

Citrix Solved

Hosting ArcGIS applications

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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 10–12 Marine Corps installations and their tenant commands. Overcoming the unique challenges of hosting ArcGIS Desktop in a Citrix environment—particularly within the Navy-Marine Corps network—provided valuable lessons and developed recommended configurations.

A successful enterprise deployment of the ArcGIS Desktop applications ArcMap and ArcCatalog through Citrix must address several issues:

- Determining the Citrix access method
- Storing user profile settings (such as ArcSDE connections and customized templates)
- Managing Presentation server with a Group Policy Object
- Configuring printer autocreation in Citrix
- Issuing ESRI licenses
- Developing cluster architecture for ArcSDE geodatabases

Determining the Citrix Access Method

The Citrix Web client is required to access published applications (e.g., ArcMap and ArcCatalog) through the Citrix Web interface. User login credentials entered at the Citrix Web interface are authenticated against the Active Directory. The Citrix Web interface

forwards the user credentials to the Citrix XML Service for 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. When a user launches ArcMap or ArcCatalog, that session is directed to the Citrix Secure Gateway, which relays Independent Computing Architecture (ICA) traffic between the client and the Presentation server. This traffic is on port 443 with 128-bit Secure Sockets Layer (SSL) encryption.

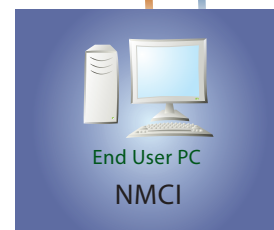
Using Citrix Secure Gateway defends against blockage of TCP port 1494 if a client is behind a firewall or proxy as well as provides a secure, encrypted channel for client-server communication without revealing Presentation servers to networks that are not trusted or allowing clients to access Presentation servers directly.

Managing Citrix Sessions

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

A roaming profile is a centrally stored

version of local files and settings used to sustain a user's configuration. It provides the user with a consistent experience when logged into any Presentation server. System processes and applications, such as antivirus software, retain connections to user registration keys. This prevents roaming profiles, which are locally cached copies, from saving to the central storage location for profiles. To ensure that users have a consistent Citrix experience



Time limit for disconnected sessions

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

Terminal server roaming profile

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

Delete roaming profiles

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

Figure 1: Group Policy Objects used for managing Citrix sessions

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when using either ArcMap or ArcCatalog, the User Profile Hive Cleanup Service [a Microsoft service that checks for leaked connections to the registry and cleans them up] is installed on all Presentation servers.

A separate Organizational Unit (OU) in the Active Directory is created for Presentation servers. [OUs are Active Directory containers that hold users, groups, computers, and other organizational units and are the smallest

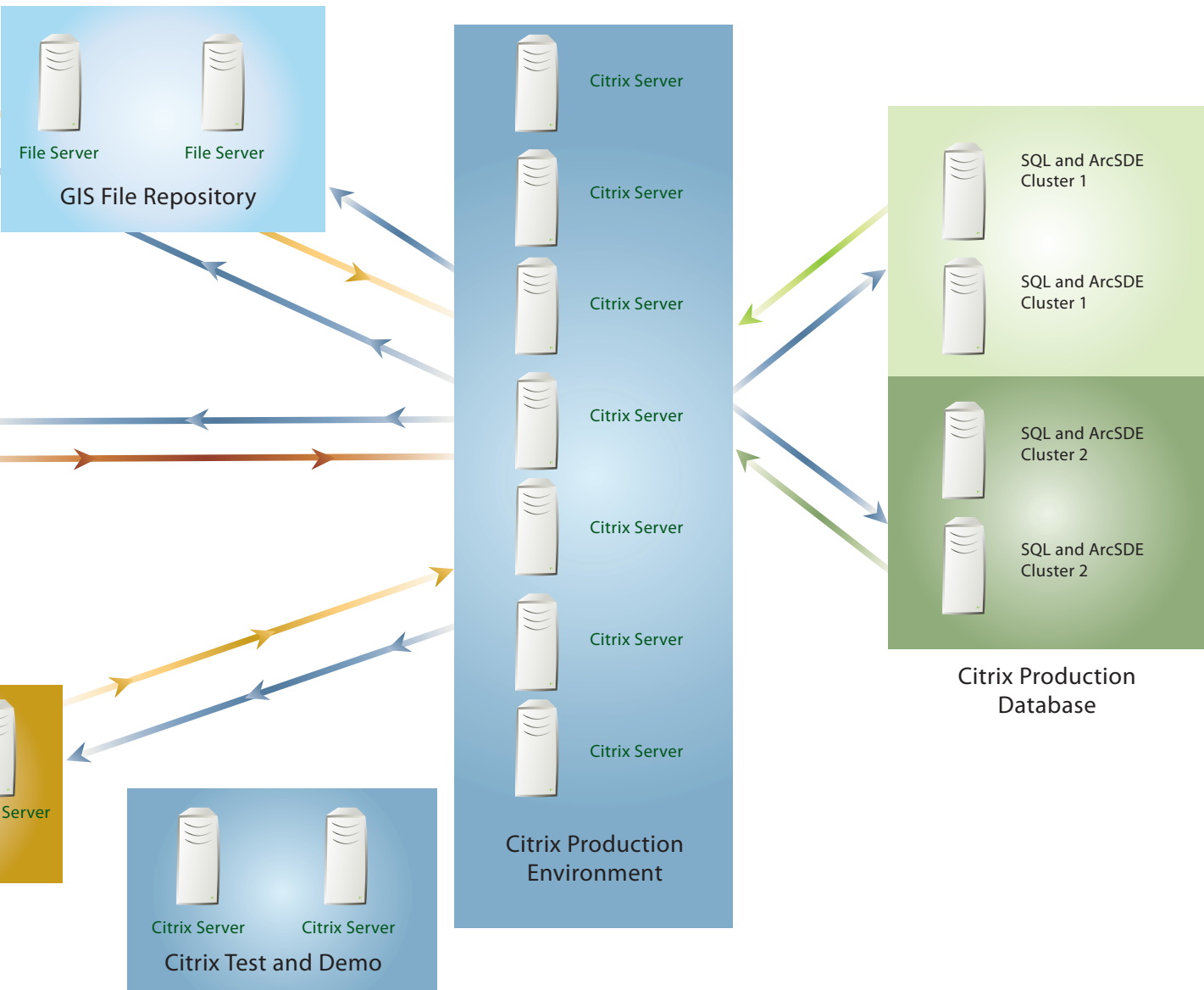
unit for which Group Policy settings can be assigned.] A Group Policy is applied to the OU where the Presentation server resides. The Group Policy defines change and configuration management across all Presentation servers. This approach allows the entire Citrix farm to be efficiently managed and kept in a consistent state during and after Group Policy Object modification. OU permissions for the Citrix User Group are Allow Read and Allow Apply

Group Policy and for Domain Admins are Allow Full Control and Deny Apply Group Policy.

Controlling Printing

To ensure that print jobs from ArcMap and ArcCatalog are sent to the intended printer, the box next to Start this application without waiting for printers to be created is unchecked

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under Client options in Citrix-published application properties. Autocreating printers before a map document is loaded can increase logon wait time. The length of time is directly proportional to the number of local and network printers that the client is connected to. A bug in ArcGIS Desktop can intermittently revert printer settings to the default printer when page settings for the default printer are saved with a map document. If a map document is loaded before printers are autocreated for a Citrix session, the print job may be sent to the default printer regardless of which printer is selected. [See the Resources section in the online version of this article at www.esri.com/arcuser for links to related information.]

Working with Licensing

The ArcGIS Desktop license level is set to ArcInfo for all Presentation servers. ArcGIS Desktop license levels for ArcEditor and ArcView are established by executing a batch file. Three variants of ArcMap and ArcCatalog, each representing a different license level, are seamlessly published in Citrix for each Marine Corps installation. The file path of the executable for both ArcMap and ArcCatalog points to batch files that alter the environment variable to either the ArcEditor or ArcView license level. This technique avoids issuing licenses on a first-come, first-served basis. Instead, it provides user access based on user group membership.

Meeting application performance and GIS capability expectations is not easily achieved in a centralized environment. However, the Marine Corps model has proved successful where others have fallen short.

Highly available solutions for license servers exist to ensure that ArcGIS Desktop, Citrix Presentation server, and Terminal server are not disrupted if a license server fails. For ArcGIS Desktop, a system variable is created on all Presentation servers that points to two different—but identical—ESRI license servers. The Citrix License Manager is installed in a fully functional Microsoft active/passive cluster environment. For the Terminal server, the Group Policy Object is used to set a preference for one of the two Terminal Licensing Servers.

For ArcView

```
Set ESRI_Software_Class=Viewer
Start/B"C:\Progra~1\ArcGIS\Bin\ArcMap.exe"\IP_Address\CitrixMSD$GIS_92_Default_PE-Environmental_ID04.mxd
Exit
```

For ArcEditor

```
Set ESRI_Software_Class=Editor
Start/B"C:\Progra~1\ArcGIS\Bin\ArcMap.exe"\IP_Address\CitrixMSD$GIS_92_Default_PE-Environmental_ID04.mxd
Exit
```

Figure 2: Examples of batch files for setting license levels.

Microsoft SQL Server and ArcSDE Cluster Architecture

The original cluster architecture consisted of one cluster in active/active mode with four Microsoft SQL Server servers, ArcSDE configured as a clustered resource, and a SQL and ArcSDE instance for each Marine Corps installation. From the perspective of providing high availability, this architecture proved invaluable 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. The Marine Corps Yuma, Arizona, installation 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 at Camp Pendleton, the SQL and ArcSDE instances on Yuma's C server would change from passive to active. Because of the number of clustered SQL instances, the main drawback of this architecture was Windows' limitation of 26 drive letters.

The current cluster architecture consists of two different clusters, both in active/active mode, with two Microsoft SQL Server 2005 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. With this architecture, the trade-off is that the drive letter limit is increased from 26 to 52 (two clusters with 26 letters each), with less complexity and a considerable decrease in system management.

Conclusion

Meeting application performance and GIS capability expectations is not easily achieved

in a centralized environment. However, the Marine Corps model has proved 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). For more information, contact Wendell Hoskins at whoskins@taic.net.

About the Authors

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