Deltek

Deltek Costpoint® 8.2

Deployment Options Technical Overview

May 31, 2023

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The information contained in this publication is effective as of the publication date below and is subject to change without notice.

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Contents

Overview

This document provides an overview of various technical features and configuration options supported by Costpoint. It is intended for administrators and other technical staff who configure and maintain Costpoint.

Each section in this document provides a high-level description of a feature. For detailed information on configuring features, see the more detailed documents referred to throughout this document.

Costpoint Components Overview

Multi-Tier Architecture

Costpoint is based on a multi-tier architecture that uses multiple application, database, and optional web-proxy servers. This architecture supports distributed computing. Additional servers can be added at any tier, allowing the system to scale to the needs of a large user base.

A typical installation of Costpoint includes:

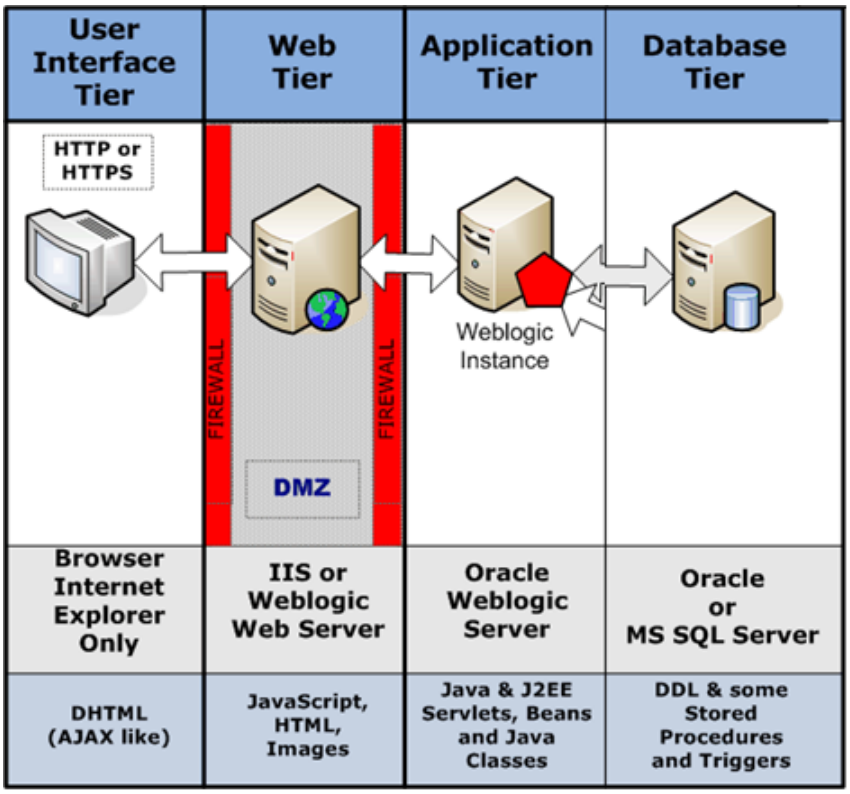
- A WebLogic® application server
- An Oracle® or Microsoft® SQL Server® database

Optionally, IIS can be used to proxy requests to the WebLogic server.

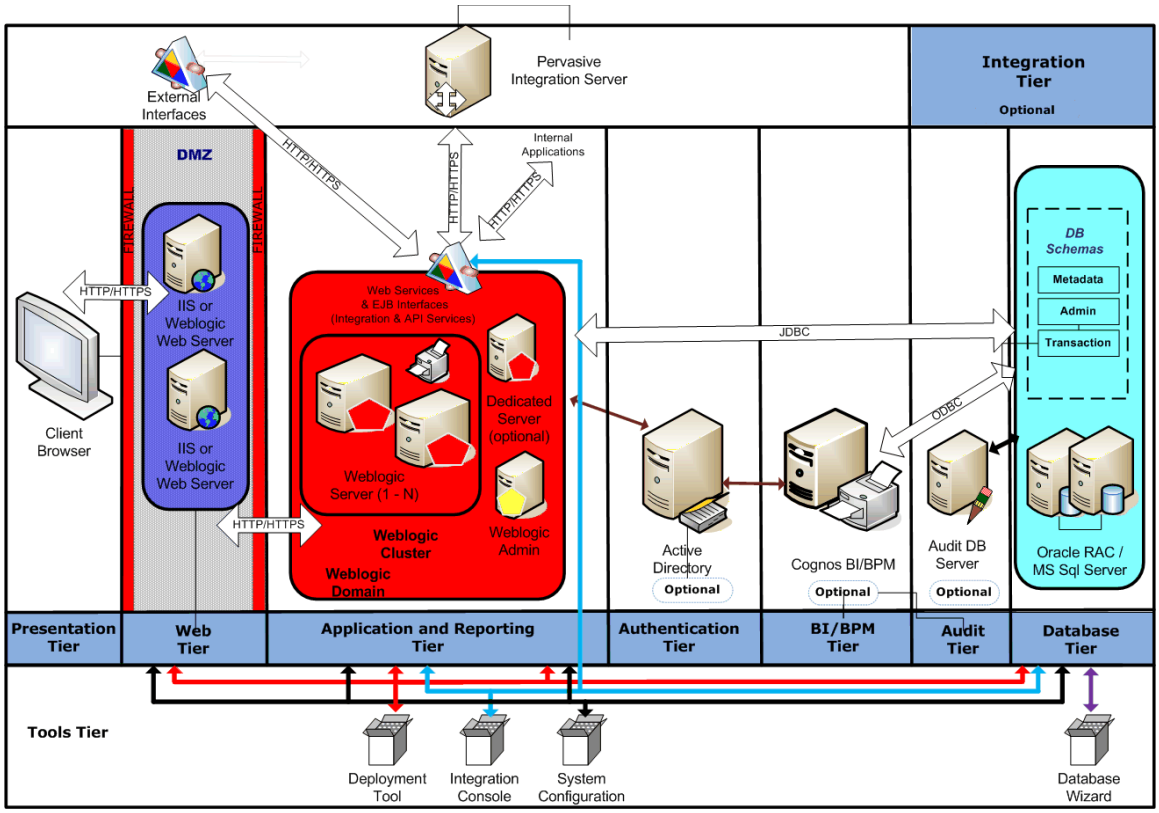
Note: With the 7.0.1 and later releases of the product, the reporting component is handled by the WebLogic application.

Attention: For detailed information on how to install Costpoint, refer to the installation instructions provided with the Costpoint release.

Costpoint Basic Deployment



Costpoint Complex Deployment



Server Components

Deltek strongly recommends that all three server components are installed on separate hardware resources and that no other software applications share the hardware.

- **WebLogic server**: This server is used for hosting the core components of Costpoint that provide business functionality to end users, including reporting capabilities. This component takes the center stage in processing all requests and coordinating with other components.

  Costpoint is compatible with the clustering capabilities of the WebLogic server. Clustering allows Costpoint to scale to the needs of large enterprise organizations, and provides high availability and failover support.

- **Database server**: Costpoint supports Oracle and SQL Server database servers. A Costpoint installation can use either of the supported database servers but not both.

  The Costpoint database is made up of three segments of data—Metadata, Admin data, and Transaction data—each of which must be stored in a separate schema. They can be stored in one or multiple databases. They may even span multiple instances or database servers, but they must be running on the exact same version of the software.

- **IIS server**: The IIS server is used to proxy client requests to the WebLogic server. Though the use of the IIS server is optional, Deltek strongly recommends installing it in a production environment. In addition to acting as the proxy, the IIS server is also used for load balancing the cluster nodes.

Data Segments

Segregation of data into separate segments provides a number of administrative benefits to database administrators, who can apply separate policies for securing, backing up, restoring and tuning each of these segments.

- **Metadata**: Costpoint is built on a metadata-driven architecture. This means that many system components and behaviors are not hard-coded in a programming language. Instead, they are declaratively described through data objects called “metadata.”

  This metadata is a collection of database tables, forming a metadata schema separate from the Admin and Transaction segments. This schema changes only when the Costpoint software changes—when you apply a hotfix or upgrade to a new service pack or release. During normal Costpoint use, all transactions to this segment are read-only.

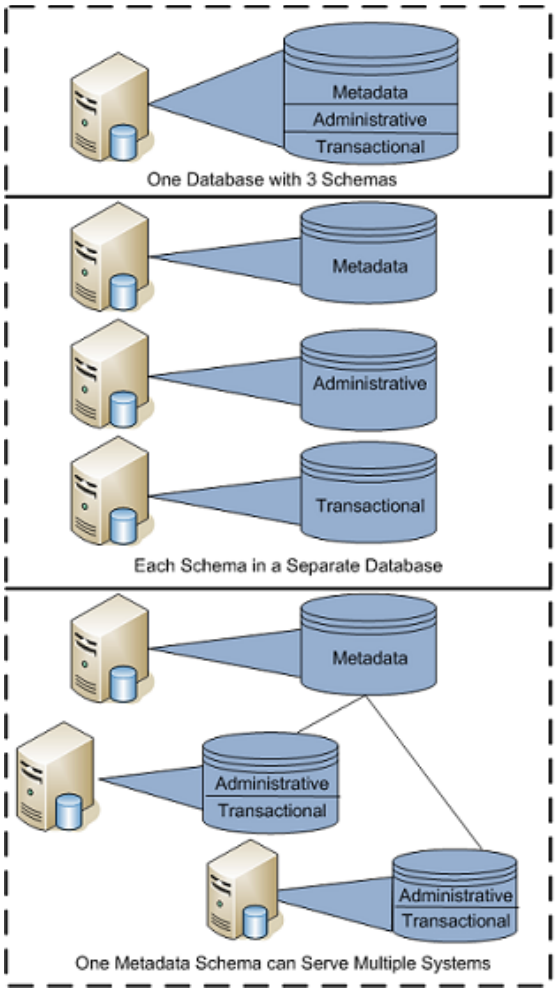
- **Admin**: This segment is used to store Costpoint user profiles and technical information related to Costpoint configuration. For example, the Admin segment stores user’s personnel information, passwords, access rights, and preferences. It stores information about the printers connected to the servers, their rights, and the locale used by the product. It also stores users’ personal preferences related to the UI and favorite applications.

- **Transaction(Data)**: This segment stores all business-related data as well the main functionality of the product. This segment can be very large, both in terms of volume and number of transactions.

- **Time and Expense**: This optional DB segment stores Time and Expense business-related data. If you have a Time and Expense license in your system you’ll need to configure this segment. In terms of volume of data and number of transactions, it is similar to the Transaction segment.

- **Budgeting and Planning**: This optional DB segment stores Budgeting and Planning business-related data. If you have a Budgeting and Planning license in your system, you’ll need to configure this segment. In terms of volume of data and number of transactions, it is similar to the Transaction segment.

Database Deployment Options



User Authentication Methods

Costpoint supports a variety of authentication options, including Active Directory, SAML, and FIDO.

> **Attention:** For a full list of authentication options, refer to *Deltek Costpoint 8.2 Security* guide

Time & Expense and Budgeting & Planning Overview

Note: This sections applies to Deltek Time & Expense 10 customers and/or Budgeting & Planning 7 customers.

Deltek Time & Expense 10 and/or Budgeting & Planning 7 and later versions are built on the Costpoint platform. As a result, Time and Expense (T&E) applications and Budgeting & Planning (B&P) applications inherit and benefit from many standard features which are already well known to Costpoint customers: web services, extensibility, CMI integration, cluster failover, saved UI profiles, user-level authentication, and so on. A common platform also enables tighter technical and functional integration between the products, which Deltek will further keep enhancing going forward.

If you upgrade from T&E 9 and/or B&P 6, it is important to know that the T&E/B&P database stays "as is." In other words, the T&E 9 and/or B&P 6 database is neither eliminated nor converted as part of upgrade process. A few changes to the database tables are done based on the enhancements as typically expected for a product version upgrade. Also, while the T&E and B&P installation requires the three database schemas used by Costpoint, the transactional Costpoint schema is mostly empty and, as such, doesn't consume much space.

Business users will be able to access the functionality of Costpoint, T&E, B&P, or all three products under one common user interface. Access to the functionalities is based on the license applied to the system.

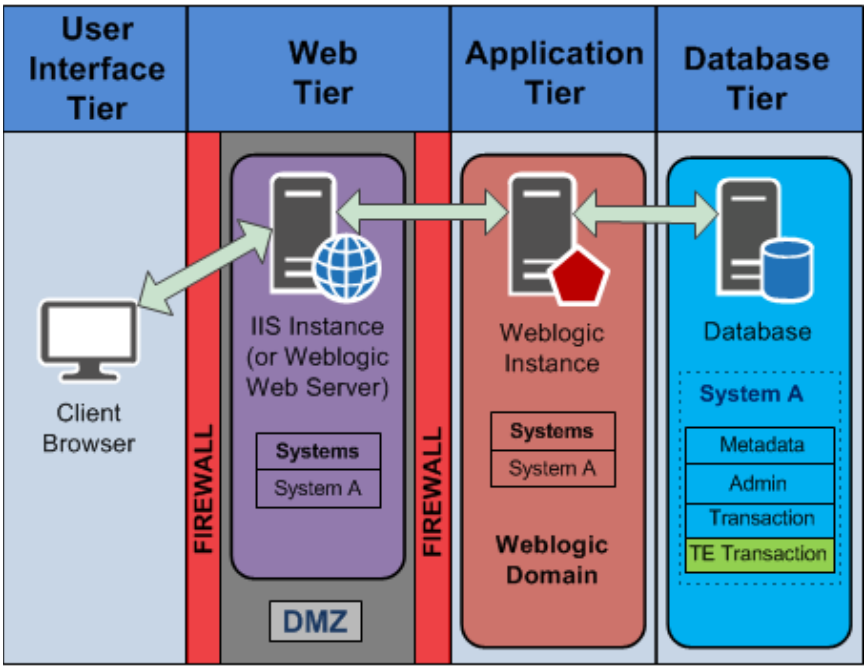
Administrators/IT can potentially benefit from sharing the hardware as well from having standardized configuration and maintenance processes across products.

Deployment Options

A functional Costpoint installation is a pre requisite and serves as the foundation for installing Time & Expense and/or Budgeting & Planning. You need to apply latest framework and system updates and then proceed towards the T&E/B&P installation. You can either upgrade your existing Time & Expense and/or B&P database or create a new database using the DB Tier installer.

Time & Expense Only Customers

If you intend to use Time and Expense alone, you would first need to install the Costpoint foundation by following the Costpoint installation instructions. You can configure the Application Tier to use a standalone Weblogic instance or use a cluster of Weblogic instances. The database tier would consist of Costpoint Data Segments as described here. The Time & Expense module has to be configured over the Costpoint installation by following the T&E installation instructions that consists of binding the T&E database to the Costpoint Application Tier into an existing Costpoint System.



Costpoint and Time & Expense / Budgeting & Planning Customers

You have the choice of continuing to deploy product as a separate product on a separate infrastructure (a standalone, "share nothing" deployment) or using one of the two new co-deployment models:

- Costpoint and T&E/B&P are deployed together as part of a single Costpoint system, known as a "share everything" co-deployment model
- Costpoint and T&E/B&P are deployed on the same infrastructure but under two separate systems, known as a "share infrastructure" or "multi-tenant" co-deployment model.

If you have all three products, you can deploy them all together, all separately, or any two of them together.

"Share Everything" Co-Deployment Model

In this case, T&E or B&P becomes just another domain within Costpoint, similar to Projects, Accounting, People, and so on. Users have a single Login screen and will see/access both CP and T&E/B&P applications from the same menu if they have rights to both products. Non-Costpoint users will only see the T&E/B&P application which they have rights to.

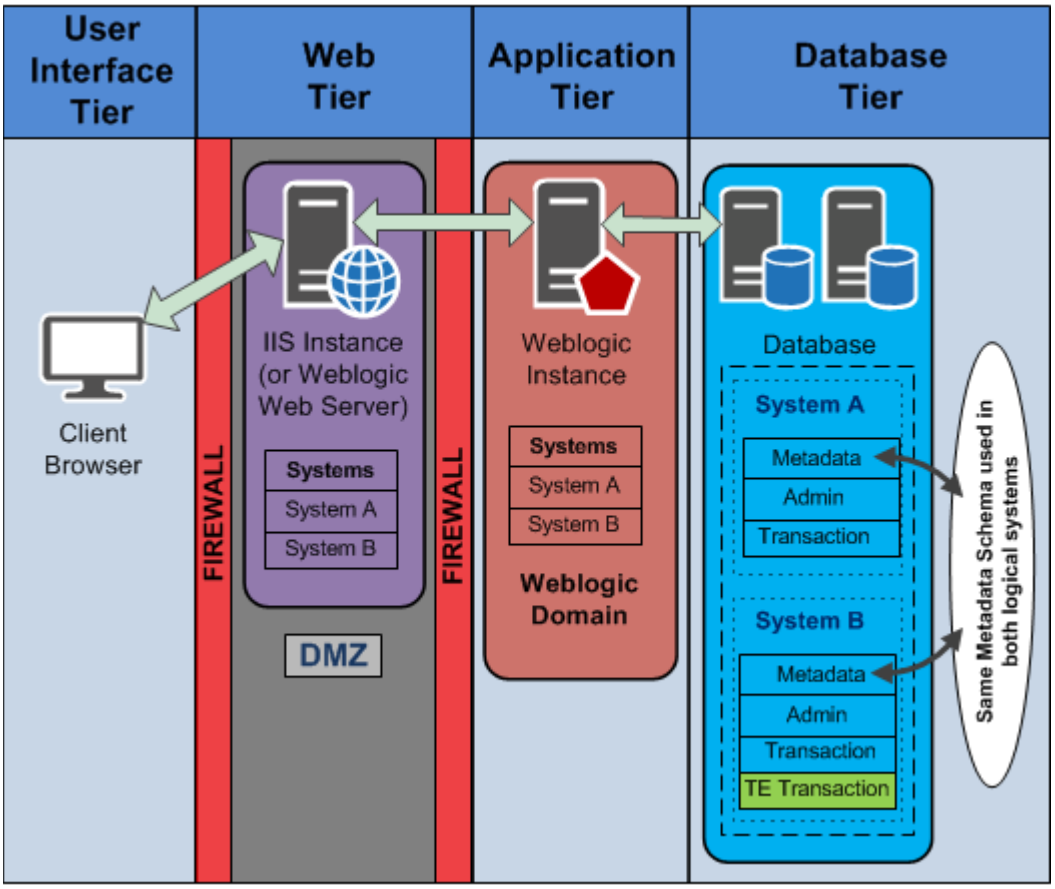
> **Attention:** See the" Network-Based Restrictions" section below if you want to control Internet/intranet access separately for Costpoint and T&E/B&P.

A single system will consist of three Costpoint database schemas along with the fourth database schema represented by an upgraded T&E 9 / B&P 6 database. For performance reasons, Deltek recommends using a separate database for Time & Expense/Budgeting & Planning; although, if desired and supported by hardware capacity, all schemas can be put into a single database instance. You need to make sure that you have enough throughput on the database server to handle the pick load from Costpoint and other product(s) at the same time.

"Share Infrastructure" or "Multi-Tenant" Co-Deployment Model

In this case and from an end-user perspective, T&E/B&P and Costpoint will appear as two different deployments (as if you used a standalone T&E/B&P deployment). Based on the system name specified on the Login page, business users will be able to access either Costpoint or T&E/B&P functions, but not both (even if they have rights to both). This is no different than having two or more Costpoint systems deployed within the same Weblogic cluster.

The Costpoint system would consists of three database schemas while the Time & Expense / Budgeting & Planning system would consist of four database schemas. The metadata schema can be shared as described in the Multi-Tenancy section. In this model, only the Application Tier is shared by the products' Database Tier, with the exception of the Metadata not shared.



Attention: Refer to the *Deltek Costpoint 8.2 Configuration Utility* guide Product Tab section for instructions on binding Time & Expense / Budgeting & Planning with on Costpoint foundation.

For detailed information on how to install Costpoint, Time & Expense, or Budgeting & Planning, refer to the installation instructions provided with the product release.

Network-Based Restrictions

Some organizations may have business users who access the Costpoint platform both through private and public networks, and may desire to restrict access to Costpoint functionality over a public network while allowing remote users to access T&E/B&P functionality. In this situation, Deltek recommends having

multiple proxies or load balancers and define rule-based restrictions on incoming traffic to the Application Tier.

For example, load balancer A with IP address 10.5.40.144 is used for public Internet traffic and load balancer B with IP address 169.54.2.15 is used for internal intranet traffic. You can set rules such that traffic flowing through 169.54.2.15 (intranet LB B) can access both the products while the traffic coming through 10.5.40.144 (public LB A) can only access T&E/B&P functionality. This allows administrators to list any number of white and black list of IP Address to allow or deny product access respectively.

Attention: Refer to *Deltek Costpoint 8.2 Configuration Utility* guide Product, Access List Tab section for instructions on defining white/black list of Proxy filters.

WebLogic Clusters

A WebLogic server cluster consists of multiple Oracle WebLogic server instances running simultaneously and working together to provide increased scalability and reliability. To a user, a cluster appears to be a single server instance. The server instances that constitute a cluster can run on the same machine or on different machines. You can increase a cluster's capacity by adding additional server instances to the cluster on an existing machine, or you can add machines to the cluster to host additional server instances. Each server instance in a cluster must run the same version of WebLogic server.

Benefits of Clustering

A WebLogic server cluster provides the following benefits:

- **Scalability**: The capacity of an application deployed on a WebLogic server cluster can be increased dynamically to meet demand. You can add server instances to a cluster without interrupting service; the application continues to run without impact to clients and end users.
- **High-Availability** (failover): In a WebLogic server cluster, application processing can continue when a server instance fails. You "cluster" application components by deploying them on multiple server instances in the cluster so that, if a server instance on which a component is running fails, another server instance on which that component is deployed can continue application processing.
- **Load Balancing**: Load balancing is the even distribution of jobs and associated communications across the computing and networking resources in your environment.

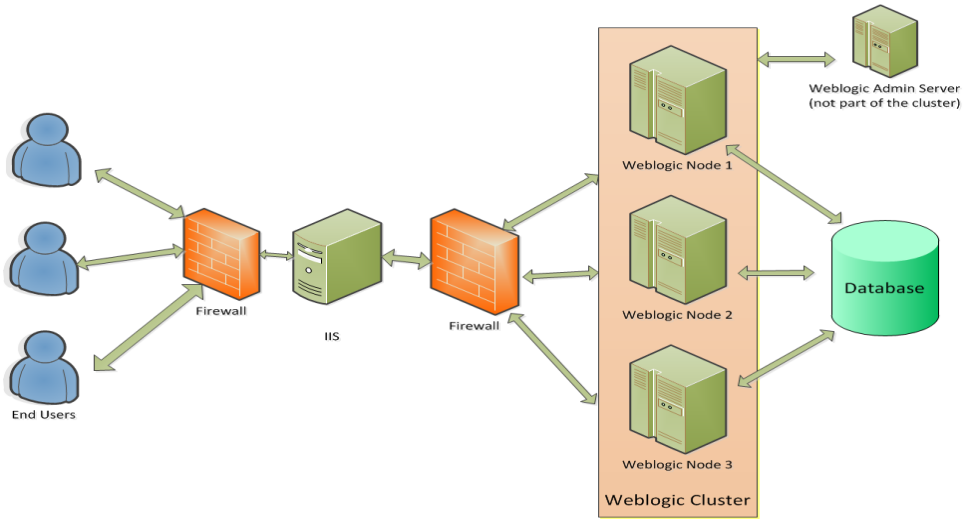
The choice to cluster WebLogic server instances is transparent to end users. However, understanding the technical infrastructure that enables clustering will help administrators maximize the scalability and availability of the product.

Recommended Homogeneous Cluster Architecture Overview

Costpoint supports a homogeneous cluster deployment model.

Deltek recommends using this homogeneous cluster architecture. All components of the Costpoint application are homogenously deployed on all cluster nodes. Each server is equally able to serve any request. Because all components are available locally, there is no additional burden of expensive serialization/deserialization of requests and remote calls.

WebLogic Server Cluster (from Oracle WebLogic Server™ Documentation)



Install Costpoint on a Shared File Location

It is important that all WebLogic instances run the exact same version of the Costpoint product. For this reason, Deltek recommends installing Costpoint in a network folder that is accessible to all servers with high reliability. Anytime a server cannot access this folder, the server will fall to failed status. By installing the product on a shared location, any updates or patches applied to it are available to all servers at once.

Note: All servers in your WebLogic domain should have file access to the folder where the Costpoint application will be deployed. Deltek strongly recommends that the shared folder is hosted on a file server with adequate failover capabilities on Tier 1 high performance storage for your production system.

Running Weblogic instances requires fast and reliable input/output access to this shared folder location. Inadequate I/O performance can jeopardize the health of the product during peak load times. If the I/O access is inadequate and Weblogic server suffers I/O errors, a restart is required to restore system functionality.

If you initially installed Costpoint locally (for example, to C:\deltek\costpoint\82), but then decide to move <Costpoint Home> to a shared location, you should use the Move Costpoint functionality in the Configuration Utility to guide you through the series of steps needed to move <Costpoint Home>. You will need to share the folder where Costpoint is installed. Deltek recommends that you install it to a network location such as \\fileserver\shared_folder1\deltek\costpoint\82.

Attention: For more information, refer to the *Deltek Costpoint 8.2 Configuration Utility* guide.

Cluster Configuration

Identify the new hardware resources to run the WebLogic nodes. Apply all operating system updates to date. Install the WebLogic software on new machines by running the App tier installer.

Oracle's Weblogic Server files should be installed in the same location on all nodes in the cluster and/or on all nodes that are running Dedicated servers. Typically, the location is C:\Oracle\MiddlewareXXXX, but you can to install it any local drive as long as you use the same drive letter for all Weblogic nodes.

Use the Configuration Utility to convert single Costpoint WebLogic server into a cluster. The existing WebLogic server becomes the Admin server by default. Define additional nodes in Configuration Utility and point them to the newly identified hardware resources.

Later, you can also use the Configuration Utility to reduce the number of nodes and release the hardware from cluster. Or, you can use it to revert back to Single Server deployment.

All servers share the same configuration files; that is, memory classpath path and other configurable items are stored in a single place and shared by all member nodes of the WebLogic cluster. When starting the cluster, it is important that the Admin server should be in running mode before the nodes can be started. Within the nodes, the order for starting the nodes does not matter.

Costpoint hotfixes should be applied to the common shared folder. This procedure works the same as it does in single server mode. But, MR installer updates should be applied to each of the WebLogic nodes, including the Admin server in order to install Weblogic security patches.

Attention: For information on how to configure WebLogic clusters, refer to the *Deltek Costpoint 8.2 Configuration Utility* guide.

Dedicated Servers

A dedicated server, as the name implies, is an additional instance of the WebLogic server dedicated to serve certain types of requests. Costpoint application, hot fixes, and Web Integration modules are homogenously deployed to all Costpoint servers including dedicated servers. But, the dedicated servers are not part of cluster and do not participate in fail over. When these servers are shutdown or restarted, only those services that are targeted to run on these servers are impacted, but the regular UI requests that are serviced by the entire cluster are not impacted.

Attention: For more information, refer to the *Deltek Costpoint 8.2 Process Execution Modes* guide.

Benefits of Dedicated Job Servers

Depending on the amount of data they are processing, some jobs (such as closing the accounting period or sub-period or calculating and posting a payroll) can run for a very long time. These jobs make heavy use of system resources while they are executing and may cause interactive users to experience a delayed response from the WebLogic server.

An administrator can choose to run these resource-intensive tasks on dedicated hardware, separate from the tasks of interactive users, so that interactive users experience better performance. Using dedicated servers does not mean that all jobs will run on a dedicated server. Costpoint application users can choose to run a process on a regular channel or on a dedicated server.

Attention: Refer to the Costpoint complex deployment graphic, earlier in this guide, to understand how dedicated job servers fit into the deployment model.

Note: Even if a dedicated WebLogic server is used to process resource-intensive jobs, the Costpoint database is still shared between all active users and processes and can act as a bottleneck for processing.

Dedicated Servers can also be used to serve Integration modules or Web Service requests. Third-party application requests can be segregated to run on these dedicated servers without having to impact the performance of entire cluster. Changes made to Web integration modules requires the servers to be restarted for the changes to take effect and that requires scheduling a downtime as the end users will get dropped during the process. By using dedicated servers, this downtime can be avoided. While deploying Web services through the Integration console, the administrator could clear the **Redeploy Enterprise Application** option of Integration console. This way, only the corresponding dedicated server has to be restarted for the changes to take effect. None of the regular users are impacted by restarting the dedicated servers.

Attention: For detailed information on how to use Redeploy Enterprise Application, refer to the “Build/Deploy Integration Modules” section of the *Deltek Costpoint 8.2 Integration Console* guide.

Considerations in Using Dedicated Servers

Here are some considerations in deciding to use dedicated servers:

- From a hardware and maintenance perspective, dedicated servers are similar to nodes in a WebLogic cluster except that they are not part of the cluster.
- Costpoint can support up to 10 dedicated servers, and they can be brought online based on need. Administrators can choose to bring these dedicated servers online at certain times during the week or month to process scheduled tasks. When they are not needed, they can be shut down, and the underlying hardware can be used for other activities or to host regular WebLogic instances that are part of the cluster.
- Dedicated servers are standalone instances that are not part of the cluster. As a result, they do not provide failover capability for the tasks that run on them. When a dedicated server fails for any reason, its jobs will remain unprocessed until the server is restored.
- Costpoint Web Tier, by default, does not forward any requests to dedicated servers. When you need to expose dedicated servers through IIS, certain configuration changes are to be made on Web Tier. You can either use the existing web tier, bring up a new virtual Application in the existing IIS, or use a different IIS server to proxy the request to dedicated servers.

Attention: For details instructions of accessing dedicated servers through IIS, refer to the “Access from IIS” section of the *Deltek Costpoint 8.2 Integration Overview* guide.

Dedicated Server Configuration and Use

- Install Costpoint on in a Shared File Location. Refer to the WebLogic Cluster section discussed above.
- Identify new hardware resources to run Dedicated Job Server. Apply all operating system updates to date. Install the WebLogic software on new machines by running the App tier installer.
- Oracle's Weblogic Server files should be installed in the same location on all nodes in the cluster and/or on all nodes that are running Dedicated servers. Typically, the location is C:\Oracle\MiddlewareXXXX, but you can to install it any local drive as long as you use the same drive letter for all Weblogic nodes.
- Use the Configuration Utility and define Dedicated Job Servers pointing to the new hardware.

Attention: For more information about dedicated servers, refer to the following sources:

- *Deltek Costpoint 8.2 Configuration Utility* guide: This guide contains Information on how to configure dedicated servers.
- *Deltek Costpoint 8.2 Process Execution Modes* guide: This guide contains Information on how to schedule Costpoint jobs.

Multiple Costpoint Systems in One Costpoint Deployment (multi-tenancy)

A single Costpoint system contains three database schemas: Metadata, Admin, and Transaction. It is possible to have multiple systems in a single Costpoint deployment, consisting of a single Costpoint Home folder, a single IIS instance, and a single WebLogic server (or cluster). This single Costpoint deployment can serve multiple database systems.

Deltek does not recommend this configuration to combine production and test environments, but does recommend it for the following scenarios. Consider it if you need to:

- Maintain private and public cloud (multi-tenant deployment)
- Maintain copies of production data for "what if" business modeling
- Maintain a training system using production software with training data
- Maintain a test system for testing Costpoint hotfixes
- Maintain a development/test system for Web services

Benefits of Having Multiple Costpoint Systems in One Costpoint Deployment

The benefits of this configuration are:

- Hardware and software reduction
- Ease of administration

These benefits are achieved by reducing the number of IIS and WebLogic servers that you need to set up and maintain.

Note that all systems must use the same code base and metadata version. If you are applying a hotfix to a multi-system deployment, you must apply it to all systems at the same time.

Add a New System to a Costpoint Deployment

To add a new system to a Costpoint deployment:

1. Use the Database Tier installation executable to create database schemas.
2. Use the Configuration Utility to register the new system. Go to the Costpoint tab, click **Add**, and enter the connection information for the new system.
3. Activate the new system.

Attention: For detailed information about this process, refer to the *Deltek Costpoint 8.2 Configuration Utility* guide.

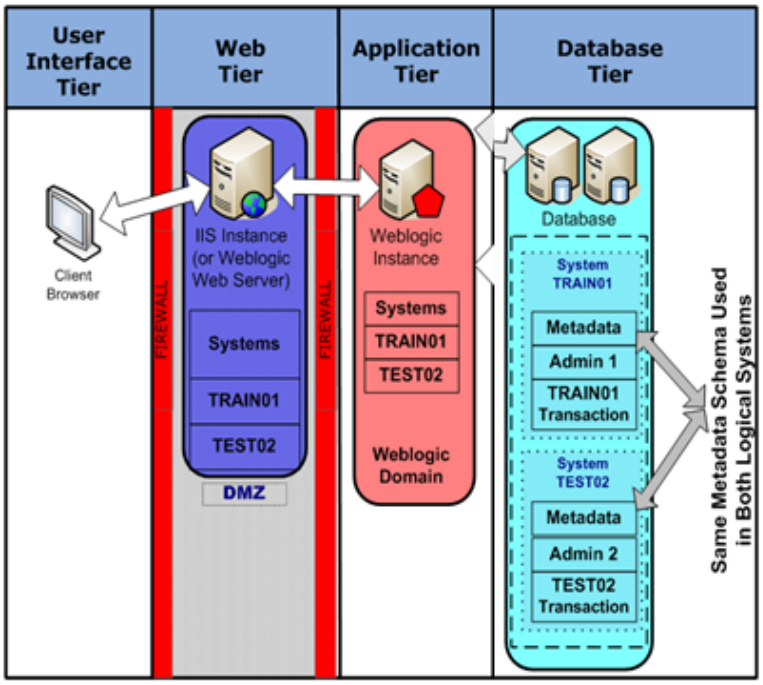
Share Database Schemas between Multiple Costpoint Systems

Share Metadata Schema

If you have multiple Costpoint systems, you can reduce the amount of hardware you need by configuring the Costpoint systems to share the same instance of the Metadata database schema. If you have two systems, for example, you need to have only five database schemas in total: one Metadata, two Admin, and two Transaction.

For this configuration to work, you need to specify different **Link User** names and different **Data To Admin Link**, **Data To Meta Link**, and **Admin To Meta Link** values for the different systems. You establish these names and values using the Configuration Utility, on the **Costpoint » Database Information** tab.

The following diagram shows two Costpoint systems (TRAIN01 and TEST02) in the same Costpoint installation, sharing the same Metadata schema.



Share Admin Schema

Furthermore, to achieve the ultimate reduction in the number of database schemas needed, you can share the Admin schema between two or more systems. In this case, you only need four database schemas in total for two systems: one Metadata, one Admin, and two Transaction.

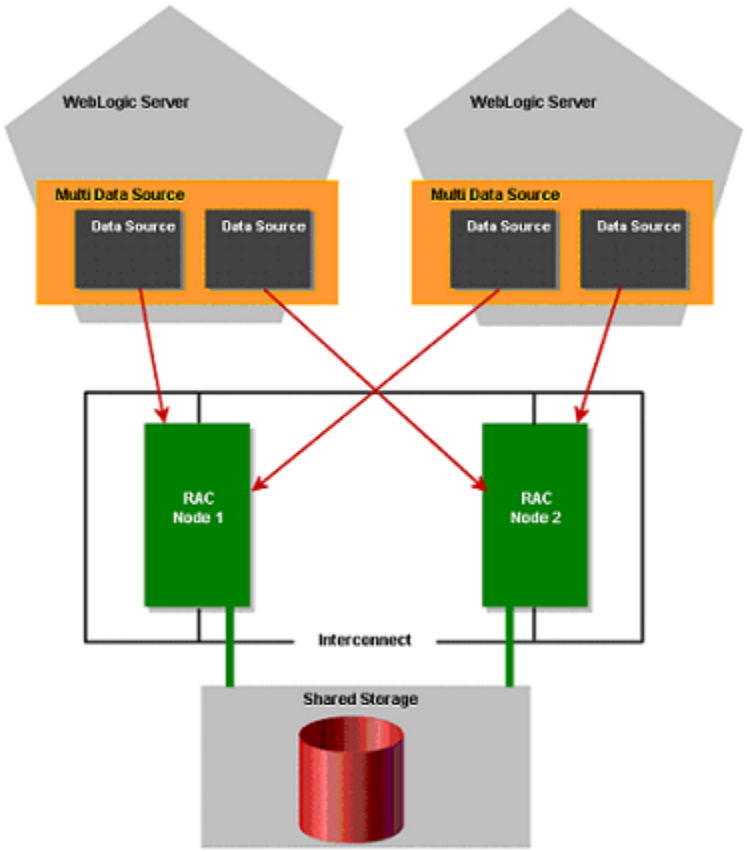
However, there are additional requirements in this scenario. Because the Admin schema contains all licensing and company information, administrative settings, and user/user group authorization and authentication information, all of these settings must be the same in all systems that share an Admin schema. And, as mentioned above, all link settings must be unique to each system for this configuration to work.

Oracle RAC

Oracle RAC (Real Application Clusters) allows multiple computers to run simultaneously while serving a single database, thus providing cluster benefits. With standard Oracle servers, a single instance serves a single database. In a RAC environment, two or more computers (each with an instance) concurrently access a single database. This allows Costpoint application servers to connect to any of the computers and have access to a single coordinated set of data.

Starting with Version 7.0, Costpoint supports Oracle RACs by using the distributed connection pools provided by WebLogic server.

Typical Oracle RAC Configuration



Integration Console

Costpoint provides a generic framework through which you can interface third-party software with Costpoint. Using the Costpoint Integration Console, you can expose any Costpoint application or part of an application as a Web service, to be consumed by a third-party application or Enterprise Service Bus system. When you use the Integration Console, you can configure additional rules (such as SSL requirements and authentication method to be used) without writing a single line of code. The console generates all the required service or EJB components and deploys them to the WebLogic server, ready to be used.

Attention: For more information on the integration features provided by Costpoint, refer to *the Deltek Costpoint 8.2 Integration Overview* guide.

For instructions on using the Integration Console, refer to the *Deltek Costpoint 8.2 Integration Console* guide.

If you are using a WebLogic cluster, integration components are deployed to all the nodes, including dedicated servers, homogenously. A user can connect to any of the servers to run Web services or EJB interfaces.

If you already use dedicated servers to run certain tasks, you should consider also serving integration components using dedicated servers.

Content Management Integration

Costpoint Content Management Integration (CMI) is an optional feature that enables access to a content management system from within Costpoint application screens. It lets you view content in the CMS, view and change content properties (metadata), and link content files to Costpoint records.

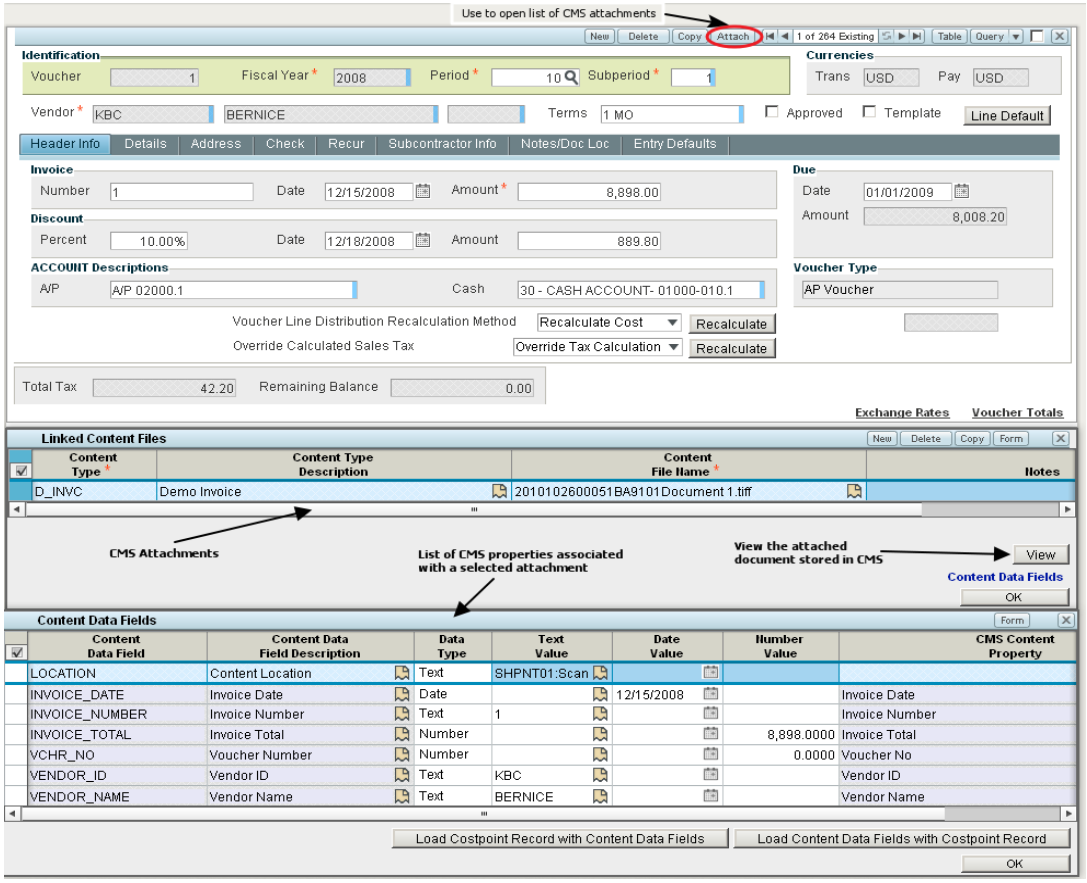
Linking is done at the business entity level. For example, you can open a voucher in Costpoint and link it to an image of a scanned invoice stored in the CMS. Regardless of the Costpoint application that processes or views the voucher, the link to the invoice image is always visible and accessible once it is created.

CMI also lets you use the CMS for file storage. You can import or export files between the CMS and Costpoint and print to a CMS destination.

CMI supports Microsoft SharePoint 2010 and 2007, using a native SharePoint Web services API. It supports other content management systems using the CMIS API, which is a new standard specification developed by major CMS vendors and moderated by the OASIS consortium.

An administrator defines which of the Costpoint applications can interact with the CMS. None of the applications are automatically linked to the CMS.

Attention: For more information on the CMS integration features provided by Costpoint, refer to the *Deltek Costpoint 8.2 Content Management Integration* guide.



Troubleshooting Costpoint

Monitoring Utility

A typical Costpoint installation consists of multiple software components installed across more than one physical machine, and depends on all of the components working together. Failure of any component will hinder the functionality of Costpoint. To help avoid this problem, Costpoint comes with a troubleshooting and monitoring tool called the Monitoring Utility.

The Monitoring Utility provides a single interface where you can monitor the overall status of various Costpoint components. It checks for dependencies and verifies configuration. A system administrator can use this tool to check for the most common configuration issues, and troubleshoot production problems quickly and easily. The utility can also help with remote diagnostics.

By reading the configuration of the entire system, the utility can generate detailed information about various attributes that can impact the system's behavior. This information is saved in XML files that can be bundled and sent by email to the Deltek Customer Care team if needed.

Attention: For more information on how to use the Monitoring Utility, refer to the *Deltek Costpoint 8.2 Monitoring Utility* guide.

Deltek Customer Care

If you encounter a problem that you cannot diagnose or fix, contact Deltek Customer Care. To help the Customer Care team solve the problem, provide as much information as possible about your Costpoint configuration along with a description of the problem.

Here is a list of items that you need to provide to Deltek Customer Care:

- Description of the problem, including when and under what circumstances it first occurred
- Exact version of Costpoint you use and any recent changes to your Costpoint system, including any hot fixes applied or configuration changes made
- Results generated by the Monitoring Utility
- Technical configuration of the product. This information is stored in the following locations:
  - All files under **C:\deltek\costpoint\82\applications\enterprise\properties**
  - All files under **C:\deltek\costpoint\82\bin**
- All log files of the servers and tools. This information is stored in the following location:
  - All files under **C:\deltek\costpoint\82\logs**

Note: Exact folder names will vary based upon your installation.

Appendix A: IIS Performance Optimization

Running Costpoint in a WAN environment presents its own set of performance challenges, typically related to the following two factors:

- Network latency
- Network bandwidth

Network latency is defined as the time it takes a signal (one bit of information) to travel between the browser and the Web server. As distance between the browser and Web server increases and/or additional hardware/software (for example, a Satellite connection) is added, the latency typically increases as well.

Network bandwidth is defined as data volume (number of kilobytes) per second that can be transferred between the browser and the Web server.

A network may have serious latency issues even though it may have more than sufficient bandwidth or vice versa; although, it is rather common for both problems to be present in WAN environments.

The information in the following sections will help you troubleshoot whether or not your network is affecting Costpoint performance, and offer ways to optimize your environment to address any problems you are experiencing.

Does Network Latency Affect My Costpoint Performance?

To determine if network latency is having an adverse impact on your Costpoint performance:

1. Measure how long it takes you to log into Costpoint.
2. On the browser's **Tools** menu, click **Internet Options**.
3. On the **General** tab of the Internet Options dialog box, click **Settings**.
4. For the **Check for newer versions of stored pages** setting, select **Never**.
5. Click **OK**.
6. Again, measure how long it takes you to log into Costpoint

If the first login time is significantly slower than the second login time, then you probably have a latency issue. Read the Using IIS Page Expiration Options to Address Latency Issues section for a possible solution.

> **Note:** After you've finished comparing the two log-in times, make sure to reset the **Check for newer versions of stored pages** setting to **Automatically**.

Does Bandwidth Affect My Performance?

If you have access to network utilization tools, you can use them to diagnose network bandwidth problems. Also, if you are able to log into Costpoint through Citrix so that the browser runs on the same LAN as the WebLogic server, you might also be able to diagnose a bandwidth problem by comparing how well your system performs when accessing Costpoint through Citrix with how well it performs when accessing Costpoint over the network.

If you think that bandwidth restrictions are negatively impacting performance, read the Using IIS and WebLogic Compression Options to Address Bandwidth Issues section for a possible solution.

Using IIS Page Expiration Options to Address Latency Issues

Much of the content that is loaded into the user's browser when running Costpoint does not change very often. Such "static" content includes image files, JavaScript files, and certain HTML files. Normally, the browser keeps copies of these files in a cache on the user's computer. If the browser gets a request to load these files, it can get them out of the cache on the user's computer, rather than having to get them from the server, thus speeding the process of loading the files into the browser.

But before the browser uses a file out of the cache, it first checks the server to see if there is a newer version of the file on the server. If there is not a newer version, the browser goes ahead and loads the cached copy. If there is a newer version, it gets the newer version from the server. This process of checking for newer file versions on the server increases the time it takes for a Costpoint screen to load into the browser. In fact, for small files, such as image files, this roundtrip to the server to check for a newer version can take just as long as getting the original file. For the static files mentioned above, particularly image files, checking for newer versions every time the user opens Costpoint is unnecessary and delays loading pages.

Fortunately, IIS provides a way to prevent the browser from checking for newer versions of a file. It does this by attaching an expiration period to the file, which tells the browser that the file will be fresh until the end of the expiration period. If a file is in the cache and the browser determines that the file has not yet expired, the browser uses the cached version without checking for a newer version on the server, thereby saving a roundtrip to the server. If the browser determines that the file has expired, it first checks the server for a newer version before using the cached copy.

Deltek recommends that you consider taking advantage of this Expiration setting. IIS provides two options for attaching an expiration period to a file:

- The first is the **Expire after** option, which allows you to specify a fixed amount of time during which the file can remain in the cache before it expires (for example, a day or an hour). When the fixed amount of time has elapsed, the browser checks for a newer version of the file on the server. At that point, a new expiration period of the same fixed length is attached to the file and the process starts all over again. This process repeats itself indefinitely until the expiration setting is changed or turned off. For reasons explained below, most Costpoint customers select the **Expire after** option.
- IIS also provides an **Expire on** option, which allows you to specify a particular date on which the file will expire. Before that date, the browser uses the cached copy without checking for a newer version. After that date, the browser checks the server for a newer version before using the cached copy. Note that if you select the **Expire on** option, the expiration period runs only one time. When the period has elapsed, a new period does not automatically start. To start a new expiration period, the Administrator has to enter a new date and time manually. For this reason, the **Expire on** option only makes sense if you want to set a very long expiration period (for example a year). Since most Costpoint customers do not want to set such long expiration periods, the **Expire on** option is not appropriate for them.

If you plan to use the IIS Expiration setting, the most important consideration to keep in mind is that even the relatively static files in Costpoint sometimes do change. This can happen when Deltek releases a new version of Costpoint or a hotfix to address a particular problem. In that event, even if you load the updated files on your server, an individual Costpoint user at your company will not automatically see the changes until the end of whatever expiration period has been set. To see the changes immediately, the individual user needs to clear the cache on his or her browser manually.

The fact that users need to clear their caches to see changes immediately determines how long your expiration period should be. If it is acceptable to require all Costpoint users at your company to clear their browser caches manually whenever Costpoint is updated, then it would make sense to set a long expiration period (for example, two years from now). In that case, you might want to choose the **Expire on** option discussed above.

For many companies, however, requiring users to clear their caches manually is not a realistic alternative. Such companies want to set a much shorter expiration period. For these companies, the **Expire after** option is the appropriate choice. The shorter expiration period should be long enough to allow users to enjoy the performance benefit of using cached files, but short enough to allow users to see updates quickly without having to clear their caches. A period somewhere between 4 to 8 hours is suggested, keeping in mind that users will not see any updates to Costpoint during that period. With an expiration period of 4 to 8 hours, an update or hotfix could be applied in the evening and Costpoint users would see the fresh files the next morning, without having to clear their caches.

While 4 to 8 hours may be a suitable period for HTML files and JavaScript files, a longer period may be appropriate for image files. This is because image files are less likely to change, and the risk posed by not seeing a change to an image file is not very serious. Because IIS allows you to set different expiration periods for different folders, you can set a longer expiration period for image files than for other files. You might also choose to set an expiration period only for image files, and not for any other type of file.

To set the expiration time for the static files in Costpoint:

1. In IIS Manager, right-click the Costpoint site, and click **Properties** on the shortcut menu.

   > **Note:** The Costpoint site is the root Costpoint folder in IIS where Costpoint's HTML files are stored.

2. In the Properties dialog box, click the HTTP Headers tab.
3. Select the **Enable content expiration** option.
4. Take one of the following actions:
   - Click the **Expire after** option and specify a period of time (in minutes, hours, or days) after which the content will expire. After the content has expired, the browser will check for a newer version on the server, and the expiration period will start all over again.
   - Click the **Expire on** option and specify a particular date and time on which you want the content to expire. After that date, the browser will start checking the server for newer versions again. With this option, the expiration period will not start all over again.
5. Click **OK**.
6. To set a different expiration period for image files or to set an expiration period only for image files, right-click the images folder, which is under the root Costpoint folder, and follow the same steps described above.

Using IIS and WebLogic Compression Options to Address Bandwidth Issues

Costpoint's Web content is sent to the user's browser in the form of HTTP traffic. IIS can be configured to compress this HTTP traffic before it is sent to the browser. Compressing it can reduce the volume of the HTTP traffic significantly, thereby conserving network bandwidth and speeding the loading of Costpoint pages. This is particularly true when a user connects to Costpoint through a low bandwidth connection. IIS offers three compression options:

- Compress static content only
- Compress dynamic content only
- Compress both types of content at the same time

The term "static" refers to content that already exists, is stored by IIS, and is ready to be sent to the browser. The term "dynamic" refers to content that is newly created by Costpoint in response to a browser's request.

If you are concerned that bandwidth restrictions may have an adverse impact on Costpoint performance, Deltek recommends that you consider using the IIS compression feature for Costpoint's static content. IIS cannot be configured to compress dynamic content from WebLogic server (the application server used by Costpoint). For dynamic content, Costpoint takes advantage of the compression mechanism built into the HTTP protocol itself, which is fully supported by WebLogic server.

Static Content Compression

Costpoint has three main types of static content:

- HTML files
- JavaScript files
- Image files

Deltek recommends that you use the IIS compression feature for HTML files and JavaScript files. Deltek does not recommend using IIS compression for image files.

When turned on for static content, the IIS compression feature compresses HTML files by default, so no extra steps are needed to compress HTML files. To compress JavaScript files, IIS must be manually configured to compress JavaScript files by editing the metabase.xml file. This takes a little effort, but it is necessary in order to reap the significant benefit of using the IIS compression feature.

To turn on the IIS compression feature for static content:

1. In IIS Manager, right-click the Web Sites folder, and click **Properties** on the shortcut menu.
2. In the Properties dialog box, click the Service tab.
3. Select the **Compress static files** option in the **HTTP Compression** section.
4. Restart IIS for the change to take effect.

Content Compression

As mentioned above, Costpoint has its own built-in compression feature for dynamic content. This feature can be switched on or off by setting the gzip property in the Enterprise Properties file, which is in the Properties folder under the DEWebApp folder of your Costpoint installation.

By default, the gzip property is set to false. To turn on the compression feature, set it to true. The change will not take effect until you either restart WebLogic or use the Reload Global Settings application.

Overhead Considerations

Before adopting the compression solution described in the previous sections, you should be aware that compression options may involve some overhead for both the server and the browser. On the server side, compressing dynamically generated files in WebLogic typically involves more overhead than compressing static files in IIS, because static file compression uses caching.

In cases where low bandwidth is an issue, the benefit provided by compression usually far outweighs the overhead cost. Moreover, such overhead can be mitigated by using a faster PC on either the client or the server, depending on where the overhead is more noticeable. Testing is needed in each particular environment to evaluate if compression improves overall performance.

Appendix B: Costpoint Reporting

This section briefly describes the changes to the Costpoint Web Reporting component.

Changes to Reporting

Costpoint 8.2 uses BIRT reporting for generating Costpoint Reports. BIRT is a java-based technology that runs within the WebLogic server. Actuate is no longer used.

Configuration

The configuration of the reporting component is much simplified in Costpoint 7.1 and later versions. Actuate is replaced with BIRT, which runs within the WebLogic server that hosts the other J2EE components of the Costpoint product. A single app tier installer is used for installing the WebLogic server, J2EE, and reporting components—making the overall configuration simpler.

If you are upgrading from a previous version of Costpoint to version 7.1, you should consider replacing the Actuate servers with Costpoint WebLogic servers so that the overall bandwidth to serve user requests is not reduced. If you are using cluster, you should add additional nodes, or you could add dedicated servers to run processes.

The Costpoint installer takes care of exporting archived reports stored in the Actuate encyclopedia into the new BIRT repository.

Report archives created by Costpoint Users are stored as binary files within the file system of the operating system. (Actuate stored this information in Encyclopedia.) It is important to allocate enough disk space to meet the growing size of archived reports. The default location for storing archived reports is C:\deltek\costpoint\82\applications\birt\report\archive, but you can use the Configuration Utility to change this location.

To support server-side printing, the appropriate drivers have to be installed and configured on all WebLogic servers.

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