Microsoft® SQL Server® 2012

Technical White Paper

Writers: Ann Bachrach, Darmadi Komo, Gopal Ashok, Joanne Hodgins, Oliver Chiu, Sabrena Mcbride, Tharun Tharian, Michael Tejedor

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Applies to: SQL Server 2012

Summary: This paper provides an overview of the new features, benefits, and functionality in Microsoft SQL Server 2012.

Contents

Background

The data explosion is happening at every level across every imaginable device, application and individual. According to Gartner, the total worldwide volume of data is growing worldwide at 59% per year with 70-85% of that data as unstructured data[1]. And according to IDC, data is predicted to grow 44 times over the next decade the number of IT Professionals is only growing at 1.4 times[2].

The IT ecosystem is faced with balancing the proliferation of applications, globalization, increasingly powerful commodity hardware, demand for accessible insights, and new form factors such as the cloud, appliances and mobile devices. And they have to do this with an uptime and level of compliance that is simply expected. These converging trends create greater challenges for IT to deliver rich, interactive experiences across the organization with secure, real-time access to data inside and outside the firewall all while paramount pressure is put on IT to conserve budgets and resources through this explosive growth.

Introducing SQL Server 2012

A key component of the cloud-ready information platform, SQL Server 2012 will help organizations unlock breakthrough insights across the organization as well quickly build solutions and extend data across on-premises and public cloud backed by mission critical confidence.

- **Mission Critical Confidence** – Enable mission critical performance and availability at low TCO.
- **Breakthrough Insight** – Unlock new insights with rapid data exploration and visualization across the organization.
- **Cloud on Your Terms** – Create and scale business solutions fast, on your terms from server to private or public cloud.

Mission Critical Confidence

The next wave of SQL Server investments further help protect an organization's infrastructure – getting you the nines and performance you need at the right price, especially for mission critical workloads. When you make a bet on Microsoft, you get more than a trusted platform; you get a trusted business partner and trusted ecosystem of experienced vendors.

Required 9's and protection

SQL Server AlwaysOn
SQL Server continues to deliver on its manageability promise through an incredible user experience with the new high availability solution, AlwaysOn. Previously, customers were able to achieve six 9s and a great level of availability with SQL Server. With AlwaysOn, the previous disparate HA tools, database mirroring, clustering, log shipping, are rolled into one solution that

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[1] *Source: Gartner Symposium Presentation 'Information Management Goes 'Extreme': The Biggest Challenges for 21st-Century CIOs, Mark Beyer, October 2011*
[2] *IDC: 2010 Digital Universe Study*

works better together and removes a lot of customer-required set up an tuning, thus also helping eliminate potential errors. New wizards make set up of availability groups a breeze, while dashboards ensure insight into the health of the HA solution.

The new integrated high availability and disaster recovery solution provides redundancy within a datacenter and across datacenters to help enable fast application failover during planned and unplanned downtime. AlwaysOn delivers a suite of new capabilities rolled into a single solution:

- SQL Server AlwaysOn Availability Groups is a new feature that greatly enhances the capabilities of Database Mirroring and helps ensure availability of application databases. Availability Groups (AG) provides an integrated set of options including automatic and manual failover of a group of databases, support for up to four secondaries, fast application failover and automatic page repair. Deploying AlwaysOn Availability Groups involves creating and configuring one or more availability groups. Each availability group is a container for a discrete set of user databases known as availability databases that fail over together. An availability group can have multiple possible failover targets (secondary replicas). Moreover, you can configure secondary replicas to support read-only access to secondary databases and for performing backups on secondary databases. The addition of availability groups removes the requirement of shared disk storage (SAN or NAS) for deployment of a Failover Cluster Instance.

Unified HA Solution

- SQL Server AlwaysOn Failover Cluster Instances enhance SQL Server Failover Clustering and support multi-site clustering across subnet which helps enable cross-datacenter failover of SQL Server instances. Fast and predictable instance failover is another key benefit which helps ensure fast application recovery.
- SQL Server AlwaysOn Active Secondries enable secondary instances to be utilized for running report queries and backup operations which helps eliminate idle hardware and improve resource utilization.
- SQL Server AlwaysOn Availability Groups Listener Capabilities:
  - Multi-subnet failover: This improvement enables faster client connection failover for AlwaysOn in multi-subnet scenarios. Now client applications can failover across multiple subnets (up to 64) almost as fast as they can failover within a single subnet.
  - Read-Only Intent: Read-only intent gives customers a way to control the type of workloads that run on their HA servers and efficiently manage their resources, providing additional flexibility to customers.
- SQL Server AlwaysOn AutoStat auto-creates and updates temporary statistics needed for queries running on the readable secondary. These temporary statistics are stored in TempDB therefore no physical changes are required in the user database. This allows the optimizer to generate optimal query plans on the secondary replica as it would do on the primary replica while not requiring any user intervention.
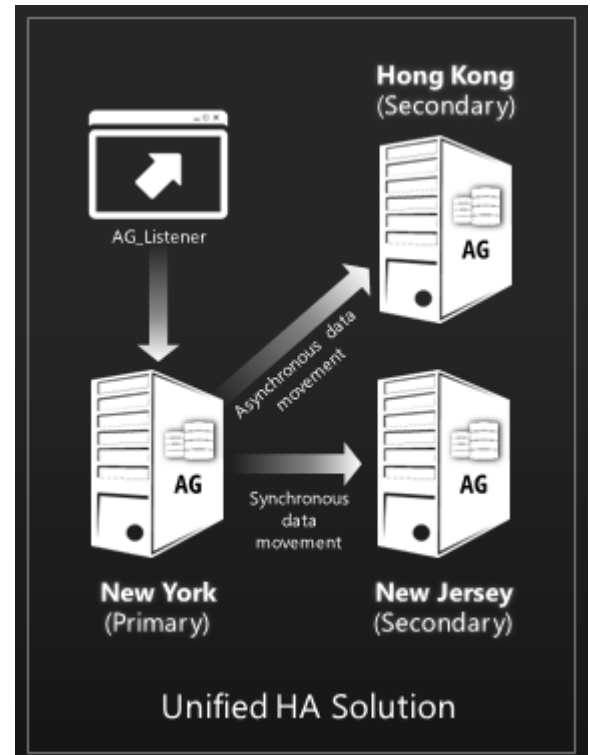
Windows Server Core Support
SQL Server is supported on Windows Server Core. By running SQL Server on Windows Server Core the OS patching can be reduced significantly which greatly reduces planned downtime. †The percentage reduction in patching and OS reboots can be as much as 50-60% in certain environments depending on the server roles that are enabled and the type of patches that are applied.

Online Operations Enhancements
SQL Server 2008 introduced support for Online Operations which allows Administrators to perform maintenance tasks without taking database systems offline and contributes to greater uptime. In SQL Server 2012, a couple new tasks are supported with Online Operations: Extended support for online index build and adding columns with default values for application upgrades.

- **Extended support for online index build:** Indexes that include LOB (varchar(max), nvarchar(max), varbinary(max), XML) columns can now be built, rebuilt, or dropped online. Previously, any index with LOB columns would have to be built or rebuilt (a common maintenance task) offline, making that object completely inaccessible to applications or users. Now, indexes with LOB type columns can be built online as well, increasing total application uptime.
- **Default values for application upgrades:** Adding columns with default values are now metadata-only operations, removing the need for painful long-term exclusive table locks. Previously, adding columns with default values in each row would take exclusive table locks where the duration of the operation (and X-Lock) was proportional to the amount of data in the table. This meant, more data, more downtime. Now, adding a column with default values is a metadata-only operation. It still takes an exclusive lock on the object, but it's for a very short (likely sub-second) amount of time.

Database Backup Enhancements
Recovery Advisor:
Database Recovery Advisor introduces significant user experience enhancements to the ways DBAs can restore databases using SQL Server Management Studio. SQL Server provides a variety of backup types so creating the right recovery sequence for any point in time can get tricky. To help make this process much more streamlined, SQL Server 2012 introduces a new Recovery Advisor to help customers create a more predictable and optimal restore sequence.

Capabilities include a visual timeline that presents the backup history of the database and the available points in time to which the user can restore the database, algorithms to streamline identifying the right sets of backup media to get the database back to a specific point in time, and page restore dialog in SSMS to do page-level restores of the database.

Additionally, SQL Server 2012 has the capability to split a backup into multiple files, known as Split File Backup. This has two key advantages over single file backups:
- Split file backups can be executed faster than single file backups because the separate backup files can be written on different disks in parallel.
- Split file backups help reduce the backup file size to more manageable/desired sizes. These sizes can be tailor-made to fit the capacity of available media.

<u>Snapshot backups to Windows Azure Platform via SSMS</u>
Within Management Studio, SQL Server 2012 allows customers to easily deploy a logical copy of their SQL Server databases directly to SQL Azure providing customers with a simple migration mechanism for their on-premise SQL Server databases. Standalone import and export capabilities are provided in Management Studio as well affording customers maximum flexibility in how and when to export or import a logical database copy. Customers can also view SQL Azure databases directly from within Management Studio.

Additionally, SQL Server 2012 customers using Management Studio will be able to import and export SQL Server or SQL Azure logical database copies directly to or from Windows Azure Storage accounts providing a seamless and efficient cloud-based storage solution within tools customers are already familiar with. Customers will also be able to connect and browse their Windows Azure Storage account directly from within Management Studio.

High Availability for StreamInsight
The new StreamInsight capabilities address key customer needs for high availability management. The next on-premise release provides customers with:
- Resilient against planned and unplanned downtime with new checkpointing capabilities
- Facilitates predictive modeling and patter matching with user-defined stream concept
- Improved monitoring and administration with performance counters
- Easier development with support for nested event type structures and new LINQ statements.

In addition, developing StreamInsight applications now becomes easier with new developer features. In particular, scenarios with statistical and predictive models over event data are significantly easier to realize. Existing installations will benefit from an upgrade to the newest release through the enhanced monitoring and manageability functionality such as performance counters.

Blazing-fast performance

Experience next-generation performance across SQL Server with xVelocity in-memory technologies for both Data Warehousing and Business Intelligence.

xVelocity in-memory technologies for Data Warehousing
xVelocity introduces a new in-memory column store index to the database engine for Data Warehousing, making SQL Server the first of the major general-purpose database systems to have a true column store. xVelocity combines the in-memory column store index with in-memory compression algorithms and a new, vector-oriented SQL query execution paradigm to provide truly astonishing speed ups for common data warehouse queries. The in-memory column store index is a secondary index built on top of an existing row-based table. It stores each column in a separate group of pages in a highly compressed format. The
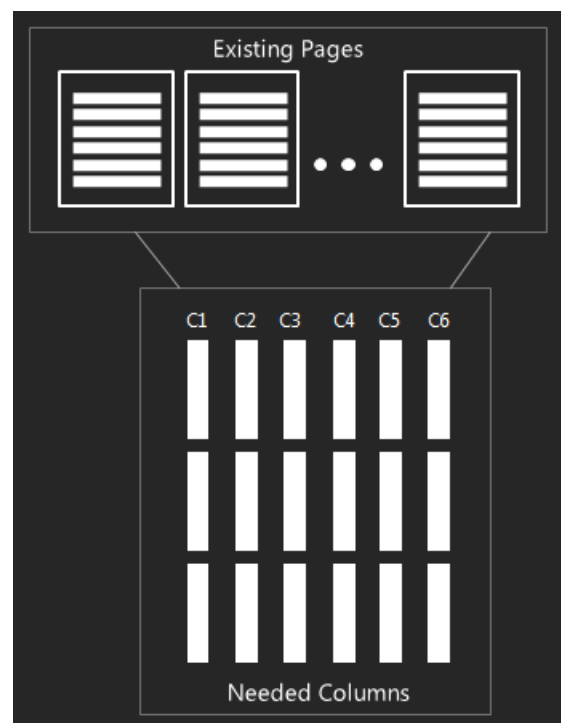
performance gains depend on the data and the nature of the query. In the best cases some customers have seen 400x performance gains.

xVelocity in-memory technologies for Business Intelligence
xVelocity brings the same in-memory analytics engine that was behind PowerPivot (introduced by Microsoft in SQL Server 2008 R2) to Analysis Services giving a generational leap in performance for Business Intelligence. This in-memory analytics engine powered Excel to process hundreds of millions of rows with sub-second response time on nothing more but an end user's desktop PC. It leveraged aggressive compression and column-oriented storage to achieve high performance on personal desktops and enabled a fluid model development experience.

With this transition to Analysis Services, xVelocity takes what was developed for the desktop to the server giving a generational leap in performance for BI projects in the enterprise.   With scan rates of 10s of Billions of rows per second on typical industry hardware, xVelocity gives users the ability to actively interact with an unprecedented amount of data at the speed of thought. This technology is made available at a minimal investment from IT because it does not require manual hand query optimization as well as giving fine grained security and data management capabilities reducing the time to manage and administer the solution.

Resource Governor Enhancements
Resource Governor enables customer to further ensure consistent performance for concurrent and mixed workloads across different SQL Server applications and within private clouds. Customers can define which workloads can take what percent of performance on any given resource.

Resource Governor in SQL Server 2012 brings more performance assurance and scale by increasing the maximum number of resource pools to 64 (from 20), adding a new maximum capacity setting on CPU utilization, and allowing affinity of resource pools to CPU schedulers and NUMA nodes. These enhancements become increasingly valuable in private cloud or consolidation scenarios.

Full-Text Search Performance Enhancements
Full-text queries perform linguistic searches against text data in full-text indexes by operating on words and phrases based on rules of a particular language such as English or Japanese. Full-text queries can include simple words and phrases or multiple forms of a word or phrase.

Full-text search is applicable in a wide range of business scenarios such as e-businesses— searching for items on a web site; law firms—searching for case histories in a legal-data repository; or human resources departments—matching job descriptions with stored resumes. The basic administrative and development tasks of full-text search are equivalent regardless of business scenarios. However, in a given business scenario, full-text index and queries can be honed to meet business goals.

Full-Text Search in SQL Server 2012 brings magnitudes of performance and scale advances with significantly improved query execution and concurrent index update mechanisms. Full-text search now includes properties scoped searches without requiring developers to maintain file

properties (such as Author Name, Title, etc…) separately in the database. Developers can now also benefit with improved NEAR operator that allows them to specify distance in-between as well as the order of words. In addition to these exciting changes, Full-text Search has revamped all language word-breakers to latest Microsoft editions and includes support for two more languages in Czech and Greek.

Table Partitioning up to 15,000
SQL Server 2012 expands partition support from 1k to 15k. This increased support enables large sliding windows scenarios. This means applications like SAP that take tens of thousands of snapshots of data in short periods of time, can significantly extend the length of time where data is held before it's pushed out to allow for new data to enter and generally makes it easier to manage these large amounts of data. This also helps streamline maintenance of large sets within filegroups that need data switched in and out per the needs of the data warehouse.

Extended Events enhancements
SQL Server Extended Events (Extended Events) is a general event-handling system for server systems. The Extended Events infrastructure supports the correlation of data from SQL Server, and under certain conditions, the correlation of data from the operating system and database applications. In the latter case, Extended Events output must be directed to Event Tracing for Windows (ETW) in order to correlate the event data with operating system or application event data.

SQL Server 2012 delivers Extended Events enhancements to help dramatically streamline functional and performance troubleshooting with new profiling information and a new user interface. Enhancements include flexible event selection, logging, and filtering with Extended Events.

Organizational security & compliance

Audit Enhancements
Enhancements to SQL Server auditing capabilities bring added flexibility and usability for auditing across the SQL Server environment, help making it even easier for organizations to meet compliance policies.
- <u>SQL Audit for all editions</u> allows organizations to expand the benefits of SQL Server Audit from Enterprise edition to all editions for more thorough auditing practices across SQL Server databases enabling audit standardization, better performance and richer features.
- <u>User-Defined Audit</u> allows the application to write custom events into the audit log to allow more flexibility to store audit information.
- <u>Audit Filtering</u> provides greater flexibility to filter unwanted events into an audit log.
- <u>Audit Resilience</u> delivers the ability to recover auditing data from temporary file and network issues.

Default Schema for Windows Groups:
Database schema can now be tied to Windows Group rather than individual users to increase database compliance. It eases administration of database schema, decreases the complexity of database schema management through individual Windows users, prevent errors of assigning

schema to the wrong users when users changes groups, avoids unnecessary implicit schema creation, and greatly reduces the chance of query errors when wrong schema being used.

User-Defined Server Roles:
User-Defined Server Roles increase flexibility, manageability, and facilitate compliance towards better separation of duties. It allows creation of new server roles to suit different organizations that separate multiple administrators according to roles. Roles can also be nested to allow more flexibility in mapping to hierarchical structures in organizations. It also helps prevent organizations to use sysadmin for database administration.

Contained Database Authentication:
Contained Database Authentication increases compliance by allowing users to be authenticated directly into user databases without logins. User information for login (username and password) is not stored inside master database but user databases directly. It is very secure because users can only perform DML operations inside the user databases and not database instance level operations. It also reduces the need to login to the database instance and avoid orphaned or unused logins in the database instance. This feature is used in AlwaysOn to facilitate better portability of user databases among servers in the case of server failover without the need to configure logins for all database servers in the cluster.

SharePoint Active Directory:
As Microsoft continues to deliver broadly accessible BI tools, the security and access around that data is critical. Help secure end user data analytics with built-in IT controls, including alignment with SharePoint and ActiveDirectory security models for end user reports published and shared in SharePoint. Enhanced security models provide control at the row column level.

Peace of Mind

Distributed Replay
Customers need a way to apply real-world application loads to their applications within their test environments. Previously customers could use SQL Server Profiler which only allowed simulating workload from a single computer which made it difficult for customers to really test large-scale workload simulation in the test environment.

Distributed Replay helps allow customers to simplify application testing and minimize errors with application changes, configuration changes, and upgrades. This multi-threaded replay utility provides the ability to simulate production workload scenarios testing after upgrade or configuration changes ultimately leading to protected performance during

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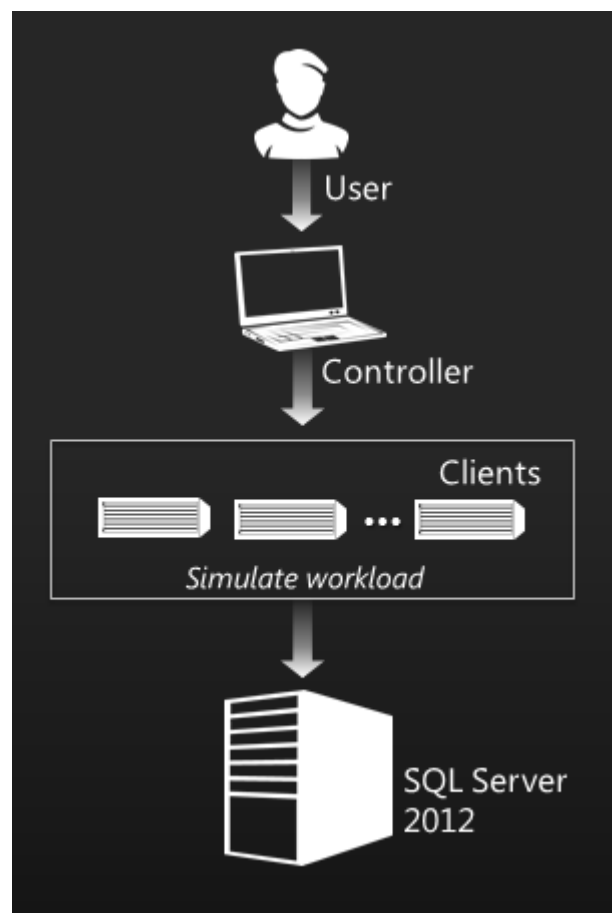
changes. Additionally, integration with SQL Server Upgrade Assistant can help customers assess the impact of future SQL Server upgrades.

Key capabilities include:

- Stress and synchronization replay modes
- Configurable connection start time and event think time
- Robust data type support
- Configurable result trace collection

Breakthrough Insight

Breakthrough Insight is about empowering everyone across the organization with self-service capabilities through the familiar Office productivity suite, embracing the way that we discover and collaborate around information every day. It is about providing IT with the tools they need to manage data of any size and type, across relational and non-relational, to harness the power of all available data and enable new business insights.

Rapid Data Exploration and Visualization

SQL Server 2012 enhances the data exploration capabilities of organizations by empowering users to access and integrate data from virtually any source. It allows users to create compelling reports and analytical applications, and easily collaborate and share insights using familiar tools. With this new version, users can create interactive, tabular, graphical, or free-form reports using data from a wide variety of data sources, including on-premises, syndicated, or unstructured data sources.

Power View

Microsoft makes self-service reporting a reality by providing a highly interactive and responsive web-based data exploration, visualization, and presentation experience for users of all types—from business executives to information workers. Now anyone can easily create a report in just seconds, transform the "shape" of data with a single click, add powerful timed animation sequences to quickly identify trends or anomalies, and make a more convincing case through rich presentation of discovered insights.
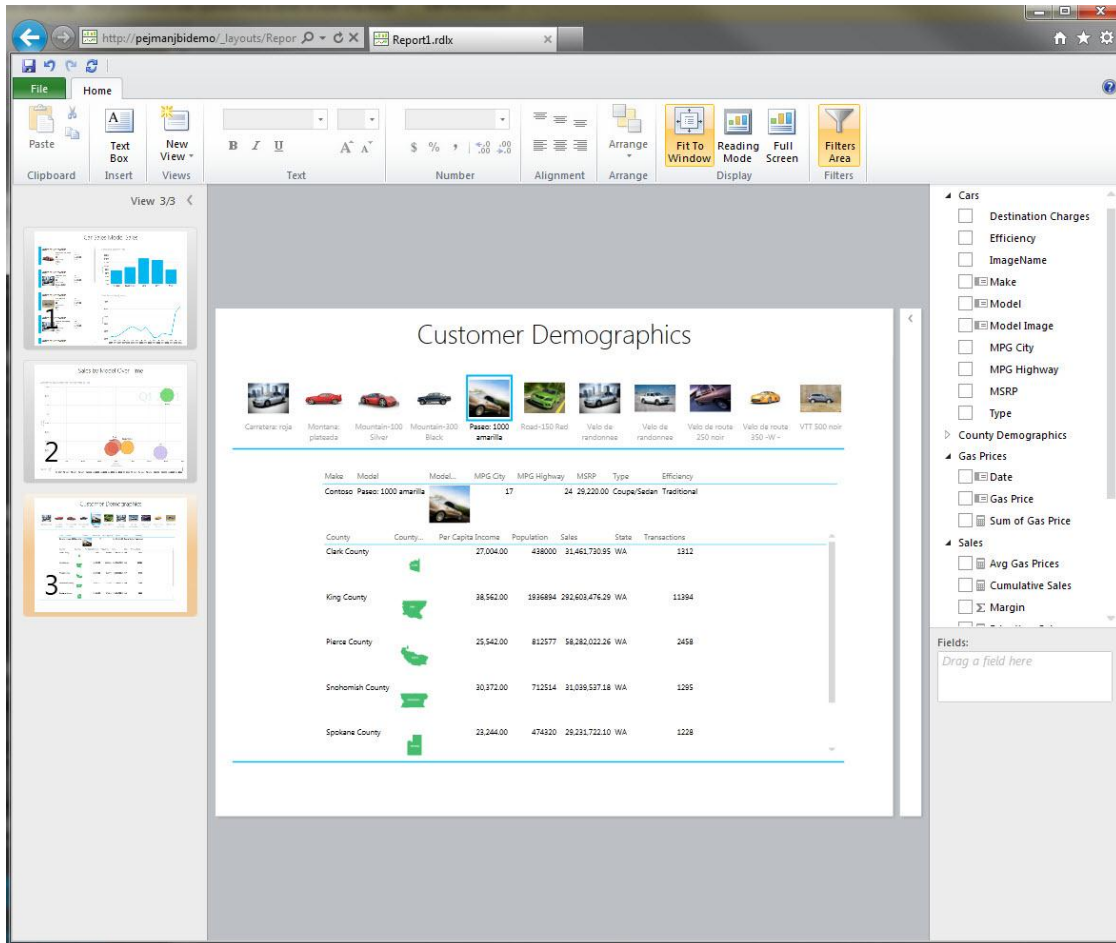
Power View includes the following main benefits:

- **Visual Design Experience:** Users can access and analyze information in a completely interactive, web-based authoring environment that has the familiar look and feel of Microsoft Office. Users can create and manipulate data with a variety of tables, charts, and views to visualize data in a way that best suits their purpose.

- **Filtering and Highlighting of Data:** Power View can identify the relationships between different tables in the underlying BI Semantic Model, enabling users to interact with the data to gain insights. This common metadata layer allows users to apply various kinds of visualization filters and highlight capabilities across the entire report.

- **Presentation-ready:** Power View enables users to share information quickly and easily, and lets users browse and present data at virtually any time, without having to preview it on any other platform to see how it looks. Users publish the reports to SharePoint Server, allowing other users to easily view and interact with the information.

- **Performance:** Power View retrieves only that part of the data which is needed for visualization at any given time. This enhances performance by saving the large amount of time and resources that would be needed to load all of the data and by providing users with a highly interactive experience from the start.

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- **Based on the BI Semantic Models:** Users can launch Power View over a tabular model (a PowerPivot model or tabular model running on SSAS) directly from a browser, without having to download anything on their local machines.

PowerPivot Enhancements

With SQL Server 2012, Microsoft empowers users to access and integrate data from virtually any source, to create compelling self-service reports and analytical applications. These reports can be published to SharePoint Server and then shared across the organization easily with enhanced collaboration features, IT organizations can manage these solutions with complete oversight through the PowerPivot Management Dashboards available in the SharePoint Central Administration Console, allowing IT to manage and protects the data without hampering user creativity.
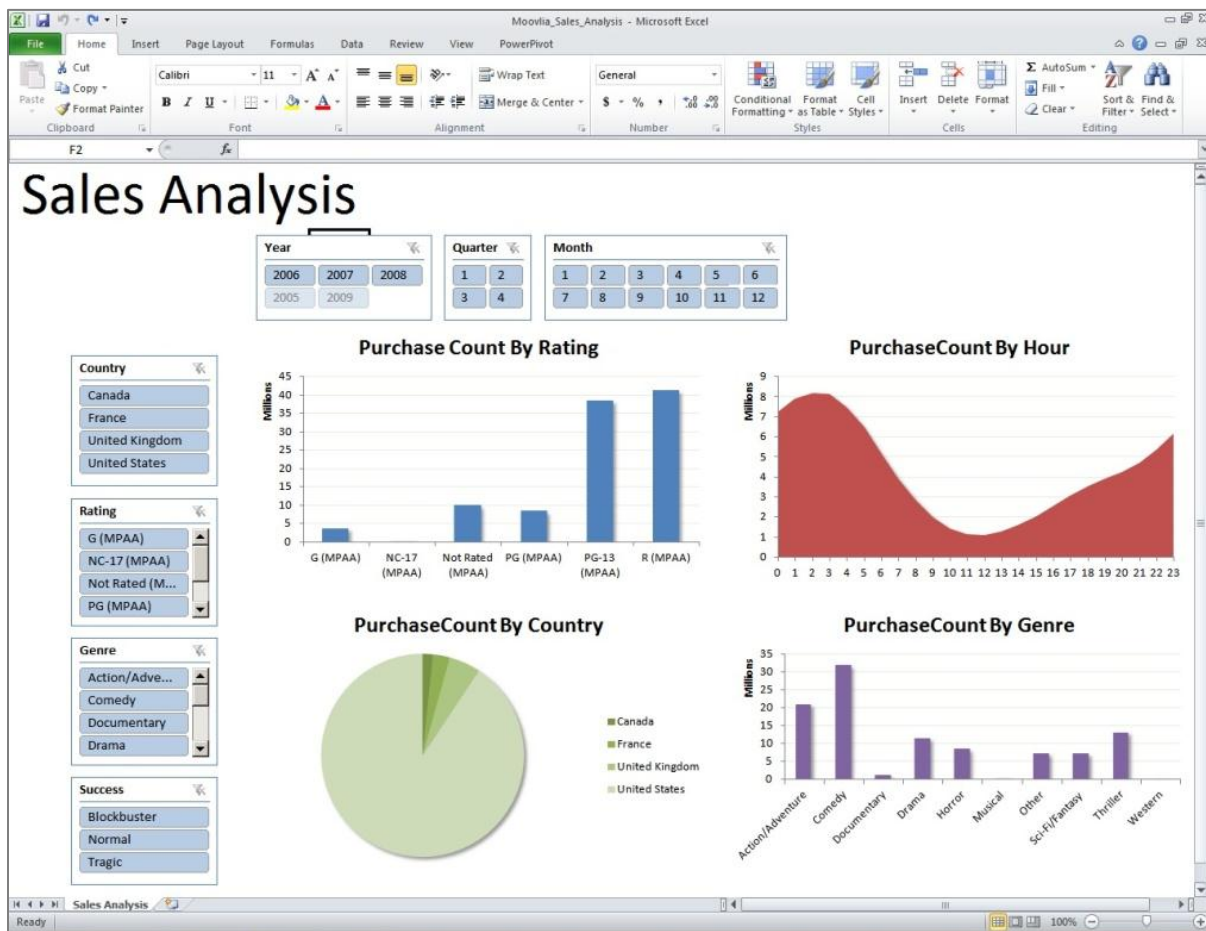
With this release, PowerPivot provides new advanced analytic capabilities, such as the ability to create KPIs, Advanced Sorting, Perspectives, Hierarchies and sophisticated business logic. New features also include extended DAX (Data Analysis Expressions) functionality, giving end users the power to build sophisticated analytical solutions with the familiarity of Excel-like functions.

Reporting Services End User Alerting
End User Alerting increases information worker productivity by providing reliable data
alerts. The Alert checks for data changes in the background and sends an Alert Message. The
Alert is triggered based on a data condition set by the IW. IWs tailor these data conditions to
their own needs, thus increasing responsiveness to data changes that matter to them. For SQL
Server 2012, End User Alerting provides a new tool to increase IW productivity when working
with Reporting Services reports published to SharePoint.

Scalable & Managed Self-Service BI

Insight and Oversight for IT
The PowerPivot Management Dashboard, available as part of the SharePoint 2010 Central
Administration console, helps IT monitor data and workbook usage and gather performance
metrics from servers. This diagnostic information provides more visibility into how data is used
throughout the organization, helping to gain a deeper understanding of usage patterns so that IT
can decide where best to invest time and resources.
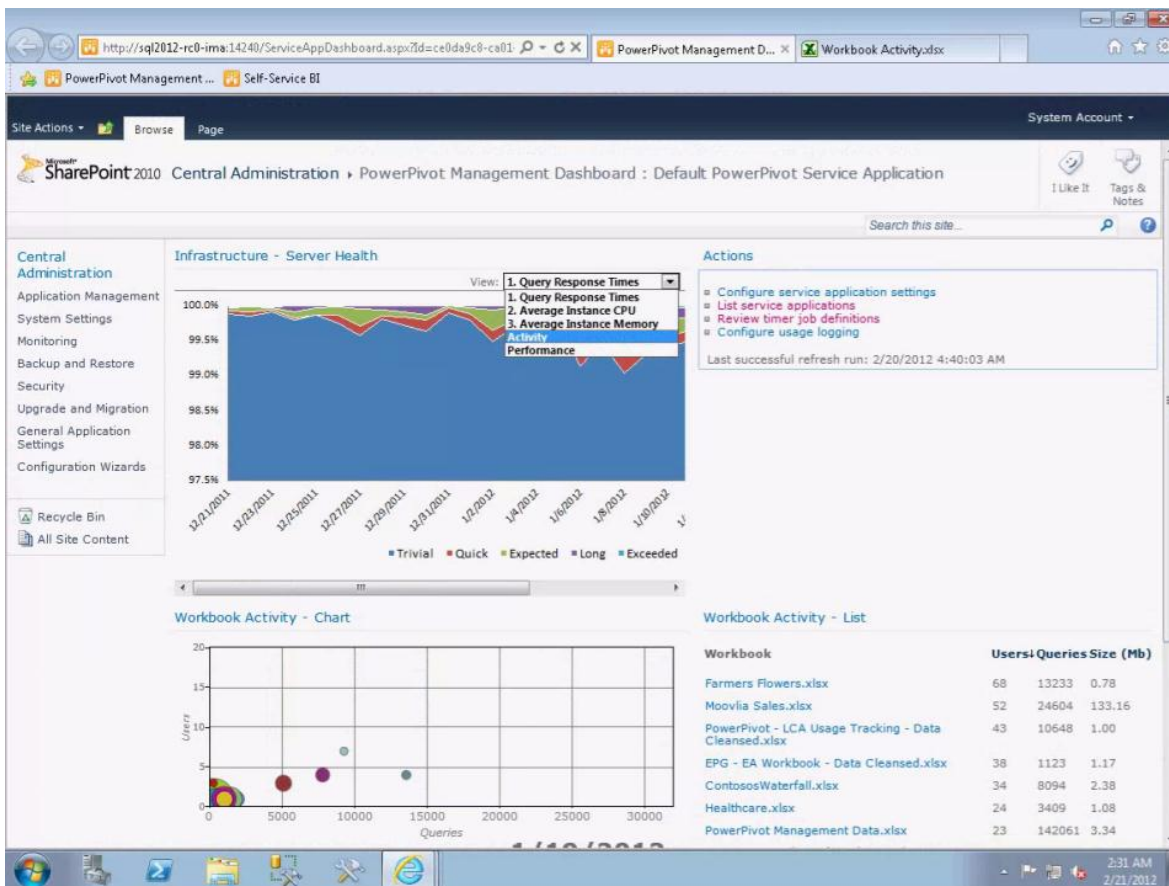
End user created, IT managed
SQL Server 2012 now bridges the gap between end user created Self-Service content and IT
managed corporate solutions by providing the importing of PowerPivot models directly into

Analysis Services. IT Professional can identifies workbooks of interest through the PowerPivot Management Dashboard, and actively engage in managing that workbook for the user. This is made possible with the extended functionality available in the professional BI development tools in Visual Studio. IT professionals can add role-based security or other needed enhancements and deploy the model back out to the user community.

**Ease of administration through SharePoint:**
SQL Server 2012 delivers new capabilities that provide an improved SharePoint integration platform for Reporting Services and self-service BI features, like Power View. This helps to reduce TCO for SharePoint administrators by consolidating Reporting Services administration, configuration, and management capabilities into SharePoint 2010 Central Administration Portal and PowerShell scripting. IT can now enable reporting capabilities to all information workers in the organization by using a single switch, and they can manage it like any other SharePoint feature.

Credible, Consistent Data

BI Semantic Model
SQL Server 2012 introduces the BI Semantic Model, a single model for users with multiple ways of building business intelligence (BI) solutions. This includes:
- Continued support for the powerful online analytical-processing (OLAP) technologies that make SQL Server Analysis Services indispensable to BI specialists.
- Tools for IT professionals and developers accustomed to dealing with data in rows and columns.
- Support for a spectrum of BI solutions that span personal, team, and corporate contexts.
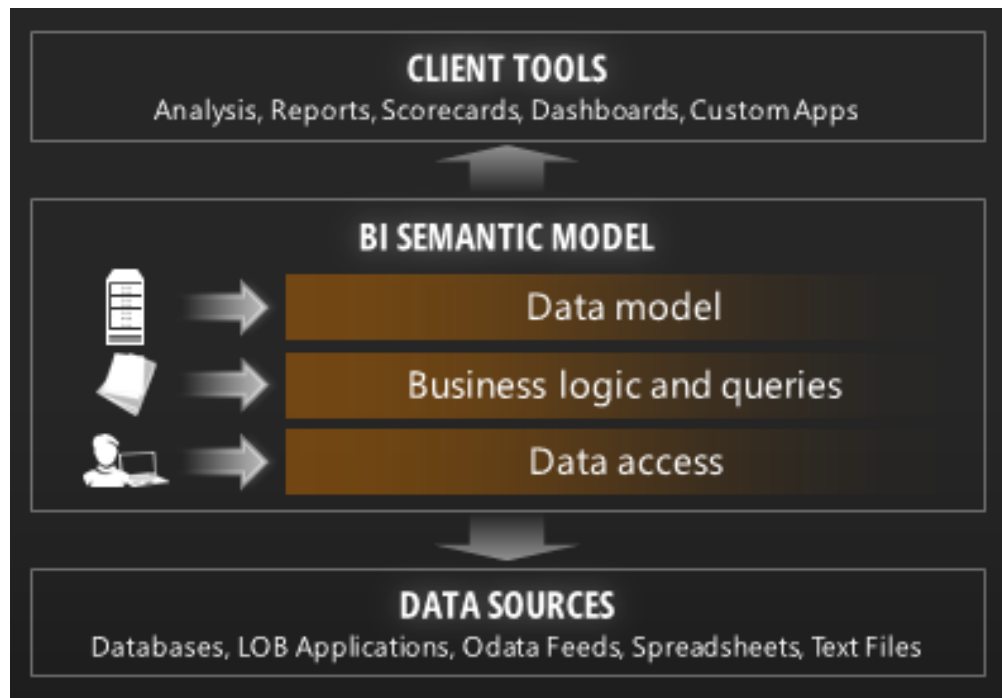
With the BI Sematic Model, organizations can scale from small personal BI solutions to the largest organizational BI needs. The BI Semantic Model is one model for all end user experiences: reporting, analytics, scorecards, dashboards, and custom applications. It offers developers flexibility of modeling experiences, richness to build sophisticated business logic, and scalability for the most demanding enterprise needs.

Data Quality Services
A new service to SQL Server, Data Quality Services (DQS) helps round out end-to-end data management for organizations. DQS provides knowledge-driven tools customers can use to allow data stewards to create and maintain a Data Quality Knowledge Base that helps improve data quality and ease data management. Specifically, customers can gain confidence in data quality by using organizational knowledge to profile, cleanse, and match data. Data Quality Services can be run as a standalone tool or integrated with Integration Services (SSIS). With SQL Server 2012, customers will be able to access the Windows Azure Marketplace DataMarket as a source of 3rd party data to help validate and cleanse data in a data quality project.

Master Data Services
Master Data Services (MDS) continues to make it easier to manage master data structures (object mapping, reference data, and dimensions and hierarchies) used in data integration operations. With new Entity Based Staging, all members and attribute values for an entity can be loaded at one time. Additionally, the Explorer and Integration Management functional areas of the Master Data Manager Web application have been updated with a new Silverlight® look and feel. Members can be added and deleted more quickly, and they can be moved into a hierarchy more easily.
The new MDS Add-in for Excel democratizes data management, so information workers have the ability to build data management applications directly in Excel. Information workers can use

this add-in to load a filtered set of data from the MDS database, work with the data in Excel, and then publish the changes back to the MDS database. Administrators can also use the add-in to create new entities and attributes.

Integration Services
SQL Server Integration Services (SSIS) helps lower the barriers to getting started with data integration. SSIS enables organizations of all sizes to operationalize their commitment to information with capabilities that increase efficiency and improve productivity related to information management efforts. SQL Server 2012 Integration Services delivers comprehensive support to help run your data integration capabilities as a mission critical application. SSIS includes rich DBA and IT Implementer support for the deployment and administration of ETL tasks. SQL Server 2012 also includes the ability to run administration and other capabilities as a separate SQL Server instance.

Big Data Analytics and Data Warehousing

SQL Server 2012 supports the largest of enterprise needs for Analytic and Data Warehouse solutions, as well as complete fault tolerance and disaster recovery with AlwaysOn, providing the required 9s of up time.

Massive Data Warehousing:
Microsoft provides a range of solutions to help customers address Big Data challenges. Our family of data warehouse solutions from Microsoft® SQL Server® 2012, SQL Server® Fast Track Data Warehouse,

and SQL Server® 2008 R2 Parallel Data Warehouse offer a robust and scalable platform for storing and analyzing data in a traditional data warehouse. SQL Server 2012 provides enhanced features such as Remote Blob Storage and partitioned tables that scale to 15,000 partitions to support large sliding window scenarios. Also available is increased support for up to 256 logical cores to enable high-performance for very large workloads and consolidation scenarios.

Next-Gen Performance with xVelocity In-Memory
Microsoft SQL Server 2012 provides a generational leap in performance with the new xVelocity in-memory technologies allowing typical improvements of 10X-100X for Analytics and Data Warehousing. With scan rates of 10s of Billions of rows per second on typical industry hardware, xVelocity gives users the ability to actively interact and explore on an unprecedented amount of data at the speed of thought.

Fast time to Solution
Fast time to solution is made available through reference architectures, appliances that offer pre-tested, pre-configured, and pre-tuned integration with open tier-one industry hardware, and software that installs and configures 4X faster than other leading vendors.

SQL Server offers one of the lowest costs of acquisition and ownership, where real-life scenarios show savings of hundreds of thousands of dollars after migrating to SQL Server.

Microsoft Big Data Solution

Microsoft's Big Data strategy embraces Hadoop for activating ambient data being born outside the traditional data platform. Hadoop is the open source implementation of MapReduce parallel computation engine and environment, and it is used for processing streams of data that go well beyond the size of even the largest enterprise data sets. Whether it's sensor, clickstream, social media, location-based or other data that is generated and collected in large gobs, Hadoop is often on the scene in the service of processing and analyzing it.

Microsoft is delivering an enterprise-class implementation, or distribution, of Hadoop for Windows Server and Windows Azure, integrated with SQL Server 2012, Active Directory, and System Center to make it dramatically easier, efficient, and cost effective for organizations to capitalize on the opportunity Big Data can bring.

Microsoft's Big Data solution enables customers to augment their analysis with publicly available data from social media sites such as Twitter and Facebook, and hundreds of trusted data providers on Windows Azure Marketplace. Azure Marketplace also exposes hundreds of applications and data mining algorithms to help unlock new insights for customers.

Also, through deep integration with PowerPivot, PowerView, and EDW tools, Microsoft's Big Data solution offers customers deep insights on all their structured and unstructured data with the tools they use every day.


Cloud on Your Terms
The next wave of SQL Server investments will offer organizations the agility to quickly create and scale solutions that solve challenges and fuel new business opportunity from server to private or public cloud linked together with common tools for optimized productivity and cutting-edge developer technologies—build once, deploy and manage wherever.

Optimized Productivity

SQL Server Data Tools
SQL Server Data Tools unifies the development experience for database development with a single powerful environment for database development across Database, BI and web and supports SQL Server and SQL Azure. Streamline application development with a single environment for developing DB, BI, and web solutions across on-premise and cloud environments.

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- New Visual Studio based IDE comes standalone or integrated (source control, unit testing, etc…), is released with SQL Server 2012, on the web, and with Visual Studio vNext and is designed for both database and BI developers

- Improved experience for database developers includes declarative, model-based development, integrated tools with modern language services, ability to work connected and offline with local testing, and offers SQL Server edition-aware targeting (SQL Server, SQL Azure…).

- Improved experience for SSIS developers for data flow design, undo/redo, and human readable packages.
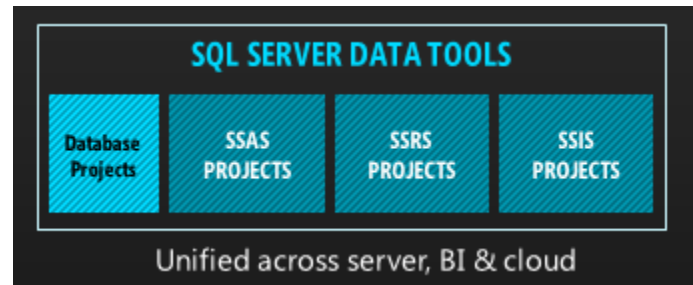
Data-tier Application Component (DAC) Framework
Introduced in SQL Server 2008 R2, Data-tier Application (DAC) support across SQL Server and Visual Studio helps IT and developers to more easily define and contain the schemas and objects required to support an application, then deploy, import, and export DACs more easily across on-premises and public cloud.
- Additional supported objects Permissions, Role Memberships, Synonym, CLR System types: Hierarchy ID, Geometry, and Geography, Spatial Index, and Statistics

Data-tier Application Component (DAC) Parity with SQL Azure
SQL Server 2012 and SQL Azure will offer 'anywhere support' for moving a DAC database between SQL Server databases across server, private cloud or SQL Azure. This enables customers to build once and deploy and manage anywhere which leads to unprecedented flexibility across IT and dev. Import and export services in the DAC framework enable archiving and migration scenarios between on-premise and cloud database servers. The new export service in the DAC framework will extract database schema as well as data and serialize it into a new logical and open archive format – a .bacpac file. Users will then be able to import the .bacpac archive into another database server.

PowerShell 2.0 Support
SQL Server 2012 expands on the PowerShell support delivered in SQL Server 2008 by leveraging Windows PowerShell 2.0 and allowing DBAs to take advantage of the latest PowerShell features. This offers the flexibility to use SQLPS.exe for all SQL and related automation scenarios. Specifically, key functions in SQL Server AlwaysOn are also supported by PowerShell 2.0 to enable administrators the flexibility to set up new availability solutions via scripting versus the AlwaysOn wizard interface.

Full-Text Statistical Semantic Search
Enable T-SQL developers to bring deep insight to the organization within non-structured data files stored in the SQL Server database by uncovering previously undiscovered relationships across stored files. FTS Semantic Search extracts statistically relevant 'key phrases' and based on these phrases 'similarity across documents' as structured data made available through new TSQL rowset functions. Together with FileTable, Semantic Search makes non-structured

documents first class citizens of a relational database allowing developers to manipulate them together with structured data in any set operations.

Extend any data, anywhere

Enhanced Support for Unstructured Data
SQL Server 2008 introduced several enhancements for growing types and volumes of unstructured data including FILESTREAM, DATE/TIME, and Spatial. SQL Server 2012 builds on the robust beyond relational foundation with additional enhancements.

- **High Availability for FILESTREAM**
  With SQL Server 2012, new complex data types are treated as a first-class citizen. The benefits of FILESTREAM allow customers to store and manage complex data through in a variety of ways, as if it were part of the database. Additionally, with SQL Server 2012, customers can enjoy the high availability benefits of AlwaysOn for complex data managed via FILESTREAM. This includes customers taking advantage of Remote Blog Storage and FileTable.

- **FileTable**
  FileTable builds on FILESTREAM to bring Win32 namespace support and application compatibility to the file data stored in SQL Server. Countless applications maintain their data in two worlds – documents, media files and other unstructured data in file servers and related Structured Metadata in relational systems. FileTable helps the barrier to entry for customers who have files on servers which currently run Win32 applications while removing the issues caused by maintaining two disparate systems and keeping them in sync.

- **Full Globe Spatial Support**
  SQL Server Spatial enhancements include circular arcs on the ellipsoid (industry firsts for relational database systems), support for full globe spatial objects, functional parity of geography and geometry data types, and spatial indexes performance.

Greater interoperability
SQL Server 2012 helps customers extend heterogeneous environments by connecting to SQL Server and SQL Azure applications with support for additional industry standard APIs across varied platforms.

- Microsoft Driver for PHP for SQL Server is designed to enable reliable, scalable integration with SQL Server for PHP applications deployed on the Windows platform.
- Connectivity for Java provides secure and highly available connectivity from java applications to SQL Server for enterprise customers.
- Microsoft JDBC Driver for Linux/Unix provides connectivity to Unix/Linux which allows customers running applications and workloads on legacy platforms to more easily migrate to SQL Server with minimal effort.
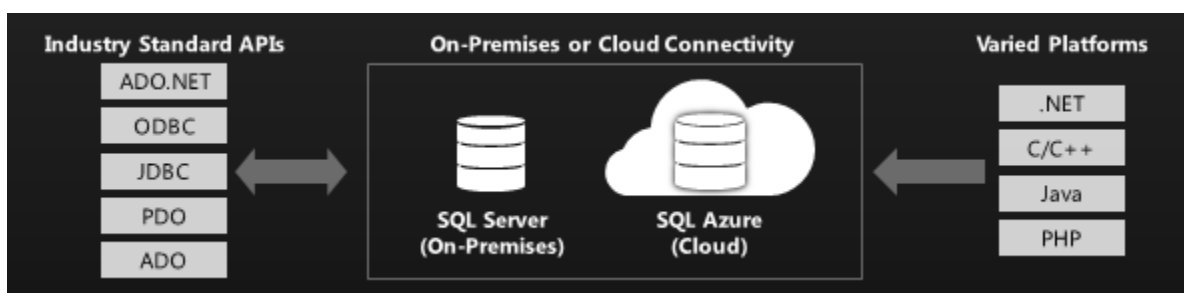
SQL Server Express LocalDB:
In SQL Server 2012, SQL Server Express edition will feature a new version, SQL Server Express LocalDB. LocalDB is a new lightweight version of Express that has all its programmability features, yet runs in user mode and has a fast, zero-configuration installation and short list of pre-requisites.

Conclusion

SQL Server 2012 is a significant product release that helps customers continue to build and support mission critical environments, now with more confidence and efficiency out of the box. New tools and enhancements enable breakthrough insight across all levels of the organization while cloud-ready technologies for application symmetry across server, private and public cloud helps customers stay agile for the future.

This white paper provides only an overview of the key new features, benefits, and functionality in SQL Server 2012.

For more information:

http://www.microsoft.com/sqlserver/: SQL Server Web site

http://technet.microsoft.com/en-us/sqlserver/: SQL Server TechCenter

http://msdn.microsoft.com/en-us/sqlserver/: SQL Server DevCenter

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