esri

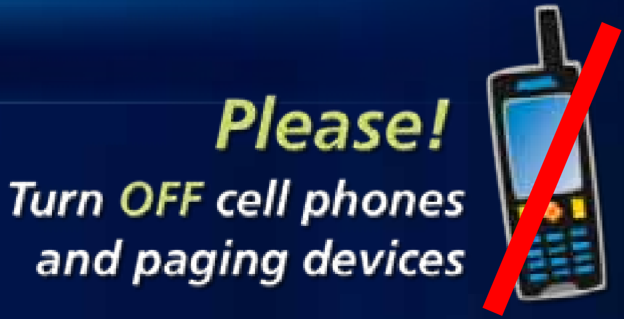
Esri International User Conference | San Diego, CA

Technical Workshops | Monday, July 11, 2011

Building Secure Applications

Tom Brenneman & Tom Shippee

Schedule



- Security overview & setup
- Securing GIS services
- Working with tokens and proxy pages
- Web apps and security patterns

- We will answer questions at the end on the session

Please complete the session survey!

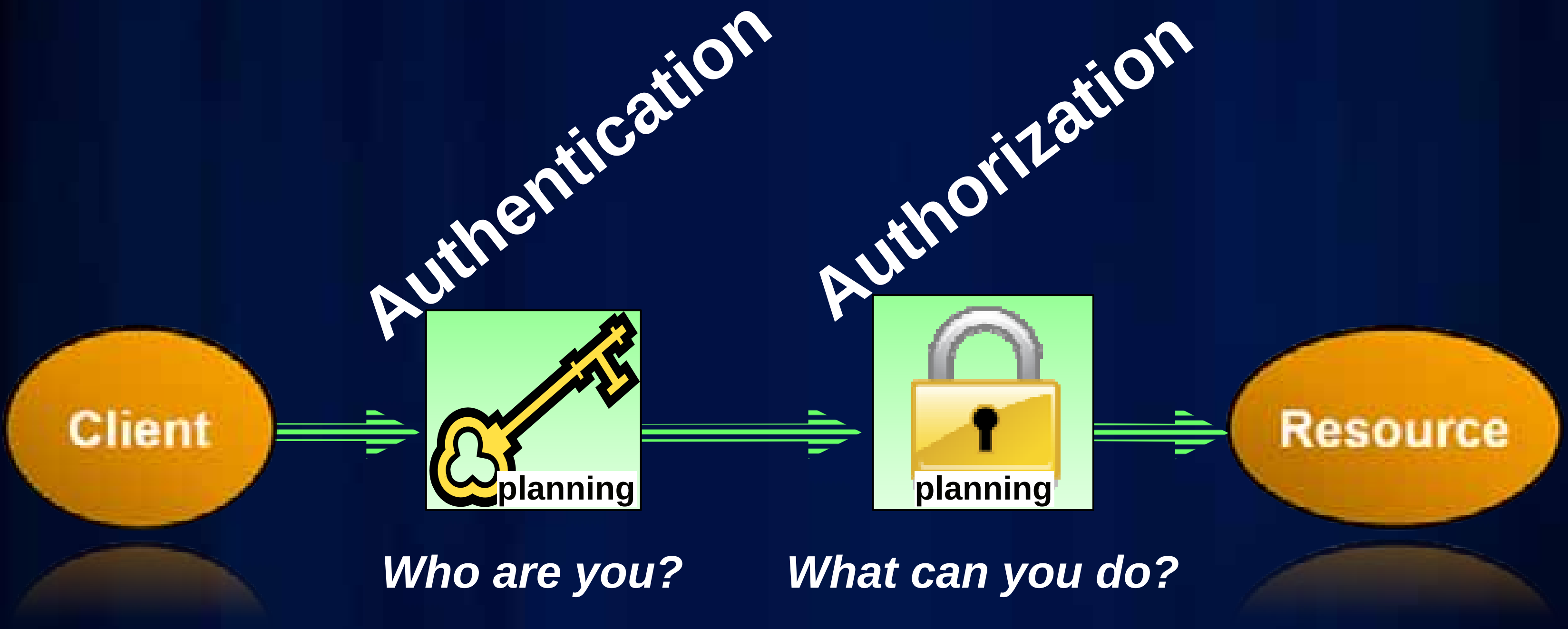
Security overview and setup

Security overview

- ArcGIS Server security provides access control
  - Users belong to specific roles
  - Roles can access particular services and applications

- Remember other security tasks
  - Security during transmission
  - Operating system – updates, virus protection
  - Code – SQL injection, cross-site scripting, etc.
  - Physical security
  - User education – phishing, etc.

Fundamental concepts



Authentication

Authorization

Client

planning

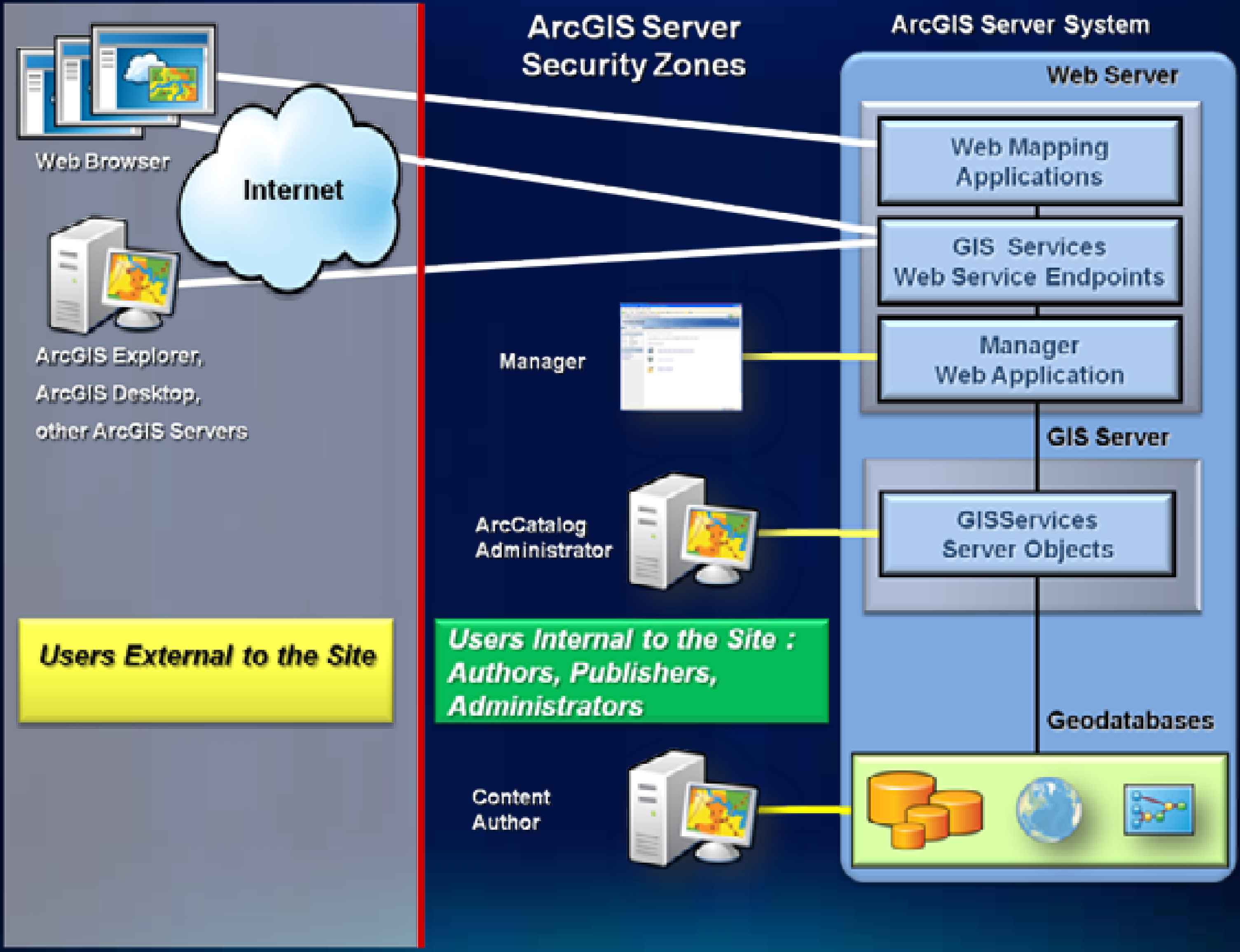
planning

Resource

Who are you?

What can you do?

ArcGIS Server Security Zones

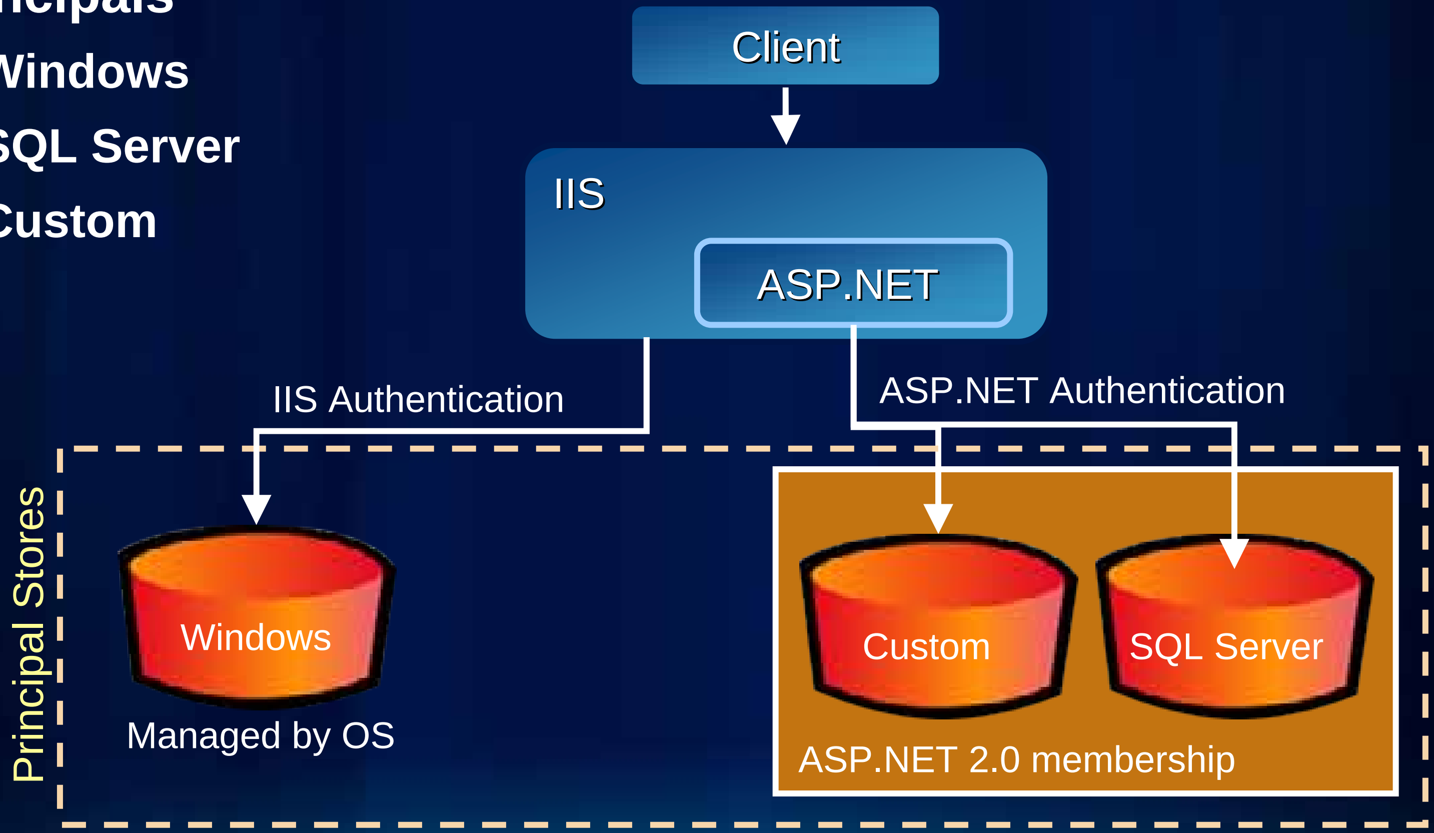


Users External to the Site

Users Internal to the Site : Authors, Publishers, Administrators

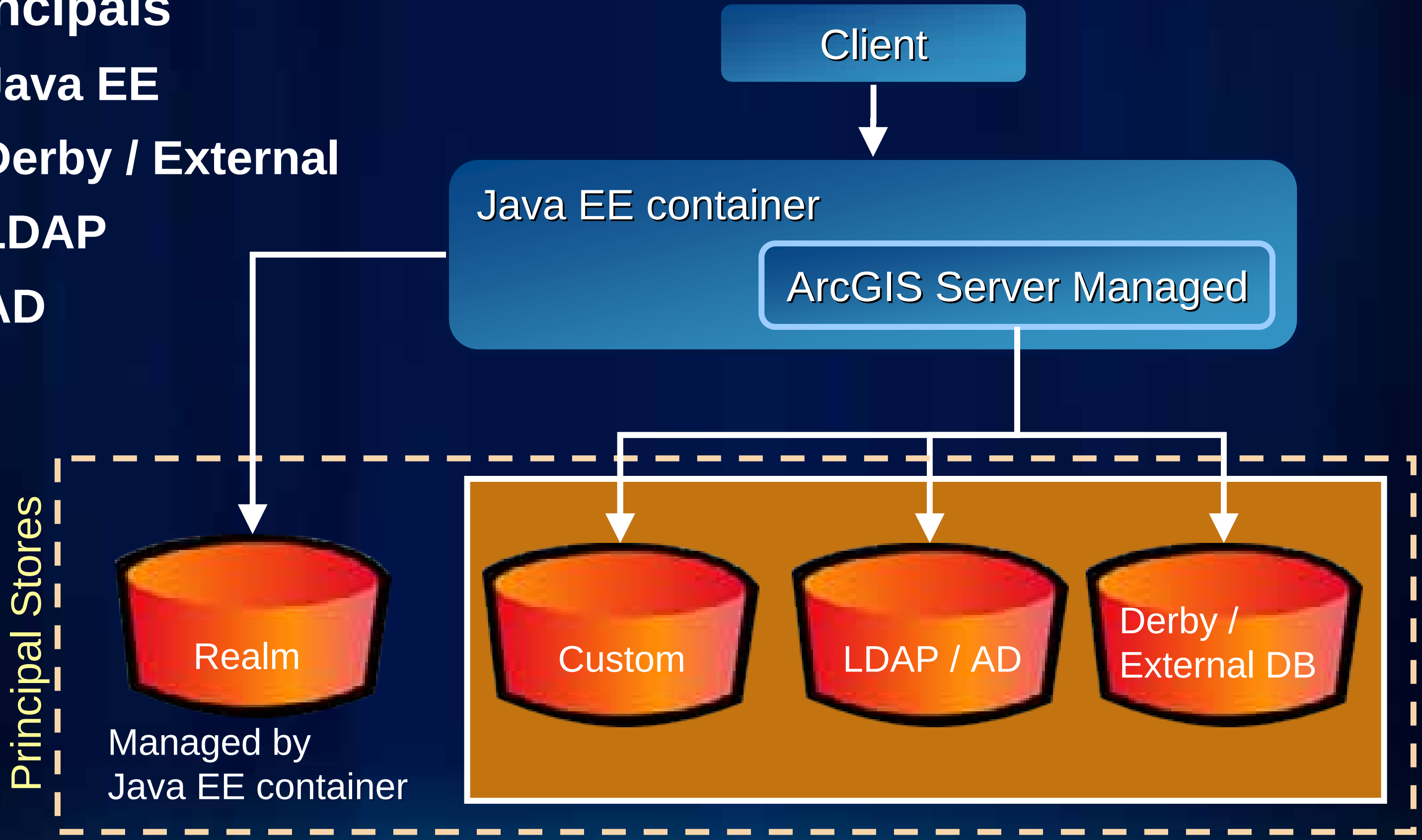
Authenticating users - Windows

- **Authentication requires storage location for Principals**
  - **Windows**
  - **SQL Server**
  - **Custom**



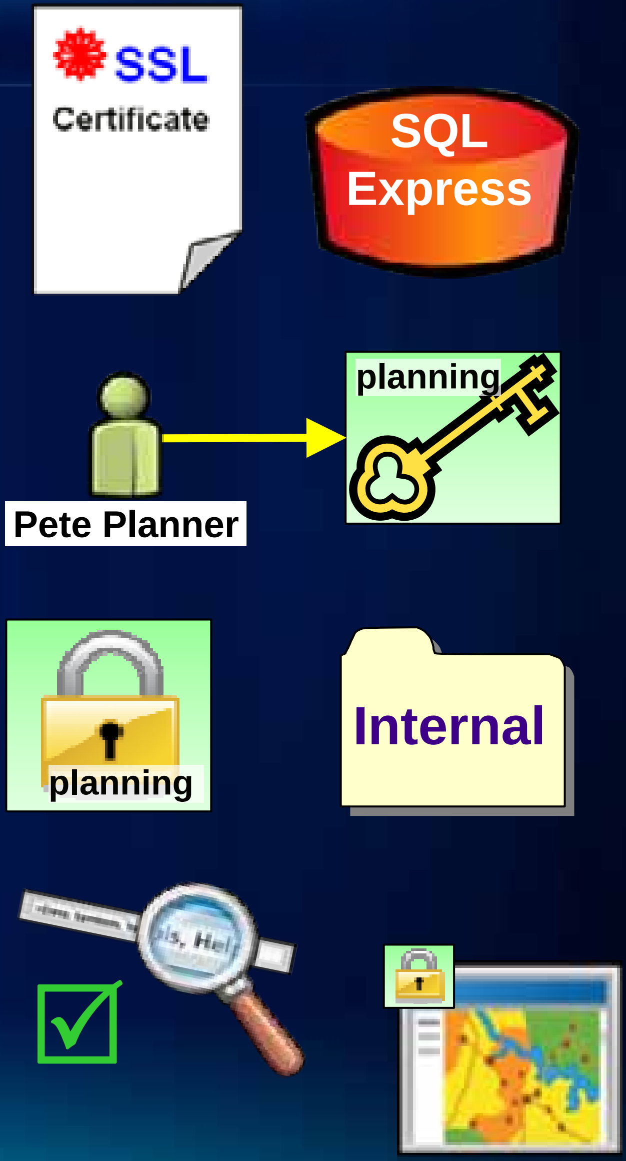
Authenticating users - Java

- Authentication requires storage location for Principals
  - Java EE
  - Derby / External
  - LDAP
  - AD



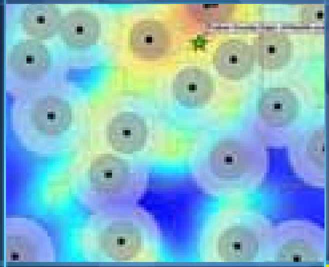
Configuring security

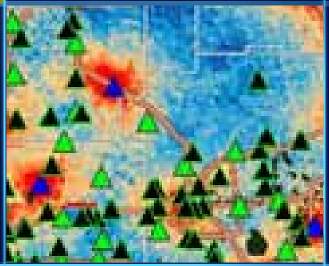
- Plan the implementation
  - Identify authentication model
  - Install supporting items
    - Database or custom provider
    - SSL Certificate
- Configure the user/role store
  - Create users/roles
  - Assign users to roles
- Assign roles to folders/services
- Enable and test service security
- Secure applications



Demo

Configuring access control

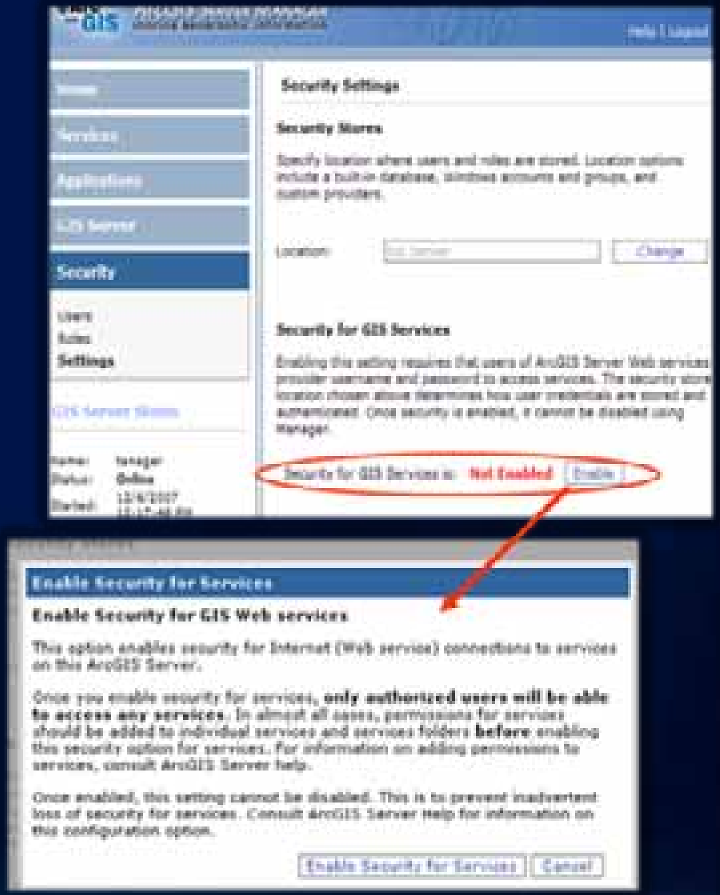




Securing GIS services

Transitioning ArcGIS Server: Open → Secured

- Enabling security for services is set separately from permissions
  - Security-Settings tab
- With no security, everyone has access to everything
- If you enable security before changing permissions, no one will be able to use existing services



Security Settings

Security Stores

Specify location where users and roles are stored. Location options include a built-in database, Windows accounts and groups, and custom providers.

Location: GIS Server

Security for GIS Services

Enabling this setting requires that users of ArcGIS Server Web services provide username and password to access services. The security store location chosen above determines how user credentials are stored and authenticated. Once security is enabled, it cannot be disabled using Manager.

Security for GIS Services is: Not Enabled

Enable Security for Services

Enable Security for GIS Web services

This option enables security for Internet (Web service) connections to services on this ArcGIS Server.

Once you enable security for services, **only authorized users will be able to access any services**. In almost all cases, permissions for services should be added to individual services and services folders **before** enabling this security option for services. For information on adding permissions to services, consult ArcGIS Server help.

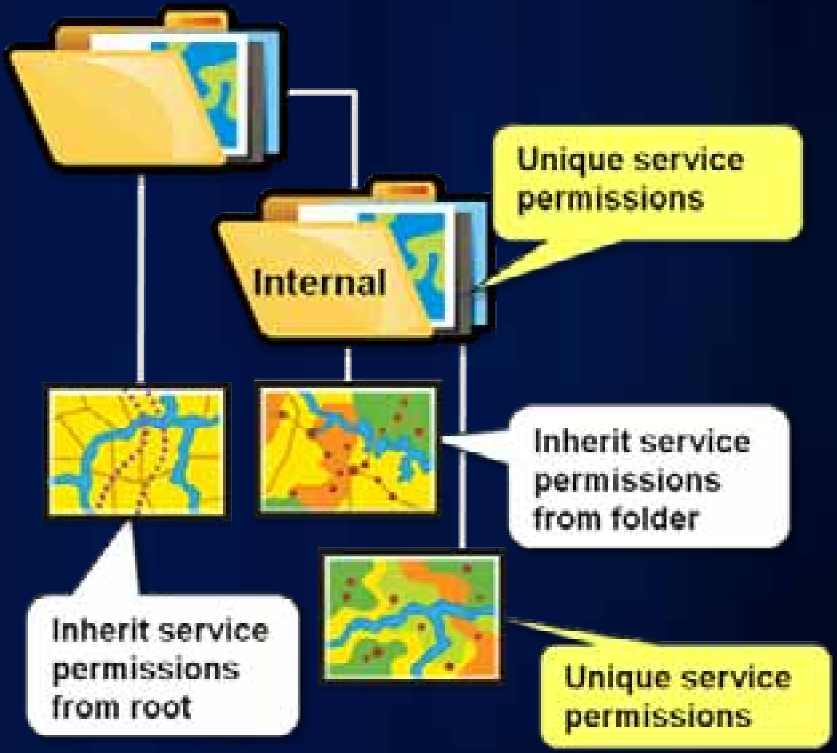
Once enabled, this setting cannot be disabled. This is to prevent inadvertent loss of security for services. Consult ArcGIS Server Help for information on this configuration option.

Capabilities have same security as service

- Services
  - Map, Geodata, Geoprocessing, Geocode, Geometry, Globe, Image, Search
- Capabilities
  - KML, WMS, WFS, WCS, Mobile Data, Feature Access, Network Analysis
- What if I want secure editing with public viewing?
  - Publish two map services

Securing GIS web services

- Services inherit folder permissions
- Good practice to secure folders
- Permissions changes cascade to all children
  - Set permissions on root first


Unique service permissions
Internal
Inherit service permissions from folder
Inherit service permissions from root
Unique service permissions

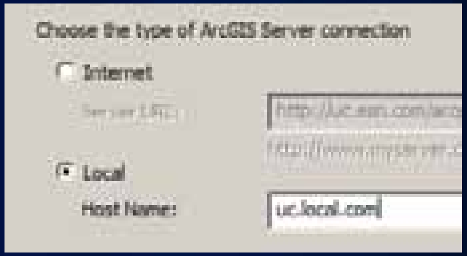
More details on users and roles

- User and role store usually same place, but can have
  - Windows users + database roles
  - Windows users + roles in custom provider
  - Database users + roles in custom provider
- Built-in roles (Token based security only)
  - Everyone (*): all users logon not required
  - Authenticated Users (@): logon IS required
  - Anonymous (?): must NOT be logged on

Securing ArcGIS Server services

- Two ways to connect to an ArcGIS Server service

- Local (“Intranet”) connection
  - Works only on intranets
  - Access to all server functionality
  - User must be a member of the agsusers or agsadmin groups



Choose the type of ArcGIS Server connection

○ Internet

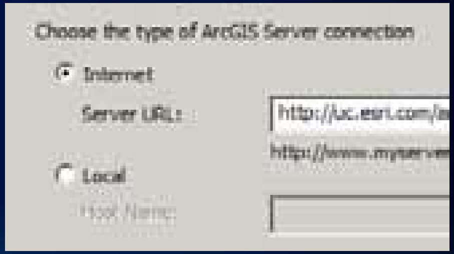
Server URL: http://uc.esri.com/arc

http://www.myserver.c

● Local

Host Name: uc.local.com

- Web service (“Internet”) connections
  - SOAP, REST, WMS, KML
  - Works on intranets and over Internet



Choose the type of ArcGIS Server connection

● Internet

Server URL: http://uc.esri.com/a

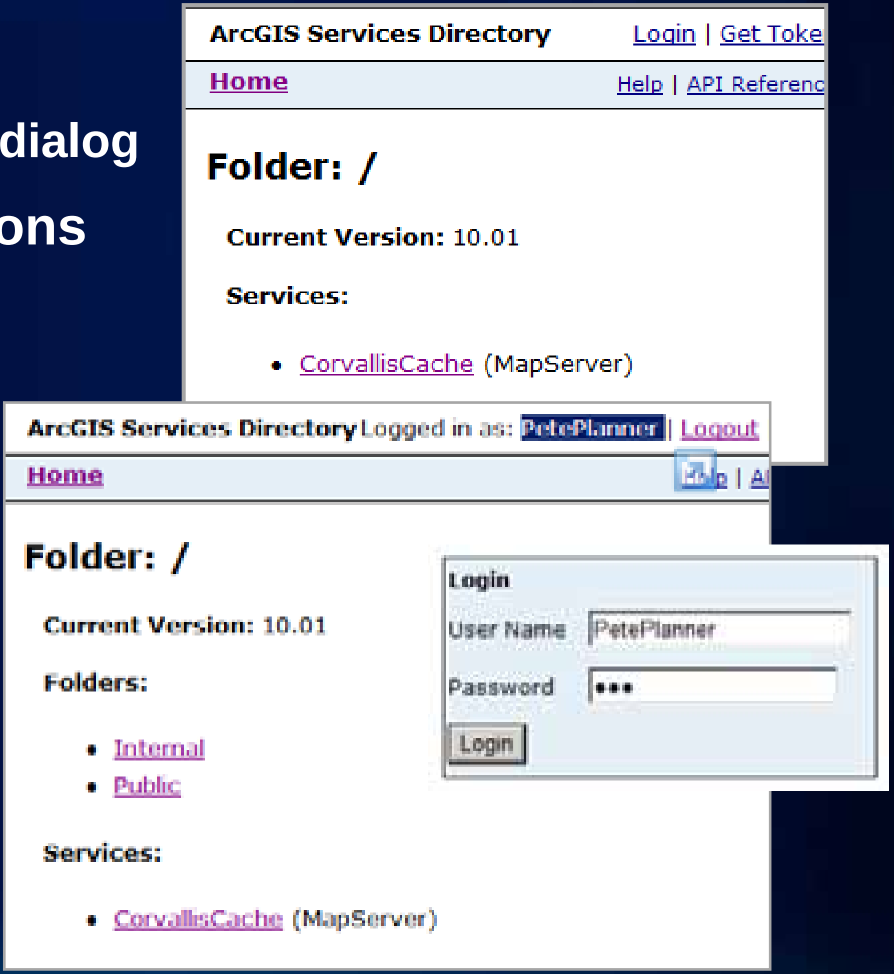
http://www.myserver

○ Local

Host Name:

Using secured services

- ArcGIS Desktop, Explorer
  - Provide identity via log on dialog
- SOAP, and REST applications
  - Use token or Windows authentication
  - More on this shortly



ArcGIS Services Directory Login | Get Toke

Home Help | API Referenc

Folder: /

Current Version: 10.01

Services:

- CorvallisCache (MapServer)

ArcGIS Services Directory Logged in as: PetePlanner | Logout

Home Help | AP

Folder: /

Current Version: 10.01

Folders:

- Internal
- Public

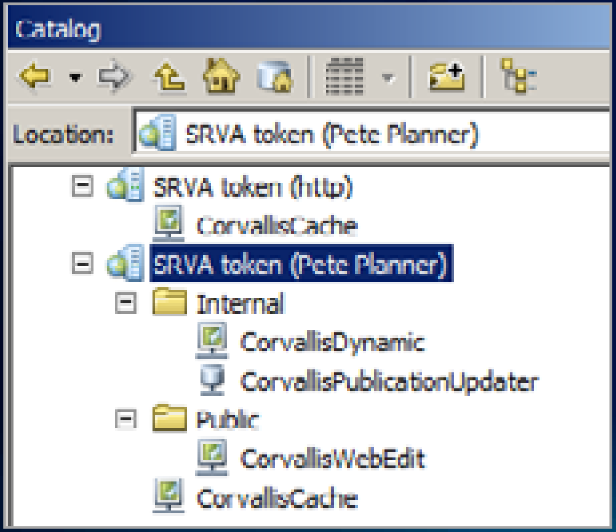
Services:

- CorvallisCache (MapServer)

Login

User Name: PetePlanner

Password: •••

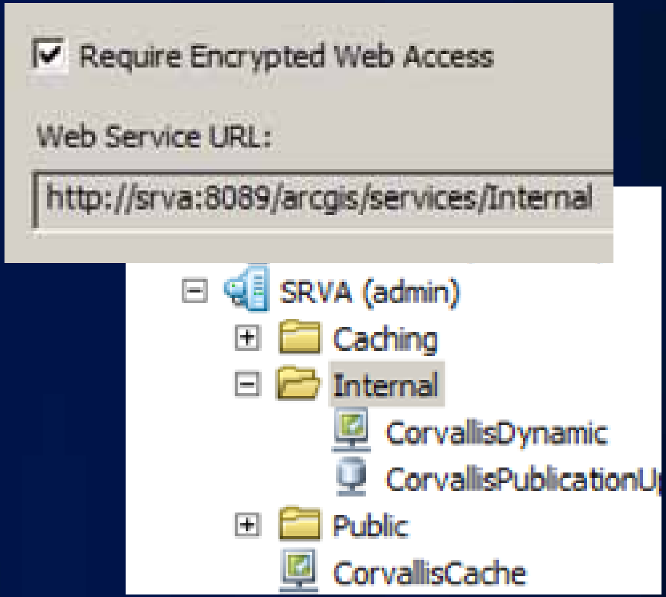


Location: SRVA token (Pete Planner)

```
⊟ SRVA token (http)
    CorvallisCache
⊟ SRVA token (Pete Planner)
    ⊟ Internal
        CorvallisDynamic
        CorvallisPublicationUpdater
    ⊟ Public
        CorvallisWebEdit
    CorvallisCache
```

SSL for services

- Require encryption
  - Set ONLY at the folder level
  - Folder property
  - Set in Catalog or Manager



☑ Require Encrypted Web Access

Web Service URL:

http://srva:8089/arcgis/services/Internal

⊟ SRVA (admin)
  ⊞ Caching
  ⊟ Internal
    CorvallisDynamic
    CorvallisPublicationU
  ⊞ Public
  CorvallisCache

- When is it needed?
  - Using Basic or Digest security
  - Protect token from intercepted in transmission
  - Sensitive geometry is dynamically displayed
  - Queried attributes contain sensitive information

Working with tokens and proxy pages

The Token service

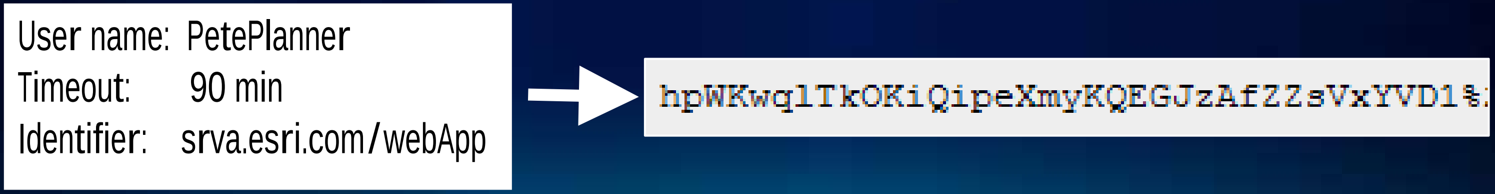
- User authentication web service
  - Token provided to access services
  - Uses HTTPS by default

- Why do we need it?
  - Web service security when using
    - Windows: ASP.NET membership / role provider
    - Java: ArcGIS Server Managed Authentication

- Used only with GIS Web services
  - Not used by default with Windows users
  - Not used to authenticate Web application users

What is in a token?

- Token is a string with encrypted information:
  - User name
  - Expiration time
  - Client ID (optional)
    - IP address or Web URL (HTTP Referrer)
    - If included, expiration can be a longer time period (weeks/months)
      - Used by most clients – Desktop, ADF, Web API/REST applications, etc.
    - If not included, shorter expiration time – needs to be renewed



User name: PetePlanner
Timeout: 90 min
Identifier: srva.esri.com/webApp

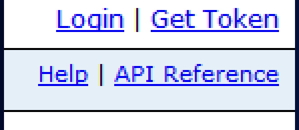
```
hpWKwqlTkOKiQipeXmyKQEGJzAfZZsVxYVD1%:
```

Working with the token service

- ArcGIS Clients will work with tokens automatically
  - ArcGIS Desktop and ArcGIS Engine
  - ArcGIS Explorer
  - Services Directory
- Other Clients will require explicit token management
  - SOAP-based clients not using ADF
    - Use server-side code to acquire and use token
  - Web API/REST Clients
    - Developer obtains a token from get-token Web page
    - Developer embeds token in application or proxy

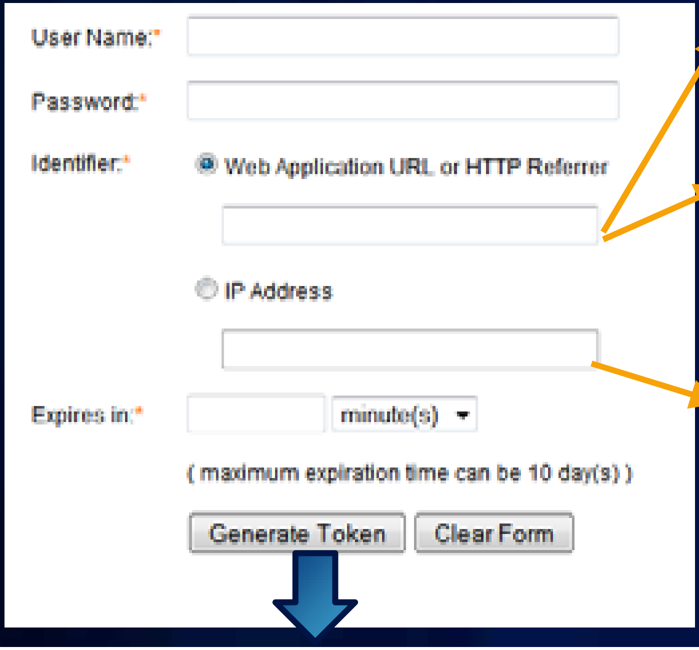
Getting a token

Services Directory



Login | Get Token

Help | API Reference



User Name:*

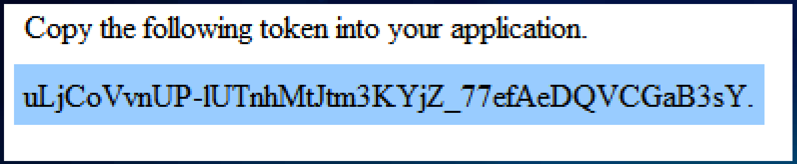
Password:*

Identifier:* ● Web Application URL or HTTP Referrer

○ IP Address

Expires in:* minute(s) ▾

(maximum expiration time can be 10 day(s))

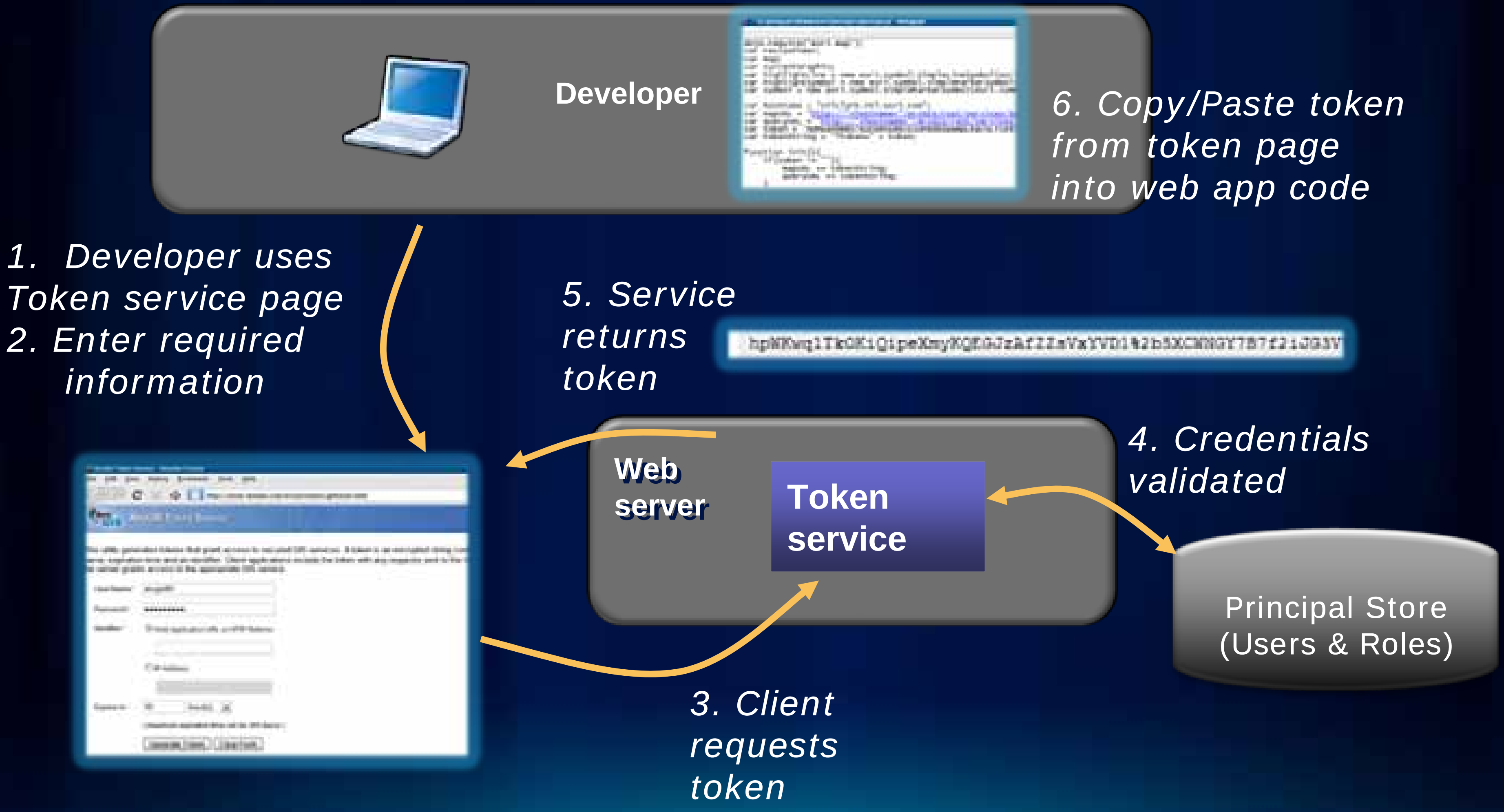


Copy the following token into your application.

uLjCoVvnUP-lUTnhMtJtm3KYjZ_77efAeDQVCGaB3sY.

- HTTP://myWebAppHost/myApp
  - App must be accessed via HTTP
- myWebAppHost/myApp
  - App can be accessed via HTTP or HTTPS
- Use IP with proxy page (more later)

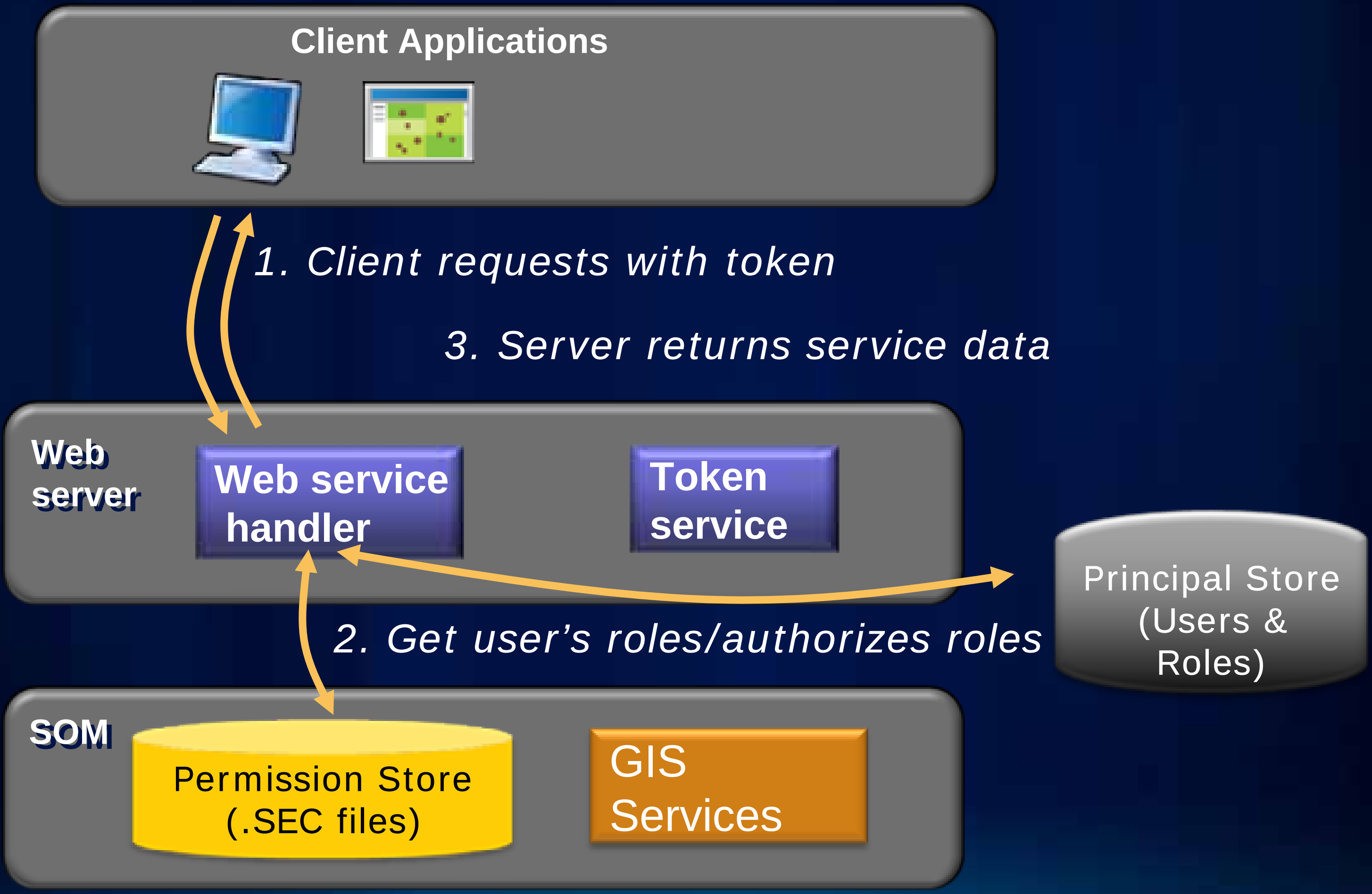
How developers commonly use the token service



Developer
6. Copy/Paste token from token page into web app code
1. Developer uses Token service page
2. Enter required information
5. Service returns token
Web server
Token service
4. Credentials validated
Principal Store (Users & Roles)
3. Client requests token

hpWKwq1TkOK1QipeXmyKQFGJzAfZZmVxYVD1%2b5XCMNGY7B7f21JG3Y

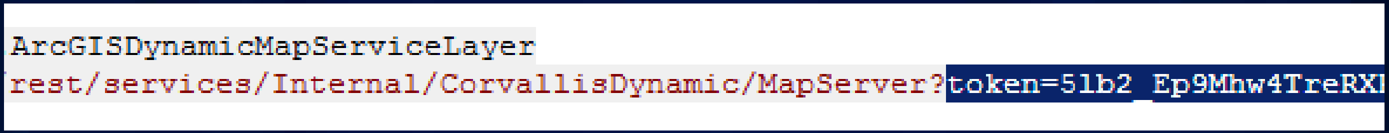
How the Web APIs/REST clients use the token



Client Applications
1. Client requests with token
3. Server returns service data
Web server
Web service handler
Token service
Principal Store (Users & Roles)
2. Get user’s roles/authorizes roles
SOM
Permission Store (.SEC files)
GIS Services

Using a token

- Append the token to the URL of the server
  - http://.../arcgis/services/myService/MapServer?token=hpWKwq...



```
ArcGISDynamicMapServiceLayer
rest/services/Internal/CorvallisDynamic/MapServer?token=51b2_Ep9Mhw4TreRX
```

- Use HTTPS
  - For maximum security over unsecure networks
  - To guard against token hijacking and replay attacks

Demo

Securing Web API applications:
Embed the token directly in code

When the token expires…

- All tokens expire
- HTTP error code of 498
- Refresh embedded tokens periodically
  - Source / config file update

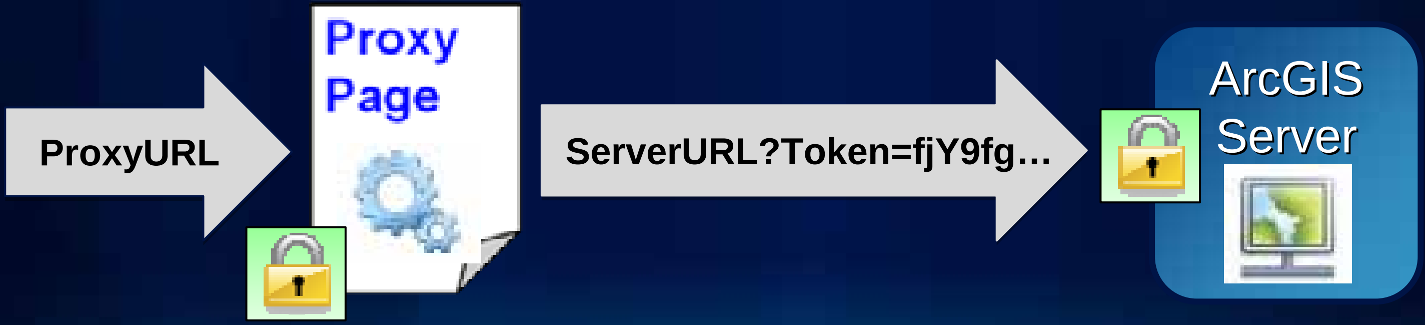
Embedding tokens in a proxy page

- Proxy page
  - Embed token using servers IP address as referrer
    - Pro: Token not exposed to client
    - Con: Tokens must still be updated in proxy page
  - Embed user name and password for dynamic token generation
    - Pro: No ongoing maintenance
    - Con: User name and password is unencrypted on the server
- Forum post contains dynamic proxy:

  http://forums.esri.com/Thread.asp?c=158&f=2396&t=297001

Proxy page security

- Proxy page contains no security logic
  - You MUST secure the proxy page
- Include proxy in web application and secure the application
- See Using the proxy page in JavaScript API help



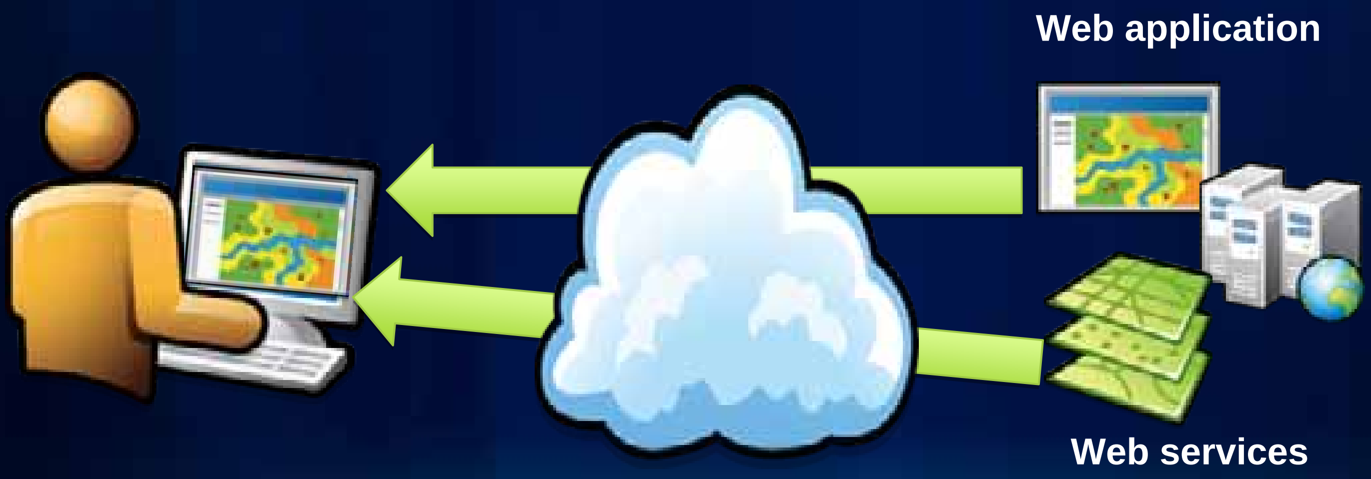
Demo

Securing Web API applications:
Bind the token in a web proxy page

Web apps and security patterns

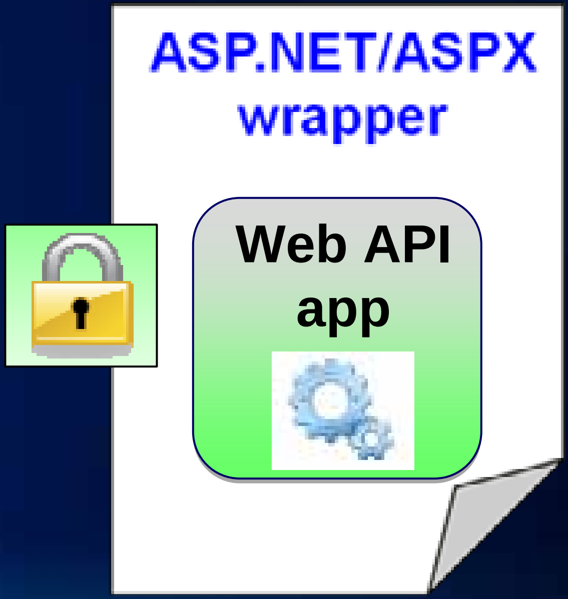
Application security considerations

- Browser based applications (JavaScript, Flex, Silverlight)
  - Application and web services need to be secured
  - Web services are accessed from the browser



Securing Web API applications

- Can’t secure applications with only client-side code
- Secure using the web server / container
  - IIS / Java EE
- Using ASP.NET
  - IIS 6: Wrap code in .aspx page
  - IIS 7: Application Pool Integrated Pipeline
- Other



ASP.NET/ASPX wrapper

Web API app

Passing identity from Web API to services

- JavaScript, Flex, and Silverlight
  - It just works
- Integrated Windows / Basic automatically pass credentials from application to web services

Passing identity to Secured Services

- Web application requests token from tokens services
  - Tokens service parameters
    - username
    - password
    - clientid (ref.[URL], ip.[IP ADDRESS])
    - Expiration (minutes)
  - E.g. : https://host/ArcGIS/tokens/?request=getToken&username=user&password=pass&clientid=ref.myAppHost&expiration=10
  - Append token to layer

Demo

Securing Web API applications:
Write full logon access to the token service

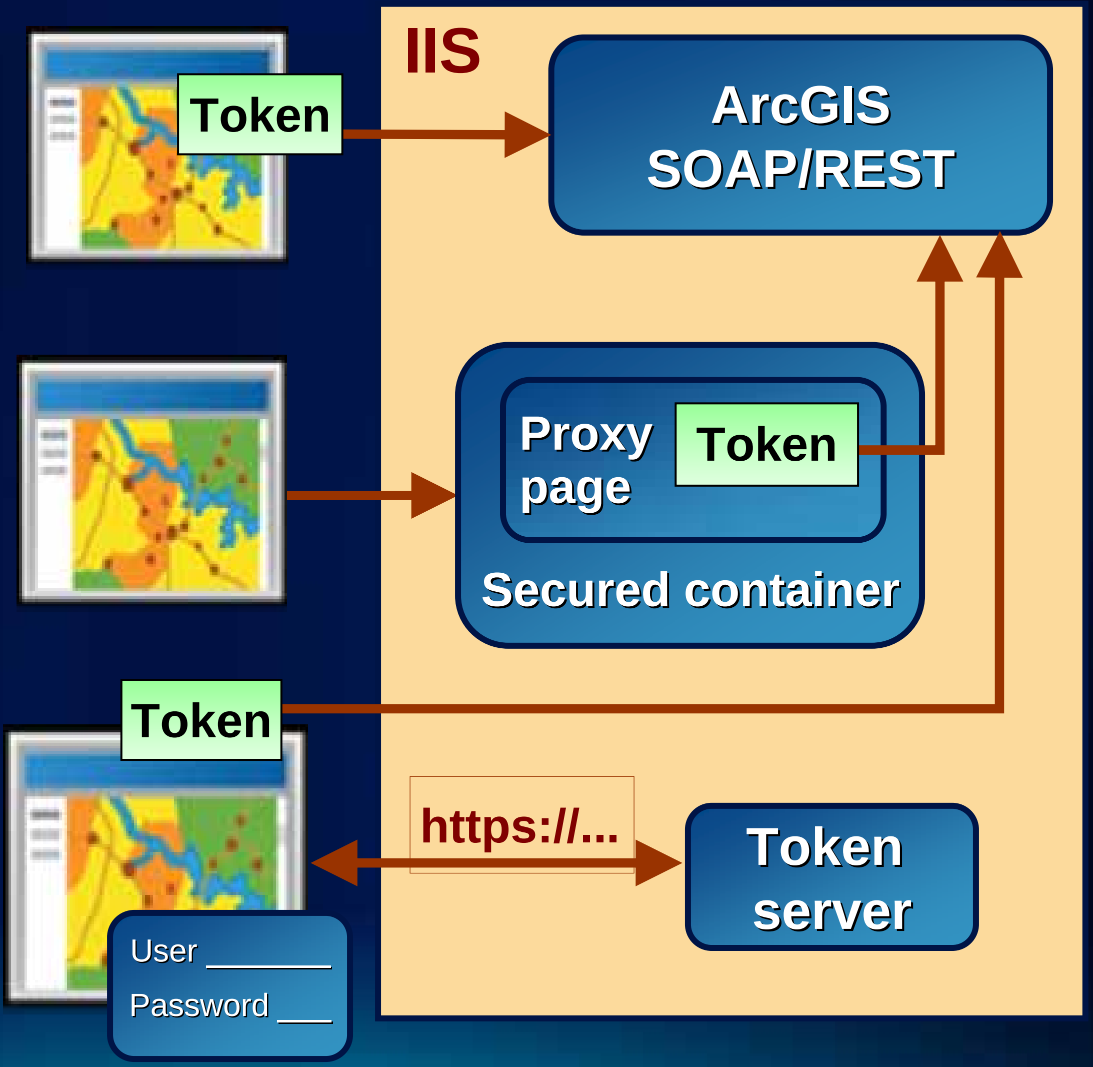
Token based Web API implementations

☑ ***Embed the token directly in code***

☑ ***Bind token in a web proxy page***

☑ ***Write full logon access to the token service***

(e.g., ArcGIS Desktop, custom application)



IIS

ArcGIS SOAP/REST

Token

Proxy page

Token

Secured container

Token

https://...

Token server

User ________

Password ___

Security patterns

Application configuration	Public app with secure services	Secure app with secure services	Public app with login for secure services	Single sign on
Security model	Token based security	All security models	Token based security	IIS Security using Integrated Windows Authentication
Embed token in proxy page	No	Yes	No	N/A
Network	Internet / Intranet	Internet / Intranet	Internet / Intranet	Intranet

Security resources for ArcGIS Server

- ArcGIS Server Resource Center
  - http://resources.arcgis.com
  - Accessing secure services: Web APIs
- Enterprise Resource Center
  - http://resources.arcgis.com/content/enterprisegis/10.0/about
- Supporting Resources for ArcGIS Server
  - ArcGIS Server Help
  - Web APIs, REST, SOAP Developer Help

Want to learn more?

ESRI Training and Education Resources

- Instructor-Led (Classroom) Training
  - ArcGIS Server: Web Administration Using the Microsoft .NET Framework

- Self-Study (Virtual Campus) Training
  - ArcGIS Server Setup and Administration
  - Implementing Security for ArcGIS Server .NET Solutions

http://www.esri.com/training

Summary

- ArcGIS Server Manager enables users to
  - Configure user and role stores
  - Secure GIS Web services
- Clients work with security
  - ArcGIS Clients (Desktop, Explorer, Engine) work seamlessly
  - SOAP and REST clients may require working with tokens
- Token management is key to maintaining secure applications

Questions

- Thank you
- Please fill out the survey

Questions ?

Please fill out a session survey…

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