



ArcGIS Server on Linux and Unix – Architecture and Deployment Recommendations

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Our Assumptions

- **Familiarity with ArcGIS Server**
- **Familiarity with Solaris and Linux**

Agenda

I. Components Overview and Architecture

II. Pre-Install requirements

III. Installation Overview

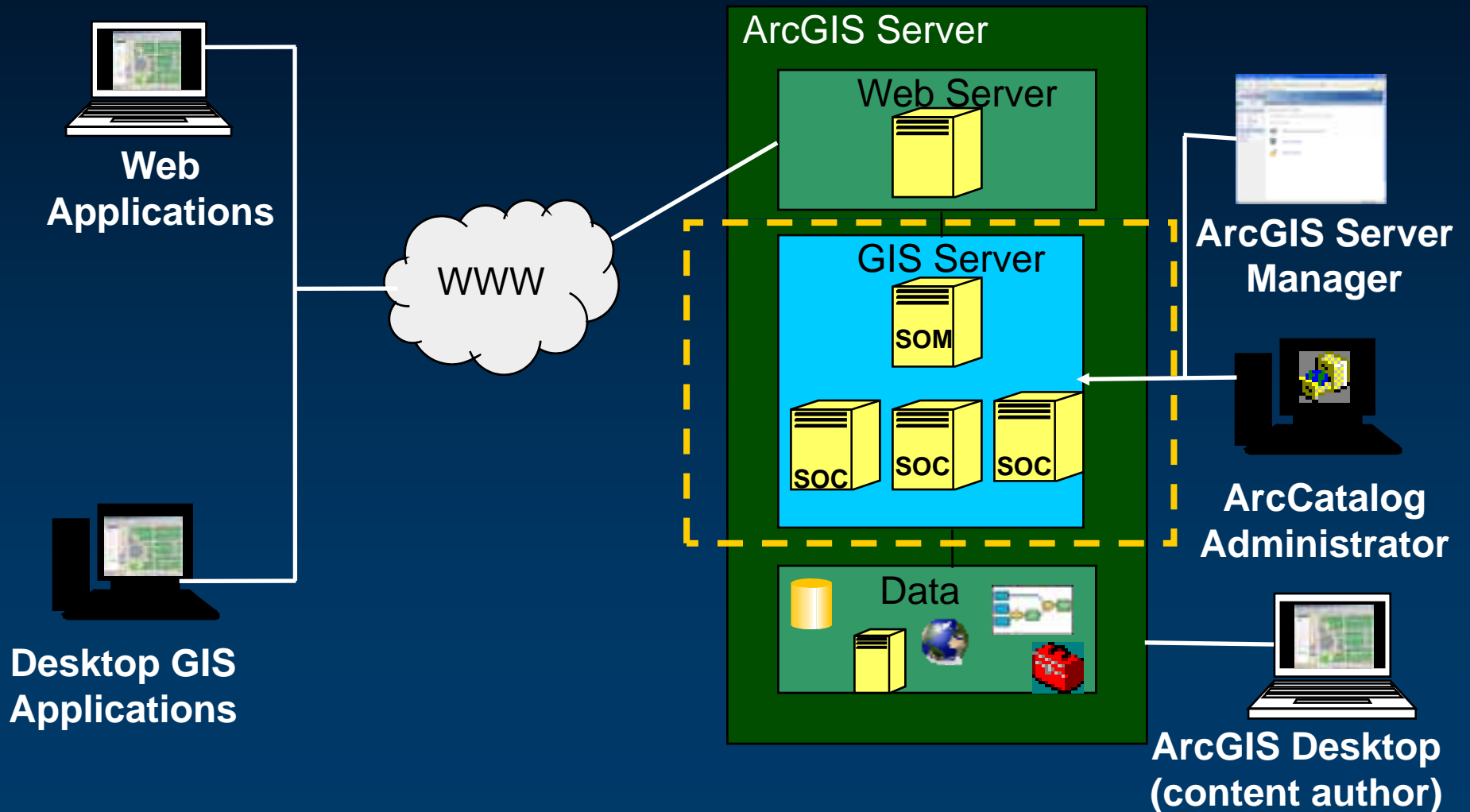
IV. Administration and Usage

- Server Management
- Troubleshooting

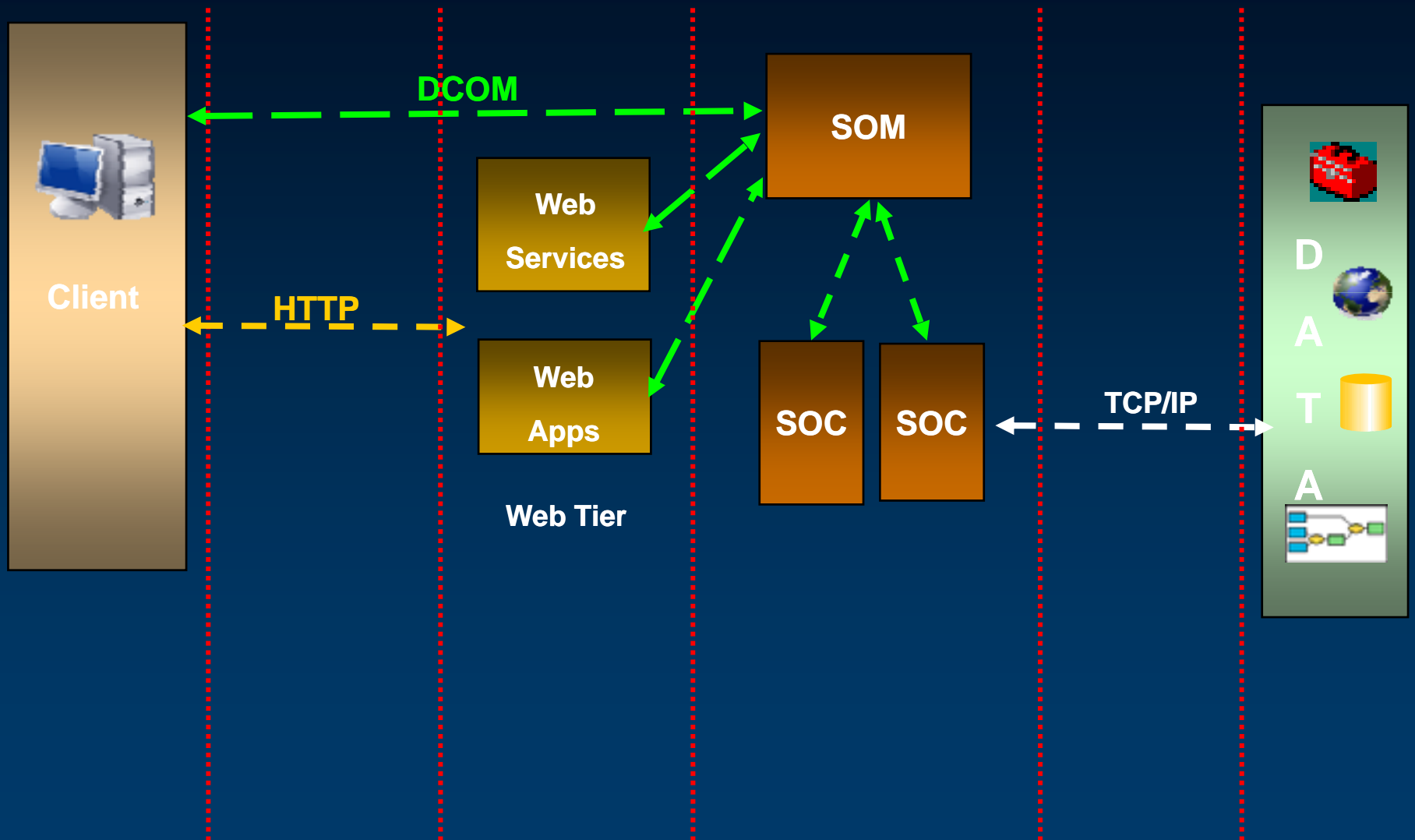
V. Configuration Scenarios

- High Availability
- Scalability
- Performance
- Security

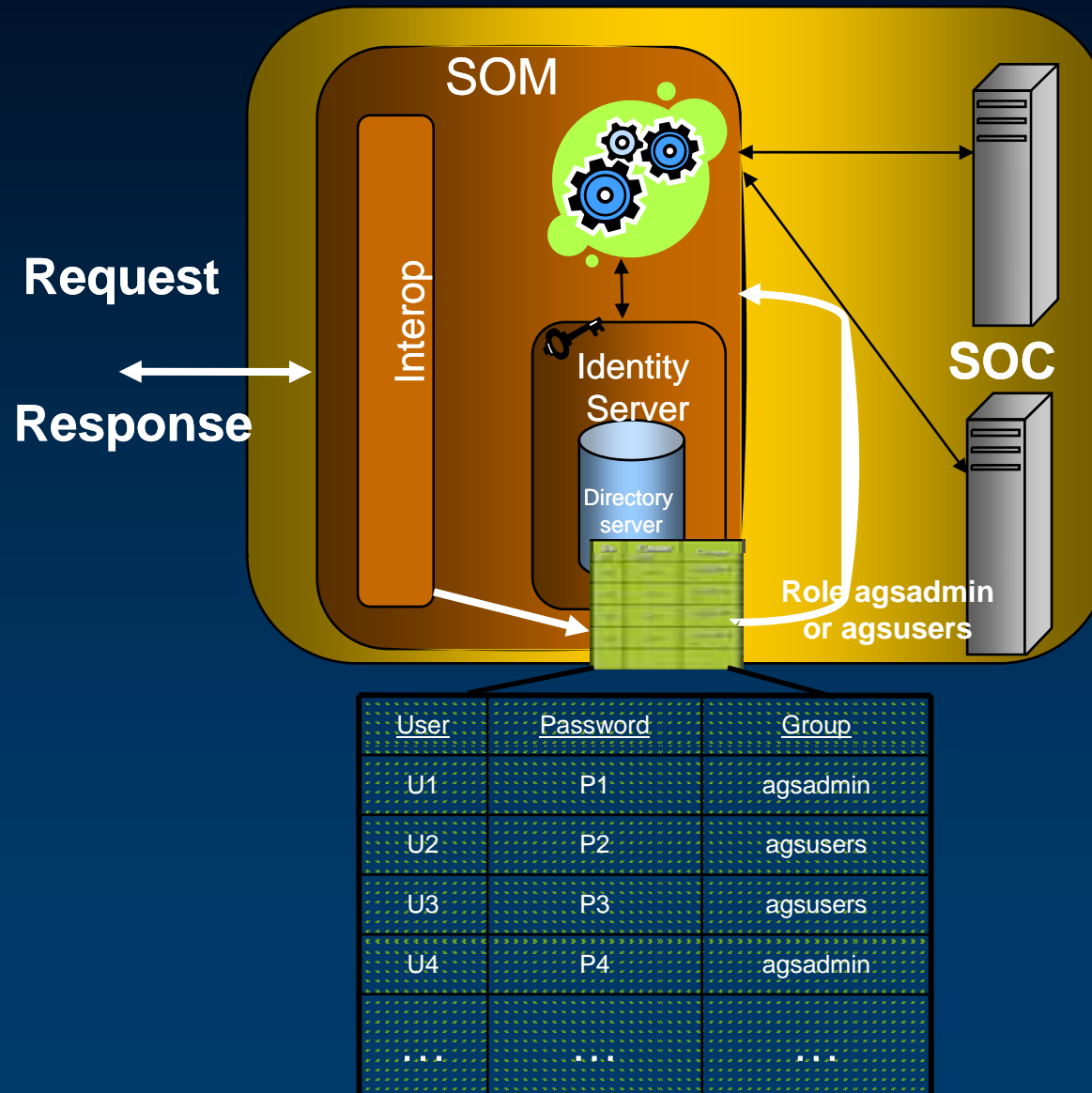
I. ArcGIS Server Components Overview



ArcGIS Server - Communications



Server Object Manager (SOM) Architecture



Agenda

- **Components Overview and Architecture**
- **Pre-Install Requirements**
- **Installation Overview**
- **Administration and Usage**
 - **Server Management**
 - **Troubleshooting**
- I. Configuration Scenarios**
 - **High Availability**
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II. Pre-Install Requirements

- **Ensure clean uninstall of previous versions including any zombie processes**
 - Refer Knowledge Base Article ID 32183
- **Install will check that**
 - **/etc/hosts contains valid entry for server IP**

```
127.0.0.1    localhost
192.168.0.1  machinename machine.example.com
```

- **Supported version of Open GL**
- **Ports 135, 2099, 3774, 8099, 8399 and 62000 are free**
- **No other multi-user ArcGIS Installation exists on the machine**
- **No other ArcGIS Installation exists in the same account**

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- **Pre-Install Requirements**
- **Installation Overview**
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- I. **Configuration Scenarios**
 - **High Availability**
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III. Installation Overview

- Simple single workflow for installation in 9.2
- Installation checks for pre-requisites
- Required OS user accounts are added by the install
- No post-installation
- Login as user *admin* at the end of install

Recommendations:

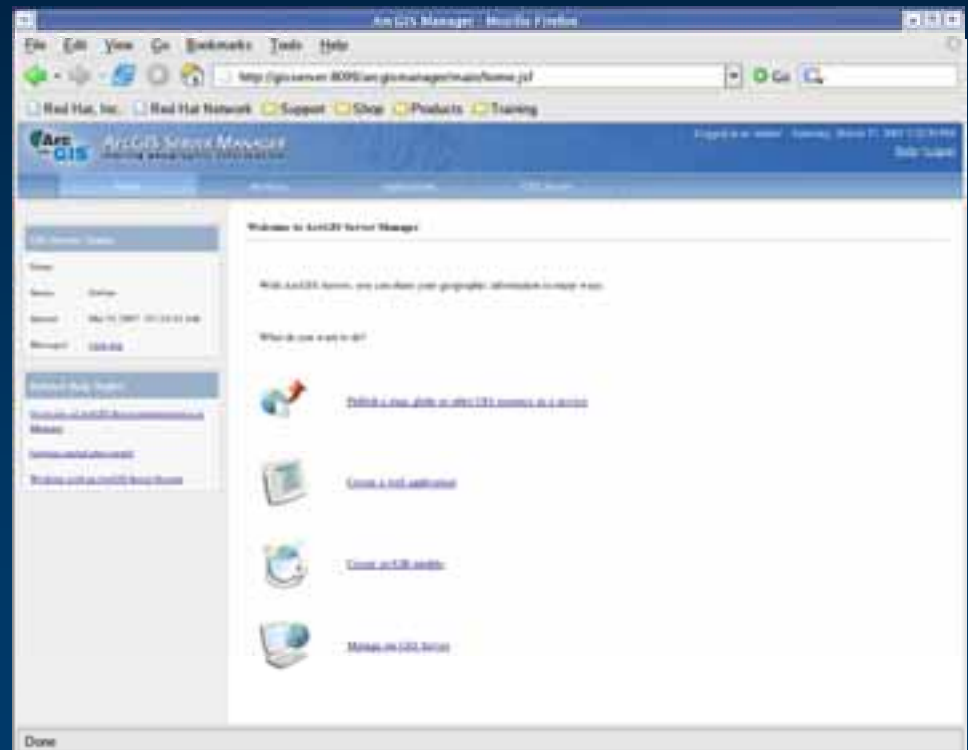
- Create ArcGIS Server owner account prior to installation
- Do not use *agsadmin* or *agsuser* as owner account
- Ensure sufficient space in temp directory (~1 GB)
- When using Red Hat 4 systems for remote install use “*ssh -X*”

Agenda

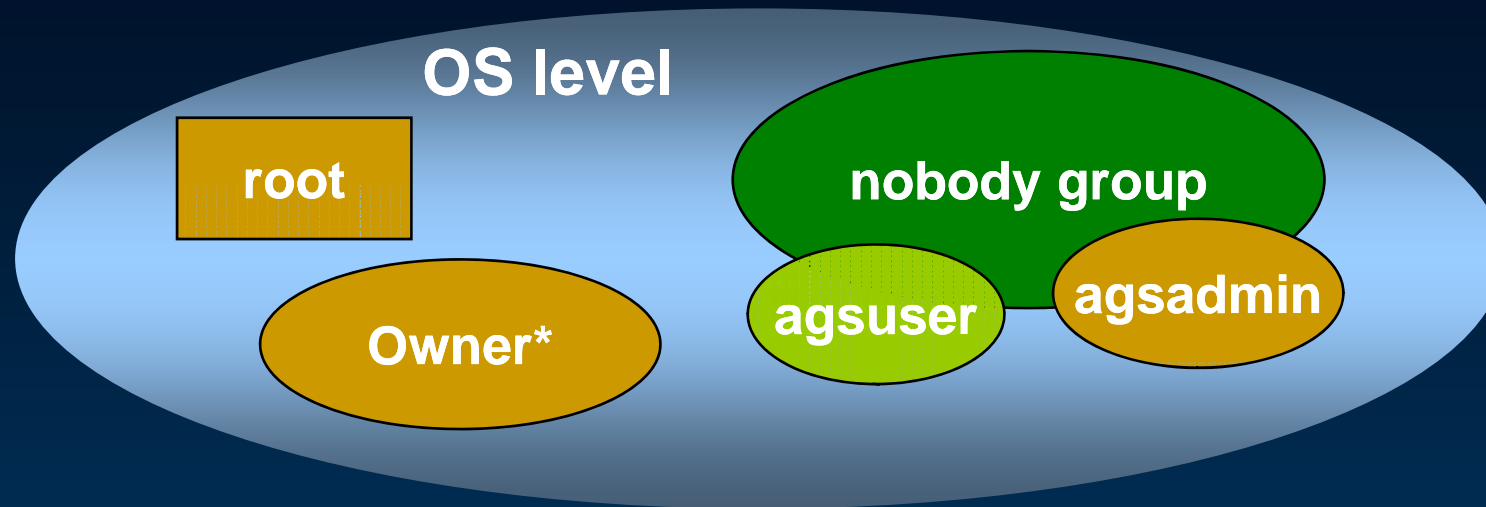
- **Components Overview and Architecture**
- **Pre-Install Requirements**
- **Installation Overview**
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IV. Administration and Usage: Server Management

- User Management
- Managing Host (SOC) Machines
- Server Directories
- Configuring Services
- Web Applications
- Data
- Command Line Manager



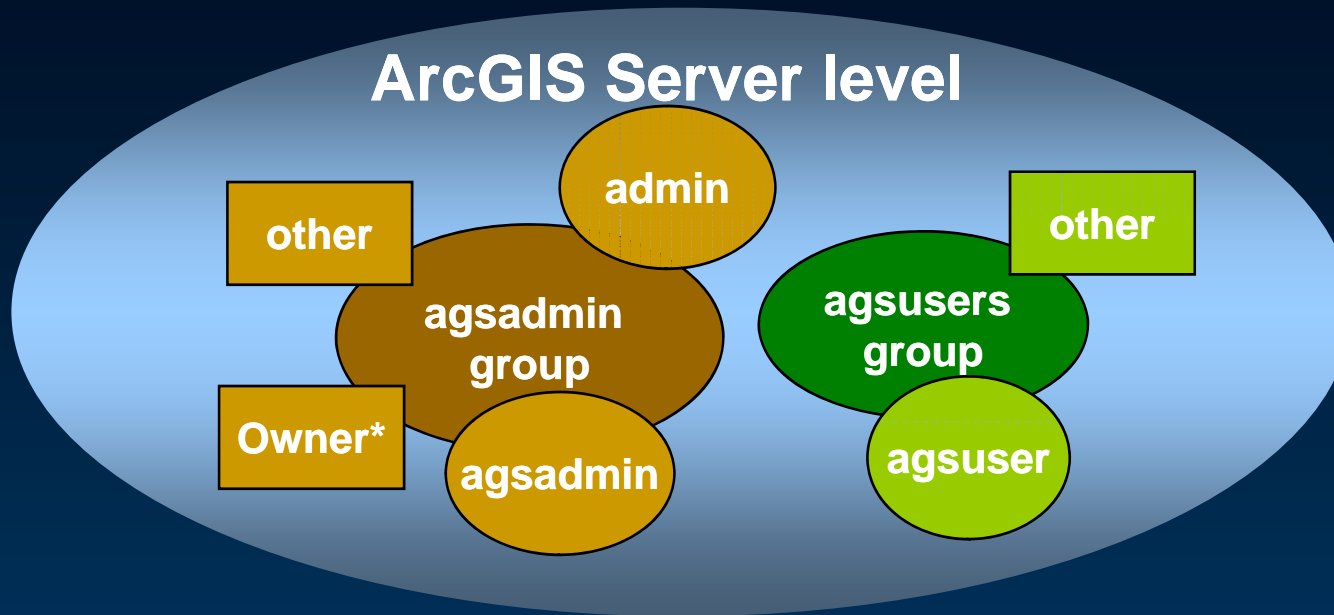
Server Management – User Management (Cont..)



- **Do not delete *agsuser* and *agsadmin* OS user accounts**
- ***agsuser* and *agsadmin* OS accounts created in */arcgis/.home***
- **Owner account, if created by the setup, resides under */arcgis/servercore/.Server/<username>***

* “Owner” stands for the account owning the ArcGIS Server

Server Management – User Management

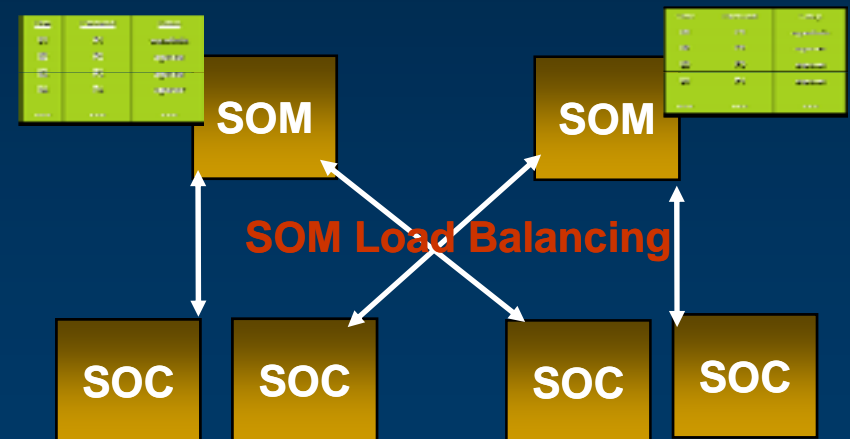
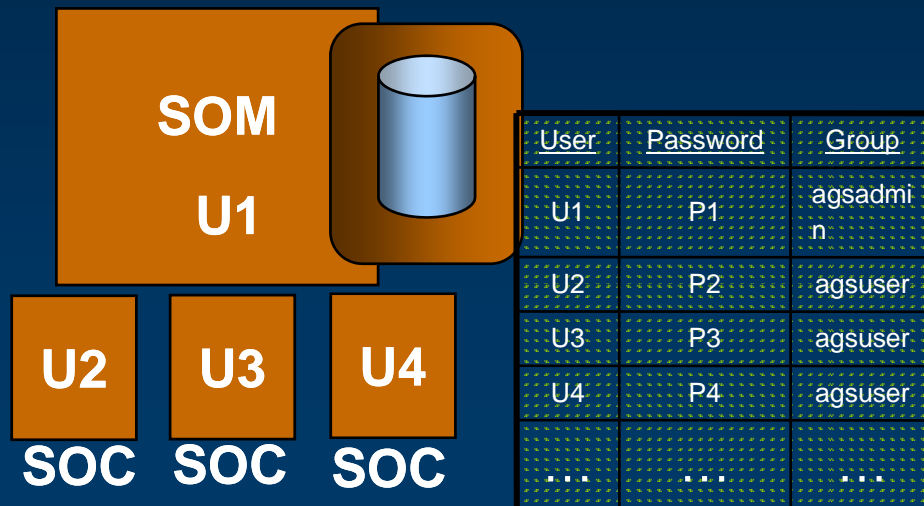


- All users except *agsuser* and *agsadmin* are virtual users
- Only members of *agsadmin* group can log into Manager
- *admin*, *agsuser* and *agsadmin* cannot be deleted

* “Owner” stands for the account owning the ArcGIS Server

Server Management – User Management (Cont..)

- Every SOM's identity server should contain the owner of SOM as well as the owner of all SOC machines that are added to it.
- In a multiple SOM scenario all users should be replicated on all SOM servers



Server Management – User Management (Cont..)

- **Super user account does not need to exist in this database**

Recommendation:

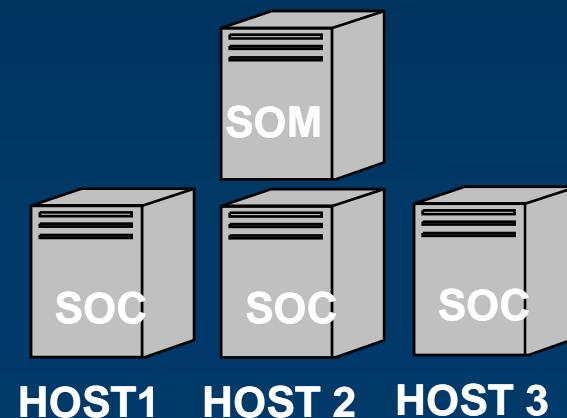
- **ONLY make a user a member of the *agsadmin* group when absolutely necessary**

Server Management - Hosts

- Local machine added to HOSTS by default
- Add SOM/SOC owners to the user list before adding remote HOSTS
- SOC machine dropped from HOSTS if it is down when SOM is restarted
- All SOC machines should have the same license level

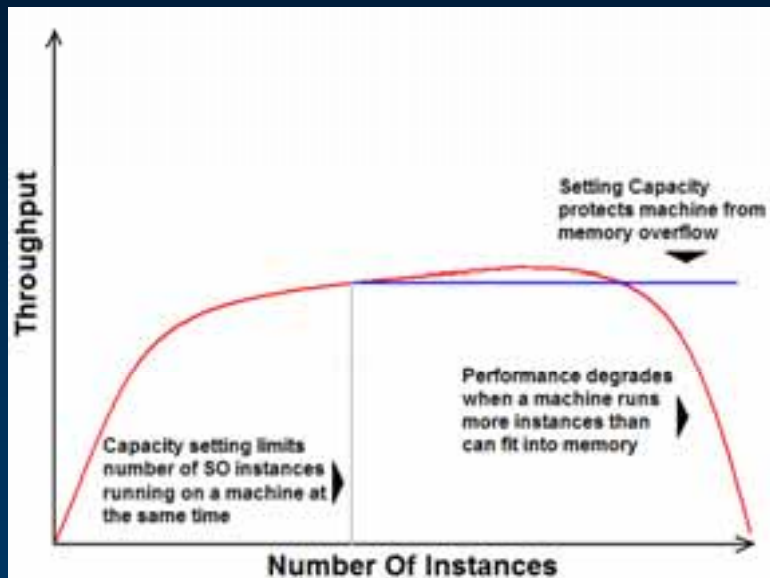
Recommendation:

- Use fully qualified name or IP address for remote HOST



Server Management – Hosts (Cont..)

- Adjust the host capacity to effectively manage server load



The screenshot shows the 'Add Server Object Container Machine' dialog box. It contains the following fields and values:
Server Machine Name: machine2.example.com
Description: GIS Server 2
Capacity: 10
(Enter -1 for Unlimited)
Buttons: Save, Save and Add Another, Cancel

Recommendation:
Recommended capacity is 2 to 4 instances per CPU

Server Management - Server Directories

| Directory Type | SOM Access(r/w) | SOC Access(r/w) | Share Directory | Create Virtual Directory | Add to Server Directory List |
|----------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Server Cache | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Server Jobs | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Server Output | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Server Log | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | Set as Log directory in Manager |
| Data | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |

Server Directories (Cont...)

- Map *Cache* directories are referenced by Service names
- Each Geodata service must use a separate *output* folder

Recommendation:

- **Avoid using filesystems mounted through automount unless necessary**

Server Management – Configuring Services

- **ArcGIS Server can host Map, Globe, Geodata or locator services.**
- **Know the available capabilities for a resource**
 - Eg: Mapping, Query, Geodata access for Map Documents
- **Expose only the required capabilities**
- **Service configuration files (/arcgis/server/user/cfg/) can be edited to fine tune additional parameters**
 - Eg: MaxImageWidth, MaxImageHeight, MaxBufferCount, MaxRecordCount

Configuring Services (Cont..)

| Service | Minimum Instances | Maximum Instances |
|--------------|-------------------|-------------------|
| Service 1 | 2 | 4 |
| Service 2 | 0 | 6 |
| Service 3 | 6 | 10 |
| Total | 8 | 20 |

Example: Pooled, High-Isolation service

A. Single machine Configuration: 20 instances

B. Multiple machine (N): 20 instances distributed across N machines

Server Management – Web Applications

- **Using Internal Web Server not recommended for production environments**
- **Configuring SOM Failover or Round Robin**
 - For local ArcGIS Server connections only
 - Custom setting in faces-config.xml
- **ESRI or Custom Fonts should reside in the system fonts folder**
 - Knowledge Base Article ID 31953

Note: Read ArcGIS Server Help topic “Deploying the application to a production environment”

Server Management – Data

- **Always use lower case directory names for data paths**
- **Do not use special characters or spaces in file/directory names**
- **Ensure data is accessible from all SOC machines**

❖ Note: Use File Geodatabase as an alternative to Personal Geodatabase on Solaris and Linux

Server Management – Data (Cont..)

- Author map documents using “Unix Ready” data
- When possible, choose relative path to data
- Use “Set Data Source” to update absolute data paths in MXD/PMF

Useful ArcGIS Help topics (<http://webhelp.esri.com/arcgisdesktop/9.2>)

- Creating Interactive maps
- Thinking about maps in web-enabled GIS applications
- An overview of authoring and publishing services

Server Management – Data (Cont..)

- **Globe services**

- 3D Vector data (non-rasterized) and elevation data should be fully cached before serving

- **Geoprocessing Services**

- Ensure data referenced by the toolbox is relative to the toolbox
- Set the “relative paths” option of the toolbox to true

Server Management - Command Line Manager

- Useful when using a headless environment
- Invoked via command

```
java -jar arcgis/java/manager/cli/arcgis_climanager.jar
```

- Supports Manager operations for
 - Services
 - Server Directories
 - Host Machines
- Scripting support for Python and JavaScript

```
ArcGIS>executescriptfile listconfigs.py
```

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V. Troubleshooting

- **Installation log files**

- **System requirements check**

- `/$ROOTHOME/ArcGIS_MWSSysReq.log`

- **Actions performed during install**

- `/$ROOTHOME/ArcGISServer_InstallLog.log`

- **List of installed features**

- `/$ROOTHOME/ArcGISServer_InstalledFeatures.log`

- **Server configuration log**

- `/arcgis/servercore/.Server/configuration.log`

Note: \$ROOTHOME refers to the home directory of *root* account

Troubleshooting (Cont..)

- **Runtime Logs**

- **Server startup and shutdown log**

- `/arcgis/servercore/.Server/AGSServer.log`

- **Authentication log**

- `/arcgis/servercore/agsidsvr/bin/RemoteSA.log`

- **Manager output and error logs**

- `/arcgis/java/manager/service/logs/manager_stdout.txt` or
`manager_stderr.txt`

- **ArcGIS Server usage logs (viewable through Manager)**

- `/arcgis/server/user/log`

- **Diagnostic tool**

```
> /arcgis/scripts/Server_diag_tool
```

Troubleshooting (Cont..) – List of Processes

- **Server Object Manager and Server Object Container**
 - arcsom.exe
 - arcsoc.exe
- **Internal Webservers**
 - 2 Tomcat processes
- **Virtual X Server**
 - Xvfb or Xsun
- **Sun Java System Directory Server**
 - ns-slapd
- **Identity server**
 - remotesa
- **Enterprise Core Services (Interop)**
 - Watchdog, mwrpcss and regss

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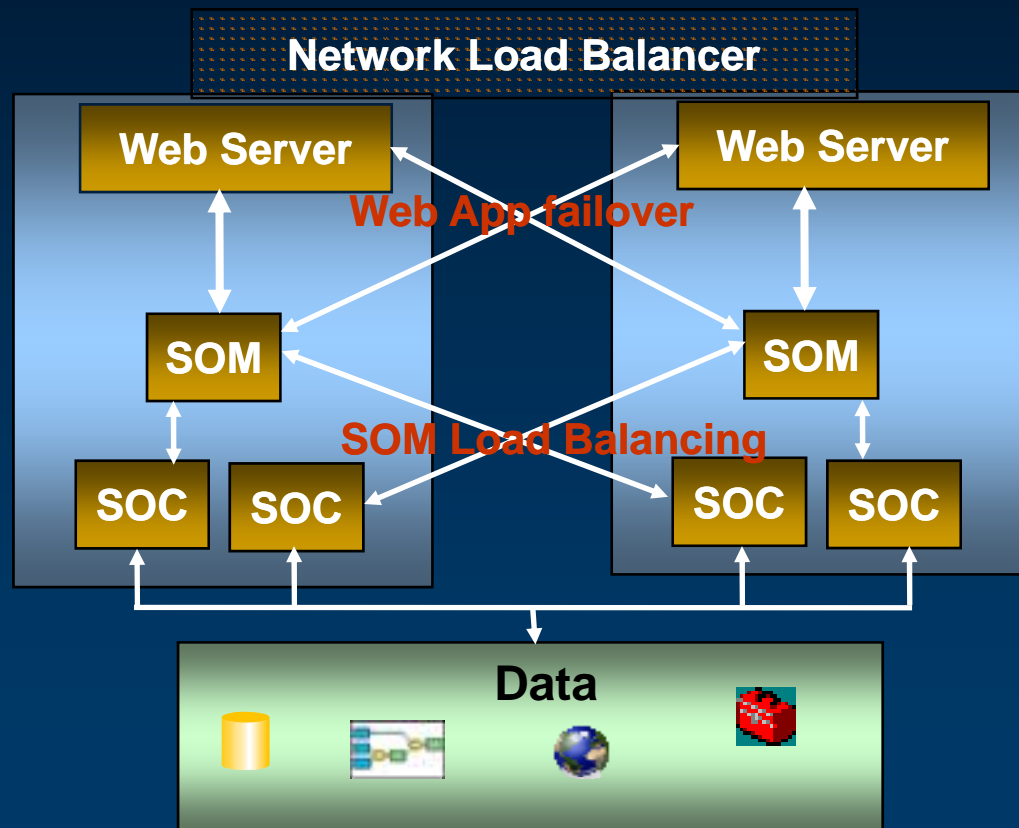
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V. Configuration Scenarios – High Availability

- Redundancy for all components (Webserver, SOM, SOC, Data)



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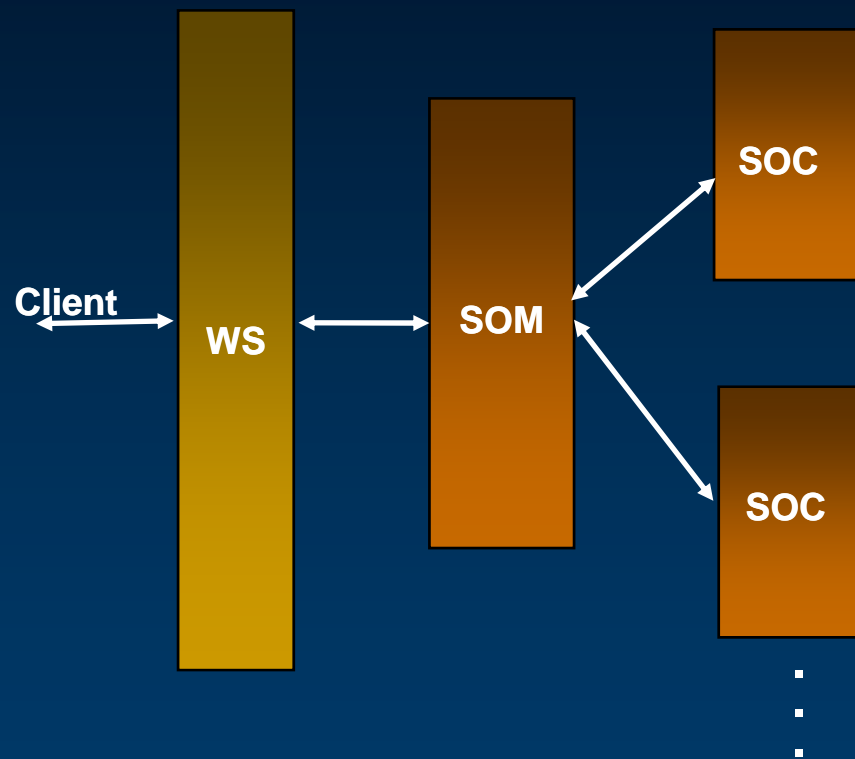
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Configuration Scenarios – Scalability

- Adding more computing power



The screenshot shows the 'Add Server Object Container Machine' dialog box in the ArcGIS Manager Information interface. The dialog has a title bar with 'MANAGER Information' and tabs for 'Services', 'Applications', and 'GIS Server'. The main content area contains the following fields:

- Server Machine Name:
- Description:
- Capacity: (Enter -1 for Unlimited)

At the bottom of the dialog, there are three buttons: 'Save', 'Save and Add Another', and 'Cancel'.

Remember to add all SOM and SOC owners to users list

- Knowledge Base Article ID 32166

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Configuration Scenarios – Performance

- **Possible performance bottlenecks**

- Web Server (Transmission time)
- SOM (Wait time)
- SOC (Usage time)
- Data (Search and retrieval time)

- **Other bottlenecks**

- Pooling model
- CPU
 - Dynamic Services
 - Static Services
- Memory
- I/O
- Network

Performance – Pooling

- To ensure service availability, use pooled instances
- Maximum throughput occurs between 2 to 4 instances per CPU

ArcGIS SERVER MANAGER
sharing geographic information

Logged in as 'admin'

Add New Service

Pooling

This service should be

Pooled - Used repeatedly by many clients.

Not Pooled - Used by a single client and disposed of after use.

Minimum number of instances

Maximum number of instances

Timeouts

The maximum time a client can use a service second(s)

The maximum time a client will wait to get a service second(s)

< Previous Next > Cancel

Performance – CPU

- **Dynamic services**

- Show relevant information
- Apply scale dependencies
- Additional tips available at

http://webhelp.esri.com/arcgisserver/9.2/java/manager/publishing/map_service.htm

- **Static services**

- Use cached data
- Command line cache generation available

```
➤ /arcgis/java/tools/generateMapCache
```

Additional tips available at

http://webhelp.esri.com/arcgisserver/9.2/java/manager/publishing/tips_map_caches.htm

Performance (Cont..)

- **Reducing Memory bottleneck**

- Additional memory

- Configure “Capacity” for each host machine

- Beyond this limit, least recently used instances get replaced

- **I/O bottleneck**

- Using RAID 3 or 4 for optimized storage and protection of data

- Avoid using data mounted via *automount*

Performance – Caching

- **The Java Server offers 2 scripts for the generation of Map and Globe caches**
- **The following properties can be set -**
 - **Origin of the tiling scheme in map co-ordinates**
 - **Tile size (default is 512x512)**
 - **The display resolution in DPI (default is 96)**
 - **Number of scales**
- **The tile size, DPI and scales control the pixel resolution in map units at each scale level**

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Configuration Scenarios - Security

- **Ports to remember**

135 **RPC Port**

3774 **Authentication Listener**

62000 **Directory Server**

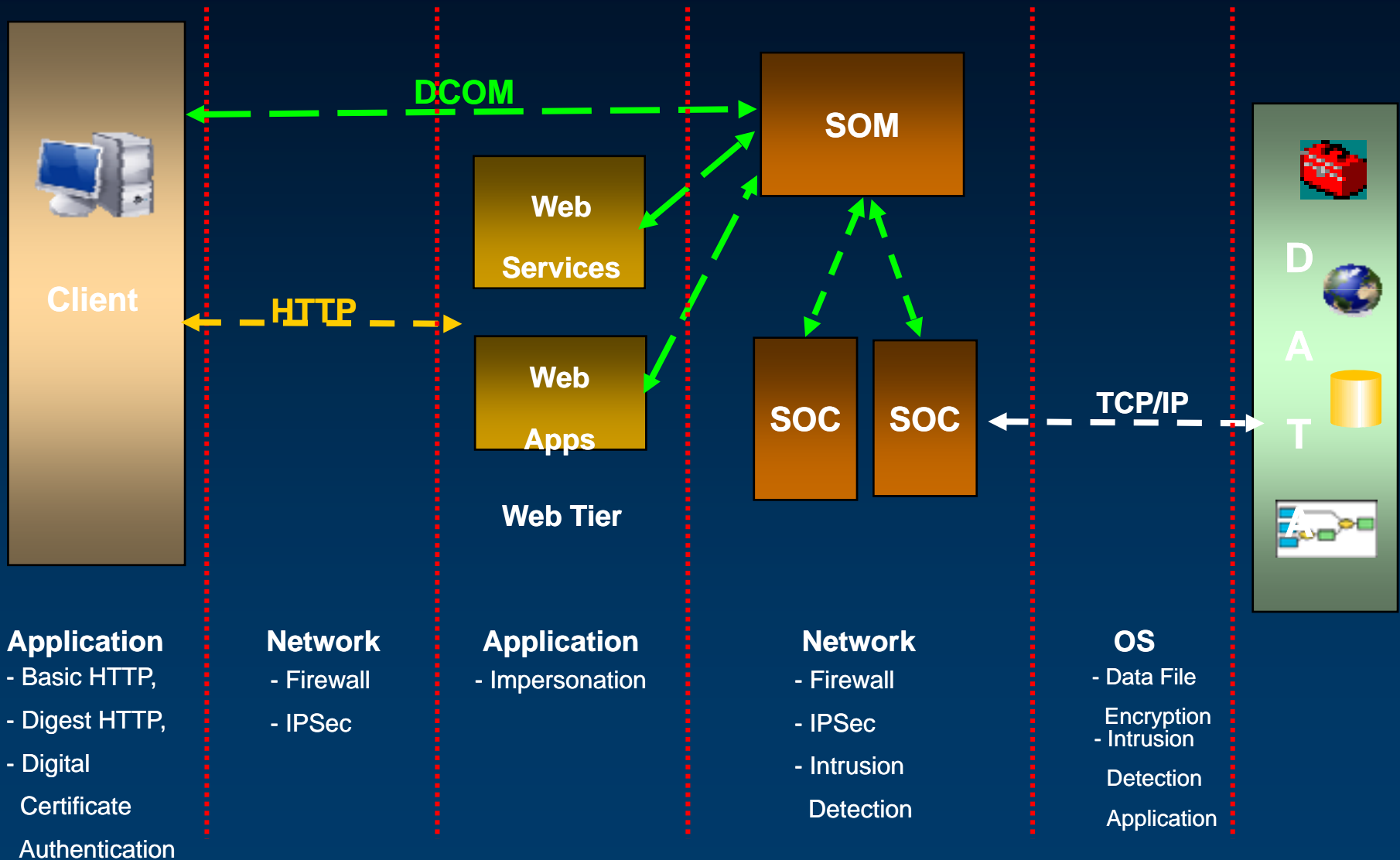
8099 **Internal Web Server**

8399 **Internal Web Server**

6600 **Internal X-Server**

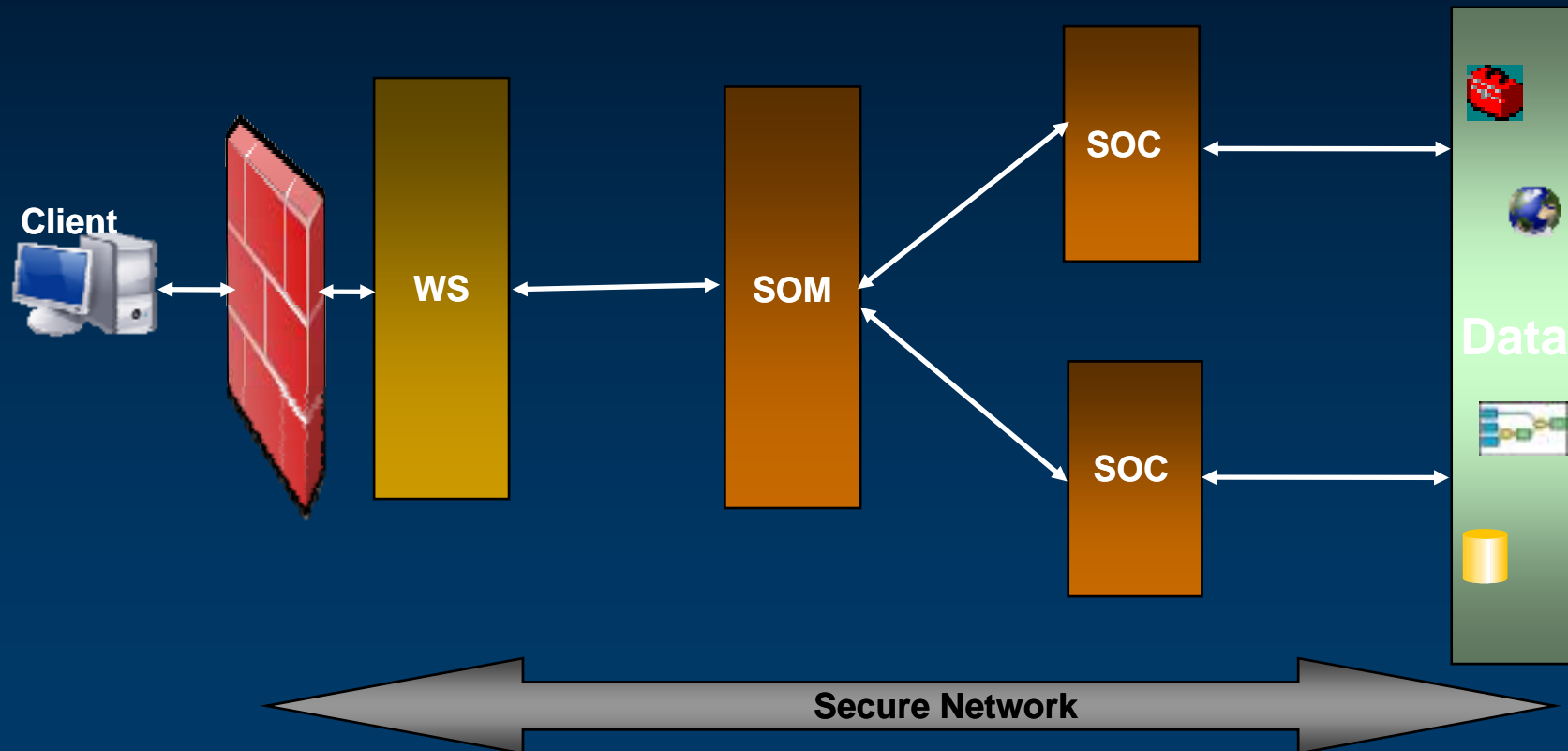
2099 **Manager service**

Security – Communications



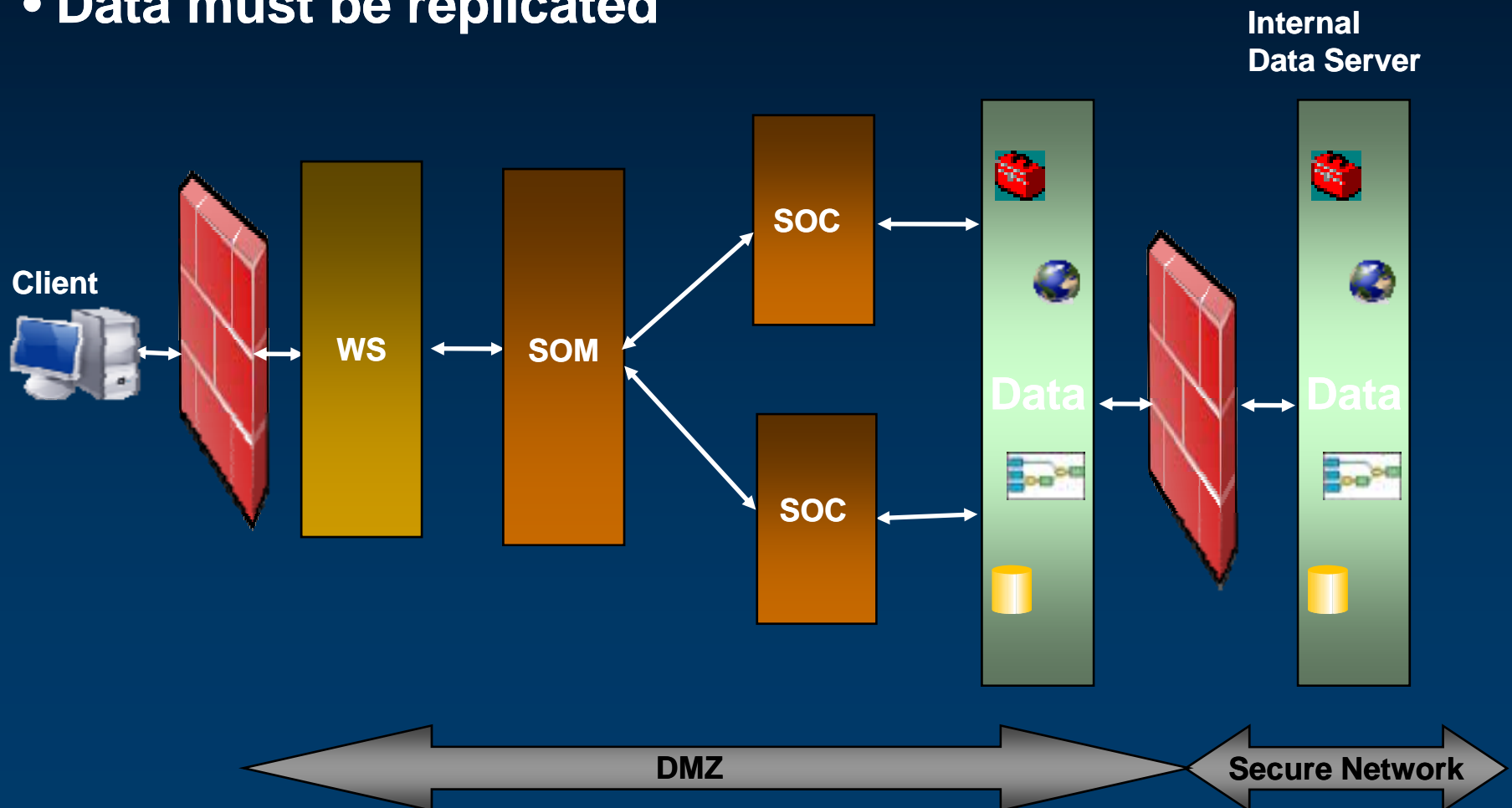
Security - Firewalls

- Simplest solution
- Not considered secure by many organizations



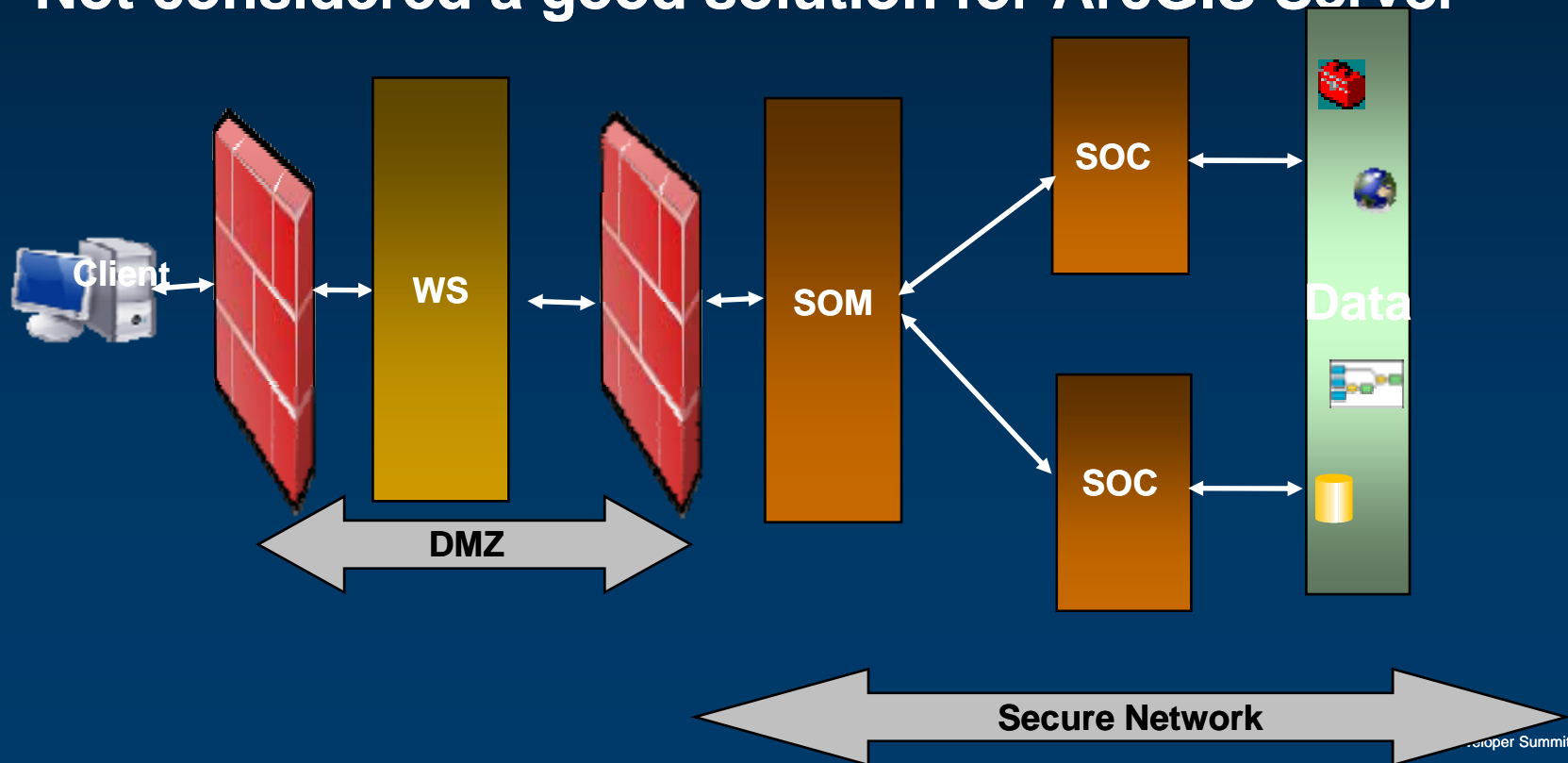
Security - Firewalls

- All components inside DMZ – Most secure solution
- Data must be replicated



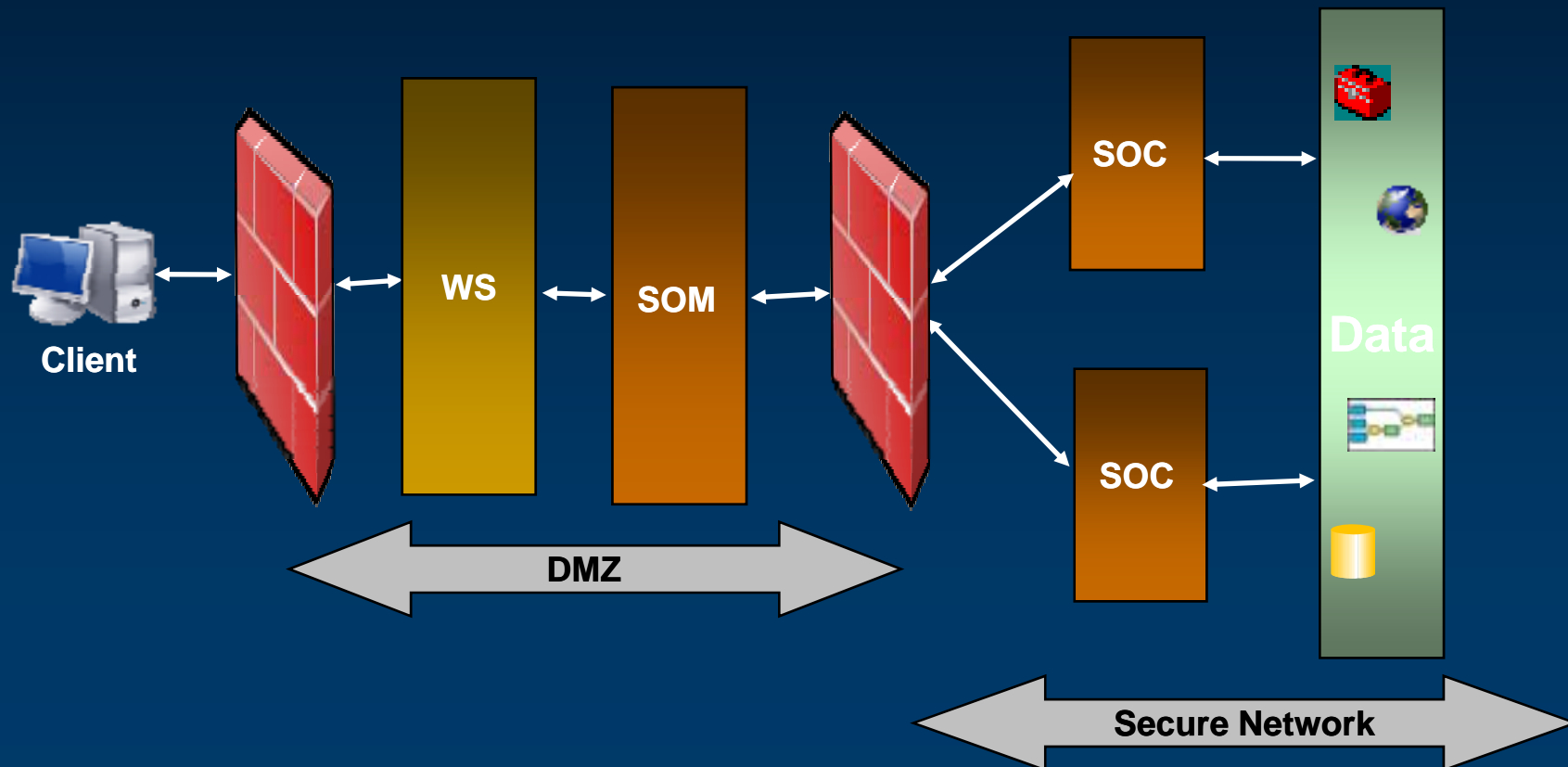
Firewalls (Cont..)

- Distribution across DMZ and Secure Network
- Output folder must be shared (one-way) across the firewall
- Not considered a good solution for ArcGIS Server



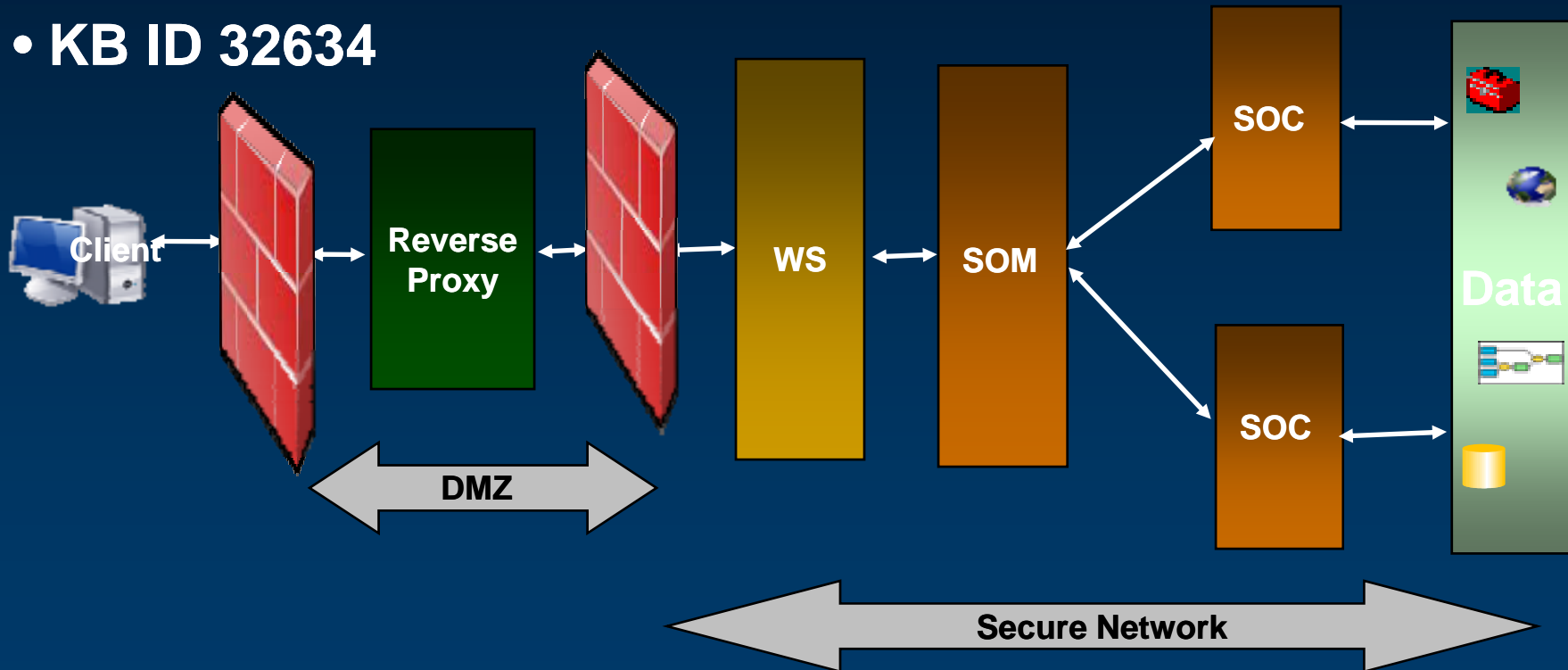
Firewalls (Cont..)

- WebServer and SOM inside the DMZ
- Not recommended for the ArcGIS Server



Firewalls (Cont..)

- Preferred setup with Reverse Proxy
- Acts on behalf of HTTP server, brokering requests to internal servers
- KB ID 32634



Summary

- I. Architecture**
- II. Difference of 9.2 from 9.1**
- III. Installation Overview**
- IV. Tasks possible through the Manager**
- V. Troubleshooting tips and tricks**
- VI. Configuration Scenarios**

Presentation materials

- PowerPoint presentation and code are posted on the conference web site

- <http://www.esri.com/events/devsummit/index.html>

- EDN – downloads and videos

Further questions?

- **TECH-TALK AREAS**

- **What:** Further opportunity to discuss questions and concerns with presenters
- **Where:** Tech Talk Area 4
- **When:** during the next 30 minutes

- **ESRI Developers Network (EDN) website**

- <http://edn.esri.com>