

OP-J Enterprise Architecture White Paper
Discussion and Implementation

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1. OP-J Enterprise Architecture

Enterprise GIS (eGIS) is defined as an integrated geospatial technology infrastructure delivering spatial information products, services and standard datasets to all business elements and processes of the organization. The eGIS architecture defines how we deploy and manage geospatial technology within USACE. The OP-J Enterprise Architecture fully adopts this philosophy and extends it's reach through the implementation of additional structural changes for controlled access to back-side spatial databases through the CEEIS firewall infrastructure.

ESRI's ArcIMS software provides a suite of tools that allows for the creation of web sites for mapping and geographic information system (GIS) needs. ArcIMS supports a multi-tier distributable architecture that can be installed entirely on a single server or scaled up across multiple machines.

When an ArcIMS request is made, it is first handled by the Web server, passed through one of the connectors, and then forwarded to the ArcIMS Application Server. The Application Server, in turn, dispatches the request to an ArcIMS Spatial Server for processing. Below is a diagram showing the business logic tier components. The components of ArcIMS may be distributed across multiple machines. The approach described hereinafter moves the web server outside the firewall and configures the connectors (shown in purple) to communicate with the map generating components of ArcIMS sitting behind the firewall.

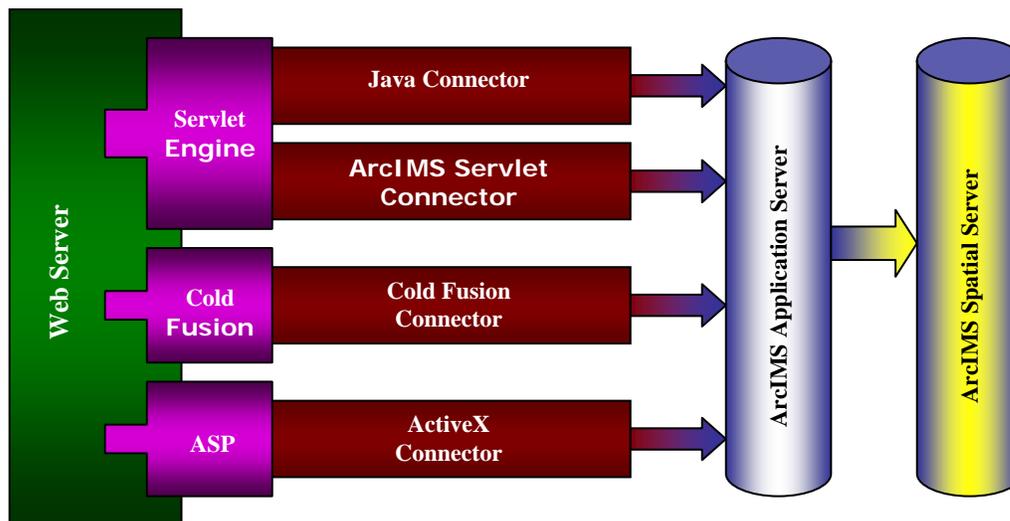


Figure 1 – ArcIMS Business Logic

1.1 Approach

The servlet container (AKA servlet engine, or web container) is usually installed on the same machine as the Web server. One reason to install it on a separate machine would be if the ArcIMS Application and Spatial Servers were behind a firewall from the Web server¹.

Without the approach described here, you might need to map a drive through the firewall, in order to allow the Spatial Server to write the map image files to a directory accessible to

the Web server. Another option is a reverse proxy server. This works well, but some organizations may have policies that prohibit use of a Web server on the internal (Spatial Server) machine. CEEIS prohibits the direct mapping of drive through the firewall.

The servlet container must be able to run separately (out of process) from the Web server. Most stand-alone servlet containers have this capability. Apache Tomcat, ServletExec Application Server, JRun and WebSphere run this way. ServletExec ISAPI cannot—be sure to use the AS version. Web servers with built-in servlet containers, such as iPlanet or WebLogic, cannot be set up this way. Some servlet containers may be able to work with these Web servers (for example, ServletExec AS can plug in to iPlanet).

Figure 2 - Basic Configuration outlines the components required on each server. The details that follow specifically implement ArcIMS 4.0.1 using ServletExec 4.0 running with Internet Information Services 5.0 and Windows 2000 Server. Other servlet implementations are possible but will not be covered here. For more information on installing ArcIMS, see the Installation Guide on the ArcIMS CD.

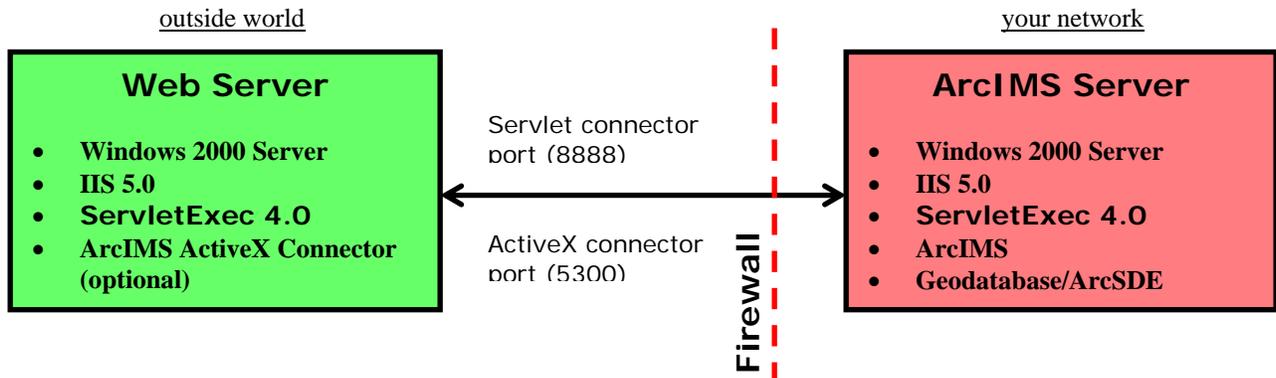


Figure 2 - Basic Configuration

Port 8888 and, optionally, port 5300 need to be opened for 2-way communication between the production server and the Internet accessible web server. Port 8888 allows the servlet engine to communicate with the java applications installed on the ArcIMS server. Port 5300 allows the ArcIMS ActiveX connector to communicate with the ArcIMS Spatial Server installed on the ArcIMS server machine. While the use of the ActiveX connector is not required its usage is very convenient, particularly if one wishes to embed interactive maps in an ASP web page.

1.2 Configuration - ArcIMS Server Machine

Before proceeding you must have Internet Information Services fully functional on the ArcIMS server. The ServletExec install requires a Web server.

On your ArcIMS server, **install the JSDK** appropriate for your ArcIMS version. For ArcIMS 4.0.1, use JSDK 1.4.0 (not the latest version). Download from java.sun.com—look in the archived releases for the correct version. The JSDK is the Java Software Development Kit provided by Sun Microsystems.

Install ServletExec Application Server (AS) on the ArcIMS server. The version on the ArcIMS 4.0.1 CD is fine. During the install:

Choose the *Install a ServletExec/AS Instance* option

- For the instance name, you can use any name, but it's recommended to use the name of the ArcIMS server
- Select the Web server that is present or that you installed above.
- Install ServletExec AS as an NT Service.
- Allow ServletExec AS to update the Web server configuration file

Edit the ServletExec startup file to allow requests from the Web server:

- Edit the StartServletExec.bat file with a text editor. This file is located in <ServletExec install directory>\se-<instance>, where <instance> is a reference to the instance name you used during the installation of ServletExec AS.
- At the end of the long startup string, add the Web server's IP address with the "allow" parameter:

```
allow 10.1.1.1
```

In this example, the Web server's address is "10.1.1.1". This should be the web server that is located outside your firewall. You can also use an IP address mask, such as 10.1.1.*. Note: you can "allow" more than one machine.

- Save the .bat file and close the text editor.

Install ArcIMS software:

- In the Post-Installation wizard, for the Servlet Connector location, point to C:\Program Files\New Atlanta\ServletExec AS\se-<instance>\Servlets, where <instance> is the name you used during the ServletExec installation.

Restart the ServletExec AS service in Control Panel-Administrative Tools-Services.

Add Web applications to ServletExec:

- Open the ServletExec Admin page via the Start-Programs-New Atlanta-ServletExec AS menu.
- Under Web Application in the left side of the Admin page, click on **manage** to display the Manage Web Applications panel.

The following application is mandatory for a successful installation.

- Click **Add ArcIMS "output" Web Application**, and in the dialog that opens, fill in the values required:
 - Application Name: use **output**. Note – application names are case-sensitive.
 - URL Context Path: **/output/**

- Location: C:\ArcIMS\Output (or wherever your ArcIMS output directory is located)
- File Caching: **disabled** is recommended, since most files will be retrieved only once.
- Click **Submit** to create the web application. If you get a message that necessary resources (WEB-INF folder, etc.) are not present, click the Create button to create those resources. You should then see that the web application has been successfully created. If not, see the troubleshooting guide in the ServletExec User Guide PDF (on the ArcIMS CD).

The following application is not mandatory; however if you need to manage your ArcIMS services remotely through your web server then add the following to properly configure the Service Administrator. Note – ArcIMS services may also be administered directly at the ArcIMS server machine console.

- Click **Add ArcIMS “esriadmin” Web Application**, and in the dialog that opens, fill in the values required:
 - Application Name: use **esriadmin**. Note – application names are case-sensitive.
 - URL Context Path: **/esriadmin/**
 - Location: C:\Program Files\ArcGIS\ArcIMS\Administrator\esriadmin (or wherever your ArcIMS Service Administrator is located).
 - File Caching: **enabled** is recommended.
 - Click **Submit** to create the web application. If you get a message that necessary resources (WEB-INF folder, etc.) are not present, click the Create button to create those resources. You should then see that the web application has been successfully created.

After clicking Submit to create the web application, you may close the ServletExec Admin page.

1.3 Web Server Setup

Before proceeding you must have Internet Information Services fully functional on the web server. The ServletExec install requires a web server.

On your web server, **install the JSDK** as done in preceding steps.

Install ServletExec Application Server (AS) on the web server. The version on the ArcIMS 4.0.1 CD is fine. During the install:

Choose the *Install a ServletExec/AS Instance* option

- For the instance name, you can use any name, but it's recommended to use the name of the web server

- Select the Web server that is present or that you installed above.
- Install ServletExec AS as an NT Service.
- Allow ServletExec AS to update the Web server configuration file

Install the ServletExec AS Web Server Adapter (redirector) on the Web server machine (see also ServletExec Installation Guide):

- Run the ServletExec AS installer (on ArcIMS CD)
- Choose the *Install a web server adapter* option
- When prompted, enter the name, IP address and port number (8888 is the default) of the ArcIMS server machine.

Choose the option to update the web server configuration files

Add the mappings to the Web server redirector. To have the web server send requests for output map images to the servlet container:

For IIS, open the file **servlethec.properties** file in Notepad. This file is located in C:\inetpub\Scripts. In this file, modify this line:

```
servlethec.<server>.aliases=/servlet,.jsp
```

to read:

```
servlethec.<server>.aliases=/servlet,.jsp,/output
```

where <server> is the name or IP address of the ArcIMS server that is running ServletExec AS.

Restart the web service and IIS Admin service. This allows the new mapping for the output to take effect. Any changes to any web application mapped with ServletExec will require the stopping and starting of these services.

1.3.1 Testing

After installing the redirector, test it by opening a browser and entering this URL:

```
http://<webserver>/servlet/com.esri.esrimap.Esrimap?Cmd=ConnectorPing
```

You should see a simple response with "Test successful". This confirms that ArcIMS is installed on the other server, and that requests are successfully being passed from Web server to the other server. If not, recheck the installation steps above, or see the ServletExec Installation Guide.

To test your servlet port through the firewall, while at the web server, open a dos window. At the prompt type telnet <arcims server ip address> 8888 and hit enter. If the test succeeds you will see a blank window. If it fails you will see a message indicating failure.

Likewise , to test your activex connector port through the firewall, while at the web server, open a dos window. At the prompt type telnet <arcims server ip address> 5300 and hit enter. If the test succeeds you will see a blank window. If it fails you will see a message indicating failure.

You can test the /output mapping by putting a file into the output directory on the ArcIMS server (perhaps by generating an ArcIMS map, or simply copying an image or text file), and then entering this URL into a browser ("sample.jpg" is the file in output in this example):

<http://<webserver>/output/sample.jpg>

You should see the image in the web browser on the web server.

1.3.2 Permissions Matrix

There are potentially many reasons this architecture could fail. Foremost among these are incorrect NTFS permissions on certain files and folders of the software used. This includes ArcIMS, ServleExec, Java Development Kit (JDK), and Internet Information Services (IIS). This permissions matrix indicates the minimum level of permissions required by the software. It is recommended that you reset the permissions on your entire system hard drive (typically c:) as indicated in Table 7 below, then assign the required permissions to the remaining folders as per Table 7. In addition to the NTFS permissions there are also IIS permissions to be set, and these are managed via the IIS management console. The ArcIMS virtual folder denoted as output, requires Read access. The virtual folder denoted as Scripts, requires Read access and Execute Permissions set to Scripts and Executables. As always, a comprehensive knowledge of NTFS and IIS permissions is helpful when establishing this architecture.

	System	Administrators	Authenticated Users	IUSR_<Machine>	IWAM_<Machine>
ArcIMS/Output	FULL	FULL		RW	
Entire Hard Drive	FULL	FULL			
Inetpup/wwwroot	FULL	FULL		R	
Program Files/Arcgis/ArcIMS/Connectors/Activex	FULL	FULL	RX		
Program Files/Java/j2re1.4.0	FULL	FULL	RX		
Program Files/New Atlanta/ServletExec AS	FULL	FULL	RXWD		
Temp (as defined for your system)	FULL	FULL	RWD		
Winnt	FULL	FULL	RW		
Winnt/system32	FULL	FULL	RX		RX
Winnt/system32/inetsrv	FULL	FULL	RX		
Wwwroot/scripts	FULL	FULL	RX		

¹ Servlet Engine on Separate Machine from Web Server, Bryan Baker, California Regional Office, ESRI, Inc. – May 2003