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Intergraph OGC WMS Viewer and Source Code

The Intergraph OGC WMS Viewer is a thin-client Web-based application enables users to view one or more WMS servers accessed through Web sites that conform to the WMS interface¹. The WMS Viewer sends requests, formatted according the OpenGIS implementation specification, to selected WMS sites. Data from various sources and formats can be combined and overlaid in one map view, which can be saved as a context document and used again by its creator or another user. The WMS Viewer supports OGC WMS 1.1.1 and all earlier versions, OGC WMS Context 0.1.2 and 0.1.4, OGC SLD 0.7.2 and 1.0.0, and OGC WRS 0.1.20.

The WMS Viewer source code includes complete functionality to combine data from disparate sources and formats to overlay in a map. The code specifies an intuitive interface that features a toolbar of capabilities for editing servers, layers and context, and querying registry services guides users as they view and format map output. Developers also have access to enhancements made to Intergraph's WMS Viewer, including support for OGC WMS SLD for more flexible symbology support, a Discovery Catalog interface for intuitive searches of the OGC Web Registry Service for WMS data, and upgraded capabilities to load and save contextual information.

Download Intergraph's OGC WMS Viewer and its source code (including ASP, HTML, and XSLT stylesheet files) from: <u>http://imgs.intergraph.com/interop/wmsviewer.asp</u>.

Main Features of Intergraph WMS Viewer are:

- 1. The WMS viewer support viewing version 1.1.1 and all earlier versions of WMS.
- 2. The WMS viewer support searching OGC Registry services for WMS layers.
- 3. The WMS viewer support customized.
- 4. The WMS viewer support viewing, loading, or saving WMS context information.
- 5. The WMS viewer support overlaying layers from different WMSes*.
- 6. The WMS viewer support retrieving FeatureInfo from WMS.
- 7. The WMS viewer fully compatible with NN7.x IE 5.x, IE6.x

The following installation instruction steps are for Intergraph WMS viewer 2.0^2 .

Step 1: Preliminary Requirements

Before you start, you need some basic knowledge of IIS server, database connections and setup. Prerequisite programs include:

- 1. MSXML Core Service 4.0
 - a. The parser can be downloaded from <u>http://msdn.microsoft.com/downloads</u>.

¹ Intergraph OGC WMS Viewer: <u>http://www.wmsviewer.com</u>

² For email support of the WMS Viewer source, email <u>wmsviewersupport@intergraph.com</u>

- b. For servers running on an Intranet, it's necessary to run the proxycfg.exe utility to configure WinHTTP to access HTTP and HTTPS servers via a proxy server³.
- c. If V4.0 SP2 is loaded, you need to check the Internet Explorer security policy setting to allow submitting non-encrypted form data, so posting form data using the ServerXmlHttp is allowed. For details see MSXML 4.0 SP2 Release Notes. Setting Procedures: Start IE --> Bring up Internet Option Dialog Tools-->Security Tab-->select INTERNET, then click Custom Level-->Make sure submitting non-encrypted form data is enabled ,then click OK.
- 2. Database connection
- 3. IIS 5.0 or above

Step 2: WMS Viewer Installation

- 1. Create a directory for the WMS viewer. For example, under {Drive}:\inetpub\wwwroot make a directory called \wmsviewer
- 2. Extract the files from the WMSViewer.zip file into the directory created in number 1 above.
- 3. Setup the website using either the Microsoft Internet Information Server (IIS) (or Peer Web Services on older versions of WindowsNT). Steps follow for each operating system.
 - a. For Windows NT 4.x: Run Start>Programs>Windows NT 4.0 Option Pack> Microsoft Personal Web Server>Internet Service Manager
 - b. For Windows2000 and above:
 - i. Run Start>Settings>Control Panel>Administrative Tools>Internet Service Manager
 - ii. Create a New Virtual Directory on your Default Web Site with the following properties
 - 1. Alias: wmsviewer
 - 2. Directory: the directory created in number 1 above
 - 3. properties: Read, Run Scripts
 - iii. Right click the virtual directory you just created and select Properties.
 - 1. (WinNT) In the Application Settings frame, select Create
 - 2. In the Application Settings frame, select Configuration
 - 3. In the App Options tab, select Enable session state
 - 4. In the App Debugging tab, Disable Debugging Setting (for performance considerations).
 - 5. Click OK twice.
 - iv. Close IIS Manager.

The files createContext.asp, createDB.sql and instDB.vbs, which are only used in installation, may be moved to another location so they are not accessible from clients.

³ See <u>http://support.microsoft.com/default.aspx?scid=kb;en-us;289481</u>

Step 3: Database Setup

The WMS Viewer requires a database connection, which is used to cache capabilities of the WMS list, and is also used to store created SLD documents and WMS connection information in each user's session.

For large scale applications:

- Create an empty database set on your database server.
- Edit the following variables to accommodate your own database connection:
 - Application ("DBConnectionString") in global.asa file
 - strDBConnection in ./setup/instDB.vbs file
 - strDBConnection in ./setup/update_server_capabilities.vbs file

For Demo/Testing purpose, and, if a full scale database server is not available, MSDE (Microsoft SQL Server 2000 Desktop Engine) is an ideal choice. The WMS viewer is not compatible with Microsoft Access.

Following are instructions on setup of a named instance of MSDE:

- MSDE is available for download at <u>http://www.microsoft.com/sql/downloads/2000/sp3.asp</u> For details on licensing, configuring and setting up MSDE please see relevant MSDN site.
- 2. Double-click on the SQL2kdesksp3.exe you downloaded from previous step.
- 3. Go to a command prompt. Navigate to the directory you expanded in previous step, and change to the MSDE subdirectory. Type: setup instancename="INGR_WMSViewer" securitymode=sql sapwd=(Some password). You are now ready to use MSDE as your database.
- 4. Start the MSDE instance if it is not started yet.Open the Windows Services dialog box form the Control Panel or Administrative Tools,select SQLAgent\$INGR_WMSVIEWER on the dialog box,right-click and select Start to start the service.
- 5. Create database named WMSViewerDB to the MSDE, and, grant database access to the internet user of your machine. Before you run the following command, please make sure the database instance you created is started running, the path to osql.exe command must be located in your PATH environment variable, and MSDE is assumed to be installed at the same machine as the WMS Viewer application is. Go to a command prompt. Navigate to the directory you created in step 1 for WMS Viewer, and, change to the setup subdirectory, then type: osql -E -S (local)\INGR_WMSViewer -i createDB.sql

The following procedures are shared by the above two different types of database connection

- 1. Run ./setup/instDB.vbs by double click the .vbs file to create/populate relevant needed tables in your created database.
- 2. Run ./setup/update_server_capabilities.vbs by double click the .vbs file, to cache the capabilities document of each wms in the servers list.
- 3. Setup a scheduled task to update the cached capbabilities info in a regular basis. Go to Start => Settings => Control Panel => Scheduled Tasks and click on Add Scheduled Task. Click Next in the first window that pops up. In the next window, click Browse and

find the ./setup folder. Highlight update_server_capabilities.vbs and click Next. Name the task and choose the interval to perform the task. Click Next. Select a start time. In the next window, enter your_user_name and input your password in the two boxes indicated. Click Next.Click Finish.

The WMS Viewer source code includes the following 'createDB' file:

```
USE master
GO
if exists (select * from sysdatabases where name='WMSViewerDB')
             drop database WMSViewerDB
go
DECLARE @device directory NVARCHAR(520)
SELECT @device directory = SUBSTRING(phyname, 1, CHARINDEX(N'master.mdf',
LOWER(phyname)) - 1)
FROM master.dbo.sysdevices
WHERE (name = N'master')
EXECUTE (N'CREATE DATABASE WMSViewerDB
ON PRIMARY (NAME = N"WMSViewerDB", FILENAME = N"' + @device directory +
N'WMSViewerDB.mdf")
LOG ON (NAME = N"WMSViewerDB log", FILENAME = N" + @device directory +
N'WMSViewerDB.ldf")')
go
exec sp dboption 'WMSViewerDB','trunc. log on chkpt.','true'
exec sp dboption 'WMSViewerDB','select into/bulkcopy','true'
go
set quoted identifier on
GO
SET DATEFORMAT mdy
GO
use "WMSViewerDB"
go
DECLARE @machine name NVARCHAR(20), @iuserlogin NVARCHAR(60), @iwamlogin
NVARCHAR(60)
SELECT @machine name = CONVERT(NVARCHAR(20)),
SERVERPROPERTY('machinename'))
```

SET @iuserlogin = @machine_name + N'\IUSR_' + @machine_name SET @iwamlogin = @machine_name + N'\IWAM_' + @machine_name

IF NOT EXISTS (SELECT *

FROM sysusers		
WHERE name = $@$ iuserlogin		
AND hasdbaccess $= 1$)		
EXEC sp_grantlogin @iuserlogin		
EXEC	sp_grantlogin @iwamlogin	
EXEC	sp_grantdbaccess @iuserlogin	
EXEC	sp_grantdbaccess @iwamlogin	
EXEC	sp_addrolemember 'db_owner', @iuserlogin	
EXEC	sp addrolemember 'db owner', @iwamlogin	

GO

Step 4: Testing your WMS Viewer Application

Enter http://{yournodename}/wmsviewer in a browser. You should see a world map as default map. On the main page, click EDIT SERVERS button to bring up SERVERS window. On the SERVERS window, click Add New...button to bring up Add New WMS Connection ... dialog. You should see a list of WMS servers, which are inserted during the DATABASE setup by default.

On the main page, click EDIT CONTEXT button to bring up CONTEXT window. On the CONTEXT window, click LOAD...button to bring up Load WMS Context From ... dialog. You should see a selection list of predefined contexts, which are inserted during the DATABASE setup by default.

Step 5: Customizing the List of WMS Servers and the List of the Predefined Contexts (Optional)

This step is optional.

1. Edit the list of WMS servers.

Add/Modify/Delete the contents of the servers table in the database using any data management tool.

Run ./setup/update_server_capabilities.vbs to update servers' capabilities automatically.

2. Edit the list of the predefined contexts.

The predefined contexts are not stored in OGC Context format internally. Enter http://{yournodename}/wmsviewer/setup/createContext.asp on your browser. Follow the instructions on the createContext page to create your own preferred contexts and insert them into the list of the predefined contexts. Predefined contexts can be removed from the list by updating table WMSViewer_predefinedContexts in the database using any data management tool

Step 6: WMS Viewer – Customizing the GUI

The Reference Guide document (part of the WMS Viewer download package) provides detailed instructions on how to customize the graphical user interface (GUI) of the WMS Viewer as desired. You should have training or experience in basic Web design/development.

The layout of the default graphical interface is shown in the Figure, below.

Title Section (table)	
Legend Section (table)	Map Section

Figure: The Layout of the WMS Viewer GUI (Default)

In addition to the main interface (main.asp), there are other ASP files, including:

- 1. Context.asp (view/load/save context of current map).
- 2. GetServerInfos.asp (gets WMS servers list from db).
- 3. GetWMS.asp (collects capabilities information from a new WMS connection and stores it in session. After that a response is transferred to maps.asp to create map).
- 4. Layers.asp (edits WMS layers/styles add, remove, adjust the priority, or change the style of WMS Layers).
- 5. Maps.asp (generates GetMap/GetFeatureInfo URL string for each WMS connection actions, like refresh, FitAll, Move, Pan, GetFeatureInfo, ZoomIn, ZoomOut, add/remove layers, are handled in this page).
- 6. Servers.asp (edits WMS connections of current session).
- 7. Sld.asp (generates/sends-out SLD document).
- 8. Styles.asp (populates relevant styles information of the highlighted layer).
- 9. Wrsquery.asp (WRS Query Form. This file is part of Intergraph's OGC WRS client implementation).

Developers can build on the HTML and ASP code to modify the interface to provide a specialized "look and feel" and add functionality that will benefit their individual applications. The style information of each html tag is defined by corresponding CSS StyleSheet elements located at corresponding ASP and HTML pages.

The following capabilities are showcased in WMS Viewer and are accessed by the four Viewer buttons on the left side of the toolbar:

- Discovery Catalog. Search OGC Registry services for WMS layers.
- Edit Servers. Edit WMS connections add, remove, or adjust the priority of WMS Server connections.
- Edit Layers. Edit WMS layers/styles add, remove, adjust the priority, or change the style of WMS Layers.
- Edit Context. View, load, or save WMS context information.



Figure: Toolbars – Viewer Buttons

The Viewer screen is divided into a Layers and a Legend section, toolbars (Viewer buttons and operations icons), and a map section. The individual sections are described below, followed by a sample workflow sample workflow to get you started.



Figure: Layers and Legend

Viewer buttons are used to build your map:

Discovery Catalog. Displays a discovery catalog interface popup window that allows you to search/retrieve OGC WMS-compatible data against OGC-compatible discovery services.

- WRS Query Dialog. After selecting area of interest, theme, and keywords, you can perform a search against an OGC Web Registry Service for relevant WMS data by clicking SUBMIT.
- **Query Result Dialog**. Results from the search, which include a list of relevant layers and their corresponding originators, will appear in the dialog. You can select one or more

layers from the list and add the selected layers to the current map view by clicking ADD LAYERS.

Edit Servers. Displays server's interface popup window from which you can add, remove, or adjust the priority of WMS connections and update image format for each WMS connection.

- **Current WMS connections**. Displays current WMS connections and their URLs. You can adjust the priority of current WMS connections by clicking the Up or Down arrow, and remove selected WMS connections from the current display by clicking REMOVE.
- Add New WMS Connection Dialog. The dialog is displayed by clicking ADD NEW to add a new WMS connection to the current map. You can choose from the WMS list, which is part of Open Geospatial Network, or key in the URL for a new connection.
- Edit Image Format Dialog. By clicking FORMAT, you may change the file (image) format requested from the selected WMS connection.
- Update Maps. Allows you to update the map image to reflect your selections.

Edit Layers. Displays a layers interface popup window that allows you to add, delete, or adjust the priority of layers from the current WMS connections, reference a predefined styled layer descriptor (SLD) document for each WMS connection, update the named style for each layer, and define your own symbols for each layer that supports SLD, through SLD editor.

- Layers of current WMS connections. Lists layers displayed in the current map. You can adjust the priority of layers by clicking Up or Down arrows, add new layers from a selected WMS connection by clicking ADD NEW, and remove a selected layer from the current display by clicking REMOVE.
- **Predefined SLD's URL textbox**. Allows you to reference your predefined SLD document for selected WMS connection if the WMS server is SLD enabled.
- Edit Style Dialog. Clicking STYLE displays a dialog in which you can edit the style for the selected layer. If the selected layer is SLD enabled, you can use the dialog to create and edit symbols.
- Recreate Maps. Allows you to update the map to reflect the parameters you specify.

Edit Context. Displays a context interface popup window that allows you to view the context information of the current map, save current context in OGC WMS Context Version 0.1.4 format, and load predefined contexts or context documents that are compatible with OGC WMS Context Version 0.1.2 or 0.1.4.

- **Context Information of Current Map** lists context information of the current map, such as bounding box, map size, WMS connections, and layer lists of the current map.
- Load Context dialog is displayed by clicking LOAD to allow you to load OGC WMS Context document version 0.1.2 or 0.1.4 to the Viewer.
- Save allows you to save current context at your local machine in OGC WMS Context Version 0.1.4 format.

Pre-customization

• You should be familiar with the layout/dependencies of the interface before you start.

- Do not change or delete JavaScript and/or ASP codes unless it is specified explicitly in this document or you fully understand the code and changes you are making.
- Do not change the id/name of each <div>, <form>, and <iframe> tag or delete those tags.
- All of the image files are stored at \images subfolder. You might need to clean up the folder before you put your new image files into the folder.
- Please keep in mind that the Intergraph Mapping and Geospatial Solutions' logo must be part of your new customized interface per the license

Basic Customization

- Using your favorite Web design tools to design your own graphical interface for Title section and Legend Section, and then slice the new design into html format. In your new graphical interface, there should be operation icons/buttons for all the operations available, such as Zoom Area, Zoom In, Zoom Out, etc. Also, create eight (8) separate arrow icons the series arrows around the maps for the user to pan the maps toward south, east, etc. using your Web design tools. There should be two image files for each corresponding icon/button used for simulating button/icon's up state and down state.
- Replace the Title Section (Table) and Legend Section (Table) of main.asp with your new graphical interface in html format. Please make sure that two <div> tags, identified as divLegend and divLegend2, are not accidentally deleted.
- Integrate the operations of DISCOVERY CATALOG, EDIT SERVERS, EDIT LAYERS, and EDIT CONTEXT with corresponding image icons/buttons in the new main.asp.
 - Add a form named frmRadioAction into the new main.asp page, and put all those following mentioned image icons/buttons into the new added form.
 - DISCOVERY CATALOG operation
 - Name your new DISCOVERY CATALOG icon/button as btnDiscovery.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, and ONCLICK event of the new icon/button.
 - onmouseover="changeImages('btnDiscovery', 'images/<your_discoverycatalog_down_image>'); this.style.cursor='hand'; return true;"
 - onmouseout="changeImages('btnDiscovery', 'images/<your_discoverycatalog_up_image>'); return true;"
 - onclick = "DiscoveryService();"
 - EDIT SERVERS operation
 - Name your new EDIT SERVERS icon/button as btnServers.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, and ONCLICK event of the new icon/button.
 - onmouseover="changeImages('btnServers', 'images/<your_editserver_down_image>'); this.style.cursor='hand'; return true;"
 - onmouseout="changeImages('btnServers', 'images/<your_ editserver _up_image>'); return true;"

- onclick = " editServers ();"
- EDIT LAYERS operation
 - Name your new EDIT LAYERS icon/button as btnLayers.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, and ONCLICK event of the new icon/button.
 - onmouseover="changeImages('btnLayers', 'images/<your_editstyle_down_image>'); this.style.cursor='hand'; return true;"
 - onmouseout="changeImages('btnLayers', 'images/<your_editstyle_up_image>'); return true;"
 - onclick = "editLayers ();"
- EDIT CONTEXT operation
 - Name your new EDITCONTEXT icon/button as context.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, and ONCLICK event of the new icon/button.
 - onmouseover= "changeImages('context', 'images/contextover.jpg');this.style.cursor='hand'; return true;"
 - onmouseout= "changeImages('context', 'images/context.jpg'); return true;"
 - onclick = "editContext ();"
- ZOOM AREA action
 - Add handler to ONMOUSEDOWN and ONMOUSEOVER event of your ZOOM AREA icon/button.
 - onmouseover="this.style.cursor='hand';window.status='Zoom Area'"
 - onmousedown= "radioClick('zoominfence');"
- ZOOM IN action
 - Add handler to ONMOUSEDOWN and ONMOUSEOVER event of your ZOOM IN icon/button.
 - onmouseover="this.style.cursor='hand';window.status='Zoom In'"
 - onmousedown= "radioClick('zoominin');"
- ZOOM OUT action
 - Add handler to ONMOUSEDOWN and ONMOUSEOVER event of your ZOOM OUT icon/button.
 - onmouseover="this.style.cursor='hand';window.status='Zoom Out'"
 - onmousedown= "radioClick('zoominout');"
- RECENTER action
 - Add handler to ONMOUSEDOWN and ONMOUSEOVER event of your RECENTER icon/button.
 - onmouseover="this.style.cursor='hand';window.status='Recenter'"
 - onmousedown= "radioClick('recenter');"
- PAN action
 - Add handler to ONMOUSEDOWN and ONMOUSEOVER event of your PAN icon/button.

- ONMOUSEOVER="this.style.cursor='hand';window.status='Pan'
- onmousedown= "radioClick('pan');"
- FEATURE INFORMATION action
 - Add handler to ONMOUSEDOWN and ONMOUSEOVER event of your FEATURE INFORMATION icon/button.
 - onmouseover ="this.style.cursor='hand';window.status='Feature Information'"
 - onmousedown = "radioClick('info');"
- REFRESH FROM BOUNDING BOX action
 - Name your new REFRESH FROM BOUNDING BOX icon/button as btnRefresh.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, ONMOUSEDOWN, ONMOUSEUP, and ONCLICK of the new icon/button.
 - onclick = "refreshMap();"
 - onmousedown ="handleMouseDown('btnRefresh');"
 - onmouseout ="this.src = './images/<your_btnRefresh _up_image>';"
 - onmouseover="this.style.cursor='hand';window.status='Refresh from Bounding Box'"
 - onmouseup="this.src = './images/<your_btnRefresh _up_image>';"
- FIT ALL action
 - Name your new FIT ALL icon/button as btnFitall.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, ONMOUSEDOWN, ONMOUSEUP, and ONCLICK of the new icon/button.
 - onclick = "fitAll();"
 - onmousedown="handleMouseDown ('btnFitall');"
 - onmouseout="this.src = './images/<your_btnFitall_up_image>';"
 - onmouseover="this.style.cursor='hand';window.status='Fit All'"
 - onmouseup="this.src = './images/<your btnFitall up image>';"
- ORIGINAL MAP action
 - Name your new ORIGINAL MAP icon/button as btnDefault.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, ONMOUSEDOWN, ONMOUSEUP, and ONCLICK of the new icon/button.
 - onclick ="Default();"
 - onmousedown ="handleMouseDown ('btnDefault');"
 - onmouseout ="this.src = './images/<your_btnDefault up image>';"
 - onmouseover="this.style.cursor='hand';window.status='Original Map'"

- onmouseup="this.src = './images/<your_btnDefault _up_image>';"
- HELP action
 - Name your new HELP icon/button as btnHelp.
 - Add handler to ONMOUSEOVER, ONMOUSEOUT, ONMOUSEDOWN, ONMOUSEUP, and ONCLICK of the new icon/button.
 - onclick = "startHelp('./html/help.htm');"
 - onmousedown ="handleMouseDown ('btnHelp');"
 - onmouseout="this.src = './images/<your_btnHelp_up_image>';"
 - onmouseup="this.src = './images/<your btnHelp up image>';"
 - onmouseover="this.style.cursor='hand';window.status='Help'"
 - Integrate Legend/Layer Section with the new main.asp.
 - Make sure that the two <div> tags identified as divLegend and divLegend2 are in your new main.asp page.
- Integrate Legend/Layer Section with corresponding image icons/buttons in the new main.asp.
 - LAYERS action
 - Name your new LAYERS icon/button as tab_layers.
 - Add handler to ONCLICK and ONMOUSEOVER event of the new icon/button.
 - onclick = "tabOnClick ('tab_layers');"
 - onmouseover = "this.style.cursor='hand';"
 - LEGEND action
 - Name your new LEGEND icon/button as tab_legend.
 - Add handler to ONCLICK and ONMOUSEOVER event of the new icon/button.
 - onclick = "tabOnClick ('tab_ legend');"
 - onmouseover = "this.style.cursor='hand';"
 - Replace those arrow image files, which are located at images subfolder, with your own ones.
 - Update JavaScript functions, such as loadImages (), radioClick (), handleMouseDown (), and tabOnClick (), which are located at .javascript/maps.js, to accommodate the new file name of those new image button/icons.
 - Customization of those popup windows.
 - Update background color with your theme color.
 - Replace those image buttons with your own ones.

Advanced Customization

For advanced users, feel free to design your own graphical interface.

- The layout of the interface can be rearranged. For example, you can have the title section moved to the bottom of the window or have the legend section moved to the left of the window, etc.
- The size of map can be changed.
 - Update Sub Session_OnStart in global.asa.
 - session ("HEIGHT") = "Number_in_Pixel"
 - session ("WIDTH") = "Number_in_Pixel "
- Functionalities can also be customized. Feel free to modify, delete, or add new.