An Overview of ArcWeb℠ for Developers

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An ESRI White Paper

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What Is ArcWeb for Developers?

ESRI® ArcWeb℠ for Developers provides a suite of Simple Object Access Protocol (SOAP)-based geographic information system (GIS) Web services that can be integrated easily into any Web or Internet-enabled desktop application. With ArcWeb for Developers, programmers can include GIS content and capabilities in their applications without hosting the data or developing any GIS applications themselves, resulting in significant savings of development time, expense, and computer resources. From simple mapping to more complex tasks, such as multipoint routing, ArcWeb for Developers makes creating lightweight, Web-enabled applications fast and simple.

The key advantages of using ArcWeb for Developers are the following:

- Access to vast amounts of current, reliable data and GIS capabilities without having to maintain or store the data or develop the GIS capabilities yourself

- Ability to combine multiple services (such as address matching, routing, point of interest [POI] management, and more) and integrate these services with your own application environment, leading to limitless possibilities for sharing geographic information

- No need to purchase hardware or software

- No need to obtain updates to data sets because the data accessed via ArcWeb for Developers is always current

- 24/7 reliability

- Standards-based (SOAP/XML interface, Web Services Description Language [WSDL] access, published on the Universal Description, Discovery, and Integration [UDDI] registry)

How ArcWeb for Developers Is Used

ArcWeb for Developers is compatible with Web service toolkits, making integration into existing applications easy, regardless of whether these applications are used for the Internet, an Intranet, or a wireless device. Any application that requires access to location-specific data (such as store locations or driving directions) can benefit from using ArcWeb for Developers.

Examples of where ArcWeb for Developers can be used are

■ **Dealer locator/Customer service Web sites**—Web developers can use ArcWeb for Developers to incorporate "find the nearest store" functionality into their Web sites.

■ **Consumer Web pages**—ArcWeb for Developers can be used to provide services to consumers such as real estate multiple listing services, Yellow Pages, and travel planning services.

■ **Custom Web applications**—ArcWeb for Developers can be used in any custom Web application that would benefit from mapping and GIS such as site selection, local government, environmental management, public health, and much more.

ArcWeb for Developers Architecture Overview
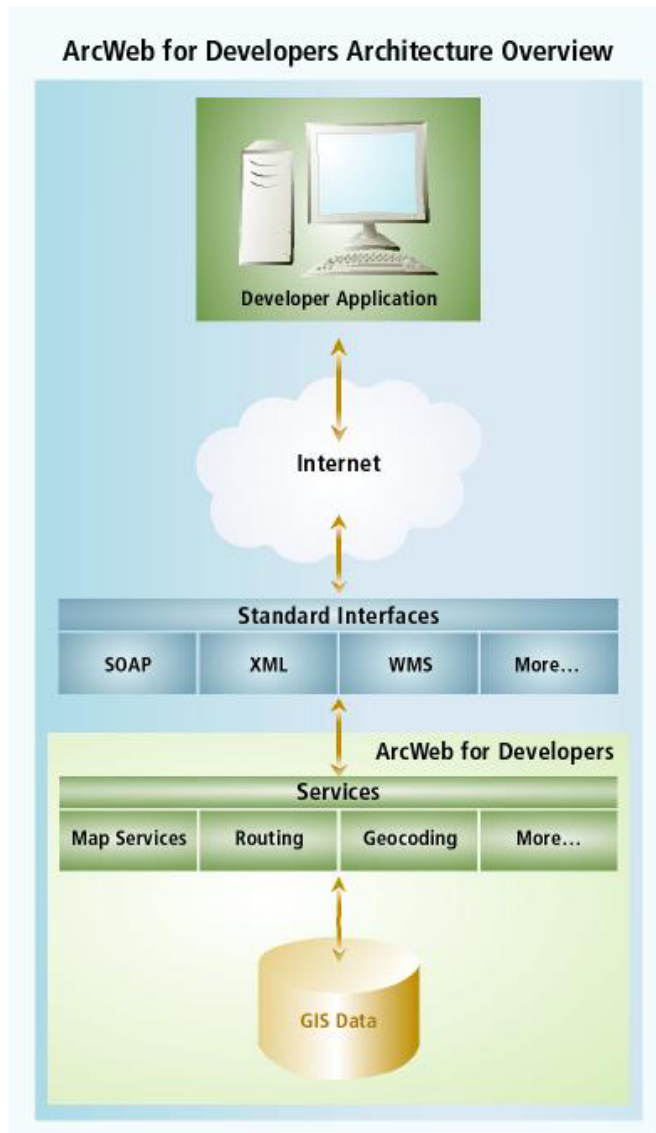
Available ArcWeb for Developers Services

The services included in ArcWeb for Developers are made available using SOAP protocols, which can be easily integrated into any Web page or custom-built Web-enabled application. ArcWeb for Developers services include

■ **Place Finder**—Ranks a candidate list of place names and associated latitude/longitude coordinates for a given input place name. This service is intended to support application developers who would like to provide "find a place" functionality within their Internet applications.

The Place Finder Web Service provides access to geographic place name data from several sources including the National Imagery and Mapping Agency (NIMA), U.S. Geological Survey (USGS), and ESRI. It also provides landmark data from Geographic Data Technology, Inc. (GDT). The Place Finder Web Service recognizes more than three million place names including geographic regions (e.g., continents, states, cities), bodies of water, and major points of interest.

The Place Finder Web Service includes the following capabilities:

- Input place name.
- Constrain search by geographic area.
- Constrain search by place type.
- Define the number of records to return.
- Filter by country.
- Define the type of search.
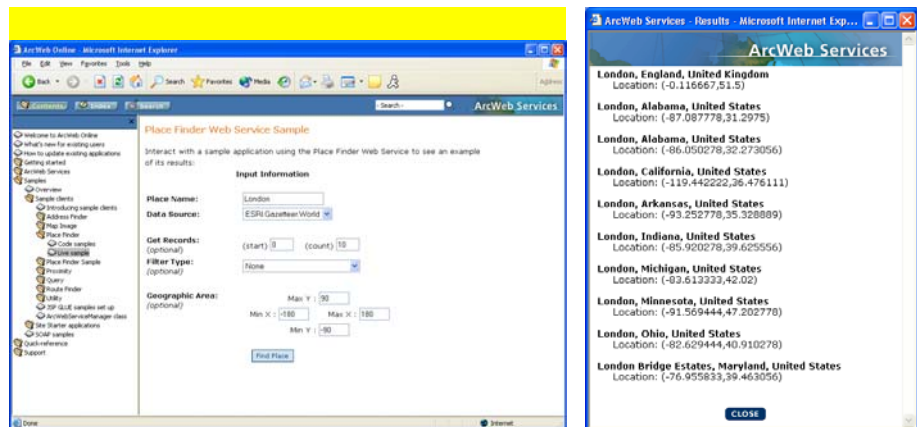
Example of the Place Finder Web Service

■ **Address Finder**—The Address Finder Web Service enables users to input a street address and receive a candidate list of matching addresses and associated *x,y* coordinates. It also enables users to input an *x,y* coordinate and receive a street address. The ArcWeb Service is intended to support application developers who would like to provide "find an address" and "get address" functionality within their Internet applications.

The Address Finder Web Service includes the following capabilities:

● Input street address or partial address (number, street name, cross street, city, state, ZIP Code).

● Perform reverse geocoding (transform a coordinate location into a street address)
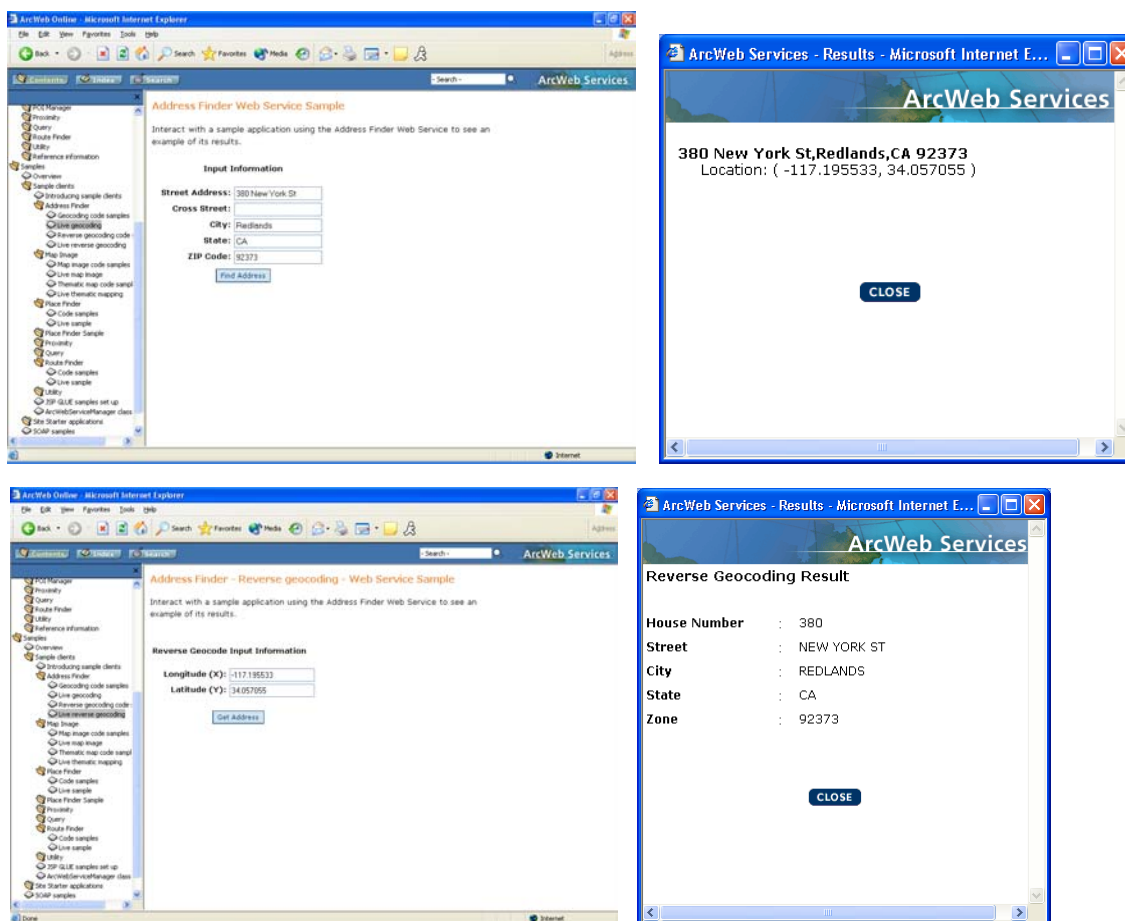
Examples of the Address Finder Web Service—Geocoding and Reverse Geocoding

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■ **Route Finder**—Returns driving directions for a multipoint user-defined route. This service accepts *x,y* coordinate inputs for two or more locations, along with routing preferences, and returns a route map and textual driving directions for the suggested route.

The Route Finder Web Service offers the following capabilities:

● Ability to specify a list of coordinate pairs for the start point, endpoint, and midpoints of a route

● Ability to input a description of points along a route

● Ability to choose whether the route is given using textual driving directions, map images, geometry, or a combination of the above

● Ability to optimize the route as shortest or quickest (along with a ranking of highway preferences)

● Supports multilingual directions (French, Italian, Dutch, Swedish, German, Portuguese, English, Spanish, Danish, and Norwegian)
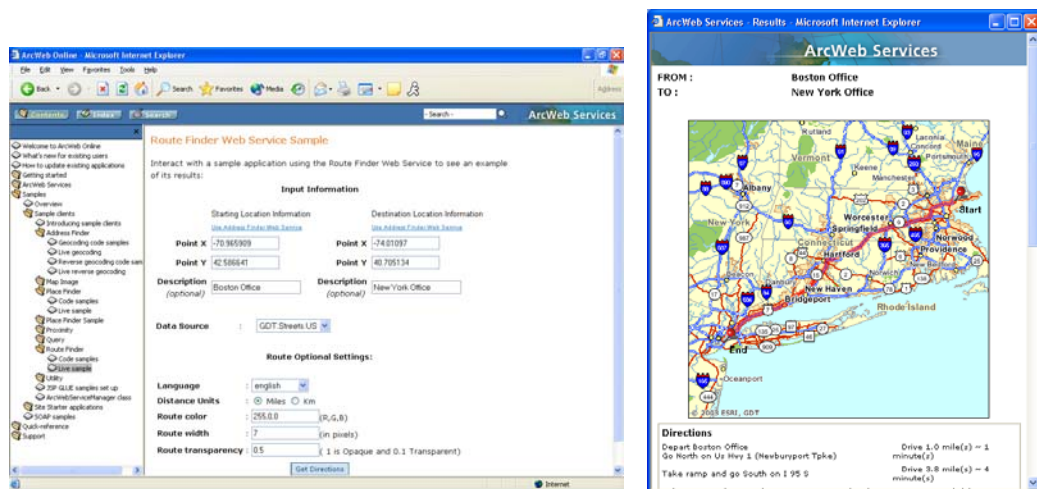
Example of the Route Finder Web Service

■ **Map Image**—Provides access to a wide variety of dynamic maps. This service enables users to input a geographic extent and several optional items (e.g., themes, type of map, size of image, map annotation) and receive the location of an output image file. The ArcWeb Service is intended to support application developers who would like to provide dynamic map content within their Internet applications.

The Map Image Web Service provides access to data sources from several leading data publishers.

The Map Image Web Service offers the following capabilities:

● Generate map image for specified geographic area.

- Generate thematic map image based on ESRI demographic variables or user-defined values.

- Generate a map style for a particular data source.

- Specify type (e.g., GIF).

- Specify size.

- Specify projection.

- Specify background color.

- Display scale bar.

- Display user-provided icons with labels through POI Manager Service.

- Display circles, lines, and polygons.

- Determine coordinate for map click.
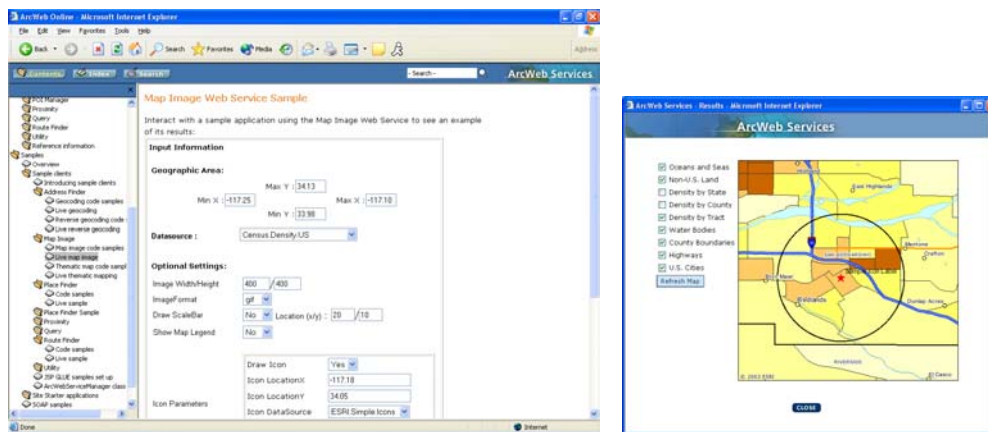
Example of the Map Image Web Service

■ **Proximity**—Returns all POI locations within a user-defined distance of a specified point or line (e.g., find all POIs within five miles of *x,y*) or determines the nearest specified number of POI locations to a specified point or line (e.g., find nearest three POIs to *x,y*).

The Proximity Web Service offers the following capabilities:

- Find the nearest features.
- Find the features within a specified radius.
- Return a list of found features and related information.
- Limit searches based on user-specified criteria.

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Example of the Proximity Web Service

■ **POI Manager**—Allows you to upload a custom set of points to ESRI, where they are geocoded and stored. Users are able to provide the points as a set of latitude/ longitude locations or street addresses along with some descriptive information about the point. The locations are then stored in a table on an ESRI server and used for mapping or proximity requests by that user.

If street addresses are uploaded to ESRI, ESRI will geocode the addresses and input the geocoded locations into the table. The user will be sent a report on the results of the geocode process. Once the locations are stored in a table, the user is able to edit or delete the locations either through a Web interface or via SOAP.

The POI Manager Service includes the following capabilities:

● Upload a set of locations or addresses to ESRI as a database file and store them in a table.

● Geocode addresses to determine locations and send the geocode report to the user.

● Add, edit, or delete locations in a table through a Web interface or SOAP.

● Upload personal icons to be used on maps.
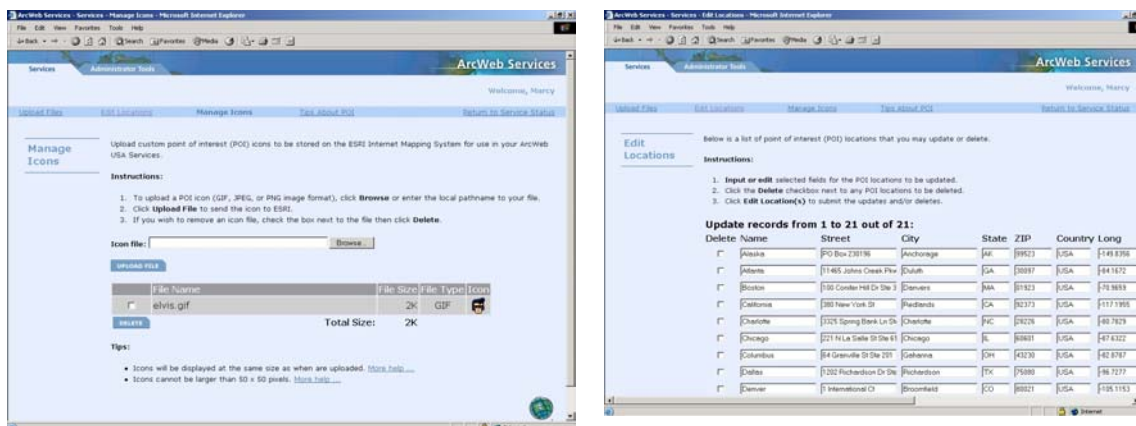
Example of the POI Manager Web Service

■ **Query**—Allows users to determine the physical, environmental, or cultural characteristics of a specific location in the United States. The data sources available for use in the Query Web Service include U.S. Census 2000 Population, Federal Emergency Management Agency (FEMA) Flood, GDT ZIP Codes, GDT Populated Places, and ESRI Business Information Solutions (ESRI BIS) demographic data.

The Query Web Service includes the following capabilities:

● Determine which attributes are available to query.

● Specify the level of geography for the query.

● Generate a list of attributes or field names, and their descriptions, for a point area, envelope, or geometric region.
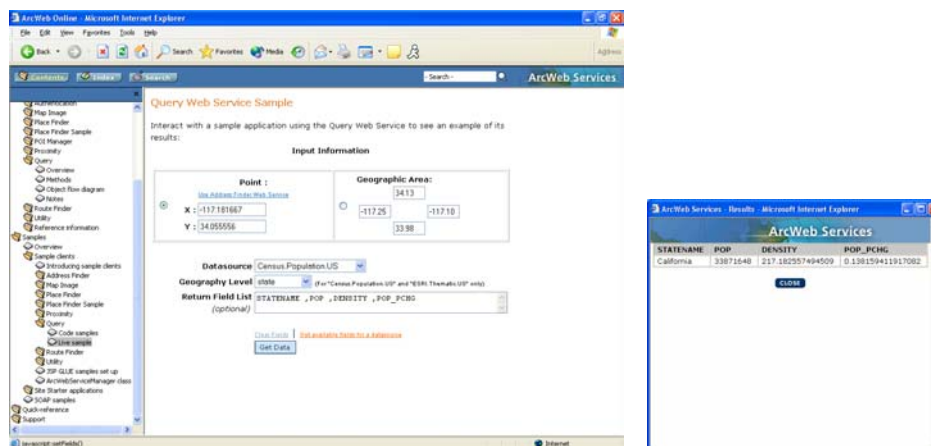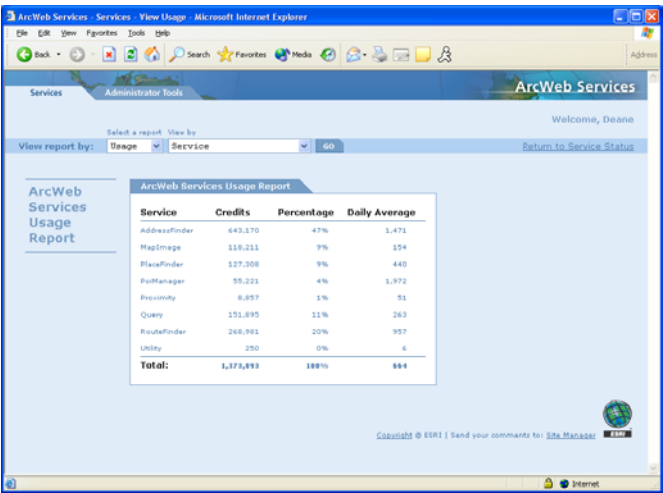

Example of the Query Web Service

■ **Account Info**—Contains information about a user's ArcWeb for Developers account. Account Info Web Service provides such information as usage statistics on data sources and ArcWeb Services. This ArcWeb Service is intended to help developers

track their usage of ArcWeb for Developers. Account Info Web Service offers a SOAP interface to information available in the View Usage section of the User Account Administration page.

Account Info Web Service contains information on the following:

- ArcWeb Services
- Data sources
- ArcWeb Services with specific data sources
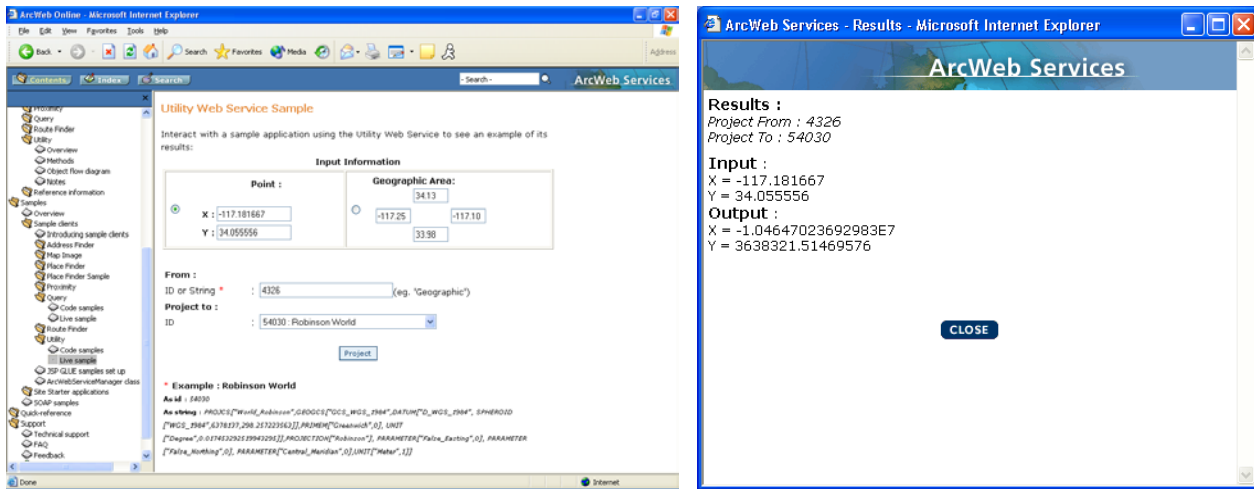- User account

Example of the Account Info Web Service

- ■ **Utility**—Allows users to change projections of map images and geometry (lines, points, and polygons).

    The Utility Web Service includes the following capabilities:

    - Change coordinate system and/or datum transformation for point, polyline, polygon, multipoint, or envelope.

Example of Utility Service

Data

ArcWeb for Developers includes a rich offering of data content. With more data being added all the time, ArcWeb for Developers includes

- GDT United States Streets
- USGS National Elevation Data
- USGS National Land Cover Data
- FEMA Q3 Flood Data
- Census 2000 Population
- National Geographic Society TOPO! Data
- Tele Atlas U.S.
- Tele Atlas Europe
- Pixxures WebPix USGS Digital Ortho Quarter Quads (DOQQ) Mosaic
- ESRI Data & Maps
- GDT Canadian Streets

Security

When it is necessary to restrict the users who can access a Web service, ArcWeb for Developers includes an Authentication Web Service. The first time a client accesses a restricted ArcWeb for Developers service, it must call the Authentication Web Service with a user name and password over a Secure Hypertext Transfer Protocol (HTTPS) Secure Sockets Layer (SSL) connection. These security measures minimize the risk that an unauthorized user can access a restricted service by stealing valid login information. If the client sends a valid user name and password, the Authentication Web Service returns a token. The token is a binary encoded string that the client application uses to call a restricted ArcWeb for Developers service.

Each time an ArcWeb for Developers service is called, the token must be passed in. This token has a time-out, after which a new token must be requested from the Authentication Web Service. A relatively short time-out helps minimize the possibility of having the token stolen. A token with a longer time-out may be requested in certain situations.

Some Web applications require additional security because of the highly sensitive nature of the data. These applications work over HTTPS and SSL so none of the information passed between client and server can be intercepted or decoded. Each ArcWeb for

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Developers service is available over HTTP and HTTPS. Because more processing occurs with HTTPS connections, performance is not as fast as with HTTP connections. If security is critical to your application, you should access ArcWeb services over HTTPS. Otherwise, use HTTP for optimal performance.

Client applications access a restricted ArcWeb for Developers service with a token from the Authentication Web Service.

More Information

For more information on the SOAP implementation of ArcWeb for Developers, download the ESRI technical paper *ArcWeb Services: A Developer's Guide to SOAP Implementation* from http://support.esri.com.

For more information on ArcWeb for Developers or to register for a free 30-day evaluation, visit www.esri.com/arcwebdev.