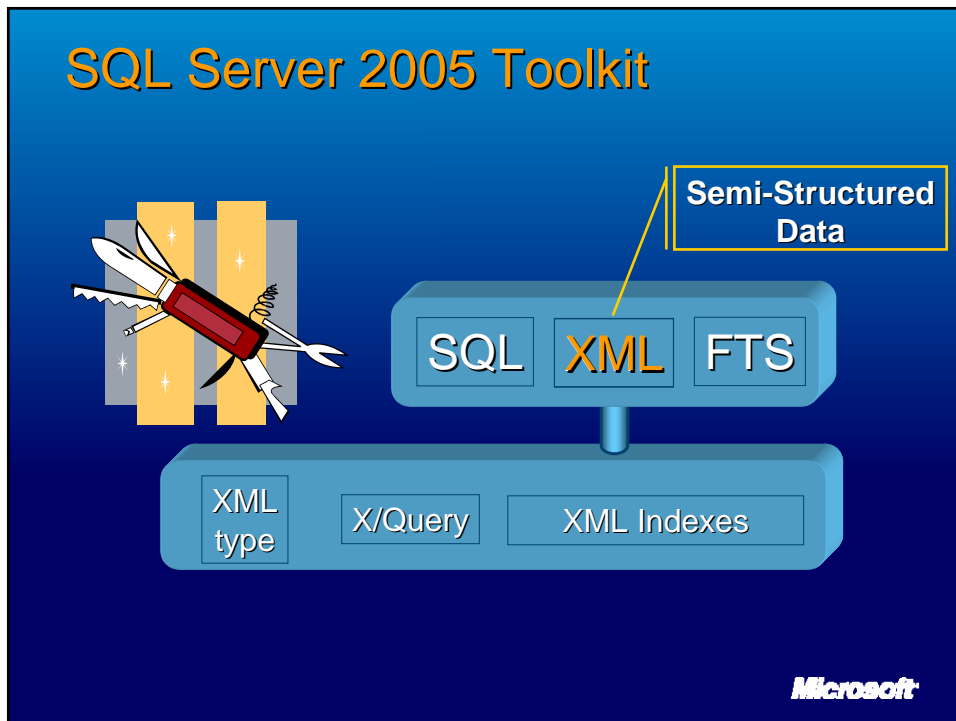
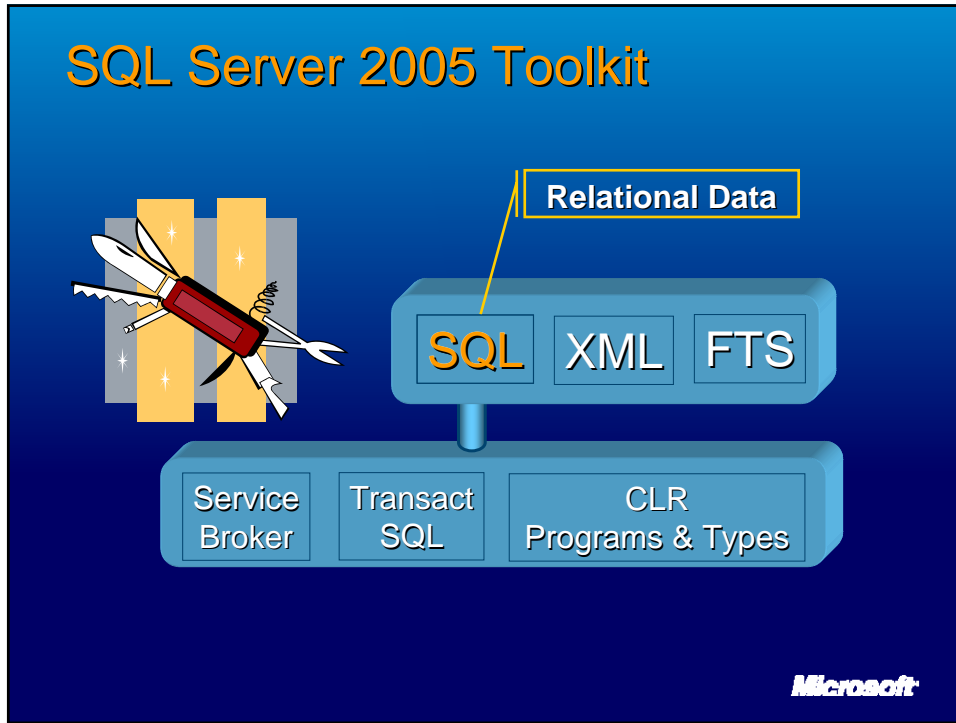
Database Architect

Increase communication and collaboration via product integration

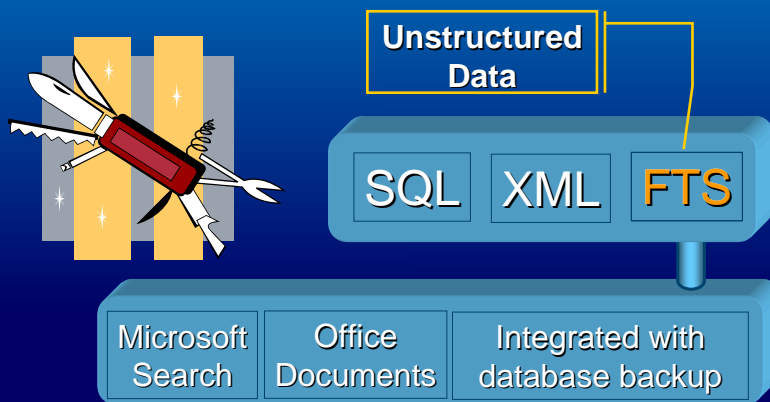
Reduce complexity through clear release management processes

- Pockets of information within disciplines
- Unclear delineation of responsibilities
- Conflicting best practices and architectures
- Conflicting strategic goals and objectives





SQL Server 2005 Toolkit



Microsoft

Developer/DBA Convergence

Developers:

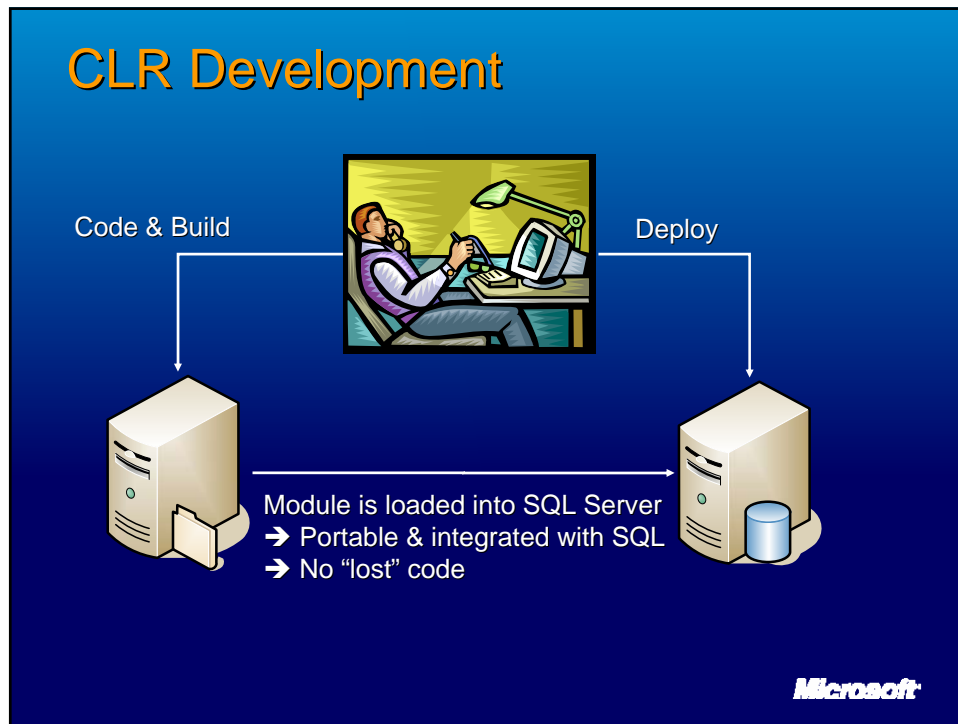
- Get productive with the new tools
- Closer integration of DBAs into the development process
- Design application to be:
 - Supportable
 - Resilient to change
- Ensure secure, robust implementation

DBAs:

- Maintain role as data steward
- Understand & advise on appropriate technology choices
- Factor XML & CLR into schema design
- Ensure secure, robust implementation



Microsoft



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CLR Development 101

Microsoft

Good Scenario for CLR Usage

- Data validation & network traffic reduction
- Writing general purpose functions:
 - Data passed as arguments
 - Little/no additional data access
 - Complex computation applied on a row by row basis to the data
- Scalar types & custom aggregations
- Leveraging the power of the .NET Framework
 - Access to a rich set of pre-built functionality
- Replacing Extended Stored Procedures (XP)
 - The CLR is safer:
 - No access violations making SQL Server crash
 - No leaks making SQL Server slow down & crash
 - Better performance & scalability (managed memory model)
 - No security issues...



Microsoft

Bad Scenario for CLR Usage



- Heavy data access – Transact-SQL set based access will be faster
 - Don't write SELECT statements as CLR procedures!
- Complex types
 - 8K size limitation
 - All data is read/re-written when updated
- Pre-Aggregation for Reports
 - CLR Aggregates cannot be used in Indexed Views
- Your application must support previous versions of SQL Server
- Technology for technology's sake...

Microsoft

Transact-SQL Enhancements

- ROW_NUMBER, RANK, DENSE_RANK
- Common Table Expressions
- PIVOT/UNPIVOT
- CROSS APPLY and OUTER APPLY
- Error handling – TRY/CATCH
- DDL Triggers (synchronous)
- Event Notifications (asynchronous)
- Parameterized TOP

Microsoft

XML Development

- Native XML datatype
 - Optimized on-disk structure (not “just a blob”)
- XML Indexes
 - Entities & Attributes
- X/PATH Query Engine
 - Integrated with core relational operators
- Schema Support
 - Strongly typed XML
- CLR/XML Integration
 - XMLTextReader
 - Access to XSLT
- Full Text Search



SQL XML & CLR Integration

- System.Data.SqlTypes.SqlXml

```
cmd.CommandText = "UPDATE docs SET xCol=@x  
WHERE id=1"; // set value of XML
```

```
parameter SqlParameter p = cmd.Parameters.Add("@x",  
SqlDbType.Xml);
```

```
p.Value = new SqlXml(new XmlTextReader("<hello/>",  
XmlNodeType.Document, null));
```

```
cmd.ExecuteNonQuery();
```

Microsoft

XML Indexes

- Primary Index:

- Requires a clustered primary key on the base table
- B-Tree of element and attribute names, node values, and node types, retains document order and structure, as well as the path from the root of the XML instance to each node for efficient evaluation of path expressions

- Secondary Indexes off of the primary XML index

- PATH → columns (path, value)
- PROPERTY → columns (PK, path, value)
- VALUE → columns (value, path)

Microsoft

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Accessing XML Data

Microsoft

Scenario for XML Development



Good Scenario:

- Data is semi-structured, small core of fixed data with many, sparsely populated extended attributes
 - Multi-value Property bags
 - Complex Property bags
 - "WordXML"
- Documents are large but rarely updated
 - Indexing will pay off
- Data is hierarchical
 - regular expressions are well suited for finding data



Bad Scenario:

- "Database in a Cell"
- Documents are large and updated frequently
- Document update contention is likely
- Data is fully structured & populated → candidate for conversion to relational schema
- Data contains large binary objects (2GB limitation)

Microsoft

SQL Server – Web Service?

- SQL Server 2004 can listen to HTTP traffic using kernel mode HTTP.SYS
 - *NOT* an IIS dependency
 - Off by default
- Clients can use SOAP to interact with SQL Server
 - Great for platforms with no SQL middleware support

Microsoft

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SQL Server 2005 Web Services

Microsoft

SQL Server as a Web Service



Good Scenario:

- Intranet
- Access to a specific stored procedure from:
 - An application
 - Off platform databases
- Data access from clients that don't have SQL Server middleware [but slower]
- Replacing SQLXML 3.0 datagrams

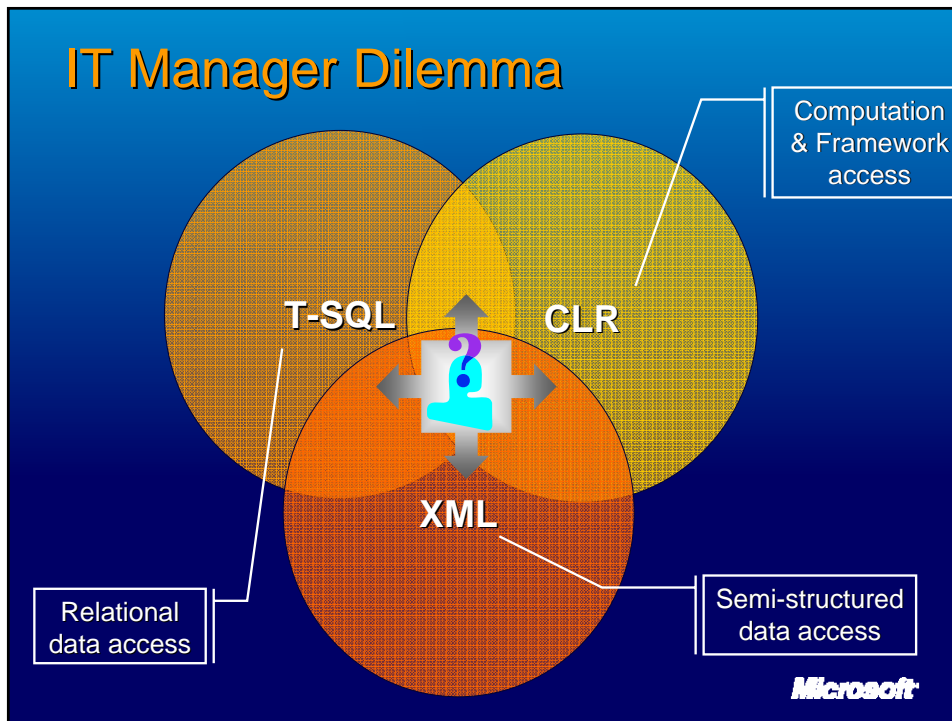


Bad Scenario:

- Internet
- When used to architect entire, complex application
- Data access from clients that can run the SQL Server middleware
- Moving data between SQL Servers
- For applications with large numbers of clients that might require scale-out of application logic

Microsoft

IT Manager Dilemma



Coping with the Dilemma

- Always carefully plan major technology introduction
- New features should be “off by default” until their utility is understood
- Avoid using a feature because it’s there:
 - Does it enable us to tackle new business problems?
 - What impact does it have on support/security?
 - Does it work with your availability plans?
 - Is there a more performant option?
 - Does it match my IT groups skills – which teams?
 - Does it require client/middle-tier server middleware change?→ Develop clear criteria for usage
- Decide which rules also apply to 3rd party applications

Microsoft

Troubleshooting

- With new tools come new problems ☺
- The core engine management tools now provide greatly enhanced information about “what is going on”:
 - SQL Profiler (with Perfmon integration)
 - Permissions can be granted!
 - Debugger support for T-SQL & CLR
 - Complete cleanup of error messages
 - Dynamic Management Views
 - Flight Recorder
 - SqlClient/OLEDB tracing
 - XML Showplan

Microsoft

Demo

Correlating Profiler Trace Logs with System Monitor

Microsoft

But...



- I love the new features!
- I want to learn!
- I want to use this for prototype & small production systems!

But...

- I'm broke!







Don't worry, there is a very attractively priced version!

Microsoft

Microsoft Express Product Range

Visual Studio 2005 Express Beta Products

The Express products, expanding the Visual Studio product line to include lightweight, easy-to-use, easy-to-learn tools for hobbyists, enthusiasts, and novices who want to build dynamic Windows applications and Web sites.

					
Visual Basic 2005 Express	Visual C# 2005 Express	Visual C++ 2005 Express	Visual J# 2005 Express	Visual Web Dev 2005 Express	SQL Server 2005 Express
Develop for: Windows	Develop for: Windows	Develop for: Windows	Develop for: Windows	Develop for: Web	Develop for: Databases
Visual Basic 2005 Express Edition, which was built with a focus on productivity, is ideal for the first time or casual programmer, students, or anyone with prior Visual Basic programming experience.	Visual C# 2005 Express Edition combines some of the best aspects of the Java language and C/C++ to create a great combination of power and productivity for students, hobbyists and enthusiasts.	Visual C++ 2005 Express Edition typically takes longer to master but can offer more horsepower and a finer degree of control than the other Express products.	Visual J# 2005 Express Edition is an implementation of the Java language and is an ideal tool for anyone with prior Java experience or students using Java in school.	Visual Web Developer 2005 Express Edition is focused exclusively on Web development with ASP.NET 2.0. Choose from Visual Basic, C#, or J# languages.	SQL Server 2005 Express Edition complements the other Express products by providing database support that is both powerful and easy to use.

Microsoft

SQL Express

- Remember MSDE?
Express has a Management UI!
- Limitations:
Single CPU, 1GB RAM, 4GB maximum database size...
- SQL Server Express is a lightweight version of SQL Server 2005 that includes all of the rich functionality of the SQL Server database engine, such as stored procedures, views, triggers, cursors, CLR support, and XML support. In addition, SQL Server Express will come with a free and easy-to-use management tool, SQL Server Express Manager.
- SQL Server Express does not include any of the advanced components of SQL Server including Analysis Services, Reporting Services, Integration Services, and Notification Services.



Microsoft

Demo

SQL Express Manager

Microsoft

Express Language Features

Feature	Express	Professional
Database design tools: "Data Connections" node	Local	All
Data access	Web services and local databases	All
Documentation	10MB core 200MB optional	Full MSDN Library
Extensibility	Tools menu	All
Class designer and object test bench	No	Yes
Debugging	Local	Local/Remote
XML designer support	XML only	XML/XSLT
Deployment support	No	Yes
Mobile development support	No	All
Reporting	No	Reporting Services, Crystal Reports
64-bit compiler support	No	Yes
Office development support	No	Yes
Server Explorer: "Servers" node	No	All
Source code control	No	SCCI
User experience	Streamlined	Full
Size	80MB	Multiple CDs Microsoft

Resources



- More about Visual Studio 2005
 - <http://lab.msdn.microsoft.com/vs2005/>
- More about SQL Server 2005
 - <http://msdn.microsoft.com/SQL/2005/default.aspx>
- XML Developer Center
 - <http://msdn.microsoft.com/xml/default.aspx>
- Microsoft Express Product Range
 - <http://lab.msdn.microsoft.com/express/>

Microsoft

Resources

- The SQL Server 2005 Developer Center on msdn
 - <http://msdn.microsoft.com/SQL/2005/default.aspx>
- “SQL Server 2005 Webcasts” contains links to 15 webcasts recorded in December to help get you started
- “SQL Server 2005 Articles” contains links for 25+ articles/whitepapers on Beta II
- Keep watching the Developer Center, there are new resources every week!

Microsoft

Call to Action!

- Start working with SQL Server 2005 NOW! At least start reading the whitepapers...
- From design forward – development and DBA should communicate on which features should be used, and why?!
- Work on cross training – not as much for depth but for better holistic design
 - Chalk talks
 - Brown bag lunches
- Use the right technology for the job – assess the problem and choose technology LAST!

Microsoft



SQL skills

Thank you!

Kimberly L. Tripp
Consultant . Trainer . Writer . Speaker

email: Kimberly@SQLskills.com
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