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**ArcGIS and Citrix – A Regional Solution**

**Abstract**

The United States Marine Corps has established two regional geospatial data centers in an effort to centralize GIS data storage and application hosting. Each of the two regional centers supports ten to twelve Marine Corps Installations and their tenant commands. Meeting application performance and GIS capability expectations is not easily achieved in a centralized environment. However, the Marine Corps model has proven successful where others have fallen short. Cornerstone components of this Enterprise GIS architecture include consolidated and pooled ESRI licenses, a centrally managed ArcSDE geodatabase, a common yet individualized browser-based map viewer via ArcGIS Server/Web ADF, and centralized hosting of the ArcGIS Desktop suite via Citrix Presentation Server (now called XenApp). Overcoming unique challenges with hosting ArcGIS Desktop in a Citrix environment, particularly within the Navy-Marine Corps network, resulted in valuable lessons learned and recommended configurations.

**Introduction**

A successful enterprise deployment of ArcMap and ArcCatalog through Citrix encompasses many areas such as – determining Citrix access method, storing user profile settings like ArcSDE connections and customized templates, managing Presentation Server with a Group Policy Object, configuring printer auto-creation in Citrix, issuing ESRI licenses, configuring redundant license servers, and cluster architecture for ArcSDE geodatabases.

**Citrix Access Method**

Citrix Web Client is required to access published applications (ArcMap and ArcCatalog) through Citrix Web Interface. User login credentials entered at the Citrix Web Interface are authenticated against Active Directory. The Citrix Web Interface forwards the user credentials to the Citrix XML Service of the predefined Presentation Servers which function as the Citrix Secure Ticket Authority. The Citrix XML Service enumerates the user's application list to the Citrix Web Interface. Once the user launches ArcMap or ArcCatalog their session is directed to the Citrix Secure Gateway. The Citrix Secure Gateway relays Independent Computing Architecture (ICA) traffic between the client and the Presentation Server. The traffic between the client and the Citrix Secure Gateway is on port 443 with 128-bit Secure Socket Layer (SSL).

The approach to use the Citrix Secure Gateway defends against blockage of TCP port 1494 (Citrix ICA) if a client is behind a firewall or proxy. Furthermore, Citrix Secure Gateway provides a secure encrypted channel for client-server communication without revealing

Presentation Servers to un-trusted networks or allowing clients to connect to Presentation Servers directly.

Periodically work is lost due to disconnected Citrix sessions. Causes include intermittent network failure or periodic network congestion. This issue is alleviated by a feature in Citrix Web Interface called workspace control. Workspace control allows reconnection of the disconnected ArcMap or ArcCatalog session within a fixed period of time. This is defined using Group Policy settings for Terminal Services.

#### **Group Policy Object: Time Limit for Disconnected Sessions**

Computer Configuration\Policies\Administrative Templates\Windows Components\Terminal Services\Sessions\Set time limit for disconnected sessions

### **Terminal Services / Citrix Profile**

A roaming profile is a centrally stored version of local files and settings used to sustain a user's configuration. It also provides the user with a consistent experience on any Presentation Server the user logs in to. System processes and applications such as AntiVirus software retain connections to user registry keys, thereby preventing roaming profiles (locally cached copies) from saving back to the central storage location for profiles. To increase the likelihood that users receive a consistent Citrix experience when utilizing ArcMap or ArcCatalog the User Profile Hive Cleanup Service is installed on all Presentation servers.

#### **Group Policy Object: Terminal Server Roaming Profile**

Computer Configuration\Policies\Administrative Templates\Windows Components\Terminal Services\Windows Components\Terminal Services\Set path for TS Roaming Profile

#### **Group Policy Object: Delete Roaming Profiles**

Computer Configuration\Policies\Administrative Templates\System\User Profiles>Delete cached copies of roaming profiles

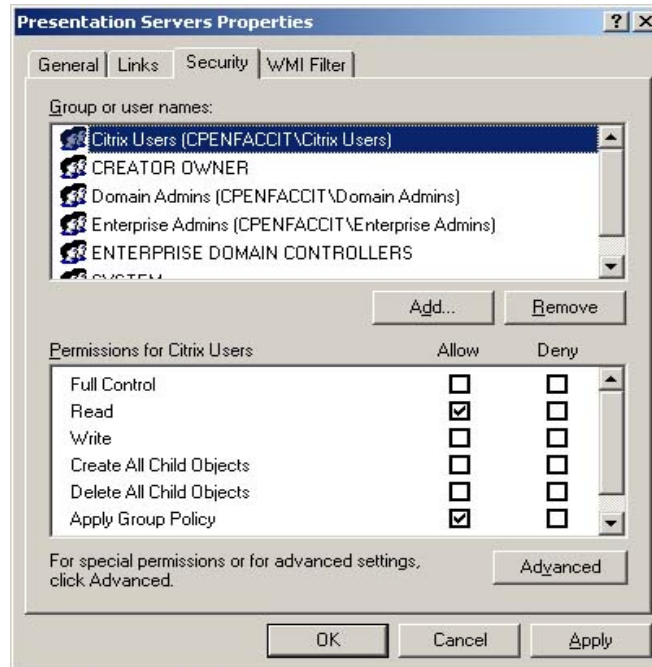
#### **User Profile Hive Cleanup Service**

<http://www.microsoft.com/downloads/details.aspx?FamilyID=1b286e6d-8912-4e18-b570-42470e2f3582&DisplayLang=en#Overview>up Service

### **Active Directory Container**

A separate Organizational Unit in Active Directory is created for Presentation Servers. A Group Policy is applied to the Organizational Unit that Presentation Server objects reside in. The Group Policy is used to define change and configuration management across all Presentation Servers. This approach allows the entire Citrix farm to be efficiently managed and kept in a consistent state during and after Group Policy Object modification. Organizational Unit permissions: Citrix User Group (Allow Read & Allow Apply Group Policy), and Domain Admins (Allow Full Control & Deny Apply Group Policy).

## Group Policy Object Permissions



### **Printing**

To ensure ArcMap and ArcCatalog print to the printer or plotter intended, uncheck “Start this application without waiting for printers to be created” under client options in Citrix published application properties. Auto-creating printers before a map document is loaded can increase the logon wait time. The degree of logon wait time is directly proportional to the number of local and network printers a client is connected to. ArcGIS Desktop possesses a bug that intermittently alters the selected printer settings back to the default printer when page settings of the default printer are saved with the map document. If a map document is loaded before printers are auto-created within a Citrix session, there is a chance that the print job will be sent to the default printer regardless of which printer is selected.

#### **ESRI: ArcMap returns settings to the default printer**

<http://support.esri.com/index.cfm?fa=knowledgebase.techarticles.articleShow&d=25294>

## Licensing

The license level of ArcGIS Desktop on all Presentation Servers is set to ArcInfo. ArcGIS Desktop license levels for ArcEditor and ArcView is established a during batch file execution. Three variants of ArcMap and ArcCatalog, each representing a different license level, are seamlessly published in Citrix for each Marine Corps Installation. ArcMap and ArcCatalog's application executable file path point to batch files that alter the environment variable to the license level of either ArcEditor or ArcView. This technique avoids issuing licenses on a first come, first served basis, but rather on a user's access level based on user group membership.

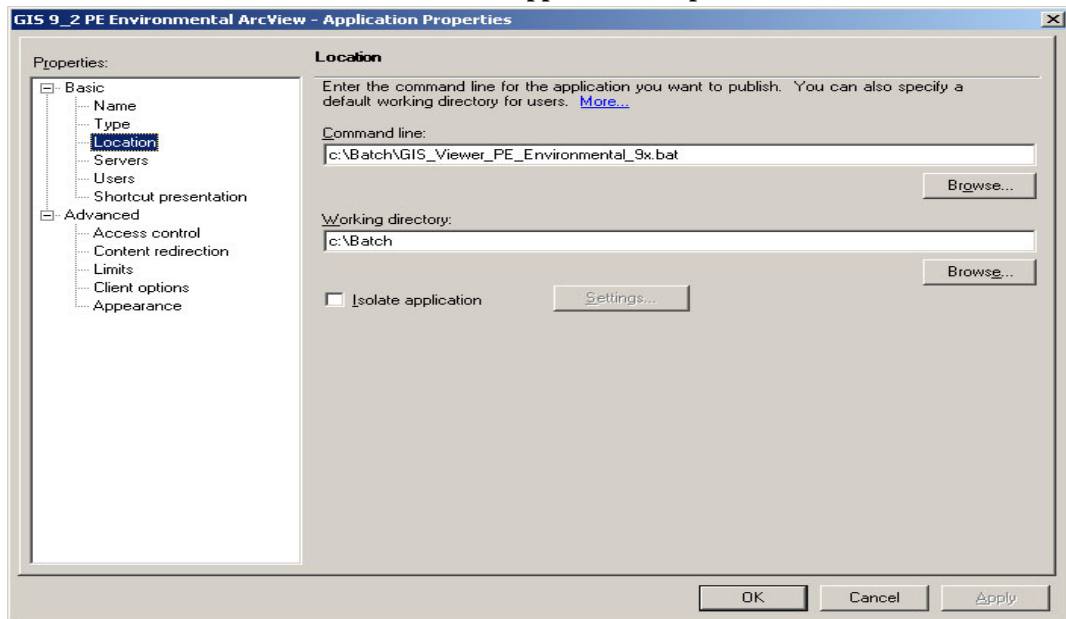
Highly available solutions for license servers exist to ensure that ArcGIS Desktop, Citrix Presentation Server, and Terminal Server are not disrupted in case of license server failure: (1) ArcGIS Desktop - a system variable is created on all Presentation Servers that point to two different, but identical ESRI license servers, (2) Citrix License Manager - installed in a fully-functional Microsoft active/passive cluster environment, (3) Terminal Server – Group Policy Object is used to set the preferred Terminal Server license server of the two Terminal Licensing Servers.

### **ArcView and ArcGIS License Level Batch Files**

```
set ESRI_SOFTWARE_CLASS=Viewer  
Start/B"C:\Progra~1\ArcGIS\Bin\ArcMap.exe" \\IP_Address\CitrixMXD$\GIS_92_Default_PE_Environmental_ID04.mxd  
exit
```

```
set ESRI_SOFTWARE_CLASS=Editor  
Start/B"C:\Progra~1\ArcGIS\Bin\ArcMap.exe" \\IP_Address\CitrixMXD$\GIS_92_Default_PE_Environmental_ID04.mxd  
Exit
```

### **Citrix Published Application Properties**



## Presentation Server System Variable: GIS License Servers

Variable name: ARCGIS\_LICENSE\_FILE

Variable Value: @IP\_ADDRESS;@IP\_ADDRESS

## Citrix License Manager Cluster

<http://support.citrix.com/servlet/KbServlet/download/11525-102-15520/Clustering.pdf>

## Group Policy Object: Preferred Terminal Service License Server

Computer Configuration\Policies\Administrative Templates\Windows Components\Terminal Services\Use the specified Terminal Server license servers

## ArcGIS License Level: ArcInfo, ArcEditor, & ArcView

The screenshot displays the Citrix Access Management Console interface. On the left, a tree view lists various applications, with 'GIS 9\_2 PE Environmental ArcView' selected. The main pane shows the application's details:

- GIS 9\_2 PE Environmental ArcView** (CITRIX logo)
- Information** (checked):
  - Name: GIS 9\_2 PE Environmental ArcView
  - Type: Installed Application
  - Status: Enabled
  - User Connection Type: Explicit
- Related Management Console Tools**:
  - The following additional administrator tools are available:
    - [Presentation Server Console](#)
  - To learn more about which tool to use for administrative tasks, refer to your product documentation.
- Available Displays**:
  - [Alerts](#): View all alerts related to this item.
  - [Servers](#): List the servers on which this application is published.
  - [Configured Users](#): List users granted access to the application.
  - [Connected Users](#): List users accessing the application.
  - [Read-only Properties](#): View properties (read-only).

## Microsoft SQL Server 2005 and Spatial Data Engine (SDE) Cluster Architecture

The original cluster architecture consisted of one cluster in active/active mode with four Microsoft SQL 2005 Server servers, ArcSDE configured as a clustered resource, and a SQL and ArcSDE instance for each Marine Corps Installation. This architecture proved invaluable from a high availability prospective because active instances of SQL and ArcSDE were present across four servers and each instance received three possible failover servers. For example, Camp Pendleton had an active instance of SQL and ArcSDE on server “A” and passive instances on servers “B”, “C”, and “D”. Yuma had an active instance of SQL and ArcSDE on server “B” and passive instances on servers “A”, “C”, and “D”. If servers “A” and “B” failed then Camp Pendleton and Yuma’s SQL and ArcSDE instance on server “C” would change from passive to active. The main drawback to this architecture was the 26 drive letter limit because of the number of clustered SQL instances. This limitation could have been overcome by using symbolic links and/or mount points, but for the sake of keeping complexity to a manageable level, a new cluster architecture was created.

The current cluster architecture consists of two different clusters, both in active/active mode, with two Microsoft SQL 2005 Server servers in both clusters, ArcSDE configured as a clustered resource, and a SQL and ArcSDE instance for each Marine Corps Installation. Marine Corps Installations are halved; with one half assigned to cluster 1 and the other half assigned to cluster 2. The tradeoff of this architecture is that the drive letter limit increased from 26 to 52 (2 clusters x 26 letters per cluster), less complexity, and a considerable decrease in system management.

### ArcSDE and Microsoft Cluster Server

<http://www.esri.com/systemsint/kbase/docs/arcde-sqlserver.pdf>

### Citrix Logical Diagram

