Reference Architecture User Guide

For Environments deployed on Amazon Web Services
Abstract

Amazon Web Services (AWS) provides a complete set of services and tools for deploying MicroStrategy Analytics Enterprise, including all of its administrator features, on its highly reliable and secure cloud infrastructure platform. MicroStrategy Analytics Enterprise is the next generation of MicroStrategy’s core enterprise analytics software platform. It combines the productivity of self-service visual data discovery with the security, scalability, and governance features of production-grade Business Intelligence. This best-of-both-worlds approach bridges the gap between fast, beautiful, interactive visual analytics and powerful, large-scale production business intelligence. AWS provides MicroStrategy on a monthly subscription basis, giving you no long term commitment and little risk.

This white paper is targeted to IT decision makers and administrators who are looking for a seamless way to deploy an enterprise platform. After reading this you should have a good understanding of the requirements to set up and deploy all components of MicroStrategy.

Introduction

A critical trend that is clearly influencing business is the migration of traditional IT client-server solutions to the Cloud. As Cloud technology matures, it is inevitable that a large number of companies will offload some aspects of their BI applications from an on-premises solution to a public or private cloud. MicroStrategy’s Analytics platform is designed to be deployed seamlessly in the Cloud, enabling IT departments to create hosted applications without losing any crucial functionality. A MicroStrategy based application, even when it’s hosted on a cloud, will provide business users with all BI functionality through mobile devices or web browsers.

A typical deployment of the MicroStrategy Analytics Enterprise Platform on AWS includes:

- MicroStrategy Analytics Enterprise
- MicroStrategy Metadata Database
- EC2, EBS
- Redshift or Relational Database (RDS or On-premises)

Depending on your environment, you may run all or some of these components on Amazon’s EC2. MicroStrategy’s AWS marketplace offering includes the EC2 with Full MicroStrategy Analytics Platforms on Microsoft Windows Server 2012 with SQL Server 2012 Standard Edition. By default the MicroStrategy Metadata is stored on the local SQL Server instance.

Amazon EC2’s simple web service interface allows you to obtain and configure capacity with minimal friction. It provides complete control of your computing resources and lets you run on Amazon’s proven computing environment. Amazon EC2
reduces the time required to obtain and boot new server instances to minutes, allowing you to quickly scale capacity, both up and down, as your computing requirements change.

Amazon Elastic Block Store (Amazon EBS) provides a persistent block level storage volumes for use with Amazon EC2 instances in the AWS Cloud. Users are allowed to attach or detach these storage volumes onto any amazon EC2 instance.

Amazon Redshift is a fast, managed, petabyte-scale data warehouse service that fully integrates with the MicroStrategy Analytics Platform.

Amazon Relational Database Service (Amazon RDS) is a web service that makes it easy to set up, operate, and scale a relational database in the cloud. MicroStrategy Analytics Enterprise seamlessly connects to all the Amazon RDS’s; MySQL, PostgreSQL, Oracle and SQL Server.

MicroStrategy Analytics Enterprise connects to a variety of other databases including, but not limited to: Amazon Redshift, Oracle, Teradata, SQL Server, IBM DB2, Netezza, ParAccel, salesforce.com and more. For a full list, please visit https://resource.microstrategy.com/support/releasenote/MSTRAnalytics/ReleaseNotes/ReadAll_8.htm

By default, the MicroStrategy Metadata resides in the local SQL server instance. You have the option to connect to an existing metadata or create a new metadata. All you need to do is create a new database in the database management system of your choice and then use our Connectivity Wizard and Configuration Wizard to connect to and configure your metadata.

For a full list of certified or supported databases to host your metadata’s please visit https://resource.microstrategy.com/support/releasenote/MSTRAnalytics/ReleaseNotes/ReadAll_8.htm

Selecting your Environment and Creating your Infrastructure

MicroStrategy offers six different user groups and four different instances sizes per user group (some user groups may have fewer instance types).

User Bundles

25 users: https://aws.amazon.com/marketplace/pp/B00JK1ZEK6
50 users: https://aws.amazon.com/marketplace/pp/B00JK1ZFLE
100 users: https://aws.amazon.com/marketplace/pp/B00JK1ZD9S
250 users: https://aws.amazon.com/marketplace/pp/B00LID3EY
500 users: https://aws.amazon.com/marketplace/pp/B00LID3D9I
1000 users: https://aws.amazon.com/marketplace/pp/B00LID3BBI

Instance types

- Small: High Memory XL, 17.1 GiB Memory, 2 vCPU, 6.5 ECU, 64-bit. The smallest instance offered. Good for light-use instances or implementations where SQL Server will be used very little or not at all for data hosting.
- Medium: High Memory 2XL, 32.4 GiB Memory, 4 vCPU, 13 ECU, 64-bit. Medium sized instance good for moderate use environments that require some in-memory data caching or moderate use of SQL Server for data hosting. Has 2x the memory and CPU of the small environment.
- Large: High Memory 4XL, 64.8 GiB Memory, 8 vCPU, 26 ECU, 64-bit. Large environment for heavy use, significant in-memory data caching and use of SQL Server for data hosting or ETL. Has double the memory and CPU of the medium sized environment. (not available for 500 and 1000 users.)
- Extra Large: High Memory 8XL, 244 GiB Memory, 32 vCPU, 88 ECU, 64-bit The largest environment offered. Great for applications where significant amounts of data are required to be loaded into memory along with use of SQL Server for data hosting and/or ETL work. 3.5 times the memory of the large environment and 4 times the CPU. (not available for 500 and 1000 users.)

For more information on instance specifications, please visit http://aws.amazon.com/ec2/instance-types/
Regions and Availability Zones
Amazon EC2 is hosted in multiple locations world-wide. These locations are composed of regions and Availability Zones. Each region is a separate geographic area. Each region has multiple, isolated locations known as Availability Zones. Amazon EC2 provides you the ability to place resources, such as instances, and data in multiple locations. Resources aren't replicated across regions unless you do so specifically.

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ap-northeast-1</td>
<td>Asia Pacific (Tokyo) Region</td>
</tr>
<tr>
<td>ap-southeast-1</td>
<td>Asia Pacific (Singapore) Region</td>
</tr>
<tr>
<td>ap-southeast-2</td>
<td>Asia Pacific (Sydney) Region</td>
</tr>
<tr>
<td>eu-west-1</td>
<td>EU (Ireland) Region</td>
</tr>
<tr>
<td>za-east-1</td>
<td>South America (Sao Paulo) Region</td>
</tr>
<tr>
<td>us-east-1</td>
<td>US East (Northern Virginia) Region</td>
</tr>
<tr>
<td>us-west-1</td>
<td>US West (Northern California) Region</td>
</tr>
<tr>
<td>us-west-2</td>
<td>US West (Oregon) Region</td>
</tr>
</tbody>
</table>

EC2 Instance Type
Instance types comprise varying combinations of CPU, memory, storage, and networking capacity and give you the flexibility to choose the appropriate mix of resources for your environment.

VPC
Amazon VPC lets you provision a logically isolated section of the Amazon Web Services (AWS) Cloud where you can launch AWS resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own IP address range, creation of subnets, and configuration of route tables and network gateways.

Security Group
MicroStrategy comes with a default security group consisting of the connections below. Customers may select the default or create your own. The security group acts as a firewall that controls the traffic allowed that is allowed to the instance.

<table>
<thead>
<tr>
<th>Type</th>
<th>Protocol</th>
<th>Port Range</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDP</td>
<td>TCP</td>
<td>3389</td>
<td>0.0.0.0/0</td>
</tr>
<tr>
<td>Custom TCP Rule</td>
<td>TCP</td>
<td>44440</td>
<td>0.0.0.0/0</td>
</tr>
<tr>
<td>HTTP</td>
<td>TCP</td>
<td>80</td>
<td>0.0.0.0/0</td>
</tr>
<tr>
<td>MS SQL</td>
<td>TCP</td>
<td>1433</td>
<td>0.0.0.0/0</td>
</tr>
<tr>
<td>Custom TCP Rule</td>
<td>TCP</td>
<td>34952</td>
<td>0.0.0.0/0</td>
</tr>
<tr>
<td>HTTPS</td>
<td>TCP</td>
<td>443</td>
<td>0.0.0.0/0</td>
</tr>
</tbody>
</table>

Key Pair
Amazon EC2 uses public–key cryptography to encrypt and decrypt login information. Public–key cryptography uses a public key to encrypt a piece of data, such as a password, then the recipient uses the private key to decrypt the data. The public and private keys are known as a key pair. To log in to your MicroStrategy instance, the user must create a key pair, specify the name of the key pair when you launch the instance, and provide the private key when you connect to the instance. Then the user may remote desktop into the EC2 with the IP address, Username and Password.

For more information on Key Pairs, please visit [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-key-pairs.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-key-pairs.html)

Setting up your MicroStrategy Environment
Connecting to your database
MicroStrategy supports many different databases. For a full list of databases, please visit https://resource.microstrategy.com/support/releasenote/MSTRAnalytics/ReleaseNotes/ReadAll_8.htm . In this document, we will focus on connecting to Amazon Redshift.

Amazon Redshift uses the PostgreSQL 8.0.2 driver which is already installed on your instance. MicroStrategy has a connectivity wizard that easily allows users to create the DSN connection to Redshift. After the ODBC connection is made through Connectivity wizard, the MicroStrategy Database Instance must be created. A Database Instance is a MicroStrategy object created in the MicroStrategy Developer desktop tool, it represents a connection to a data source. A Database Instance specifies data connection information, such as a data warehouse DSN, Login ID and password, and other data source specific information.

Configuring the MicroStrategy Metadata
MicroStrategy in AWS provides a pre-configured metadata along with sample data stored in the SQL Server instance selected pre-installed and configured for your environment. To re-configure the metadata or connect to a new metadata, MicroStrategy provides a Configuration Wizard to configure the metadata and point the intelligent server to the correct metadata.

User Security
Like most security architectures, the MicroStrategy security model is built around the concept of a user. To do anything useful with MicroStrategy, a user must log in to the system using a login ID and password. The user can then perform tasks such as creating objects or executing reports and documents, and can generally take advantage of all the other features of the MicroStrategy system. Each User has a set of privileges the administrator assigns them. Based on their different privileges, the users and user groups can perform different types of operations in the MicroStrategy system. If a user does not have a certain privilege, that user does not have access to that privilege’s functionality.

There are two types of users you can create for your MicroStrategy Environment; Windows users who can access the EC2 instance, and users who can log into MicroStrategy through any of the available MicroStrategy user interfaces.

To create users who can access the EC2 instance: http://windows.microsoft.com/en-us/windows/create-user-account#create-user-account=windows-7

Make sure to add the users to the remote desktop user group: http://technet.microsoft.com/en-us/library/cc758036(v=ws.10).aspx

MicroStrategy application users can be created in MicroStrategy Developer desktop tool and be assigned different privileges. To add or remove a privilege for a user or group, double click that user or group to open it in the user editor or group editor, select the Project Access category and select or clear the check boxes for the privilege for any projects you want the privilege to apply to.

Product Architecture
The MicroStrategy Analytics platform is built on one, unified, organically-developed architecture. To achieve the design tenets for Enterprise BI, the underlying architectural design establishes:

1. A single, unified object model to define and construct objects that represent any business.
2. An organic, platform of 17 distinct products that dynamically assemble, and re-assemble these objects in response to any business question or user action.

All platform products use object-oriented programming techniques of inheritance and encapsulation ensuring scalability and high performance.

The MicroStrategy object model is the genius of the MicroStrategy platform. The MicroStrategy metadata is the manifestation of the object model. The metadata contains the building blocks or objects necessary to represent an enterprise’s business. The
metadata stores these objects in a database for efficient re-use, manageability, and performance. The objects themselves are used to create new objects such as a report definition. Hence, if an object changes, every other object dependent on it also changes. This ensures consistency across business definitions, and actually minimizes the number of objects created, stored, and managed. What truly makes the MicroStrategy metadata unique is that it only stores these objects; it does not store a finished report complete with a static SQL statement. Because of this, the MicroStrategy metadata gives the MicroStrategy platform unparalleled analytical, functional, and administrative flexibility.

The MicroStrategy BI platform dynamically assembles the metadata objects to create reports, scorecards, dashboards, analyses, and alerts. The platform provides many styles of BI uniformly through a wide variety of user interfaces, including mobile phones, tablets, Web browsers, Enterprise Portals, Microsoft Office, E-mail, Microsoft Windows® workstations, network printers, and file servers. The MicroStrategy platform comprises of tightly integrated products that deliver unmatched functionality, power, control, and extensibility on enterprise-class technology.

<table>
<thead>
<tr>
<th>Architectural Functionality</th>
<th>MicroStrategy Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Applications with Transaction Write-back</td>
<td>Mobile, Intelligence Server, Report Services, Transaction Services</td>
</tr>
<tr>
<td>Reports, Scorecards, Dashboards, OLAP, Advanced, and Ad-Hoc Analysis, and Alerts and Proactive Notification</td>
<td>Intelligence Server, Web, Distribution Services, Report Services, OLAP Services</td>
</tr>
<tr>
<td>Business User Interactivity</td>
<td>Web, Office, Report Services, OLAP Services, Intelligence Server, Desktop</td>
</tr>
<tr>
<td>Batch Reporting</td>
<td>Distribution Services, Intelligence Server, Report Services, OLAP Services</td>
</tr>
<tr>
<td>Application Development (Metadata Object creation)</td>
<td>Architect, Desktop, Web, Intelligence Server</td>
</tr>
<tr>
<td>Administration</td>
<td>Command Manager, Enterprise Manager, Integrity Manager, Object Manager, Desktop, Intelligence Server</td>
</tr>
<tr>
<td>Integration With Other Applications</td>
<td>SDK, Office, Transaction Services</td>
</tr>
</tbody>
</table>

Every MicroStrategy BI application requires at a minimum:

3. Interface products to run reports and manipulate the results for investigative analysis: MicroStrategy Mobile, Web, Office, or Distribution Services

Depending on the application demands, any number of products can be used together to scale to large business user populations. For example, MicroStrategy Distribution Services can distribute reports directly to business users via E-mail who simply need dashboards or static reports and not the full interactivity of MicroStrategy Mobile or Web. MicroStrategy Office is particularly popular with finance departments who like to do all their work in Microsoft Excel.
Certainly mid to large BI environments would benefit from MicroStrategy’s administration products – Enterprise Manager, Command Manager, Integrity Manager, and Object Manager – to centrally monitor, and manage the entire business intelligence infrastructure. If the BI applications require sophisticated closed-loop, actionable BI reports, MicroStrategy Transaction Services lets business users initiate transactions with backend systems and write back to databases and web services. The products that comprise the MicroStrategy platform are briefly described next.

**MicroStrategy Intelligence Server**

MicroStrategy Intelligence Server™ is the architectural foundation of the MicroStrategy platform. As the central contact point to the metadata, Intelligence Server dynamically assembles the metadata objects to create optimized, multi-pass SQL queries for every major relational database, HiveQL queries for Hadoop distributions, and MDX queries for multidimensional data sources. Intelligence Server retrieves the data, performs any additional analytical calculations not available in the databases, formats the report, and delivers the reports to business users via MicroStrategy Mobile, Web, Office, Desktop, or Distribution Services.

Intelligence Server is a highly scalable, parallel-processing, self-tuning analytic server. Intelligence Server manages high performance interactions accessing terabytes of data by tens of thousands of users using in-memory Intelligent Cubes, caching, load balancing, resource prioritization, and connection pooling. It accesses and joins data from multiple data sources, such as data warehouses, operational databases, multidimensional (cube) databases, and even Web services and flat files. Intelligence Server also manages users, system security, data security, and user functionality access. A clustering option is available with Intelligence Server that increases scalability, and provides fault tolerance with automatic failover.

**MicroStrategy Web**

MicroStrategy Web™ provides a powerful and user-friendly environment for interactive analysis through any Web browser. Suitable for all levels of user sophistication from beginner to advanced, MicroStrategy Web contains report and dashboard viewing, formatting, exporting, pivoting, sorting, drilling, and ad hoc querying to WYSIWYG design and creation. Using advanced Web technology including xHTML, CSS, AJAX, Flash, and JavaScript, MicroStrategy Web delivers a highly interactive user experience spanning the full range of MicroStrategy functionality.
MicroStrategy Web accomplishes all of its functionality through a cookie-less, zero-footprint Web client without using ActiveX® or Java Applets resident in or downloaded to the Web browser. Thus, MicroStrategy Web works seamlessly through all standard Web firewalls making deployment straightforward and minimizing administration overhead.

MicroStrategy Web provides the Web interface using Active Server Pages (ASP) running Microsoft Internet Information Service (IIS) and using Java Server Pages (JSP) on either 32-bit or 64-bit processor computers running any supported application servers on any operating system.

MicroStrategy Mobile

MicroStrategy Mobile™ puts business reports, KPIs, documents, and dashboards in the hands of your employees and customers. MicroStrategy Mobile lets decision makers run an organization wherever they are and view business data on the iPad, iPhone, and Android smartphones and tablets in multi-touch tables, graphs, charts, visualizations, maps, documents, and dynamic dashboards. It securely connects to a MicroStrategy Mobile Server which manages the transmission of interactive reports, documents, and dashboards to the Mobile client applications.

MicroStrategy’s platform for mobile apps enables organizations to build a wide variety of essential mobile apps:

- Business intelligence – view corporate data through interactive, visual dashboards
- Transactions – enact data-driven decisions from BI data, or input information for surveys and operational systems
- Multimedia content – distribute presentations, brochures, and videos to employees, customers, and partners

MicroStrategy Report Services

MicroStrategy Report Services™ is a plug-n-play extension to Intelligence Server providing pixel-perfect, print-perfect, and page-perfect app, dashboard, visual analysis, and report design and distribution through MicroStrategy Mobile, Web, Office, Desktop, and Distribution Services. Report Services delivers the most exacting report formatting for any of the following:

- Mobile Applications – highly interactive apps that deliver business intelligence, transactions, and multimedia content to the mobile workforce
- Dashboards and Scorecards – highly visual, interactive, pixel-perfect displays that provide “at-a-glance” view of the enterprise using gauges, dials, KPIs, and visualizations
- Visual Insight – visual exploration of data with a large library of interchangeable visualizations and speed of-thought filtering to help you spot outliers and anomalies in your data quickly
- Enterprise Reports – classic production reporting requiring print-perfect layout with data organized and aggregated into hierarchies or bands of increasing finer detail
- Invoices and Statements – page-perfect layouts designed for billing applications and statutory reporting
- Business Reports – any report format, usually combining graphs, detail data, and often explanatory text, used to describe business performance

Report Services reports, dashboards, scorecards, analyses, invoices, statements, and business reports have fully interactive analytical, WYSIWYG design, and transactional capabilities over a zero-footprint Web browser and on Mobile devices.

MicroStrategy OLAP Services

MicroStrategy OLAP Services™ is a plug-n-play extension to Intelligence Server that adds in-memory data functionality to the standard ROLAP functionality of the MicroStrategy BI platform. OLAP Services creates and manages Intelligent Cubes, a multi-dimensional cache structure that speeds up access to the data your users use most. OLAP Services exposes the report objects (metrics and attributes) in the Intelligent Cube so that analysts can manipulate report objects, create derived metrics, group rows, and modify filter criteria.

One frequent user action is to drill down into the data. With OLAP Services, the Intelligent Cubes can contain attributes commonly requested via drilling. This greatly enhances the report performance because OLAP
Services can return results without querying the data warehouse. OLAP Services allows seamless drill through to the data warehouse to investigate the full breadth and depth of the corporate data assets. Ad-hoc reports and drilling dynamically use Intelligent Cubes wherever possible, maneuvering between in-memory cubes and the data warehouse to retrieve the information requested.

MicroStrategy Transaction Services

MicroStrategy Transaction Services™ is a plug-in extension to Intelligence Server that provides write-back capabilities from Report Services documents. The predominant use is in Mobile BI Apps, and it also works from Web-based DHTML documents. It writes-back to ERP and other operational systems via Web services using XQuery; and to databases via freeform SQL.

MicroStrategy Transaction Services provides users the flexibility of designing their own freeform Transaction reports and hand-picking the data to perform each transaction. MicroStrategy Transaction Services allows users to perform any of the following three actions: update data, insert new information, or delete existing records.

MicroStrategy Distribution Services

MicroStrategy Distribution Services™ is a plug-and-play add-on to Intelligence Server that proactively distributes personalized reports and alerts. In contrast to MicroStrategy Web’s interactive BI environment, Distribution Services delivers interactive Flash dashboards and static reports via E-mail, folders, or printers. Often, the largest number of users simply needs to receive this type of corporate content. Those reports, however, must be sent automatically based on one or more of the following:

- A time schedule such as every Monday morning at 8 a.m.
- An event such as a completed database load
- A trigger such as business metric tracking outside an acceptable range

Serving these large user communities, Distribution Services can deliver many thousands of messages per hour. Because it is critical these users receive this information without having to request it, Distribution Services automatically sends those reports to a variety of devices, including E-mail, file servers, and networked printers. Business users can also subscribe to receive Distribution Services’ proactive notification and alerts from the MicroStrategy Web interface. The proactive notifications and alerts Distribution Services sends include the precise report formatting for the desired output device. The report can also include multiple attachments including:

- Interactive dashboards in Flash format
- Enterprise documents or scorecards in PDF format
- MicroStrategy reports in Microsoft Excel workbooks
- Large datasets in CSV format
- Zip files containing any of the above

MicroStrategy Office

MicroStrategy Office™ delivers MicroStrategy reporting and analysis to Microsoft Excel, PowerPoint, and Word using Web services. This is ideal for business users who want to use Microsoft Office for their BI interface. Excel, PowerPoint, and Word become live repositories of MicroStrategy scorecards, reports, and charts, all of which are continually linked back to Intelligence Server ensuring 100% data consistency across the enterprise.

Additionally, MicroStrategy Office offers outstanding offline analysis capabilities. Microsoft Office is the most natural place for business users to format, sort, and analyze data disconnected from a network. Once back online, MicroStrategy Office refreshes the files with the latest data with just one mouse click while preserving the analytical and formatting work.

MicroStrategy Developer

MicroStrategy Developer is an advanced development and analysis interface for creating BI applications intended primarily for analysts, power users, and application developers. Developer builds the metadata objects used for designing reports,
scorecards, and dashboards. It employs editors and wizards to speed-up application development without the need for coding. Together with MicroStrategy Architect, they are the key development tools required for create BI applications.

Developer is an equally powerful BI interface for the most advanced analysts who aggressively investigate the data to uncover valuable insight. Developer provides a full range of analytical functionality for reporting, data mining and predictive analysis, statistical analysis, financial analysis, mathematical analysis, set analysis, and time series analysis. Developer offers the rich Windows interface and power of a thick-client, workstation environment.

**MicroStrategy Architect**

MicroStrategy Architect™ is a rapid development tool that creates the metadata objects that map the physical structure of a database to a logical, object-oriented model of the business. Architect employs a graphical interface and editors to link the enterprise's business model to the physical database tables and columns.

The abstraction of the physical database into a logical business model makes subsequent report design using Desktop extremely fast and intuitive. The logical business model abstraction also provides a layer of isolation between the physical database and the reporting applications allowing each to change independently of the other as they evolve over time. Moreover, the object-oriented nature of the metadata repository allows all changes in the logical model to propagate immediately and transparently to all dependent objects.

The abstraction of physical models to logical models allows MicroStrategy-based analytical applications to be ported across different data warehouse platforms. This has profound benefits to analytic application developers who want their applications to be easily connected to any existing data warehouse.

MicroStrategy Architect also includes a MicroStrategy Tutorial module designed to dramatically speed up the development and deployment of customized BI applications. The Tutorial module is a result of MicroStrategy’s 20+ years of BI experience.

MicroStrategy Tutorial includes a data model, an extensive library of foundation metrics, attributes, and hierarchies, and many business reports. The module can quickly be linked to existing data warehouses to rapidly produce a working BI application. The application analytics can be easily adapted and extended to the unique needs of each enterprise. This application portability is unprecedented in the BI industry, and is only available for applications built on the MicroStrategy platform.

**MicroStrategy MultiSource Option**

MicroStrategy MultiSource Option™ is a plug-and-play add-on to Intelligence Server that allows users to seamlessly report, analyze, and monitor corporate data across multiple data sources through a single multi-dimensional view of the business. It extends the unparalleled scalability, analytical depth, and query performance of MicroStrategy’s award-winning ROLAP technology to heterogeneous data source environments. Users and report developers can look at all relevant information as if they were looking at a single database.

MicroStrategy MultiSource Option employs a Multi-source Relational (ROLAP) architecture that pushes calculations and all data joins down to the database utilizing the power of the database management system. This push-down design eliminates the need for vast hardware resources on the BI middle tier servers. Business users can seamlessly report, analyze, and monitor data across multiple sources. Companies can get BI applications up and running in almost no time with minimum data engineering.

**MicroStrategy Clustering Option**

MicroStrategy Clustering Option™ allows a group of Intelligence Servers running on separate machines, called nodes, to work together as a single logical system.

**MicroStrategy Object Manager**
MicroStrategy Object Manager™ is a change management tool that manages the application development lifecycle by assessing the impact of changes to the application, and migrating these changes across development, testing, and production environments. In short, MicroStrategy Object Manager makes change management accurate, fast and efficient. MicroStrategy Object Manager includes the following components:

- **Graphical Interface** – enables administrators to interactively and visually move objects between applications using a drag-and-drop or copy/paste from the source supplication into the destination application.
- **Update Packages** – extract changes into a standalone file (.mmp extension) outside of the MicroStrategy metadata. This file contains all the information about the objects allowing migration without a live connection to the source application.
- **Project Merge** – merges two separate BI applications by copying all objects from the source. Project Merge is useful when synchronizing or consolidate two applications.

**MicroStrategy Integrity Manager**

MicroStrategy Integrity Manager™ automates the detection of inconsistencies and errors so that business users can rely 100% on the accuracy of their information. It compares each dashboard or report, comparing its data, SQL, graph, Excel, PDF output and execution times. This saves the time needed to manually generate and compare report output. This also eliminates potential human errors when manually comparing hundreds of thousands of cells of data, or hundreds of lines of detailed SQL, or pages of pixel-perfect formatted enterprise documents, between two reports, documents, or dashboards.

Integrity Manager can detect the impact of any change to the BI ecosystem. The results of the reports can be stored as historical snapshots and used as a baseline for subsequent report comparisons. Integrity Manager is designed to handle thousands of reports thus adding value exponentially. Data and report integrity testing that previously took weeks if not months of IT effort can now be accomplished overnight.

**MicroStrategy Enterprise Manager**

MicroStrategy Enterprise Manager™ enables analysis of resource utilization, project performance, user statistics, and trends to facilitate performance tuning and resource planning of a MicroStrategy business intelligence implementation. Enterprise Manager is a packaged data warehouse containing historical analysis of MicroStrategy operating statistics, a data-load process that transforms the operating statistics to the data warehouse, and a MicroStrategy project built on top of the data warehouse.

With Enterprise Manager, administrators are more informed and can easily maintain application speed by eliminating unused reports, reduce downtime by identifying capacity or performance issues before they occur, and analyze historic usage patterns to plan for future application growth. Enterprise Manager enables report developers to better understand user adoption trends, identify patterns, and review project success. Project managers are equipped to plan for resources, analyze trends in project growth, and quantify and improve project ROI. Areas of analysis are grouped into four primary reporting areas:

- **User Analysis**
- **Project Analysis**
- **Operational Analysis**
- **Performance Analysis**

**MicroStrategy Command Manager**

MicroStrategy Command Manager™ enables script-based administration and maintenance of objects, security, and system configuration for large user communities using textual commands. These commands can be compiled into script files and run from a graphical interface, through a command line editor, or directly from the command line. The script files can be scheduled through operating system utilities or integrated into 3rd-party Systems Management Software, automating repetitive maintenance tasks.
MicroStrategy Command Manager is designed to minimize operational costs by automating BI administration. Scripted, tested, and automated task execution minimizes administrative effort. Tasks commonly used together can be combined via Java programming to create procedures. Procedures save time by automating processes that require multiple complicated steps for completion.

**MicroStrategy SDK**

The MicroStrategy SDK™ is a comprehensive development environment primarily used for integrating MicroStrategy functionality into other existing systems, especially enterprise portals, and customizing and extending the functionality of the MicroStrategy Web. The MicroStrategy SDK includes:

- Documentation of the API and platform functionality
- Development kits for portal, external security, and Web services integration
- Utilities and sample code the show how the APIs can be used

The SDK is a key architectural component used to fully exploit the power of the MicroStrategy platform through its documentation of the platform’s open APIs. The APIs expose the complete set of functionality contained in the platform. The platform includes the following groups of API’s:

- MicroStrategy Web API
- MicroStrategy Mobile API
- Visualization API
- Portal integration API
- Web services API
- MicroStrategy Office API

**Conclusion**

MicroStrategy and AWS allows users to easily deploy MicroStrategy on the AWS infrastructure. MicroStrategy consists of 17 distinct products designed to deliver the complete range of BI functionality to business users, the depth of analytical power to analysts and developers, comprehensive administration to IT administrators, and limitless extensibility to IT developers and integrators. AWS provides a complete set of Cloud Computing services that enables organizations build scalable applications according to their needs. By combining MicroStrategy and AWS, you engage with the industries best Business Intelligence software on-demand without having to host or maintain anything on-site. This white paper went over all configuration requirements before launching your instance and all software products installed on the ec2.

If you need any additional information, please visit [http://www.microstrategy.com/platforms/analytics/cloud/AWS](http://www.microstrategy.com/platforms/analytics/cloud/AWS)