Microsoft

SQL Server 2012 Gives You More Advanced Features (Out-Of-The-Box)

SQL Server White Paper

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Applies to: SQL Server 2012

Summary:

This paper explains the different ways in which databases are packaged among the three leading enterprise database vendors: Microsoft SQL Server, IBM DB2, and Oracle DB. Specifically, we will focus on the Enterprise Edition of the products and examine which advanced features are included in the base packaging and which ones require extra purchase through feature packs, options, or separate products. IBM and Oracle include basic features in their base products and offer advanced features through feature packs, options, or separate products. These extras could become very costly and sometimes could end up costing more than the base product itself. In contrast, SQL Server 2012 Enterprise Edition includes all the advanced features in the base products and customers do not have to pay more for those features.

Knowing which features they are getting from the base products from each vendor is crucial for customers in order to make better database decision depending on their needs, requirements, and budget.

The following table shows the comparison of how advanced features based on Enterprise Edition are packaged from each vendor; these are covered in more detail in this paper.

Features	*SQL Server*	*IBM DB2*	*Oracle DB*
High Availability & Disaster Recovery	✓	✓	
Advanced Security	✓		
Data Warehousing	✓		
Advanced Compression	✓		
Manageability	✓		
Non-relational	✓		
Advanced Business Intelligence	✓		
Master Data Management	✓		
Data Quality	✓		
Complex Event Processing	✓		

✓ Included in the base product (Enterprise Edition), no need to pay extra

In summary, SQL Server 2012 Enterprise Edition provides more advanced functionalities without the need of feature packs, options, or separate products. Please go this site for more details on SQL Server 2012 and how SQL Server can help you lower database licensing cost.

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Overview

Historically, database provides basic relational storage for client-server applications. As new applications emerge, more capabilities (such as security, high availability, data warehouse, and business intelligence) are needed in the applications. Database vendors are faced with an important decision on how to package these new capabilities in their products. The choice for these vendors on the packaging will eventually affect how customers end up paying to deploy applications that use the product. It is important for customers to understand what they are getting from each vendor in order to make the right decision.

SQL Server Advanced Features

SQL Server 2012 Enterprise Edition includes advanced features in the base product without the need to purchase feature pack or options. Customers who purchase SQL Server 2012 Enterprise Edition are able to make use of all these features in their applications.

The following table outlines these features in more detail:

Features	*Details*
High Availability & Disaster Recovery	AlwaysOn
Advanced Security	Transparent Data Encryption, Extensible Key Management, SQL Server Audit, User-Defined Server Roles, Default Schema for Groups, Contained Database Authentication
Data Warehousing	ColumnStore Index, Change Data Capture, Table Partitioning, Integration Services
Advanced Compression	Storage and Backup Compression
Manageability	Distributed Replay, Control Point, Database Tuning Advisor, Performance Data Collector, Policy Based Management
Non-relational	Spatial data support, FileTable
Advanced Business Intelligence	Analysis Services, Reporting Services, Data Mining, Semantic Model
Master Data Management	Master Data Services
Data Quality	Data Quality Services
Complex Event Processing	StreamInsight

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High Availability & Disaster Recovery

AlwaysOn

AlwaysOn is the new integrated, flexible, cost-efficient high availability and disaster recovery solution in SQL Server 2012 that provides redundancy within/across datacenters and enables fast application failover providing both maximum availability and data protection for mission critical applications.

IBM and Oracle

For high availability, IBM includes HADR in the base product. However, Oracle requires customer to purchase additional database options called Real Application Clusters for local high availability and Active Data Guard for remote disaster recovery.

Advanced Security

Transparent Data Encryption

Transparent Data Encryption (TDE) reduces the complexity of developing applications that require encrypted data by performing all encryption transparently at the database level through a security enhanced database encryption key (DEK). TDE enables application developers to access encrypted data without changing existing applications.

Extensible Key Management

Consolidate enterprise encryption by using an Extensible Key Management (EKM) system. EKM can separate data from the keys using Hardware Security Modules to store the keys in separate hardware. Simplify key management by using specialist systems.

SQL Server Audit

SQL Server Audit enables companies to ensure compliance with company policies and/or government regulations. Audit Resilience delivers the ability to recover auditing data from temporary file and network issues. User-Defined Audit allows application to write custom events into the audit log to allow more flexibility to store audit information. Audit Filtering provides greater flexibility to filter unwanted events into an audit log.

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 having to use system administrator for all database administration.

Default Schema for 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.

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.

IBM and Oracle

For advanced security, IBM requires customer to purchase additional database feature pack called Advanced Access Control. Oracle also requires customer to purchase additional database option called Advanced Security.

Data Warehousing

ColumnStore Index

ColumnStore Index introduces in-memory column store technology to the database engine, making SQL Server the first of the major general-purpose database systems to have a true column store. ColumnStore Index brings together the VertiPaq technology that was developed in Analysis Services (and is the crucial foundation for PowerPivot) and a new query execution paradigm called batch processing to provide truly astonishing speed up for common data warehouse queries. In test scenarios customers have experienced up to100x improvements in star join and similar queries.

Table Partitioning

Partitioning a large table divides the table and its indexes into smaller partitions, so that maintenance operations can be applied on a partition-by-partition basis, rather than on the entire table. In addition, the SQL Server optimizer can direct properly filtered queries to appropriate partitions rather than the entire table. SQL Server 2012 supports up to 15K partitions per table.

Integration Services

SQL Server Integration Services (SSIS) is an effective enterprise ETL toolset for both the traditional demands of ETL operations, as well as for the evolving needs of general-purpose data integration.

IBM and Oracle

IBM sells separate data warehouse product called InfoSphere Warehouse and requires customer to purchase separate products for ETL called InfoSphere DataStage. Oracle also requires customer to purchase additional product for ETL called Oracle Data Integrator.

Advanced Compression

Storage Compression

The data compression feature in SQL Server reduces the size of tables, indexes or a subset of their partitions by storing fixed-length data types in variable length storage format and by reducing the redundant data. The space savings achieved depends on the schema and the data distribution. Based on testing with various data warehouse databases, we have seen a reduction in the size of real user databases up to 87% (a 7 to 1 compression ratio).

Backup Compression

Backup compression helps in multiple ways. By reducing the size of SQL backups, customers save significantly on disk media for SQL backups. Results of 50% are not uncommon, and greater compression is possible. This enables customers to use less storage for keeping backups online, or to keep more cycles of backups online using the same storage. Backup compression also saves time. Traditional SQL backups are almost entirely limited by I/O performance. By reducing the I/O load of the backup process, we actually speed up both backups and restores.

IBM and Oracle

For compression, IBM requires customer to purchase additional database feature pack called Storage Optimization. Oracle also requires customer to purchase additional database option called Advanced Compression.

Manageability

Distributed Replay

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 changes.

Control Point

Customers have an increasingly important requirement to manage their SQL Server environment as a whole and less on managing individual computers and instances of SQL Server. SQL Server addresses this requirement through the concept of the SQL Server managed server group. The managed server group is managed through a Utility Control Point using the new Utility Explorer in SQL Server Management Studio (SSMS). The Control Point is configured on a SQL Server instance and provides the central reasoning point for a managed server group. It contains configuration and performance information collected by managed instances of SQL Server, and it stores this information in a central management repository. SQL Server configuration settings and performance data are collected and then compared to policy evaluation results on the Control Point to help administrators identify resource utilization bottlenecks and consolidation opportunities. The Control Point also contains data used for impact analysis and what-if scenarios.

Database Tuning Advisor

Database Engine Tuning Advisor (DTA) can be used to gain insight into the existing indexing and partitioning structure of SQL Server databases, and to get recommendations for how to improve database performance by creating appropriate indexing and partitioning structures. In addition to optimizing indexing structure, DTA can also recommend new physical data structures, including partitioning. DTA also has the ability to tune across multiple servers and limit the amount of time the tuning algorithms run. DTA is available as both a command-line and graphical utility. The command-line utility enables advanced scripting options.

Performance Data Collection

SQL Server provides Performance Data Collection that enables customers to collect, analyze, troubleshoot, and store SQL Server diagnostics information. Performance Data Collection provides an end-to-end solution for performance monitoring that includes low overhead collection, centralized storage, and analytical reporting of performance data. Customers can use SQL Server Management Studio to manage collection tasks, such as enabling the data collector, starting a collection set, and viewing system collection set reports as a performance dashboard. Customers can also use system-stored procedures and the Performance Studio API to build your own performance management utilities based on Performance Data Collection.

Policy-Based Management

The Policy-Based Management framework provides the ability to define policies that apply to servers, databases, and other objects in data environment. Well-defined policies can help administrators to control and manage change proactively within the data services environment.

IBM and Oracle

For manageability, IBM requires customer to purchase additional database feature pack called Performance Optimization. Oracle also requires customer to purchase additional database option called Diagnostic, Tuning, Change Management, Configuration Management, and Patch Automation Packs.

Non-Relational

Spatial Data Support

SQL Server provides support for geographical data through the inclusion of spatial data types, which customers can use to store and manipulate location-based information. The spatial support in SQL Server can help customers to make better decisions through analysis of location data.

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.

IBM and Oracle

For spatial data, IBM requires customer to purchase additional database feature pack called Geodetic Data Management. Oracle also requires customer to purchase additional database option called Spatial.

Advanced Business Intelligence

Analysis Services

SQL Server Analysis Services is designed to provide exceptional performance and scales to support applications with millions of records, terabytes in size, and thousands of users. Innovative, consolidated tools help improve developer productivity through cube, dimension, and attribute designers that produce results in better design and faster implementation.

Reporting Services & Power View

SQL Server Reporting Services provides a complete server-based platform that is designed to support a wide variety of reporting needs including managed enterprise reporting, ad-hoc reporting, embedded reporting, and web based reporting to enable organizations to deliver relevant information where needed across the entire enterprise. Power View is an interactive data exploration and visual presentation experience targeted at Information Workers who need access to their business data but don't have the technical knowledge to write their own queries or specialized knowledge around reporting. Built on top of the BI Semantic Model, which provides a user friendly view of the data, Power View gives the user a powerful yet simple to use experience for telling stories with their data.

Data Mining

SQL Server offers predictive analysis through a complete and intuitive set of data mining tools. Business users gain advanced data mining within the simplicity and familiarity of Microsoft Excel with SQL Server Data Mining Add-ins for Microsoft Office. Developers appreciate familiar tools and a comprehensive development environment for building sophisticated data-mining solutions.

Semantic Model

BI Semantic Model is a single model for users with multiple ways of building business intelligence (BI) solutions. With the BI Sematic Model organizations can scale from small personal BI solutions to the largest organizational BI needs. BI Semantic Model is one model for all end user experiences – reporting, analytics, scorecards, dashboards, and custom applications and offers developers flexibility of modeling experiences, richness to build sophisticated business logics and scalability for your most demanding enterprise needs.

IBM and Oracle

For business intelligence, IBM requires customer to purchase a separate product called Cognos. Oracle also requires customer to purchase additional database option called OLAP or separate products called Oracle Business Intelligence or Hyperion Business Intelligence.

Master Data Management

Master Data Services

Master Data Services helps enterprises standardize the data people rely on to make critical business decisions. With Master Data Services, IT organizations can centrally manage critical data assets companywide and across diverse systems, enable more people to securely manage master data directly, and ensure the integrity of information over time.

IBM and Oracle

For master data management, IBM requires customer to purchase a separate product called InfoSphere Master Data Management. Oracle also requires customer to purchase separate products in a package called Oracle Master Data Management suite.

Data Quality

Data Quality Services

Data Quality Services (DQS), helps round out end-to-end data management for organizations. DQS provides knowledge-driven tools customers can use allow data stewards to create and maintain a Data Quality Knowledge Base which 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).

IBM and Oracle

For data quality, IBM requires customer to purchase a separate product called InfoSphere QualityStage. Oracle also requires customer to purchase separate products in a package called Oracle Enterprise Data Quality.

Complex Event Processing

StreamInsight

SQL Server StreamInsight is a powerful platform for developing and deploying complex event processing (CEP) applications. Its high-throughput stream processing architecture and .NET-

based development platform enable developers to quickly implement robust and highly efficient event processing applications.

IBM and Oracle

For master data management, IBM requires customer to purchase a separate product called WebSphere Business Events. Oracle also requires customer to purchase separate products called Oracle Complex Event Processing.

Conclusion

Understanding which features come with the base product and which features requires additional purchase allows customers to make a more informed decision when deciding which database is best for their organization. SQL Server has taken the approach to simplify packaging by including advanced features in the base product without extra cost.

For more information:

- http://www.microsoft.com/sqlserver/
- http://www.ibm.com/db2
- http://www.oracle.com

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