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Getting Started

1.1 About this guide

This guide helps you plan a successful deployment of SAP BusinessObjects Enterprise. Whether you are a new or experienced user, this guide provides all the information you need to:

- Understand SAP BusinessObjects Enterprise architecture.
- Choose an appropriate configuration.
- Plan a secure and fail-safe environment.
- Learn the new features available for SAP BusinessObjects Enterprise.

For information on installation types and considerations, see the SAP BusinessObjects Enterprise Installation Guide. For information on the deployment of WAR files to web application servers, see the BusinessObjects Enterprise Web Application Deployment Guide.

For server configuration and user management tasks, see the SAP BusinessObjects Enterprise Administrator Guide.

For specific information related to wdeploy, see the SAP BusinessObjects Enterprise Web Application Deployment Guide.

All product documentation (including error message explanations) is available in all supported languages in an HTML-based documentation library. This system enables full-text search and other customizable features to make it easy to find the information you need. You can also access or download the PDF guides from the same website. The website is refreshed with up-to-date content as it becomes available between releases. Go to http://support.businessobjects.com/documentation/

1.2 What's new

For information on new features and changes made since the last release, see the What's New in SAP BusinessObjects Enterprise Guide.

All product documentation (including error message explanations) is available in all supported languages in an HTML-based documentation library. This system enables full-text search and other customizable features to make it easy to find the information you need. You can also access or download the PDF guides from the same website. The website is refreshed with up-to-date content as it becomes available between releases. Go to http://support.businessobjects.com/documentation/.
1.3 Overview of SAP BusinessObjects Enterprise

BusinessObjects Enterprise is the business intelligence platform that supports a range of performance management (Dashboard and Analytics), reporting, querying, and analysis applications. It also provides an industry-standard, proven architecture and platform-support for semantic layers, data integration, and security. SAP BusinessObjects Enterprise provides for web-based administration and configuration of the entire system.

SAP BusinessObjects Enterprise features:
- Extend the robust information infrastructure provided by earlier releases and integrate seamlessly with existing product lines.
- Support all deployment models and let you fine-tune administration and configuration of the entire system.
- Bring together features from across the Business Objects product line to meet your evolving reporting needs, from using SAP BusinessObjects Interactive Analysis anywhere to improving Crystal Reports interactivity and personalization.
- Facilitate upgrading from older products to BusinessObjects Enterprise XI.
- Support side-by-side deployments, enabling existing customers to leverage their investments in Business Objects and Crystal technologies.
- Deliver innovation to drive user productivity and self-service reporting.
- Deliver more reporting with fewer reports.
- Include a variety of major enhancements spread across data access methods, administration capabilities, and report design options.
- Simplify business monitoring with dashboard functionality and improved user experience.
- Deliver the strongest self-service query and analysis solution for SAP customers.

About this guide
This guide provides you with information for planning your SAP BusinessObjects Enterprise deployment. It explains the key concepts and choices you need to make before you begin your deployment. You should read this to gain an understanding of how you can install SAP BusinessObjects Enterprise to suit your organization.

For information about installing SAP BusinessObjects Enterprise, see the SAP BusinessObjects Enterprise Installation Guide.

For initial server configuration and user management tasks, see the SAP BusinessObjects Enterprise Administrator Guide.

For specific information related to wdeploy, see the SAP BusinessObjects Enterprise Web Applications Deployment Guide.

Who should use this guide?
It is recommend to consult this guide if you are:
- New to SAP BusinessObjects Enterprise.
• Planning your first deployment.
• Making significant changes to the architecture of an existing deployment.

This guide is intended as pre-reading material for administrators responsible for configuring, managing, and maintaining a SAP BusinessObjects Enterprise installation. Familiarity with your operating system and your network environment is beneficial, as is a general understanding of web application server management and scripting technologies. However, to assist all levels of administrative experience, this guide provides sufficient background and conceptual information to clarify administrative tasks and features.

1.4 Deploying for the first time

If you are planning or performing your first deployment of SAP BusinessObjects Enterprise, it is recommended that you perform the following tasks and read the corresponding sections:
• Familiarize yourself with the SAP BusinessObjects Enterprise system architecture by reading "Architecture basics".
• Assess your needs and design a deployment architecture that works best for you with Assessing your organization's environment.
• To learn specific requirements and caveats related to the architecture type you have selected for your deployment, review sections of the SAP BusinessObjects Enterprise Administrator Guide and the SAP BusinessObjects Enterprise Installation Guide prior to installation.
• For information on how to deploy web applications to a web application server, including detailed configuration examples for each of the supported web application servers with simple, distributed (clustered), and enterprise deployment scenarios, see the SAP BusinessObjects Enterprise Web Application Deployment Guide.
• To find out about support for Single Sign On (SSO), security plug-ins, active trust relationships, session tracking, environment protection, auditing, trusted authentication, third-party authentication (Active Directory or SiteMinder, using NTLM, Kerberos, or LDAP), reverse proxy servers, and working with firewalls, see the SAP BusinessObjects Enterprise Administrator Guide.
• To improve performance by assessing your needs, evaluating system performance, and see how to scale or plan for scaling your system, see the SAP BusinessObjects Enterprise Administrator Guide.
• Once you have formulated your deployment plan, proceed with your installation using the SAP BusinessObjects Enterprise Installation Guide.
• After you install, read the Managing and configuring servers chapter of the SAP BusinessObjects Enterprise Administrator Guide for information about configuring your SAP BusinessObjects Enterprise server processes from within the Central Management Console (CMC). The guide also includes advanced topics such as configuring clustered environments, multi-homed machines, and secure socket layer (SSL) configuration.
1.5 Changing your deployment's architecture

If you need to revise your deployment to account for significant changes in how you use the system, it is recommended that you read the following documentation:

- In the SAP BusinessObjects Enterprise Administrator Guide, read the Monitoring chapter for information about assessing and improving the performance of an existing deployment.
- After determining which areas need improvement, read Assessing your organization’s environment to see other if a different deployment configuration would improve performance in your area of interest.
- If you need to configure server components, see the Managing and configuring servers chapter of the SAP BusinessObjects Enterprise Administrator Guide.
- For information about installing server components or deploying to a new web application server platform, see the Deploying with wdeploy section of the SAP BusinessObjects Enterprise Web Application Deployment Guide.

1.6 SAP BusinessObjects Enterprise guides

The following table provides a list of SAP BusinessObjects Enterprise guides and their contents.
<table>
<thead>
<tr>
<th>Guide</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP BusinessObjects Enterprise Planning Guide</td>
<td>Covers the key concepts you should consider before you begin deploying SAP BusinessObjects Enterprise. This guide includes an overview of the architecture, tips for assessing your existing environment, determining your organization's needs, and preparing for the installation.</td>
</tr>
<tr>
<td>SAP BusinessObjects Enterprise Installation Guide</td>
<td>Leads you through the steps required to run the installation program and complete your installation of SAP BusinessObjects Enterprise. There are UNIX and Windows versions of this guide available.</td>
</tr>
<tr>
<td>SAP BusinessObjects Enterprise Web Application Deployment Guide</td>
<td>Covers topics related to the deployment of web applications to web application servers with SAP BusinessObjects Enterprise. There are UNIX and Windows versions of this guide available.</td>
</tr>
<tr>
<td>SAP BusinessObjects Enterprise Administrator Guide</td>
<td>Provides content for server and content administration. The server administration topics includes server configuration, managing authentication, configuring firewalls, and measuring system performance. The content administration topics include working with the CMC, configuring rights and access levels, managing users, and working with SAP Business Objects applications and objects.</td>
</tr>
<tr>
<td>SAP BusinessObjects Enterprise Publisher's Guide</td>
<td>Provides an overview of the publishing process, working with publications, publishing Crystal reports, publishing SAP BusinessObjects Business Intelligence Solution documents, publishing documents, and publishing security.</td>
</tr>
<tr>
<td>SAP BusinessObjects Enterprise Upgrade Guide</td>
<td>Information for upgrades from previous versions of SAP BusinessObjects Enterprise to the current version of SAP BusinessObjects Enterprise.</td>
</tr>
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</table>

For a complete list of all of our product documentation please the SAP BusinessObjects support site [service.sap.com/bosap-support](service.sap.com/bosap-support).
BusinessObjects Enterprise Architecture

2.1 Architecture overview

This section outlines the overall platform architecture, system, and service components that make up the SAP BusinessObjects Enterprise Business Intelligence (BI) platform. The information helps administrators understand the system essentials and help to form a plan for the system deployment, management, and maintenance.

SAP BusinessObjects Enterprise is designed for high performance across a broad spectrum of user and deployment scenarios. For example, specialized platform services handle either on-demand data access and report generation, or report scheduling based on times and events. You can offload processor intensive scheduling and processing by creating dedicated servers to host specific services. The 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 and interfaces.

Developers can integrate SAP BusinessObjects Enterprise BI into your organization's other technology systems by using web services, Java, or .NET application programming interfaces (APIs).

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

- Clients installed by SAP BusinessObjects Enterprise Client Tools installation program:
  - Interactive Analysis (formerly Web Intelligence)
  - Business View Manager
  - Report Conversion Tool
  - Universe design tool
  - Web Service query tool (formerly Query as a Web Service)
  - Information design tool (formerly Information Designer)
  - Translation Management Tool (formerly Translation Manager)
  - Widgets for SAP BusinessObjects Enterprise (formerly BI Widgets)

- Clients available separately:
  - SAP Crystal Reports
  - SAP BusinessObjects Dashboard Design (formerly Xcelsius)
  - SAP BusinessObjects Enterprise Advanced Analysis (formerly Voyager)
  - BI Workspaces (formerly Dashboard Builder)

IT departments can use data and system management tools that include:

- Report Viewers
- Central Management Console (CMC)
- Central Configuration Manager (CCM)
- Repository Diagnostic Tool (RDT)
- Data Federation Administration Tool
- Upgrade management tool (formerly Import Wizard)
- Universe design tool (formerly Universe Designer)
- SAP BusinessObjects Mobile

To provide flexibility, reliability, and scalability, SAP BusinessObjects Enterprise components can be installed on one or across many machines. You can even install two different versions of SAP BusinessObjects Enterprise simultaneously on the same computer, although this configuration is only recommended as part of the upgrade process or testing purposes.

Server processes can be “vertically scaled” (where one computer runs several, or all, server-side processes) to reduce cost, or “horizontally scaled” (where server processes are distributed between two or more networked machines) to improve performance. It is also possible to run multiple, redundant, versions of the same server process on more than one machine, so that processing can continue if the primary process encounters a problem.

**Note:**
While it is possible to use a mixture of Windows and Unix or Linux platforms, it is recommended that you do not mix operating systems for Central Management Server (CMS) processes.

### 2.1.1 System overview

SAP BusinessObjects Enterprise is a Business Intelligence (BI) platform that provides enterprise level analysis and reporting tools. Data can be analyzed from any of a large number of supported database systems (including text or multi-dimensional OLAP systems) and BI reports can be published in many different formats to many different publishing systems.

The following diagram illustrates how SAP BusinessObjects Enterprise fits in with your organization's infrastructure.
SAP BusinessObjects Enterprise reports from a read-only connection to your organization's databases, and uses its own databases for storing its configuration, auditing, and other operational information. The BI reports created by the system can be sent to a variety of destinations, including file systems, and email, or accessed through web sites or portals.

SAP BusinessObjects Enterprise is a self-contained system that can exist on a single machine (for example, as a small development or pre-production test environment) or can be scaled up into a cluster of many machines that run different components (for example, as a large-scale production environment).

### 2.1.2 Databases

SAP BusinessObjects Enterprise uses several different databases.

- **Reporting database**
  This refers to your organization's information. It is the source information analyzed and reported on by SAP BusinessObjects Enterprise. Most commonly, the information is stored within a relational database, but it can also be contained within text files, Microsoft Office documents, or OLAP systems.

- **CMS system database**
  The CMS system database is used to store SAP BusinessObjects Enterprise information, such as user, server, folder, document, configuration, authorization, and authentication details. It is maintained by the Central Management Server (CMS), and is sometimes referred to as the *system repository*.

- **Auditing Data Store**
The Auditing Data Store (ADS) is used to store information on trackable events that occur in SAP BusinessObjects Enterprise. This information can be used to monitor the usage of system components, user activity, or other aspects of day-to-day operation.

- Lifecycle Management database
  The Lifecycle Management database tracks configuration and version information related to an SAP BusinessObjects Enterprise installation, as well as updates.

- Monitoring database
  Monitoring uses the Java Derby database to store system configuration and component information for SAP supportability.

If you do not have a database server in place for use with the CMS system and Auditing Data Store databases, the SAP BusinessObjects Enterprise installation program can install and configure one for you. It is recommended that you evaluate your requirements against information from your database server vendor to determine which supported database would best suit your organization’s requirements.

2.1.3 Servers

SAP BusinessObjects Enterprise consists of collections of servers running on one or more hosts. Small installations (such as test or development systems) can use a single host for a web application server, database server, and all SAP BusinessObjects Enterprise servers.

Medium and large installations can have servers running on multiple hosts. For example, a web application server host can be used in combination with an SAP BusinessObjects Enterprise server host. This frees up resources on the SAP BusinessObjects Enterprise server host, allowing it to process more information than if it also hosted the web application server.

Large installations can have several SAP BusinessObjects Enterprise server hosts working together in a cluster. For example, if an organization has a large number of SAP Crystal Reports users, Crystal Reports processing servers can be created on multiple SAP BusinessObjects Enterprise server hosts to ensure that there are plenty of resources available to process requests from clients.

The advantages of having multiple servers include:

- Improved performance
  Multiple SAP BusinessObjects Enterprise server hosts can process a queue of reporting information faster than a single SAP BusinessObjects Enterprise server host.

- Load balancing
  If a server is experiencing a higher load than the other servers in a cluster, the CMS automatically sends new work to a server with better resources.

- Improved availability
  If a server encounters an unexpected condition, the CMS automatically re-routes work to different servers until the condition is corrected.
2.1.4 Web application servers

A web application server acts as the translation layer between a web browser or rich application, and SAP BusinessObjects Enterprise. Web application servers running on Windows, Unix, and Linux are supported.

The following web application servers are supported:

- JBoss
- Oracle Application Server
- Sun Java System Application Server (Unix only)
- SAP NetWeaver AS Java
- Tomcat
- WebLogic
- WebSphere

For a detailed list of supported web application servers, consult the Supported Platforms Guide available at: [http://service.sap.com/bosap-support](http://service.sap.com/bosap-support).

If you do not have a web application server in place for use with SAP BusinessObjects Enterprise, the installation program can install and configure a Tomcat 6 web application server for you. It is recommended that you evaluate your requirements against information from your web application server vendor to determine which supported web application server would best suit your organization’s requirements.

**Note:**
When configuring a production environment, it is recommended that the web application server is hosted on a separate system. Running SAP BusinessObjects Enterprise and a web application server on the same host in a production environment may decrease performance.

2.1.4.1 Web Application Container Service (WACS)

A web application server is required to host SAP BusinessObjects Enterprise web applications.

If you are an advanced Java web application server administrator with advanced administration needs, use a supported Java web application server to host SAP BusinessObjects Enterprise web applications. If you are using a supported Windows operating system to host SAP BusinessObjects Enterprise, and prefer a simple web application server installation process, or you do not have the resources to administer a Java web application server, you can install the Web Application Container Service (WACS) when installing SAP BusinessObjects Enterprise.
WACS is an SAP BusinessObjects Enterprise server that allows SAP BusinessObjects Enterprise web applications, such as the Central Management Console (CMC), BI launch pad, and Web Services, to run without the need for a previously installed Java web application server.

Using WACS to provides a number of advantages:

- WACS requires a minimum effort to install, maintain, and configure. It is installed and configured by the SAP BusinessObjects Enterprise installation program, and no additional steps are required to start using it.
- WACS removes the need for Java application server administration and maintenance skills.
- WACS provides an administrative interface that is consistent with other SAP BusinessObjects servers.
- Like other SAP BusinessObjects Enterprise servers, WACS can be installed on a dedicated host.

**Note:**
There are some limitations to using WACS instead of a dedicated Java web applications server:

- WACS is only available on supported Windows operating systems.
- Custom web applications cannot be deployed to WACS, as it only supports the web applications installed with SAP BusinessObjects Enterprise.
- WACS cannot be used with an Apache load balancer.

It is possible to use a dedicated web application server in addition to WACS. This allows your dedicated web application server to host custom web applications, while the CMC and other SAP BusinessObjects Enterprise web applications are hosted by WACS.

### 2.1.5 Software Development Kits

A Software Development Kit (SDK) allows a developer to incorporate aspects of SAP BusinessObjects Enterprise into an organization’s own applications and systems.

SAP BusinessObjects Enterprise has SDKs for software development on Java and .NET platforms.

**Note:**
SAP BusinessObjects Enterprise .NET SDKs are not installed by default, and must be downloaded from the SAP Service Marketplace.

The following SDKs are supported by SAP BusinessObjects Enterprise:

- SAP BusinessObjects Enterprise Java SDK and .NET SDK
  
  The SAP BusinessObjects Enterprise SDKs allow application to perform tasks such as authentication, session management, working with repository objects, report scheduling and publication, and server management.

  **Note:**
  For full access to security, server management, and auditing functions, use the Java SDK.

- Report Application Server Java SDK and .NET SDK
The Report Application Server SDKs allow applications to open, create, and modify existing Crystal reports, including setting parameter values, changing data sources, and exporting to other formats, including XML, PDF, Microsoft Word, and Microsoft Excel.

- Report Engine Java SDK and .NET SDK
  The Report Engine SDKs allow applications to interact with reports created with SAP BusinessObjects Interactive Analysis (formerly Web Intelligence).
  The Report Engine SDKs include libraries that you can use to build a web report design tool. Applications built with these SDKs can view, create, or modify, a variety of different SAP BusinessObjects Interactive Analysis documents. Users can modify documents by adding, removing, and modifying objects such as tables, charts, conditions, and filters.

- Platform Search SDK: The Platform Search SDK is the interface between the client application and the Platform Search Service. Platform Search supports Public SDK that comes as a part of the Platform Search SDK.
  When a search request parameter is sent through the client application to the SDK layer, the SDK layer converts the request parameter into XML- encoded format and passes it to the Platform Search Service.

- Crystal Reports Viewers Java SDK and .NET SDK
  The Viewers SDKs allow applications to display and export Crystal reports. The following viewers are available:
  - Report Parts Viewer: provides the ability to view individual parts of a report, including charts, text, and fields.
  - Viewer Tag Library: allows for the behavior of the viewer to be customized in JSP pages.

- SAP BusinessObjects Enterprise Java Consumer SDK and .NET Consumer SDK
  An implementation of Web Services that allows you to handle user authentication and security, document and report access, scheduling, publications, and server management.

**Note:**
The SAP BusinessObjects Enterprise JavaServer Faces Components are deprecated.

The SDKs can be used in combination to provide a wide range of BI functionality to your applications. For example, the BI launch pad web application included with SAP BusinessObjects Enterprise was built using these SDKs.


### 2.1.5.1 Web Services Java and .NET Consumer SDKs
The SAP BusinessObjects Enterprise Web Services Java and .NET Consumer SDKs allow you to create distributed Web Services applications that take advantage of the SAP BusinessObjects Enterprise platform features.

Web Services consists of software components that can be called remotely using the Simple Object Access Protocol (SOAP). SOAP is a protocol for exchanging information that is not dependent on a specific platform, object model, or programming language.

SAP BusinessObjects Enterprise Web Services includes functionality in the following areas:

- **Session**
  Authentication and user management.

- **BI platform**
  Exposes advanced platform features such as scheduling, publishing, search, user and group administration, and server administration services.

- **Report Engine**
  Displays SAP BusinessObjects Business Intelligence Solution and Crystal Reports in HTML, PDF, Excel, and XML format.

- **Query**
  Builds ad-hoc queries based on the Universe semantic layer.

SAP BusinessObjects Enterprise Web Services uses standards such as XML, SOAP, AXIS 2.0 and WSDL. The platform follows WS-Interoperability Basic Profile 1.0 web services specification.

**Note:**
Web Services applications are currently only supported with the following load balancer configurations:

1. Source IP address persistence.
2. Source IP and destination port persistence (available only on a Cisco Content Services Switch).
3. SSL persistence.

**Note:**
SSL persistence may cause security and reliability issues on some web browsers. Check with your network administrator to determine if SSL persistence is appropriate for your organization.

### 2.1.5.2 Web Services query tool

Web service query tool is a wizard-based application that allows queries to be made into a web service and integrated with web-ready applications. Queries can be saved to create a catalog of standard queries that application builders can select as required.
Business Intelligence (BI) content is usually bound to a specific user interface of BI tools. Web service query tool changes this by allowing BI content to be delivered to any user interface that can process web services.

Web service query tool is designed to work on top of any Microsoft Windows application the same way as other web services. Query as a Web Service is based on the W3C web service specifications SOAP, WSDL, and XML. It has two main components:

- **Server component**
  The server component (included in SAP BusinessObjects Enterprise) stores the Web service query tool catalog and hosts the published web services.

- **Client tool**
  This is how business users create and publish their queries as a web service on the server. You can install the client tool on several machines that can access and share the same Web service query tool catalog stored on the server. The client tool communicates with the server components via web services.

Web service query tool allows web queries to be used as part of a range of client-side solutions, including:

- Microsoft Office, Excel, and InfoPath
- SAP NetWeaver
- OpenOffice
- Business rules and process management applications
- Enterprise Service Bus platforms

### 2.1.6 Data sources

#### 2.1.6.1 Universes

The universe abstracts the data complexity by using business language rather than data language to access, manipulate, and organize data. This business language is stored as objects in a universe file. Interactive Analysis and Crystal Reports use universes to simplify the user creation process required for simple to complex end-user query and analysis.

Universes are a core component of SAP BusinessObjects Enterprise. All universe objects and connections are stored and secured in the central repository by the Connection Server. Universe design tools need to log into SAP 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 from within the design environment.
The semantic layer allows SAP BusinessObjects Interactive Analysis to deliver documents, by utilizing multiple synchronized data providers, including online analytical processing (OLAP) and common warehousing metamodel (CWM) data sources.

### 2.1.6.2 Business Views

Business Views simplify report creation and interaction by abstracting the complexity of data for report developers. Business Views help separate the data connections, data access, business elements, and access control.

Business Views can only be used by Crystal Reports and are designed to simplify the data access and view-time security required for Crystal report creation. Business Views support the combination of multiple data sources in a single view. Business Views are fully supported in SAP BusinessObjects Enterprise.

SAP BusinessObjects Enterprise includes a series of dedicated, pre-configured platform management services for tasks such as password management, server metrics, and user access control for decentralized management functions.

### 2.1.7 Language support

SAP BusinessObjects Enterprise products are translated into many different languages and supports data in an even broader selection of languages.

Product interfaces are available in the following languages:

- Czech
- Simplified Chinese
- Traditional Chinese
- Danish
- Dutch
- English
- Finnish
- French
- German
- Italian
- Japanese
- Korean
- Norwegian Bokmal
- Polish
- Portuguese
- Russian
- Spanish
- Swedish
- Thai

In addition to supporting data in any of the languages available in the interface, the following character sets are also supported:
- Greek
- Malaysian
- Hebrew
- Arabic
- Romanian
- Vietnamese
- Hungarian
- Turkish
- Hindi

### 2.1.8 Authentication and single sign-on

System security is managed by the Central Management Server (CMS), security plug-ins, and third-party authentication tools, such as SiteMinder or Kerberos. These components authenticate users and authorize user access for SAP BusinessObjects Enterprise, its folders, and other objects.

The following user authentication single sign-on security plug-ins are available:
- Enterprise (default), including Trusted Authentication support for third-party authentication.
- LDAP
- Windows Active Directory (AD)

When using an Enterprise Resource Planning (ERP) system, single sign-on is used to authenticate user access to the ERP system so that reports can be against ERP data. The following user authentication single sign-on for ERP systems are supported:
- SAP ERP and Business Warehouse (BW)
- Oracle E-Business Suite (EBS)
- Siebel Enterprise
- JD Edwards Enterprise One
- PeopleSoft Enterprise

### 2.1.8.1 Security plug-ins
Security plug-ins automate account creation and management by allowing you to map user accounts and groups from third-party systems into SAP BusinessObjects Enterprise. You can map third-party user accounts or groups to existing Enterprise user accounts or groups, or you can create new Enterprise user accounts or groups that correspond to each mapped entry in the external system.

The security plug-ins dynamically maintain third-party user and group listings. So, once you map an Lightweight Directory Access Protocol (LDAP) or Windows Active Directory (AD) group to SAP BusinessObjects Enterprise, all users who belong to that group can log into SAP BusinessObjects Enterprise. Subsequent changes to the third-party group memberships are automatically propagated.

SAP BusinessObjects Enterprise supports the following security plug-ins:

- Enterprise security plug-in
  
The Central Management Server (CMS) handles security information, such as user accounts, group memberships, and object rights that define user and group privileges. This is known as Enterprise authentication.

  Enterprise authentication is always enabled; it cannot be disabled. Use the system default Enterprise Authentication if you prefer to create distinct accounts and groups for use with SAP BusinessObjects Enterprise, or if you have not already set up a hierarchy of users and groups on an LDAP or Windows AD server.

  Trusted Authentication is a component of Enterprise authentication that integrates with third-party single sign-on solutions, including Java Authentication and Authorization Service (JAAS). Applications that have established trust with the Central Management Server can use Trusted Authentication to allow users to log on without providing their passwords.

- LDAP security plug-in
- Windows AD

**Note:**
Although a user can configure Windows AD authentication for SAP BusinessObjects Enterprise and custom applications through the CMC, the CMC and BI launch pad do not support Windows AD authentication with NTLM. The only methods of authentication that the CMC and BI launch pad support are Windows AD with Kerberos, LDAP, Enterprise, and Trusted Authentication.

### 2.1.8.2 Enterprise Resource Planning (ERP) integration

An Enterprise Resource Planning (ERP) application supports the essential functions of an organization's processes by collecting real-time information related to day-to-day operations. SAP BusinessObjects Enterprise supports single sign-on and reporting from the following ERP systems:

- SAP ERP and Business Warehouse (BW)

**Note:**
SAP GUI must be installed before using OLAP Data Access (ODA), SAP BusinessObjects Advanced Analysis (formerly Voyager), or BW connections.
• Siebel Enterprise
• Oracle E-Business Suite
• JD Edwards EnterpriseOne
• PeopleSoft Enterprise

**Note:**
• SAP ERP and BW support is installed by default. Use the Custom / Expand installation option to
deselect SAP integration support if you do not want support for SAP ERP or BW.
• Support for Siebel Enterprise, Oracle E-Business Suite, JD Edwards EnterpriseOne, or PeopleSoft
is not installed by default. Use the "Custom / Expand" installation option to select and install integration
for non-SAP ERP systems.

For detailed information on the specific versions supported by SAP BusinessObjects Enterprise, consult
the *Supported Platforms Guide*, available at [service.sap.com/bosap-support](http://service.sap.com/bosap-support).

To configure ERP integration, see the *SAP BusinessObjects Enterprise Administrator Guide*.

### 2.1.9 SAP integration

SAP BusinessObjects Enterprise integrates with your existing SAP infrastructure with the following SAP
tools:

• SAP System Landscape Directory (SLD)

  The system landscape directory of SAP NetWeaver is the central source of system landscape
  information relevant for the management of your software life-cycle. By providing a directory
  comprising information about all installable software available from SAP and automatically updated
  data about systems already installed in a landscape, you get the foundation for tool support to plan
  software life-cycle tasks in your system landscape.

  The SAP BusinessObjects Enterprise installation program registers the vendor and product names
  and versions with the SLD, as well as server and front-end component names, versions, and location.

• SAP Solution Manager

  The SAP Solution Manager is a platform that provides the integrated content, tools, and methodologies
to implement, support, operate and monitor an organization's SAP and non-SAP solutions.

  Non-SAP software with an SAP-certified integration is entered into a central repository and transferred
automatically to your SAP System Landscape Directories (SLD). SAP customers can then easily
identify which version of third-party product integration has been certified by SAP within their SAP
system environment. This service provides additional awareness for third-party products besides
our online catalogs for third-party products.

  SAP Solution Manager is available to SAP customers at no extra charge, and includes direct access
to SAP support and SAP product upgrade path information. For more information on SLD, see
“Registration of SAP BusinessObjects Enterprise in the System Landscape” in the SAP BusinessObjects Enterprise Administrator Guide.

- CTS Transport (CTS+)
  The Change and Transport System (CTS) helps you to organize development projects in ABAP Workbench and in Customizing, and then transport the changes between the SAP systems in your system landscape. As well as ABAP objects, you can also transport Java objects (J2EE, JEE) and SAP-specific non-ABAP technologies (such as Web Dynpro Java or SAP NetWeaver Portal) in your landscape.

- Monitoring with CA Wily Introscope
  CA Wily Introscope is a web application management product that delivers the ability to monitor and diagnose performance problems that may occur within Java-based SAP modules in production, including visibility into custom Java applications and connections to back-end systems. It allows you to isolate performance bottlenecks in NetWeaver modules including individual Servlets, JSPs, EJBs, JCOs, Classes, Methods and more. It offers real-time, low-overhead monitoring, end-to-end transaction visibility, historical data for analysis or capacity planning, customizable dashboards, automated threshold alarms, and an open architecture to extend monitoring beyond NetWeaver environments.

### 2.1.10 Lifecycle management (LCM)

Lifecycle management (LCM) refers to a set of processes involved in managing an installation’s product information. It establishes procedures for governing the installation of SAP BusinessObjects Enterprise to development, test, production, or maintenance environments.

SAP BusinessObjects Enterprise Lifecycle Manager is a web-based tool that enables you to move BI objects from one system to another system, without affecting the dependencies of those objects. It also enables you to manage different versions, manage dependencies, or roll back a promoted object to its previous state.

The LCM tool is a plug-in for SAP BusinessObjects Enterprise. You can promote a BI object from one system to another system only if the same version of the application is installed on both the source and destination systems.

For more information, see the SAP BusinessObjects Enterprise Lifecycle management console User's Guide.

### 2.1.11 Integrated version control
The files that make up SAP BusinessObjects Enterprise on a server system are now kept under version control. The installation program will install and configure the Subversion version control system, or you can enter details to use an existing Subversion or ClearCase version control system.

A version control system makes it possible to keep and restore different revisions of configuration and other files, which means it is always possible to revert the system to a known state from any time in the past.

**2.1.12 Permanent data**

The term "permanent data" refers to any piece of information considered important enough to be migrated during a system upgrade. For example, the Central Management Server (CMS) stores configuration information in the CMS database rather than the Windows registry or a configuration file.

All SAP BusinessObjects Enterprise products store permanent data in the CMS system database. This allows data and configuration information to be easily migrated to a new version when you upgrade.

**2.1.13 Upgrade path**

It's possible to upgrade from a previous release of SAP BusinessObjects Enterprise, but you must first install SAP BusinessObjects Enterprise XI 4.0, then migrate the settings and data from your existing system with the Upgrade management tool.

For information on how to upgrade from a previous version, see the *SAP BusinessObjects Enterprise Upgrade Guide*.

**2.2 Conceptual tiers**

SAP BusinessObjects Enterprise can be thought of as a series of conceptual tiers:
- **Web tier**
  The Web Tier contains web applications deployed to a Java web application server. Web applications provide SAP BusinessObjects Enterprise functionality to end users through a web browser. Examples of web applications include the Central Management Console (CMC) administrative web interface and BI launch pad.

  The web tier also contains Web Services. Web Services provides SAP BusinessObjects Enterprise functionality to software tools via the web application server, such as session authentication, user privilege management, scheduling, search, administration, reporting, and query management. For example, Live Office is a product that uses Web Services to integrate SAP BusinessObjects Enterprise reporting into Microsoft Office products.

- **Management tier**
  The management tier coordinates and controls all of the components that make up SAP BusinessObjects Enterprise. It is comprised of the Central Management Server (CMS) and the Event Server. The CMS provides maintains security and configuration information, sends service requests to servers, manages auditing, and maintains the CMS system database. The Event Server manages file based events, which occur in the storage tier.

- **Processing tier**
  The processing tier analyzes data and produces reports. This is the only tier that accesses the databases that contain report data.

- **Storage tier**
  The storage tier is responsible to handling files, such as documents and reports.

  The Input File Repository Server manages files that contain information to be used in reports, such as the following file types: `.rpt`, `.car`, `.exe`, `.bat`, `.js`, `.xls`, `.doc`, `.ppt`, `.rtf`, `.txt`, `.pdf`, `.wid`, `.rep`, `.unv`.

  The Output File Repository Server manages reports created by the system, such as the following file types: `.rpt`, `.csv`, `.xls`, `.doc`, `.rtf`, `.txt`, `.pdf`, `.wid`, `.rep`.

  The storage tier also handles report caching to save system resources when users access reports.
2.3 Services and servers

The following diagram shows a hypothetical installation of SAP BusinessObjects Enterprise.

**Note:**
The nodes, servers, and services shown are for illustrative purposes only. The number of hosts, nodes, servers and services—as well as the type of servers, and services—will vary in real-world installations.

Two hosts form the cluster named *ProductionBISystem*, with two hosts:
- The host named *HostAlpha* has SAP BusinessObjects Enterprise installed and is configured to have two nodes:
  - *NodeMercury*: contains an Adaptive Job Server (*NodeMercury.AJS*) with services to schedule and publish reports, an Input File Repository Server (*NodeMercury.IFRS*) with a service to store input reports, and an Output File Repository Server (*NodeMercury.OFRS*) with a service to store report output.
- **NodeVenus**: contains an Adaptive Processing Server (**NodeVenus.APS**) with services to provide publishing, monitoring, and translation features, an Adaptive Processing Server (**NodeVenus.APS2**) with a service to provide client auditing, and a Central Management Server (**NodeVenus.CMS**) with a service to provide the CMS services.

- The host named **HostBeta** has SAP BusinessObjects Enterprise installed and is configured to have three nodes:
  - **NodeMars**: contains a Central Management Server (**NodeMars.CMS**) with a service to provide the CMS services.
  - **NodeJupiter**: contains a Interactive Analysis Processing Server (**NodeJupiter.InteractiveAnalysis**) with a service to provide Interactive Analysis reporting, and an Event Server (**NodeJupiter.EventServer**) to provide report monitoring of files.
  - **NodeSaturn**: contains an Adaptive Processing Server (**NodeSaturn.APS**) with a service to provide client auditing.

SAP BusinessObjects Enterprise uses the terms **server** and **service** to refer to the two types of software running on an SAP BusinessObjects Enterprise machine.

A **service** is a server subsystem that performs a specific function. The service runs within the memory space of its server under the process id of the parent container (server). For example, the SAP BusinessObjects Interactive Analysis Scheduling and Publishing Service is a subsystem that runs within the Adaptive Job Server.

The term **server** is used to describe an operating system level process (on some systems, this is referred to as a *daemon*) hosting one or more services. For example, the Central Management Server (CMS) and Adaptive Processing Server are servers. A server runs under a specific operating system account and has its own PID.

A **node** is a collection of SAP BusinessObjects Enterprise servers running on the same host. One or more nodes can be on a single host.

SAP BusinessObjects Enterprise can be installed on a single machine, spread across different machines on an intranet, or separated over a wide area network (WAN).

### 2.3.1 Services

The following table describes each of the services.

**Table 2-1: Services**

<table>
<thead>
<tr>
<th>Service</th>
<th>Service Category</th>
<th>Server type</th>
<th>Service description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Connectivity Service</td>
<td>Connectivity Services</td>
<td>Adaptive Processing Server</td>
<td>Provides connectivity services (replaces Connection Server).</td>
</tr>
<tr>
<td>Service</td>
<td>Service Category</td>
<td>Server type</td>
<td>Service description</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Authentication Update Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Provides synchronization of updates for third-party security plug-ins.</td>
</tr>
<tr>
<td>BEx Web Application Service</td>
<td>Connectivity Services</td>
<td>Adaptive Processing Server</td>
<td>Provides integration of SAP Business Warehouse (BW) Business Explorer (BEx) web applications with BI launch pad.</td>
</tr>
<tr>
<td>BOE Web Application Service</td>
<td>Core Services</td>
<td>Web Application Container Server</td>
<td>Provides web applications for WACS: includes the Central Management Console (CMC), BI launch pad, and OpenDocument.</td>
</tr>
<tr>
<td>Business Process BI Service</td>
<td>Core Services</td>
<td>Web Application Container Server</td>
<td>Provides Business Process BI Web Services for WACS: allows BI technology to be incorporated into web applications. Business Process BI Service is deprecated.</td>
</tr>
<tr>
<td>Central Management Service</td>
<td>Core Services</td>
<td>Central Management Server</td>
<td>Provides server, user, session management, and security (authorization and authentication) management. At least one Central Management Service must be available in a cluster for the cluster to operate.</td>
</tr>
<tr>
<td>Client Auditing Proxy Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>Collects auditing events sent from clients and forwards them to the CMS server.</td>
</tr>
<tr>
<td>Crystal Reports 2011 Processing Service</td>
<td>Crystal Reports Services</td>
<td>Crystal Reports Processing Server</td>
<td>Accepts and processes Crystal Report 2011 reports; can share data between reports to reduce the number of database accesses.</td>
</tr>
<tr>
<td>Service</td>
<td>Service Category</td>
<td>Server type</td>
<td>Service description</td>
</tr>
<tr>
<td>--------------------------------------</td>
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<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Crystal Reports 2011 Scheduling Service</td>
<td>Crystal Reports Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled legacy Crystal Reports jobs and publishes the results to a given output location.</td>
</tr>
<tr>
<td>Crystal Reports 2011 Viewing and Modification Service</td>
<td>Crystal Reports Services</td>
<td>RAS</td>
<td>Report Application Server (RAS).</td>
</tr>
<tr>
<td>Crystal Reports Cache Service</td>
<td>Crystal Reports Services</td>
<td>Crystal Reports Cache Server</td>
<td>Limits the number of database accesses generated from Crystal reports and speeds up reporting by managing a cache of reports.</td>
</tr>
<tr>
<td>Crystal Reports Processing Service</td>
<td>Crystal Reports Services</td>
<td>Crystal Reports Processing Server</td>
<td>Accepts and processes Crystal reports; can share data between reports to reduce the number of database accesses.</td>
</tr>
<tr>
<td>Crystal Reports Scheduling Service</td>
<td>Crystal Reports Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled new Crystal Reports jobs and publishes the results to a given output location.</td>
</tr>
<tr>
<td>Custom Data Access Service</td>
<td>Connectivity Services</td>
<td>Adaptive Processing Server</td>
<td>Provides dynamic connections to data sources that do not require a Connection Server.</td>
</tr>
<tr>
<td>Dashboard Analytics Service</td>
<td>Core Services</td>
<td>Dashboard Analytics Server</td>
<td>Provides BI workspaces and Module functionality for data analysis.</td>
</tr>
<tr>
<td>Dashboard Design Cache Service</td>
<td>Dashboard Design Services</td>
<td>Dashboard Design Cache Server</td>
<td>Limits the number of database accesses generated from Dashboard Design reports and speeds up reporting by managing a cache of reports.</td>
</tr>
<tr>
<td>Service</td>
<td>Service Category</td>
<td>Server type</td>
<td>Service description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------------------</td>
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<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dashboard Design Processing Service</td>
<td>Dashboard Design Services</td>
<td>Dashboard Design Server</td>
<td>Accepts and processes Dashboard Design reports; can share data between reports to reduce the number of database accesses.</td>
</tr>
<tr>
<td>Dashboard Service</td>
<td>Core Services</td>
<td>Dashboard Server</td>
<td>BI workspace support</td>
</tr>
<tr>
<td>Data Federation Service</td>
<td>Data Federation Services</td>
<td>Adaptive Processing Server</td>
<td>Data Federation service.</td>
</tr>
<tr>
<td>Destination Delivery Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled jobs and publishes the results to a given output location, such as the file system, FTP, email, or a user's inbox.</td>
</tr>
<tr>
<td>DSL Bridge Service</td>
<td>Interactive Analysis Services</td>
<td>Adaptive Processing Server</td>
<td>Dual Semantic Layer (DSL) session support.</td>
</tr>
<tr>
<td>Event Service</td>
<td>Core Services</td>
<td>Event Server</td>
<td>Monitors for file events on a File Repository Server (FRS), and triggers reports to run when required.</td>
</tr>
<tr>
<td>Excel Data Access Service</td>
<td>Connectivity Services</td>
<td>Adaptive Processing Server</td>
<td>Supports Excel files uploaded to SAP BusinessObjects Enterprise as data sources.</td>
</tr>
<tr>
<td>Information Engine Service</td>
<td>Interactive Analysis Services</td>
<td>Interactive Analysis Processing Server</td>
<td>Service required for Interactive Analysis documents processing.</td>
</tr>
<tr>
<td>Input Filestore Service</td>
<td>Core Services</td>
<td>Input File Repository Server</td>
<td>Maintains published report and program objects that can be used in the generation of new reports when an input file is received.</td>
</tr>
<tr>
<td>Service</td>
<td>Service Category</td>
<td>Server type</td>
<td>Service description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Interactive Analysis Common Service</td>
<td>Interactive Analysis Services</td>
<td>Interactive Analysis Processing Server</td>
<td>Supports Interactive Analysis documents processing.</td>
</tr>
<tr>
<td>Interactive Analysis Core Service</td>
<td>Interactive Analysis Services</td>
<td>Interactive Analysis Processing Server</td>
<td>Supports Interactive Analysis documents processing.</td>
</tr>
<tr>
<td>Interactive Analysis Processing Service</td>
<td>Interactive Analysis Services</td>
<td>Interactive Analysis Processing Server</td>
<td>Accepts and processes Interactive Analysis documents.</td>
</tr>
<tr>
<td>Interactive Analysis Scheduling Service</td>
<td>Interactive Analysis Services</td>
<td>Adaptive Job Server</td>
<td>Enables support for scheduled Interactive Analysis jobs.</td>
</tr>
<tr>
<td>Lifecycle Management ClearCase Service</td>
<td>Lifecycle Management Services</td>
<td>Adaptive Processing Server</td>
<td>Provides ClearCase support for LCM.</td>
</tr>
<tr>
<td>Lifecycle Management Scheduling Service</td>
<td>Lifecycle Management Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled Lifecycle Management jobs.</td>
</tr>
<tr>
<td>Lifecycle Management Service</td>
<td>Lifecycle Management Services</td>
<td>Adaptive Processing Server</td>
<td>Lifecycle Management Core service.</td>
</tr>
<tr>
<td>Monitoring Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>Provides monitoring functions.</td>
</tr>
<tr>
<td>Multi Dimensional Analysis Service</td>
<td>Advanced Analysis Services</td>
<td>Adaptive Processing Server</td>
<td>Provides access to multi-dimensional Online Analytical Processing (OLAP) data; converts the raw data into XML, which can be rendered into Excel, PDF, or Voyager crosstabs and charts.</td>
</tr>
<tr>
<td>Native Connectivity Service</td>
<td>Connectivity Services</td>
<td>Connection Server</td>
<td>Providing Native Connectivity services for 64-bit architectures.</td>
</tr>
<tr>
<td>Native Connectivity Service (32-bit)</td>
<td>Connectivity Services</td>
<td>Connection Server</td>
<td>Providing Native Connectivity services for 32-bit architectures.</td>
</tr>
<tr>
<td>Service</td>
<td>Service Category</td>
<td>Server type</td>
<td>Service description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------</td>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Output Filestore Service</td>
<td>Core Services</td>
<td>Output File Repository Server</td>
<td>Maintains collection of completed documents.</td>
</tr>
<tr>
<td>Platform Search Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled search to index all content in the Central Management Server (CMS) repository.</td>
</tr>
<tr>
<td>Platform Search Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>Provides searching functionality for the Enterprise platform.</td>
</tr>
<tr>
<td>Probe Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Provides scheduled Probe jobs and publishes the results to a given output location.</td>
</tr>
<tr>
<td>Program Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Runs programs that have been scheduled to run at a given time.</td>
</tr>
<tr>
<td>Publication Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled publishing jobs and publishes the results to a given output location.</td>
</tr>
<tr>
<td>Publishing Post Processing Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>Performs actions on reports after they have completed, such as sending a report to a specific output location.</td>
</tr>
<tr>
<td>Publishing Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>Coordinates with the Publishing Post Processing Service and Destination Job Service to publish reports to a given output location, such as the file system, FTP, email, or a user's inbox.</td>
</tr>
<tr>
<td>Rebean Service</td>
<td>Interactive Analysis Services</td>
<td>Adaptive Processing Server</td>
<td>SDK used by Interactive Analysis and Explorer.</td>
</tr>
<tr>
<td>Service</td>
<td>Service Category</td>
<td>Server type</td>
<td>Service description</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Replication Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled federation jobs to replicate content between federated sites.</td>
</tr>
<tr>
<td>Security Query Scheduling Service</td>
<td>Core Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled Security Query jobs.</td>
</tr>
<tr>
<td>Security Token Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>SAP Single Sign-On support</td>
</tr>
<tr>
<td>Single Sign-on Service</td>
<td>Core Services</td>
<td>Central Management Server</td>
<td>Active Directory Single Sign-On support. This is secondary service. It is automatically added to &quot;Central Management Service&quot;.</td>
</tr>
<tr>
<td>TraceLog Service</td>
<td>Core Services</td>
<td>ANY SERVER</td>
<td>Tracing, Logging and supportability support</td>
</tr>
<tr>
<td>Translation Service</td>
<td>Core Services</td>
<td>Adaptive Processing Server</td>
<td>Translates InfoObjects with input from the Translation Manager client.</td>
</tr>
<tr>
<td>Visual Difference Scheduling Service</td>
<td>Lifecycle Management Services</td>
<td>Adaptive Job Server</td>
<td>Runs scheduled Visual Difference (Lifecycle Management) jobs and publishes the results to a given output location.</td>
</tr>
<tr>
<td>Visual Difference Service</td>
<td>Lifecycle Management Services</td>
<td>Adaptive Processing Server</td>
<td>Determines whether documents are visually identical for doc promotion and Lifecycle Management.</td>
</tr>
<tr>
<td>Visualization Service</td>
<td>Interactive Analysis Services</td>
<td>Adaptive Processing Server</td>
<td>Common Visualization Object Model Service, used by Interactive Analysis.</td>
</tr>
<tr>
<td>Web Services SDK and QaaWS</td>
<td>Core Services</td>
<td>Web Application Container Server</td>
<td>Web Services on WACS.</td>
</tr>
</tbody>
</table>
Note:
New services or server types may be added in future maintenance releases of SAP BusinessObjects Enterprise.

### 2.3.2 Service categories

The following table lists each of the servers, ordered by service category. For a description of each service, see *Services*.

Note:
New services or server types may be added in future maintenance releases of SAP BusinessObjects Enterprise.

*Table 2-2: Services, ordered by service category*

<table>
<thead>
<tr>
<th>Service category</th>
<th>Service</th>
<th>Server Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Analysis Services</td>
<td>BEx Web Application Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Advanced Analysis Services</td>
<td>Multi Dimensional Analysis Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Connectivity Services</td>
<td>Adaptive Connectivity Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Connectivity Services</td>
<td>Custom Data Access Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Connectivity Services</td>
<td>Excel Data Access Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Connectivity Services</td>
<td>Native Connectivity Service</td>
<td>Connection Server</td>
</tr>
<tr>
<td>Connectivity Services</td>
<td>Native Connectivity Service (32-bit)</td>
<td>Connection Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Authentication Update Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>BOE Web Application Service</td>
<td>Web Application Container Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Business Process BI Service</td>
<td>Web Application Container Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Central Management Service</td>
<td>Central Management Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Client Auditing Proxy Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Dashboard Analytics Service</td>
<td>Dashboard Analytics Server</td>
</tr>
<tr>
<td>Service category</td>
<td>Service</td>
<td>Server Type</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Core Services</td>
<td>Dashboard Service</td>
<td>Dashboard Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Destination Delivery Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Event Service</td>
<td>Event Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Input Filestore Service</td>
<td>Input File Repository Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Monitoring Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Output Filestore Service</td>
<td>Output File Repository Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Platform Search Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Platform Search Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Probe Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Program Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Publication Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Publishing Post Processing Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Publishing Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Replication Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Security Query Scheduling Service</td>
<td>Adaptive Job Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Security Token Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Single Sign-on Service</td>
<td>Central Management Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>TraceLog Service</td>
<td>ANY SERVER</td>
</tr>
<tr>
<td>Core Services</td>
<td>Translation Service</td>
<td>Adaptive Processing Server</td>
</tr>
<tr>
<td>Core Services</td>
<td>Web Services SDK and QaaWS</td>
<td>Web Application Container Server</td>
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<tr>
<td>Crystal Reports Services</td>
<td>Crystal Reports 2011 Processing Service</td>
<td>Crystal Reports Processing Server</td>
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<tr>
<td>Crystal Reports Services</td>
<td>Crystal Reports 2011 Scheduling Service</td>
<td>Adaptive Job Server</td>
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<tr>
<td>Service category</td>
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<td>Server Type</td>
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<td>Crystal Reports Services</td>
<td>Crystal Reports 2011 Viewing and Modification Service</td>
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<td>Crystal Reports Services</td>
<td>Crystal Reports Cache Service</td>
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<td>Dashboard Design Services</td>
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<td>Lifecycle Management Services</td>
<td>Visual Difference Scheduling Service</td>
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<td>Lifecycle Management Services</td>
<td>Visual Difference Service</td>
<td>Adaptive Processing Server</td>
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<tr>
<td>Interactive Analysis Services</td>
<td>Document Recovery Service</td>
<td>Adaptive Processing Server</td>
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<td>Interactive Analysis Services</td>
<td>DSL Bridge Service</td>
<td>Adaptive Processing Server</td>
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<td>Interactive Analysis Services</td>
<td>Information Engine Service</td>
<td>Interactive Analysis Processing Server</td>
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<td>Interactive Analysis Monitoring Service</td>
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<td>Interactive Analysis Services</td>
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<td>Interactive Analysis Services</td>
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<td>Interactive Analysis Services</td>
<td>Interactive Analysis Scheduling Service</td>
<td>Adaptive Job Server</td>
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</tbody>
</table>

### 2.3.3 Server types

The following table lists each of the servers, ordered by server type. For a description of each service, see Services.

Table 2-3: Servers, ordered by server type

<table>
<thead>
<tr>
<th>Server Type</th>
<th>Service category</th>
<th>Service category</th>
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</thead>
<tbody>
<tr>
<td>Adaptive Job Server</td>
<td>Authentication Update Scheduling Service</td>
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<td>Crystal Reports Scheduling Service</td>
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<td>Adaptive Job Server</td>
<td>Destination Delivery Scheduling Service</td>
<td>Core Services</td>
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<td>Lifecycle Management Scheduling Service</td>
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<td>Platform Search Scheduling Service</td>
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<td>Probe Scheduling Service</td>
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<td>Adaptive Job Server</td>
<td>Program Scheduling Service</td>
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<td>Adaptive Job Server</td>
<td>Publication Scheduling Service</td>
<td>Core Services</td>
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<tr>
<td>Adaptive Job Server</td>
<td>Replication Service</td>
<td>Core Services</td>
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<td>Adaptive Job Server</td>
<td>Security Query Scheduling Service</td>
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<td>Server Type</td>
<td>Service</td>
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<tr>
<td>Adaptive Job Server</td>
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<td>Lifecycle Management Services</td>
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<td>Adaptive Connectivity Service</td>
<td>Connectivity Services</td>
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<td>Adaptive Processing Server</td>
<td>BEx Web Application Service</td>
<td>Advanced Analysis Services</td>
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<td>Adaptive Processing Server</td>
<td>Client Auditing Proxy Service</td>
<td>Core Services</td>
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<td>Adaptive Processing Server</td>
<td>Custom Data Access Service</td>
<td>Connectivity Services</td>
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<td>Adaptive Processing Server</td>
<td>Data Federation Service</td>
<td>Data Federation Services</td>
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<td>Adaptive Processing Server</td>
<td>Document Recovery Service</td>
<td>Interactive Analysis Services</td>
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<tr>
<td>Adaptive Processing Server</td>
<td>DSL Bridge Service</td>
<td>Interactive Analysis Services</td>
</tr>
<tr>
<td>Adaptive Processing Server</td>
<td>Excel Data Access Service</td>
<td>Connectivity Services</td>
</tr>
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<td>Adaptive Processing Server</td>
<td>Interactive Analysis Monitoring Service</td>
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<td>Adaptive Processing Server</td>
<td>Lifecycle Management ClearCase Service</td>
<td>Lifecycle Management Services</td>
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<td>Adaptive Processing Server</td>
<td>Lifecycle Management Console Service</td>
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<td>Adaptive Processing Server</td>
<td>Monitoring Service</td>
<td>Core Services</td>
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<td>Adaptive Processing Server</td>
<td>Multi Dimensional Analysis Service</td>
<td>Advanced Analysis Services</td>
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<td>Adaptive Processing Server</td>
<td>Platform Search Service</td>
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<td>Adaptive Processing Server</td>
<td>Publishing Post Processing Service</td>
<td>Core Services</td>
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<td>Publishing Service</td>
<td>Core Services</td>
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<td>Adaptive Processing Server</td>
<td>Rebean Service</td>
<td>Interactive Analysis Services</td>
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<tr>
<td>Adaptive Processing Server</td>
<td>Security Token Service</td>
<td>Core Services</td>
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<td>Adaptive Processing Server</td>
<td>Translation Service</td>
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<tr>
<td>Adaptive Processing Server</td>
<td>Visual Difference Service</td>
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<td>Adaptive Processing Server</td>
<td>Visualization Service</td>
<td>Interactive Analysis Services</td>
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<tr>
<td>Server Type</td>
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<td>Service category</td>
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<tr>
<td>ANY SERVER</td>
<td>TraceLog Service</td>
<td>Core Services</td>
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<tr>
<td>Central Management Server</td>
<td>Central Management Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Central Management Server</td>
<td>Single Sign-on Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Connection Server</td>
<td>Native Connectivity Service</td>
<td>Connectivity Services</td>
</tr>
<tr>
<td>Connection Server</td>
<td>Native Connectivity Service (32-bit)</td>
<td>Connectivity Services</td>
</tr>
<tr>
<td>Crystal Reports Cache Server</td>
<td>Crystal Reports Cache Service</td>
<td>Crystal Reports Services</td>
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<tr>
<td>Crystal Reports Processing Server</td>
<td>Crystal Reports 2011 Processing Service</td>
<td>Crystal Reports Services</td>
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<td>Crystal Reports Processing Server</td>
<td>Crystal Reports Processing Service</td>
<td>Crystal Reports Services</td>
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<tr>
<td>Dashboard Analytics Server</td>
<td>Dashboard Analytics Service</td>
<td>Core Services</td>
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<tr>
<td>Dashboard Design Cache Server</td>
<td>Dashboard Design Cache Service</td>
<td>Dashboard Design Services</td>
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<tr>
<td>Dashboard Design Processing Server</td>
<td>Dashboard Design Processing Service</td>
<td>Dashboard Design Services</td>
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<tr>
<td>Dashboard Server</td>
<td>Dashboard Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Event Server</td>
<td>Event Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Input File Repository Server</td>
<td>Input Filestore Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Output File Repository Server</td>
<td>Output Filestore Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>RAS</td>
<td>Crystal Reports 2011 Viewing and Modification Service</td>
<td>Crystal Reports Services</td>
</tr>
<tr>
<td>Web Application Container Server</td>
<td>BOE Web Application Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Web Application Container Server</td>
<td>Business Process BI Service</td>
<td>Core Services</td>
</tr>
<tr>
<td>Web Application Container Server</td>
<td>Web Services SDK and QaaWS</td>
<td>Core Services</td>
</tr>
<tr>
<td>Interactive Analysis Processing Server</td>
<td>Information Engine Service</td>
<td>Interactive Analysis Services</td>
</tr>
<tr>
<td>Server Type</td>
<td>Service</td>
<td>Service category</td>
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<tr>
<td>Interactive Analysis Processing Server</td>
<td>Interactive Analysis Common Service</td>
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<td>Interactive Analysis Core Service</td>
<td>Interactive Analysis Services</td>
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<tr>
<td>Interactive Analysis Processing Server</td>
<td>Interactive Analysis Processing Service</td>
<td>Interactive Analysis Services</td>
</tr>
</tbody>
</table>

**2.3.4 Server types**

Servers are collections of services running under a Server Intelligence Agent (SIA) on a host. The type of server is denoted by the services running within it. Servers can be created in the Central Management Console (CMC). The following table lists the different types of servers that can be created in the CMC.
<table>
<thead>
<tr>
<th><strong>Server kind</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Job Server</td>
<td>General server that processes scheduled jobs. When you add a Job server to the SAP BusinessObjects Enterprise system, you can configure the Job server to process reports, documents, programs, or publications and send the results to different destinations.</td>
</tr>
<tr>
<td>Adaptive Processing Server</td>
<td>A generic server that hosts services responsible for processing requests from a variety of sources.</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>The installation program installs one Adaptive Processing Server (APS) per host system. Depending on the features that you've installed, this APS may host a large number of services, such as the Monitoring Service, Lifecycle Management Service, Multi-Dimensional Analysis Service (MDAS), Publishing Service, and others.</td>
</tr>
<tr>
<td></td>
<td>If you are installing a production environment, do not use the default APS. Instead, it is highly recommended that once the installation process is complete, you perform a system sizing to determine:</td>
</tr>
<tr>
<td></td>
<td>• The type and number of APS services.</td>
</tr>
<tr>
<td></td>
<td>• The distribution of services across multiple APS servers.</td>
</tr>
<tr>
<td></td>
<td>• The optimal number of APS servers. Multiple APS servers provide redundancy, better performance, and higher reliability.</td>
</tr>
<tr>
<td></td>
<td>• The distribution of APS servers across multiple nodes.</td>
</tr>
<tr>
<td></td>
<td>Create new APS server instances as determined by the sizing process.</td>
</tr>
<tr>
<td></td>
<td>For example, if the outcome of your sizing happens to suggest the creation of one APS for each service category, then may end up creating eight APS servers. One for each service category: Advanced Analysis Services, Connectivity Services, Core Services, Crystal Reports Services, Dashboard Design Services, Data Federation Services, Lifecycle Management Services, and Interactive Analysis Services.</td>
</tr>
<tr>
<td>Central Management Server (CMS)</td>
<td>Maintains a database of information about your SAP BusinessObjects Enterprise system (in the CMS system database) and audited user actions (in the Auditing Data Store). All platform services are managed by the CMS. The CMS also controls access to the system files where documents are stored, and information on users, user groups, security levels (including authentication and authorization), and content.</td>
</tr>
<tr>
<td>Connection Server</td>
<td>Provides database access to source data. It supports relational databases, as well as OLAP and other formats. The Connection Server is responsible for handling connection and interaction with the various data sources and providing a common feature set to clients.</td>
</tr>
<tr>
<td>Server kind</td>
<td>Description</td>
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<td>----------------------------------------------</td>
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</tr>
<tr>
<td>Crystal Reports Cache Server</td>
<td>Intercepts report requests sent from clients to the page server. If the cache server cannot fulfill the request with a cached report page, it passes the request on to the Crystal Reports Processing server, which runs the report and returns the results. The cache server then caches the report page for potential future use.</td>
</tr>
<tr>
<td>Crystal Reports Processing Server</td>
<td>Responds 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 improves system performance and reduces unnecessary network traffic for large reports.</td>
</tr>
<tr>
<td>Dashboard Analytics Server</td>
<td>Server process used by the BI Workspace component to create and manage corporate and personal BI workspace module content.</td>
</tr>
<tr>
<td>Dashboard Server</td>
<td>Used by the BI Workspace component to create and manage corporate and personal dashboards. BI workspaces offers dashboard management capabilities to help organizations monitor and understand their business activities.</td>
</tr>
<tr>
<td>Dashboard Design Cache Server</td>
<td>Intercepts report requests sent from clients to the Dashboard server. If the cache server cannot fulfill the request with a cached report page, it passes the request on to the Dashboard server, which runs the report and returns the results. The cache server then caches the report page for potential future use.</td>
</tr>
<tr>
<td>Dashboard Design Processing Server</td>
<td>Responds to Dashboard Design 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 improves system performance and reduces unnecessary network traffic for large reports.</td>
</tr>
<tr>
<td>Event Server</td>
<td>Monitors the system for events, which can act as a trigger for running a report. When you set up a event trigger, the Event Server monitors the condition and notifies the CMS that an event has occurred. The CMS can then start any jobs that are set to run upon the event.</td>
</tr>
<tr>
<td>Server kind</td>
<td>Description</td>
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<td>---------------------------------</td>
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</tr>
<tr>
<td>File Repository Server</td>
<td>Responsible for the creation of file system objects, such as exported reports, and imported files in non-native formats. An Input FRS stores report and program objects that have been published to the system by administrators or end users. An Output FRS stores all of the report instances generated by the Job Server.</td>
</tr>
<tr>
<td>Report Application Server</td>
<td>Provides ad-hoc reporting capabilities that allow users to create and modify Crystal reports via the SAP Crystal Reports Server Embedded Software Development Kit (SDK).</td>
</tr>
</tbody>
</table>

### 2.4 Client applications

You can interact with SAP BusinessObjects Enterprise using two different types of desktop (client) applications:

- **Desktop applications**
  
  These applications must be installed on a supported Microsoft Windows operating system, and can process data and create reports locally.

  **Note:**
  
  The SAP BusinessObjects Enterprise installation program no longer installs desktop applications. To install desktop application on a server, use the stand-alone SAP BusinessObjects Enterprise Client Tools installation program.

  Desktop clients allow you to offload some BI report processing onto individual client computers. Most desktop applications directly access your organization's data through drivers installed on the desktop, and communicate with your SAP BusinessObjects Enterprise deployment through CORBA or encrypted CORBA SSL.

  Examples of this type of application include: Crystal Reports and Live Office.

  **Note:**
  
  Although Live Office is a rich functionality application, it interfaces with SAP BusinessObjects Enterprise web services over HTTP.

- **Web applications**

  These applications are hosted by a web application server and can be accessed with a supported web browser on Windows, Macintosh, Unix, and Linux operating systems.
This allows you to provide business intelligence (BI) access to large groups of users, without the challenges of deploying desktop software products. Communication is conducted over HTTP, with or without SSL encryption (HTTPS).

Examples of this type of application include BI launch pad, SAP BusinessObjects Interactive Analysis, the Central Management Console (CMC), and report viewers.

### 2.4.1 Installed with SAP BusinessObjects Enterprise Client Tools

#### 2.4.1.1 Interactive Analysis Desktop

Interactive Analysis Desktop (formerly Web Intelligence Desktop) is an ad-hoc analysis and reporting tool for business users with or without access to the SAP BusinessObjects Enterprise platform.

It allows business users to access and combine data from relational, online analytical processing (OLAP), spreadsheet, or text file sources, using familiar business terms in a drag-and-drop interface. Workflows allow very broad or very narrow questions to be analyzed, and for further questions to be asked at any point in the analysis workflow.

Interactive Analysis Desktop users can continue to working with Interactive Analysis document files (.wid) even when unable to connect to a Central Management Server (CMS).

#### 2.4.1.2 Business View Manager

Business View Manager allows users to build semantic layer objects that simplify underlying database complexity.

Business Views Manager can create data connections, dynamic data connections, data foundations, business elements, business views, and relational views. It also allows detailed column and row-level security to be set for the objects in a report.

Designers can build connections to multiple data sources, join tables, alias field names, create calculated fields, and then use the simplified structure as a Business View. Report designers and users can then use the business view as the basis for their reports, rather than and building their own queries from the data directly.
2.4.1.3 Report Conversion Tool

The Report Conversion Tool converts reports to Interactive Analysis (formerly Desktop Intelligence) format and publishes them to a Central Management Server (CMS).

Reports can be retrieved from the CMS folders Public, Favorites, or Inbox. Once converted, reports publish to the same folder as the original Interactive Analysis report, or to a different folder. The tool does not convert all Interactive Analysis features and reports. The level of conversion depends on the features in the original report. Some features prevent the report from being converted. Other features are modified, reimplemented, or removed by the tool during conversion.

The Report Conversion Tool also lets you audit your converted reports. This helps identify reports that cannot be fully converted by the Report Conversion Tool and explains why.

2.4.1.4 Universe design tool

Universe design tool (formerly Universe Designer) allows data designers to combine data from multiple sources in a semantic layer that hides database complexity from end users. It abstracts the complexity of data by using business rather than technical language to access, manipulate, and organize data.

Universe design tool provides a graphical interface to select and view tables in a database. The database tables are represented as table symbols in a schema diagram. Designers can use this interface to manipulate tables, create joins between tables, create alias tables, create contexts, and solve loops in a schema.

You can also create universes from metadata sources. Universe design tool is used for the universe generation at the end of the creation process.

2.4.1.5 Web service query tool

Web service query tool (formerly Query as a Web Service) allows Business Intelligence (BI) queries to be used in custom web applications. Business users create a own query from a universe connection and published it as a web service so it can be incorporated into a web application.

Web service query tool provides new client solutions for businesses. For example, it enables SAP BusinessObjects Dashboard Design (formerly Xcelsius) to aggregate multiple disparate data sources into a trusted BI view.

Web service query tool also works with a range of client-side solutions, including:
• Microsoft Office, Excel, and InfoPath
• SAP NetWeaver
• OpenOffice
• Business rules and process management applications
• Enterprise Services

2.4.1.6 Information design tool

The information design tool (formerly Information Designer) is an SAP BusinessObjects metadata design environment that enables a designer to extract, define, and manipulate metadata from relational and OLAP sources to create and deploy SAP BusinessObjects universes.

2.4.1.7 Translation Management Tool

SAP BusinessObjects Enterprise provides support for multilingual documents and universes. A multilingual document contains localized versions of universe metadata and document prompts. A user can create reports, for example, from the same universe in their chosen languages.

The Translation Management Tool (formerly Translation Manager) defines the multilingual universes and manages translation of universes and their Web Intelligence documents and prompts.

Translation Management Tool:
• Translates universe or an SAP BusinessObjects Interactive Analysis documents for a multilingual audience.
• Defines the metadata language parts of a document, and the appropriate translation. It generates external XLIFF format and imports XLIFF files to get translated information.
• Lists the universe or SAP BusinessObjects Interactive Analysis document structure to be translated.
• Lets you translate the metadata through the user interface, or through an external translation tool by importing and exporting XLIFF files.
• Creates multilingual documents.

2.4.1.8 Data Federation Administration Tool

The Data Federation Administration Tool (formerly Data Federator) is a rich client application that offers easy-to-use features to manage your data federation service.
Tightly integrated in the SAP BusinessObjects Enterprise platform, the data federation service enables multi-source universes by distributing queries across disparate data sources, and lets you federate data through a single data foundation.

The data federation administration tool lets you optimize data federation queries and fine-tune the data federation query engine for the best possible performance.

You use the data federation administration tool to do the following:

- Test SQL queries.
- Visualize optimization plans which detail how federated queries are distributed to each source.
- Compute "statistics" and set system parameters to fine-tune the data federation services and get the best possible performance.
- Manage properties to control how queries are executed in each data source at the connector level.
- Monitor running SQL queries.
- Browse the history of executed queries.

### 2.4.1.9 Widgets for SAP BusinessObjects Enterprise

Widgets are mini-applications that allow easy and fast access to frequently used functions and provide visual information from your desktop. Widgets for SAP BusinessObjects Enterprise (formerly BI Widgets) allows your organization to provide access to existing Business Intelligence (BI) content on SAP BusinessObjects Enterprise, or you can add Web Dynpro applications that are registered as XBCML (Extensible Business Client Markup Language) widgets on the SAP NetWeaver Application Servers as desktop widgets.

To render XBCML widgets on the user's desktop, SAP Web Dynpro Flex Client is used. The SAP Web Dynpro Flex Client is a rendering engine based on Adobe Flex which is used for rendering widgets. For details about how to configure Web Dynpro applications, see the [To enable widgets on the SAP NetWeaver Application Server](#) topic in the [Widgets for SAP BusinessObjects User Guide](#).

**Note:**
The SAP Web Dynpro Flex Client support for XBCML Widgets begins in release 7.0 EhP2 SP3. Flex Client queue support is confined only to Flex Client issues found in XBCML widgets in these specified releases.

With widgets for SAP BusinessObjects Enterprise, you search or browse for existing content, such as Interactive Analysis documents, Dashboard Design models, and Web Dynpro applications, then paste the information onto your desktop so it is readily available when needed.

As a widget, the content gains the following features from the widget framework:

- User-controlled size and positioning
- Automatic refresh
- Optional setting as the top application window
• Full SAP BusinessObjects Enterprise security (Interactive Analysis report parts and Dashboard Design models only)
• Saved display
• Saved data context state (Interactive Analysis report parts only)
• Web Intelligence OpenDocument links to detailed reports (Interactive Analysis documents only)
• Tabbed views (Dashboard Design models only)

2.4.2 Installed with SAP BusinessObjects Enterprise

2.4.2.1 Central Configuration Manager (CCM)

The Central Configuration Manager (CCM) is a server troubleshooting and node management tool provided in two forms. In a Microsoft Windows environment, the CCM allows you to manage local and remote servers through its graphical user interface (GUI) or from a command line. In a Unix environment, the CCM shell script (`ccm.sh`) allows you to manage servers from the command-line.

The CCM allows you to create and configure Server Intelligence Agent (SIA) nodes and start or stop your web application server. On Windows, it also allows you to configure network parameters, such as Secure Socket Layer (SSL) encryption. These parameters apply to all servers within a node.

**Note:**
Most server management tasks are now handled through the CMC, not through the CCM. The CCM is now used for troubleshooting and node configuration.

2.4.2.2 Upgrade management tool

Upgrade management tool (formerly Import Wizard) is installed as a part of SAP BusinessObjects Enterprise, and guides administrators through the process of importing users, groups, and folders from previous versions of SAP BusinessObjects Enterprise. It also allows you to import and upgrade objects, events, server groups, repository objects, and calendars.

For information on upgrading from a previous version of SAP BusinessObjects Enterprise, see the *SAP BusinessObjects Enterprise Upgrade Guide*. 
2.4.2.3 Repository Diagnostic Tool

The Repository Diagnostic Tool (RDT) can scan, diagnose, and repair inconsistencies that may occur between the Central Management Server (CMS) system database and the File Repository Servers (FRS) filestore.

It can also report the repair status and completed actions. To determine synchronization between the file system and database, RDT should be used after the user first completes a hot back-up. It can also be used after a restoration and prior to starting their SAP BusinessObjects Enterprise services. The user can set a limit for the number of errors the RDT will find and repair before stopping.

2.4.3 Available separately

2.4.3.1 SAP BusinessObjects Advanced Analysis, edition for Microsoft Office

SAP BusinessObjects Advanced Analysis, edition for Microsoft Office (formerly Voyager) allows business analysts to explore multi-dimensional online analytical processing (OLAP) data.

Analysts can quickly answer business questions and then share their analysis and workspace with others, spreading knowledge beyond the confines of a single department or group.

SAP BusinessObjects Voyager enables analysts to:
- Discover trends, outliers, and details stored in their financial systems without the help of a database administrator
- Get answers to business questions while viewing multidimensional data sets - large or small - quickly and efficiently
- Access the full range of OLAP data sources available within the organization and share results using a simple, intuitive Web interface
- Access multiple different OLAP sources in the same report to get a comprehensive view of the business and the cross-impact that one trend may have on another
- Interrogate, analyze, compare, and forecast business drivers
- Use a comprehensive range of business and time calculations
2.4.3.2 SAP Crystal Reports

SAP Crystal Reports software enables users to design interactive reports from a data source.

2.4.3.3 SAP BusinessObjects Dashboard Design

SAP BusinessObjects Dashboard Design (formerly Xcelsius) is a tool for data visualization and the creation of dynamic, interactive dashboards. Data and formulae are imported or directly entered into an embedded Excel spreadsheet. A Flash interface provides a canvas that can display a variety of analytics and dashboards.

Data can be updated dynamically from SAP BusinessObjects Enterprise, and exported to a variety of different formats that can be viewed by data consumers in standard formats, such as PowerPoint, PDF, or Flash.

2.4.3.4 SAP BusinessObjects Explorer

SAP BusinessObjects Explorer is a data discovery application that uses a powerful search capability to retrieve answers to business questions from corporate data quickly and directly.

When you install SAP BusinessObjects Explorer, the following servers are added to the BusinessObjects Enterprise Central Configuration Manager (CCM) and Central Management Console (CMC):

- Explorer Master Server: manages all of the Explorer servers.
- Explorer Indexing Server: provides and manages the indexing of information space data and metadata.
- Explorer Search Server: processes search queries and returns the results.
- Explorer Exploration Server: provides and manages the information space exploration and analysis capabilities including search on data, filtering and aggregation.

2.4.4 Web application clients

Web application clients reside on a web application server, and are accessed on a client machine's in a web browser. Web applications are automatically deployed when you install SAP BusinessObjects Enterprise.
Web applications are easy for users to access from a web browser, and communication can be secured with SSL encryption if you plan to allow users access from outside your organization's network.

Java web applications can also be reconfigured or deployed after the initial installation by using the bundled WDeploy command-line tool, which allows you to deploy web applications to a web application server in two ways:

1. Standalone mode
   All web application resources are deployed to a web application server that serves both dynamic and static content. This arrangement is suitable for small installations.

2. Split mode
   The web application's static content (HTML, images, CSS) is deployed to a dedicated web server, while dynamic content (JSPs) is deployed to a web application server. This arrangement is suitable for larger installations that will benefit from the web application server being freed up from serving static web content.

For more information about WDeploy, see the SAP BusinessObjects Enterprise Web Application Deployment Guide.

### 2.4.4.1 Central Management Console (CMC)

The Central Management Console (CMC) is a web-based tool to perform administrative tasks, including user, content, and server management. It also allows you to publish, organize, and configure security settings. Because the CMC is a web-based application, you can perform all of these administrative tasks through a web browser on any machine that can connect to the server.

All users can log on to the CMC to change their user preference settings. Only members of the Administrators group can change management settings, unless explicitly granted the rights to do so. Roles can also be assigned to the CMC to grant some users privileges to perform minor administrative tasks.

### 2.4.4.2 BI launch pad

BI launch pad (formerly InfoView) is a web-based interface that end users access to view, schedule, and keep track of published business intelligence (BI) reports. BI launch pad can access, interact with, and export, any type of business intelligence including reports, analytics, dashboards, scorecards, and strategy maps.

BI launch pad allows users to manage:
- BI catalog browsing and searching.
• BI content access (creating, editing, and viewing).
• BI content scheduling and publishing.

2.4.4.3 BI workspaces

BI workspaces (formerly Dashboard Builder) helps you track your business activities and performance using modules (templates for data) and Business Intelligence (BI) workspaces (viewing data in one or more modules). Modules and BI workspaces provide information needed to adjust business rules as conditions change. It helps you track and analyze key business data via management BI workspaces and modules. It also supports group decision-making and analysis via integrated collaboration and workflow capabilities. BI workspaces provides the following features:

• Tab-based browsing
• Page creation: Manage BI workspaces and modules
• A point and click application builder
• Content linking between modules for in-depth data analysis

Note:
To use the BI workspaces features, you must purchase a SAP BusinessObjects Enterprise license that includes the use of BI workspaces as part of the agreement.

2.4.4.4 Report viewers

Report viewers support different platforms and different browsers and fall into one of two categories:

• Client-side report viewers (Active X viewer, Java viewer)

  Client-side report viewers are downloaded and installed in the user's browser. When a user requests a report, the application server processes the request, and retrieves the report pages from SAP BusinessObjects Enterprise. The web application server then passes the report pages to the client-side viewer, which processes the report pages and displays them in the web browser.

• Zero-client report viewers (DHTML viewer)

  Zero-client report viewers reside on the web application server. When a user requests a report, the web application server retrieves the report pages from SAP BusinessObjects Enterprise and creates DHTML pages that display in the web browser.

All report viewers process report requests and present report pages that appear in the web browser.

For more information on the specific functionality or platform support provided by each report viewer, see the SAP BusinessObjects Enterprise BI launch pad User's Guide or the SAP Crystal Reports Developer's Guide.
2.4.5 SAP BusinessObjects Interactive Analysis

SAP BusinessObjects Interactive Analysis is a web-based tool that provides query, reporting, and analysis functionality for relational data sources in a single web-based product.

It allows users to create reports, perform ad-hoc queries, analyze data, and format reports in a drag-and-drop interface. Web Intelligence hides the complexity of underlying data sources.

Reports can be published to a supported web portal, or to Microsoft Office applications using BusinessObjects Live Office.

2.4.6 SAP BusinessObjects Advanced Analysis

SAP BusinessObjects Advanced Analysis (formerly Voyager) is an online analytical processing (OLAP) tool in the BI launch pad portal for working with multi-dimensional data. It can also combine information from different OLAP data sources within a single workspace. Supported OLAP providers include SAP BW, Microsoft Analysis Services, and Oracle Hyperion Essbase.

The Advanced Analysis OLAP feature set combines elements of SAP Crystal Reports (direct data access to OLAP cubes for production reporting) and SAP BusinessObjects Interactive Analysis (ad-hoc analytic reporting with universes from OLAP data sources). It offers a range of business and time calculations, and includes features such as time sliders to make the analysis of OLAP data as simple as possible.

**Note:**
The Advanced Analysis web application is available only as a Java web application. There is no corresponding application for .NET.

2.4.7 SAP BusinessObjects Mobile

SAP BusinessObjects Mobile allows your users to remotely access the same business intelligence (BI) reports, metrics, and real-time data available on desktop clients from a wireless device. Content is optimized for mobile devices so your users can easily access, navigate, and analyze familiar reports without additional training.

With SAP BusinessObjects Mobile, management and information workers can stay up-to-date and make decisions using the latest information. Sales and field service staff can provide the right customer, product, and work order information where and when it’s needed.
SAP BusinessObjects Mobile supports a broad set of mobile devices including BlackBerry, Windows Mobile, and Symbian.

For information on mobile installation, configuration, and deployment, see the *SAP BusinessObjects Mobile Installation and Deployment Guide*. For information on using SAP BusinessObjects Mobile, see the *Using SAP BusinessObjects Mobile Guide*.

### 2.5 Information Workflows

When tasks are performed in BusinessObjects Enterprise, such as logging in, scheduling a report, or viewing a report, information flows through the system and the servers communicate with each other. The following section describes some of the process flows as they would happen in the BusinessObjects Enterprise system.

#### 2.5.1 Authentication

**2.5.1.1 Logging on to SAP BusinessObjects Enterprise**

This workflow describes a user logging on to SAP BusinessObjects Enterprise from a web browser.

1. The browser sends the login request via the web server to the web application server.
2. The web application server determines that the request is a logon request. The web application server sends the username, password, and authentication type to the CMS for authentication.
3. The CMS validates the username and password against the appropriate database (in this case, Enterprise authentication is used, and user credentials are authenticated against the CMS system database).
4. Upon successful validation, the CMS creates a session for the user in memory.
5. The CMS sends a response to the web application server to let it know that the validation was successful. The web application server generates a logon token for the user session in memory. For the rest of this session, the web application server uses the logon token to validate the user against the CMS.
6. The web application server generates an HTML page to send to the client. The web application server sends the response back to the user's machine where it is rendered in the web client.
2.5.1.2 SIA start-up

A Server Intelligence Agent (SIA) can be configured to start automatically with the host operating system, or can be started manually with Central Configuration Manager (CCM).

A SIA retrieves information about the servers it manages from a Central Management Server (CMS). If the SIA uses a local CMS, and that CMS is not running, the SIA starts the CMS. If a SIA uses a remote CMS, it attempts to connect to the CMS.

Once a SIA is started, the following sequence of events is performed.

1. The SIA looks in its cache to locate a CMS.
   a. If the SIA is configured to start a local CMS, and the CMS is not running, the SIA starts the CMS and connects.
   b. If the SIA is configured to use a running CMS (local or remote), it attempts to connect to the first CMS in its cache. If the CMS is not currently available, it attempts to connect to the next CMS in the cache. If none of the cached CMSs are available, the SIA waits for one to become available.

2. The CMS confirms the SIA’s identity to ensure that it is valid.

3. Once the SIA has successfully connected to a CMS, it requests a list of servers to manage.
   A SIA does not store information about the servers it manages. The configuration information that dictates which server is managed by a SIA is stored in the CMS system database and is retrieved from the CMS by the SIA when it starts.

4. The CMS queries the CMS system database for a list of servers managed by the SIA. The configuration for each server is also retrieved.

5. The CMS returns the list of servers, and their configuration, to the SIA.

6. For each server configured to start automatically, the SIA starts it with the appropriate configuration and monitors its state. Each server started by the SIA is configured to use the same CMS used by the SIA.
   Any servers not configured to start automatically with the SIA will not start.

2.5.1.3 SIA shutdown

A Server Intelligence Agent (SIA) can be configured to stop automatically with the host operating system, or can be stopped manually with the Central Configuration Manager (CCM).

When the SIA shuts down, the following steps are performed.

1. The CMS tells the SIA to stop.
2. The SIA tells the CMS that it is shutting down.
a. If the SIA is stopping because the host operating system is shutting down, the SIA requests its servers to stop. Servers that do not stop within 25 seconds are forcefully terminated.
b. If the SIA is being stopped manually, it will wait for the managed server to finish processing existing jobs. Managed servers will not accept any new jobs. Once all jobs are complete, the servers stop. Once all servers have stopped, the SIA stops too.

**Note:**
During a force shutdown, the SIA tells all managed servers to stop immediately.

## 2.5.2 Scheduling

### 2.5.2.1 Scheduling an SAP Crystal report

This workflow describes the process of a user scheduling an SAP Crystal report to be run at a future time.

1. The web client submits a schedule request in an URL, typically via the web server to the web application server.
2. The web application server interprets the URL request and determines that the request is a schedule request. The web application server sends the schedule time, database login values, parameter values, destination, and format to the specified CMS.
3. The Central Management Server (CMS) ensures that the user has rights to schedule the object. If the user has sufficient rights, the CMS adds a new record to the CMS system database. The CMS also adds the instance to its list of pending schedules.

### 2.5.2.2 Scheduling an SAP Crystal report to run now

This workflow describes the process of a user scheduling an SAP Crystal report to be run immediately.

1. The user schedules a report and the request is sent to the web application server.
2. The web application server passes the request to the Central Management Server (CMS).
3. The CMS determines whether or not the user has the appropriate rights to schedule the report.
4. If the user has the appropriate rights to schedule the report, the CMS commits the scheduled object request to the CMS system database.
5. When the scheduled time arrives, the CMS locates an available Crystal Reports Job Server based on the "Maximum Jobs Allowed" value configured for each Crystal Reports Job Server.
6. The CMS sends the job information to the Crystal Reports Job Server.
7. The Crystal Reports Job Server determines the location of the Input File Repository Server (FRS) that houses this report. The Crystal Reports Job Server then requests the report template from the Input FRS.
8. The Input FRS locates the report template and then streams to the Crystal Reports Job Server.
9. The report template is placed in a temporary directory on the Crystal Reports Job Server.
10. The Crystal Reports Job Server launches a child process (JobServerChild.exe) to coordinate running the report.
12. The report is created when the Crpe32.dll completes the following tasks:
   - Open the report.
   - Connect to the production database.
   - Process the report.
   - Create and save the report instance.
   - Pass the report back to JobServerChild.exe.
13. The Crystal Reports Job Server updates the CMS periodically with the job status. At this time the status shows that the report is processing.
14. JobServerChild.exe uploads the report instance to the Output FRS.
15. The Output FRS notifies the JobServerChild.exe that the report has been saved successfully.
16. JobServerChild.exe notifies the Crystal Reports Job Server that the report creation has completed.
17. The Report Job Server updates the CMS with the job status. The JobServerChild.exe clears itself from memory.
18. The CMS updates the job status in its memory, and then writes the instance information to the CMS system database.

### 2.5.2.3 A scheduled SAP Crystal report runs

This workflow describes the process of a scheduled a SAP Crystal report running at a scheduled time.

1. The Central Management Server (CMS) checks the CMS system database to determine if there is any scheduled SAP Crystal report to be run at that time.
2. When scheduled job time arrives, the CMS locates an available Crystal Reports Job Server based on the "Maximum Jobs Allowed" value configured on each Crystal Reports Job Server. The CMS sends the job information to the Crystal Reports Job Server. The information the CMS sends to the Crystal Reports Job Server is Report ID, Format, Destination, Logon information, parameters, and selection formulas.
3. The Crystal Reports Job Server communicates with the Input File Repository Server (FRS) to obtain a report template as per the requested Report ID.
4. The Crystal Reports Job Server launches the JobChildserver process.
5. The child process (JobChildserver) launches the ProcReport.dll upon receiving the template from the Input File Repository Server via the Enterprise Infrastructure. The ProcReport.dll contains all of the parameters that were passed from the CMS to the Crystal Reports Job Server.
6. The ProcReport.dll launches the Crpe32.dll that processes the report according to all the parameters that were passed.
7. While still processing, records are retrieved from a database server as defined within a report.
8. The Crystal Reports Job Server updates the CMS periodically with the job status. At this time the status shows that it is processing.
9. Once the report is compiled into the memory of the Crystal Reports Job Server, it needs to be exported to a different format, such as Portable Document Format (PDF). When exporting to PDF, the PDF .dll is used.
10. The report with saved data also needs to be submitted to the default location. Then it is sent to the Output FRS.
11. Once that process is finished, the Crystal Reports Job Server updates the CMS with the job status. At this time the status is reported as a success.
12. The CMS updates the job status in its memory, and then writes the instance information to the CMS system database.

2.5.2.4 Scheduling an SAP BusinessObjects Interactive Analysis document

This workflow describes the process of a user scheduling an SAP BusinessObjects Interactive Analysis (formerly Web Intelligence) document to be run at a future time.
1. The user sets a schedule for a document and the request is sent to the web server. The web server passes the document schedule request to the web application server.
2. The web application server passes the document schedule request to the CMS.
3. The CMS determines whether or not the user has the appropriate rights to schedule the document.
4. An instance of the SAP BusinessObjects Interactive Analysis document is created in the CMS that contains all the relevant scheduling information.
5. If the user has the appropriate rights to schedule the document, the user then sets the different scheduling parameters.
6. The CMS commits the scheduled object request to the system database.

2.5.2.5 A scheduled SAP BusinessObjects Interactive Analysis document runs

This workflow describes the process of a scheduled a SAP BusinessObjects Interactive Analysis (formerly Web Intelligence) document running at a scheduled time.
1. The Central Management Server (CMS) checks the CMS system database to determine if there is any scheduled SAP BusinessObjects Interactive Analysis to be run at that time.
2. When the scheduled time arrives, the CMS sends the schedule request and all the information about the request to the Adaptive Job Server that houses the SAP BusinessObjects Interactive Analysis Scheduling and Publishing Service.


4. The SAP BusinessObjects Interactive Analysis Processing Server determines the location of the Input File Repository Server (FRS) that houses the document and the universe metatlayer file on which the document is based. The SAP BusinessObjects Interactive Analysis Processing Server then requests the document from the Input FRS. The Input FRS locates the SAP BusinessObjects Interactive Analysis document as well as the universe file on which the document is based and then streams them to the SAP BusinessObjects Interactive Analysis Processing Server.

5. The SAP BusinessObjects Interactive Analysis document is placed in a temporary directory on the SAP BusinessObjects Interactive Analysis Processing Server. The SAP BusinessObjects Interactive Analysis Processing Server opens the document in memory. The QT.dll generates the SQL from the Universe on which the document is based. The Connection Server (component of the SAP BusinessObjects Interactive Analysis Process Server) connects to the database. The query data passes through QT.dll back to the Document Engine where the document is processed. A new successful instance is created.

6. The SAP BusinessObjects Interactive Analysis Processing Server uploads the document instance to the Output FRS.

7. The SAP BusinessObjects Interactive Analysis Processing Server notifies the Adaptive Job Server (SAP BusinessObjects Interactive Analysis Scheduling and Publishing Service) that document creation is completed. If the document is scheduled to go to a destination (file system, FTP, SMTP, or Inbox), the Adaptive Job Server retrieves the processed document from the Output FRS and delivers it to the specified destination(s). Assume that this is not the case in this example.

8. The Adaptive Job Server (Web Intelligence Scheduling and Publishing Service) updates the CMS with the job status.

9. The CMS updates the job status in its memory, and then writes the instance information to the CMS system database.

### 2.5.2.6 Scheduling an object

This workflow describes the process of a user scheduling an object to be run.

1. The user schedules an object and the request is sent to the web server.
2. The web server passes the object schedule request to the web application server.
3. The web application server passes the request to the Central Management Server (CMS).
4. The CMS determines if the user has the appropriate rights to schedule the object.
5. If the user has the appropriate rights to schedule the object, the CMS commits the scheduled object request to the CMS system database.
6. When the scheduled time arrives, the CMS locates an available Program Job Server based on the Maximum Jobs Allowed value configured on each Program Job Server.
7. The CMS sends the job information to the Program Job Server.
8. The Program Job Server communicates with the Input File Repository Server and requests the program object.
9. The Input File Repository Server returns the program object back to the Program Job Server.
10. The Program Job Server launches the scheduled object.
11. The Program Job Server updates the CMS periodically with the job status. At this time the status reported is that the program is processing.
12. The Program Job Server sends a log file to the Output File Repository Server.
13. The Output File Repository Server notifies the Program Job Server that the object was scheduled successfully by sending an object log file.
14. The Program Job Server updates the CMS with the job status.
15. The CMS updates the job status in its memory, and then writes the object instance information to the CMS system database.

2.5.2.7 Scheduling an object to run now

This workflow describes the process of a user scheduling an object to be run immediately.
1. The user schedules an object and the request is sent to the web server.
2. The web server passes the object schedule request to the web application server.
3. The web application server passes the request to the Central Management Server (CMS).
4. The CMS determines if the user has the appropriate rights to schedule the object.
5. If the user has the appropriate rights to schedule the object, the CMS commits the scheduled object request to the CMS system database.
6. When the scheduled time arrives, the CMS locates an available Program Job Server based on the "Maximum Jobs Allowed" value configured on each Program Job Server.
7. The CMS sends the job information to the Program Job Server.
8. The Program Job Server communicates with the Input File Repository Server and requests the program object.
9. The Input File Repository Server returns the program object back to the Program Job Server.
10. The Program Job Server launches the scheduled object.
11. The Program Job Server updates the CMS periodically with the job status. At this time the status reported is that the program is processing.
12. The Program Job Server sends a log file to the Output File Repository Server.
13. The Output File Repository Server notifies the Program Job Server that the object was scheduled successfully by sending an object log file.
14. The Program Job Server updates the CMS with the job status.
15. The CMS updates the job status in its memory, and then writes the object instance information to the CMS system database.
2.5.3 Viewing

2.5.3.1 Viewing an SAP Crystal report

This workflow describes the process of a user requesting a page in an SAP Crystal report when the report does not already exist on a cache server.

1. The user sends the view request through the web server to the web application server.
2. The web application server recognizes the request as a request to view a report page. The web application server checks the Central Management Server (CMS) to ensure the user has sufficient rights to view the report.
3. The CMS determines if the user has the appropriate rights to view the report.
4. The CMS sends a response to the web application server to confirm the user has sufficient rights to view the report.
5. The web application server sends a request to the Crystal Reports Cache Server for the requested report page.
6. The Crystal Reports Cache Server determines if the requested file exists in the cache directory.
7. The requested EPF file is not found in the cache directory.
8. The Crystal Reports Cache Server sends the request to the Crystal Reports Page Server.
10. The Output FRS sends the requested report instance to the Crystal Reports Page Server.
11. The Crystal Reports Page Server opens the report instance and checks the report to determine if it has data.
12. The Crystal Reports Page Server determines that the report contains data and creates the file for the requested report page without having to connect to the production database.
13. The Crystal Reports Page Server sends the EPF file to the Crystal Reports Cache Server.
14. The Crystal Reports Cache Server writes the EPF file to the cache directory.
15. The Crystal Reports Cache Server sends the requested page to the web application server.
16. The web application server forwards the file to the web server.
17. The web server sends the requested page to the report viewer.

2.5.3.2 Viewing a cached SAP Crystal report
This workflow describes the process of a user requesting a page in an SAP Crystal report, when the report already exists on a cache server.

1. A web client sends a view request in a URL to the web application server.
2. The web application server interprets the request and determines that it is a request to view the first page of a selected report instance. The web application server sends a request to the Central Management Server (CMS) to ensure that the user has rights to view the instance.
3. The CMS checks the CMS system database to verify the user rights.
4. The CMS sends a response to the web application server to confirm the user has sufficient rights to view the instance.
5. The web application server sends a request to the Crystal Reports Cache Server requesting the first page of the report instance. The Crystal Reports Cache Server checks to see if the page already exists. If the page does exist, the Crystal Reports Cache Server returns the page to the web application server.
6. The web application server sends the page to the web client, where the page is rendered and displayed.

### 2.5.3.3 Viewing an SAP Advanced Analysis workspace

This workflow describes the process of a user requesting an SAP Advanced Analysis (formerly Voyager) workspace.

1. The web client sends a request via the web server to the web application server to view a new workspace. The web client communicates with the web application server using DHTML AJAX technology (Asynchronous JavaScript and XML). The AJAX technology allows for partial page updates, so a new page does not have to be rendered for each new request.
2. The web application server translates the request and sends it to the Central Management Server (CMS) to determine whether a user is entitled to view or create a new workspace.
3. The CMS retrieves the user's credentials from the CMS system database.
4. If the user is allowed to view or create a workspace, the CMS confirms this to the web application server. At the same time, it also sends a list of one or more available Multi-Dimensional Analysis Server (MDAS) servers.
5. The web application server picks an MDAS server from the list of available choices and sends a CORBA request to the server to find the appropriate OLAP server(s) to create a new, or refresh an existing, workspace.
6. The MDAS server needs to communicate with the Input File Repository Server (FRS) to retrieve the appropriate workspace document that has information about the underlying OLAP database and an initial OLAP query saved with it. The Input FRS retrieves the appropriate Information Analyzer workspace (.amw) from the underlying directory and streams that workspace back to the MDAS.
7. The MDAS server opens the workspace, formulates a query, and sends it to the OLAP database server. The MDAS server has to have an appropriate OLAP database client configured for the OLAP data source. The translation of the web client query into the appropriate OLAP query needs to occur. The OLAP database server sends the query result back to the MDAS server.
8. The MDAS server, based on the request to either create, view, print, or export, pre-renders the result to enable the Java WAS to finish the rendering more quickly. The MDAS server sends XML packages of the rendered result back to the web application server.

9. The web application server renders the workspace and sends the formatted page or portion of the page to the web client via the web server. The web client displays the updated or newly requested page. This is a zero-client solution that does not need to download any Java or ActiveX components.

2.5.4 On Demand

2.5.4.1 Viewing an SAP Crystal report on demand

This workflow describes the process of a user requesting an SAP Crystal report page on demand.

1. The web client sends the view on demand request in an URL typically via the web server to the web application server.

2. The web application server interprets the requested page and the values sent in the URL request and determines that it is a request to view the first page of the selected report object.

3. The web application server sends a request to the Central Management Server (CMS) to ensure that the user has rights to view the object. The CMS checks the CMS system database to verify the user rights.

4. The CMS sends a response to the web application server to confirm the user has sufficient rights to view the object.

5. The web application server sends a request to the Crystal Reports Cache Server requesting the first page of the report object.

6. The Crystal Reports Cache Server checks to see if the page already exists. Unless the report meets the requirements for On Demand report sharing (within a set time of another On Demand request, database login, parameters), the Crystal Reports Cache Server sends a request for the Crystal Reports Processing Server to generate the page.

7. The Crystal Reports Processing Server requests the report object from the Input File Repository Server. The Input File Repository Server streams a copy of the object to the Crystal Reports Processing Server. The Crystal Reports Processing Server opens the report in its memory and checks to see if the report contains data.

8. Assuming that there is no data in the report object, the Crystal Reports Processing Server must connect to the database to query for data.


10. The Crystal Reports Cache Server sends the page to the web application server.
11. The web application server sends the .epf page to the web server. The web server sends the page to the user's machine where it is rendered in the viewer in the web client.

2.5.4.2 Viewing an SAP BusinessObjects Interactive Analysis document on demand

This workflow describes the process of a user viewing an SAP BusinessObjects Interactive Analysis (formerly Web Intelligence) document on demand.

1. A web browser sends the view request to the web application server via the web server.
2. The web application server determines that the request is for an Interactive Analysis document, and sends a request to the Central Management Server (CMS) to ensure the user has the appropriate rights to view the document.
3. The CMS sends a response to the web application server to confirm the user has sufficient rights to view the document.
4. The web application server sends a request to the Interactive Analysis Processing Server, requesting the document.
5. The Interactive Analysis Processing Server requests the document from the Input File Repository Server (FRS) as well as the universe file on which the requested document is built. The universe file contains metalayer information, including row- and column-level security.
6. The Input FRS streams a copy of the document to the Interactive Analysis Processing Server, as well as the universe file on which the requested document is built.
8. The Interactive Analysis Report Engine uses QT component (inproc) and Connection Server (inproc). The QT component generates/validates/regenerates the SQL and connects to the database to run the query. The Connection Server uses the SQL to get the data from the database to the Report Engine where the document is processed.
9. The Interactive Analysis Processing Server sends the viewable document page that was requested to the web application server. The web application server forwards this viewable page to the web server. The web server sends the viewable page to the user's machine, where it is rendered in a web browser.

2.5.4.3 Viewing an SAP Crystal report on demand when the default view format is set to Web Java

This workflow describes the process of a user viewing an SAP Crystal report when the default view format is set to Web Java.

1. The web client sends the view on demand request via the web server to the web application server.
2. The web application server interprets the requested page and the values sent in the URL request and determines that it is a request to view the first page of the selected report object.

3. The web application server sends a request to the Central Management Server (CMS) to ensure that the user has rights to view the object. The CMS checks the CMS system database to verify the user rights.

4. The CMS sends a response to the web application server to confirm the user has sufficient rights to view the object.

5. The web application server sends a request to the Crystal Reports Cache Server requesting the first page of the report object.

6. The Crystal Reports Cache Server checks to see if the page already exists. Unless the report meets the requirements for On Demand report sharing (within a set time of another On Demand request, database login, parameters), the Crystal Reports Cache Server sends a request for the Crystal Reports Processing Server to generate the page.

7. The Crystal Reports Processing Server requests the report object from the Input File Repository Server. The Input File Repository Server streams a copy of the object to the Crystal Reports Processing Server. The Crystal Reports Processing Server opens the report in its memory and checks to see if the report contains data.

8. Assuming that there is no data in the report object, the Crystal Reports Processing Server must connect to the database to query for data.

9. The Crystal Reports Processing Server sends the .epf page to the Crystal Reports Cache Server. The Crystal Reports Cache Server stores a copy of the .epf page in its cache directory in anticipation of new viewing requests. An .etf page may also be generated and sent to the Crystal Reports Cache Server in this step. The .etf page (left-pane group tree navigation of the report) is generated when the first page of the report is generated and when the report is grouped. There is only one .etf page per report, but the size of this .etf page can be substantial.

10. The Crystal Reports Cache Server sends the .epf page to the web application server.

11. The web application server sends the .epf page to the web server. The web server sends the .epf page to the user's machine where it is rendered in the viewer in the web client.
Planning Your Deployment

3.1 Planning your SAP BusinessObjects Enterprise deployment

This section provides guidelines for assessing your organization's needs, and suggestions for deployment scenarios. By evaluating your needs before you deploy your SAP BusinessObjects Enterprise system, you can keep troubleshooting to a minimum.

The section includes examples and suggestions for deployment, but it is important to note that each deployment is unique. The flexibility of the SAP BusinessObjects Enterprise service-based architecture allows you to tailor the deployment to serve your organization's requirements as precisely as possible.

Planning your deployment involves the following steps:

1. Refer to the SAP BusinessObjects Enterprise supported platform document at: [http://support.businessobjects.com/documentation/supported_platforms](http://support.businessobjects.com/documentation/supported_platforms).
2. Review the key concepts you need to consider for your deployment, including operating system, database, and application server considerations, in addition to security, performance and scalability, and high availability. See [Assessing your organization's environment](#).
3. Choose an initial deployment architecture. Which deployment architecture will serve your needs within the limits of your resources? For suggestions and common configurations, see "Deployment scenarios".

3.2 Assessing your organization's environment

The resources and conventions used in your existing network environment affect how you deploy SAP BusinessObjects Enterprise. This section serves as a checklist of criteria to help you plan your deployment, with resources provided for areas that you may need to investigate further.

Different deployment options are available to you, depending on the operating systems, web application servers, database servers and authentication method you plan to use. Other conventions used in your current environment may also affect how you deploy SAP BusinessObjects Enterprise, such as security, performance monitoring, and design for high availability.

This section provides a high-level overview for assessing your environment prior to deployment.
Network configuration

Because SAP BusinessObjects Enterprise is deployed in a networked environment, you must verify connectivity between all machines and verify that DNS names can be correctly resolved. Use the ping command to verify network connectivity and DNS name resolution.

**Note:**
Internet Protocol version 6 (IPv6) is supported in BusinessObjects Enterprise. For information on IPv6 networking, see [IPv6 networking](#).

### 3.2.1 Operating systems

SAP BusinessObjects Enterprise runs on Microsoft Windows and Unix (including Linux) operating systems. There is one version of the *SAP BusinessObjects Enterprise installation guide* for Windows, and one version for UNIX.

An Administrator account must be used to install SAP BusinessObjects Enterprise on Windows operating systems. However, installing SAP BusinessObjects Enterprise on UNIX operating systems does not require `root` access.

For a complete list of system privileges required, refer to *User permissions for installing BusinessObjects Enterprise* in the Windows version of *BusinessObjects Enterprise Installation Guide*, or UNIX permissions in the UNIX version of *BusinessObjects Enterprise Installation Guide*.

**Note:**
Review the online SAP BusinessObjects Enterprise supported platforms document for information related to supported operating system release versions, patch levels, or caveats: [http://support.businessobjects.com/documentation/supported_platforms](http://support.businessobjects.com/documentation/supported_platforms).

**Deployment on Windows**

Ensure your hosts do not use any of the following characters in their name: an underscore, a period, or a slash. You must have Administrator rights to install SAP BusinessObjects Enterprise on a Windows platform.

SAP BusinessObjects Enterprise supports both 32- and 64-bit Windows operating systems.

To open ports and run daemon processes or services, SAP BusinessObjects Enterprise must have the appropriate operating system account privileges.

**Deployment on UNIX**

Ensure your hosts use none of the following characters in their name: an underscore, a period, or a slash. You do not require root privileges in order to install SAP BusinessObjects Enterprise, although you may require root access to work with your chosen database, web, or web application systems.

To run the installation program correctly, the following commands and utilities must be installed on your UNIX system and available on the `PATH` for the account being used to install SAP BusinessObjects Enterprise:
Planning Your Deployment

<table>
<thead>
<tr>
<th>Command</th>
<th>Alias 1</th>
<th>Alias 2</th>
<th>Alias 3</th>
<th>Alias 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>/bin/sh</td>
<td>pwd</td>
<td>read</td>
<td>touch</td>
<td></td>
</tr>
<tr>
<td>uname</td>
<td>expr</td>
<td>hostname</td>
<td>sed</td>
<td></td>
</tr>
<tr>
<td>awk</td>
<td>chown</td>
<td>grep</td>
<td>tail</td>
<td></td>
</tr>
<tr>
<td>tar</td>
<td>id</td>
<td>dirname</td>
<td>gzip</td>
<td></td>
</tr>
<tr>
<td>stty</td>
<td>ulimit</td>
<td>which</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These commands and utilities should be available on all UNIX distributions. However, if one of them is not available on your system, download and install a version appropriate to your UNIX system. It is recommended that you obtain any required files from your UNIX vendor when possible.

**Note:**
In Solaris, AIX, and HP-UX, ensure that the PATH environment variable of the account being used to install or run SAP BusinessObjects Enterprise does not include GNU or third-party replacements for core system command-line tools (e.g., the GNU coreutils package, or an individually downloaded and compiled version of a tool). While the GNU versions of these tools offer enhanced functionality, their output can differ significantly from the native UNIX tools, and can cause problems with the SAP BusinessObjects Enterprise installation or server scripts.

Your operating system locale must be set to a UTF-8 encoding variant, such as en_US.UTF-8 (for other languages, use the appropriate localized UTF-8 encoding, such as de_DE.UTF-8 for German UTF-8). See the online SAP BusinessObjects Enterprise supported platforms document for more information about locales: [http://support.businessobjects.com/documentation/supported_platforms](http://support.businessobjects.com/documentation/supported_platforms).

SAP BusinessObjects Enterprise supports both 32- and 64-bit UNIX operating systems.

**Deployment in a virtualized environment**
SAP BusinessObjects Enterprise can also be installed in the following supported virtualized environments:
- VMware.
- AIX LPAR.
- Solaris 10 Containers.

### 3.2.2 Databases in BusinessObjects Enterprise

In SAP BusinessObjects Enterprise, a database can be defined as a data repository that organizes a collection of information into structures called tables for rapid search and information retrieval.

Databases allow tables to be grouped together into collections of logically related tables called tablespaces. Tables are grouped into tablespaces within a database system in the same way that files are grouped into a directory within a file system.
Note:
SAP BusinessObjects Enterprise documentation uses the terms “tablespace” and “database” interchangeably.

The following database systems are supported for the Central Management System (CMS) database:
- IBM DB2
- Oracle Database
- MySQL
- Microsoft SQL Server
- Sybase Adaptive Server Enterprise (ASE)


You are free to use any supported database system with SAP BusinessObjects Enterprise. If you do not have a database system ready, the SAP BusinessObjects Enterprise installation program can create and configure a database as part of the installation process (Microsoft SQL Server on Windows; DB2 on Unix and Linux).

Note:
- If you use your own database system, first it must be configured and confirmed as running, as the SAP BusinessObjects Enterprise installation program attempts to verify the database connection.
- Ensure that any third-party database servers and clients are set up to use Unicode character encoding (UTF-8). Consult your database documentation to determine how to enable Unicode support.

SAP BusinessObjects Enterprise connects directly to the database that you specify as a data source. For example, you could create reports directly from your organization's existing sales, manufacturing, or scientific database.

In addition to your data source, SAP BusinessObjects Enterprise uses several other databases to store internal system information. They can be configured as several tablespaces within a single database system, or as tablespaces distributed across several database systems. The following table details the different database or tablespace repositories used by BusinessObjects Enterprise.
<table>
<thead>
<tr>
<th>Repository</th>
<th>Description</th>
<th>Required during installation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting</td>
<td>Your organization’s data repository containing the data to be analyzed with BusinessObjects Enterprise.</td>
<td>No</td>
</tr>
<tr>
<td>CMS</td>
<td>Main repository that stores BusinessObjects Enterprise user, group, security, content, and service information. If you do not have a CMS system database from a previous installation, objects in this database will be initialized by the SAP BusinessObjects Enterprise installation program.</td>
<td>Yes</td>
</tr>
<tr>
<td>Auditing</td>
<td>Activity tracking repository that allows administrators to view system usage information, such as the number of report generation or login events. Auditing can be enabled and configured during the installation process.</td>
<td>No</td>
</tr>
<tr>
<td>Performance Manager (repository for Dashboard and Analytics)</td>
<td>Dashboard and Analytics tracks system performance and matches it to set goals defined by an administrator. Dashboard and Analytics is only enabled when purchased as part of your license agreement. A Dashboard and Analytics repository is not set up by the installation program, but can be configured after the initial installation is complete.</td>
<td>No</td>
</tr>
</tbody>
</table>

SAP BusinessObjects Enterprise scripts require database user privileges that permit the creation and deletion of database objects, including tables, indexes, and temporary data. Rather than assign administrative privileges to the account used by SAP BusinessObjects Enterprise, this table summarizes the privileges required for each supported database system.
## Account or role privileges required

<table>
<thead>
<tr>
<th>Database</th>
<th>Account or role privileges required</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM DB2</td>
<td>User with Connect to database, Create tables, and Create schemas implicitly enabled.</td>
</tr>
<tr>
<td>Oracle Database</td>
<td>User with the following privileges enabled:</td>
</tr>
<tr>
<td></td>
<td>• create session</td>
</tr>
<tr>
<td></td>
<td>• create table</td>
</tr>
<tr>
<td></td>
<td>• create procedure</td>
</tr>
<tr>
<td></td>
<td>Alternatively, a user with the CONNECT and RESOURCE roles enabled, and the Admin Option setting disabled for both roles.</td>
</tr>
<tr>
<td>MySQL</td>
<td>Default database owner (DBO) account permissions.</td>
</tr>
<tr>
<td>Microsoft SQL Server</td>
<td>Default database owner (DBO) account permissions.</td>
</tr>
<tr>
<td>Sybase ASE</td>
<td>Default database owner (DBO) account permissions.</td>
</tr>
</tbody>
</table>

Databases may require specific configuration to function best with BusinessObjects Enterprise. The following table provides a list of additional configuration settings.

<table>
<thead>
<tr>
<th>Database</th>
<th>Additional settings required</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM DB2</td>
<td>DB2CODEPAGE=1208</td>
</tr>
<tr>
<td>Oracle</td>
<td>NLS_LANG must be set to a valid UTF-8 setting, such as AMERICAN_AMERICA.WE8MSWIN1252 or AMERICAN_AMERICA.AL32UTF8.</td>
</tr>
<tr>
<td></td>
<td>The FORCE setting must be enabled.</td>
</tr>
<tr>
<td>Sybase</td>
<td>LC_ALL must be set to a valid locale, as found in the configuration file SYBASE_HOME /locales/locales.dat.</td>
</tr>
</tbody>
</table>

### 3.2.2.1 Connection Server in heterogenous environments

The BusinessObjects Enterprise Connection Server provides access to databases for the Interactive Analysis server and Interactive Analysis Desktop. In heterogenous environments, where there is a mixture of UNIX and Windows systems, the Connection Server can be used to access databases running on platforms other than the operating system used by the Central Management Server (CMS).
For example, a UNIX-based CMS, with an SAP BusinessObjects Interactive Analysis server and Interactive Analysis rich clients, can use a connection server running on Windows to provide a database connection to a Microsoft SQL Server database server.

A number of connection servers can be used by a SAP BusinessObjects Enterprise system at the same time, allowing UNIX-based deployments to access Windows-based databases without the need to install ODBC drivers on UNIX systems.

### 3.2.3 Web application servers

SAP BusinessObjects Enterprise requires a Java web application server to process the server-side scripts that make up web applications. You can install the Tomcat application server during the SAP BusinessObjects Enterprise installation or use a supported third-party web application server and Java Development Kit (JDK).

For a detailed list of supported web application servers, consult the Supported Platforms Guide available at: [http://service.sap.com/bosap-support](http://service.sap.com/bosap-support).

If you use a third-party server, it must be installed and configured before SAP BusinessObjects Enterprise, as the installation program attempts to verify the location of your web application server, and can deploy your web applications directly.

#### Java web application servers

The SAP BusinessObjects Enterprise installation program can deploy to supported Java web application servers running on the local system during installation.

**Note:**

The SAP BusinessObjects Enterprise installation program will not deploy web applications for the following web application servers:

- JBoss 4.2.3
- JBoss 5
- SAP Application Server 7.0
- IBM WebSphere Community Edition 2.0
- Sun Java Application Server 8.2

These web application servers must have web applications deployed manually through the web application server administrative console, or on the command-line with the `wdeploy` tool included with BusinessObjects Enterprise.

There are two different ways to deploy web applications using the `wdeploy` tool:

1. Standalone mode.
   
   All web application resources are deployed together on a web application server that serves both dynamic and static content.

2. Split mode.
The application's dynamic and static resources are separated: static content is deployed to a web server; dynamic content is deployed to a web application server. Supported split combinations for SAP BusinessObjects Enterprise:

- Apache HTTP Server 2.2 and Tomcat 5.5
- Apache HTTP Server 2.2 and WebLogic 9.2 MP2 or 10
- IBM HTTP Server 6.1 and WebSphere 6.1.07
- iPlanet and Sun Java Application Server 8.2

For more information on the `wdeploy` command, see the *SAP BusinessObjects Enterprise Web Application Deployment Guide*.

When deploying to a BEA WebLogic and IBM WebSphere web application server, the following points must be considered.

<table>
<thead>
<tr>
<th>Web Application Server</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEA WebLogic</td>
<td>Minimum 2 gigabytes of free space on install partition used to hold <code>/tmp</code> or the user-defined temporary directory, with a minimum of 2 gigabyte of free disk space on the install partition. Also recommended to have one gigabyte of RAM.</td>
</tr>
<tr>
<td>IBM WebSphere</td>
<td>It is recommended that you have at least 2 gigabytes of free space on the partition used to hold <code>/tmp</code> or the user-defined temporary directory specified by your <code>TMPDIR</code> environment variable. Also recommended to have one gigabyte of RAM.</td>
</tr>
</tbody>
</table>

### 3.2.4 Web servers

Although web application servers come with built-in web server functionality, SAP BusinessObjects Enterprise also supports the separation of web and web application servers into a de-paired configuration.

In a de-paired configuration, the web server will serve static and cached content to offset a portion of the requests sent to the web application server. A web server may also support a reverse proxy configuration to improve site security. For more information on reverse proxy configuration, please see [Reverse proxy](#).

The SAP BusinessObjects Enterprise installation program will not automatically deploy the BI launch pad or Central Management Console (CMC) web applications to a de-paired environment. Web application tools must be configured manually using the bundled `wdeploy` utility to split the static and dynamic content so that each can be separately deployed to the web and web application servers. For more information on `wdeploy`, see the *SAP BusinessObjects Enterprise`wdeploy user's guide* or the Post Installation Web Application Deployment chapter of the *SAP BusinessObjects Enterprise Web Application Deployment guide*. 
Note:
For more information about configuring split web and web application servers, please see the SAP BusinessObjects Enterprise Web Application Deployment Guide.

3.2.5 Failover and load balancing

SAP BusinessObjects Enterprise supports clustered web application servers with load balancing. Hardware or software load balancers can be used as the entry-point for the web application servers to ensure that the processing is evenly distributed among the web application servers.

The following hardware load balancers are currently supported:

- Cisco Content Services Switches (CSS).
- Cisco Content Switching Modules (CSM).
- The F5 BIG-IP family of load balancers.

The following persistence types are currently supported:

- Source IP address persistence.
- Cookie persistence Insert mode (ArrowPoint Cookie).

Load balancing a cluster of SAP BusinessObjects Enterprise servers is not required, as the Central Management Server (CMS) already distributes work between cluster nodes.

Note:
The Central Management Console (CMC) web application does not support session fail-over. However, BI launch pad is fault-tolerant, and does support session fail-over, so users will not notice if a cluster node fails.

3.2.6 Multi-homed environment

SAP BusinessObjects Enterprise supports multi-homed environments, in which a server has two or more network addresses. This allows servers to be configured to receive requests from one network and transmit requests to another.

For example, an environment may have web application servers and database servers on separate subnets. The server tier can be configured to accept requests from the web application servers on one subnet (e.g. 192.168.0.0), and transmit database requests to database servers on another (e.g. 10.50.0.0). Multihomed environments use multiple physical or logical network cards.
3.2.7 Security

Your organization’s security policies affect how you deploy SAP BusinessObjects Enterprise on your network. Do you plan to use the system’s built-in authentication, or do you need it to work with existing LDAP or Windows Active Directory (AD) authentication? You also need to decide how your firewalls are configured, and if you plan to use a reverse proxy.

To protect against unauthorized access, the SAP BusinessObjects Enterprise architecture supports features such as: SSL encryption, reverse proxies, single sign-on, resource access security, object rights, and LDAP or Windows AD authentication.

3.2.7.1 Authentication

Authentication verifies the identity of a user who attempts to access the system. Assess how authentication is handled by your existing environment before deciding how to manage security within SAP BusinessObjects Enterprise.

The current release supports these methods of authentication:

- SAP BusinessObjects Enterprise authentication
- LDAP authentication
- Windows AD authentication
- Trusted Authentication

To use any of the third-party methods of authentication or Trusted Authentication, you need to configure them before you use them with SAP BusinessObjects Enterprise. For detailed instructions, see the Configuring third-party authentication section of the SAP BusinessObjects Enterprise Administrator Guide.

For information about how to configure primary authentication or single sign-on, see the Security concepts section of the SAP BusinessObjects Enterprise Administrator Guide.

3.2.7.2 Firewalls

The Central Management Server (CMS) uses two ports: the request port and the name server port. The request port is selected dynamically by default. The name server port is 6400 by default.

SAP BusinessObjects Enterprise servers initially contact the CMS on its name server port. The CMS responds by returning the value of its request port.
Internal network communication
Almost all internal communication between networked SAP BusinessObjects Enterprise servers is conducted through dynamically chosen port numbers. There are a few exceptions to this rule, as the standard port numbers are used if your deployment features any SMTP, FTP, rexec, rsh, and NetBIOS, or Microsoft Directory services. Standard ports for database and web application servers are also used, unless you specify otherwise during the SAP BusinessObjects Enterprise installation process.

If your SAP BusinessObjects Enterprise system is distributed across more than one network (such as multiple CMS servers running in different geographic locations, or individual servers running on different subnets), you can configure the system to use static port numbers. This may simplify integration with any network security systems through which your SAP BusinessObjects Enterprise system components must communicate.

If all of your SAP BusinessObjects Enterprise system components are contained locally within the same network, with unrestricted communication between each of the server machines, no configuration is required to facilitate internal communication.

External network communication
For both distributed and locally contained networked deployments, a firewall or other security system may separate the internal SAP BusinessObjects Enterprise system components from any external web browser or feature-desktop clients. Unless you change the default port numbers for your CMS and BI launch pad web applications, you must allow incoming traffic through your firewall on port 6400 TCP to allow clients to contact the CMS, and incoming traffic to allow clients to contact any other services that you want to be accessible. Your firewall must also allow outbound connections on any port to allow the CMS and BI launch pad to reply to external clients on a dynamically chosen port.

Network Address Translation (NAT)
Firewalls often provide Network Address Translation (NAT) between systems on either side of the firewall. The CMS server configuration page allows you to enter the firewall's IP address or hostname in place of the corresponding system on the other side of the firewall. Network traffic is then sent to the firewall, which is configured to forward it to the appropriate machine on the other side.

For example, a CMS server is configured to send database requests to a firewall that resides between two different subnets. Effectively, the CMS considers the firewall to be a database server. The firewall accepts traffic from the CMS and passes it through to a database server running on a different subnet. Effectively, the database server sees the firewall as a CMS server. Neither the CMS nor the database server is aware of the firewall's existence, as the firewall provides the network translation between each of the two subnets.

Note:
Static port numbers must be unique when using NATs as firewalls forward traffic based upon the port number used. If two different servers on one side of a firewall attempt to use the same port number, the traffic will merge and go to only one server will be able to communicate with the other side of the firewall.

Packet filtering
Your firewall may also provide packet filtering. This service allows or blocks traffic across a firewall based upon the original or destination network address. If your firewall uses packet filtering you must
configure it so that traffic from your SAP BusinessObjects Enterprise system components is allowed to pass through the firewall.

For detailed information on any of these topics, see the *Securing SAP BusinessObjects Enterprise* section of the *SAP BusinessObjects Enterprise Administrator Guide*.

### 3.2.7.3 Reverse proxy

Reverse proxies hide internal web application servers from clients on an external network. They receive and forward resource requests from external client to servers on an internal network. They then return any responses from the internal network back to the originating clients, modifying the HTTP headers so the clients cannot detect that their request was not processed by the reverse proxy.

**Restriction:**
A reverse proxy used with SAP BusinessObjects Enterprise must have the ability to modify the value of the *path* attribute in *Set-Cookie* headers. Special configuration is required to enable the root cookie path on the web application server for BusinessObjects Enterprise web components to work with ISA 2006.

If you have a de-paired web and web application server, you can configure them to operate in a reverse proxy arrangement. The configuration of a reverse proxy server is a post-installation task that involves configuring a web server to forward client requests to the SAP BusinessObjects Enterprise web application server.

For more information about reverse proxies and SAP BusinessObjects Enterprise, including detailed steps for individual web application servers, see the *Modifying Default Security Behavior* section of the *SAP BusinessObjects Enterprise Administrator Guide*.

### 3.2.7.4 HTTPS support

You can secure the HTTP communication between your SAP BusinessObjects Enterprise web application server and the web browser clients it serves by using secure socket layer (SSL) encryption for HTTP. This arrangement is commonly referred to as HTTPS.

As HTTPS communication is handled by the web application server and the client web browser, it is transparent to SAP BusinessObjects Enterprise system components and must therefore be configured post-install on your chosen web application server platform.

To generate the encryption keys and enable HTTPS encryption, please consult the documentation supplied by your web application server vendor.
3.2.7.5 CORBA SSL support

Non-HTTP network communication between your SAP BusinessObjects Enterprise system components uses the Common Object Request Broker Architecture (CORBA) communication standard. As CORBA supports SSL encryption, non-HTTP network traffic in your deployment can be secured:

- Between desktop clients and back-end servers.
- Between your web application and back-end servers.
- Between back-end servers.

Note:
To learn more about how to secure HTTP traffic between your web application server and web clients, read HTTPS support.

You can enable CORBA SSL encryption by configuring each component of your SAP BusinessObjects Enterprise deployment in turn, post-installation. See the Managing and configuring servers section of the SAP BusinessObjects Enterprise Administrator Guide.

3.2.8 IPv6 networking

Internet Protocol version 6 (IPv6) is supported in SAP BusinessObjects Enterprise. If you're planning to deploy to an IPv6 network environment, ensure that all machines have an IPv6 stack enabled, verify IPv6-based network connectivity between all machines in the deployment, and ensure that all DNS names resolve to IPv6 addresses.

Note:
To verify IPv6 network connectivity and DNS name resolution use the command ping -6 <FULL_DNS_NAME> on Windows machines, or ping6 <FULL_DNS_NAME> on Unix.

Choosing a host type
SAP BusinessObjects Enterprise can run on IPv6-only hosts (with only an IPv6 stack enabled), IPv4-only hosts (only an IPv4 stack enabled), or mixed hosts (with both IPv6 and IPv4 stacks enabled). A host with both IPv4 and IPv6 enabled can accept and send both IPv4 and IPv6 traffic. A host using only IPv6 can only accept and send IPv6 traffic.

You should determine which network protocol and the host type best fits your needs before deploying SAP BusinessObjects Enterprise.

Connecting to third party software products
If you plan to use third-party software products in a SAP BusinessObjects Enterprise IPv6 deployment, such as a database or LDAP server, you must ensure that they are also IPv6-compliant. To run
non-IPv6-compliant products in an IPv6 SAP BusinessObjects Enterprise deployment, use a mixed IPv6/IPv4 host.

If you are going to transition an existing SAP BusinessObjects Enterprise deployment to an IPv6-only environment, consider the following recommendations:

- Your third-party software must be fully IPv6-compliant. For more information consult the documentation from the third-party software vendor.
- Until your system is completely transitioned to supporting IPv6-only traffic, SAP BusinessObjects Enterprise server and client components should run in mixed IPv6/IPv4 mode.

### 3.2.9 Performance and scalability

Before deciding how to deploy your system, consider whether the demand on the system may change after it has been installed. This could be an increase in the number of concurrent users, the volume of business data, report complexity, or any other factor that could cause your SAP BusinessObjects Enterprise system requirements to change.

Anticipate these changes before you deploy to save you time and money by making architectural choices that will support a scalable solution. For example, if you are expecting an increase in the number of concurrent users accessing your system, you may consider deploying a small three-node cluster that can be expanded to five-nodes when demand increases.

By monitoring and regularly re-evaluating your system’s performance, schedule tuning or configuration changes before potential issues become performance problems.

For general information about assessing SAP BusinessObjects Enterprise performance, see the Monitoring section of the SAP BusinessObjects Enterprise Administrator guide.

#### 3.2.9.1 Split web and web application servers

You may choose to split your web and web application server into two servers, separated by a reverse proxy and firewall. This arrangement improves the performance of your web applications by off-loading static content from the web application server onto the web server, as well as shielding your web application servers behind several network layers for improved security.

### 3.2.10 Designing for high availability

High availability refers to a system that is almost always operational. When designing a system for high availability, consider how much down-time is acceptable for the system. To minimize time down, consider a combination of failover processing, server or server process redundancy, and frequent back-ups:

- **Failover processing**
  
  If a SAP BusinessObjects Enterprise service fails, a fault-tolerant system allows for continuous processing of system requests with no loss of service. To achieve this level of availability, you should provision duplicate BusinessObjects Enterprise services. For example, if an SAP BusinessObjects Interactive Analysis Job Server process fails, the duplicate Web Intelligence Job Server process immediately takes its place.

- **Server redundancy**
  
  A disaster recovery plan can minimize the effects of a disaster on an organization so you can maintain or quickly resume important system functions. It is good practice to keep the backup system at a different geographic location.

  The SAP BusinessObjects Enterprise disaster recovery plan involves implementing redundant servers that mirror the primary system. If the primary system goes down, a backup system is still available and becomes the production system.

- **Frequent data backups**
  
  Regular and frequent backups provide an easy, cost-effective, and reliable method of protecting your valuable data. During a catastrophic system failure, the entire system can be quickly restored to the last backup point without the need to recreate a lot of data.

  **Note:**
  
  When you back up your primary system, you need to back up: the Central Management Server system database; the content of the Input and Output File Repository Servers; the user ID and password for the Administrator account; the application code from the Web Application Server; and the registry settings (if manual changes were made).

You may not have the resources to implement a high degree of availability, but you can use best practices to provide the best possible availability for your system. These include vertical scaling (adding redundant server processes to a system in case the primary server process fails) and maintaining a regular back-up schedule.

### 3.2.10.1 Designing a multiple-server system for high availability

In a multiple-server environment, duplicate server processes can be installed onto additional machines. This is referred to as horizontal scaling because the duplicate server processes are spread across several machines, as opposed to the vertical scaling with duplicate server processes installed on just one machine.
You can also cluster servers together so that transactions are processed more quickly, and, in the event of a failure, an unaffected machine can continue to process requests with minimal impact on the system's overall ability to process requests.

Two common examples of fault tolerance in a multiple-server environment are:

- CMS clustering

  With CMS clustering, a set of two or more server machines function as a single Central Management Server. In the event of a network, power, hardware, or software failure on one server, the workload of the failed CMS is picked up by another within the same cluster.

  For more information about CMS clustering, see Managing and configuring servers in the SAP BusinessObjects Enterprise Server Administrator Guide.

- Active and passive File Repository Servers (FRS)

  Your deployment can have multiple Input and Output FRSes. The first File Repository Server pair to register with the CMS cluster becomes the active FRS pair and the other FRS services are considered passive. Although all File Repository Server services run simultaneously, only the active FRS pair handles requests. If an active FRS fails, a passive FRS that is registered with the CMS cluster is changed to active status. When the previously active FRS becomes operational again, it is registered as a passive FRS with the CMS.

### 3.2.11 Product co-existence

Several SAP BusinessObjects Enterprise products can exist on the same host.

For example, the Client Tools can be installed on a host running SAP BusinessObjects Enterprise server products, although it is recommended that SAP BusinessObjects Enterprise is installed before Client Tools.

**Note:**

All SAP BusinessObjects Enterprise products installed at your organization must have the same patch level. For example, if your organization upgrades SAP BusinessObjects Enterprise server products to a service pack or fix pack, all add-ons, Client Tools, and stand-alone products must also be upgraded. Similarly, if one product is downgraded, all other products should also be downgraded.

To install add-on products, ensure that any required server components are present. A dependency check that identifies missing or outdated components is run by SAP BusinessObjects installation programs. If a dependency requirement is not met, the installation program identifies and suggests ways to meet the requirement. An add-on product which requires server components will not install until the appropriate server components are available.

If a product included with Client Tools also comes with a dedicated stand-alone installation program, both can be installed on the same host. For example, Interactive Analysis Desktop is available in the Client Tools package, and as a stand-alone product. When both versions of Interactive Analysis desktop
interface are installed on a single host, they share components but either can be uninstalled without affecting the other.

Mid-market server products, such as SAP Crystal Reports Server OEM Edition, or SAP BusinessObjects enterprise performance management (EPM) solutions, cannot be installed on the same host as SAP BusinessObjects Enterprise XI 4.0.

When installing SAP BusinessObjects Enterprise products, the user has the option to select a custom destination parent folder, into which the software is installed. Subsequent installations of other SAP BusinessObjects Enterprise products uses the same folder given for the original installation, and cannot be changed.

If an SAP BusinessObjects Enterprise product is removed from a host, any remaining SAP BusinessObjects Enterprise product installation will be unaffected. Any component shared by the both installations will remain, and will only be removed when the last product that requires the shared component is removed.

Add-on products with dependencies on other products should be removed before the product on which they depend.

3.2.12 Enterprise Resource Planning (ERP) integration

An Enterprise Resource Planning (ERP) application supports the essential functions of an organization’s processes by collecting real-time information related to day-to-day operations. SAP BusinessObjects Enterprise supports single sign-on and reporting from the following ERP systems:

- SAP ERP and Business Warehouse (BW)

  **Note:**
  SAP GUI must be installed before using OLAP Data Access (ODA), SAP BusinessObjects Advanced Analysis (formerly Voyager), or BW connections.

- Siebel Enterprise
- Oracle E-Business Suite
- JD Edwards EnterpriseOne
- PeopleSoft Enterprise

  **Note:**
  - SAP ERP and BW support is installed by default. Use the Custom / Expand installation option to deselect SAP integration support if you do not want support for SAP ERP or BW.
  - Support for Siebel Enterprise, Oracle E-Business Suite, JD Edwards EnterpriseOne, or PeopleSoft is not installed by default. Use the "Custom / Expand" installation option to select and install integration for non-SAP ERP systems.

For detailed information on the specific versions supported by SAP BusinessObjects Enterprise, consult the *Supported Platforms Guide*, available at [service.sap.com/bosap-support](service.sap.com/bosap-support).
To configure ERP integration, see the SAP BusinessObjects Enterprise Administrator Guide.

### 3.2.13 Creating additional Adaptive Processing Servers

The installation program installs one Adaptive Processing Server (APS) per host system. Depending on the features that you've installed, this APS may host a large number of services, such as the Monitoring Service, Lifecycle Management Service, Multi-Dimensional Analysis Service (MDAS), Publishing Service, and others.

If you are installing a production environment, do not use the default APS. Instead, it is highly recommended that once the installation process is complete, you perform a system sizing to determine:

- The type and number of APS services.
- The distribution of services across multiple APS servers.
- The optimal number of APS servers. Multiple APS servers provide redundancy, better performance, and higher reliability.
- The distribution of APS servers across multiple nodes.

Create new APS server instances as determined by the sizing process.

For example, if the outcome of your sizing happens to suggest the creation of one APS for each service category, then may end up creating eight APS servers. One for each service category: Advanced Analysis Services, Connectivity Services, Core Services, Crystal Reports Services, Dashboard Design Services, Data Federation Services, Lifecycle Management Services, and Interactive Analysis Services.
## Deployment Checklists

### 4.1 Deployment Checklist

This section provides a checklist for the steps you need to perform when planning a deployment of SAP BusinessObjects Enterprise.

This section provides a checklist of the major tasks to be completed for the planning phase of your SAP BusinessObjects Enterprise deployment.

<table>
<thead>
<tr>
<th>Checklist item</th>
<th>Reference</th>
<th>Complete? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the tiers that make up the SAP BusinessObjects Enterprise architecture.</td>
<td>Assessing your organization’s environment</td>
<td>Y/N</td>
</tr>
<tr>
<td>Understand the components and how they communicate with each other.</td>
<td>Architecture overview</td>
<td>Y/N</td>
</tr>
<tr>
<td>Understand the workflows (how information travels through the architecture).</td>
<td>Information Workflows</td>
<td>Y/N</td>
</tr>
<tr>
<td>Identify the operating system you are deploying the system on.</td>
<td>Operating systems</td>
<td>Y/N</td>
</tr>
<tr>
<td>Choose the database servers will you be accessing.</td>
<td>Databases in BusinessObjects Enterprise</td>
<td>Y/N</td>
</tr>
<tr>
<td>Choose a web application server.</td>
<td>Web application servers</td>
<td>Y/N</td>
</tr>
<tr>
<td>If you are using third-party authentication, secure sockets layer, firewalls, and/or reverse proxy, read the pertinent sections of the SAP BusinessObjects Enterprise Administrator Guide.</td>
<td>Security</td>
<td>Y/N</td>
</tr>
<tr>
<td>Identify potential performance problems.</td>
<td>Performance and scalability</td>
<td>Y/N</td>
</tr>
<tr>
<td>Checklist item</td>
<td>Reference</td>
<td>Complete? (Y/N)</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>----------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Choose whether or not to design for high availability and failover support.</td>
<td>Designing for high availability</td>
<td>Y_/N_</td>
</tr>
<tr>
<td>Choose an architecture that meets all of these needs.</td>
<td>&quot;Deployment scenarios&quot;</td>
<td>Y_/N_</td>
</tr>
<tr>
<td>Review the installation order for SAP BusinessObjects Enterprise.</td>
<td>Installation order</td>
<td>Y_/N_</td>
</tr>
</tbody>
</table>

### 4.2 Installation order

The following table lists the recommended order that SAP BusinessObjects Enterprise system components should be installed. The actual order will vary depending on whether your system included pre-existing systems that are to be incorporated into the new SAP BusinessObjects Enterprise deployment.

<table>
<thead>
<tr>
<th>Order</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Database server</td>
<td>To use your own database server to store SAP BusinessObjects Enterprise data, rather than the database installed by the installation program, at least one database server must be available for the CMS to use. A second database is required to enable auditing. In addition, SAP BusinessObjects Enterprise requires a connection to your organization’s own database, to act as source material against which to run reports.</td>
</tr>
<tr>
<td>2.</td>
<td>Database firewall</td>
<td>To protect your database behind a firewall, install the firewall after the databases are configured and verified to be working. Ensure that access through the firewall is working in both directions.</td>
</tr>
<tr>
<td>3. (a)</td>
<td>SAP BusinessObjects Enterprise database drivers</td>
<td>Install the appropriate database drivers on your SAP BusinessObjects Enterprise server systems and ensure that the database servers can be accessed through the firewall.</td>
</tr>
<tr>
<td>3. (b)</td>
<td>SAP BusinessObjects Enterprise server or cluster</td>
<td>Install your SAP BusinessObjects Enterprise server or cluster using the SAP BusinessObjects Enterprise installation program. You need to enter connection information for all databases during the install.</td>
</tr>
<tr>
<td>Order</td>
<td>Component</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>4.</td>
<td>Server firewall</td>
<td>To protect your SAP BusinessObjects Enterprise server or cluster behind a firewall, install the firewall after the servers are configured and verified to be working. Ensure that access through the firewall is working in both directions.</td>
</tr>
<tr>
<td>5. (a)</td>
<td>Web application server or cluster</td>
<td>To use your own web application server instead of the version of Tomcat installed by the installation program, install the web application server or cluster and verify network connectivity between it and the SAP BusinessObjects Enterprise server.</td>
</tr>
<tr>
<td>5. (b)</td>
<td>Web application files</td>
<td>When your web application server is verified to be working, deploy the SAP BusinessObjects Enterprise web application files.</td>
</tr>
<tr>
<td>6.</td>
<td>Web application server firewall</td>
<td>To protect your web application server or cluster behind a firewall, install the firewall after the servers are configured and verified to be working. Ensure that access through the firewall is working in both directions.</td>
</tr>
<tr>
<td>7.</td>
<td>Web server or cluster</td>
<td>To use split web and web application servers so that server static content can be off-loaded from the web application servers, configure your web server or cluster and ensure connectivity to the web application server. When using a load balancer, configure the load balancer after the web servers or cluster are verified to be working.</td>
</tr>
<tr>
<td>8.</td>
<td>Web server firewall</td>
<td>To protect your web server behind a firewall, install the firewall after the servers are configured and verified to be working. Ensure that access through the firewall is working in both directions.</td>
</tr>
<tr>
<td>9.</td>
<td>Reverse proxy</td>
<td>When using a reverse proxy server, configure the reverse proxy to once access through the web or web application server firewall has been verified.</td>
</tr>
<tr>
<td>10.</td>
<td>External firewall</td>
<td>To protect your entire deployment behind a firewall, install the firewall after the entire system is configured and verified to be working. Ensure that access through the firewall is working in both directions.</td>
</tr>
</tbody>
</table>
# More Information

<table>
<thead>
<tr>
<th>Information Resource</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP Help Portal</td>
<td>Navigate to <a href="http://help.sap.com/businessobjects">http://help.sap.com/businessobjects</a> and on the “SAP BusinessObjects Overview” side panel click <strong>All Products</strong>. You can access the most up-to-date documentation covering all SAP BusinessObjects products and their deployment at the SAP Help Portal. You can download PDF versions or installable HTML libraries. Certain guides are stored on the SAP Service Marketplace and are not available from the SAP Help Portal. These guides are listed on the Help Portal accompanied by a link to the SAP Service Marketplace. Customers with a maintenance agreement have an authorized user ID to access this site. To obtain an ID, contact your customer support representative.</td>
</tr>
</tbody>
</table>
  * Installation guides: [https://service.sap.com/bosap-instguides](https://service.sap.com/bosap-instguides)  
  The SAP Service Marketplace stores certain installation guides, upgrade and migration guides, deployment guides, release notes and Supported Platforms documents. Customers with a maintenance agreement have an authorized user ID to access this site. Contact your customer support representative to obtain an ID. If you are redirected to the SAP Service Marketplace from the SAP Help Portal, use the menu in the navigation pane on the left to locate the category containing the documentation you want to access. |
| Docupedia                                | [https://cw.sdn.sap.com/cw/community/docupedia](https://cw.sdn.sap.com/cw/community/docupedia)  
Docupedia provides additional documentation resources, a collaborative authoring environment, and an interactive feedback channel. |
| Developer resources                      | [https://boc.sdn.sap.com/](https://boc.sdn.sap.com/)  
<table>
<thead>
<tr>
<th>Information Resource</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP BusinessObjects articles on the SAP Community Network</td>
<td><a href="https://www.sdn.sap.com/irj/boc/businessobjects-articles">https://www.sdn.sap.com/irj/boc/businessobjects-articles</a></td>
<td>These articles were formerly known as technical papers.</td>
</tr>
<tr>
<td>Notes</td>
<td><a href="https://service.sap.com/notes">https://service.sap.com/notes</a></td>
<td>These notes were formerly known as Knowledge Base articles.</td>
</tr>
<tr>
<td>Training</td>
<td><a href="http://www.sap.com/services/education">http://www.sap.com/services/education</a></td>
<td>From traditional classroom learning to targeted e-learning seminars, we can offer a training package to suit your learning needs and preferred learning style.</td>
</tr>
<tr>
<td>Online customer support</td>
<td><a href="http://service.sap.com/bosap-support">http://service.sap.com/bosap-support</a></td>
<td>The SAP Support Portal contains information about Customer Support programs and services. It also has links to a wide range of technical information and downloads. Customers with a maintenance agreement have an authorized user ID to access this site. To obtain an ID, contact your customer support representative.</td>
</tr>
<tr>
<td>Consulting</td>
<td><a href="http://www.sap.com/services/bysubject/businessobjectsconsulting">http://www.sap.com/services/bysubject/businessobjectsconsulting</a></td>
<td>Consultants can accompany you from the initial analysis stage to the delivery of your deployment project. Expertise is available in topics such as relational and multidimensional databases, connectivity, database design tools, and customized embedding technology.</td>
</tr>
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