ArcGIS Server on Linux and Unix – Architecture and Deployment Recommendations

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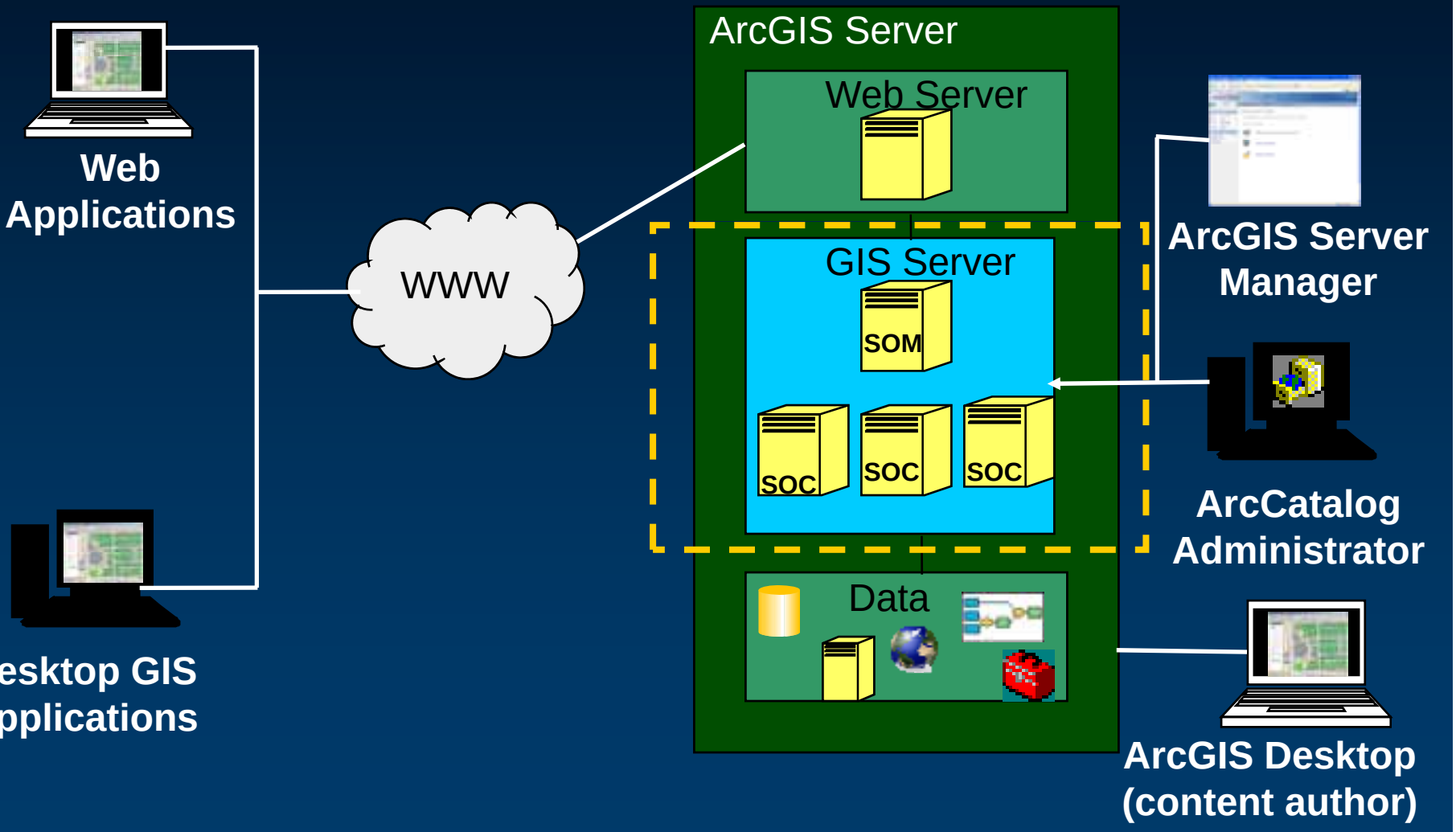
Our Assumptions

- Familiarity with ArcGIS Server
- Familiarity with Solaris and Linux

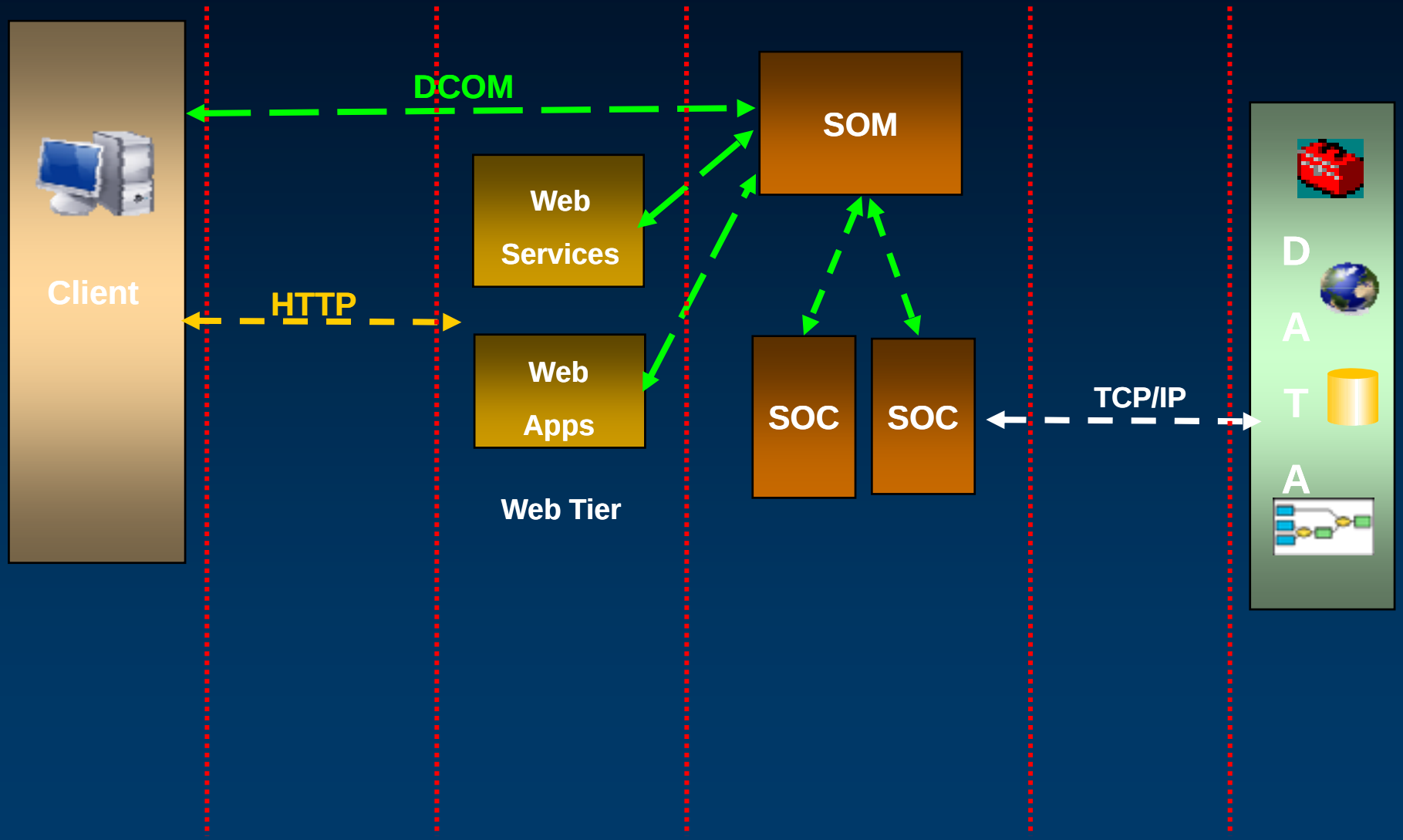
Agenda

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

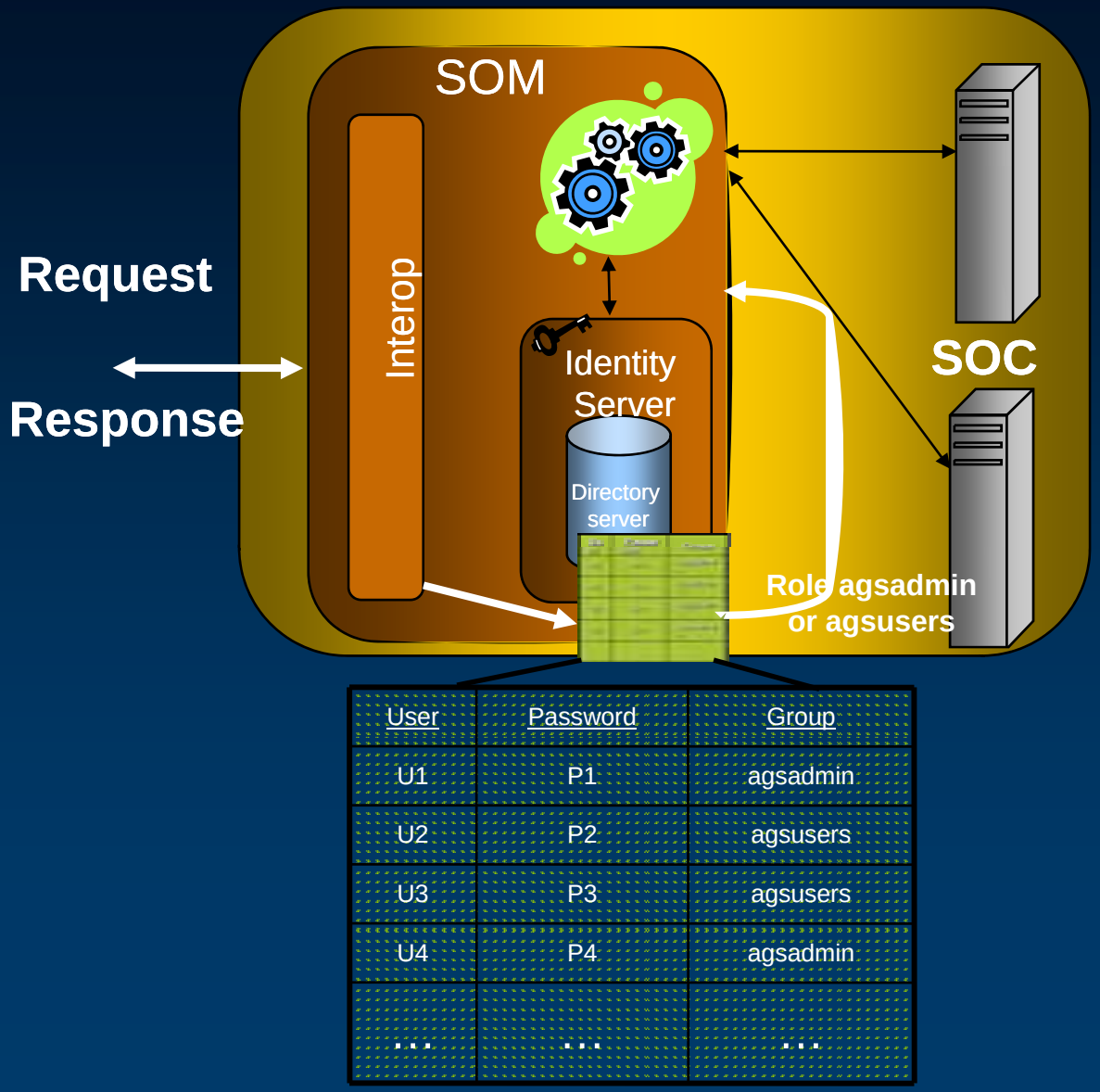
I. ArcGIS Server Components Overview



ArcGIS Server - Communications



Server Object Manager (SOM) Architecture



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

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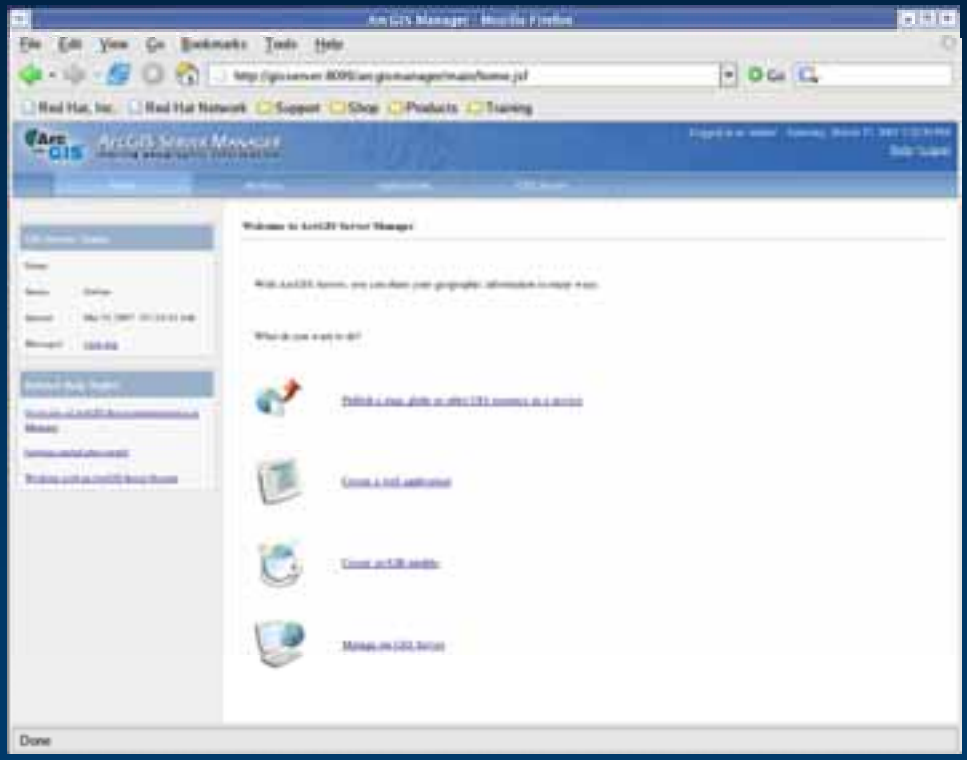
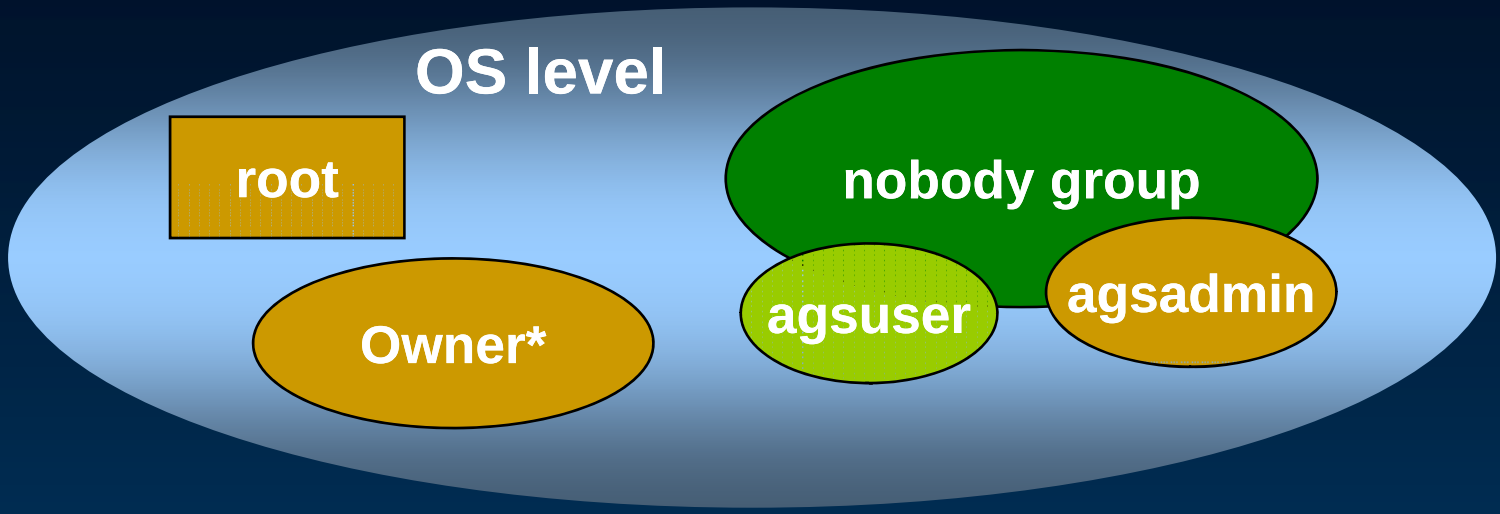
IV. Administration and Usage: Server Management

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



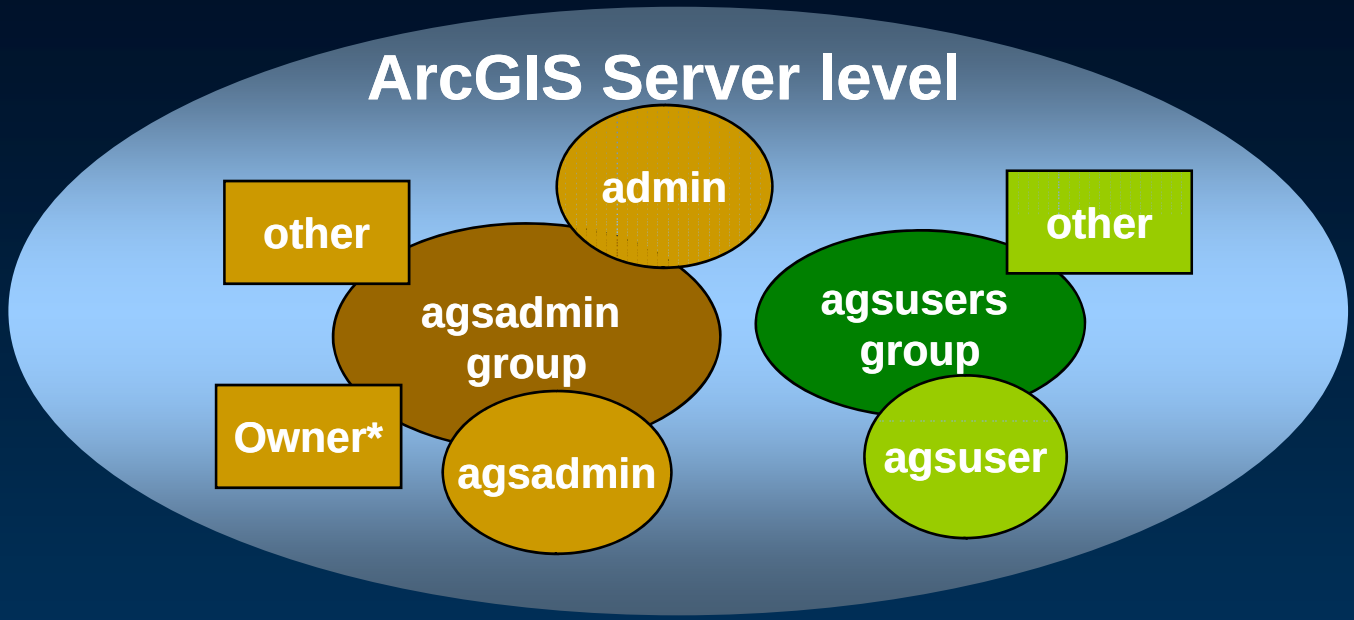
Server Management – User Management (Cont..)



- **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

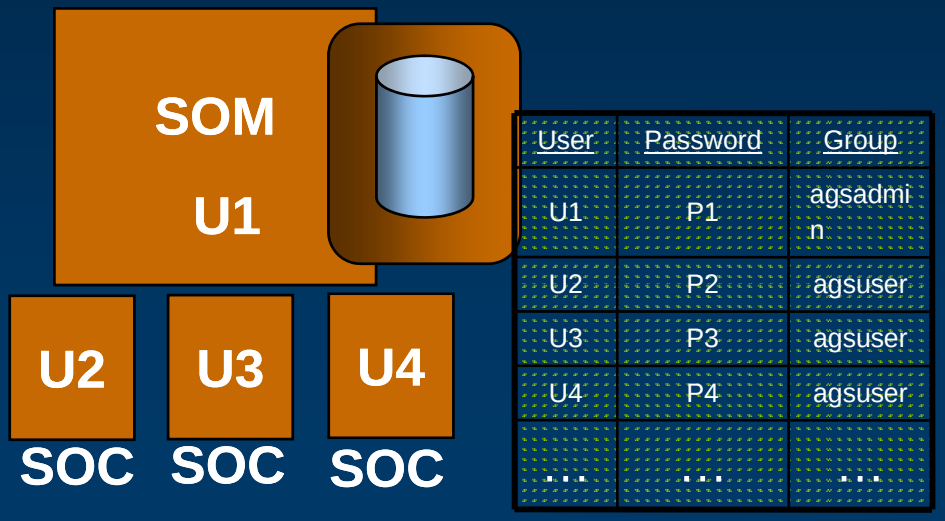


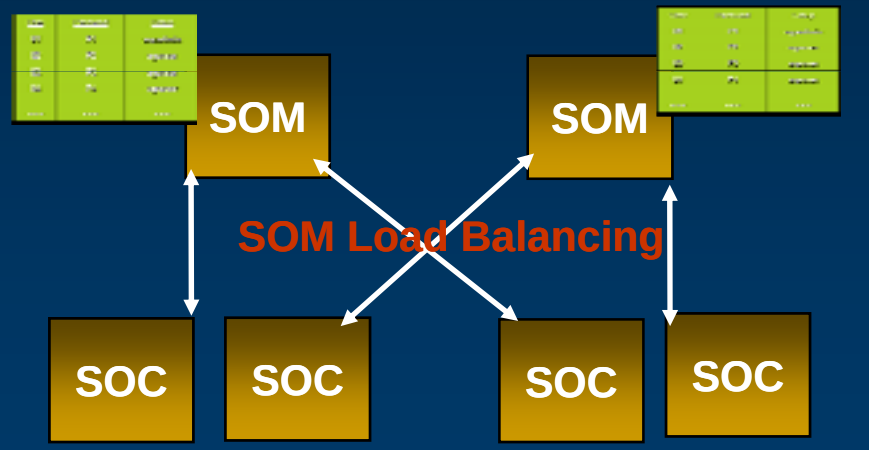
- **All users except *agsuser* and *agsadmin* are virtual users**
- **Only members of *agsadmin* group can log into Manager**
- ***admin*, *agsuser* and *agsadmin* cannot be deleted**

*** "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

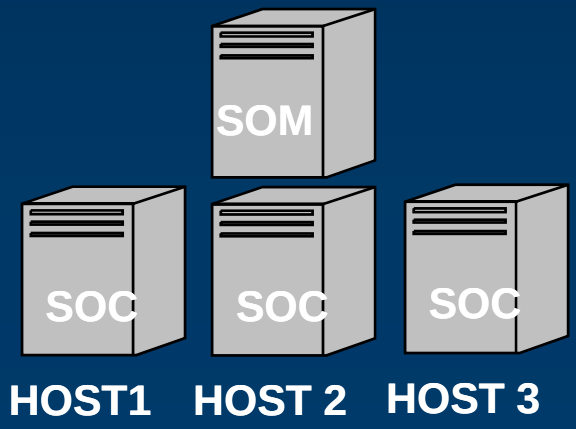
Recommendation:

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

Server Management - Hosts

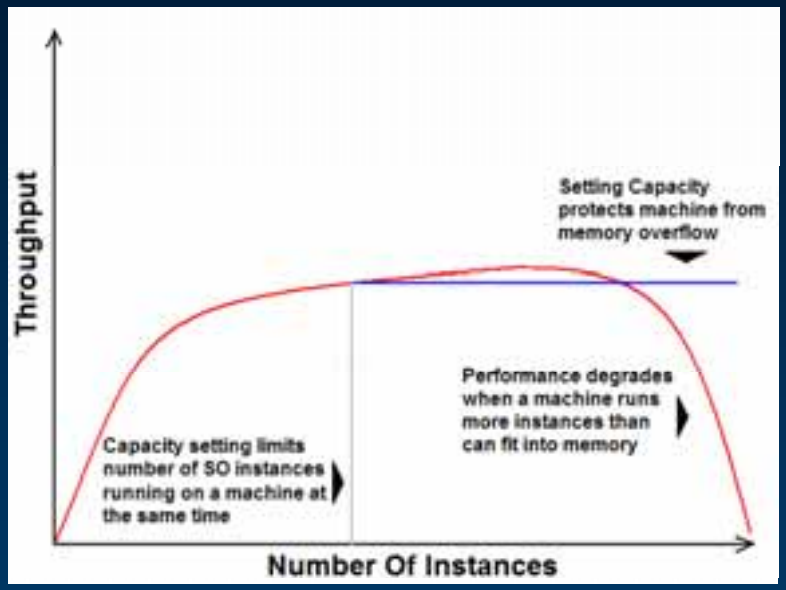
- Local machine added to HOSTS by default
- Add SOM/SOC owners to the user list before adding remote HOSTS
- SOC machine dropped from HOSTS if it is down when SOM is restarted
- All SOC machines should have the same license level

Recommendation:
- Use fully qualified name or IP address for remote HOST



Server Management – Hosts (Cont..)

- Adjust the host capacity to effectively manage server load



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		☑	☑	☑	☑
Server Jobs		☑	☑	☑	☑
Server Output		☑	☑	☑	☑
Server Log	☑	☑	☑		Set as Log directory in Manager
Data		☑	☑		

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
    - /$ROOTHOME/ArcGIS_MWSysReq.log
  - Actions performed during install
    - /$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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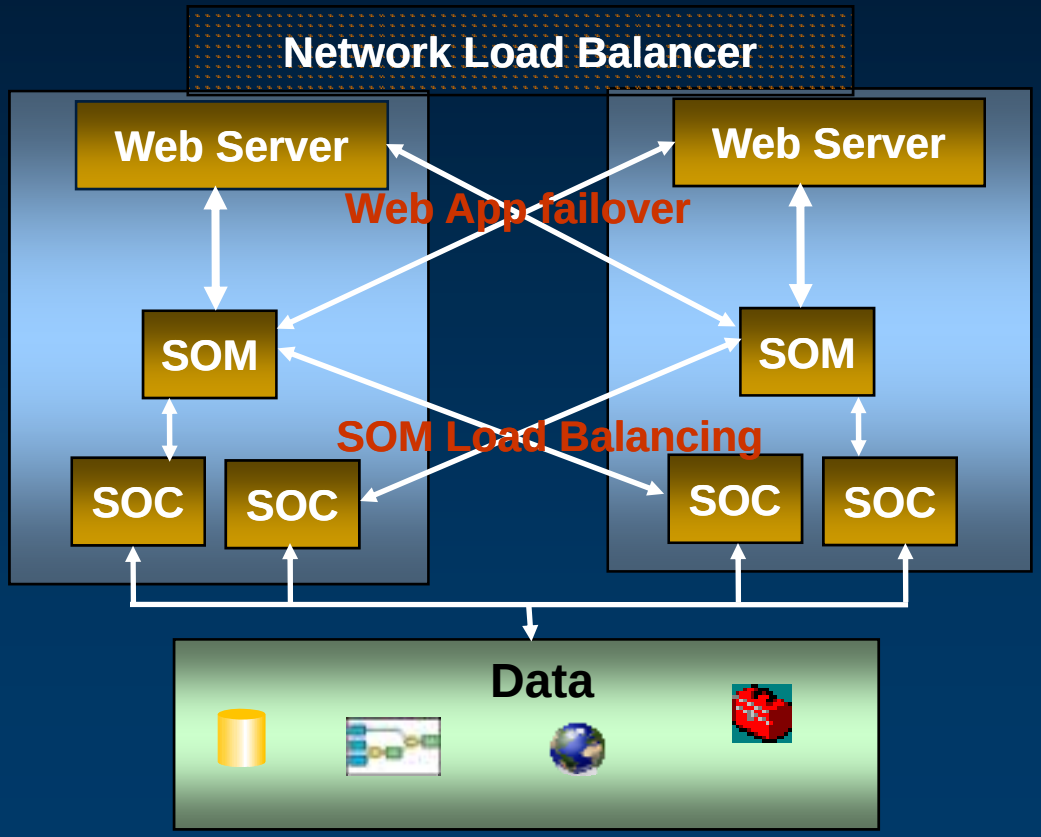
V. Configuration Scenarios – High Availability

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



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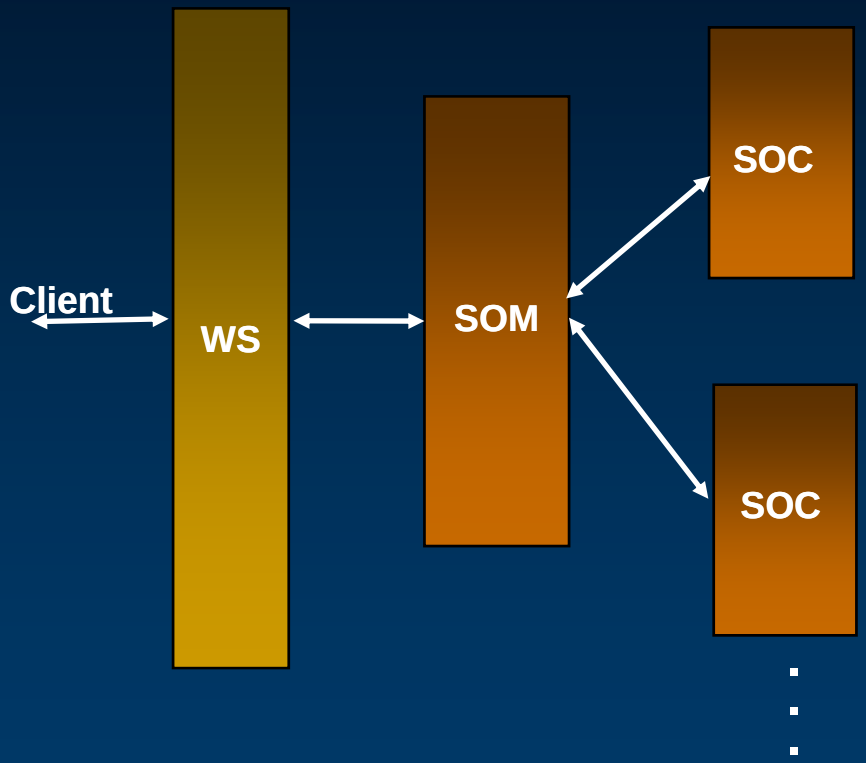
Configuration Scenarios – Scalability

- Adding more computing power



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

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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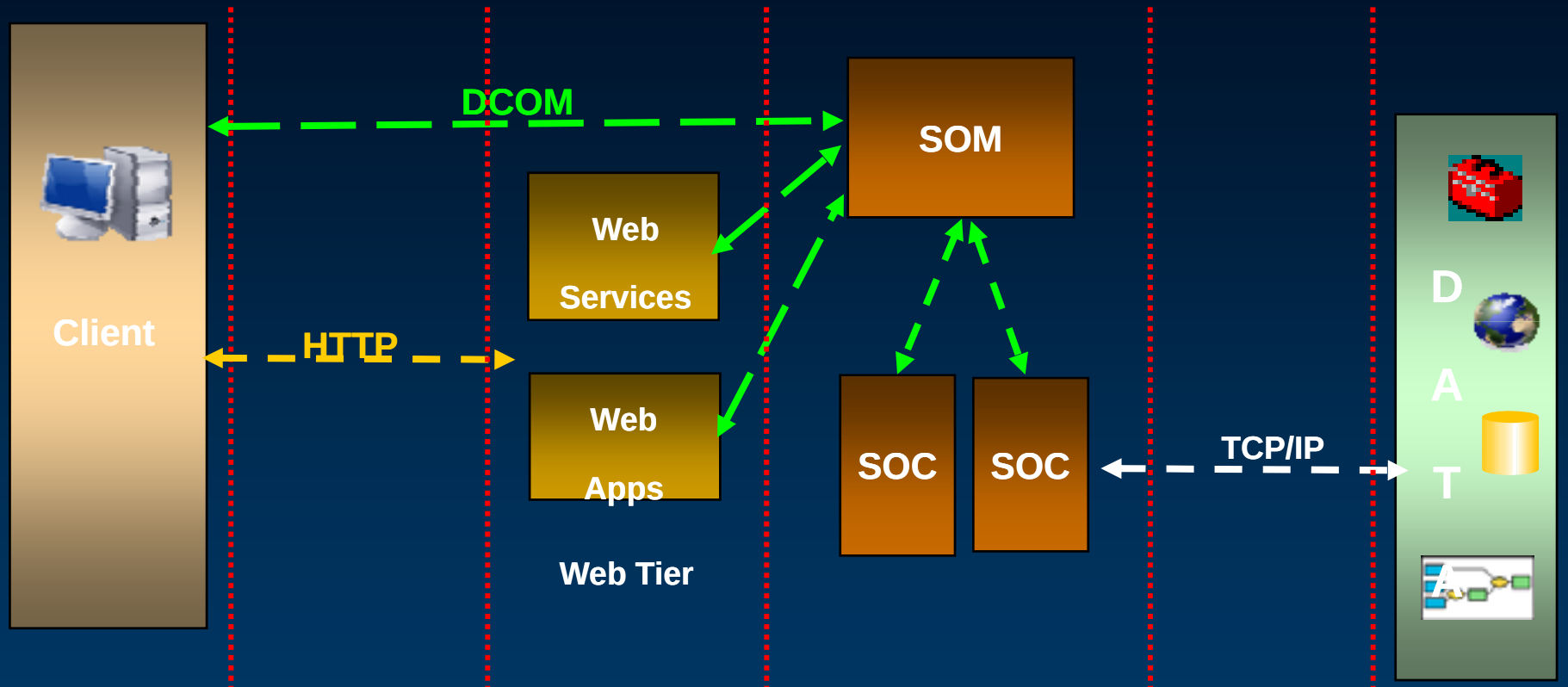
Configuration Scenarios - Security

- **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



Application
- Basic HTTP,
- Digest HTTP,
- Digital Certificate Authentication

Network
- Firewall
- IPSec

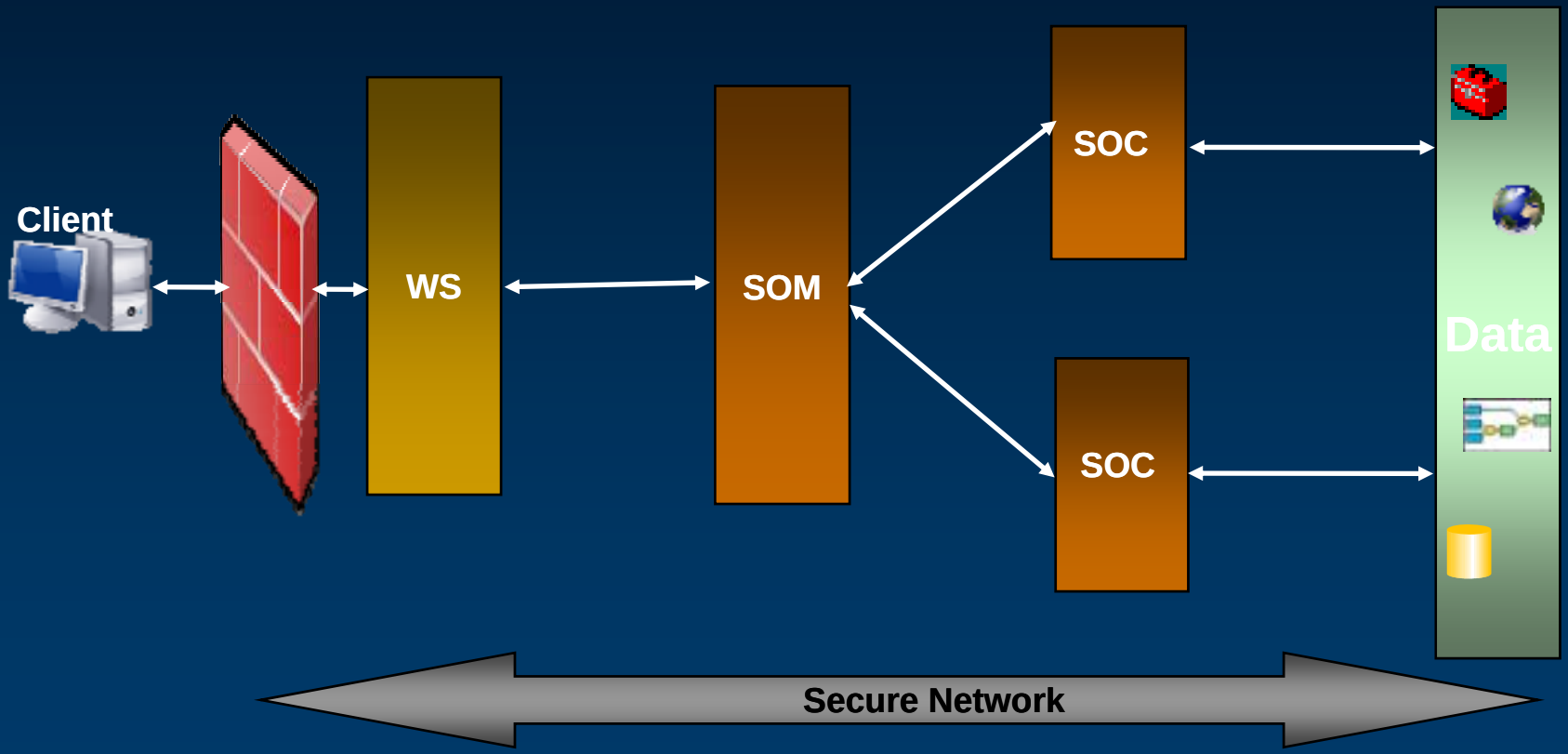
Application
- Impersonation

Network
- Firewall
- IPSec
- Intrusion Detection

OS
- Data File Encryption
- Intrusion Detection Application

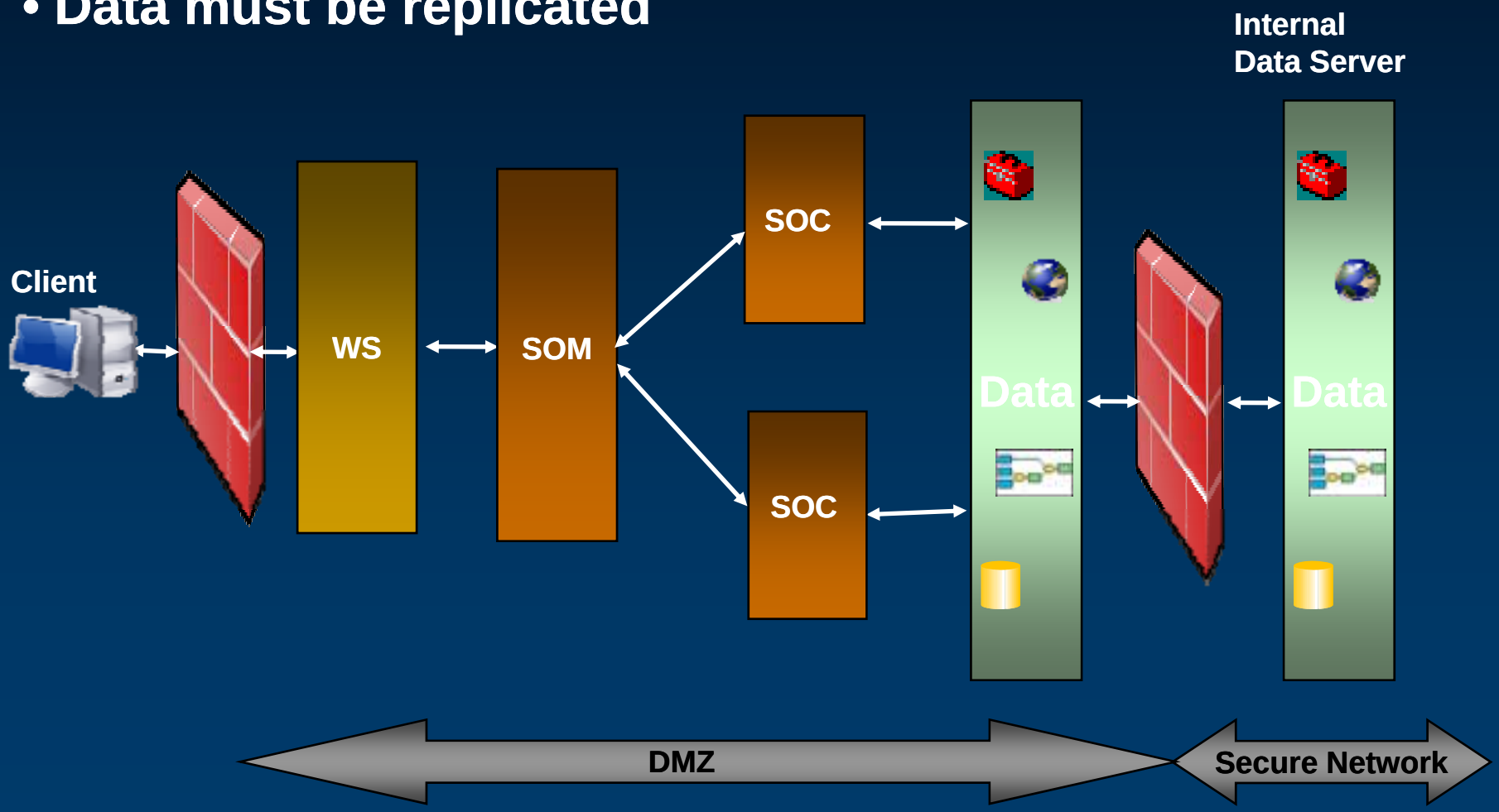
Security - Firewalls

- Simplest solution
- Not considered secure by many organizations



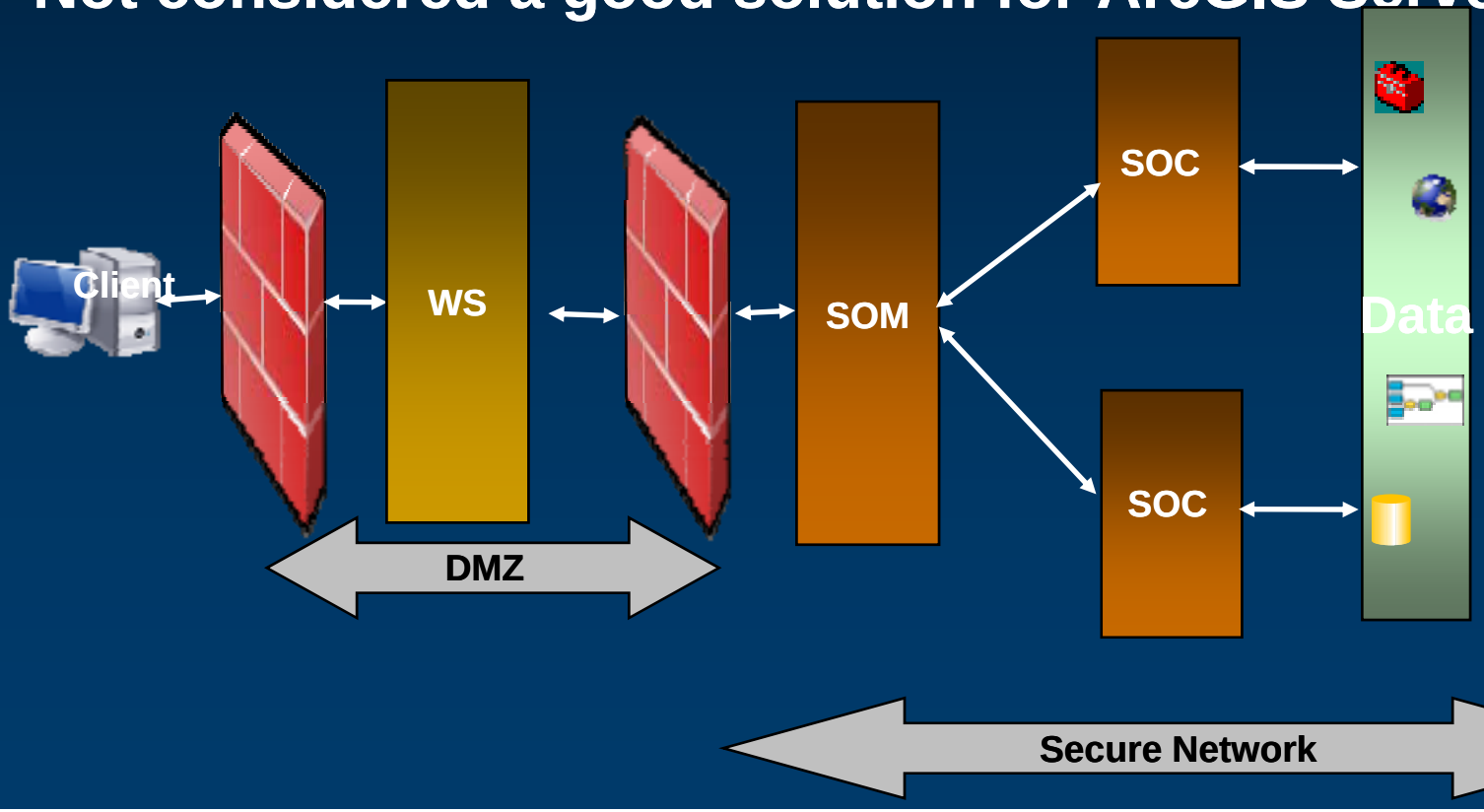
Security - Firewalls

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



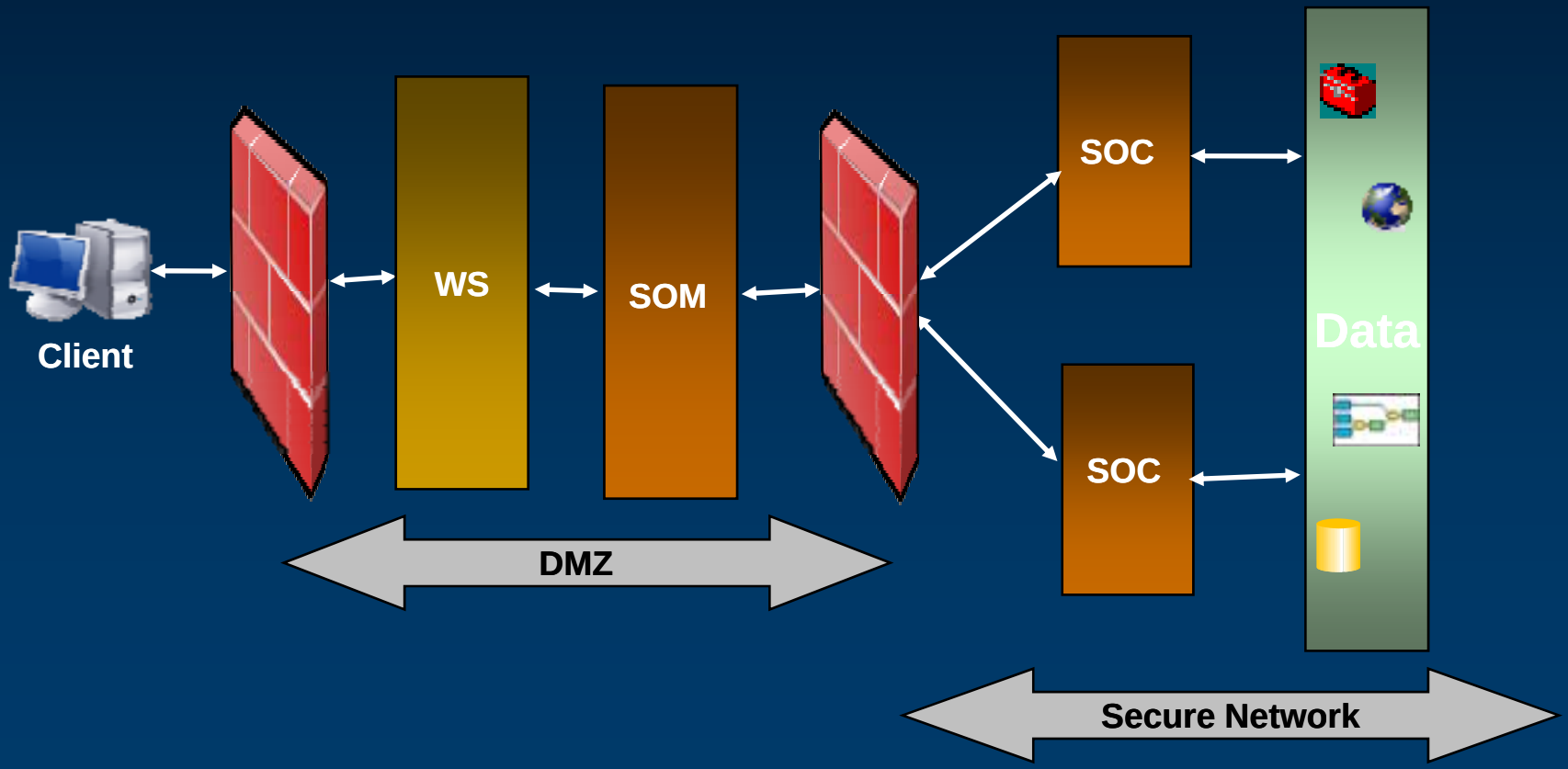
Firewalls (Cont..)

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



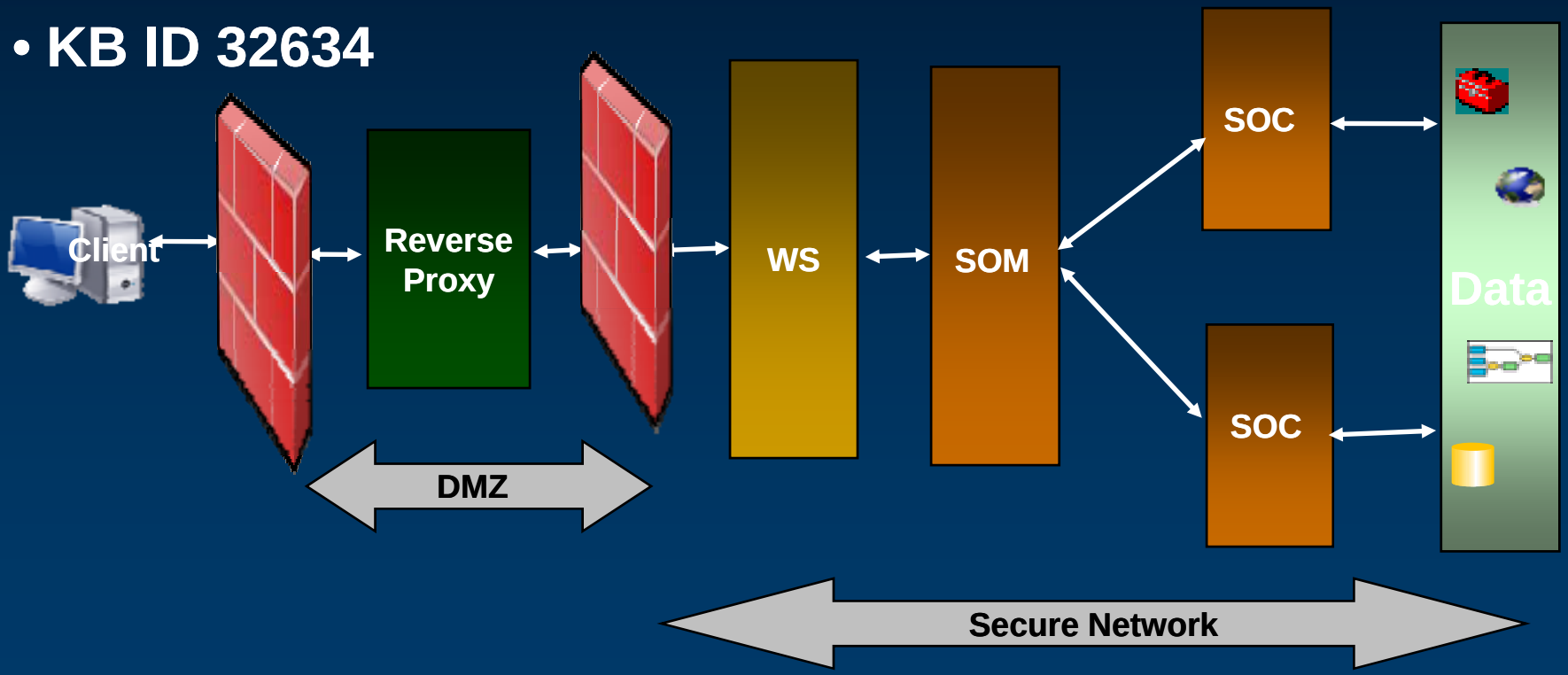
Firewalls (Cont..)

- 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