SQL Server Versions in Distribution, Parallelism and Big Data

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ABSTRACT

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. 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(2000 -2016). According the role of Distribution, Parallelism and Big Data in Microsoft SQL Server specifically reviewed.

Keywords
Distribution, Parallelism, Big Data, SQL Server

1. INTRODUCTION

Table 1. SQL Server release history [2]

| Version	Year	Release name	Code name	Internal version
8.0	2000	SQL Server 2000	Shiloh	539
8.0	2003	SQL Server 2000 64-bit Edition	Liberty	539
9.0	2005	SQL Server 2005	Yukon	611/612
10.0	2008	SQL Server 2008	Katmai	661
10.25	2010	Azure SQL DB	Cloud Database or Cloud DB	-
10.50	2010	SQL Server 2008 R2	Kilimanjaro (aka KJ)	665
11.0	2012	SQL Server 2012	Denali	706
12.0	2014	SQL Server 2014	SQL14	782
13.0	2016	SQL Server 2016	-	852

Old version
Older version, still supported
Latest version
Latest preview version

Table 2. SQL Server Basic Features[3]

Database Engine, Analysis Services, Integration Services, Replication, Reporting Services, Notification Services, Service Broker, Full-Text Search, Master Data Services, SharePoint Integration, Data Quality Services, R Services.

Table 3. SQL Server Versions Features[4]

Version	Features
SQL Server 2000	Enterprise Manager, Query Analyzer, SQL Profiler, Service Manager, Data Transformation Services (DTS), XML and HTTP Support, Book Online
SQL Server 2005	Relation Database, Replication Services, Analysis Services, Reporting Services ,Management Tools ,Development Tools, SSIS, Business Intelligence, new method for database programing

SQL Server 2008	Support for Up to 256 Processor Cores, Power Pivot and Self-Service BI, Multi server Management, Master Data Services, Stream Insight, Report Builder 3.0, **.**NET Framework Support, Hyper-Threading Support, Snap shot and Mirror Support for Database
SQL Server 2008 R2	Analysis Services, Multidimensional Data, Analysis Services, Data Mining, Integration Services, Master Data Services, Replication, Reporting Services, SharePoint Integration, Service Broker
SQL Server 2012	Always On Availability Groups, Windows Server Core Support, Column store Indexes, User-Defined Server Roles, Enhanced Auditing Features, BI Semantic Model, Sequence Objects, Enhanced PowerShell Support, Distributed Replay, Power View, SQL Azure Enhancements, Big Data Support.
SQL Server 2014	New In-memory OLTP Engine, Enhanced Windows Server 2012 Integration, Enhanced to Always on Availability Groups, Enhancements to Backups, Updateable Column store Indexes, SQL Server Data Tools for Business Intelligence (BI), Power BI For Office 365 Integration
SQL Server 2016	Always Encrypted, Dynamic Data Masking, JSON Support, Multiple Temp OB Database Files, Poly Base, R comes to SQL Server, Query Store, Row Level Security, Stretch Database, Temporal Table

2. DIFFERENCES, SQL SERVER VERSIONS FEATURES [5]

Table 4. Difference between SQL **server 2000 and 2005**

SQL Server 2000	**SQL Server** 2005
1.Quary Analyser and Enterprise manager are separate	A. Both are combined as SSMS
2.No XML data type is introduced	B. XML data type is introduced
3.We can create maximum of 65,535 database	C. We can create 2(pow(20)) -1 database
4. Exception Handling is not here	D. Exception Handling is there
5. can,t compress the tables and indexes	E. can compress the tables and indexes
6. Determine data type is used for both date and time	F. Determine is used for both date and time
7.No var char(max) or var binary(max) is available	G. var char(max) or var binary(max) is available
8. No SSIS is included	H. SSIS is started using
9. PIVOT and UNPIVOT functions are not used	I. PIVOT and UNPIVOT functions are used
10.Cant bulk copy update	J. Cant copy update
11. can,t Encrypt the Database	K. can Encrypt the Database

Table 5. Difference between Sql server 2005 and 2008

SQL Server 2005	**SQL Server** 2008
1.We can,t able to Encrypt the entric Database	A. We able to Encrypt the entric Database
2.Does n,t provide Backup Encryption	B. Introduced Backup Encryption
3.XML Datatype is introduced	C. XML Datatype is implemented and used
4. FILESTREAM is not there	D.FILESTREAM is introduced
5. LINQ is not there	E. LINQ is introduced for retrieving multiple type of data
6. Table valued parameters is not there in sql 2005	F. Table valued parameters is introduced in sql 2005

7.No varchar(max) orvarbinary(max) is available	G. varchar(max) orvarbinary(max) is available
8. Data synchronization isn,t introduced	H. 8. Data synchronization introduced

Table 6. **Difference between Sql server 2008 and 2008R2**

SQL Server **2008**	SQL Server **2008R2**
1.It support maximum of 64 logical process	A. It support maximum of 256 logical process
2.MDS part of BI is not included in SQL Server 2008	B. MDS part of BI is included in SQL Server 2008R2
3.Poverpivot in BI isn,t implemented in SQL Server	C. Poverpivot in BI is implemented in in SQL Server 2008R2
4. Introduced geospatial data types with few common features in ssrs2008	D. Additional feature added geospatial data types in ssrs2008 ,including mapping, routing and custom shaps

Table 7. Difference between Sql server 2008 and 20 12

SQL Server **2008**	SQL Server **2012**
1.Code name	A. Code name Denali
2.Query page splitting is not there in sql2008	B. Query page splitting is implemented in sql2012
3. It can support only 1000 partitions	C. It can support upto 1500 partitions
4. String function concate and format are not available sql2008	D. String function concate and format are available sql2012
5. Analysis service dosen,t have BISM sql2008	E. Analysis service include BISM sql2012
6. Order by clause doesn,t have OFFSET/FETCH options	F. Order by clause with OFFSET/FETCH options

3. DISTRIBUTION ,PARALLELISM AND BIG DATA IN SQL SERVER VERSIONS

According the role of Distribution , Parallelism and Big Data in Microsoft SQL Server specifically reviewed[6].

Parallelism is a feature in SQL Server which allows expensive queries to utilize more threads in order to complete quicker. The query optimizer makes the determination of how expensive a query is based upon the Cost Threshold for Parallelism setting set at the SQL Server Instance level. This cost threshold for parallelism is an estimate (roughly defined in seconds) that the query optimizer has determined a statement will take based on an estimated (or cached) execution plan. Generally the queries that qualify for parallelism are high IO queries. In a normal process, a source is read using a single SPID (Server Process ID) and it output using the same SPID. In parallelism, multiple SPIDs are used to read a source (this is known as distributing streams), then an operation may be performed in the streams, then the streams are gathered[7].

Big data is a term for data sets that are so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data curation, search, sharing, storage, transfer, visualization, querying, updating and information privacy. The term often refers simply to the use of predictive analytics or certain other advanced data analytics methods that extract value from data, and seldom to a particular size of data set. Accuracy in big data may lead to more confident decision making, and better decisions can result in greater operational efficiency, cost reduction and reduced risk[8].

A distributed database is a database in which storage devices are not all attached to a common processing unit such as the CPU, and which is controlled by a distributed database management system. It may be stored in multiple computers, located

in the same physical location; or may be dispersed over a network of interconnected computers. Unlike parallel systems, in which the processors are tightly coupled and constitute a single database system, a distributed database system consists of loosely coupled sites that share no physical components. The Distributor is a server that contains the distribution database, which stores metadata and history data for all types of replication and transactions for transactional replication. To set up replication, you must configure a Distributor. Each Publisher can be assigned to only a single Distributor instance, but multiple publishers can share a Distributor. The Distributor uses these additional resources on the server where it is located.

4. DISTRIBUTION , PARALLELISM AND BIG DATA FEATURES IN SQL SERVER VERSIONS (DETAILS)[9]

4.1 The following tables to determine which features are supported by the different editions of SQL Server 2000

Table 8. SQL Server 2000 Database Engine Features

Database Engine Feature	Enterprise Edition	Standard Edition	Personal Edition	Developer Edition	Desktop Engine (MSDE 2000)	SQLServer CE	Enterprise Evaluati on Edition
Parallel DBCC	Supported	N/A	N/A	Supported	N/A	N/A	Supported
Parallel CREATE INDEX	Supported	N/A	N/A	Supported	N/A	N/A	Supported
Distributed Partitioned Cubes	Supported	N/A	N/A	Supported	N/A	N/A	Supported

4.2 The following tables to determine which features are supported by the different editions of SQL Server 2005.

The following abbreviations represent SQL Server 2005 editions

- EE = SQL Server 2005 Enterprise Edition
- DE = SQL Server 2005 Developer Edition
- SE = SQL Server 2005 Standard Edition
- WG = SQL Server 2005 Workgroup Edition
- SSE = SQL Server 2005 Express Edition
- SSEA = SQL Server 2005 Express Edition with Advanced Services

Table 9. SQL Server 2005 Database Engine Features

DatabaseEngine Features, Enhancements	EE(32bit) EE(64bit) DE(32bit) DE(64bit)	SE(32bit) SE (64bit)	WG (32bit)	SSE (32bit)	SSEA (32bit)
Transact-SQL Enhancements, Distributed Query	Yes	Yes	Yes	Yes	Yes
Manageability Features, Parallel Service Security	Yes	No	No	No	No
Database Maintenance Features, Parallel Index Operations	Yes	No	No	No	No
Scalability and Performance Features, Parallel DBCC	Yes	No	No	No	No
Scalability and Performance Features, Updateable Distributed Partitioned Views	Yes	No	No	No	No

Table 10.   SQL Server 2005 Analysis Services Features

Analysis Services Features, Enhancements	EE(32bit) EE(64bit) DE(32bit) DE(64bit)	SE (32bit)	WG (32bit)	SSE (32bit) SSEA (32bit)	SE (64bit)
Scalability and Performance Features, Auto Parallel Partition Processing	Yes	No	No	No	No
Scalability and Performance Features, Distributed Partitioned Cubes	Yes	No	No	No	No
Data Mining Features , Parallelism for	Yes	No	No	No	No

model processing					
Data Mining Features , Parallelism for model prediction	Yes	No	No	No	No

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Table 11. SQL Server 2005 Notification Services Features

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Notification Services Features, Enhancements	**EE(32bit) EE(64bit) DE(32bit) DE(64bit)**	**SE (32bit)**	**WG (32bit)**	**SSE (32bit) SSEA (32bit)**	**SE (64bit)**
Scalability Features, Parallelism and Multicast and Distributed deployment	Yes	No	No	No	No

4.3 The following tables to determine which features are supported by the different editions of SQL Server 2008.

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Table 12. Scalability

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Feature Name	Enterprise	Standard	Workgroup	Web Express	Express Tools	Express Advanced
Partition able	Yes					
parallelism	Yes					

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Table 13.   Manageability

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Feature Name	Enterprise	Standard	Workgroup	Web Express	Express Tools	Express Advanced
Distributed partitioned views	Yes	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable
Parallel index operations	Yes					
Parallel database backup checksum check	Yes					

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Table 14.   Data Warehouse Scale and Performance

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Feature Name	Enterprise	Standard	Workgroup	Web Express	Express Tools	Express Advanced
Auto parallel partition processing	Yes					
Distributed partitioned cubes	Yes					

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Table 15. Data Mining

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Feature Name	Enterprise	Standard	Workgroup	Web Express	Express Tools	Express Advanced
Parallel model processing	Yes					

4.4 The following tables to determine which features are supported by the different editions of SQL Server 2008 R2.

Table 16. Scalability and Performance

Feature Name	Datacenter	Standard	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel index operations	Yes	Yes				
Parallel consistency checks (DBCC)	Yes	Yes				
Distributed Partitioned Views	Yes	Yes	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable

Table 17. Data Warehouse

Feature Name	Datacenter	Standard	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel query processing on partitioned tables and indices	Yes	Yes				
Distributed partitioned cubes	Yes	Yes				

Table 18 . Analysis Services - Advanced Analytic Functions

Feature Name	Datacenter	Standard	Workgroup	Express with Advanced Services	Express with Tools	Express
Partitioned cubes and distributed partitioned cubes	Yes	Yes				

Table 19. Data Mining

Feature Name	Datacenter	Standard	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel model processing	Yes	Yes				

4.5 This topic provides details of features supported by the different editions of SQL Server 2012.

Table 20. Scalability and Performance

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Partition Table Parallelism	Yes					

Table 21. Management Tools

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express

Distributed Replay Admin Tool	Yes	Yes	Yes	Yes	Yes	Yes
Distributed Replay Client	Yes	No	Yes	Yes		
Distributed Replay Controller	Yes	No	Yes	Yes		

Table 22. RDBMS Manageability

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Distributed partitioned views	Yes	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable
Parallel indexed operations	Yes					
Parallel consistency check	Yes					

Table 23. Data Warehouse

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel query processing on partitioned tables and indices	Yes					

Table 24. Data Mining

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel Model Processing	Yes	Yes				

4.6 This topic provides details of features supported by the different editions of SQL Server 2014

Table 25. Scalability and Performance

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Partition Table Parallelism	Yes					

Table 26. Management Tools

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Distributed Replay Admin Tool	Yes	Yes	Yes	Yes	Yes	Yes
Distributed Replay Client	Yes	No	Yes	Yes		
Distributed Replay Controller	Yes	No	Yes	Yes		

Table 27. RDBMS Manageability

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Distributed partitioned views	Yes	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable	Partial. Distributed Partitioned Views are not updatable
Parallel indexed operations	Yes					
Parallel consistency check	Yes					

Table 28. Data Warehouse

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel query processing on partitioned tables and indices	Yes					

Table 29. Data Mining

Feature Name	Business Intelligence	Standard web	Workgroup	Express with Advanced Services	Express with Tools	Express
Parallel Model Processing	Yes	Yes				

5. CONCLUSION

According the role of Distribution Parallelism and Big Data in information technology world , Given the role it is worth More studying. Parallelism is a feature in SQL Server which allows expensive queries to utilize more threads in order to complete quicker. Big data is a term for data sets that are so large or complex that traditional data processing applications are inadequate. A distributed database is a database in which storage devices are not all

attached to a common processing unit such as the CPU, and which is controlled by a distributed database management system. Given the importance of the need for more research.

There for Distribution, Parallelism and Big Data in SQL Server need for strong research for advance database works.

6. REFERENCES

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