



Leonard Ponich

# Integrating WebSphere Portal with DataPower XC10

IBM® offers two elastic caching options: IBM WebSphere® eXtreme Scale and the IBM WebSphere DataPower® XC10 appliance. Although WebSphere eXtreme Scale provides the ultimate flexibility across a broad range of caching scenarios, the WebSphere DataPower XC10 appliance is built for simple, drop-in caching scenarios that require few software configuration and application code changes to your existing environment.

The WebSphere DataPower XC10 appliance can be fully operational within a couple of hours of being wheeled into your data center. Additionally, a single appliance provides 240 GB of “real” caching storage capacity which, optionally configured with a second appliance for high availability purposes, is sufficient for most enterprise requirements without the cost of the real storage required for WebSphere eXtreme Scale.

This IBM Redpapers™ publication provides instructions on how to integrate, configure, and monitor session HTTP sessions from WebSphere Portal in a DataPower XC10 data grid. This paper discusses the common use cases for introducing a DataPower XC10 solution into a WebSphere Portal architecture.

The paper is designed for current and potential users of WebSphere Portal who want to add the DataPower XC10 appliance caching option to their configuration.

This paper contains the following sections:

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*Scalable, Integrated Solutions for Elastic Caching Using IBM WebSphere eXtreme Scale, SG24-7926, provides instructions for integrating, configuring, and monitoring WebSphere eXtreme Scale with the WebSphere Portal product.*

## When to use DataPower XC10 with WebSphere Portal

DataPower XC10 can serve as an efficient application state store for customer portlets that make heavy use of session data. DataPower XC10 appliance can be used to offload HTTP sessions to the grid which otherwise are stored and persisted either in memory or in a shared database.

Placing session data in a DataPower XC10 grid provides the following benefits:

- ▶ Integration with the WebSphere DataPower XC10 is easy.
- ▶ Response times are reduced, increasing the throughput of the application.
- ▶ Replication across the data grid provides high availability.
- ▶ Moving session replication off the database reduces the load on the database.
- ▶ If session data is currently being held in the JVM memory, introducing DataPower XC10 frees up the JVM heap for other application data.
- ▶ Zone-based support for data grids improves high availability by controlling the placement of the primary and replica partitions across other physical locations.

## Prerequisites and requirements

Installation of the WebSphere eXtreme Scale Client v7.1.1 or v7.1.0.4 into the WebSphere Application Server environment is required for the portal applications to communicate with the DataPower XC10 appliance.

An option if you are currently running v7.1.0.3 is to obtain an available iFix from IBM Support that will allow you to continue running with v7.1.0.3. To access the latest information about fixes available, visit the following website:

<http://www-01.ibm.com/support/docview.wss?uid=swg27019704>

**Note:** There might be prior publications stating that v7.1.0.1 is the minimum WebSphere eXtreme Scale Client level required, but that has changed with the introduction of APAR PM41758, which is required for WebSphere Portal integration only.

Additionally, using versions earlier than v7.1.0.4 will result in all portal applications customized to use session data grids using the same data grid assigned to the **wps** application, regardless of the data grid name provided to all other portal applications.

This scenario assumes that you meet the following prerequisites before starting the WebSphere Portal and DataPower XC10 integration:

- ▶ An existing WebSphere Portal Server V7.0 stand-alone application server or clustered application server environment. Older versions are not supported for HTTP session persistence by the WebSphere eXtreme Scale client. Note that if you are running with WebSphere eXtreme Scale v7.1.1, the minimum WebSphere Application Server level required is v7.0.0.19 or v8.0.0.1.
- ▶ Serializable session objects for each of your custom portlets. Objects have to be serializable to be placed in the data grid.

## Sample environment and configuration

We have configured a sample environment to demonstrate the HTTP session offload functionality provided by the DataPower XC10 appliance for a custom portlet and the **wps** portal application. Figure 1 shows a high-level deployment architecture of the sample environment. Because DataPower XC10 is an appliance, this is a remote topology where the DataPower XC10 data grid is hosted in a collective spanning one or more appliances.

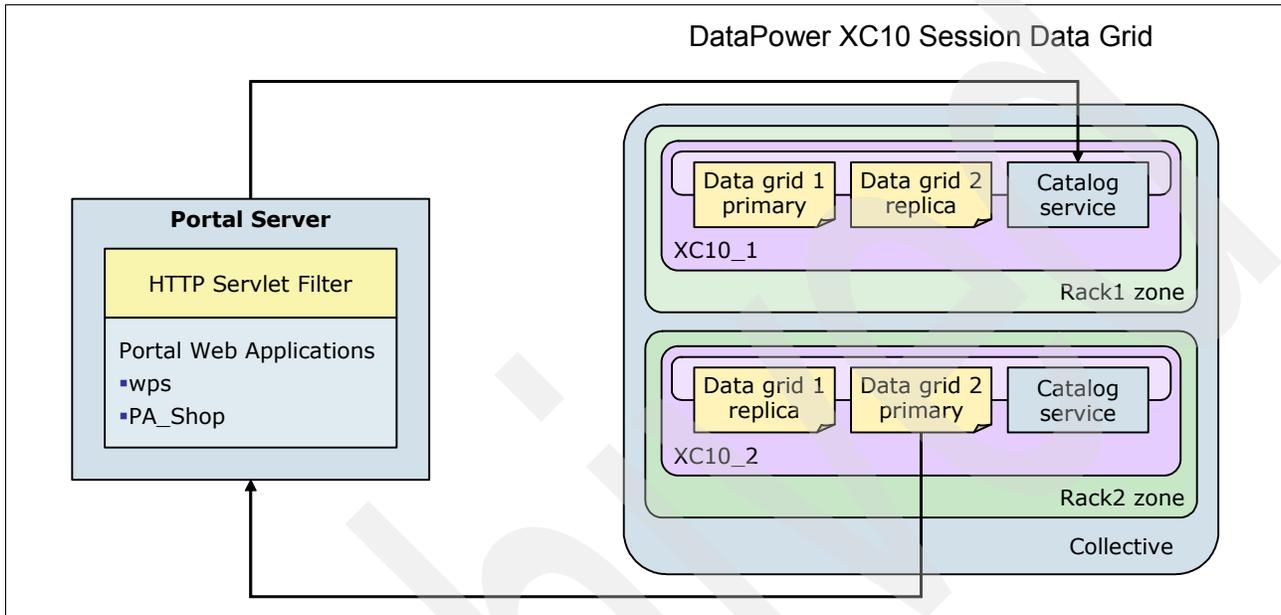


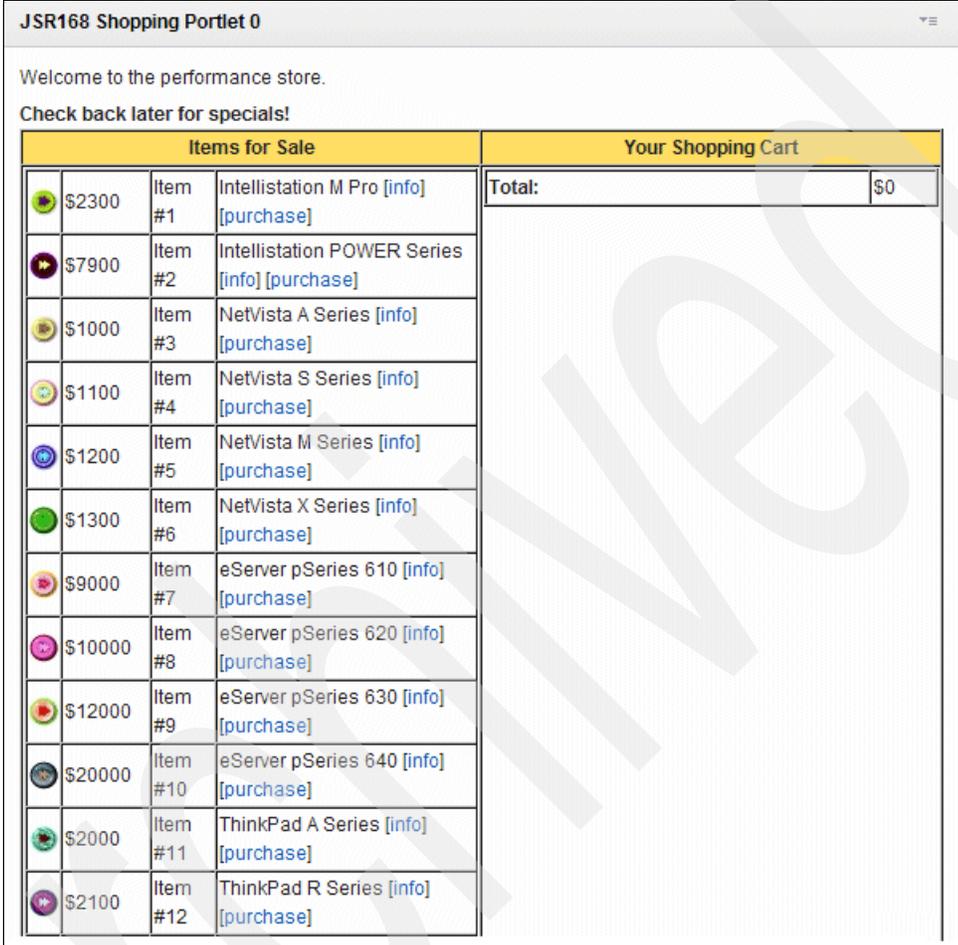
Figure 1 Sample DataPower XC10 and WebSphere Portal integration architecture

The following two broad categories of configuration are required to build the sample DataPower XC10 and WebSphere Portal integration environment:

- ▶ Configuration of the DataPower XC10 data grid collective for session data
- ▶ Configuration of WebSphere Portal Server

## Custom portlet sample

To demonstrate the use of DataPower XC10 for session persistence in a WebSphere Portal environment, we use the custom Shopping Portlet (shown in Figure 2). The portlet's application name is *PA\_Shop*.



The screenshot shows a web browser window titled "JSR168 Shopping Portlet 0". The page content includes a welcome message, a prompt to check back for specials, and two main tables. The "Items for Sale" table lists 12 items with their prices, item numbers, and names, each with "info" and "purchase" links. The "Your Shopping Cart" table shows a total of \$0.

Items for Sale				Your Shopping Cart	
	\$2300	Item #1	Intellistation M Pro <a href="#">[info]</a> <a href="#">[purchase]</a>	Total:	\$0
	\$7900	Item #2	Intellistation POWER Series <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$1000	Item #3	NetVista A Series <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$1100	Item #4	NetVista S Series <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$1200	Item #5	NetVista M Series <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$1300	Item #6	NetVista X Series <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$9000	Item #7	eServer pSeries 610 <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$10000	Item #8	eServer pSeries 620 <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$12000	Item #9	eServer pSeries 630 <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$20000	Item #10	eServer pSeries 640 <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$2000	Item #11	ThinkPad A Series <a href="#">[info]</a> <a href="#">[purchase]</a>		
	\$2100	Item #12	ThinkPad R Series <a href="#">[info]</a> <a href="#">[purchase]</a>		

Figure 2 Shopping portlet

## Integration of DataPower XC10 and WebSphere Portal Server

The following steps must be performed to integrate DataPower XC10 for session management into a WebSphere Portal Server configuration:

1. Install the required products into your environment
2. Create the session data grid(s) on the DataPower XC10 appliance.
3. Review the HTTPSessionIDReuse setting.
4. Review and adjust security settings.
5. Test and validate the configuration.

**Note:** When using the WebSphere DataPower XC10 appliance to cache session data, it is not possible to configure a Catalog Server Domain. Instead, the XC10 catalog service maintains communication between all appliances in the collective. All that is required is that you establish a connection once to one of the XC10 catalog servers and up to three host:port combinations obtained from the XC10 catalog service will be automatically stored in the auto-generated splicer.properties file. With one appliance, one host:port is stored, with two appliances, two are stored, with three or more appliances, three are stored.

If your IP addresses or host names change, then the session management needs to be reconfigured so that the splicer.properties can be updated with the new information.

Following are the details required to create an integrated environment.

## Installation considerations

In this section, we describe only those installation considerations specific to WebSphere Portal's use of the DataPower XC10. We are going to make the following assumptions about the installation environment:

- ▶ The WebSphere Portal Server installation has already been performed with the minimum required levels of WebSphere Application Server Network Deployment.
- ▶ A WebSphere Portal Server or cluster already exists that we are going to configure for use with DataPower XC10.
- ▶ A collective of one or more DataPower XC10 appliances is available, and the necessary authority to create and utilize session data grids in the collective has been granted.

All that remains is to install the WebSphere eXtreme Scale client on all the nodes with WebSphere Portal Server:

1. Stop the cell. Stop all the processes in the cell starting with the servers running WebSphere Portal Server, then the node agent, and finally the deployment manager.
2. Install the WebSphere eXtreme Scale client. See the DataPower XC10 V2 Information Center for more details:  
<http://publib.boulder.ibm.com/infocenter/wdpxc/v2r0/index.jsp>
3. During the client installation, augment the existing WebSphere Portal Server profiles to enable the WebSphere eXtreme Scale functionality.

You must allow all prompted profiles to be augmented including the deployment manager and any nodes that run WebSphere Portal Server.

After you have completed the client installation, start the deployment manager, and proceed to create the session data grids on DataPower XC10.

## Creating the session data grids

Session data grid configuration is required for the **PA\_Shop** portlet application. In addition, the **wps** portal application will require session data grid configuration because it contains all the servlet definitions in WebSphere Portal Server, thus serving as a “funnel” through which other custom portlets are run, including **PA\_Shop**.

Here we are configuring only one session data grid named `wps_grid` for both `wps` and `PA_Shop`. You have the capability of using a separate grid for each application. It might be desirable to keep the session data grid used by `wps` separate from all others as `wps` will be run with all portlets, regardless of whether the portlets cache to the DataPower XC10 data grid or not. For simplicity of this demonstration, we will use only one data grid.

To build the session data grid and associate it with the portal applications, you will use the WebSphere Application Server administrative console (this step can be done with a `wsadmin` script if desired).

1. From the administrative console, navigate to **Applications** → **Application Types** → **WebSphere enterprise applications**.
2. Click the `wps` application.
3. Under **Web Module Properties** section, click **Session management**.
4. Under **Additional Properties** section, click **eXtreme Scale session management settings**.
5. Select the check box for **Enable session management**, and you will see the administration console window similar to that in Figure 3.

**Enterprise Applications** > **wps** > **Session management** > **eXtreme Scale session management settings**

Configure this application to be associated with eXtreme Scale.

Configuration

**General Properties**

Enable session management

Manage session persistence by:  
IBM WebSphere DataPower XC10 Appliance

\* IP or host name of the IBM WebSphere DataPower XC10 Appliance:  
1.23.456.789

**IBM WebSphere DataPower XC10 Appliance security credentials**

\* User name:  
[Text Field]

\* Password:  
[Text Field]

Test Connection...

**Session persistence preference**

Persist sessions in a new data grid on the IBM WebSphere DataPower XC10 Appliance  
Data grid name:  
[Text Field]

Persist session in an existing data grid on the IBM WebSphere DataPower XC10 Appliance  
Existing data grid name:  
wps\_grid [Browse...]

Apply OK Reset Cancel

Figure 3 Session Management settings

6. Select **Manage session persistence** → **IBM WebSphere DataPower XC10 Appliance** from the drop-down list.
7. Enter the IP address or host name of the XC10 appliance or collective of appliances.

8. Enter the user name and password. This will be the user identification that will create and update the session grid and is automatically stored (in encrypted form) in the `splicer.properties` file.
9. (Optional) Click **Test Connection** to confirm that you can connect successfully to the appliance.
10. In the **Session persistence preference** section, click **Persist sessions in a new data grid on the IBM WebSphere DataPower XC10 Appliance**.
11. Enter `wps_grid` (or the grid name of your choice) in the **Data grid name** entry field.

**Note:** Steps 10 and 11 assume the data grid for the application has not been previously created. If you will be using an existing grid, then in the Session persistence preference section, click **Persist session in an existing data grid on the IBM WebSphere DataPower XC10 Appliance**, select **Browse** to see the list of available data grids, and select the one of choice.

12. Click **OK** at the bottom of the page.

**Note:** When you click **OK** or **Apply**, the WebSphere eXtreme Scale client will immediately begin the process of creating the session cache on the appliance, rather than waiting for you to save your changes. Creating the session grid can take up to one minute. If you do not save the changes made here, the session grid will still be present on the appliance; any subsequent actions such as deleting the grid must be done through DataPower XC10 administration.

13. Click **Review** in the messages area.
14. On the Save panel, if the check box **Synchronize changes with Nodes** is displayed, then select it.
15. Click **Save**. Click **OK** when the sync operation completes.

Note that on the **General Properties**, the check box for **Override session management** is now selected.

Go through exactly the same process for the **PA\_Shop** application. This time, however, in step 11, the session data grid `wps_grid` will have already been created (for the `wps` application). Therefore, select the option **Persist session in an existing data grid on the IBM WebSphere DataPower XC10 Appliance** this time.

If you choose to use a separate session data grid for **PA\_Shop**, then you should provide the new grid name here upon selecting the option **Persist session in an existing data grid on the IBM WebSphere DataPower XC10 Appliance**.

## Reviewing the HTTPSessionIDReuse Setting

Prior to WebSphere eXtreme Scale v7.1.0.4 and v7.1.1, it was necessary for you to configure the **timeout.resume.session** parameter to **true**. Beginning with WebSphere eXtreme Scale v7.1.0.4 and v7.1.1, it is no longer required to set this parameter when integrating WebSphere eXtreme Scale or DataPower XC10 with the WebSphere Portal product (and only the WebSphere Portal product). Additional changes have been made to the WebSphere eXtreme Scale client in v7.1.0.4 and v7.1.1, and either of these two fix pack levels are now required for a fully successful integration between the WebSphere eXtreme Scale client and WebSphere Portal Servers.

Because of these changes, the **HttpSessionIdReuse=true** web container custom property is now a requirement when using WebSphere Portal with the XC10. In WebSphere eXtreme Scale v7.1.1, when configuring a portlet to use the XC10 for session replication, this custom property is added automatically by the installation process. In WebSphere eXtreme Scale v7.1.0.4, it is a user requirement to set the custom property on each of the WebSphere Portal Servers. See APAR PM41758 for more information.

## Security considerations

In this section, we will review several security considerations for WebSphere DataPower integration with WebSphere Portal.

### User name and group

For step 8 in “Creating the session data grids” on page 5, the user name provided must already have the **Data cache creation** permission on the appliance. Additionally, consider if other user names or groups will minimally be monitoring the session grid; if so, then those users or groups must minimally have the **Appliance monitoring** permission (the default) and read access to the session data grid.

### SSL/TLS

Transport Layer Security/Secure Sockets Layer (SSL/TLS) is a security protocol that provides a secure communications channel between the WebSphere eXtreme Scale client and the WebSphere DataPower XC10 appliance.

When configuring SSL/TLS between any WebSphere eXtreme Scale client and the XC10 appliance, one characteristic of the appliance that affects the SSL configuration is that when the appliance sends a response back to the client application, it creates a new connection. The result is that a second SSL handshake will then take place beyond the first SSL handshake upon the initial connection from the client to the appliance. Therefore, whether you are “disabling” or “enabling” SSL, do so from both ends of the connection.

Typically, there are three SSL/TLS configurations used. The following list is not meant to be a comprehensive discussion of SSL/TLS configuration but will provide several of the highlights to get you started.

- ▶ SSL is disabled. Configure the **Transport** setting to TCP/IP on the WebSphere Portal Server’s inbound and outbound CSiv2 settings, and also on the appliance.
- ▶ SSL is enabled, by default, without Client Certificate Authentication. In this scenario, perform the following actions:
  - a. Enter SSL-Required for the **Transport** setting for both the WebSphere Portal Server’s inbound and outbound CSiv2 settings, and enter TLS-required for the appliance.
  - b. Exchange certificates between the WebSphere Portal Server and the XC10 appliance by following the procedure described in the DataPower XC10 information center at this site:

[http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/topic/com.ibm.iea.wdatapower/wdatapower/2.0/xc10/Labs/XC10\\_HTTP\\_Session\\_Lab.pdf](http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/topic/com.ibm.iea.wdatapower/wdatapower/2.0/xc10/Labs/XC10_HTTP_Session_Lab.pdf)

- ▶ SSL is enabled, optionally with Client Certificate Authentication. Here you should perform the following actions:
  - a. Enter Required as the **Client certificate authentication** setting on both the WebSphere Portal Server's inbound and outbound CSIv2 settings, and check the **Enable client certificate authentication** option on the appliance.
  - b. If you have not done so already, exchange certificates between the WebSphere Portal Server and the DataPower XC10 appliance.

## Testing and validating the DataPower XC10 integration

Validate the DataPower XC10 and Portal integration environment by taking the following steps:

1. After starting WebSphere Portal Server and accessing the Portal browser, you should see messages in the SystemOut.log similar to what is shown in Example 1.

*Example 1 Log entries for the first HTTP request sent to the Portal Server*

---

```
[9/28/11 10:14:39:968 CDT] 00000000 WsServerImpl A WSVR0001I: Server
WebSphere_Portal open for e-business
[9/28/11 10:14:51:718 CDT] 00000038 HttpSessionFi A CWWSM0007I: Using the
ObjectGrid based Session Manager.
[9/28/11 10:14:55:750 CDT] 00000038 ObjectGridImp I CWOBJ0059I: The
transaction time out value was not configured or was set to 0 for ObjectGrid
wps_grid. With this configuration, transactions never time out. The transaction
time out is being set to 600 seconds.
...
[9/28/11 10:15:52:109 CDT] 00000041 ObjectGridImp I CWOBJ4700I: The map name
objectgridSessionAttributeEvicted matched the regular expression of template
map objectgridSessionAttribute.*. The objectgridSessionAttributeEvicted map
has been created for ObjectGrid wps_grid.
...
[9/28/11 10:39:58:093 CDT] 00000045 ObjectGridImp I CWOBJ4700I: The map name
objectgridSessionAttribute matched the regular expression of template map
objectgridSessionAttribute.*. The objectgridSessionAttribute map has been
created for ObjectGrid wps_grid.
```

---

2. Access the portlet and purchase several items so that data is added to the session object. In our sample environment, we added a couple of items to the cart (Figure 4).

JSR168 Shopping Portlet 0			
Welcome to the performance store.			
Check back later for specials!			
Items for Sale			Your Shopping Cart
	\$2300	Item #1 Intellistation M Pro <a href="#">[info]</a> <a href="#">[purchase]</a>	2 NetVista A Series \$2000
	\$7900	Item #2 Intellistation POWER Series <a href="#">[info]</a> <a href="#">[purchase]</a>	3 eServer pSeries 630 \$36000
	\$1000	Item #3 NetVista A Series <a href="#">[info]</a> <a href="#">[purchase]</a>	<b>Total:</b> \$38000
	\$1100	Item #4 NetVista S Series <a href="#">[info]</a> <a href="#">[purchase]</a>	
	\$1200	Item #5 NetVista M Series <a href="#">[info]</a> <a href="#">[purchase]</a>	
	\$1300	Item #6 NetVista X Series <a href="#">[info]</a> <a href="#">[purchase]</a>	
	\$9000	Item #7 eServer pSeries 610 <a href="#">[info]</a> <a href="#">[purchase]</a>	
	\$10000	Item #8 eServer pSeries 620 <a href="#">[info]</a> <a href="#">[purchase]</a>	
	\$12000	Item #9 eServer pSeries 630 <a href="#">[info]</a> <a href="#">[purchase]</a>	

Figure 4 Sample Shopping Cart portlet

The next step is to monitor the session data grid.

- In the DataPower XC10 web console, go to the **Monitor** tab, select **Individual Data Grid Overview**, select your `wps_grid` grid, and view the **Used Capacity** tab in Table format shown in Figure 5. You might need to wait 30 seconds to a minute for the monitor to start reflecting accurate statistics.



Figure 5 Viewing the Used Capacity Monitor in the DataPower XC10 web console

- After refreshing the Shopping Cart browser window, you will see the same items you added to the cart before refreshing the window (see Figure 4 on page 10).

5. As in step 3, again view the Monitor for the wps\_grid, and this time view the **Cache Usage** tab in Table format, as shown in Figure 6. We observe the following details:
  - The information at time 11:40 AM correlates to the first purchase in the shopping cart
  - The information at time 11:48 correlates to the second purchase in the shopping cart
  - The information at time 11:56 correlates to the refresh of the shopping cart window



Figure 6 Viewing the Cache Usage Monitor in the DataPower XC10 web console

- As we end our shopping and the HTTP session closes, we observe the session data is automatically evicted from the session data grid, as seen by viewing the Used Capacity monitor in Chart format in Figure 7. If the user explicitly logs out, the session data is removed from the grid immediately. If the user just exits the browser or continues to a separate website, then the data is removed from the grid based on the session timeout parameter.

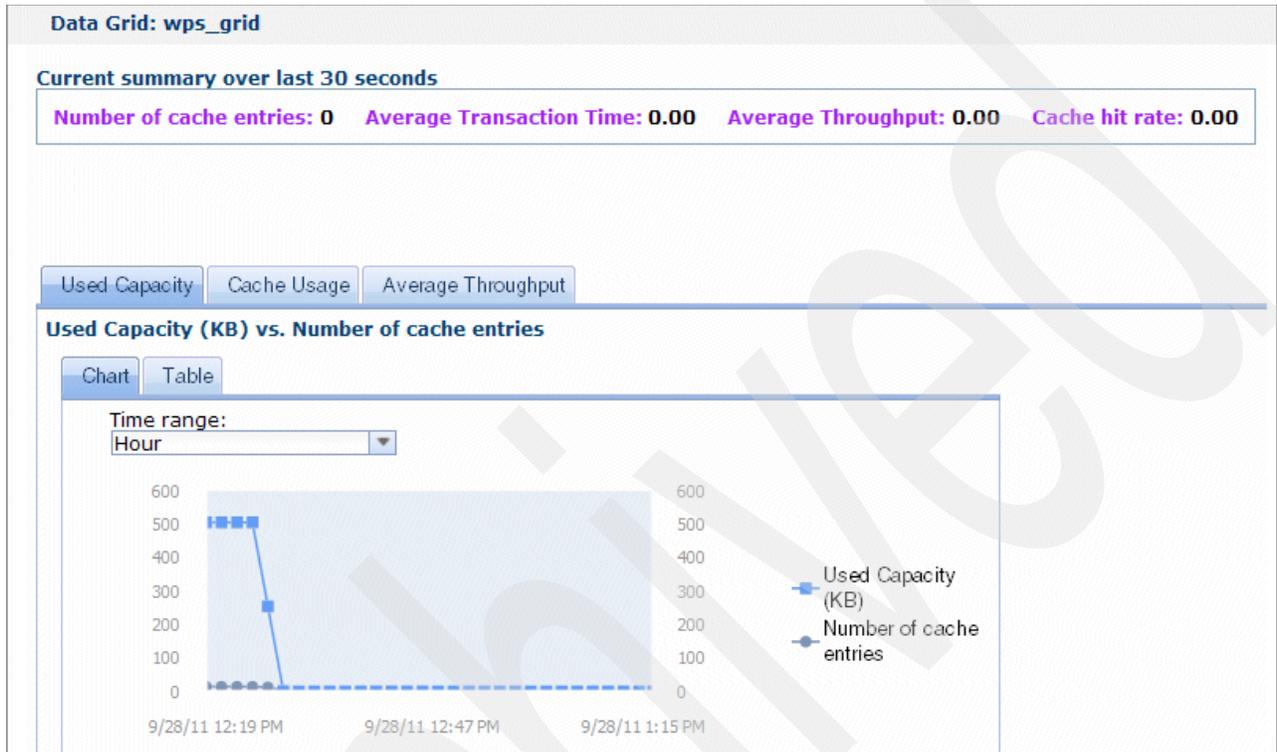


Figure 7 Viewing the Cache Used Capacity in the DataPower XC10 web console

- The WebSphere eXtreme Scale client includes a sample **xsadmin** administration utility used to monitor the internal state of your data grid, to view diagnostic information, and provide a foundation for writing custom utilities. Here we only cover one basic **xsadmin** command line option to monitor session data maps in the grid. Further information about **xsadmin** can be found in the Information Center at the following address:

<http://publib.boulder.ibm.com/infocenter/wdpxc/v2r0/topic/com.ibm.websphere.datapower.xc.doc/txsadmin.html>

While session data exists in the data grid, run the **xsadmin** command from the `WAS_HOME\bin` directory as follows:

```
xsadmin -ch <host name> -username <username> -password <password> -g wps_grid
-m sessionMapSet -mapsizes
```

The partial output from the `xsadmin` command for this environment is shown in Figure 8 (the host name and IP address were modified in the output).

```

This administrative utility is provided as a sample only and is not to be
considered a fully supported component of the WebSphere extreme Scale product

Connecting to Catalog service at xc10.ibm.com:1099

*****Displaying Results for Grid - wps_grid; MapSet - sessionMapSet*****

*** Listing Maps for xsServer03_9.12.345.678 ***
Map Name                Partition Map Entries Used Bytes Shard Type
objectgridSessionAttribute 10      0      0      Primary
objectgridSessionAttribute 11      0      0      Primary
objectgridSessionAttribute 12      0      0      Primary
objectgridSessionAttribute 13      0      0      Primary
objectgridSessionAttribute 14      12     504 KB Primary
objectgridSessionAttributeEvicted 10      0      0      Primary
objectgridSessionAttributeEvicted 11      0      0      Primary
objectgridSessionAttributeEvicted 12      0      0      Primary
objectgridSessionAttributeEvicted 13      0      0      Primary
objectgridSessionAttributeEvicted 14      0      0      Primary
objectgridSessionMetadata 10      0      0      Primary
objectgridSessionMetadata 11      0      0      Primary
objectgridSessionMetadata 12      0      0      Primary
objectgridSessionMetadata 13      0      0      Primary
objectgridSessionMetadata 14      2      843 B  Primary
Server Total: 14 (505 KB)

```

Figure 8 Partial `xsadmin` output of Map entries

## Guidelines and best practices

In this section, we discuss a few guidelines to get the maximum benefit from your DataPower XC10 session data grid.

- ▶ If the session data grid on the DataPower XC10 appliance is unreachable from the web container client, the client instead uses the base web container session cache in WebSphere Application Server for session management. It is up to the administrator to monitor for this situation and to determine why the session data grid is unreachable.

If the data grid is unreachable, you will see messages in the `SystemOut.log` similar to Example 2.

*Example 2 Log entries for an unreachable data grid*

---

```

[10/13/11 16:07:32:281 CDT] 0000003e EvictedMapTim E   CWWSM0004E: Caught a
datagrid exception com.ibm.websphere.objectgrid.TransactionException:
getNextKey failure
...
Caused by: com.ibm.websphere.objectgrid.TargetNotAvailableException: cannot
find primary target after retries for ObjectGrid=wps_grid:sessionMapSet and
partition=5, check your server status
...
when performing a Datagrid operation.
[10/13/11 16:09:57:265 CDT] 00000040 GridAvailabil I   Remote grid wps_grid is
unavailable. Using web container as session manager

```

---

- ▶ In the cases where there is a transition of caching from the DataPower XC10 to the base web container session cache, and vice versa as the session data grid becomes reachable again, there is a potential for loss of user's session data. Therefore, minimize the unavailability of the entire production data grid, especially when the system is running under load.

To minimize the potential for your entire DataPower XC10 data grid becoming inaccessible, configure one or more replicas. Replicas ensure that your data grid data is still available if the primary copy fails. To configure replicas, from the DataPower XC10 web console, click **Data Grid** → **Session** → **Show advanced attributes**. Replicas are created only when the appliance is in a collective. If the number of appliances in the collective is  $n$ , the maximum number of replicas is  $n-1$ . Note that the data grid content is cleared when you edit the number of replicas.

- ▶ Configure a capacity limit for the data grid, thus disallowing one data grid to consume more than its “fair share” of the collective’s capacity. By configuring capacity limits on data grids, you can ensure that the storage capacity for the collective is used in a predictable manner.

To configure a capacity limit, from the DataPower XC10 web console, click **Data Grid** → **Session**, select your data grid, and then click **Show advanced attributes**.

- ▶ When coding applications that you plan to use with the WebSphere eXtreme Scale client to access session data grids on the DataPower XC10, remember the following guidelines:
  - All session objects that need to be stored in the grid have to be serializable, that is, they must implement the `java.io.Serializable` interface.
  - All application objects or data that needs to be recovered in the event of a failover should be set on the HTTP session object. A common mistake that developers make is to forget saving an object to session after an update.
  - Because, by default, the WebSphere eXtreme Scale client layer stores the session data asynchronously to the remote DataPower XC10, it is handled on a separate thread than the request thread. Therefore, the web application should perform one of the following actions:
    - Call `setAttribute` with a copy of the list
    - Ensure the object is not modified after setting it as a session attribute. This will avoid `ConcurrentModificationExceptions` when attempting to serialize the List.

Example 3 shows a code snippet that retrieves a shoppingCart ArrayList attribute from the session object and updates it. After the update, the shoppingCart list is not updated in the session object. If a failover occurs in this case, the session is invalidated out of the session cache, gets reconstituted from the grid under a new session object, and thus loses the shoppingCart data.

*Example 3 Bad Code: storing application data in session*

---

```
ArrayList list = httpSession.getAttribute("shoppingCart");  
list.add("item1");
```

---

Example 4 shows the correct way of retrieving the ArrayList attribute from the session object and updating it. After the ArrayList has been updated with an added item, it is placed back in the session object. In essence, any update to an object that is stored in the session should be directly updated in the session so it can be pushed out to the grid.

*Example 4 Good Code- storing application data in session*

---

```
ArrayList list = httpSession.getAttribute("shoppingCart");  
list.add("item1");  
httpSession.setAttribute(list);
```

---

## Summary

In summary, customers running the WebSphere Portal product have two elastic caching options. WebSphere eXtreme Scale provides ultimate flexibility, but if this high level of flexibility is not required, a more cost-effective solution and a much simpler solution to install and manage is the IBM WebSphere DataPower XC10 appliance.

This paper further discussed the reasons to use DataPower XC10, the requirements and installation considerations for running this integrated configuration, the steps required to configure the integration, and several suggestions for monitoring the integration. Additionally, several guidelines and best practices were provided to help manage and maintain your production caching environment on the DataPower XC10 appliance.

## Related Materials

For more information, see the following related materials:

- ▶ Information on WebSphere Portal integration with WebSphere eXtreme Scale can be found in *Scalable, Integrated Solutions for Elastic Caching Using IBM WebSphere eXtreme Scale*, SG24-7926 (See chapter 5: Integrating WebSphere Portal with WebSphere eXtreme Scale).
- ▶ *Configuring HTTP session manager with WebSphere Portal:*  
<http://publib.boulder.ibm.com/infocenter/wdpxc/v2r0/index.jsp?topic=%2Fcom.ibm.websphere.datapower.xc.doc%2Ftxshttpportal.html>
- ▶ *Configuring Transport Layer Security (TLS).*  
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- ▶ WebSphere eXtreme Scale v7.1 Information Center:  
<http://publib.boulder.ibm.com/infocenter/wxsinfo/v7r1/index.jsp>
- ▶ IBM Education Assistant: *Tutorial: HTTP Session Configuration.:*  
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## About the author



Leonard Ponich recently joined the AIM Early Program team as a technical team member. He is involved with the development and delivery of education of new product functions and provision of customer support during pre-GA (early) programs and post-GA (customer acceleration) programs for DataPower XC10, IWD, and IPAS. Leonard has been with IBM since 1999, working within IBM Global Services mostly with IBM WebSphere MQSeries® and WebSphere Message Broker, and as an Accelerated Value Program specialist.

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