EXECUTIVE SUMMARY

This paper provides a technical overview of BusinessObjects™ XI. BusinessObjects Enterprise is the business intelligence (BI) platform that supports BusinessObjects XI. It is designed to let IT manage and securely deploy specialized end-user tools and applications for reporting, query and analysis, and performance management on a proven, scalable, and open service-oriented architecture. The scalable, reliable, high-performance architecture delivers business insight to all end users with a flexible system that allows organizations to deploy and standardize BI implementations with confidence.

This paper outlines the overall platform architecture, system tiers, and individual services and components that make up the BI platform. We’ve included information that will help IT and administrators understand the essentials of BusinessObjects Enterprise and help them plan the deployment, management, and maintenance of the system. For more extensive documentation, installation guides, and deployment strategy support, refer to the documentation available with BusinessObjects XI.

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BusinessObjects Enterprise XI is the modern, service-oriented architecture (SOA) BI platform from Business Objects, an SAP company, currently used by thousands of global organizations to deliver mission-critical information that helps companies track, understand, and manage their business. BusinessObjects Enterprise XI combines the underlying platform services including publishing, security, management, and the powerful Business Objects semantic layer and BI tools. It provides the complete BI platform for specialized end-user tools including Crystal Reports®, BusinessObjects Web Intelligence®, BusinessObjects Desktop Intelligence®, BusinessObjects Dashboard Builder, BusinessObjects Performance Manager, and a series of analytic engines and applications.

The BusinessObjects Enterprise BI platform was designed to integrate seamlessly with existing web and rich-client application investments without imposing a new set of standards and processes. The platform helps our customers extend their current Business Objects and Crystal technology investments with an extensive set of upgrade tools and single platform support.

BusinessObjects Enterprise provides organizations the ability to mix operating systems and servers and to meet ever-changing business needs. It has proven near-linear scalability, supported by published benchmarks and numerous deployments, with user bases greater than 1,000. It provides superior reliability with services redundancy and delivers enterprise-class reliability backed by third-party certifications. BusinessObjects XI Release 2 also offers specific capabilities to drive performance, such as built-in load balancing, caching services, and data sharing (the ability to share the same data for different reports). The result is a platform you can trust to power your current and future BI initiatives.

SERVICE-ORIENTED ARCHITECTURE
A BI platform is a vital component of an overall enterprise IT infrastructure and provides a key support system for corporate information access and decision-making. Customers depend on the BI platform to enable organizations to track, understand, and manage their businesses. This necessitates a readily available and highly efficient architecture for processing, managing, and delivering critical information and analysis to a broad user base.

BusinessObjects Enterprise is built on a modern, sophisticated service-oriented architecture and is designed for flexibility and extensibility so it can manage and grow with the varied demands of BI. BusinessObjects Enterprise XI was architected using modern web standards with an industry-standard communication framework to tie all the components and services together. Customers and third-party benchmarks have recognized it as one of the industry’s most scalable, reliable, and powerful platforms.
BusinessObjects Enterprise XI includes specialized services including Web Intelligence components, Desktop Intelligence components, Crystal Reports components, and an entire set of performance management services for dashboards, metrics management, predictive analysis, process analysis, and more. Due to the open and extensible nature of these products, the services can integrate or plug directly into the framework and instantly take advantage of the platform performance, failover, and load-balancing capabilities.

DEPLOYMENT SCENARIOS
The BusinessObjects Enterprise XI platform can be deployed on Windows, Solaris, IBM AIX, HP-UX, and Red Hat and Novell SuSE Linux machines. All BusinessObjects Enterprise XI services are OS- and server-agnostic and can reside anywhere in the network. Guided installation tools provide quick and efficient services deployment on the chosen platform. For Windows users, BusinessObjects Enterprise includes a wizard-driven installation routine to ease system setup and configuration. For UNIX environments, shell scripts are used to install and configure each of the system services on the available hardware.

The deployment flexibility offered by BusinessObjects Enterpriser XI allows the following advantages:

• IT departments can capitalize on performance efficiencies by dedicating specific servers to specific BI tasks or services

• Organizations can deploy all XI Release 2 services in an existing heterogeneous server environment to lower their total cost-of-ownership without sacrificing the flexibility to adapt to future architecture decisions

• Customers can respond to changing BI needs over time by starting with one or a few servers and then adding more servers over time as their BI needs change

• Customers can avoid vendor lock-in by retaining a multioperating system strategy

PERFORMANCE AND BENCHMARKS
BusinessObjects Enterprise is architected for high performance across the broad spectrum of user and deployment scenarios. For example, specialized platform services are included that handle either on-demand data access and report generation or time- and event-based report scheduling. You can offload processor intensive scheduling and processing to dedicated servers to minimize performance impact for end users who are simply viewing and interacting with documents. The entire architecture is designed to meet the needs of virtually any BI deployment and is
flexible enough to grow from several users with a single tool, to tens of thousands of users with multiple tools, interfaces, and user types.

BusinessObjects Enterprise has undergone rigorous internal benchmark and performance tests throughout the product development cycle. The testing continues throughout the product lifecycle to ensure that it continues to meet customer performance needs. In addition, the product is tested with third-party testing labs on various platforms. Business Objects provides sizing guides and tools to estimate the required deployment architecture for different usage scenarios.
The BusinessObjects Enterprise XI technical architecture is composed of a complete set of separate, yet interconnected, tiers each optimized for specific tasks and operations. The architecture is based completely on modern web standards for inter service-to-service communications across internet networks. This communication protocol is based on the Internet Inter ORB Protocol (IIOP) which is the communication method of choice for a majority of web application servers and enterprise applications available today. This communication method continues as the preferred choice for Business Objects due to the latency challenges and unnecessary network traffic common with other approaches, including Simple Open Access Protocol (SOAP).

All end-user tools, portals, and portal integration kits are built on top of the platform. Developers can easily access the platform using a complete set of web services, Java, and .NET APIs. The result is the best of both worlds when it comes to the BI platform. The platform delivers a powerful, high-performance BI 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 all the flexibility developers need to customize the user experience, integrate the BI platform in enterprise applications, and connect to data and documents stored using the integrated development environment of choice.
These architecture tiers include:

• User Interaction
• Developer Services
• Platform Services
• Data Services

End users can access, create, edit, and interact with specialized tools and applications that include:

• Crystal Reports
• Web Intelligence
• Desktop Intelligence
• Voyager
• Performance Manager
• Dashboard Builder
• Performance management applications

IT use data and system management tools that include:

• Central Management Console
• Central Configuration Manager
• Import Wizard
• Publishing Wizard
• Universe Designer

Combined, the BI system supports the entire range of end-user tools on a common, secure, scalable, and reliable platform. BusinessObjects Enterprise XI also includes an updated BI portal and a fully web-based management environment.
BUSINESSOBJECTS INFOVIEW
BusinessObjects Enterprise XI includes an intuitive portal for both Java and .NET platforms. BusinessObjects InfoView allows customers to provide access to BI to large groups of users via the web, without the challenges of deploying desktop software products. With its single web interface, it can access and interact with any type of business intelligence including reports, analytics, dashboards, scorecards, and strategy maps.

InfoView Discussions offers end users the ability to collaborate and share insight on different content types, while the Encyclopedia feature helps end users locate and interpret their corporate information for more confident and accurate decision-making.

PORTAL INTEGRATION KITS
Business Objects provides portal integration kits to enable our customers to integrate business intelligence content into industry-leading enterprise portals. BusinessObjects Enterprise XI includes prebuilt integration kits for BEA WebLogic Portal, IBM WebSphere Portal Server, Microsoft SharePoint Server, SAP.
Enterprise Portal, and Oracle Portal Server. These portal integration kits were built based on portal standards such as JSR-168, enabling interoperability between portals and portlets. Additional portlets and portal integration kits can be built by partners or customers using the software development kits (SDKs) provided with BusinessObjects Enterprise XI.

**DASHBOARDS AND SCORECARDS**

BusinessObjects Enterprise XI supports an entire set of performance management tools that help organizations align corporate actions with strategy by tracking and analyzing key business metrics and goals via management dashboards, scorecards, and alerting. Business Objects dashboard and scorecard products consist of an integrated dashboard, scorecard, and dashboard builder, as well as a catalog of analytic templates and five integrated analytic engines. The five analytic engines (metrics, rules, sets, predictive, and process analysis) provide the processing power to monitor performance, alert to exceptions, track customer segments, forecast, and analyze business processes.

**MICROSOFT OFFICE INTEGRATION**

BusinessObjects Enterprise XI includes tight integration with Microsoft Office including the ability to store and manage Word, PowerPoint, and Excel documents in the system repository. With BusinessObjects Live Office, end users embed accurate, updatable data in documents, spreadsheets, and presentations while allowing IT to maintain control of the underlying information. Users can then refresh the view or modify document parameters from within Office by logging in to BusinessObjects Enterprise. Live Office provides business users with easy access to the data available within Web Intelligence documents for live integration into their PowerPoint, Word, and Excel files. Live Office also offers the ability to filter data from a Crystal report using dynamic and cascading prompt pick lists. In addition, users can dynamically change the data viewed in their reports by using pick lists generated from Crystal Reports parameters.

In this release Live Office has been enhanced to make the process of accessing trusted data within Microsoft Office even simpler. Users will be able to create new queries directly from within Office documents, with the addition of a query panel that utilizes the Business Objects semantic layer. This can further reduce the time and resources spent adding trusted data into presentations and documents, where no Web Intelligence or Crystal report exists to meet the requirement. This release also includes the ability to add secure, refreshable tables and charts from Web Intelligence documents (known as “report parts”). This allows customers to gain further value from their Web Intelligence documents and help ensure consistent
use of data across the organization. Finally, customers can use Live Office in an extranet deployment, enabling them to make available secure, trusted business intelligence to users outside their firewall.

**KEY USER INTERACTION INNOVATIONS**

**Search**

BusinessObjects Enterprise already delivers innovative capabilities to bring the simplicity of search to the world of business intelligence. This allows BusinessObjects XI users to search using the familiar Google interface and retrieve, index, and deliver BI content, presentations, business content in documents, and web pages. In this current release, an additional set of capabilities further advance the concept of search-based business intelligence.

These new capabilities reduce 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 InfoView, users will quickly see a relevant, categorized, and ranked set of results from with their XI Release 2 system. Other new search capabilities include 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 BusinessObjects advanced semantics, and step-by-step refining of results based on a user selecting defined subsets of document.

**Encyclopedia**

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

**Threaded Discussions**

Discussions provide threaded notes that enable users to create and maintain comments on any documents in BusinessObjects Enterprise. Discussions are a fully integrated feature of the BusinessObjects Enterprise environment and are displayed in the InfoView portal. The system manages all threaded discussion information and stores it in the repository. Discussion threads can be added to Crystal Reports, Web Intelligence, and OLAP documents, and third-party managed documents like Microsoft Word or Adobe PDF.
DEVELOPER SERVICES: CONNECTING THE PLATFORM TO THE USERS

DEVELOPER INTERFACES
BusinessObjects Enterprise is composed of a powerful set of BI services, exposed through a set of software development kits (SDK). All of the end-user interfaces provided by the platform are built on top of these SDKs, ensuring developers can access all aspects of the system. These object models encapsulate all the calls needed to extract content listings from the system, control content processing and delivery, view content, interact with content, and administer the system. And all the sample applications included with the product use this well-documented object model.

JAVA AND .NET SDKS
BusinessObjects Enterprise provides tight integration with Java and Microsoft-based platforms via native Java Platform, Enterprise Edition and Microsoft .NET. These kits are made up of robust components, sample applications, and documentation. Developers install these components on web application platforms including BEA WebLogic Server, IBM WebSphere Application Server, Apache, Microsoft Internet Information Services, Oracle 10g Application Server, or Sun Java System Web Server. For specific platform support, please refer to the online documentation or contact your account representative.

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

From a technical perspective, BusinessObjects Enterprise systems use the BusinessObjects Enterprise Java SDK or the BusinessObjects Enterprise .NET SDK to run the system with a third-party application server. The application server acts as the gateway between the web server and the rest of BusinessObjects Enterprise components. The application server is responsible for processing requests from your browser, sending certain requests to the web component adapter (WCA) and using the SDK to interpret components in Java server pages (.jsp files) or in active server pages (.aspx files). BusinessObjects Enterprise XI continues to support Crystal Server Pages (.csp) for legacy system support. However, developers are encouraged to use industry standard .jsp and .asp whenever possible when building web applications.

1 The web component adapter runs on the web application server and provides all services that are not directly supported by the BusinessObjects Enterprise SDK.
WEB SERVICE SDK
Business Objects offers a comprehensive set of web services that supports organizations extending the reach of BI beyond the traditional corporate boundaries. The BusinessObjects web service SDK makes it easier and faster to integrate BusinessObjects technology with other web-based applications, and it facilitates the deployment of BusinessObjects XI with customized applications.

These web services are made available through a software development kit and consist of two parts—the server and the consumer. On the server side, web services are deployed with BusinessObjects Enterprise XI and are based on the Java Platform, Enterprise Edition framework. On the consumer side, the application programming interface (API) enables consumers to create web services that access XI Release 2 functionality using .NET or Java Platform, Enterprise Edition.

BusinessObjects Enterprise XI offers a broad range of web services that include:

- **Session**, for authentication, authorization, and user-setting management
- **BIPlatform**, to expose advanced platform features such as scheduling, search, user and group administration, server administration, platform events, and calendars
- **ReportEngine**, to display Web Intelligence and Crystal Reports in HTML, PDF, Excel, and XML format
- **Query**, to build ad hoc query based on the Business Objects universe semantic layer

QUERY AS A WEB SERVICE
Business Objects Query as a Web Service is a wizard-based application that allows the creation of custom web services for specific queries. Query as a Web Service gives customers the ability to integrate queries with any application or tool. This ensures customers’ standard semantic layer (the BusinessObjects universe) can become the central hub of delivery for secure, trusted information wherever it is needed.

Using the simple-to-use wizard-based client component, IT staff 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 any application. A catalogue of queries as web services can be stored and managed 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 business intelligence within other applications or tools such as Xcelsius Enterprise as simple and manageable as possible.
PLATFORM SERVICES OVERVIEW
The platform services tier is the core processing and management engine for BusinessObjects Enterprise XI. The BI 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 takes place. The platform is segmented into a series of specialized services for different tasks and is linked by a highly-optimized communication framework. The individual services can be run from a single processor, multiple processors on the same machine, or in virtually any clustered multi-server environment.

The communication framework handles the movement of information between the platform services and SDKs, and provides end-user information access, delivery, and interaction. You can access individual services via the provided Java, .NET, and web service SDKs so there is no need to directly access or configure the communication framework. This communication framework is built on proven application technology and 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 BI platform. In addition, specialized administration interfaces are provided when you require administration of specific-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 BI platform that meets the needs of end users while providing IT with full control over the deployment.

BUSINESSOBJECTS ENTERPRISE PLATFORM SERVICES
BusinessObjects Enterprise includes the entire set of cross-platform BI services and supports leading server and application platforms including Microsoft Windows, Sun Solaris, IBM AIX, HP-UX, Red Hat Linux, and Novell SUSE Linux. In addition, it provides support for Java and .NET application servers and web servers.

The platform 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.

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.
The BusinessObjects Enterprise platform is comprised of a set of components or services, connected with a powerful web-based communication framework.

**MANAGEMENT SERVER**

The Central Management Server (CMS) is the central platform service and is responsible for maintaining a database of information about your BusinessObjects Enterprise XI system. All the platform services are managed and controlled by the CMS. The CMS also manages access to the system file store where the physical documents are actually managed. The system repository database is maintained using the provided MySQL database, or by using your preferred IBM DB2, Microsoft SQL Server, Oracle database, or Sybase ASE1. The database structure is automatically created when you set up your BusinessObjects Enterprise XI system 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, BusinessObjects Enterprise content, and services. The CMS also maintains the BusinessObjects Enterprise repository, and a separate audit database of information about user actions. The CMS performs four main tasks:

- Maintaining Security. By maintaining a database of users and their associated object rights, the CMS enforces access rights to BusinessObjects Enterprise and the types of tasks users are able to perform. The platform manages user access and content delivery to broad internal and external user audiences. Building on a hierarchical object-level security model, BusinessObjects Enterprise enables the application of rights at both the folder and object level, and supports full inheri-

2 Please refer to our supported platform documentation for exact versions
tance at the user and group level. Similarly, it supports aggregation through a flex-
ible, group-user membership model.

The system is designed for access and integration with third-party security sys-
tems including the Lightweight Directory Access Protocol (LDAP), CA Siteminder,
Microsoft Active Directory, and Windows NT. The BusinessObjects Enterprise
security system directly maps to these security systems so when a user is added
to an LDAP group, he or she is automatically added to that same group within the
platform. In addition, an integrated security system is available for those customers
who do not currently use an entitlement database. The system also supports
the ability to use more than one entitlement database in the same implementation. This
is particularly important in cases where organizations need to combine different
audiences. For example, a system might maintain that internal users 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 system objects are called InfoObjects and essentially contain
all the information about the actual object. The physical documents or objects are
stored in a file store. The separation of the object definition (metadata) from the
physical document allows for fast and efficient processing as only the required
information is retrieved from the system’s repository. In addition, by communicat-
ing with the scheduling and processing services, the CMS is able to ensure that
scheduled jobs run at the appropriate times.

- Managing Servers. By staying in frequent contact with each of the services in the
system, the CMS is able to maintain a list of service status. Report services access
this list, for instance, to identify which cache server is free for a report viewing
request. BusinessObjects Enterprise XI includes adaptive Crystal Reports page
generation services that automatically add or remove service instances as work
loads change or services become unavailable.

The CMS also handles intelligent load balancing and automated clustering using
algorithms to eliminate bottlenecks and maximize hardware efficiency. In a multi-
server environment, balancing load efficiently across multiple machines greatly
enhances scalability and end-user response time. Therefore, most implementa-
tions do not require separate third-party load balancing software.

- Managing Auditing. By collecting information about user actions from each Busi-
nessObjects Enterprise service and writing these records to a central audit data-
base, the CMS acts as the system auditor. This audit information allows system
administrators to better track and manage their BusinessObjects Enterprise XI
deployment.
Typically, administrators provide the CMS with database connectivity and credentials when they install BusinessObjects Enterprise XI, so the CMS can create its own system database and BusinessObjects Enterprise repository database using your organization’s preferred database server. The auditing functionality allows administrators to better understand which users accessed the enterprise system, which documents they interacted with, and the overall system metrics for system optimization. The usage data is collected from the system interactions, and then written in a usable form to the auditing database. A sample universe and a set of sample auditing reports are also available to provide fast access to information such as the most accessed reports, peak system use times, and average user session times. With new compliance regulations like Sarbanes-Oxley and Basel II, capturing and storing audit information is a critical component for any BI system.

FILE REPOSITORY SERVICES
In every BusinessObjects Enterprise XI implementation, there is both an input and an output file repository service. The input file repository server manages all of the objects managed by the platform. The output file repository server manages all of the report instances generated by the scheduling services.

EVENT SERVICES
The event service manages three event types: file-based, scheduled, or 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 as they are added to the application. After the file-based event is created and stored in BusinessObjects Enterprise XI, 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 your 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 manager, allowing the manager to take the appropriate action.

Scheduled events are an effective way to link the execution of reports together. It is possible to have a report schedule processed 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 your file-based event.
SCHEDULE SERVICES
Job servers provide scheduling capabilities for Crystal Reports, Web Intelligence, Desktop Intelligence as well as refreshing performance management metrics. 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. There are many options 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 Crystal Reports, Web Intelligence, Desktop Intelligence, Excel, CSV, PDF, Word, and text and schedule to different destinations including email, printer, or file server.

A job server processes scheduled actions on objects at the request of the CMS. 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, BusinessObjects Enterprise. 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 will be 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. The 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 request and the rights he or she has 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 conserve database traffic and use of unnecessary database licenses.

CACHE SERVICES
The cache services are responsible for handling all report viewing requests. The cache service checks whether or not 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 has been 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, BusinessObjects Enterprise XI 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.

• **Crystal Reports Cache Server** The cache server is accessed before the page server is used. If the cache server does not 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.

BusinessObjects Enterprise XI also supports active data sharing with Crystal Reports. Active data sharing means that in situations where different reports access the same data, the documents can use shared data and the requested report can be rendered without an additional database hit even though the other report itself 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 as the load and usage increases, more data is cached, and the system runs more efficiently.

• **Desktop Intelligence Cache Server** As with the Crystal Reports cache server, the Desktop Intelligence cache server is accessed before the page server is used. If the cache server cannot 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.

**REPORT SERVICES**

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

For users who want to conduct ad hoc query and analysis, the Web Intelligence reports server requests a predefined metadata object, called a universe, from the repository and opens an HTML or Java-based query panel. Users select fields and/ or filters through the interface. The Web Intelligence report server handles report modification and interaction. Due to the interactive nature of Web Intelligence, no separate report application server is required.
Desktop Intelligence Report Services

The Desktop Intelligence Report service is the core engine that handles the collection of data, formatting, and layout of a Desktop Intelligence document. As a core service, it communicates with the CMS when a document is requested. The service handles connection to the universe to collect the data. The CMS determines the user rights to the document and then generates the information required to view with the document.

Report Modification Services

The Crystal Reports Report Application Server (RAS) is used by Business Objects provided or custom-written applications that address interactive report creation and modification scenarios. When RAS is used within BusinessObjects Enterprise, these applications are generally 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 Server processes these requests. The RAS API that is used to create and modify reports is remoteable—meaning that the application that uses the RAS API can reside on a separate machine from the RAS Server. When used in combination with the BusinessObjects Enterprise SDK, RAS can create reports and save them into the BusinessObjects Enterprise Repository.

RAS is different from the Page Server in that it is optimized to meet the needs of report creation and modification scenarios. The Page Server / Cache Server combination is optimized for report viewing.

New Multi-Dimensional Analysis Services

BusinessObjects Voyager is a new web-based application that enables business analysts to easily navigate and perform analysis on their various OLAP data sources. It is a compelling next-generation web-based OLAP client and one of the key differences from OLAP Intelligence is the focus on providing the best possible user experience for analyst users.

Voyager documents are processed via the CMS and are serviced by the new Multi-Dimensional Analysis Services (MDAS) Server. Unlike OLAP Intelligence which used the Web Component Adaptor, this new server is dedicated to Voyager and provides a scalable architecture to distribute load as the number of users increases. The CMS is used for user authentication and managing access rights to Voyager workspaces and connections while data level security is managed by the OLAP server. The web-based viewing and interaction requires sign on to both the BusinessObjects Enterprise XI Release 2 platform and the OLAP data source, except for MS Analysis Services and SAP BW where single sign-on is supported.
Voyager supports the following OLAP servers:

- Essbase 7.0.x, 7.1.x and 9.0.x
- SAP BW v3.0b, 3.1c, 3.5, and SAP BI 7
- MSAS 2000 SP4
- MSAS 2005 SP1
- Oracle OLAP 10g R2 (planned to be delivered in H2 2007)

PERFORMANCE MANAGEMENT SERVICES

BusinessObjects XI integrates specialized analytic engine services to support dashboard, scorecard and analytic products. Each of these services can be configured separately depending on the license options purchased and the specific implementation requirements. More information on these services is available separately.

*Within the performance management framework, there are specific graphic and analytic engine services managed by BusinessObjects Enterprise. The arrow signifies that all these services plug directly into the Enterprise communication framework and take advantage of the platform management and deployment capabilities.*
ENTERPRISE COMMUNICATION FRAMEWORK
Within the performance management framework, there are specific graphic and analytic engine services managed by BusinessObjects Enterprise. The arrow signifies that all these services plug directly into the Enterprise communication framework and take advantage of the platform management and deployment capabilities.

The services are:
• Analytics Service
• Metrics Service
• Rules Service
• Mining Service
• Profiling Service
• Query Management Service
• Dashboard Management Service
• Performance Management Service
• Set Analysis Service
• Predictive Analysis Service
• Process Analysis Service

DASHBOARD AND SCORECARD PRODUCT UPDATES FOR BUSINESSOBJECTS XI RELEASE 2 PRODUCTIVITY PACK
Dashboard and scorecard products from Business Objects help organizations align corporate actions with strategy by tracking and analyzing key business metrics and goals via management dashboards, scorecards, and alerting. BusinessObjects XI Release 2 Productivity Pack brings better life-cycle management for customers who deploy software via a development, test, quality assurance, and production environments. Enhancements include enhanced workflow, a new user interface, and the ability to import and export additional assets including calendars, security on dimensions, rules, and alerts. This upgraded deployment tool will make it easier for customers to deploy enterprise-class dashboard and scorecard applications.

Additional enhancements include the ability for Voyager documents and Web Intelligence report parts to be displayed in a dashboard frame. This allows for easier reuse of existing reports and documents and improved dashboard display. With Web Intelligence report parts, you can select sections of the report to be displayed in the dashboard frame, as well as a “compact mode” which allows you to remove toolbar from around the report and have a cleaner dashboard design.
PLATFORM SERVICE SCALABILITY

Platform services can be vertically scaled (use more processors on the same machine) to take full advantage of the hardware they are running on, and can be horizontally scaled to take advantage of multiple computers over a network environment. This means that the services can all run on the same machine, or they can run on separate machines. The same service can also run in multiple instances on a single machine for reliability and load balancing.

For example, you can run the central management server and the file repository server on one machine, while you run the report application server on a separate machine. This is called horizontal scaling. If the entire set of system services is running on a multi-processor computer, then you may choose to run multiple instances of each service on it. This is called vertical scaling. The services do not need to run on separate computers but rather take advantage of multiple processors on the same machine.

There are many factors that influence the actual architectural design and configuration. These include an understanding of where the data resides, the complexity of the application, the need to place processing power closest to the application to speed performance, and reduce network traffic and current and future hardware investments. Once the system is up and running, individual services can be added, removed, and configured using the tools provided with the platform without restarting or reinstalling the entire system.

Below are a few examples of how BusinessObjects Enterprise could be deployed. The different shading refers to different physical hardware boxes that comprise the individual services.

Single Server Deployment: Reporting Server on Windows

In this scenario, all services are deployed on a single Windows NT/2000/2003 machine. The platform accesses a portal server on a separate machine and databases are managed within an application. Some services are duplicated to spread the workload. When more than one service is installed, the system automatically load balances across them.
Mixed Deployment: ERP BI Solution on Windows and Sun Solaris

In this scenario, the report processing services are placed on a UNIX machine closest to the ERP application to minimize network traffic. The remaining services are placed on a Windows machine closest to the end-user portal environment. The result is that the processing and display are separated for optimal performance of each task. The common framework communicates with each service regardless of the platform.

Mixed Deployment: Data Warehouse on Multiple Servers

In this scenario, a Linux server handles the web portal viewing services and system management while IBM AIX or HP-UX handles the core report processing. In this case, available hardware is used in a mixed-realm deployment to lower procurement costs while maximizing processing efficiency.
DATA SERVICES: COMPREHENSIVE AND FLEXIBLE DATA ACCESS

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

SEMANTIC LAYER
With BusinessObjects Enterprise XI, you can easily and cost-effectively create a metadata-based semantic layer to unlock corporate data for end users.

Universes
The Business Objects patented semantic layer 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. That business language is stored as objects in a universe file. Web Intelligence and Crystal Reports use the universe to simplify the user creation process required for simple to complex end-user query and analysis.

Universes are a core component of BusinessObjects Enterprise XI. All universe objects and connections are stored and secured in the central repository. Universe designers need to login to BusinessObjects Enterprise to access the system and create universes. Universe access and row-level security can also be managed at the group or individual user level directly from within the design environment.

BusinessObjects XI Release 2 saw a number of improvements made to the BusinessObjects universes, with the objective of meeting the requirements of the specialized end-user client tools discussed elsewhere within this document. Enhancements made to the semantic layer allows Web Intelligence to deliver documents utilizing synchronized multiple data providers. The ability to build universes upon OLAP database sources have been updated so users can leverage their data stored in OLAP servers. Additionally, it has been further enhanced to support the Common Warehousing Metamodel (CWM) version 1.1. This functionality has also been extended to include the lineage and impact analysis capabilities of BusinessObjects Data Integrator.

Business Views
As with universes, access to Business Views is managed by BusinessObjects Enterprise security. Business Views Manager is a tool designed to simplify the report creation experience and interaction by abstracting the complexity of data for report developers. Business Views help separate the data connections, data access, business elements, and the overall business definition and allow for granular rights access control for report designers.

Business Views can only be used by Crystal Reports and are designed to simplify the data access and granular view time security required for Crystal Reports creation. Business views support the combination of multiple data sources in a single view. Business Views are fully supported in BusinessObjects Enterprise XI.
BusinessObjects Enterprise XI includes a series of 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
BusinessObjects Enterprise provides for centralized and/or decentralized system management depending on the organizational needs. The system management is built on a common API providing granular control of the environment for tasks that include setting up user roles, security access, server administration, password management, and more.

Included with BusinessObjects Enterprise is a 100% .NET or Java web-based environment for total infrastructure management, deployment, and configuration. The CMC is a web-based environment for administrators to easily access and configure the system while controlling the overall access rights, applications, and end-user viewing experience.

The CMC manages the following system elements:
- User and group creation and management
- User categories
- Security authentication services
- Services configuration
- Objects rights

From the Central Management Console, you can manage user-access and interaction rights at the folder, category, group, user, or object level.
• Processing configuration
• Scheduling
• Business calendars
• License keys
• Universes and data connections
• User interface settings and preferences

CENTRAL CONFIGURATION MANAGER
The central configuration manager (CCM) is designed exclusively for the server management and configuration of your BusinessObjects Enterprise services. This tool allows you to start, stop, enable, and disable servers, and it allows you to view and configure advanced server settings.

IMPORT WIZARD
The Import Wizard is a locally-installed Windows application that guides administrators through the process of importing users, groups, reports, and folders from an existing Crystal Enterprise, BusinessObjects, or Crystal Info implementation to BusinessObjects Enterprise. In addition, the Import Wizard can be used to move a test or development deployment of BusinessObjects XI to a production deployment.

In BusinessObjects XI Release 2, the Import Wizard has been enhanced to simplify the process of managing the full lifecycle of BI deployments. This capability is called the BI Application Resource and allows customers to move documents (Web Intelligence, Crystal Reports, and Desktop Intelligence) and their associated dependencies (folders, categories, universes, connections, Business Views, cascading prompts, etc.) through the development lifecycle—from development, to test, to production—without the need to rewrite or recreate these elements.

The import wizard can access a BusinessObjects 6.x and/or a Crystal deployment and can import documents, semantic layer, security settings, users, and groups.
The Import Wizard runs as a Windows client, but can be used to import information into a new BusinessObjects Enterprise system running on Windows, UNIX, and Linux by simply logging in to the CMS. The BusinessObjects Enterprise XI import wizard supports imports of Web Intelligence documents, universes, users, categories, and folders from the BusinessObjects 5.1.4 and above. This includes all of the 6, 6.1.x, and 6.5.x repositories. In addition, BusinessObjects XI Release 1 supports the full repository upgrade for Crystal Info 7.5 and Crystal Enterprise 8, 8.5, 9, and 10 and BusinessObjects XI Release 2 supports automated upgrade from Crystal Enterprise 8.5, 9, 10, and BusinessObjects XI.

PUBLISHING WIZARD
The Publishing Wizard is a Windows desktop application that enables both administrators and end users to add documents to BusinessObjects Enterprise. By assigning object rights to BusinessObjects Enterprise folders, you control who can publish reports and where they can publish them to. The Publishing Wizard publishes reports from a Windows machine to BusinessObjects Enterprise servers running on Windows or UNIX.
CONCLUSION

BusinessObjects Enterprise XI is the proven and trusted BI platform from Business Objects. The highly-scalable, service-oriented architecture is comprised of specialized tiers for the presentation, design, deployment, and data access required for today’s BI requirements. The platform is designed for extensibility—so as new services are purchased, new and innovative tools become available, new platforms are introduced, new hardware or software is acquired, new innovations are developed, and more users need access, the system can adapt to these changing requirements.