

## **SAP® BusinessObjects™ EDGE**

A COMPREHENSIVE SOLUTION TO  
ANALYZE YOUR BUSINESS END-TO-END



Growing organizations like yours can take advantage of the extensive functionality for business intelligence in SAP® BusinessObjects™ Edge. An intuitive Web interface provides access to flexible ad hoc reporting, robust query and analysis, and information-rich dashboards, enabling fast, flexible decision making. Your employees gain convenient “live” access to company information by leveraging the tools they use every day. Packaged for rapid deployment, SAP BusinessObjects Edge enables your organization to get up and running quickly so that you can empower your employees and decision makers with greater information insight.



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## EXECUTIVE SUMMARY

### EMPOWERING YOUR ORGANIZATION WITH BUSINESS INTELLIGENCE

This paper provides a technical overview of SAP® BusinessObjects™ Edge software – the end-to-end business intelligence (BI) solution for growing organizations.

SAP BusinessObjects Edge takes advantage of extensive BI functionality to empower your end users and decision makers with greater information insight. Its intuitive Web interface gives you access to flexible ad hoc reporting, robust query and analysis functionality, and information-rich dashboards, enabling fast, flexible decision making – all without relying on IT. Your users gain convenient, “live” access to company information leveraging the tools they use every day, like Microsoft Office and SharePoint. Built on our proven intelligence platform, SAP BusinessObjects Edge enables secure, managed, and

trusted information access – so the right user receives the right information at the right time.

This paper outlines the overall intelligence platform, individual services, and components that make up SAP BusinessObjects Edge. For more detailed information, refer to the documentation available with SAP BusinessObjects Edge software.

With SAP® BusinessObjects™ Edge software, your growing company can now access a single, end-to-end business intelligence (BI) product – taking advantage of features once reserved for only the largest organizations in the world.

The product's expansive features include:

- BI tools for ad hoc reporting, personal dashboards, report hosting, and financial analysis
- An intelligence platform that provides secure access to your tools and reports and delivers trusted data to your BI implementation from any data source
- Rapid and flexible deployment of a complete solution on a single Windows or Linux server, with the option to integrate popular SAP and Microsoft SharePoint applications

SAP BusinessObjects Edge is available in two versions:

- For companies with data that's ready to be used in a BI implementation, the **standard package** provides our core BI tools and intelligence platform as well as rapid deployment.
- For growing companies needing to organize and manage their BI data sources, this version includes our core BI tools and intelligence platform as well as the **data integration** tools and functionality and the rapid deployment they require.

### Business Intelligence Tools

SAP BusinessObjects Edge features a complete set of BI tools for your decision makers and business analysts, including:

- SAP BusinessObjects Web Intelligence® software
- SAP BusinessObjects Xcelsius® Enterprise software for dashboarding
- Crystal Reports® software
- SAP BusinessObjects Voyager software for online analytical processing (OLAP) analysis
- SAP BusinessObjects Live Office software

#### SAP BusinessObjects Web Intelligence

SAP BusinessObjects Edge includes SAP BusinessObjects Web Intelligence software, a Web-based query and analysis solution that delivers secure, self-service access to data and intuitive information analysis. With just a few mouse clicks, your end users can create a query from scratch, format the information retrieved, and easily analyze it to understand underlying trends and root causes. SAP BusinessObjects Edge also lets your users explore information in existing reports created with SAP BusinessObjects Web Intelligence software, enabling them to format and interact with data to meet specific needs.

The interactive viewing framework<sup>1</sup> in SAP BusinessObjects Web Intelligence offers the functionality to drill down and explore data across different dimensions.

Users can make their own changes to reports and share them with other SAP BusinessObjects Edge users, reducing the IT reporting backlog. When users share documents, SAP BusinessObjects Edge supports collaborative decision making via threaded discussions. Users can review the metadata behind their reports, such as the definition of measures used, the data filters that have been applied, where the data originated from, and when it was last updated.

SAP BusinessObjects Edge is a comprehensive business intelligence solution that is priced, packaged, and designed for small businesses and midsize companies. It enables you to cost-effectively address your most pressing business needs, see quick return on your IT investment, and easily add more functionality as your needs grow.

1. The interactive viewing framework requires the Java version of SAP BusinessObjects Web Intelligence and is not available if you install the Microsoft Internet Information Services (IIS) version of SAP BusinessObjects Web Intelligence.



You can consolidate and cleanse data from all sources within the company, so information is no longer locked away in silos.

Our patented semantic layer hides the complexity of underlying data sources by providing a business representation of organizational data. The semantic layer also makes available reusable report elements and powerful calculation functionality, allowing users to access key information quickly. With minimal knowledge of the underlying data structures, users can access and synchronize data from multiple sources, create custom formulas, and use variables within a single report.

SAP BusinessObjects Web Intelligence puts security and control in the hands of your IT department. The central management console of SAP BusinessObjects Edge gives you granular control over who accesses what data – down to the database-row level – and which specific features your users access. Not only do your users have the functionality appropriate to their requirements, but they also have the freedom of self-service access to the information they really need.

#### SAP BusinessObjects Xcelsius Enterprise

SAP BusinessObjects Xcelsius Enterprise lets you easily create business dashboards that connect to any existing business data source. SAP BusinessObjects Xcelsius Enterprise includes prebuilt components that make it easy for nontechnical users to develop fully interactive business dashboards.

SAP BusinessObjects Edge hosts your SAP BusinessObjects Xcelsius Enterprise dashboards, providing granular control over who can see them. You can design a single dashboard or visual model to display different information to different individuals based on their security credentials. With just one click, your business users can refresh data for instant access to up-to-the-minute information – without relying on IT.

#### Crystal Reports

The world standard for report creation, Crystal Reports software allows you to access and present data any way you want. With more than 35 data drivers, Crystal Reports provides direct access to relational, XML, OLAP, and in-memory data. And for report design, the Crystal Reports designer lets you create almost any report imaginable – from financial statements to sales reports to regulatory reports.

SAP BusinessObjects Edge gives you the ability to host, schedule, and view your Crystal Reports documents – making sure the right reports reach the right users at the right time and in the

right format. SAP BusinessObjects Edge includes flexible scheduling functionality for reporting, minimizing the burden on your IT infrastructure. You can schedule reports to run overnight, reducing database traffic at peak hours. You can schedule reports for direct output to a variety of formats and destinations – including Adobe PDF, Microsoft Excel, e-mail, file servers, or printers – ensuring up-to-date information is readily available when and where users need it. Additionally, our report-publishing wizard locates your organization's existing reports and sets up scheduling and security options at the same time.

#### SAP BusinessObjects Voyager

SAP BusinessObjects Voyager is part of SAP BusinessObjects Edge. A tool designed specifically for financial analysts who need to explore OLAP data,<sup>2</sup> SAP BusinessObjects Voyager delivers a full range of functions for the analysis of multidimensional data sets. For example, the “chart slider” allows users to magnify a specific subset of a data set while still viewing the overall data trend. When analysts need to use specific time and business calculations, SAP BusinessObjects Voyager provides a range of its own calculations – while taking advantage of the most important functions currently available within industry-leading OLAP databases.

Once analysis is complete, you can share your insights across the organization with SAP BusinessObjects Edge, allowing other users to explore and understand the analysis further.

2. SAP BusinessObjects Voyager requires the deployment of a Java application server, such as Tomcat.

SAP BusinessObjects Voyager supports the following OLAP servers:

- Oracle Essbase 7.0.x, 7.1.x, and 9.0.x
- SAP Business Information Warehouse 3.0b, 3.1c, and 3.5, and the SAP NetWeaver® Business Intelligence 7.0 component
- Microsoft SQL Server 2000 (service pack 4) and Microsoft SQL Analysis Services 2005 (service pack 1)
- Oracle OLAP 10g Release 2

In the SAP BusinessObjects Edge environment, SAP BusinessObjects Voyager is one part of a strategy that provides the right tools for the needs of each user. For OLAP information discovery and delivery, this strategy includes SAP BusinessObjects Web Intelligence (for ad hoc analytic reporting from OLAP data sources) and Crystal Reports (for direct data access to OLAP cubes for production reporting).

#### **SAP BusinessObjects Live Office**

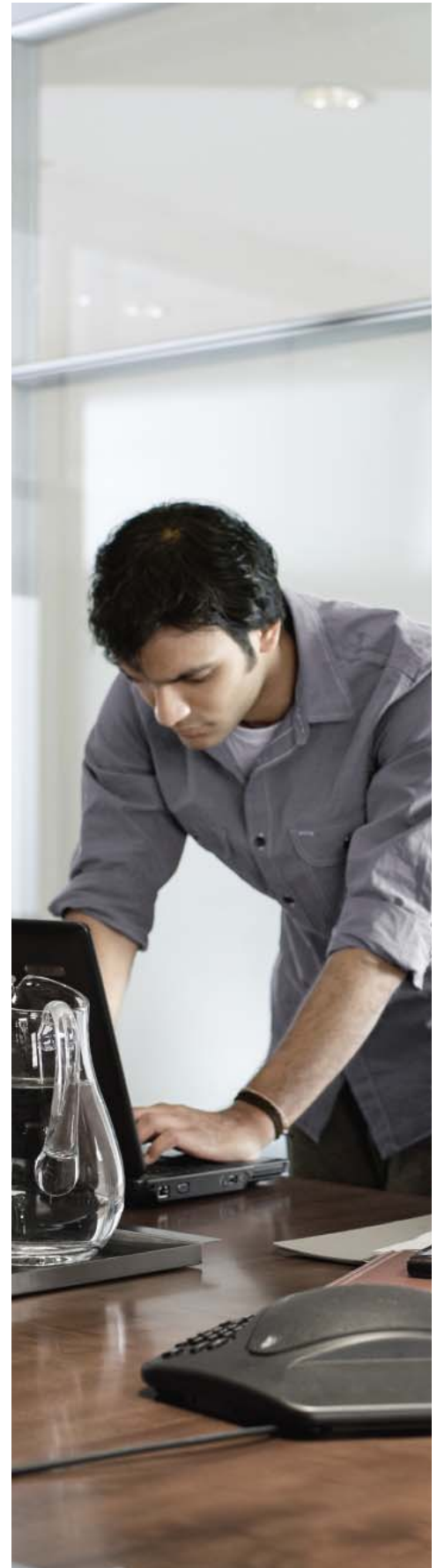
Extensive integration with Microsoft Office includes functionality to store and manage Word, PowerPoint, and Excel documents in the system repository. With SAP BusinessObjects Live Office, end users embed accurate, updatable data in documents, spreadsheets, and presentations while allowing IT to maintain control of the underlying information. By logging in to SAP BusinessObjects

Edge, your end users can then refresh the view or modify document parameters from within Microsoft Office.

SAP BusinessObjects Live Office provides business users with easy access to the data available within SAP BusinessObjects Web Intelligence documents for live integration into their PowerPoint, Word, and Excel files. In addition, your users can add secure, refreshable tables and charts from SAP BusinessObjects Web Intelligence documents (known as “report parts”) to their Microsoft Office documents. This allows you to gain further value from your SAP BusinessObjects Web Intelligence documents and provides consistent use of data across the organization.

Dynamic and cascading prompt pick lists in SAP BusinessObjects Live Office give you the ability to filter data from a Crystal Reports document. In addition, users can dynamically change the data viewed in their reports by using pick lists generated from Crystal Reports parameters. When no existing SAP BusinessObjects Web Intelligence report or Crystal Reports document is available, users can create new queries directly from within Microsoft Office documents via a query panel that utilizes the patented semantic layer.

SAP BusinessObjects Live Office supports the full range of currently supported Microsoft Office versions (2000, XP, 2003, and 2007).



# A FOUNDATION FOR GROWTH

## THE “INTELLIGENT” ARCHITECTURE FOR BUSINESS INTELLIGENCE

SAP BusinessObjects Edge is powered by the same underlying services as SAP BusinessObjects XI solutions, enabling customers to upgrade as their needs grow. The service-oriented architecture (SOA) platform was designed to integrate smoothly with existing Web and rich-client application investments without imposing a new set of standards and processes.

### Service-Oriented Architecture

An intelligence platform is a vital component of an overall enterprise IT infrastructure and provides key support for corporate information access and decision making. Customers depend on an intelligence platform to enable their organizations to track, understand, and manage their businesses – necessitating a readily available and highly efficient architecture for processing, managing, and delivering critical information and analysis to a broad user base.

Built on a sophisticated SOA, the flexible and extensible SAP BusinessObjects Edge lets you manage and grow with the varied demands of business intelligence. Current Web standards and an industry-standard communication framework tie all the components and services together.

### Performance and Benchmarks

SAP BusinessObjects Edge is architected for high performance across a broad spectrum of user and deployment scenarios. For example, it includes specialized platform services that handle either on-demand data access and report generation or time- and event-based report scheduling. Designed to meet the needs of any BI deployment, the underlying architecture for SAP BusinessObjects Edge is flexible enough to grow from accommodating several users with a single tool to an enterprise-scale deployment of tens of thousands of users with multiple tools, interfaces, and user types.

SAP BusinessObjects Edge has undergone rigorous internal benchmark and performance tests throughout the product development cycle. The testing continues throughout the product life cycle to help ensure that it continues to meet customer performance needs. In addition, third-party testing labs test the product on various platforms. SAP provides sizing guides and tools to estimate the required deployment architecture for different usage scenarios.

### Intelligence Platform Architecture

The intelligence platform underlying SAP BusinessObjects Edge is composed of a complete set of separate yet interconnected tiers – each optimized for specific tasks and operations.

The architecture, shown in Figure 1, is based on the latest Web standards for service-to-service communication across Internet networks. This communication protocol is based on the Internet Inter-ORB (object request broker) Protocol (IIOP), which is the communication method of choice for most Web application servers and enterprise applications available today. This communication method continues as the preferred choice for SAP due to the latency challenges and unnecessary network traffic common with other approaches, including SOAP.

All end-user tools, portals, and portal integration kits are built on top of the intelligence platform. Developers easily access the platform using a complete set of Web services, Java, and Microsoft .NET application programming interfaces (APIs) – resulting in the best of both worlds when it comes to an intelligence platform. This architecture delivers a powerful, high-performance platform proven by customers and benchmarks to scale to meet the demands of an extremely broad set of customers. At the same time, it provides the flexibility developers need to customize the user experience, integrate the platform in enterprise applications, and connect to data and documents stored using the integrated development environment of choice.



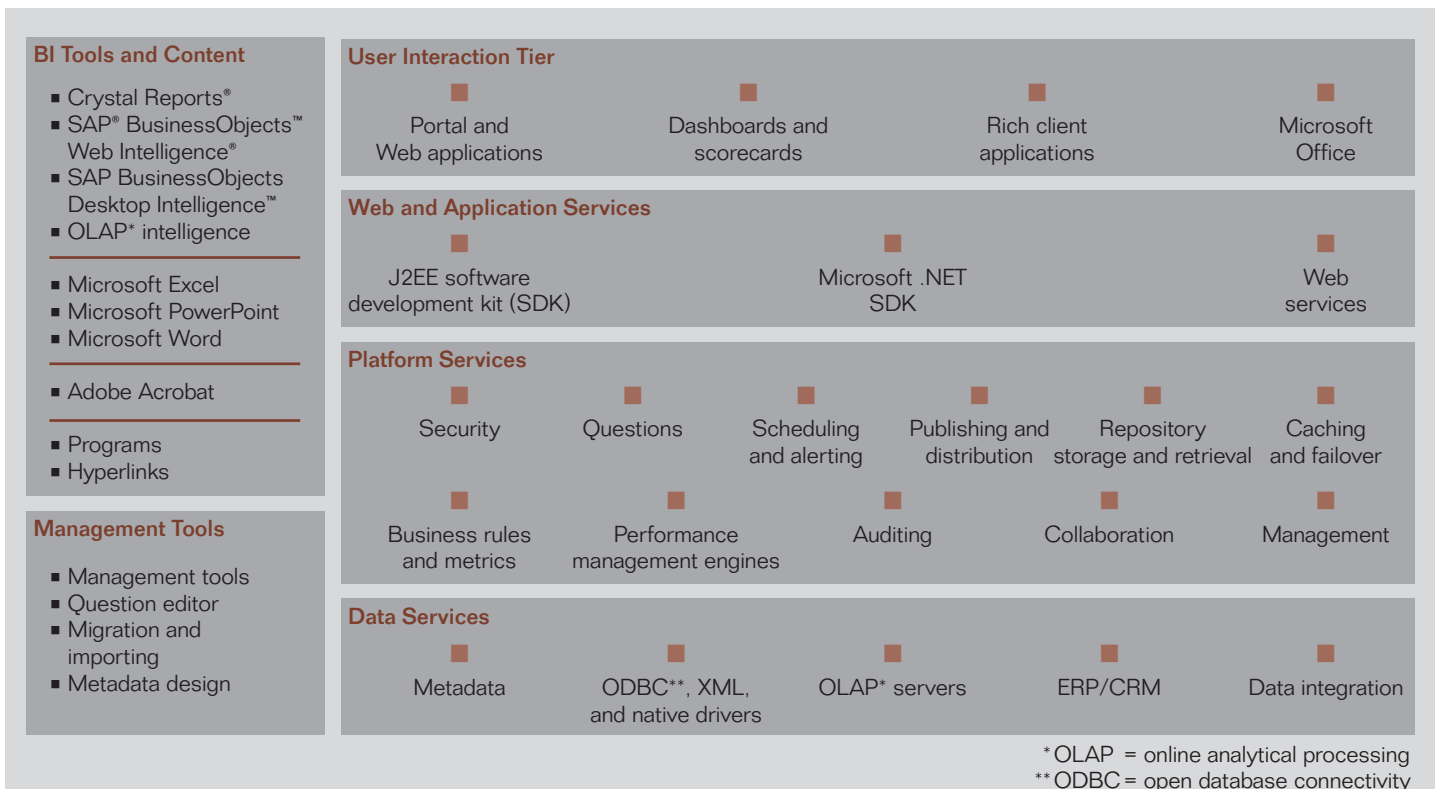


Figure 1: Functional Architecture and Tools

As shown in Figure 1, the architecture tiers include:

- User interaction
- Web and application services (developer services)
- Platform services
- Data services

The architecture supports an entire range of end-user tools on a common, secure, scalable, and reliable platform. In addition to its underlying intelligence platform, SAP BusinessObjects Edge includes an updated BI portal and a fully Web-based management environment.

#### User Interaction

Portals enable users to access BI content, regardless of where it resides. Threaded discussions and search functions make it easy for users to search for and collaborate on documents.

## Business Intelligence Portal

SAP BusinessObjects Edge provides an intuitive business intelligence portal for both Java and Microsoft .NET platforms, allowing customers to access BI via the Web without the challenges of deploying desktop software products. With its single Web interface, the portal accesses and interacts with any type of BI data, including reports, analytics, dashboards, scorecards, and strategy maps (see Figure 2).

Portal discussions offer end users the ability to collaborate and share insight on different content types, while an “encyclopedia” feature helps end

users locate and interpret corporate information for more confident and accurate decision making.

## Threaded Discussions

Discussions provide threaded notes that enable users to create and maintain comments on any documents in SAP BusinessObjects Edge. Discussions are a fully integrated feature of the SAP BusinessObjects Edge environment and are displayed in the portal. The software manages all threaded-discussion information and stores it in a repository. Discussion threads can be added to SAP BusinessObjects Web Intelligence and Crystal Reports docu-

ments as well as third-party-managed documents like Microsoft Word or Adobe PDF.

## Encyclopedia

The encyclopedia feature is a key innovation that delivers improved user insight by providing informative BI reference guides for your organization’s information. The encyclopedia feature is accessible from every document directly through your BI portal, so users can easily locate and interpret the right information to more confidently and accurately make decisions. All encyclopedia content is stored and managed in a central repository and is available directly within the portal environment.

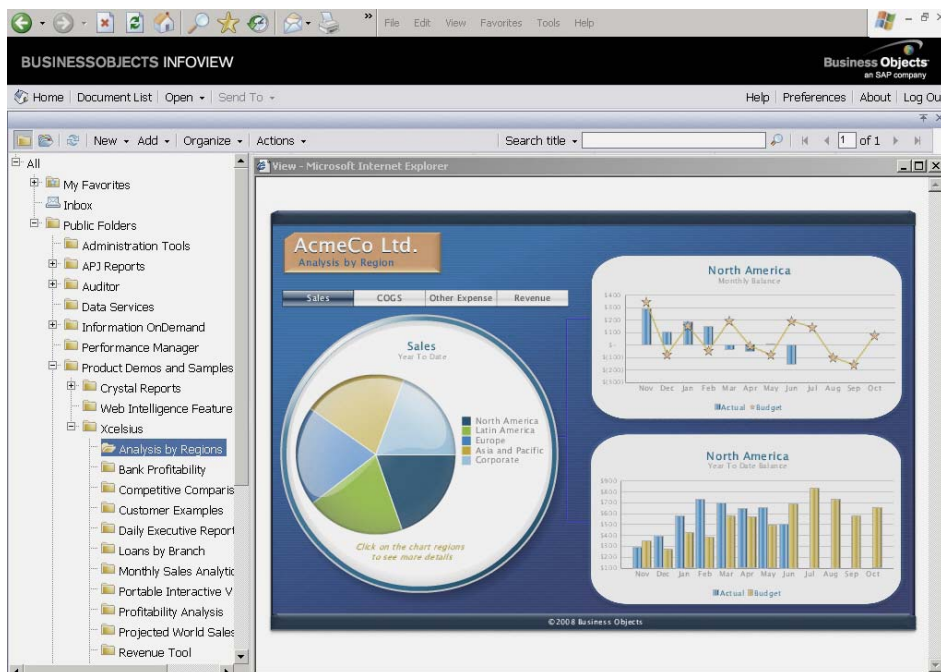


Figure 2: Web-Based Access to Business Intelligence Data via a Portal

## SAP BusinessObjects Intelligent Search

SAP BusinessObjects Edge delivers innovative functionality to bring the simplicity of search to the world of business intelligence, allowing users to search using the familiar Google interface and retrieve, index, and deliver BI content, presentations, business content in documents, and Web pages.

SAP BusinessObjects Edge reduces the time and effort users spend finding the specific piece of data or report they need to answer their business questions. Simply by entering text into the search box within the business intelligence portal, users quickly see a relevant, categorized, and ranked set of results from within SAP Business-

Objects Edge. Other new search functionality includes document ranking based on frequency and position of use of the user's search string, intelligent categorization of documents by relevant topics and type based on advanced search semantics, and step-by-step refining of results based on a user's selection of defined subsets of documents.

#### **Integration Kit for Microsoft Office SharePoint Server**

SAP provides portal integration kits to enable you to integrate BI content into industry-leading enterprise portals.

SAP BusinessObjects Edge includes a prebuilt integration kit for Microsoft Office SharePoint Server. This integration kit provides tight integration between SAP BusinessObjects Edge and Microsoft Office SharePoint Server, so people in your organization can connect to the information they need wherever it may reside. With our integration kit, you can bring Crystal Reports documents, Web content, Microsoft Word and Excel documents, and Adobe PDF documents together in one portal location.

#### **Developer Services**

SAP BusinessObjects Edge software includes a number of services for developers, including software development kits (SDKs). These services enable developers to integrate SAP technology with other Web-based applications, facilitating the deployment of SAP BusinessObjects Edge.

#### **Developer Interfaces**

SAP BusinessObjects Edge is composed of a powerful set of BI services that are exposed through SDKs. All of the end-user interfaces provided by the platform are built on top of these SDKs so that developers can access all aspects of the platform and software. Object models encapsulate all the calls needed to extract content listings, control content processing and delivery, view content, interact with content, and administer the software. All the sample applications included with the product use a well-documented object model.

The developer-services layer hosts the server-side components and acts as the translation layer between the end user and SAP BusinessObjects Edge. The components process requests from users in the user interaction tier and then communicate these requests to the appropriate service in the platform tier. Developer services include support for document viewing and scheduling, and logic to understand and direct Web requests to the appropriate service in SAP BusinessObjects Edge.

From a technical perspective, SAP BusinessObjects Edge uses SDKs for Java or Microsoft .NET to run the software with a third-party application server. The application server acts as the gateway between the Web server and SAP BusinessObjects Edge software. The application server is responsible for processing requests from your browser, sending certain requests to the Web component adapter (WCA)<sup>3</sup> and using the SDK to interpret compo-

nents in Java server pages (.jsp files) or in active server pages (.aspx files).

#### **Web Service SDK**

SAP offers comprehensive Web services that support organizations extending the reach of BI beyond the traditional corporate boundaries. The Web service SDK makes it easier and faster to integrate SAP technology with Web-based applications, and it facilitates the deployment of SAP BusinessObjects Edge with customized applications.

Web services are made available through a software development kit and consist of two parts: server and consumer. On the server side, Web services are deployed with SAP BusinessObjects Edge and are based on the Java Platform, Enterprise Edition framework. On the consumer side, the API enables consumers to create Web services that access SAP BusinessObjects Edge functionality using the Microsoft .NET or Java platform.

SAP BusinessObjects Edge offers a broad range of Web services to:

- **Authenticate**, authorize, and manage user settings
- **Expose** advanced platform features such as scheduling, search, user and group administration, server administration, platform events, and calendars
- **Display** SAP BusinessObjects Web Intelligence and Crystal Reports documents in HTML, PDF, Excel, and XML format
- **Build** ad hoc queries based on the semantic layer

3. The Web component adapter runs on the Web application server and provides all services that are not directly supported by the software development kit for SAP BusinessObjects Edge.

### Query as a Web Service

This Web service is wizard-based software that lets you create custom Web services for specific queries and gives you the ability to integrate queries with any application or tool. This integration helps ensure that your standard semantic layer becomes the central hub for delivering secure, trusted information wherever it is needed.

Using the simple-to-use, wizard-based client component, your application developers or business users can quickly create the queries they would like to use. At the end of this process, the Web service is available for use via a URL that can be added to an application. You can store and manage a catalog of queries as Web services for use by a range of users. The generated Web service can be consumed by any Web service-enabled application. All of this makes the process of accessing trusted BI within other applications or tools simple and manageable.

### Platform Services

The platform-services tier of SAP BusinessObjects Enterprise is the core processing and management engine for SAP BusinessObjects Edge. The platform-services tier is often referred to as the intelligence and processing tier, because this is the area where the actual data processing, document processing, and end-user interactivity access take place.

The communication framework (see Figure 3) handles the movement of information between the platform services and SDKs and provides end-user information access, delivery, and interaction. You access individual services via the provided Java, Microsoft .NET, and Web service SDKs, so there is no need to access or configure the communication framework directly. Built on proven application technology, the communication framework is designed as a pluggable or extensible framework to add, customize, or remove services as required for specific BI deployments.

The central management console (CMC) is included for full control over the platform. In addition, specialized administration interfaces are provided when you require administration of user access, document creation, and server configuration. This is particularly important in decentralized system management environments where different

people are responsible for different aspects of the deployment. The result is a powerful, open, and complete intelligence platform that meets the needs of end users while providing IT with full control over the deployment.

### Cross-Platform BI Services

SAP BusinessObjects Edge includes a set of cross-platform BI services and supports Microsoft Windows, Red Hat Linux, and Novell SUSE Linux. In addition, it provides support for Java and Microsoft .NET application servers and Web servers.

The platform, shown in Figure 3, enables end users to view and interact with information. It allows intuitive on-report analysis for information exploration, discussion threads for collaborative decision making, and integrated scheduling and distribution of documents based on events, business calendars, or intervals.

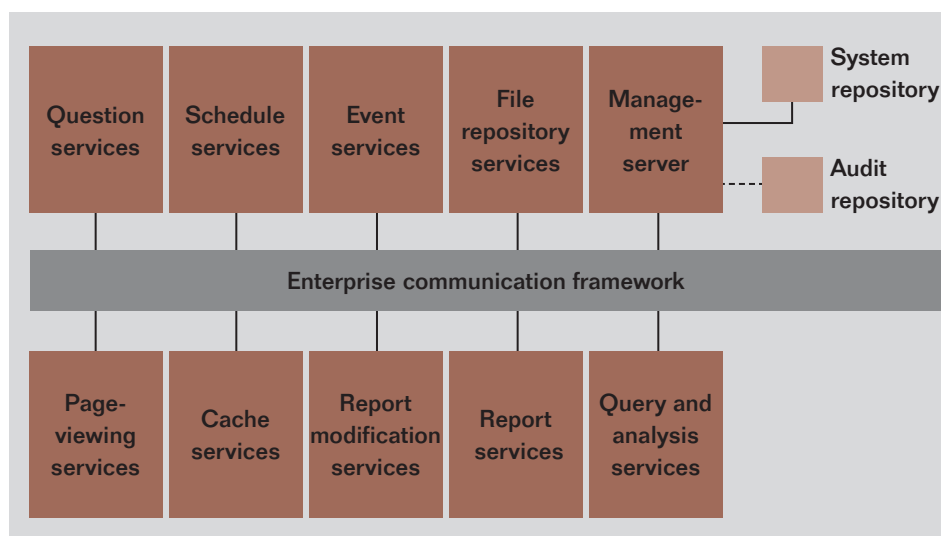


Figure 3: Web-Based Communication Framework

IT management and administration benefit from the central repository for all content and user profiles; access to security entitlement databases for user, role, and document security; metrics management and performance management applications; and portal integration components.

#### Management Server

The central management server (CMS) is the central platform service and is responsible for maintaining a database of information about your SAP BusinessObjects Edge software. The CMS manages and controls all the platform services as well as access to the system file store where the physical documents are actually managed. The system repository database is maintained either by using the provided MySQL database or by using your preferred database, such as IBM DB2, Microsoft SQL Server, Oracle database, or Sybase ASE. The database structure is created automatically when you set up your SAP BusinessObjects Edge software, or it can be configured on a different database if you want to move your implementation to another environment. All access to the repository is managed directly by the platform and management interfaces and by the SDKs.

The CMS data includes information about users and groups, security levels, SAP BusinessObjects Edge content, and services. The CMS also maintains the SAP BusinessObjects Edge repository and a separate audit database of information about user actions.

You can develop an overall business strategy that is built on a complete understanding of the business instead of basing it on incomplete data and intuition.

The CMS performs four main tasks:

**Maintaining security.** By maintaining a database of users and associated object rights, the CMS enforces access rights to SAP BusinessObjects Edge and the types of tasks users are able to perform. Building on a hierarchical object-level security model, SAP BusinessObjects Edge enables the application of rights at both the folder and object level and supports full inheritance at the user and group level. Similarly, it supports aggregation through a flexible group-user membership model.

The software is designed for access and integration with third-party security applications including Lightweight Directory Access Protocol (LDAP), CA SiteMinder, Microsoft Active Directory, and Microsoft Windows NT. SAP BusinessObjects Edge security software maps directly to these security applications, so when added to an LDAP group, a user is added automatically to that same group within the platform. In addition, an integrated security

application is available for customers who aren't currently using an entitlement database.

The software also supports the ability to use more than one entitlement database in the same implementation. This feature is particularly important in cases where organizations need to combine different audiences. For example, an application might maintain internal users that access the environment using an NT authentication database while business-partner security information is stored in an LDAP database.

**Managing objects.** The CMS keeps track of the object location and maintains the folder hierarchy. All objects essentially contain all information about the actual object. The physical documents or objects are stored in a file store. Separating the object definition (metadata) from the physical document allows for fast and efficient processing, since only the required information is retrieved from the repository. In addition, by communicating with the scheduling and processing services, the CMS ensures that scheduled jobs run at the appropriate time.

**Managing servers.** By staying in frequent contact with each of the services in the software, the CMS maintains a list of service statuses. Report services access this list, for instance, to identify which cache server is free for a report-viewing request. SAP BusinessObjects Edge includes adaptive Crystal Reports page-generation services, which automatically add or remove service instances as workloads change or services become unavailable.





**Managing auditing.** By collecting information about user actions from each SAP BusinessObjects Edge service and writing these records to a central audit database, the CMS acts as the auditor. Audit information allows system administrators to better track and manage the SAP BusinessObjects Edge deployment.

Typically, when installing SAP BusinessObjects Edge software, administrators provide the CMS with database connectivity and credentials, so the CMS creates its own system database and repository database using your organization's preferred database server. The auditing functionality helps your administrators better understand which users accessed the enterprise application, which documents they interacted with, and the overall metrics for software optimization. The usage data is collected from application interactions and then written in a usable form to the auditing database. A sample semantic layer and a set of sample auditing reports are also available to provide fast access to information such as the most-accessed reports, peak use times, and average user-session times. With compliance regulations like the Sarbanes-Oxley Act and Basel II, capturing and storing audit information is a critical component for any BI solution.

#### File-Repository Services

In every SAP BusinessObjects Edge implementation, there is both an input

and an output file-repository service. The input file-repository service manages all of the objects managed by the platform. The output file-repository service manages all of the report instances generated by the scheduling services.

#### Event Services

The event service manages three event types: file-based, scheduled, and programmatic. IT administrators create file-based event-monitoring programs to track a variety of tasks, including the monitoring of inventory reorder thresholds, revenue shortfalls or increases, or the addition of new customers or employees to the application. After the file-based event is created and stored in SAP BusinessObjects Edge, the event service monitors the specified directory for new files and executes those programs when they appear. In other words, the event server notifies the CMS that the file-based event has occurred. The CMS starts processing any jobs that are dependent upon the file-based event. For example, if inventory reorder thresholds are met, a file is written to the event directory that executes the scheduling of an inventory-level report to the responsible manager, enabling the manager to take the appropriate action.

Scheduled events are an effective way to link the execution of reports together. It's possible to have a report schedule that is based on the success of

another scheduled report. Programmatic events are events that are triggered from within a custom application. After notifying the CMS of the event, the event service resets itself and monitors the directory for the appropriate file. When the file is newly created in the monitored directory, the event service triggers the file-based event.

#### Schedule Services

Job servers provide scheduling functionality for SAP BusinessObjects Web Intelligence and Crystal Reports. The report job server processes scheduled reports and generates report instances (instances are versions of a report object that contain saved data). To generate a report instance, the report job server communicates with the database to retrieve the current data and then stores that instance in the repository. Many options are available for scheduling, including scheduling based on a specified time, a recurring schedule, or even a predefined business calendar. Depending on the object type, the scheduler can schedule objects to different formats, such as SAP BusinessObjects Web Intelligence, Crystal Reports, Excel, PDF, Word, and text, and schedule to different destinations, including e-mail, printer, or file server.

At the request of the CMS, a job server processes scheduled actions on objects. A job server configured to process program objects is called a program job server. Program objects allow

you to write, publish, and schedule custom applications, including scripts or Java programs that run against and perform maintenance work on SAP BusinessObjects Edge. To run a program, the program job server first retrieves the files from storage on the input file-repository server and then runs the program. By definition, program objects are custom applications. Therefore, the outcome of running a program is dependent upon the particular program object that is run.

#### Page-Viewing Services

The Crystal Reports page server is primarily responsible for responding to page requests by processing reports and generating encapsulated page format (EPF) pages. The key benefit of EPF is that it supports page-on-demand access, so only the requested page is returned, not the entire report. This greatly enhances performance and reduces unnecessary network traffic for large reports. EPF pages contain formatting information that defines report layout. The page server retrieves data for the report from an instance or directly from the database, depending on the user's request and the user's rights to the report object. When retrieving data from the database, the page server automatically disconnects from the database after it fulfills its initial request and, if necessary, reconnects to retrieve additional data. This helps reduce database traffic and the use of unnecessary database licenses.

Employees can trust the information from reports and analyses for decision making; they can align their individual activities with overall plans and goals.

#### Cache Services

Cache services are responsible for handling all report-viewing requests. The cache service checks whether it can fulfill the request with a cached report page before it requests new data from the database. For example, if the cache server finds a previously viewed page that was stored with exactly the requested data, it returns that cached report page instead of retrieving the duplicate data. By storing report pages in a cache, SAP BusinessObjects Edge avoids accessing the database each and every time a report is requested, greatly accelerating viewing performance for end users while, at the same time, reducing unnecessary network traffic and database hits.

The **Crystal Reports cache server** is accessed before the page server is used. If the cache server doesn't fulfill the request with a cached report page,

it passes the request to the page server. The page server runs the report and returns the results to the cache server. The cache server then caches the report page for future use and returns the data to the viewer.

SAP BusinessObjects Edge also supports active data sharing with Crystal Reports. Active data sharing means that in situations where different reports access the same data, the documents use shared data, and the requested report is rendered without an additional database hit, even though the other report may be different. This results in a significant performance improvement across the entire system, including the database. A major benefit of active data sharing is that as the load and usage increase, more data is cached, and the system runs more efficiently.

The **SAP BusinessObjects Web Intelligence report server** provides core display and interaction within the platform for end-user query and analysis. This report server is accessed when the CMS requests the creation or viewing of an SAP BusinessObjects Web Intelligence document for further interaction.

For users who want to conduct ad hoc query and analysis, the SAP BusinessObjects Web Intelligence report server requests a predefined metadata object – called a semantic layer – from the repository and opens an HTML or Java-based query panel. Users select fields and filters through the interface.

The report server handles report modification and interaction. Due to the interactive nature of SAP BusinessObjects Web Intelligence, no separate report-application server is required.

#### Report Modification Services

A report application server (RAS) – a component of Crystal Reports – is used by SAP-provided or custom-written applications that address interactive report creation and modification scenarios. When RAS is used with SAP BusinessObjects Edge, these applications generally are Web-based.

RAS has two main parts: the server that processes requests and the API. When an application uses the RAS API to create and modify reports, the RAS processes these requests. The RAS API that's used to create and modify reports is remote, meaning the application that uses the RAS API resides on a separate machine from the RAS. When used in combination with the SAP BusinessObjects Edge SDK, RAS creates reports and saves them into the SAP BusinessObjects Edge repository.

RAS is different from the Crystal Reports page server in that it's optimized to meet the needs of report creation and modification scenarios. The page server–cache server combination is optimized for report viewing.

#### Data Services

SAP BusinessObjects Edge supports a flexible set of options for accessing, organizing, and exposing data to report writers, analysts, and end users.

The patented semantic layer, known also as a “universe,” is the foundation for empowering end-user query and analysis. It abstracts the complexity of data by using business language rather than data language to access, manipulate, and organize data. Business language is stored as objects in a file. SAP BusinessObjects Web Intelligence and Crystal Reports use the semantic layer to simplify the user-creation process required for simple-to-complex end-user query and analysis.

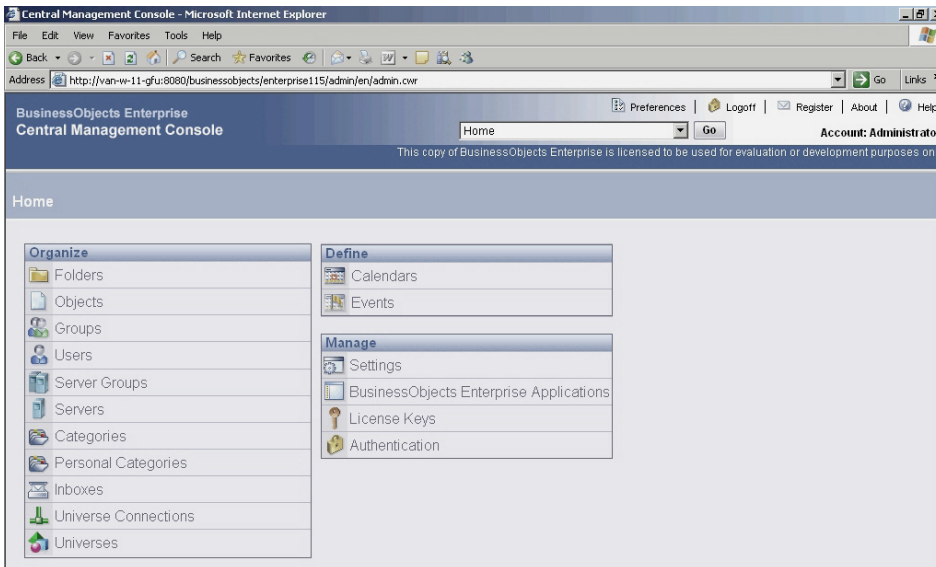
The semantic layer is a core component of SAP BusinessObjects Edge. All related objects and connections are stored and secured in the central repository. Designers need to log in to SAP BusinessObjects Edge to access the software. Access and row-level security can be managed at the group or user level directly from the design environment. The semantic layer can be built on top of relational as well as OLAP data sources.

#### Management Tools – Flexible Administration and Upgrades

SAP BusinessObjects Edge includes dedicated, preconfigured platform management services for tasks such as password management, server metrics, and user access control to support decentralized management functions.

#### Central Management Console

SAP BusinessObjects Edge provides for either centralized or decentralized management, depending on the organizational needs. Built on a common API, the CMC (see Figure 4) provides gran-



**Figure 4: Central Management Console for Managing User Access and Interaction Rights**

ular control of the environment for tasks that include setting up user roles, security access, server administration, password management, and so on.

Included with SAP BusinessObjects Edge is a Microsoft .NET or Java environment for total infrastructure management, deployment, and configuration. The CMC is a Web-based environment for administrators to easily access and configure the software while controlling the overall access rights, applications, and end-user viewing experience.

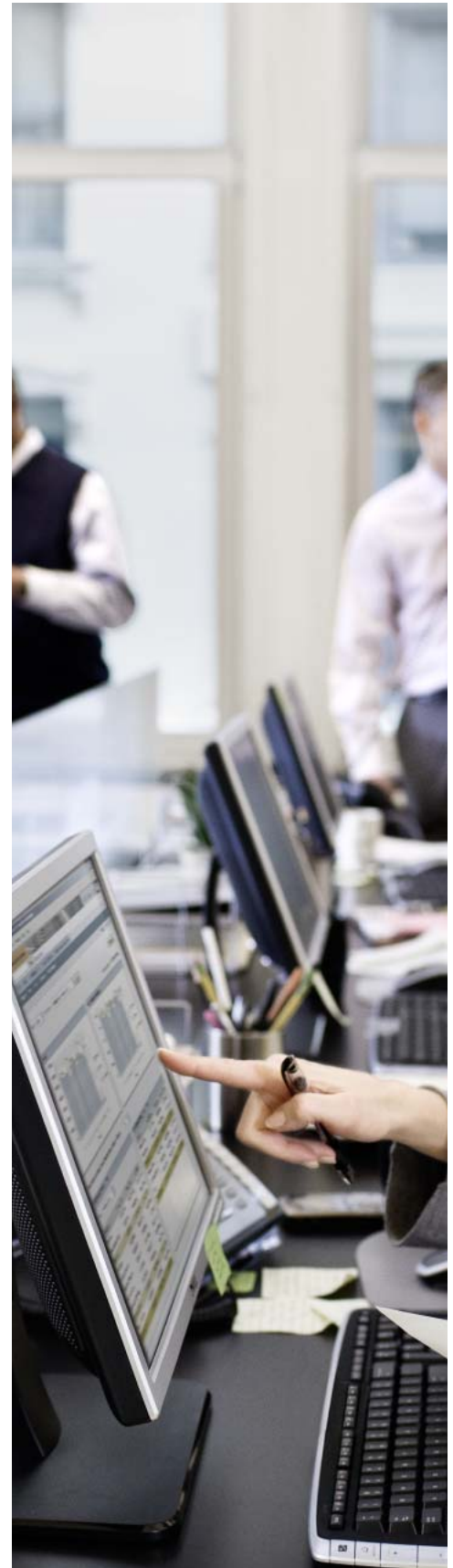
You use the CMC to manage the following elements:

- User and group creation
- User categories
- Security authentication services
- Services configuration

- Objects rights
- Processing configuration
- Scheduling
- Business calendars
- License keys
- Data connections
- User-interface settings and preferences

#### **Central Configuration Manager**

The central configuration manager is designed exclusively for server management and configuration of SAP BusinessObjects Edge services. You can start, stop, enable, and disable servers as well as view and configure advanced server settings.





# DATA INTEGRATION

## DEEP INTEGRATION AND UNIFICATION FOR DATA TRANSFORMATION

### A Design Environment for Data Integration

SAP BusinessObjects Edge with data integration includes SAP BusinessObjects Data Integrator software. With it, developers can easily explore, extract, transform, and deliver data anywhere, at any frequency, through a single, graphical design environment. SAP BusinessObjects Data Integrator helps your organization provide data integrity, maximize developer productivity, and accelerate reporting, query and analysis, and performance management projects.

SAP BusinessObjects Data Integrator consists of four primary components:

- A graphical design tool
- A Web-based administrator
- A data server
- A metadata repository

The graphical design component is the single tool that provides a graphical interface for performing all the tasks involved with building, testing, and managing an extract, transform, and load (ETL) job. Through its intuitive graphical interface, you can:

- Manage projects
- Profile data
- Create ETL jobs
- Cleanse, validate, and audit data
- Set parallel job execution
- Build workflows
- Test, debug, and monitor your ETL jobs

The Web-based administrator allows you to start, stop, schedule, and monitor ETL jobs independently from the design environment.

The data server integrates data from multiple heterogeneous sources, performs complex data transformations, and manages extractions and transactions from enterprise resource planning (ERP) applications.

The metadata repository holds user-created and predefined objects, source and target metadata, and transformation rules. It is set up on an open client-server platform to facilitate the sharing of metadata with other enterprise tools. When using SAP BusinessObjects Data Integrator, you have complete metadata integration between your BI tools and ETL environment. This shared metadata provides advantages such as end-to-end impact analysis and data lineage, which are key requirements for delivering trusted information.

### Delivering Trusted Information

Until now, data warehousing and the BI market in general have consisted of many best-of-breed players, with each vendor focused on selling its component within the end-to-end “stack.” SAP has focused on true integration from source applications to end-user reports and executive dashboards.

Through the deep integration of the entire ETL process with the intelligence platform, both IT and business users gain measurable benefits that include

easy metadata management, simplified and unified administration, life-cycle management, and – ultimately – trusted information.

SAP BusinessObjects Data Integrator delivers the following key points of unification within SAP BusinessObjects Edge:

- End-to-end data lineage and impact analysis
- The ability to create a semantic layer and manage change within the ETL design environment
- Data quality within the ETL design environment

### End-to-End Data Lineage and Impact Analysis

Change is inevitable. Data sources are updated, added, or deleted. You need insight on the impact of source-application changes to your entire BI solution. Conversely, your BI end users need visibility to trace the “chain of truth” back to the source. SAP BusinessObjects Data Integrator is unique in its ability to exchange metadata up and down the intelligence platform. End-to-end data lineage and impact analysis mean that SAP BusinessObjects Data Integrator allows developers and system administrators to communicate directly with the platform.

Whether it's a Crystal Report or an SAP BusinessObjects Web Intelligence document, SAP BusinessObjects Data Integrator lets you find the relationships between sources (tables or columns), targets, data layers, and documents.



This functionality helps to significantly reduce maintenance costs by conveying the impact of changes to source and target applications. Knowing which sources provide data for which reports also increases end-user trust and allows you to gain a better understanding of the overall data architecture. This means you can track data from an end-user report right back to its original data source.

#### **Semantic Layer Creation and Change Management**

Within the design tool of SAP BusinessObjects Data Integrator, you can create and update a semantic layer with the click of a button, saving time and avoiding errors commonly associated with manual effort. The semantic layer is based on the metadata present in the SAP BusinessObjects Data Integrator repository. Information that isn't normally available in the design tool – such as column descriptions and information about primary and foreign keys from database catalogs – is loaded automatically into the semantic layer. This means you can quickly build a semantic layer for the target warehouse database and easily transfer ETL metadata such as data lineage, mapping expressions, and descriptions. Easy metadata sharing also lets developers know exactly where the data is coming from and helps them create better semantic layers for end-user query and analysis.

But creating a metadata-rich layer is only the beginning. With SAP BusinessObjects Data Integrator, you can update layers based on source changes

without having to make changes manually with the design tool. You can also do a gap analysis between the technical and business metadata so you can easily see what's changed and decide if you want to propagate some or all of those changes. For example, you may want to transfer selected information into the layer, such as lineage, but not descriptions. Easy metadata sharing and change management improve users' understanding of information and give them greater trust in their data, because they can see where it came from and how it was transformed and calculated.

#### **Data Quality Within the ETL Design Environment**

There isn't an organization in the world that does not have data quality problems. They are created from the point of data entry with your operational applications and persist through your IT infrastructure, affecting downstream applications that depend on this information, such as your BI solutions. SAP BusinessObjects solutions give you the market-leading technology to profile and cleanse data from any type of operational domain, such as customer, product, or service.

#### **Data Profiling Within the ETL Design Environment**

With the design tool in SAP BusinessObjects Data Integrator, you can define data mappings, transformations, and ETL logic. As the single, graphical design environment for the majority of data integration tasks, the design tool is used to create workflows (job execu-

tion definitions) and data flows (data transformation definitions). The tool allows developers to create objects and then drag, drop, and configure them by selecting icons in flow diagrams, table layouts, and nested workspace pages. The objects in the design tool represent metadata; the interface allows you to manage metadata stored in the metadata repository for SAP BusinessObjects Data Integrator.

Using a feature unique to SAP BusinessObjects Data Integrator, you can view and profile data before and after it is extracted and transformed without leaving the design environment. By helping to reduce design and data validation time and increase developer efficiency and productivity, SAP BusinessObjects Data Integrator allows you to profile data to get an understanding of its range and quality before executing the ETL process.

SAP BusinessObjects Data Integrator lets you:

- Preview and profile physical data in source, target, and transform objects
- Profile and analyze column characteristics
- Analyze the number of distinct values, nulls, minimum, maximum, and column distribution
- Filter and manipulate rows in data flows
- Preview all qualifying elements
- Preview, filter, and sort data before and after a transform in the data flow (see Figure 5)
- View data from heterogeneous objects side by side

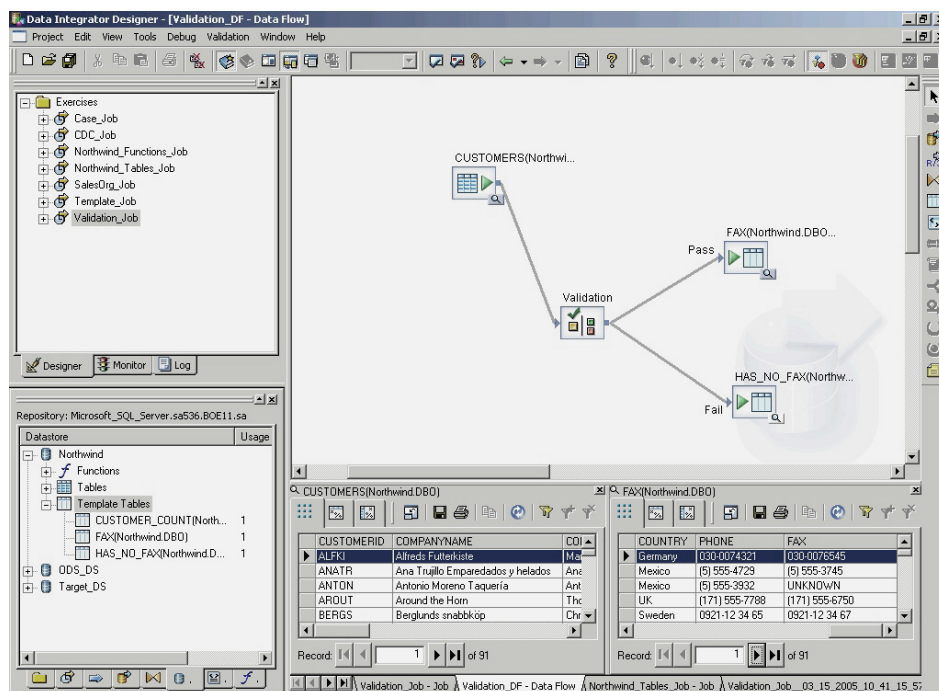


Figure 5: Previewing and Profiling Data Within the ETL Design Environment

## Data Validation

Data validation addresses the need for delivering trusted information through a productivity-enhancing process that ensures the accuracy of your data. A common challenge for ETL developers is exception handling – out of range data, fields with a null value, or incorrect data.

SAP BusinessObjects Data Integrator offers an efficient and flexible way to identify, correct, or reject erroneous data during the ETL process. Using a validation transform, you can define a reusable business rule to validate each record and column. For example, if you want to load only sales records for the month of October 2008, you could set up a validation rule that states, “Sales

date is between 10/1/08 to 10/31/08.” SAP BusinessObjects Data Integrator looks at the date field in each record to determine if the record meets this requirement. If it doesn't, you can choose to pass the record into a “fail” table, correct it, or do both.

## Data Auditing

Another challenge for developers is auditing the integrity of the ETL job against operational rules. SAP BusinessObjects Data Integrator has built-in auditing functions that allow you to collect audit statistics – such as row count, sum, average, and check sum – and verify them against user-defined operational rules. With data auditing, you can verify if the expected data is read, processed, and loaded success-

fully. For example, if you extract tables from flat files, you can verify that all 100,000 records successfully loaded into the data warehouse. You can also verify the successful execution of a join. Auditing helps you see if any rows are missing or if any joins have been configured improperly.

You can use audit statistics to specify rules to ensure that the correct amount of data is processed. In the case of errors, you can generate a notification of audit rule(s) failure. You can set the notification to e-mail notification, raise an exception, or run a custom audit script. In addition, the audit statistics persist in the repository of SAP BusinessObjects Data Integrator. This provides you with an audit trail for all your data integration jobs.

## Maximizing Developer Productivity

If you are currently building and maintaining SQL scripts to extract, transform, and load data from disparate sources into your data warehousing infrastructure, you must consider the productivity benefits that SAP BusinessObjects Data Integrator delivers. With SAP BusinessObjects Data Integrator, you can develop and maintain complex ETL routines without writing or maintaining custom code. Business intelligence deploys faster, and the ongoing maintenance challenges of growing data volumes and continuous change are managed in an efficient administrative environment. Your developers are more productive and can focus on delivering greater value to your organization at a lower total cost of ownership (TCO).

SAP BusinessObjects Data Integrator ensures maximum developer productivity through:

- A single design environment
- Ease of use
- Graphical data flow and workflow
- Extensive and reusable transformations and functions
- Interactive debugging and error trapping
- Portability
- Centralized management and administration
- Comprehensive changed-data capture support
- Batch and real-time data movement
- Comprehensive platform, source, and target support
- Deep integration with ERP and customer relationship management (CRM) applications
- Metadata management

#### A Single Design Environment

Whether you're moving data in batch or real time, or accessing and integrating data from mainframe or SAP applications, SAP BusinessObjects Data Integrator delivers maximum productivity through a single design environment. This enables faster time to deployment and easier maintenance, both of which can lower TCO. The design tool in SAP BusinessObjects Data Integrator is a graphical, Windows-based development environment where data mappings, transformations, and control logic are defined. With the design tool, you can create ETL jobs containing workflows and data flows. You can create objects and then use icons to drag, drop, and configure the objects. The objects in the design tool represent metadata; within the intuitive interface, you are

able to manage the metadata stored in the metadata repository in SAP BusinessObjects Data Integrator.

The design tool in SAP BusinessObjects Data Integrator allows users to work from a single tool to manage projects, profile data, create ETL jobs, cleanse and consolidate data, set parallel job execution, build workflows, and test, debug, and monitor ETL jobs.

#### Ease of Use

SAP BusinessObjects Data Integrator is a highly visual development environment. The vast majority of mappings are performed using the graphical interface by dragging and dropping objects. More complex mappings use drag-and-drop in combination with function wizards. SAP BusinessObjects Data Integrator includes many built-in functions, including conversion, date, string, validation, math, if-then-else, and lookup. SAP BusinessObjects Data Integrator also includes more than a dozen powerful and flexible transforms for slowly changing dimensions, hierarchy flattening of XML content, table comparison, merge, pivot, history preserving, data cleansing, data matching and consolidation, and data validation.

#### Graphical Data Flow and Workflow

SAP BusinessObjects Data Integrator projects are built graphically from data flows – the smallest reusable objects that load tables. Data flows can include complex logic, like the ability to read an unlimited number of data sources in one flow. They can be nested or combined into workflows, which dictate process order and conditions for processing. Workflows are combined into schedulable units called jobs.

All graphical objects in SAP BusinessObjects Data Integrator are self-documenting. This function, along with the ease of building complex business-logic data flows, makes ETL design faster and allows you to easily maintain your work within a single design environment. You can perform multiple transformation steps without writing code and easily build and combine complex data movement steps in reusable units of work that contain conditional logic based on your unique business rules.

#### Extensive and Reusable Transformations and Functions

SAP BusinessObjects Data Integrator has a library of prebuilt transformations that make common data warehousing tasks easy and help accelerate development. Reusable transformations are available for slowly changing dimensions, data validation, data cleansing, history preserving, table comparison, surrogate key generation, hierarchy flattening, and case statements. Many of the powerful transformation functions of SAP BusinessObjects Data Integrator can be found within the query transform. Functions such as sorting and aggregating data are performed within the query transform.

The vast majority of mappings are performed using a drag-and-drop function in the graphical interface. In the rare case when scripting is required, SAP BusinessObjects Data Integrator provides a powerful scripting language that includes all basic programming constructs, such as if-then-else, while, try, catch blocks, and global and local variables. Developers can use this scripting language to write reusable custom functions.

### Interactive Debugging and Error Trapping

SAP BusinessObjects Data Integrator provides built-in functions for managing data and improving the quality of the ETL design. Interactive debugging and error trapping help you easily track problems and identify errors in your ETL design. The interactive debugger allows you to debug one or more records by setting a breakpoint (that is, a condition) and a filter. The breakpoint suspends the ETL job when the condition is met and allows you to get only the next row of data, step to the next transform, or continue debugging. You can edit data on the fly and see how it progresses through the ETL process. Additionally, you can analyze a specific transform by viewing a range of data that passes through it. Interactive debugging helps ensure that you bring the right data into your environment. The ability to view and modify data within the single design environment helps maximize developer productivity.

### Portability

A typical challenge that developers have is editing ETL jobs to support different database environments. This is a common problem when you want to port jobs from a testing to a production environment. In addition, when ETL functionality is being built into an application through an OEM partnership, portability is necessary to easily deploy across different database environments. With SAP BusinessObjects Data Integrator, you can have a single data store that supports multiple database configurations, regardless of

database type, instance, or version. The single data store allows you to decrease end-to-end development time in a multisource, 24x7, enterprise data warehouse environment by allowing you to more easily port jobs among different database types, versions, and instances. For example, if you developed a job using Microsoft SQL Server source tables, you don't need to rebuild or configure the job to support an Oracle or Teradata environment.

This feature provides greater ease of use for job portability scenarios, such as:

- OEM (different connections for design and distribution)
- Migration (different connections for development, test, and production environments)
- Multi-instance (databases with different versions or locales)
- Multiuser (databases for central and local repositories)

### Centralized Management and Administration

The administrator tool in SAP BusinessObjects Data Integrator provides browser-based management and administration of resources, including:

- Scheduling, monitoring, and executing batch jobs
- Configuring, starting, and stopping real-time services
- Configuring the ETL job server and repository usage
- Configuring and managing interfaces
- Managing users

Although SAP BusinessObjects Data Integrator has a built-in job scheduler that enables you to schedule jobs, you can also launch jobs based on events. Event-driven scheduling is usually achieved through a third-party scheduler. SAP BusinessObjects Data Integrator support for the simple network management protocol (SNMP) allows it to integrate with network management products such as Tivoli, HP OpenView, and BMC Performance Manager (formerly BMC Patrol).

### Comprehensive Changed-Data Capture Support

Support for changed-data capture (CDC) is a requirement for organizations with large data-volume movement. Since only a small percentage of records change (update, insert, and delete) in a day, you want to be able to easily move only the changed data instead of the entire data set from your source applications. SAP BusinessObjects Data Integrator offers a log-based CDC approach that leverages native CDC technology from database and mainframe vendors. The advantage of a log-based approach is lower impact on source applications; SAP BusinessObjects Data Integrator reads from a database log instead of having source applications track and handle changes directly. For example, with Microsoft SQL Server, changed data is put into a distribution database that SAP BusinessObjects Data Integrator is able to read. SAP BusinessObjects Data Integrator supports mainframe CDC using IBM and Attunity technology.

### Batch and Real-Time Data Movement

SAP BusinessObjects Data Integrator provides batch and real-time data integration within a single tool and interface. Common data definitions across batch and real-time processes ensure data consistency and ease of development. Bidirectional, real-time interfaces and support for Web services allow for metadata integration with a wide array of tools and applications. You can graphically design real-time data flows that include logic to pull data from ERP and other enterprise applications to supplement a request and to construct a reply. These real-time data flows process requests and return messages in the form of XML. The message-processing server processes incoming messages and triggers outgoing messages in real time from any application.

SAP BusinessObjects Data Integrator easily transforms hierarchical documents, such as XML or electronic data interchange (EDI) documents, to a relational format. Hand coding these transformations is highly complex and difficult; breaking data down into a flat format is cumbersome and can cause loss in meaning and context. It can also degrade performance significantly. SAP BusinessObjects Data Integrator deals with transformations on a nested relational data model from within the graphical user interface, mitigating the need for hand coding. Hierarchical data can be combined with relational data or flat files in the same data flow.

SAP BusinessObjects Data Integrator offers comprehensive support for Web services and allows you to publish any

batch or real-time ETL jobs as a Web service called from another application. SAP BusinessObjects Data Integrator can also call Web service-enabled applications to easily access virtually any data.

### Comprehensive Platform, Source, and Target Support

SAP BusinessObjects Data Integrator can run on Windows, 64-bit Intel Itanium processors, and Red Hat Linux as well as IBM, HP, and Sun UNIX. With an extensive list of native database, application, mainframe, and technology interfaces that are available separately from SAP (see Figure 6), you can standardize on a single solution for all your data integration needs.

### Deep Integration with ERP and CRM Applications

SAP BusinessObjects Data Integrator significantly reduces the amount of time and expertise needed to access, integrate, and deliver data from ERP and CRM applications (see Figure 7). Customers can import live ERP descriptive metadata from SAP, Oracle, and Siebel applications and use it to design integration projects offline. Built-in search functions make it faster to extract metadata from ERP applications, while the presentation of metadata makes it easier to design integration projects.

Within the design tool of SAP BusinessObjects Data Integrator, ERP data appears in the same table and column format as any other source. Native application interfaces deal directly with data dictionaries so you can concen-

Managers can monitor performance against targets and make on-going adjustments based on business conditions, emerging trends, and potential variances.

trate on building ETL jobs and not worry about becoming experts in the ERP application itself. And when metadata is imported, SAP BusinessObjects Data Integrator automatically captures customizations made to ERP and CRM applications. Alternatively, you can import single tables, functions, or other objects on an individual basis. SAP BusinessObjects Data Integrator has built-in utilities that help you determine changes that have been made to data sources.

### Metadata Management

Each SAP BusinessObjects Data Integrator repository is stored on an existing relational database and must be associated with one or more instances of an SAP BusinessObjects Data Integrator data server.

SAP BusinessObjects Data Integrator captures all metadata about the ETL process from source-to-target BI reports and analytics. This includes source-to-target transforms, propagation of business descriptions, opera-



<b>Database Interfaces</b> <ul style="list-style-type: none"> <li>■ Oracle</li> <li>■ IBM DB2</li> <li>■ Sybase</li> <li>■ Microsoft SQL Server</li> <li>■ IBM Informix</li> <li>■ Teradata</li> <li>■ Microsoft online database connectivity</li> </ul>	<b>Mainframe Bulk Interfaces</b> <ul style="list-style-type: none"> <li>■ ADABAS</li> <li>■ DataCom</li> <li>■ IBM DB2 universal database (UDB)</li> <li>■ IDMS</li> <li>■ IBM IMS</li> <li>■ Sequential files</li> <li>■ Virtual storage access method (VSAM)</li> </ul>	<b>Technology Interfaces</b> <ul style="list-style-type: none"> <li>■ IBM MQSeries</li> <li>■ HTTP/HTTPS</li> <li>■ Java Message Service</li> <li>■ Extensible markup language (XML)</li> <li>■ SOAP</li> <li>■ Firstlogic</li> <li>■ Trillian</li> <li>■ Web services</li> <li>■ COBOL Copybooks</li> <li>■ Simple network management protocol (SNMP)</li> <li>■ Web service definition language (WSDL)</li> <li>■ Crystal Reports®</li> </ul>
<b>Application Interfaces</b> <ul style="list-style-type: none"> <li>■ SAP® ERP</li> <li>■ J.D. Edwards</li> <li>■ Oracle</li> <li>■ PeopleSoft</li> <li>■ Siebel</li> </ul>	<b>Mainframe Live Interfaces</b> <ul style="list-style-type: none"> <li>■ ADABAS</li> <li>■ IBM DB2 UDB</li> <li>■ IDMS</li> <li>■ IMS</li> <li>■ VSAM CICS</li> </ul>	

Figure 6: Standards-Based Source and Target Support from SAP® BusinessObjects™ Data Integrator

tional data, and mapping data in which SAP BusinessObjects Web Intelligence or Crystal Reports uses the source data as well as the tool metadata. SAP BusinessObjects Data Integrator automatically manages and captures metadata within the metadata repository, and you can add notes and descriptions to objects.

Customizable, Web-based metadata reports provide impact analysis, lineage, where-used lists, execution statistics, and historical execution analysis. Metadata is available externally to SAP BusinessObjects Data Integrator via an export utility to products like ERwin or via the common warehouse metadata interchange (CWM).

All SAP BusinessObjects Data Integrator metadata is held within a relational database of the customer's choice. The metadata is open, and the metadata repository schema is published. SAP BusinessObjects Data Integrator provides open support for the following standards and technologies: CWM, ERwin XML, XML metadata inter-

change (XMI), and XML schema. You can also query metadata through straight SQL access against the source relational tables.

SAP BusinessObjects Data Integrator is unique in its ability to share metadata from source applications all the way through to target reports and dashboards, providing customers with a single-vendor, end-to-end solution. With this level of metadata integration, the combination of SAP BusinessObjects Data Integrator and the intelligence platform provides you with:

- Source-to-target impact analysis across all ETL processes
- Report-to-source data lineage
- Source-to-dashboard real-time integration
- Source-to-target report auditing
- Automatic creation of the semantic reporting layer for both Crystal Reports and SAP BusinessObjects Web Intelligence documents
- ETL auditing reports on execution statistics, trace, and error metadata

<b>SAP® ERP</b> <ul style="list-style-type: none"> <li>■ ABAP™</li> <li>■ BAPI®</li> <li>■ Intermediate document (IDOC)</li> <li>■ Hierarchies</li> <li>■ Functions</li> <li>■ Pool and cluster tables</li> <li>■ Z tables</li> </ul>	<b>Oracle</b> <ul style="list-style-type: none"> <li>■ Open interface</li> <li>■ Flexfields</li> <li>■ Advanced queuing</li> </ul> <b>Siebel</b> <ul style="list-style-type: none"> <li>■ Table and column description</li> <li>■ Business component</li> </ul>	<b>PeopleSoft</b> <ul style="list-style-type: none"> <li>■ Effective dates</li> <li>■ Domains</li> <li>■ Trees</li> <li>■ Panels</li> </ul> <b>J.D. Edwards</b> <ul style="list-style-type: none"> <li>■ Numeric formats</li> <li>■ Date and time formats</li> <li>■ Module objects</li> </ul>
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Figure 7: Access to Leading ERP and CRM Applications

# RAPID AND FLEXIBLE DEPLOYMENT

## GET READY FOR END-TO-END BUSINESS INTELLIGENCE

SAP BusinessObjects Edge is designed for rapid deployment, so you can quickly start realizing the benefits of BI. Its all-in-one packaging gives you everything you need to start addressing your BI needs – software licenses, technical support, software updates, and maintenance services.

### Operating Systems

SAP BusinessObjects Edge can be deployed on Windows and on Red Hat and Novell SuSE Linux machines. All guided installation tools provide quick and efficient services deployment on the chosen platform. For Microsoft Windows users, SAP BusinessObjects Edge includes a wizard-driven installation routine to ease setup and configuration. For Linux environments, shell scripts are used to install and configure each of the system services on the available hardware.

### Application Frameworks

SAP BusinessObjects Enterprise provides tight integration with Java and Microsoft-based platforms via SDKs for native Java Platform, Enterprise Edition, and Microsoft .NET. These kits are made up of robust components, sample applications, and documenta-

tion. Developers install these components on Web application platforms, including BEA WebLogic Server, IBM WebSphere Application Server, Apache, Microsoft Internet Information Services, Oracle Application Server 10g, and Sun Java System Web Server.<sup>4</sup>

### Quick-Start Packs

You can choose from a variety of “quick-start” packs (available separately from SAP and our solution provider partners) for access to a tailored collection of templates and data connections that help apply BI to your existing line of business applications or industry needs. Built by our experienced BI partners, quick-start packs deliver relevant BI to meet your organization’s needs.

### SAP BusinessObjects Rapid Marts

SAP BusinessObjects Rapid Marts® packages<sup>5</sup> (available separately from SAP) deliver a packaged data integration solution for ERP and CRM applications from vendors such as SAP, PeopleSoft, Oracle, and Siebel. Rather than designing a data warehouse or data mart from scratch, you can use

SAP BusinessObjects Rapid Marts packages to obtain prebuilt reports, data flows, and data schemas; identification of source-to-target mappings and transformations; and a basis for quick implementation and testing.

### BI for SAP Customers

SAP BusinessObjects Edge delivers end-to-end BI for SAP customers, with reports and dashboards created either directly on top of SAP software or via SAP BusinessObjects Rapid Marts packages.

#### Integration for SAP Software

SAP BusinessObjects Edge provides Crystal Reports developers with powerful, native access to SAP software (see Figure 8), including existing SAP info sets and queries written in the ABAP™ programming language. Reports can also be written with an Open SQL driver, which provides powerful and easy access to SAP transparent tables, pool tables, cluster tables, and views. SAP BusinessObjects Edge also has built-in SAP module-specific integration, for example, reporting on nonstandard data clusters in the SAP ERP Human Capital Management solution. Report writers can easily choose the area they wish to report on and select the fields to be displayed using meaningful field descriptions rather than technical terminology.

4. SAP BusinessObjects Data Integrator requires a Tomcat application server. For specific platform support, please refer to the online documentation or speak with your account representative.

5. SAP BusinessObjects Rapid Marts packages require SAP BusinessObjects Data Integrator, which is included in the SAP BusinessObjects Edge version with data integration.

## SAP BusinessObjects Rapid Marts Packages

SAP BusinessObjects Rapid Marts packages for SAP solutions contain preconfigured data warehousing and BI content for SAP solutions as well as preconfigured best-practice sample reports.

The reports in these packages include information across all areas of your business, such as sales and marketing, finance and operations, inventory and purchasing, and manufacturing and distribution. For example:

- The SAP BusinessObjects Sales Rapid Mart package provides reports about bookings, billings, and backlogs as well as on-time deliveries and invalid documents.
- The SAP BusinessObjects Accounts Receivable Rapid Mart package provides reports about revenue, discounts, and late payments as well as receivable aging, days sales outstanding, and cash flow.
- The SAP BusinessObjects Inventory Rapid Mart package provides reports about batch, physical, and reserved inventory as well as material movement, stock valuation, and production orders.

- The SAP BusinessObjects HR Rapid Mart package provides reports about employee demographics, wages, and benefits enrollment as well as headcount and compensation by organizational units and country.

Functionality in SAP BusinessObjects Rapid Marts packages can browse and import metadata from data dictionaries in SAP solutions and automatically gen-

erate optimized ABAP for batch data extraction from solutions' data structures, including pooled, clustered, and transparent tables. SAP BusinessObjects Rapid Marts packages eliminate the need for custom coding, providing real-time interfaces to BAPI® programming interfaces, inbound and outbound intermediate docs (IDocs), and support for application link enabling (ALE) and remote function calls (RFCs).

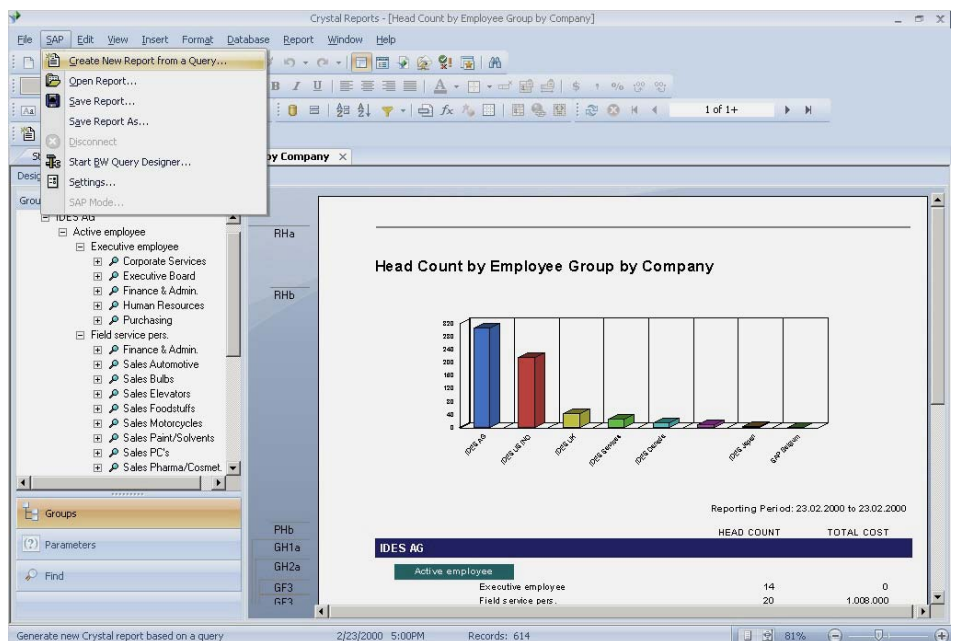


Figure 8: Report Authoring with Native Access to SAP® Software from Crystal Reports®

## CONCLUSION

### BUSINESS INTELLIGENCE SOLUTIONS FOR YOUR GROWING ORGANIZATION

SAP BusinessObjects Edge is the end-to-end BI solution for growing companies. Our BI tools empower business users to access and report on trusted data from across the organization and to share and collaborate with others to drive business growth. SAP BusinessObjects Edge is packaged for rapid deployment, allowing your organization to get up and running quickly. Its underlying intelligence platform is designed for extensibility – adapting to changing requirements as you purchase new services, deploy new and innovative tools, adopt new platforms, acquire new hardware or software, or provide access to more users. With SAP BusinessObjects Edge, you can successfully organize and manage all your data sources.



With the increased visibility and alignment provided by SAP BusinessObjects Edge, your company can be more agile and better able to meet your growth and profitability objectives.

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## Summary

SAP® BusinessObjects™ Edge software is a complete business intelligence solution priced, packaged, and designed to meet the needs of small businesses and midsize companies. Fast to deploy, with an intuitive interface, SAP BusinessObjects Edge enables companies to get insight from their business data for well-informed, fact-based decision making.

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## Challenges

- Improve decision making by providing a single version of the truth that's accessible to all authorized users
  - Enable employees to create and maintain their own queries, reports, analyses, and dashboards without having to rely on IT staff
  - Eliminate the use of homegrown spreadsheets, application adapters, data integrators, and user interfaces that are expensive to maintain and hard to use
  - Control access to sensitive business data and prevent unauthorized use of information
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## Key Features

- **Enterprise reporting** – Access any data source, create any type of report, and deliver reports through any distribution channel
  - **Ad hoc query and analysis** – Enable users to ask a question, receive an answer, and ask more questions based on report results
  - **Data visualization** – Enable users to monitor trends and variances, identify root causes, and model scenarios
  - **Data integration and quality** – Consolidate and cleanse data across multiple sources to ensure complete, accurate, and trusted information for operational and strategic decision making
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## Business Benefits

- **Low cost** with functionality available in a concurrent-access license model
  - **Fast deployment** with common installation, security, and metadata as well as prebuilt solutions and packages
  - **Strong governance** with data-level security, impact analysis, and data lineage
  - **High productivity** with alerts, guided navigation, a patented semantic layer, and intuitive interfaces
  - **Great agility** with clear visibility into business processes, business partners, and financial performance
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## For More Information

To learn more about SAP BusinessObjects Edge, call your SAP representative or visit us on the Web at [www.sap.com/sapbusinessobjects](http://www.sap.com/sapbusinessobjects).

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