Introducing Microsoft SQL Server 2012

ANALYSIS AND COMMENTARY OF THE LATEST VERSION OF MICROSOFT SQL SERVER, AS ORIGINALLY PUBLISHED ON INTERGEN’S BLOG.
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The release of a new version of Microsoft SQL Server is always significant for the Microsoft community given the importance of the database platform to most Microsoft solutions and platforms. So many key solutions – ranging from SharePoint, through to the Dynamics range, and the development solutions – rely on SQL Server to underpin their capabilities.

Earlier this year, Microsoft released SQL Server 2012, building on the core functionality that everyone is familiar with, while adding a range of new business intelligence and reporting capabilities. In anticipation of this release, Intergen published a number of articles on its blog, highlighting the new capabilities of the platform from multiple perspectives, including from consultants, developers and database administrators.

Published between December 2011 and June 2012, these posts were written by our experts in these areas, looking at what’s changed and what’s stayed the same, both of which are equally important to organisations invested in SQL Server.

This ebook is a compilation of these posts, bringing the 14 posts together in a single place so that anyone interested in SQL Server 2012 can quickly get an independent analysis of the latest offering and understand what the database platform has to offer.
2012 will be an exciting year for all of us who utilise the broad features of the SQL Server platform.

A few weeks ago, Microsoft made available the release candidate (RC0) of SQL Server 2012 (previously known as Denali). The release candidate term is used when a product is considered “production ready” – feature and code complete and in a form that can be released, unless fatal defects emerge. The next stage is ‘release to manufacturing’ (RTM) which is currently touted for Q1 2012. The RC0 release enables the Intergen team to continue to build on the knowledge gained from utilising the CTP releases.

As we have come to expect from the Microsoft SQL Server team, the three CTP (Community Technology Preview) releases have been of a high standard and have been continually improved. The CTP releases have been downloaded by more than 100,000 people who have been actively providing stability and feature requests over the past year to help shape the product that we see in the RC0 release.

SQL Server 2012 is a major release: there are many new features in this release that will continue to position this platform product as world-class. To summarise the major themes of this release, the SQL Server team have outlined below what they believe is the core value proposition:

Greater availability. Deliver the required 9s and data protection with AlwaysOn, delivering added functionality that allows customers to experience multiple, readable secondaries for distributed scale of reporting and backup workloads, and support for FileTable and FILESTREAM which brings first-class high availability to complex data types.

Blazing-fast performance. More effectively govern performance in multi-tenancy environments like private cloud. Resource Governor enhancements include support for 64 resource pools, greater CPU usage control, and resource pool affinity for partitioning of physical resources and predictable resource allocation.

Rapid data exploration. Empower end users with new insights through rapid data exploration and visualisation. Discover new insights at the speed of thought with more feature/functionality in Power View, the highly interactive, familiar browser-based data exploration, visualisation, and presentation experience for end users.

Credible, consistent data. In addition to Data Quality Services and Master Data Services, customers can better support heterogeneous data within Data Warehouses through new Change Data Capture (CDC) support for Oracle.

Optimised productivity. Optimise IT and developer productivity across server and cloud with the new SQL Server Data Tools, a unified development experience for database and business intelligence projects, and cloud-ready capabilities within SQL Server Management Studio for snapshot backups to the Windows Azure Platform. Additionally, SQL Server 2012 offers a new version of Express – LocalDB. SQL Express LocalDB is a lightweight version of Express with all its programmability features, yet runs in user mode with a fast, zero-configuration installation and short list of prerequisites.

Of interest as well to us is that Microsoft is eliminating three of its current SKUs when it launches SQL Server 2012, standardising on three main editions: Standard, Business Intelligence and Enterprise (alongside the
Developers, Express and Compact editions). Note that Microsoft presents the Web edition as an available edition, but this is only available to organizations that sign a Service Provider License Agreement (SPLA) and this edition will no longer be available to enterprises.

The differences between the three main editions can be summarized as follows:

» **Standard Edition** offers "basic database, reporting, and analytics capabilities."

» **Business Intelligence Edition** includes all of the Standard Edition's capabilities, plus Power View (code name "Crescent"), reporting and analytics, data quality services, and master data services.

» **Enterprise Edition** includes all the Standard and BI features, plus the "AlwaysOn" high-availability, ColumnStore data warehousing functionality, and "Maximum virtualisation" (for users with Software Assurance licenses). Enterprise has a 20-core maximum, while the Business Intelligence and Standard editions support a maximum of 16 cores.


Aside from the revamped line of product editions, the biggest licensing change for SQL Server 2012 is Microsoft’s shift from counting processors and moving toward a core- (and virtual core-) based approach for SQL Server Standard and Enterprise editions.

As mentioned above, SQL Server 2012 is a major release with a large number of new features and enhancements. To help you understand the relevance and benefit of these new features to your organization, both from a technical and business perspective, from January the Intergen team will start posting a range of blogs covering in detail the following high-level categories:

**Database Engine** – including topics such as high availability, management and security, scalability and performance, programmability, and SQL Azure (SQL Server in the cloud)

**Business Intelligence** – including topics such as Analysis Services, Integration Services, Visualisation, BI Semantic model, and programmability

**Enterprise Information Management** – including Data Quality Services and Master Data Services

**Developer tools** – the standardization of a single developer experience delivered through SQL Server Data Tools.

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Adding cream to your BI cake

Business Intelligence (BI) applications have long been compared to cakes, with many layers needed to create a complete and flavorsome experience.

With SQL Server 2012, Microsoft has added a user-friendly end user interface to their BI solution that supports all end user querying tools. The advantage: SQL Server now provides a single, consistent, easy to use model across all tools.

Microsoft calls this the Business Intelligence Semantic Model, or BISM. The objective of the BISM is to have one model for all user experiences – reporting, analytics, scorecards, dashboards, and custom applications (the cream in the cake).

The BISM is a business translation layer that sits between the database and the end user. The primary goal of the BISM is to allow users to interact with their data using familiar business terminology instead of having to understand where the data resides, the naming conventions and what business rules to apply to the data. In other words, the BISM provides the linkages between the reporting tools and the physical data models.

With the introduction of the BISM, there are now two flavours of Analysis Services databases in Microsoft SQL Server: multidimensional (ROLAP, MOLAP) databases, which are the mainstay of SQL Server Analysis Services; and tabular (VertiPaq) which are the basis of Excel PowerPivot.

You can create a BISM using Excel PowerPivot or SQL Server Data Tools (formerly BIDS). You create one of three things: a multidimensional model, a tabular model, or a PowerPivot workbook. Each of these items is a BI semantic model.

The BI Semantic Model can be considered as a three-layer model as the above diagram suggests:

» **The Data Model** layer is the conceptual data model that the model developer and the model consumer work with. The BI Semantic Model is a hybrid model supporting both multidimensional and tabular data modelling.

» **The Business Logic** layer that encapsulates the intelligence in the model. An author creates a business logic model using either DAX (Data Analysis Expressions) or MDX (Multidimensional Expressions). The beauty of the new model is that DAX is an expression language based on Excel formulas that was introduced in PowerPivot and built on relational concepts. While DAX doesn’t give the raw power and flexibility that MDX offers, it can be written by trained users, does not generally require a background in development, and infrequently requires tuning.

» **The Data Access** layer integrates data from multiple sources, including relational databases, business applications, flat files, OData feeds and Cloud Services.
As many of the BI professionals agree, based on what we know and seen in PowerPivot, BISM has a huge potential and will bring welcome enhancements when using the tabular models. These benefits include:

» Schema simplification – There is no need to define explicit cubes, dimensions, measures, eliminating the perceived complexity of implementing an OLAP solution.

» Improved performance – At first glance it may not be obvious, but as the BISM utilises the VertiPac engine (a proprietary columnar data store engine) – which works well for BI-type querying.

» Flexibility – There will be no distinction between measures and dimensions. Every attribute can be used for aggregating and slicing. This is one PowerPivot feature that I really like.

» The DAX expression-based language removes much of the complexity of MDX.

» Possibility of real-time data access.

It allows solutions to scale from tens of millions of rows (using Excel PowerPivot), to hundreds of millions of rows (using Microsoft SharePoint) to billions of rows (with Microsoft SQL Server 2012).

From a business perspective the BISM enables end users (both technical and non-technical) to use any Microsoft client tool to self-serve BI content via a consistent semantic model, reducing their requirements for training and support. It also enables subject matter experts to architect semantic models relevant to their end users, further removing the dependency on specialised IT skills which more often than not impacts a business’s ability to support the demand for information.

In summary the BISM that is coming with Microsoft SQL Server 2012 is a great evolution of the BI stack, adding capability while simplifying the process for creating and using BI content. We are looking forward to the impending release so we can have some more cream with our cake.

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Since its inception, I have been impressed with Excel PowerPivot. It was released early in 2010 to provide greater analytical functions to business users. I have recently been using the beta version of PowerPivot that will be released in the next few months along with SQL Server 2012 and I have been really impressed to see how it has matured as an end user tool.

PowerPivot is a free Excel 2010 add-in that gives you the ability to create Business Intelligence solutions in the familiar spreadsheet environment. It is a powerful tool for business analysts and accountants who know their data well and are comfortable with Microsoft Excel, and who don’t have a background in IT development. PowerPivot will quickly link data together from disparate sources and apply business logic to create Business Intelligence solutions. All data is stored in memory so PowerPivot is incredibly fast and performs impressively well, handling multi-million row tables with ease.

To date, I have been reluctant to use it for anything more than prototyping. PowerPivot has been called by some as ‘spreadsheet hell on steroids’ because although it is really powerful, the models can get too big to manage and can potentially spread through an organisation without any form of control. PowerPivot sheets can be loaded into Microsoft SharePoint Enterprise, but if the PowerPivot model is sizeable, that process is slow and manageability is limited. Although business users love the PowerPivot capability, IT professionals get nervous about how to manage its use within their organisation.

POWERPIVOT IMPROVEMENTS IN SQL SERVER 2012

With the upcoming release of Microsoft SQL Server 2012, the PowerPivot engine has been brought into SQL Server.

This provides manageability and scalability, without compromising on the ease and simplicity of use. With the new version of PowerPivot you can simply create a new SQL Server Analysis Services database by restoring it from a PowerPivot model. You simply select the PowerPivot model and it creates the database. You can then create roles to secure the database as well as manage the data refreshes and monitor performance and usage – the best of both worlds.

In my opinion this function is a big deal. It allows for better separation of duties in the development of Business Intelligence solutions. The business experts, who understand the business goals and processes – and know the data – can participate in the creation of data models, building and enhancing the business logic themselves prior to passing the model to the IT professionals who can ensure it is secure and can perform in a managed environment.

PowerPivot does have some limitations in function (compared to traditional Analysis Services databases), but it is easier to learn and faster to use.

We always recommend that our Business Intelligence clients take a long-term view creating a Business Intelligence roadmap that is aligned to their business goals, and then work incrementally in small steps to add functionality. I would therefore suggest that clients look seriously at how they can include PowerPivot into their technology roadmap and plan for adjustments to their development roles and processes to ensure a successful introduction of the tool.

In summary, the enhancements to PowerPivot mean that it has grown from a great end user tool for analysis and prototyping to becoming a solution that can be fully integrated into the development lifecycle. In doing so, this provides better linkage between the business and technical teams which has to benefit organisations at multiple levels.

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This is the latest in a series of posts about the upcoming release of Microsoft SQL Server 2012. These posts are predominantly written for technical users of SQL Server.

Microsoft SQL Server 2012 has continued what SQL Server 2005 started by extending the partition functions that allows users to rapidly, and with less code, calculate analytical information about rows of data relative to all data within partitions or a subset of the complete data result set.

WHAT ARE SQL SERVER 2012 PARTITION FUNCTIONS?
Traditionally in SQL Server, one defines a group of logical conditions and SQL Server returns a result set that satisfies these conditions. From day one users have been able to ask SQL Server to perform set manipulation, typically using “group by’s”, but these are somewhat limiting.

With the addition of partition functions in SQL Server 2005, users were given the ability to get information about how a row relates to other rows within a subset (partition) of the result set (or, to other rows within the result set, as the result set is a sub-set of itself).

WHAT’S A PARTITION (OR SUBSET) OF A RESULT SET, AND WHY IS IT USEFUL?
Partitions are useful for providing more flexible access to the data in your SQL Server. As an example, one can now group values by month within year, and another is being able to identify employees within a department. We may have sales by employee; now we can quickly (both in terms of coding effort and in processing time) for each employee look at:

» where they rank in the department.
» what percentage of sales they have compared to best and worst performers.
» how they perform compared to the next best/worst performer.
» the percentage of employees they are better or worse than.
» where their sales sit as a percentage of department sales.

Then, on top of this, we can quickly pull out percentile values within the group. That is, for a given percentile (e.g. 50% if we want medians) SQL Server will calculate this value within our given partition (either discrete (i.e. the closest actual value) or continuous (i.e. the calculated value)).

COULD WE DO THIS BEFORE THE PARTITION FUNCTIONS?
Yes, but it required significantly more code. Most related values can be obtained by using a sub-query joining on the attributes that define your subset, then ordering and grabbing the min/max (or min/max greater/less than our row) of that set of results.

That said, if you have ever tried this approach on large data sets it can take a long time to achieve a result, not to mention requiring a complex query which therefore creates the possibility of coding errors and maintenance nightmares.
WHAT CAN'T WE DO WITH PARTITION FUNCTIONS?

When using partition functions we are trapped within our defined partition which means we can’t, directly, access values from previous or following partitions. This is the sort of thing we often do when we are analysing data by month or quarter (e.g. comparing one month to the same month in a previous year).

Of course we are now getting into the realms of cubes and MDX, and should maybe use – or at least consider – using the tools which are fit for purpose, rather than force the one tool to do everything. That said, this approach is only one step away from SQL Server indexing (and accessing information from related rows) the rows within a subset, to it then indexing each subset and accessing information from related rows in related subsets.

(That said, I haven’t properly investigated the performance hit in using the existing partition functions on very large result sets.)

SUMMARY

The new partition function in SQL Server 2012 allows us to achieve analytical and data summaries much faster, with cleaner, easier to read code. This results in a faster delivery time and a solution that can be modified and extended with less effort or risk of coding errors. Additionally, the new (SQL Server 2012) code runs faster than the equivalent code in previous versions of SQL Server.

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With the introduction of SQL Server 2012 and its new Data Quality Services, it is timely to understand to what extent the Microsoft solution will support our needs and at the same time present some thoughts on data quality as a function within your organisation.

Let’s start by looking at the cost of poor data quality. At the lowest level, poor data quality directly affects the ability of a business to perform its core business functions. If you look at any business function in an organisation, there will be a direct cost that can be attributed to poor data quality including non-recoverable costs, rework of products and services, workarounds, lost and missed revenue, compliance issues and poor decisions through misleading information. For any organisation it is challenging to estimate what that exact cost is, but feedback from leading industry commentators suggest it is somewhere between 8-25% of operating revenue – a significant amount in anyone’s terms.

Armed with this knowledge, it makes sound commercial sense that organisations take an active interest in the quality of their data and resolve to address it.

So how should organisations approach data quality? In my opinion, data quality needs to be recognised as one of a number of activities delivered through a business-wide function called ‘Data Management.’

To achieve effective data management, organisations need to work through a process where they start to recognise data as a corporate asset and accept that data management should have strategic focus and be delivered through an effective data governance function.

This process can take time and a level of maturity, but knowing where you sit in terms of maturity, your target and how to get there, you are in a good position to consider how to achieve data quality. For the most part, this process is implemented in small steps and quick wins are certainly possible early on in this cycle – data quality is a great candidate to be one of these quick wins.

**HOW DO YOU APPROACH A DATA QUALITY PROGRAMME?**

Firstly, data quality is relative. Your baseline of quality should be measured relative to the purpose of its use (i.e. to the extent it does not satisfy the intended use). Good measures of data quality include accuracy, timeliness, completeness, reliability, relevance and clarity.

Secondly, addressing data quality is not a one-off process. It is a continual cycle of analysing, improving and monitoring. Implementing a suitable methodology with support at all levels of the organisation will enhance your success greatly.

Thirdly, implementing a Data Quality toolset in isolation will not be sufficient. You need the right balance of people (skills and adoption), technology and process.

With this in mind, let’s consider the new Microsoft SQL Server 2012 Data Quality Services offering. Instead of diving deep into using these tools I will present a high-level architectural overview and describe the major components and their usage. For a deep dive technical show-and-tell, I suggest you look the many resources that exist on the internet.

<table>
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<th>DATA SIZE</th>
<th>DISCOVERY</th>
<th>CLEANSING</th>
<th>SSIS CLEANSING</th>
<th>MATCHING</th>
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<td>1 minute</td>
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<td>2-5 minutes</td>
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<td>1.5-3 hours</td>
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INTRODUCING DATA QUALITY SERVICES

At the highest level, Microsoft SQL Server 2012 Data Quality Services (DQS) presents a set of functions to perform data cleansing, duplicate detection, and profiling of your source data. These functions are managed by a centralised DQS server and through a DQS web-based application. DQS can also be integrated with SQL Server Integration Services through DQS-specific transforms, is integrated with SQL Server Master Data Services (MDS), and can also source industry reference data from third parties (e.g. the Windows Azure Marketplace).

Core to DQS is the Data Quality Knowledge Base (DQKB). The DQKB is responsible for managing quality-related knowledge. Within the DQKB, users create domains and one or more of these are then assigned to data source elements which DQS uses to assess quality. A domain can contain:

» A list of correct values for the domain.
» A list of common errors and how to fix them.
» A list of common variations for terms in a domain and how to fix them.
» A list of rules for that the correct domain values must adhere to.

Domains can be developed specific to your organisation and can also reference externally-sourced industry domains and reference data.

I particularly like the clear separation between building a knowledge base and applying it in the data correction process. I also like that the DQS solution has been designed with the data steward in mind; a key role in data management as they hold the deep knowledge about our data and the interest in keeping quality high.

In addition to maintaining the knowledge base and profiling source data, two core functions supported in DQS are Data Matching and Data Cleansing. Data Matching looks for duplicate data records in the source data, and Data Cleansing uses the domains in the DQKB to identify data quality issues.

A critical concept to understand in both the cleansing and matching processes is that DQS doesn’t automatically attempt to fix records at source. Instead, DQS runs a quality assessment process and indicates through this process its confidence (represented as a percentage) in the quality of each record and a suggested action (a status). Status include suggested, new, invalid, corrected and correct. Once this process has been run, the next step is for
the data steward to accept, reject or manually modify the record through the user interface (shown below). The last step in the process is to export the changes to a database table or Microsoft Excel spreadsheet so that the changes can be saved and applied manually back to the source.

In the case of Integration Services, the developer can utilise the DQS Status field of each record to determine what the subsequent logic should be, as shown below; in this case the SSIS package writes the different records to different destination tables.

A word of advice when considering using the DQS transform activity in SSIS packages: the cleansing and matching process is resource intensive and takes a reasonable amount of time, so careful consideration is required. Microsoft has officially published the following baseline against their recommended hardware configuration along with best practice documentation at http://www.microsoft.com/download/en/details.aspx?id=29075.

WHAT ABOUT ALTERNATIVE USES FOR DQS?
I see a big opportunity to use DQS to support the data migration activity as part of our larger projects, especially our large ERP and CRM implementations. Managing data quality and data transformations is inherently difficult and DQS is well suited to providing a useful solution to many of the data quality and duplication issues we face during this predominantly manual process.

WHAT DOES THIS ALL MEAN?
In summary, I like what I see in Microsoft’s DQS implementation; it provides a solid foundation that seems to have been well thought through and is supported by capable tools. The Data Quality service comes with a SQL Server Enterprise or Business Intelligence licence, so compare that to other data quality solutions in the market and that certainly presents good value. It’s too early yet to see if the platform lives up to the promise in enterprise scale implementations, but give us a few months and we’ll be able to provide some accurate feedback.

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The new release of SQL Server 2012 includes a brand new Business Intelligence (BI) reporting tool called Power View (formally known as Project Crescent).

End-user reporting was introduced in SQL Server 2005 with Report Builder. This concept has been extended in SQL Server 2012 with the graphical report designer Power View. This is a self-service reporting tool which allows business users to create interactive reports. Power View is not a replacement for Report Builder, but rather a natural progression and amalgamation of PowerPivot and SSRS.

WHAT IS DATA VISUALISATION?

In his article “A Tale of Two Types of Visualization and Much Confusion” http://eagereyes.org/criticism/tale-of-two-types, Robert Kosara explains Pragmatic Visualisation as a way to visually represent data in such a way as to gain new insights into the data. A visualisation should allow us to visually gain insight into data, and develop an understanding of the data. This can replace traditional non-visual methods such as data mining or statistics.

If a report created with Microsoft Power View allows users to visually gain new insight, and to understand the data, then I believe the tool will be a success.

WHY SHOULD WE USE DATA VISUALISATION?

When the amount of data is large or abstract, a visualisation can make the data easier to read and understand. A good example of this is a public transport map such as the London Tube map. This contains a large amount of data which would be very difficult to absorb and understand in any other way. Visually being able to see if a station on one line is within walking distance to a station on another, is something that would be difficult to present in a non-visual manner, making visualisation the optimal way to present the data.

Data Visualisation can help create a shared view, because it clearly shows how data is trending. The Slider feature in Microsoft’s Power Pivot provides the functionality for users to interact with the data and also see how performance trends over time.

WHAT DO YOU NEED TO KNOW ABOUT MICROSOFT POWER VIEW?

Microsoft describe Power View as “an interactive data exploration, visualisation, and presentation experience.”

It is a tool for business users to use to create intuitive ad-hoc reports. A user creating a report with Power View is not required to know about security, database names, and table structures, as the tool natively understands the relationships between the objects.

POWER VIEW BENEFITS

Power View is a tool where a visually rich and interactive report can be created quickly and easily using a drag and drop interface.

During my trialling of Power View, one of the features that I was most impressed with was the ability to create multiple views of the same report. There isn’t just one view of the data, as typically found in a traditional reporting tool. Many different views of the data can be created. The user can navigate between using a Microsoft Office style ribbon. The view of the data can be instantly switched from a bubble chart to a line chart, or a bar chart, as well as various others. This provides another medium of interaction for the user, and allows them to select a view of the data which best helps their absorption and understanding of the data.

I found the slider which I mentioned earlier in this blog, to be a very intuitive and interactive feature. I think that many company directors would enjoy using this tool because they can visualise how their company’s Key Performance Indicators (KPIs) trend over time.
Visually Power View’s interface reminded me of Microsoft Powerpoint. Another feature of this tool is that reports can be exported to Powerpoint, where they are presented as fully interactive reports.

There are some great interactive Power View demos available here:

http://blogs.msdn.com/b/microsoft_business_intelligence1/archive/2012/02/16/the-power-view-contest-is-here.aspx

A Windows Live account and Silverlight Version 5 are required to view the Power View demos.

CONCLUSION

Power View is not the first tool of its type to arrive in the market. However I think Microsoft has made great gains in making reports more interactive, enjoyable and easy to develop with this tool. It is a change in the mind-set of what reporting means.

Reporting no longer has to be a function carried out by the IT Department, creating a dry, static, and limited view of the data. It can now be about Business Users having fun while interacting with the data, and learning more about their business at the same time.

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With the release of SQL Server 2012, Reporting Services is establishing itself as a mature product with the introduction of several improvements rather than any substantial new functionality.

The key new features to Reporting Services 2012 include SharePoint integration configured as a shared service, Report Server Projects which can be opened in Visual Studio 2010, Word and Excel rendering for both 2003 and 2007-2010 formats, and Data Alerts.

SharePoint administrators will be pleased that the Reporting Services SharePoint integration is now configured as a service application using the SharePoint Central Administrator tool. This takes advantage of the SharePoint features including scale-out, claims-based authentication, and backup and recovery. But my favourite new feature of Reporting Services 2012 is Data Alerts.

DEALING WITH INFORMATION OVERLOAD

Information is great, but information overload isn’t. Managers can end up with hundreds of reports in their inbox but not have the time to view them all. They risk spending their time viewing reports which don’t need attention, while missing the critical reports which may require immediate action.

What if you could save time by only viewing the reports which showed the data you need to take action on? The new Data Alerts feature of SQL Server 2012 allows you to do this.

Scheduling reports has been part of previous versions of SQL Server Reporting Services and it allows users to subscribe to reports from SharePoint, and it is a convenient way of receiving reports on a regular basis. Sometimes,
though, it doesn’t make sense to receive reports regularly but only when the data in the report meets certain criteria. If you are receiving too many reports, you may miss the information most critical to your decision making.

Data Alerts are similar to schedules, but they only execute when the data meets the rules you have specified. This means you only get the email containing the report when the data meets the criteria you set. Maybe your sales have dropped below estimates, deliveries fallen behind schedule, or your revenue has exceeded your latest milestone (and you need to celebrate!).

Previously, in SQL Server Reporting Services 2008 you could mimic this behaviour with some workarounds. You could create a Data-Driven Subscription using some custom SQL code to only include the recipients when certain SQL conditions were met. You could also create the report in such a way that it would throw an error under certain circumstances, which would stop the report being sent. However, none of these approaches are easy for an end user to create and the responsibility typically fell on the IT team to create and manage subscriptions for everyone.

Data Alerts are created in SharePoint using an easy-to-use wizard which enables business users to add rules against the data from the report without any knowledge of SQL, MDX or any other programming language, or without modifying the report. The user can define how often they would like the data alert to run, who it will be sent to, and what the subject and description of the email will say. Users can also easily manage and execute their Data Alerts from the Data Alert Manager page from within SharePoint.

As Data Alerts will be sent out less frequently than scheduled reports, inbox sizes will be smaller. Administrators can also monitor and manage all data alerts set up in SharePoint.

With Data Alerts in SQL Server 2012, business users can now create alerts to monitor the information they need in order to make the correct decisions at the right time without overloading their inbox and without the overhead of reviewing unnecessary reports.

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I spend a lot of time in the intersection between two traditionally distinct but increasingly connected worlds: SharePoint and Business Intelligence (BI).

To me, business intelligence isn’t just about tables, graphs, and dashboards. It’s about decision making and providing ready access to the information required for making smart, informed decisions.

SharePoint, on the other hand, specialises in the bringing together of all sorts of information; and managing, classifying and collaborating on it with business area and subject matter experts.

It’s in the intersection of these two specialties that makes SharePoint Business Intelligence an ideal place to present your decision makers with the information they need to make effective and informed decisions.

In this post I’m going to cover the various forms of BI integration in SharePoint and when each is most effectively used.

Note: Most of these offerings are only available with the Enterprise Edition of SharePoint (in fact BI is one of the main compelling features of the SharePoint Enterprise license). That said, the Reporting Services capability is still provided under the SharePoint Standard license, and indeed SharePoint Foundation. For that reason I have mentioned the coverage alongside the respective technologies’ headings below.

### SQL Server Reporting Services [ALL EDITIONS]

SQL Server Reporting Services (SSRS) has been around since SQL Server 2000, but ever since SQL Server 2005 was released SSRS has been integrated into SharePoint so the reports themselves become documents in SharePoint document libraries.

This allows them to benefit from the following SharePoint capabilities:

- classification with business terms (e.g. Department, Business Unit, Report Owner, Reporting Frequency).
- participation in workflows (e.g. notification, approval).
- version control.
- placement on web pages as a web part or as part of a dashboard of information.

![Figure 1 - SSRS Reports in a SharePoint Document Library](image-url)
In terms of when to use SSRS reports it's worth noting that they are great at delivering a specific outcome with a specific experience. They can be highly interactive and highly capable with a very specific presentation format, but they can only answer the questions that the BA who designed them (or the developer who built them) had in mind. Through the use of parameters, groupings and expressions, the user can ask and answer a number of questions, but generally the flexibility is limited when compared to other alternatives.

For that reason, I often suggest to customers that they use SSRS reports when they have predefined data, a predefined layout, and a predefined interaction, or when they wish to prescribe how users can interact with the information. Your power bill is a good example of this – it always looks the same, it presents the same information in the same place each month (although the numbers seem to get ever-larger!) and there's no further information you can glean from it, apart from what the utility provider had in mind.

That said, SSRS reports are very effective and come with many data visualisation capabilities and two highly effective editing tools: Microsoft Visual Studio for the developer and Report Builder for the Business Analyst.

EXCEL SERVICES [ENTERPRISE EDITION ONLY]

With Excel Services we combine the number crunching and enhanced visualisation capabilities of Excel with the document management and web part sharing capabilities of SharePoint.

Excel sheets can be produced by analysts and business area experts – often in response to requests from the board or for annual reporting. Rather than living on the file system in an ever-increasing collection, these sheets can be managed, classified and collaborated in SharePoint document libraries and then brought to life on dashboards and web pages in SharePoint. Furthermore, they don't require the end user to be running Microsoft Office to view the report – the browser handles all that.

As with SSRS, however, the end user can only glean the information that the person who built it had in mind. By using parameters and groupings the user can interact with the data, although flexibility remains somewhat limited.

The true power of Excel Services lies in the hands of the Number Crunchers.
POWERPIVOT SERVICES [ENTERPRISE EDITION ONLY]

A free extension to Microsoft Excel 2010, PowerPivot allows users to consume information from a variety of sources (e.g. SQL Server, Microsoft Access, XML, text, and various OLEDB and ODBC sources). Users can link to data sources and define relationships between disparate sources, allowing pivot tables to be created against quite logically separate information.

PowerPivot Services can be compared to PowerPivot in the same way as Excel Services can be compared to Microsoft Excel. It allows the PowerPivot sheet to be surfaced in SharePoint and there are a number of visualisations and schedules in place to ensure data can be interacted with and refreshed appropriately.

I often describe PowerPivot as a beautiful way of bringing information together from a variety of sources – but with a warning: You are relying on the analyst to determine and model the associations between the various data sources and what those business rules ought to be. It is therefore at the ad-hoc end of the spectrum, so while a potentially very powerful analytic tool I often suggest it is best for analysts that:

» don’t have the luxury of a data warehouse and cubes, or wish to analyse data that is not yet in their data warehouse.

» understand the data and the relationships between the systems intricately.

» are aware of the potential to draw the wrong conclusions if they misalign their data.

If these concepts are respected, PowerPivot presents an incredibly fast and effective way to combine information from disparate sources.

*The true power of PowerPivot Services lies in the hands of the Business Analysts.*

![Figure 4 - PowerPivot Gallery in Carousel View](image)
PERFORMANCEPOINT SERVICES [ENTERPRISE EDITION ONLY]

Now we come to a technology that can start answering some of the 'Why?' questions and the 'What about this?' questions. PerformancePoint is all about creating Reports, Scorecards and Dashboards that consume data from data warehouses and cubes. Here we are standing on the shoulders of the data warehouse designers and all the hard work they have done in combining and transforming data into a 'single source of the truth.' Now we want to start surfacing the value of the aggregated information out to the business.

Business Analysts and Report Writers can create and deploy reports and scorecards using the provided Dashboard Designer tool, but with a difference. This time the end user can actually ask some of the questions that the designer may not have had in mind because they have the full power of the aggregated data behind them.

For example, a chart might present sales by region for 2011, but the user may wish to see a breakdown of the sales generated in the Northern Region by the products that were sold. This would have been quite difficult with SSRS or Excel unless the report or sheet designer was aware of this requirement and had built it in to the report or sheet. In PerformancePoint it’s a matter of right-clicking on the bar and selecting Drill down into Product. Additionally drill downs can be presented as a decomposition tree. All of these views and presentations can be selected and changed by the user, sorted, filtered and exported for further analysis.

VISIO SERVICES [ENTERPRISE EDITION ONLY]

Microsoft Visio has also taken up residence in SharePoint and has its own Service Application. The main benefits of this are:

» As discussed above, we can treat Visio documents in document libraries exposing them to all that SharePoint offers (i.e. versioning, metadata, collaboration, etc.).

» Users can view Visio documents without having Visio installed on their PC.

» Visio diagrams can be data-bound to data sources in the enterprise. This means, for example, that diagrams relating to a supply chain, network infrastructure, or floor plan can be coloured according to metrics in the business. Consider as another example your organisation’s strategic goals, coloured according to KPIs in the business that indicate progress toward these goals.

Visio also makes a foray into SharePoint territory as a visual design surface for SharePoint workflow and as a means to view the progress of a given workflow through its stages. But that’s probably a topic for another day.
The Chart Web part allows graphs to be inserted into web pages in very similar fashion to those of Excel.

There are many chart visualisations available, as well as many ways to connect to data (including SharePoint list data, line of business systems and Excel Services). There are some limitations with this: for example you have to graph columns of data against other columns. In particular you don't seem to be able to aggregate data in a chart (e.g. plotting a value against the number of times the value occurs) which is trivial in Excel. That said, there are a lot of advanced settings that can enable some quite compelling charts to be displayed.

PUTTING IT ALL TOGETHER: DASHBOARDS AND THE BI CENTRE

Once you have some or all of these pieces in place, it's a matter of deciding what tool is appropriate for what type of job and how you wish to present it to your Business Users. From individual reports for general use, graphs for the cafeteria and annual reports, through to targeted individual dashboards for managers and executives, there's something in there for everyone.

If you have the Enterprise Edition of SharePoint there's even a logical home for all the BI content: the Business Intelligence Centre Site Template. For other editions, it's just a matter of creating lists and libraries manually to hold the SSRS reports and data sources. You can then assemble and present the web pages and dashboards of information to your heart's content...

IN SUMMARY

There is a wealth of Business Intelligence integration potential in SharePoint, most of which really comes to life with the Enterprise Edition and the backing of a data warehouse, but without both (or either) of these, there are still some highly effective ways to surface your business data in SharePoint.

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When To Use What

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<th>Feature or behaviour</th>
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M = Manually configured
In this blog I will be providing a high-level overview of the high availability options in Microsoft SQL Server 2012, and how these compare with the solutions provided in earlier versions of SQL Server.

Before explaining the differences, I think it’s important to differentiate between high availability (HA) and disaster recovery (DR), terms which can often cause some confusion.

Essentially, a HA solution minimises or eliminates data loss and impact to the users. Depending on the whatever client service level agreements may be in place, the annual downtime can range from five minutes (99.999% availability) to three days (99% availability). To be able to achieve this goal, an automated failover is required which delivers little to no impact to the user.

Conversely, a DR solution requires manual intervention to achieve failover, and because of this delay there will typically be some level of data loss.

It’s worth noting that any self-respecting DBA would recommend using a combination of both HA and DR. Such a “belt and braces” approach ensures that in a highly unlikely situation of the HA solution collapsing, we still have a DR instance of SQL Server to fall back on.

Below is an overview of the current high availability features available in Microsoft SQL Server 2012, including two tried and tested options (Clustering and Mirroring) that have been available in past releases in SQL Server, and a completely new feature (AlwaysOn).

CLUSTERING

First introduced in SQL Server 6.5, clustering has been around for many years and has progressively improved.

The main advantage of clustering is that it can recover from either a software or hardware failure. The failover is seamless to the application and, in the case of a failover cluster, only one SQL Server license is required.

The downside of clustering is that shared storage is required; this can be costly and only single database copies exist – which can be considered a point of failure.

MIRRORING

Mirroring was introduced in SQL Server 2005 and has proven to be a great high availability solution. Mirroring has three different operating modes: High Availability, High Performance and High Safety.

» High Availability: Uses a witness server to achieve a quick automatic failover between the principal and mirrored SQL Server. All transactions are committed to both the mirror server and the principal server (synchronous-commit) ensuring there is no data loss. There are costs to achieving these benefits: performance overheads are incurred for the application, there are high-speed network requirements and there can be geographical restrictions.

» High Performance: Does not have a witness server and only has manual failover. All transactions are committed on the principal server before transferring to the mirror (asynchronous-commit), while performance, overall, is not affected. It is possible to lose transactions in the event of a failover. This approach is ideal for DR.
» High Safety: Not recommended for normal operations, this option should only be used if replacing the witness server as it prevents any new connection to the mirrored databases.

» The downside of mirroring is that three SQL Servers are required for the principal, mirror and witness. While the witness server can be run using SQL Server Express, the other two servers will require SQL Server licenses. The mirror SQL Server is also unusable when the databases are in a restoring state.

SQL SERVER ALWAYSON

AlwaysOn is the new integrated HA solution for SQL Server 2012. AlwaysOn consists of two features: AlwaysOn Availability Groups and AlwaysOn Failover Cluster.

AlwaysOn Availability Groups is database mirroring on steroids, providing flexibility in terms of database failover as well as zero data loss. Availability Groups use Windows failover clustering and support both shared and non-shared storage. Databases are placed into availability groups; multiple availability groups can be created allowing a DBA to separate the databases by client or by application. Each of the availability groups can be added to a replica; SQL Server 2012 allows one primary replica and up to four secondary replicas. The advantage is not just database redundancy, but the secondary replicas can be used for executing reporting and other read-only operations (database backups included). The limit to the number of replicas that can have synchronous-commit and therefore automatic failover is two. The number of replicas that can have asynchronous-commit and manual failover is also limited to two.

AlwaysOn Failover Cluster Instances (FCIs) is, as the name suggests, failover clustering with extras. The new features available in FCI are as follows:

» Multi-Subnet Clustering: This is new to SQL Server and allows clusters to be geographically dispersed (otherwise called ‘stretch clusters’) without the need for shared storage. Data is replicated between storage devices on multiple subnets, delivering a “belt and braces” solution that ticking both boxes for HA and DR.

» TempDB on Local Disk: TempDB generates some of the highest disk I/O, and the ability to move TempDB on to a local disk will certainly improve performance.

» Flexible Failover Policy: Eliminates the issue of false failover by allowing you to choose what failure conditions trigger failovers.

It’s also worth noting that the FCI can also be used with Availability Groups, as long as the Availability Groups have shared storage and manual failover.

Operating System Support for SQL Server 2012 Deployment

Windows Server Core was first released with Windows Server 2008, however earlier versions of SQL Server were not compatible with Windows Core; this has changed with the release of SQL Server 2012.

The advantage of Server Core is that it’s a minimal deployment of Windows, which dramatically reduces patching and potential planned downtime (up to 60%). The attack surface is also reduced which makes the server more secure. Only a subset of SQL Server’s features are available on Windows Core. These include:

» Database Engine Services

» SQL Server Replication

» Full Test Search

» Analysis Services

» Client Tools Connectivity

» Integration Services

The additional SQL Server features can only be used by remote connection to the SQL Server Core instance.
SUMMARY

Microsoft has significant enhanced high availability in SQL Server 2012.

Historically, a general rule with high availability solutions is that the more uptime you require, the greater the cost. This rule still applies in SQL Server 2012, as the AlwaysOn feature is only available in the Enterprise Edition of SQL Server 2012.

With SQL Server 2012 having only recently been released, it’s still too early to see if they are any cost savings in adopting the SQL Server AlwaysOn feature for clients with small to medium sized SQL Servers. Even though each replica can be used as a read-only database, a production SQL Server license is still needed. However, AlwaysOn does give the DBA the ability to achieve a 99.999% uptime benchmark straight out of the box and that in itself is a cost saving.

The failover clustering option offered by the Standard Edition remains the same as SQL Server 2008 R2 with the advantage of running on Windows Server Core Edition; to me is an ideal cost effective HA solution.

Finally, I would also recommend using the Server Core Edition for those clients that have replicated SQL databases in the DMZ.

Overall the SQL 2012 HA features provides DBAs with significantly more flexibility and stability in implementing a better-fitted solution that can meet clients’ needs while also requiring less support and maintenance in the long-term.

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SQL Server Integration Services (SSIS) is another aspect of SQL Server that has been overhauled in SQL Server 2012.

Because SSIS is a development tool, and the updates are mostly of a technical nature, trying to explain their business value is quite challenging. Putting it simply, the main value to business is that with the updates, development will be easier and therefore faster.

I will focus on a few of the development improvements about which I’m the most excited.

**VISUAL STUDIO 2010**

Business Intelligence Development Studio (BIDS) has been replaced with SQL Server Data Tools, which uses the core of Visual Studio 2010. This does not just apply to SSIS but the whole BI development environment. This is due to Microsoft’s internal realignment of their internal product delivery cycles which should help reduce the mismatch between functionality in related tools. This makes deployments much simpler and integration with Team Foundation Server 2010 a lot smoother.

**ABILITY TO DEBUG SCRIPT TASKS**

In previous versions of SQL Server, you had the ability to debug Script Components but not Script Tasks. With the release of SQL Server 2012, this is no longer the case: you can forget about having to output to the console to try and figure out where exactly your code is failing.

**CHANGE DATA CAPTURE**

Although Change Data Capture (CDC) is not new to SQL Server, there are now CDC Tasks and Components within SSIS that make it easier to implement.

**UNDO AND REDO**

At long last you are now able to undo or redo any actions – such as bringing back the data flow that you accidently deleted – without having to reload the whole project. In my opinion this improvement alone makes it worth upgrading!

**FLAT FILE SOURCE IMPROVEMENTS**

Two great additions to SQL Server 2012 that will solve a lot of headaches when importing data from flat files are the support for varying numbers of columns and embedded text qualifiers.

**PROJECT CONNECTION MANAGERS**

Gone are the days where you had to recreate connections to your source and destination within each SSIS package. Connections can now be set up at a project level which can then be shared within the packages.
COLUMN MAPPINGS

In SQL Server 2012, SSIS is a lot smarter about how it deals with column mappings and now uses the column names instead of the lineage ID. This means that if you decide to recreate your data source task, you do not have to remap all the columns as was the case in the past. SQL Server 2012 also comes with a Resolve Column Reference Editor which allows you to link unmapped output columns to unmapped input columns across the whole execution tree; in the past this had to be done from task to task.

PARAMETER HANDLING

Parameters are a new addition to SSIS and are very useful. In the past you had to use configurations which could only be assigned at a package level. Parameters can now be set at both a package and project level. You can assign three different types of values to parameters, namely Design default, Server default and Execution.

There are quite a few more additions to SSIS (including its built-in reporting capabilities, improvements to the user interface, and integration with Data Quality Services), but the features I have focused on in this post are improvements to issues that I have frequently come across on previous projects. I’m sure these improvements and additions to SSIS will be greatly appreciated by the industry.

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The security and management enhancements included in Microsoft SQL Server 2012 offer some small but significant improvements over those included in SQL Server 2008 R2.

In this blog, I will focus on the improvements that I believe will deliver the most benefits, based on experiences I have had with SQL Server in the past.

CONTAINED DATABASES

Microsoft SQL Server 2012 includes a new feature called the Contained Database. Had this feature been available in earlier versions of SQL Server, it would have saved me a considerable amount of time when I was moving databases between instances, during development and deployment.

With a Contained Database, login information is stored directly in the User Database rather than the Master Database. This means that when the database is moved to another instance, logins do not have to be deleted and then recreated. Not only that, but the task of having to update user SIDs can also be avoided.

SQL Server 2012’s Contained Database will create the temp table within the scope of the Contained Database. This feature means avoiding the time consuming work of moving a database to another instance, making the required adjustments to get the users working correctly, and having everything looking like it is ready to go, only to find that one is getting collation conflicts due to this new instance having a different collation to the database that has just been moved.

This feature doesn’t require that you set the database compatibility to the latest version because it is supported back to SQL Server 2005. Given that a clear boundary is established between the Contained Database and the SQL Server instance, it may be a useful feature for simulating a cloud environment.

While this new feature has some great benefits, including those mentioned, it still has some way to go before it is ideal. The database can only be considered Partially-Contained, as the database can still have server-level logins. The authentication of logins is more complicated, but this is a price I’m happy to pay for the benefits it delivers. Overall I believe it is a positive step in the right direction.

DEFAULT SCHEMA FOR GROUPS

With previous versions of SQL Server, you could define a default schema for a user. Now with SQL Server 2012 default schemas can be created for Windows Groups. This helps reduce the administrative nightmare of having to manage large numbers of schemas, or even if you are not an overly big user of schemas, being faced with the headache of having to remove them.

Like most of us, I am a creature of habit, and one of these habits is explicitly stating the schema when I create tables. I also explicitly reference the schema in queries, views, functions and stored procedures. But being able to assign a default schema to a group is not as necessary as before, because the administrator does not have to set the default schema for each and every user.

USER-DEFINED SERVER ROLES

With SQL Server 2008 R2, and earlier versions of SQL Server, we could create database roles and assign permissions to them.
However these were restricted to fixed roles at a server level. If one of the nine fixed roles didn’t match the security requirements, then permissions had to be signed at an individual level. To keep these in sync quickly became an administrative nightmare, especially when a server-level permission had to be granted to a large number of users.

A major improvement has been made with security management in SQL Server 2012. We are now able to create user defined server roles and assign permissions to them. This can be done either through SQL Server Management Studio (SSMS), or by using TRANSACT-SQL with the GRANT SERVER ROLE, ALTER SERVER ROLE and DROP SERVER ROLE commands.

As a result of this new feature, SQL Server management has become easier and more secure. With the DBA now having the ability to create server level roles, the security requirements are specific to the security requirement.

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The use of OLAP capabilities by Microsoft customers is among the highest when compared to other vendors, largely due to the success and adoption of Microsoft SQL Server Analysis Services, bundled with Microsoft SQL Server. With the release of SQL Server 2012, Microsoft is adding even more benefits for OLAP users.

In addition to the Multidimensional model that has been available in previous releases of SQL Server, SQL Server 2012 provides the ability to develop solutions using the Tabular model, a relational model which enables in-memory analytics.

With the addition of the Tabular model, the Unified Dimensional Model that was introduced in SQL Server 2005 is now replaced by the Business Intelligence Semantic Model (BISM), which had been labelled as “one model for all user experiences – reporting, analytics, scorecards, dashboards and custom applications.”

Users now have the choice of developing solutions in either the multidimensional model, which is great for analysing data, but can be complicated to set up initially; or the tabular model, which is easier to understand because of its relational model.

AN OVERVIEW OF THE TABULAR MODEL

The concepts behind the tabular model were originally introduced in PowerPivot, a free add-in for Microsoft Excel 2010.

With the release of SQL Server 2012, the model has been further enhanced, and users can now develop tabular models using SQL Server Data Tools (which replaces the Business Intelligence Development Studio previous versions of SQL Server) for consumption by OLAP client tools such as Excel and PowerView, another SQL Server 2012 addition that can only report off tabular models at this stage.

Tabular models use the xVelocity engine, previously known as VertiPaq, which is an in-memory column store engine which can store billions of rows of data in memory and produce rapid response times and high data compression rates.

Tabular models also bridge the gap between business users and developers. Business users can develop a model in PowerPivot which can then become the basis of an Analysis Services tabular model application – they don’t need to resort to software development, which may have been the case in the past. Users that are familiar with relational database structures will also find developing with the tabular models much easier than the multidimensional model.

Although it is still strongly recommended to have a data warehouse as a source for tabular model cubes, the tabular model can use a variety of data sources including tables, Microsoft Excel spread sheets, SQL Azure data and even multidimensional cubes. This makes it ideal for fast prototyping exercises but also enables users to enrich data in the data warehouse using data from external sources.

There is also no need to first perform ETL (Extract, Transform and Load) procedures on these sources before using them, which can often be a lengthy and time consuming process.
MULTIDIMENSIONAL MODEL EVOLUTION

In SQL Server 2012, there aren’t any major changes or additions to functionality in the multidimensional model; the improvements that have been introduced are mainly focused on improving performance, reliability and scalability. Development of projects is now performed using the SQL Server Data Tools, which are based on Visual Studio 2010 and replace the Business Intelligence Development Studio, provided in earlier versions of SQL Server.

Comparing the two models, the tabular model should not be seen as a replacement of the multidimensional model, but rather as an addition to an already powerful toolset. Each model has its own advantages and it will be up to the business to decide which model suits their needs – the best solution might even be a combination of both models.

By simplifying the way businesses are able to access, model and analyse data in SQL Server 2012 it brings users closer to a self service BI model in which they are able to get the right information at the right time. With the increased focus on data within organisations of all sizes, these tools empower users – and their organisations – to better understand the data with which they work, and derive even more value from their software investments.

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For developers, the release of SQL Server 2012 provides both new and familiar capabilities. More specifically, in SQL Server 2012 there is a new development tool, another tool has been replaced with a new one, while the remaining tools have largely been left untouched.

First, let’s take a look at the new tool. Power View is a new powerful, interactive report format which provides business users with ad hoc reporting capabilities for the first time; capabilities that were previously unavailable in Microsoft SQL Server itself.

This developer tool incorporates elements of both Report Builder and Microsoft Excel, providing the user with an intuitive and familiar design experience. Power View reports are created, edited and developed from a SharePoint PowerPivot Gallery. The report designer opens as a Silverlight application within the browser and provides a simple, yet powerful, interface to allow the user to create a report that incorporates text boxes, slicers, tables, matrices and charts.

The Power View report designer makes good use of the screen real estate with sidebars on the left and right of the report canvas, giving the developer easy access to the attributes from the data source, the list of views in the current Power View report while the Microsoft ribbon provides the formatting, layout and styling options that any Excel user will be familiar with. The report uses live data as it is being created, providing immediate feedback – one doesn’t have to preview on a separate screen, allowing for fast development.

Power View is a great addition to Self Service Business Intelligence in SQL 2012, allowing non-IT users to create impressive looking reports and export them to SharePoint or PowerPoint where they can still remain interactive.
THE REPLACEMENT

SQL Server Data Tools (SSDT) replaces the Business Intelligence Development Studio (BIDS) as the developer tool for creating solutions for Integration Services, Analysis Services and Reporting Services projects.

Using the Visual Studio 2010 shell, this is convenient for both .NET Developers and Business Intelligence Developers as it allows database changes to be made within the shell. It also includes a schema compare tool, T-SQL debugging, and can be integrated with Visual Studio 2010 for enhanced team development, source control and change tracking. SSDT can connect to SQL Server 2005, 2008, 2012 and SQL Azure databases.

EVOLUTION, NOT REVOLUTION

The remaining development tools in SQL Server 2012 have received minor updates.

The user interface is untouched for Analysis Services (SSAS) and Reporting Services (SSRS) projects, but there are some changes with the development layout of Integration Services (SSIS) projects. The new SSIS Parameters tab is positioned alongside the Control Flow and Data Flow tabs, allowing for easy configuration of the package parameters.

The SSIS Toolbox sidebar has also had a bit of an overhaul, with the addition of two new sections: Favourites and Common. The tools in these sections are customisable, allowing the developer to choose which tools belong in these sections, which I think is a nice touch, allowing developers to personalise their development environment.

Likewise, SQL Server Management Studio (SSMS) is mostly unchanged. There are some formatting and font changes, but someone who is used to SSMS 2008 won’t notice many changes.

Report Builder still remains at version 3, with no new features being added in SQL Server 2012. It is still easy to learn and use but still offers most of the functionality of a SSRS report in the new SSDT environment.

In summary, most of the tools have stayed the same, which is good for consistency and training budgets. The SSDT does provide some advantages to BI and .NET developers, but the experience will be quite similar overall. I find the new Power View tool the most exciting, as it provides a familiar user experience while allowing quite a different style of report than any other Microsoft has in the past.

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With columnstore indexes, Microsoft has entered the world of column-oriented database management systems, which offer better performance for business intelligence (BI)-related requests.

Columnstore indexes are, as the name implies, storing of data in a column-centric manner rather than, the traditional row-centric form. The row-centric form makes sense for transactional data: for example, displaying all invoices for a customer for a date range. This will be a small number of data rows but will include most columns from each row.

In the BI/data warehousing world the style of query changes dramatically. The more common request is something along the lines of "get me a few columns of data, filtered by other columns from all my data." Typically, this will return a large number of rows, but only requires a subset of all columns and will not have as predictable groupings or filtering options. In essence, the difference between the two methods can be thought of a horizontal versus vertical data retrieval.

When used in the right context, columnstore indexes can result in a number of benefits; in this post we look to detail some of them.

**REDUCED DEVELOPMENT COSTS**

Incorporating columnstore indexes can greatly reduce development costs. We can realise many of the benefits of Analysis Services and cubes without actually building or deploying cubes. We can avoid building and maintaining many pre-built aggregate tables that would previously have been required to provide a respectable response time. If a business has an existing data warehouse, they can add columnstore indexes with no real changes to their existing warehouse and therefore with very little effort.

**REAL-TIME DATA USING COLUMNSTORE INDEXES**

Since adding a columnstore index to a table makes the table read only, we cannot think of columnstore indexed tables as standard SQL Server tables. But, since they are still SQL tables, we can have a similar table (possessing the same columns) as the table we write or update data back to, and can then "union all" the two tables. This gives the user a single table that is both very fast for BI-style queries and contains real-time, up to the minute data. This not completely free, as we will then need to run periodic processes to move data from our real-time table into the columnstore table to keep the real-time table small and performance fast.

**REASONABLE ROLAP A REALITY**

With the use of Columnstore Indexes ROLAP (Relational Online Analytical Processing) performance can easily be improved, making ROLAP a reasonable data warehouse architecture.

**PERFORMANCE GAINS**

Microsoft tests claim speed increases of 500-fold with very large data sets, even reducing this by a factor of ten gives 50-fold speed increases, taking a two minute query down to 2.4 seconds, or a 50 minute query to one minute. This shows that even with a pessimistic improvement, what used to be painfully slow can now be instantaneous, and what used to be unworkable can be quite acceptable.

The relative speed gains vary depending on available memory, and whether the columnstore working set fits into memory compared to the row store data set. The whole point of columnstore indexes is that a large (as measured by number of rows) result set will require less memory, due to not needing every column. The upshot: configuring servers with large amounts of memory will maximise the performance gains you achieve when setting up columnstore indexes.
That said, there are cases when columnstore indexes won’t improve performance. But, remembering they are only indexes and the rest of SQL Server still exists around them, the query engine can choose to use (an old school) b-tree or heap index when it identifies this would give better performance. And, of course, the developer can force this behaviour with query hints.

But if you have a star schema database (which is what the column indexes are designed for) and are not doing OLTP-style queries you can, with very little effort, get substantial performance gains by using columnstore indexes.

**SUMMARY**

Columnstore indexes are blurring the lines between Analysis Services cubes and SQL Server databases. On the one hand, this enables the data analyst to explore the data with cube performance and the familiarity of SQL; on the other, this allows the data warehouse developer to gain cube-level performance at very little development cost.

This, coupled with the comparative ease of implementing real-time BI and the ability for the development team to stay in the familiar SQL world, will see the rapid adoption of columnstore indexes into the BI and data-warehouse world.

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Microsoft SQL Server 2012 delivers numerous enhancements, while the core capabilities of this remain as solid as ever.

If you would like more information on any of the topics in this ebook, please feel free to contact us to have a discussion and to better understand how SQL Server 2012 can help your organisation achieve its business outcomes.