Microsoft SQL Server

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Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet).

Microsoft markets at least a dozen different editions of Microsoft SQL Server, aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users.

SQL Server uses as its primary query languages T-SQL and ANSI SQL-92 (natively). A Markup Language (XML) can be stored in SQL Server. The XML data type was added with SQL Server 2000. This data type is a value that is stored in SQL Server with an associated XML schema. The associated XML schema has an XML format and is also stored in the same table as the XML data.

SQL Server 2005 introduced Multi-Version Concurrency Control. User facing features include new transaction isolation level called SNAPSHOT and a variation of the READ COMMITTED isolation level based on statement-level data snapshots.

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### Genesis [edit]

In 1988 Microsoft joined Ashton-Tate and Sybase to create a variant of Sybase SQL Server for IBM OS/2 (then developed jointly with Microsoft), which was released the following year. This was the first version of Microsoft SQL Server, and served as Microsoft's entry to the enterprise-level database market, competing against Oracle, IBM, and Sybase. SQL Server 4.2 was shipped in 1995 bundled with OS/2 version 1.3, followed by version 4.21 for Windows NT, released alongside Windows NT 3.1. SQL Server 6.0 was the first version designed for MS-DOS, and not included any direction from Sybase.

About the time Windows NT was released in July 1993, Sybase and Microsoft parted ways and each pursued its own design and marketing strategies. Microsoft negotiated exclusive rights to all versions of SQL Server written for Microsoft operating systems. (In 1996 Sybase changed the name of its product to Adaptive Server Enterprise to avoid confusion with Microsoft SQL Server.) Until 1994, Microsoft's SQL Server carried three Sybase copyright notices as an indication of its origin.

### SQL Server 7.0 and SQL Server 2000 [edit]

SQL Server 7.0 and SQL Server 2000 included modifications and extensions to the Sybase codebase, adding support for the IA-64 architecture. By SQL Server 2005, the legacy Sybase codebase had been completely rewritten.

Since the release of SQL Server 2000, advances have been made in performance, the client IDE tools, and several complementary systems that are packaged with SQL Server 2005. These include:

- an extended transform interface (ETI) tool (SQL Server Integration Services or SSIS)
- a Reporting Server
- an OLAP and data mining server (Analysis Services)
- several messaging technologies, specifically Service Broker and Notification Services

### SQL Server 2005 [edit]

SQL Server 2005 (formerly codenamed "Yukon") was released in October 2005. It included native support for managing XML data, in addition to relational data. For this purpose, it defined an xml data type that could be used either as a data type in database columns or as literals in queries. XML columns can be associated with XSD schemas. XML data being stored is verified against the schema. XML is converted to an internal binary data type before being stored in the database. Specialized indexing methods were made available for XML data. XML data is queried using XQuery, a XSLT processor and support for recursive queries with CTEs (Common Table Expressions). SQL Server 2005 has also been enhanced with new indexing algorithms, syntax and better error recovery systems. Data pages are checksummed for better error resiliency, and optimistic concurrency support has been added for better performance. Permissions and access control have been made more granular and the query processor handles concurrent execution of queries in a more efficient way. Partitions on tables and indexes are supported natively, so scaling out a database onto a cluster is easier. SQL CLR was introduced with SQL Server 2005 to let it integrate with the .NET Framework.

SQL Server 2005 introduced Mult-Version Concurrency Control. User facing features include new transaction isolation level called SNAPSHOT and a variation of the READ COMMitted isolation level based on statement-level data snapshots.

SQL Server 2005 introduced "MARS" (Multiple Active Result Sets), a method of allowing usage of database connections for multiple purposes.

SQL Server 2005 introduced DMVs (Dynamic Management Views), which are specialized views and functions that return server state information that can be used to monitor the health of a server instance, diagnose problems, and tune performance.

Service Pack 1 (SP1) of SQL Server 2005 introduced Database Mirroring, a high availability option that provides redundancy and failover capabilities at the database level. Later versions of SQL Server 2005 can be configured for automatic failover. Automatic failover requires a witness partner and an operating mode of synchronous (also known as high-safety or full safety). Database Mirroring was included in the first release of SQL Server 2005 for evaluation purposes only. Prior to SP1, it was not enabled by default, and was not supported by Microsoft.

### SQL Server 2008 [edit]

SQL Server 2008 is a relational database management system developed by Microsoft. It is a software product with the primary function of storing and retrieving data as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet).

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SQL Server 2008 introduced the following features:

- Multi-Version Concurrency Control (MVCC)
- Integration Services (SSIS)
- A new management layer called the Business Intelligence Development Studio (BIDS)
- A new graphical user interface called SQL Server Management Studio (SSMS)
- A new reporting tool called SQL Server Reporting Services (SSRS)
- A new analysis tool called SQL Server Analysis Services (SSAS)
- A new data mining tool called SQL Server Data Mining (SSDM)

SQL Server 2008 is written in C/C++. It is available on Microsoft Windows and supports all the major operating systems, including Windows Server 2008, Windows Vista, and Windows 7.

### SQL Server 2008 release history [edit]

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SQL Server 2008 is available in various editions, including:

- Enterprise Edition
- Standard Edition
- Web Edition
- Express Edition
- Express Edition with Advanced Services
- Express Edition with Advanced Services (64-bit)

SQL Server 2008 is written in C/C++. It is available on Microsoft Windows and supports all the major operating systems, including Windows Server 2008, Windows Vista, and Windows 7.
SQL Server 2008 (formerly codenamed "Katmai") was released on August 6, 2008, to the SQL Server Special Interest Group at the ESRI 2008 Users' Conference on August 6, 2008 by Ed Kellaher (Spatial Program Manager at Microsoft), and aims to make data management self-tuning, self-organizing, and self-maintaining within the development of SQL Server Always On technologies, to provide near-zero downtime. SQL Server 2008 also includes support for structured and semi-structured data, including digital media formats for pictures, audio, video, and other multimedia data. In current versions, such multimedia data can be stored as large objects (LOBs), but they are generic byte streams. Intrinsic awareness of multimedia data will allow semantically structured data to be referenced on the file system. This structured data and metadata about the file is stored in SQL Server databases, whereas the unstructured component is stored in the file system. Such files can be accessed both via Win32 file handling APIs as well as via SQL Server using T-SQL; doing the latter accesses the files as a BLOB. Backing up and restoring the database backups or restores the referenced files as well.[27] SQL Server 2008 also natively supports hierarchical databases, and includes T-SQL constructs to directly deal with them, without using recursive queries.[27]

The full-text search functionality has been integrated into the database engine. According to a Microsoft technical article, this simplifies management and improves performance.[19]

Spatial data will be stored in two types. A "flat Earth" (GEOMETRY or plane) data type represents geospatial data which has been projected from a native, spherical, coordinate system into a plane. A "Round Earth" data type is used for data that represents a single continuous entity which does not suffer from the singularities such as the international date line, poles, or map projection zone "edges". Approximately 70 methods are available to represent spatial operations for the Open Geospatial Consortium Simple Features for SQL, Version 1.1.[27]

SQL Server includes an in-memory OLTP database engine known as Hekaton, which allows configuring policies and constraints on the entire database or certain tables, declaratively.[17]

SQL Server 2014 was released to the general public on April 1, 2014. Until November 2013 there were two CTP revisions, CTP1 and CTP2. SQL Server 2014 provides a new in-memory capability for tables that can fit entirely in memory (also known as Hekaton). While small tables may be entirely resident in memory in all versions of SQL Server, they also may reside on disk, so work is involved in reserving RAM, writing evicted pages to disk, loading new pages from disk, locking the pages in RAM while they are being operated on, and many other tasks. By treating a table as guaranteed to be entirely resident in memory much of the 'plumbing' of disk-based databases can be avoided.[35]

Data in SQL Server 2014 resides in memory, while the database engine is optimized for data that is already in memory. Both data and indexes are maintained in memory. SQL Server 2014 introduces in-memory databases, and new storage engines and features to manage them. SQL Server 2014's new features and enhancements include Always On SQL Server Failover Cluster Instances and Availability Groups which provides a set of options to improve database availability.

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For disk-based SQL Server applications, it also provides the SSD Buffer Pool Extension, which can improve performance by cache between DRAM and spinning media. SQL Server 2014 also enhances the Always On (HA/DR) solution by increasing the reachable secondaries count and enhancing read operations upon secondary primary disconnections, and it provides new hybrid disaster recovery and backup solutions with Microsoft Azure, enabling customers to use existing skills with the on-premises version of SQL Server to take advantage of Microsoft's global datacenters. In addition, it takes advantage of new Windows Server 2012 and Windows Server 2012 R2 capabilities for database application scalability in a physical or virtual environment. Microsoft provides three versions of SQL Server 2014 for downloading: the one that runs on Microsoft Azure, the SQL Server 2014 CAB, and SQL Server 2014 ISO.[43]

SQL Server 2014 SP1, consisting primarily of bugfixes, was released on May 15, 2015. It is intended as a replacement for MSDE. Two additional editions provide a superset of features including provisioning during setup, new permissions, improved role management, and default schema assignment for groups.[48][49]

SQL Server 2016 Community Technology Preview 3.2 (CTP 3.2) is the most recent pre-release version available. It was released on December 7, 2015.[50]

Microsoft makes SQL Server available in multiple editions, with different feature sets and targeting different users. These editions are:[40][48][49]

**Mainstream editions**

Datacenter

SQL Server 2008 R2 Datacenter is a full-featured edition of SQL Server and is designed for datacenters that need high levels of application support and scalability. It supports 256 logical processors and virtually unlimited memory and comes with StreamInsight Premium edition.[40] The Datacenter edition has been retired in SQL Server 2012; all of its features are available in SQL Server 2012 Enterprise Edition.[48]

Enterprise

SQL Server Enterprise Edition includes both the core database engine and add-on services, with a range of tools for creating and managing a SQL Server cluster. It can manage databases as large as 524 petabytes of data and tens of thousands of servers. SQL Server 2012 Enterprise Edition supports 160 physical processors.[50]

Standard

SQL Server Standard Edition includes the core database engine, along with the stand-alone services. It differs from Enterprise edition in that it supports fewer active instances (number of nodes in a cluster) and does not include some high-availability functions such as hot-add memory (allowing memory to be added while the server is still running), and parallel indexes.

Web

SQL Server Web Edition is a low TOC option for Web hosting.

Business Intelligence

Introduced in SQL Server 2012 and focusing on Self-Service and Corporate Business Intelligence. It includes the Standard Edition capabilities and Business Intelligence tools: PowerPivot, Power View, the BI Semantic Model, Master Data Services, Data Quality Services and xml/xe-in-memory analytics.[40]

Workgroup

SQL Server Workgroup Edition includes the core database engine functionality but does not include the additional services. Note that this edition has been retired in SQL Server 2012.[48]

**Express**

SQL Server Express Edition is a scaled down, free edition of SQL Server, which includes the core database engine. While there are no limitations on the number of databases or users supported, it is limited to using one processor. 1 GB memory and 10 GB database files (4 GB database files prior to SQL Server Express 2008 R2).[50] It is intended as a replacement for MSDE. Two additional editions provide a superset of features not in the original Express Edition. The first is SQL Server Express with Tools, which includes SQL Server Management Studio Basic. SQL Server Express with Advanced Services adds full-text search capability and reporting services.[48]

**Specialized editions**

Azure

Azure SQL Database is the cloud-based version of Microsoft SQL Server, presented as a platform as a service offering on Microsoft Azure.

**Compact (SQL CE)**

SQL Server 2008 CE is an embedded database engine. Unlike the other editions of SQL Server, the CE engine is based on SQL Mobile (initially designed for use with handheld devices) and does not share the same binaries. Due to its small size (1 MB DLL footprint), it has a markedly reduced feature set compared to the other editions. For example, it supports a subset of the standard data types, does not support stored procedures or views or multiple-statement batches (among other limitations). It is limited to 4 GB maximum database size and cannot be run as a Windows service. Compact Edition must be hosted by the application using it. The 3.5 version includes support for ADO.NET and WCF data providers. SQL CE does not support ADO.NET connectivity, unlike SQL Server proper.
The Lock Manager maintains an in-memory table that manages the database objects and locks, if any, along with other metadata about the lock. Access to any shared object is mediated by the lock manager, which enforces the locking protocol used by SQL Server to manage concurrent access. SQL Server supports both shared and exclusive locks, which allow multiple processes to access the same database object simultaneously without interfering with each other. Locks are held at various levels of granularity, such as on entire tables, pages, or even on a per-row basis. The level of granularity is determined by the isolation level specified when the transaction was started, which can be either READ_UNCOMMITTED, READ_COMMITTED, or SERIALIZABLE, among others. When a process requests a lock on an object, the Lock Manager checks the lock state of the object and grants the lock if it is available. If the lock is not available, the process is blocked until the lock can be acquired. This helps prevent deadlocks, in which two or more processes are waiting for each other to release locks on shared resources. SQL Server uses various deadlock detection and resolution techniques to ensure that transactions are completed in a timely manner.

Architecture

SQL Server provides a number of tools and utilities to help manage and monitor the database server. The SQL Server Management Studio (SSMS) is a graphical management tool that allows administrators to perform a wide range of tasks, such as creating and managing databases, configuring server settings, and monitoring server performance. SSMS provides a visual interface for managing all aspects of the SQL Server environment, including creating and managing databases, managing users and roles, and administering server settings. SQL Server also provides a command-line interface, called SQL Server Management Shell (SSMS), which allows administrators to perform tasks using T-SQL commands and scripts.

Data retrieval and programmability

SQL Server supports a variety of programming interfaces for retrieving data from the database. The primary interface is the Transact-SQL (T-SQL) language, which is a procedural language that allows developers to write scripts that perform various database operations, such as creating and managing databases, creating and managing tables, inserting and updating data, and generating reports. T-SQL is an evolution of the SQL-92 standard and provides a comprehensive set of features for database development. SQL Server also supports other programming languages, such as Visual Basic, Java, and Python, through OLE DB and ODBC interfaces. This allows developers to build applications that can access SQL Server data from a variety of environments.

SQL Server also supports stored procedures, which are parameterized T-SQL queries that are stored in the server itself. Stored procedures can be executed by a user with the appropriate permissions, and they can access data in the database and perform transactions. Stored procedures can be used to encapsulate complex database operations, improve performance, and enforce application rules. SQL Server also supports views, which are virtual tables that are based on one or more underlying tables. Views can be used to simplify the interface to the database, hide complexity, and enforce business rules. SQL Server also supports functions, which are user-defined T-SQL procedures that can be used to perform calculations and transformations on data. Functions can be used to create custom data types and to perform operations that are difficult or impossible with built-in data types.
SQL Native Client (aka SNAC) [edit]

SQL Native Client is the native client side data access library for Microsoft SQL Server, version 2005 onwards. It natively implements support for the SQL Server features including the Tabular Data Stream implementation for mirrored SQL Server databases, full support for all data types supported by SQL Server, asynchronous operations, query notifications, encryption support, as well as receiving multiple result sets in a single database session. SQL Native Client is used under the hood by SQL Server plug-ins for other data access technologies, including OLE DB. The SQL Native Client can also be directly used, bypassing the generic data access layers.[86]

On November 28, 2011, a preview release of the SQL Server ODBC driver for Linux was released.[97]

SQL CLR [edit]

Main article: SQL CLR

Microsoft SQL Server 2005 includes a component named SQL CLR ("Common Language Runtime") via which it integrates with .NET Framework. Unlike most other applications that use .NET Framework, SQL Server itself has its own .NET runtime, i.e., memory, threading and resource management requirements of .NET Framework are satisfied, rather than the underlying Windows operating system. SQLCLR provides deadlock detection and resolution services for .NET code as well. With SQL CLR, stored procedures and triggers can be written in any managed .NET language, including C# and VB.NET. Managed code can also be used to define LDT's (user defined types), which can persist in the database. Managed code is compiled to CLI assemblies and after being verified for type safety, registered at the database. After that, they can be invoked like any other CLR (managed) code.[67]

When writing code for SQL CLR, data stored in SQL Server databases can be accessed using the ADD-NET APIs like any other managed application that accesses SQL Server data. However, doing that creates a new database session, different from the one in which the code is executing. To avoid this, SQL Server provides some enhancements to the ADD-OPT provider that allows the connection to be redirected to the same session which already hosts the running code. Such connections are called contended connections and are set by setting the connection parameter (true) in the connection string. SQL Server also provides several other APIs for SQLCLR, including ADO.NET API, including classes to work with tabular data or a single row of data as well as classes to work with internal metadata about the data stored in the database. It also provides access to the XML features in SQL Server, including XML support. These enhancements are also available in T-SQL. Procedures in consequence of the introduction of the new XML Dataspace (query/value, nodes functions).

Services [edit]

SQL Server also includes an assortment of add-on services. While these are not essential for the operation of the database system, they provide value-added services on top of the core database management system. These services either run as a part of some SQL Server component or out-of-process as Windows Service and presents their own API to control and interact with them.

Service Broker [edit]

Used inside an instance, programming environment. For cross instance applications, Service Broker communicates over TCP/IP and allows the different components to be synchronized together, via exchange of messages. The Service Broker, which runs as a part of the database engine, provides a reliable messaging and message queuing platform for SQL Server applications.[76]

Replication Services [edit]

SQL Server Replication Services are used by SQL Server to replicate and synchronize database objects, either in entirety or a subset of the objects present, across replication agents, which might be other database servers across the network, or database caches on the client side. Replication follows a publisher/subscriber model, i.e., the changes are sent out by one database server ("publisher") and are received by others ("subscribers"). SQL Server supports three different types of replication.[77]

Transaction replication

Each transaction made to the publisher database (master database) is synched out to subscribers, who update their databases with the transaction. Transactional replication synchronizes databases in near real time.[78]

Merge replication

Changes made at both the publisher and subscriber databases are tracked, and periodically the changes are synchronized bi-directionally between the publisher and the subscribers. If the same data has been modified differently in both the publisher and the subscriber databases, synchronization will result in a conflict which has to be resolved, either manually or by using pre-defined policies. Merge needs to be configured on a column if merge replication is configured.[79]

Snapshot replication

Snapshot replication publishes a copy of the entire database (the then-snapshot of the data) and replicates out to the subscribers. Further changes to the snapshot are not tracked.[76]

Analysis Services [edit]

Main article: SQL Server Analysis Services

SQL Server Analysis Services adds OLAP and data mining capabilities for SQL Server databases. The OLAP engine supports MOLAP, ROLAP and HOLAP storage modes for data. Analysis Services supports the XMI for Analysis standard as the underlying communication protocol. The cube data can be accessed using MDX and LINQ to SQL queries.[80] Data mining specific functionality is exposed via the DMX query language. Analysis Services includes various algorithms—Decision trees, clustering algorithm, Naive Bayes algorithm, time series analysis, sequence clustering algorithm, linear and logistic regression analysis, and neural networks—for use in data mining.[77]

Reporting Services [edit]

Main article: SQL Server Reporting Services

SQL Server Reporting Services is a report generation environment for data gathered from SQL Server databases. It is administered via a web interface. Reporting services features a web services interface to support the development of custom-reporting applications. Reports are created as RDL files.[81]

Reports can be designed using recent versions of Microsoft Visual Studio (Visual Studio NET 2003, 2005 and 2008) with Business Intelligence Development Studio, installed or with the included Report Builder. Once created, RDL files can be rendered in a variety of formats, including Excel, PDF, CSV, XML, BMP, EMF, GIF, JPEG, PNG and TIFF, and HTML Web Archive.

Notification Services [edit]

Main article: SQL Server Notification Services

Originally introduced as a post-release add-on for SQL Server 2000,[82] Notification Services was bundled as part of the Microsoft SQL Server platform for the first time and only with SQL Server 2005.[83] SQL Server Notification Services is a mechanism for generating data-driven notifications, which are sent to Notification Services subscribers. A subscriber registers for a specific event or transaction (which is registered on the database server as a trigger), when the event occurs. Notification Services can use one of three methods to send a message to the subscriber informing about the occurrence of the event. These methods include SMTP, SOAP, or by writing to a file in the filesystem.[84] Notification Services was discontinued by Microsoft with the release of SQL Server 2008 in August 2008, and is no longer an officially supported component of the SQL Server database platform.

Integration Services [edit]

Main article: SQL Server Integration Services

SQL Server Integration Services (SSIS) provides ETL capabilities for SQL Server for data import, data integration and data warehousing needs. Integration Services includes GUI tools to build workflows such as extracting data from various sources, querying data, transforming data—including aggregation, de-duplication, de-normalization and merging of data—and then exporting the transformed data into destination databases or files.[85]

Full Text Search Service [edit]

SQL Server Full Text Search service is a specialized indexing and querying service for unstructured text stored in SQL Server databases. The full text search index can be created in any column with character based text data. It allows for words to be searched for in the text columns. While it can be performed with the SQL [ESC] operator, using SQL Server Full Text Search service can be more efficient. Full text search can match on a multi-line string. The search engine can find phrases, whole words, or any combination of these and ignore words, parts of words, and noise words, which occur frequently and are not useful for search. With the remaining words, an inverted index is created, associating each word with the documents they were found in. SQL Server Full Text Search service includes a function to determine if the text column contains an exact match or if there are missing characters in the text. SQL Server Full Text Search service can also match on partially matched strings. SQL Server Full Text Search service can also match on partially matched strings.

The Full Text Search engine is divided into two processes: the Fiber Daemon process (ntfssd.exe) and the Search process (msftesql.exe). These processes interact with the SQL Server. The Search process includes the indexer (that creates the full text indexes) and the full text query processor. The indexer scans through text columns in the database. It can also index through binary columns, and use filters to extract meaningful text from the binary blob (for example, when a Microsoft Word document is stored as an unstructured binary file in a database). The Filters are handled by the Fiber Daemon process. Once the text is extracted, the Fiber Daemon process breaks it up into words and hands it over to the indexer. The indexer filters out noise words, i.e., words like A And etc., which occur frequently and are not useful for search. With the remaining words, an inverted index is created, associating each word with the documents they were found in. SQL Server Full Text Search service includes a function to determine if the text column contains an exact match or if there are missing characters in the text. SQL Server Full Text Search service can also match on partially matched strings.

When a full text query is received by the SQL Server query processor, it is handed over to the FTS query processor in the Search process. The FTS query processor breaks up the query into its constituent words, filters out the noise words, and uses an index to determine the most likely word for each word. The words are then queried against the inverted index and a rank of their accuracy is computed. The results are then returned to the client via the SQL Server process.

SQLCMD [edit]

SQLCMD is a command line tool that can connect with Microsoft SQL Server, and exposes the management features of SQL Server. It allows SQL queries to be written and executed from the command prompt. It can also act as a scripting language to create and run a set of SQL commands as a script. Such scripts are stored as a .sql file, and are used either for management of databases or to create the database schema during the deployment of a database.

SQLCMD was introduced with SQL Server 2005 and this continues with SQL Server 2012 and 2014. Its predecessor for earlier versions was OSQL and QSQL, which is functionally equivalent as it pertains to TSQL execution, and many of the command line parameters are identical, although SQLCMD adds extra versatility.
Visual Studio  | edit  
Main article: Microsoft Visual Studio

Microsoft Visual Studio includes native support for data programming with Microsoft SQL Server. It can be used to write and debug code to be executed by SQL CLR. It also includes a data designer that can be used to graphically create, view or edit database schemes. Queries can be created either visually or using code. SSIS 2008 onwards, provides intelligence for SQL queries as well.

SQL Server Management Studio  | edit  
Main article: SQL Server Management Studio

SQL Server Management Studio is a GUI tool included with SQL Server 2005 and later for configuring, managing, and administering all components within Microsoft SQL Server. The tool includes both script editors and graphical tools that work with objects and features of the server. SQL Server Management Studio replaces Enterprise Manager as the primary management interface for Microsoft SQL Server since SQL Server 2005. A version of SQL Server Management Studio is also available for SQL Server Express Edition, for which it is known as SQL Server Management Studio Express (SSME). A central feature of SQL Server Management Studio is the Object Explorer, which allows the user to browse, select, and act upon any of the objects within the server. It can be used to visually observe and analyze query plans and optimize the database performance, among others. SQL Server Management Studio can also be used to create a new database, alter any existing database schema by adding or modifying tables and indexes, or analyze performance. It includes the query windows which provide a GUI-based interface to write and execute queries.

Business Intelligence Development Studio  | edit  
Main article: Business Intelligence Development Studio

Business Intelligence Development Studio (BIDS) is the IDE from Microsoft used for developing data analysis and Business Intelligence solutions utilizing the Microsoft SQL Server Analysis Services, Reporting Services and Integration Services. It is based on the Microsoft Visual Studio development environment but is customized with the SQL Server services-specific extensions and project types, including tools, controls and projects for Reporting Services, Cubes and data mining structures (using Analysis Services). For SQL Server 2012 and later, this IDE has been renamed SQL Server Data Tools (SSID).

See also

- Comparison of relational database management systems
- Comparison of object-relational database management systems
- Comparison of data modeling tools
- List of relational database management systems

References

59. "Table and Index Organization," Retrieved 2012-12-02.
64. "Features of SQL Native Client," Retrieved 2007-12-03.
Further reading [edit]


External links [edit]

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