



Client Development Guide for Maestro 5-Series Web Services



4600 Westown Parkway Suite 301 • West Des Moines, IA 50266-1100
Phone (800) 970-9903 or (515) 222-9903 • fax (515) 222-5920
info@geolearning.com • www.geolearning.com

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Revision History

| Name | Date | Reason For Changes | Version |
|--------------|------------|---|---------|
| Ryan Bergman | 06/30/2007 | Initial | 1 |
| Ryan Bergman | 01/05/2008 | Deprecation of Group.HierarchyName complete | 1.1 |
| Ryan Bergman | 01/22/2008 | SSL documentation. | 1.1.1 |
| Ryan Bergman | 03/23/2008 | HRIS notes | 1.1.2 |
| Ryan Bergman | 07/24/2008 | Added clarifications about passwords | 1.1.3 |
| Terry Huston | 07/08/2009 | Reformatted and added data elements: <ul style="list-style-type: none"> • External ID • UniqueID • MiddleInitial • TimeZone • EHREmployeeID • AgencySubElementCode • DoChangePasswordNextLogin • Language | 1.1.4 |
| Terry Huston | 07/15/2009 | UniqueID element name correction – changed to UniqueId | 1.1.5 |
| Terry Huston | 07/31/2009 | General clarifications throughout and additional data elements: <ul style="list-style-type: none"> • BirthDate • Currency • SocialSecurityNumber | 1.1.6 |
| Terry Huston | 10/09/2009 | Role Assignment Rules | 1.1.7 |
| Terry Huston | 03/23/2010 | Explained administrator account password expiration implications | 1.1.8 |
| Terry Huston | 04/02/2010 | Added link to GitHub examples | 1.1.9 |

Introduction

Purpose of Web Services for HRIS Data

Most clients desire to integrate their human resources systems with the Maestro LMS. This allows for the seamless transfer of user data and may contain demographic information, supervisors, roles, or other information. Usually this information needs to be added when new or updated when changed. GeoMaestro provides a Web Services based API for the creation and updating of HRIS related information. This API uses the common SOAP 1.1 standard. This standard is the foundation of countless Web Services across all kinds of systems including Google, Yahoo, Microsoft and others.

Web Services Updates

GeoLearning makes every effort to minimize the frequency of changes to the Maestro Web Services API. However, as changes are made in the GeoMaestro LMS it is sometimes necessary to reflect those changes in the Web Services API. At such times it will be necessary for clients to update their references to the API even if the new elements are not required and they do not intend to use the new element. This synchronization is necessary to maintain proper functioning of the Web Services integration.

Working With Maestro Web Services

Requirements for Client Development

- Programming Tools and Libraries
 - Web Services with SOAP are a relatively recent technology which has emerged over the last decade. As such, modern programming languages, and clients are typically more at home natively working with SOAP than traditional languages. Each client has strengths and weaknesses when dealing with SOAP and SOAP objects. You should evaluate the client you wish to use to make sure it can properly interact with SOAP 1.1 and SOAP Objects; Particularly those created by .NET.
 - SOAP is, by design, a cross platform standard. However, different clients will interpret SOAP objects differently. Because the SOAP Web Services in Maestro are created by the Microsoft .NET framework it is recommended that for optimal integration clients use .NET to integrate with the services. Other clients will also integrate with these services, but you may find the translation between .NET and your client may necessitate extra steps to work with the objects. Coding examples are currently available in C#.NET, Java using Axis 1.2, and ColdFusion MX 8.
 - Go to <http://github.com/GeoLearning/HR-WebServices-Examples-C-Sharp> or <http://github.com/GeoLearning/HR-WebServices-Examples-Java> to download sample code.

- Known Incompatibilities
 - Adobe ColdFusion MX 7
ColdFusion MX 7 uses an outdated version of the Axis engine which has some problems integrating with the Maestro Web Services. While many methods work fine, developers may have difficulty with the more complex types. Clients wishing to integrate using ColdFusion should use Adobe ColdFusion MX 8.

Authentication

Maestro Web Services authenticate through simple HTTP authentication that is tied into Maestro's session management. This requires the username and password of a valid user assigned a role that has permission to "Manage User Profiles." As a default, the Administrator role has this permission. If the Administrator role has been edited another role may be substituted, providing the "Manage User Profiles" permission has been granted.

Note: In the LMS Password Security / Password Policy Settings, the Admin Pw Life Time field determines the number of days for which an administrator's password will remain valid. After this number of days elapses, the password will expire. Web Services will not work for an account whose password has expired. To prevent an interruption in Web Services, you will want to update passwords within the specified time. An option would be to set the Admin Pw Life Time to a large number like 9999 (days) so password changes would be infrequent. However, the number of days between password changes should be based on your organization's security policy.

Security

When processing real data please make sure to use an SSL encrypted channel when accessing the services. This is simply done by making all calls through "HTTPS".

- Importing SSL Certs into Java for Axis/J2EE and ColdFusion MX 8
 - Depending on your version of Java you may receive a error when attempting to talk securely to the Maestro Web Services of:
"javax.net.ssl.SSLPeerUnverifiedException: peer not authenticated"
 - To fix this error simply import the GeoLearning SSL cert into the Java key-store by doing the following:
 1. In IE 7 go to the secure login page of your domain. For example:
<https://gm1.geolearning.com/geonext/MyDomain/Login.geo>
 2. Click on the lock icon next to the URL location
 3. Select "View Certificates"
 4. Click the "Details" tab
 5. Click the "Copy to File" button
 6. In step 2 of the wizard select the "Base-64 encoded x.509 (.cer)" option.
 7. In step 3 find the location of your security folder. This should be in jre/lib/security
 - a. Coldfusion MX 8 users will find this in /ColdFusion8/runtime/jre/lib/security/

8. Save the cert with a name of your choosing
 9. Inside the JRE/bin you will find a application called keytool.exe which can import this cert. Execute the following command replacing "MyCert" with the name you gave the cert:
 - a. keytool -import -trustcacerts -keystore cacerts -storepass changeit -noprompt -alias mycert -file mycert.cer
 10. You should receive a message that "Certificate was added to keystore"
- For more information on the Java Keytool see:
<http://java.sun.com/j2se/1.4.2/docs/tooldocs/windows/keytool.html>
 - Preemptive Authentication
 - Currently most of the major Web Service engines do not support maintaining any kind of session state by accepting cookies. As a result the Web Services are designed to be completely stateless and to destroy sessions as soon as the request is complete. This means that each request coming into the services is seen as "new" and must react to the challenge-response of the HTTP authentication. While the Web Services are typically quite fast you can reduce the number of HTTP requests and gain a small speed increase by using preemptive authentication in your Web Service / HTTP engine if it is available.

Requesting New Services

GeoLearning is constantly evolving and adding to the SOAP API. If you find that you require a service that is not currently available, please contact your sales representative.

Obtaining a WSDL

In order to obtain a WSDL. Simply point your web browser to the services at:

- <https://<Your Instance URL>/<Your Domain Path>/webservises/geonext.asmx?wsdl>

Web Methods

- UserExists([string](#) userName)
 - Parameter: The unique username for the user.
 - Return Value: A Boolean of True or False to indicate if the user exists.
- UserExistsByExternalId([guid](#) ExternalID)
 - Parameter: The unique GUID for the user. This is assigned by the LMS and is immutable. You may use this ID as a foreign key in your own system if you so desire.
 - Return Value: A Boolean of True or False to indicate if the user exists.
- UserExistsByUniqueld([string](#) uniqueld)
 - Parameter: A valid unique ID for the user.
 - Return Value: A Boolean of True or False to indicate if the user exists.

- GenerateUserObject()
 - Parameter: Null
 - Return Value: An uninitialized user object.
- LoadUser(string userName)
 - Parameter: A valid username.
 - Return Value: A user object matching the username requested.
- LoadUserByExternalId(string externalId)
 - Parameter: A valid externalID.
 - Return Value: A user object matching the externalID requested.
- LoadUserByUniqueId(string uniqueId)
 - Parameter: A client provided unique ID for the user being asked for.
 - Return: A user object matching the unique ID requested.
- CreateUser(User user)
 - Parameter: A valid new user object whose name does not yet exist in the LMS.
 - Return Value: A return object listing errors and warnings.
- UpdateUser(User user)
 - Parameter: An existing user object who is to be updated.
 - Return Value: A return object listing errors and warnings.

The Maestro Object Model

This section will cover the business rules of the HRIS objects. For technical descriptions of the objects see the WSDL and accompanying .NET documentation.

User

The user object represents a user and contains all the root properties of a user.

| Property | Type | Value required? | Notes |
|----------------|--------|-----------------|--|
| FirstName | String | Yes | |
| MiddleInitial | String | No | Limited to 1 alpha character. |
| LastName | String | Yes | |
| Email | String | Yes | The LMS does not check if an email address is valid. It only looks for the "@" and a valid domain extension. |
| StreetAddress | String | No | |
| StreetAddress2 | String | No | |
| City | String | No | |

| Property | Type | Value required? | Notes |
|----------------|------------------|-----------------|--|
| State | String | No | Must exactly match a value in one of the lookup tables. Reference the: <ul style="list-style-type: none"> • State Lookup Table OR • StateShort Lookup Table Note: Values are case-sensitive. |
| Country | String | No | Must exactly match a value in the lookup table. <ul style="list-style-type: none"> • Reference the Country Lookup Table Note: Values are case-sensitive. |
| PostalCode | String | No | |
| PostalCodeType | Postal Code Type | Yes | Valid values include: <ul style="list-style-type: none"> • APO • Foreign • US • Undefined Note: Values are case-sensitive. |
| Telephone | String | No | |
| Extension | String | No | |
| LocationName | String | No | Values must exactly match a Location created in the LMS (Administration / Learning Content / Resources). Note: Values are case-sensitive. |
| StartDate | UTC Date/Time | No | Must be UTC and in International (ISO) format, yyyy-mm-dd. Note: Will default to "Today" if not passed. |
| UserName | String | Yes | Must be unique to the client domain. It must be comprised of between 1 and 64 alphanumeric characters; including dot, hyphen, underscore and @. Spaces are not allowed. Note: Reference the Unique ID / External ID / Username topic for guidelines. |
| Password | String | No | Reference the Password topic for guidelines. |

| Property | Type | Value required? | Notes |
|----------------------|-----------------|-----------------|--|
| BirthDate | UTC Date/Time | No | Must be UTC and in International (ISO) format, yyyy-mm-dd. Note: May NOT populate if EHRI is not turned on in the LMS. EHRI is reserved for Government clients only. |
| SocialSecurityNumber | String | No | Full 11 character string, with dashes, is required. Note: May NOT populate if EHRI is not turned on in the LMS. EHRI is reserved for Government clients only. |
| SupervisorUserNames | Array of String | No | Each entry must match the username of an existing user. |
| Groups | Array of Group | No | Valid values must exactly match an existing Group in the LMS. Note: Reference the Groups topic for guidelines. |
| RoleNames | Array of String | Yes | Valid values must exactly match an existing Role in the LMS. A user must have at least one role assigned at all times. Notes: Values are case-sensitive. Reference the Role Assignment Rules topic for guidelines. |
| DefaultRoleName | String | Yes | Must be a valid Role as defined in the RoleNames array. |
| ExternalId | String | No | This is assigned by the LMS and is immutable. Note: Reference the Unique ID / External ID / Username topic for guidelines. |
| TimeZone | String | No | Must exactly match a value in the lookup table. Defaults to domain time zone. • Reference the Time Zone Lookup Table Note: Values are case-sensitive. |
| Currency | String | No | Functionality not yet available in the LMS. |

| Property | Type | Value required? | Notes |
|----------------------------|--------------------------------|-----------------|--|
| Language | String | No | Must be turned on for the domain and exactly match a value in the lookup table. Defaults to English (United States). <ul style="list-style-type: none"> Reference the Language Lookup Table Note: Values are case-sensitive. |
| EHREmployeeID | String | No | Note: May NOT populate if EHRI is not turned on in the LMS. EHRI is reserved for Government clients only. |
| AgencySubElementCode | String | No | Note: May NOT populate if EHRI is not turned on in the LMS. EHRI is reserved for Government clients only. |
| DoChangePasswordNextLogin | String | No | Defaults to False unless password is auto-generated by the LMS. Valid values include: <ul style="list-style-type: none"> True False |
| Uniqueld | String | No | Must be unique to the client domain. It may be comprised of between 1 and 42 alphanumeric characters. Note: Reference the Unique ID / External ID / Username topic for guidelines. |
| CustomUserAttributes | Array of Custom User Attribute | No | An array of names of text input Custom User Attributes. The name must exactly match the <u>name</u> of a Custom User Attribute that exists in the LMS. Note: Reference the Custom User Attributes topic for guidelines. |
| CustomSelectUserAttributes | Array of Custom User Attribute | No | An array of names of single select Custom User Attributes. The name must exactly match the <u>name</u> of a Custom User Attribute that exists in the LMS. Note: Reference the Custom User Attributes topic for guidelines. |

| Property | Type | Value required? | Notes |
|------------------------|-----------------|-----------------|---|
| CatalogAccessCodeNames | Array of String | No | An array of names of Catalog Access Codes to assign to the student. Must exactly match the <u>name</u> of a Catalog Access Code that exists in the LMS. Note: CAC's can be assigned by group. |
| Status | Status | Yes | Valid values are: <ul style="list-style-type: none"> • Active • Inactive • Archived Note: Values are case-sensitive. |

Unique ID / External ID / Username

This hierarchy of unique identifiers enables clients to update user records as follows:

- Unique ID (optional)
When Unique ID is turned on in the Configure Fields module in the LMS:
 - The system will look for this field first to act as the key identifier for updating user records.
 - If a Unique ID value is provided for an individual record and that value matches one already in the system, then all remaining data elements (including username) for that record will be updated accordingly.
 - If a Unique ID value is not provided OR the Unique ID value provided does not match a value already in the system for an individual record, then the import will look to username as the unique identifier for updating user records (this is so it can update a record if it exists). If no username match exists, it will create a new user account.
- Username (required)
 - If the username provided matches a value already in the system, then all remaining data elements for that record will be updated accordingly.
 - If the username provided does not match a value already in the system, then the import will create a new user.
- External ID
 - This is assigned by the LMS and is immutable.
 - This value may be used by web services in place of the username as the key to update a record.

Password Settings

There are several options available to clients for password management, and special care should be taken in order to avoid hindering users experience by resetting or setting passwords without warning.

- All passwords passed to the user objects must pass validation against the password settings of the domain. This includes number of characters, types of characters and so on.
- If no password is passed to a "CreateUser" method the LMS will auto-generate a random password and assign it to the user. This will be communicated to the user with the "UserCreationEvent" email if it is on. By default, users will have to change their password at next login.
- If no password is passed to an "UpdateUser" method no action will be taken on password at all, thus keeping the users current password.
- **Note:** For security reasons a "LoadUser" never returns any value in the password element.

Groups

Groups represent a hierarchical structure used to organize users. At this time the Group hierarchy must be built and maintained through the Maestro user interface. Each Group is made up of a name string that represents the hierarchical structure. For example if you have a root group called "Foo" and a child named "Bar" you can assign a user to the group with a value of "Foo/Bar". By using the pathing you can have two or more groups with the same name as long as they have different parents:

- Group A
 - Group Y
 - Group Z
- Group B
 - Group Y
 - Group Z

| Property | Type | Value Required? | Notes |
|----------|--------|-----------------|--|
| Name | String | Yes | The hierarchical path to the group, including the group name. Children and parents are separated by slashes. For example if you have a root group called "Foo" and a child named "Bar" you can assign a user to the group with a value of "Foo/Bar". |

Role Assignment Rules

Clients who use Web Services to create and update user profile information need to be aware that the user account used for connection can only assign Roles to other users if that account profile also contains that Role. This is true for all Roles other than Learner. For example:

- USER123 account is assigned these roles: Learner, Instructor, Domain Manager.
- USER123 account is used to connect via Web Services to upload a user record that contains the following data:

| Username | FirstName | LastName | Email | Password | Status | RoleNames | DefaultRoleName |
|----------|-----------|----------|--|----------|--------|---------------|-----------------|
| ADMIN987 | Admin | Account | admin987@geo.com | | Active | Administrator | Administrator |

- USER123 will receive an error and will not be able to complete the upload.

Custom User Attributes

Custom User Attributes are fields created in your domain by an admin. These attributes become part of the domain user profile. There is only one kind of Custom User Attribute object but two collections that they are a part of.

| Property | Type | Value Required? | Notes |
|----------|--------|--------------------|---|
| Name | String | Yes | The Name of the CUA. An example might be "Job Description" |
| Value | String | Yes | The Value of the CUA for the user. An example might be "Software Developer" |

- CUA Collection: CustomSelectUserAttributes
CustomSelectUserAttributes are CUA's that are displayed as a select menu in the user profile. They have a predefined set of possible values. Passing a CUA to this collection where the value does not match an existing value will result in a warning.
- CUA Collection: CustomUserAttributes
CustomUserAttributes are CUA's that are displayed as a text input in the user profile. Any string value may be passed as its value.

Return

Any Web Service method that performs any kind of save action within the LMS will return a "Return" object. This is a set of collections containing errors and warnings. Any error listed in the "Errors" array means that the object was not saved. Any error in the "Warnings" array means that the object was saved but that these specific items failed.

Working with HRIS Data

Clients of GeoLearning range from small companies with a few hundred employees to large corporations and government agencies with hundreds of thousands of employees and customers. When considering a strategy for feeding HRIS data through Web Services please keep in mind the physical limitations of both your own system and the LMS to which you will integrate.

The main advantage to a Web Services approach is the idea of having “real time” integration. Meaning it is possible that as soon as a user is created or updated in your HRIS system a call can be made to the LMS to create or update the user. By implementing in this manner you distribute the load across time, reducing load on the HRIS system as well as the LMS.

If real time integration is not possible and the process must be batched then delta record sets should be used. This would be only new or changed users since the last set of updates. Clients with more than a few hundred users should never attempt to feed all of their users at once.

Initial Load of Historical Data

For clients with more than 500 users, it is recommended that you utilize either the batch user import utility or the historical data migration framework in order to populate the application with your initial dataset. Once your data has been populated you will be able to synchronize your process with delta sets.

Working with Multiple Update Points

A users profile and assignments can be modified by many different interfaces within the LMS. These include the batch user import and the user management interface. Collections like CAC's and groups can be modified within their own administrative areas. It is important to remember that when you update a user through the Web Services you are replacing all data contained in that request. The CAC's, groups and roles that you assign will become the **ONLY** ones the user will be assigned to. Clients who wish to avoid overwriting collection data that may have changed through other means should make sure they are performing a “load” of the existing user object and only adding data to it rather than replacing it completely.

Appendix A: Glossary

| Term | Definition |
|------|--|
| HTTP | Hypertext Transfer Protocol is a communications protocol used to transfer or convey information on the World Wide Web. Its original purpose was to provide a way to publish and retrieve HTML hypertext pages. |
| SOAP | (Simple Object Access Protocol) is a protocol for exchanging XML-based messages over computer networks, normally using HTTP/HTTPS. SOAP forms the foundation layer of the Web Services stack, providing a basic messaging framework that more abstract layers can build on. |
| WSDL | Web Services Description Language (pronounced 'wiz-dull') is an XML-based service description on how to communicate using Web Services. The WSDL defines services as collections of network endpoints, or ports. WSDL specification provides an XML format for documents for this purpose. |

Appendix B: Lookup Tables

State Lookup Table

The value for the element State must exactly match a value in the table below.

Note: Values are case-sensitive.

| State List – United States | |
|--------------------------------|--------------------------|
| ALABAMA | MONTANA |
| ALASKA | NEBRASKA |
| AMERICAN SAMOA | NEVADA |
| ARIZONA | NEW HAMPSHIRE |
| ARKANSAS | NEW JERSEY |
| CALIFORNIA | NEW MEXICO |
| COLORADO | NEW YORK |
| CONNECTICUT | NORTH CAROLINA |
| DELAWARE | NORTH DAKOTA |
| DISTRICT OF COLUMBIA | NORTHERN MARIANA ISLANDS |
| FEDERATED STATES OF MICRONESIA | OHIO |
| FLORIDA | OKLAHOMA |
| GEORGIA | OREGON |
| GUAM | PALAU |
| HAWAII | PENNSYLVANIA |
| IDAHO | PUERTO RICO |
| ILLINOIS | RHODE ISLAND |
| INDIANA | SOUTH CAROLINA |
| IOWA | SOUTH DAKOTA |
| KANSAS | TENNESSEE |
| KENTUCKY | TEXAS |
| LOUISIANA | UTAH |
| MAINE | VERMONT |
| MARSHALL ISLANDS | VIRGIN ISLANDS |
| MARYLAND | VIRGINIA |
| MASSACHUSETTS | WASHINGTON |
| MICHIGAN | WEST VIRGINIA |
| MINNESOTA | WISCONSIN |
| MISSISSIPPI | WYOMING |
| MISSOURI | |
| State List – Canada | |
| ALBERTA | NUNAVUT |
| BRITISH COLUMBIA | ONTARIO |
| MANITOBA | PRINCE EDWARD ISLAND |
| NEW BRUNSWICK | QUEBEC |
| NEWFOUNDLAND AND LABRADOR | SASKATCHEWAN |
| NOVA SCOTIA | YUKON |
| NORTHWEST TERRITORIES | |

Short State Lookup Table

The value for the element StateShort must exactly match a value in the table below.

Note: Values are case-sensitive.

| State Short List – United States | |
|----------------------------------|----|
| AL | MT |
| AK | NE |
| AS | NV |
| AZ | NH |
| AR | NJ |
| CA | NM |
| CO | NY |
| CT | NC |
| DE | ND |
| DC | MP |
| FM | OH |
| FL | OK |
| GA | OR |
| GU | PW |
| HI | PA |
| ID | PR |
| IL | RI |
| IN | SC |
| IA | SD |
| KS | TN |
| KY | TX |
| LA | UT |
| ME | VT |
| MH | VI |
| MD | VA |
| MA | WA |
| MI | WV |
| MN | WI |
| MS | WY |
| MO | |
| State Short List – Canada | |
| AB | NV |
| BC | ON |
| MB | PE |
| NB | QC |
| NL | SK |
| NS | YT |
| NT | |

Country Lookup Table

The value for the element Country must exactly match a value in the table below.

Note: Values are case-sensitive.

| Country List | | |
|--------------------------------|-----------------------------|----------------------------|
| Afghanistan | Chad | Ghana |
| Albania | Chile | Gibraltar |
| Algeria | China | Greece |
| American Samoa | Christmas Island | Greenland |
| Andorra | Cocos (Keeling) Islands | Grenada |
| Angola | Colombia | Guadeloupe |
| Anguilla | Comoros | Guam |
| Antarctica | Congo | Guatemala |
| Antigua and Barbuda | Cook Islands | Guinea |
| Argentina | Costa Rica | Guinea-Bissau |
| Armenia | Cote D'Ivoire (Ivory Coast) | Guyana |
| Aruba | Croatia (Hrvatska) | Haiti |
| Australia | Cuba | Heard and McDonald Islands |
| Austria | Cyprus | Honduras |
| Azerbaijan | Czech Republic | Hong Kong |
| Bahamas | Czechoslovakia (former) | Hungary |
| Bahrain | Denmark | Iceland |
| Bangladesh | Djibouti | India |
| Barbados | Dominica | Indonesia |
| Belarus | Dominican Republic | Iraq |
| Belgium | East Timor | Ireland |
| Belize | Ecuador | Israel |
| Benin | Egypt | Italy |
| Bermuda | El Salvador | Jamaica |
| Bhutan | Equatorial Guinea | Japan |
| Bolivia | Eritrea | Jordan |
| Bosnia and Herzegovina | Estonia | Kazakhstan |
| Botswana | Ethiopia | Kenya |
| Bouvet Island | Falkland Islands (Malvinas) | Kiribati |
| Brazil | Faroe Islands | Korea (South) |
| British Indian Ocean Territory | Fiji | Kuwait |
| Brunei Darussalam | Finland | Kyrgyzstan |
| Bulgaria | France | Laos |
| Burkina Faso | French Guiana Lebanon | Latvia |
| Burundi | French Guiana | Lebanon |
| Cambodia | French Polynesia | Lesotho |
| Cameroon | French Southern Territories | Liberia |
| Canada | Gabon | Libya |
| Cape Verde | Gambia | Liechtenstein |
| Cayman Islands | Georgia | Lithuania |
| Central African Republic | Germany | Luxembourg |

| Country List (continued) | | |
|--------------------------|----------------------------------|---------------------------|
| Macau | Palau | Swaziland |
| Macedonia | Panama | Sweden |
| Madagascar | Papua New Guinea | Switzerland |
| Malawi | Paraguay | Taiwan |
| Malaysia | Peru | Tajikistan |
| Maldives | Philippines | Tanzania |
| Mali | Pitcairn | Thailand |
| Malta | Poland | Togo |
| Marshall Islands | Portugal | Tokelau |
| Martinique | Puerto Rico | Tonga |
| Mauritania | Qatar | Trinidad and Tobago |
| Mauritius | Reunion | Tunisia |
| Mayotte | Romania | Turkey |
| Mexico | Russian Federation | Turkmenistan |
| Micronesia | Rwanda | Turks and Caicos Islands |
| Moldova | S. Georgia And S. Sandwich Isls. | Tuvalu |
| Monaco | Saint Kitts and Nevis | Uganda |
| Mongolia | Saint Lucia | Ukraine |
| Montserrat | Samoa | United Arab Emirate |
| Morocco | San Marino | United Kingdom |
| Mozambique | Sao Tome and Principe | United States |
| Myanmar | Saudi Arabia | Uruguay |
| Namibia | Senegal | US Minor Outlying Islands |
| Nauru | Seychelles | Uzbekistan |
| Nepal | Sierra Leone | Vanuatu |
| Netherlands | Singapore | Vatican City State |
| Netherlands Antilles | Slovak Republic | Venezuela |
| Neutral Zone | Slovenia | Viet Nam |
| New Caledonia | Solomon Islands | Virgin Islands (British) |
| New Zealand (Aotearoa) | Somalia | Virgin Islands (U.S.) |
| Nicaragua | South Africa | Wallis and Futuna Islands |
| Niger | Spain | Western Sahara |
| Nigeria | Sri Lanka | Yemen |
| Niue | St. Helena | Yugoslavia |
| Norfolk Island | St. Pierre and Miquelon | Zaire |
| Northern Mariana Islands | St. Vincent And the Grenadines | Zambia |
| Norway | Sudan | Zimbabwe |
| Oman | Suriname | |
| Pakistan | Svalbard and Jan Mayen Isls. | |

Time Zone Lookup Table

The value for the element TimeZone must exactly match a value in the table below.

Note: Values are case-sensitive.

| Time Zone List | | |
|----------------------|--------------------------------|------------------------------|
| Africa/Abidjan | Africa/Nairobi | America/Cayman |
| Africa/Accra | Africa/Ndjamena | America/Chicago |
| Africa/Addis_Ababa | Africa/Niamey | America/Chihuahua |
| Africa/Algiers | Africa/Nouakchott | America/Costa_Rica |
| Africa/Asmera | Africa/Ouagadougou | America/Cuiaba |
| Africa/Bamako | Africa/Porto-Novo | America/Curacao |
| Africa/Bangui | Africa/Sao_Tome | America/Danmarkshavn |
| Africa/Banjul | Africa/Tripoli | America/Dawson |
| Africa/Bissau | Africa/Tunis | America/Dawson_Creek |
| Africa/Blantyre | Africa/Windhoek | America/Denver |
| Africa/Brazzaville | America/Adak | America/Detroit |
| Africa/Bujumbura | America/Anchorage | America/Dominica |
| Africa/Cairo | America/Anguilla | America/Edmonton |
| Africa/Casablanca | America/Antigua | America/Eirunepe |
| Africa/Ceuta | America/Araguaina | America/El_Salvador |
| Africa/Conakry | America/Argentina/Buenos_Aires | America/Fortaleza |
| Africa/Dakar | America/Argentina/Catamarca | America/Glace_Bay |
| Africa/Dar_es_Salaam | America/Argentina/Cordoba | America/Godthab |
| Africa/Djibouti | America/Argentina/Jujuy | America/Goose_Bay |
| Africa/Douala | America/Argentina/La_Rioja | America/Grand_Turk |
| Africa/El_Aaiun | America/Argentina/Mendoza | America/Grenada |
| Africa/Freetown | America/Argentina/Rio_Gallegos | America/Guadeloupe |
| Africa/Gaborone | America/Argentina/San_Juan | America/Guatemala |
| Africa/Harare | America/Argentina/Tucuman | America/Guayaquil |
| Africa/Johannesburg | America/Argentina/Ushuaia | America/Guyana |
| Africa/Kampala | America/Aruba | America/Halifax |
| Africa/Khartoum | America/Asuncion | America/Havana |
| Africa/Kigali | America/Atikokan | America/Hermosillo |
| Africa/Kinshasa | America/Bahia | America/Indiana/Indianapolis |
| Africa/Lagos | America/Barbados | America/Indiana/Knox |
| Africa/Libreville | America/Belem | America/Indiana/Marengo |
| Africa/Lome | America/Belize | America/Indiana/Petersburg |
| Africa/Luanda | America/Blanc-Sablon | America/Indiana/Vevay |
| Africa/Lubumbashi | America/Boa_Vista | America/Indiana/Vincennes |
| Africa/Lusaka | America/Bogota | America/Inuvik |
| Africa/Malabo | America/Boise | America/Iqaluit |
| Africa/Maputo | America/Cambridge_Bay | America/Jamaica |
| Africa/Maseru | America/Campo_Grande | America/Juneau |
| Africa/Mbabane | America/Cancun | America/Kentucky/Louisville |
| Africa/Mogadishu | America/Caracas | America/Kentucky/Monticello |
| Africa/Monrovia | America/Cayenne | America/La_Paz |

| Time Zone List (continued) | | |
|--------------------------------|---------------------------|-------------------|
| America/Lima | America/St_Vincent | Asia/Dubai |
| America/Los_Angeles | America/Swift_Current | Asia/Dushanbe |
| America/Maceio | America/Tegucigalpa | Asia/Gaza |
| America/Managua | America/Thule | Asia/Harbin |
| America/Manaus | America/Thunder_Bay | Asia/Hong_Kong |
| America/Martinique | America/Tijuana | Asia/Hovd |
| America/Mazatlan | America/Toronto | Asia/Irkutsk |
| America/Menominee | America/Tortola | Asia/Jakarta |
| America/Merida | America/Vancouver | Asia/Jayapura |
| America/Mexico_City | America/Whitehorse | Asia/Jerusalem |
| America/Miquelon | America/Winnipeg | Asia/Kabul |
| America/Moncton | America/Yakutat | Asia/Kamchatka |
| America/Monterrey | America/Yellowknife | Asia/Karachi |
| America/Montevideo | Antarctica/Casey | Asia/Kashgar |
| America/Montreal | Antarctica/Davis | Asia/Katmandu |
| America/Montserrat | Antarctica/DumontDURville | Asia/Krasnoyarsk |
| America/Nassau | Antarctica/Mawson | Asia/Kuala_Lumpur |
| America/New_York | Antarctica/McMurdo | Asia/Kuching |
| America/Nipigon | Antarctica/Palmer | Asia/Kuwait |
| America/Nome | Antarctica/Rothera | Asia/Macau |
| America/Noronha | Antarctica/South_Pole | Asia/Magadan |
| America/North_Dakota/Center | Antarctica/Syowa | Asia/Makassar |
| America/North_Dakota/New_Salem | Antarctica/Vostok | Asia/Manila |
| America/Panama | Arctic/Longyearbyen | Asia/Muscat |
| America/Pangnirtung | Asia/Aden | Asia/Nicosia |
| America/Paramaribo | Asia/Almaty | Asia/Novosibirsk |
| America/Phoenix | Asia/Amman | Asia/Omsk |
| America/Port-au-Prince | Asia/Anadyr | Asia/Oral |
| America/Port_of_Spain | Asia/Aqtan | Asia/Phnom_Penh |
| America/Porto_Velho | Asia/Aqtobe | Asia/Pontianak |
| America/Puerto_Rico | Asia/Ashgabat | Asia/Pyongyang |
| America/Rainy_River | Asia/Baghdad | Asia/Qatar |
| America/Rankin_Inlet | Asia/Bahrain | Asia/Qyzylorda |
| America/Recife | Asia/Baku | Asia/Rangoon |
| America/Regina | Asia/Bangkok | Asia/Riyadh |
| America/Rio_Branco | Asia/Beirut | Asia/Saigon |
| America/Santiago | Asia/Bishkek | Asia/Sakhalin |
| America/Santo_Domingo | Asia/Brunei | Asia/Samarkand |
| America/Sao_Paulo | Asia/Calcutta | Asia/Seoul |
| America/Scoresbysund | Asia/Choibalsan | Asia/Shanghai |
| America/Shiprock | Asia/Chongqing | Asia/Singapore |
| America/St_Johns | Asia/Colombo | Asia/Taipei |
| America/St_Kitts | Asia/Damascus | Asia/Tashkent |
| America/St_Lucia | Asia/Dhaka | Asia/Tbilisi |
| America/St_Thomas | Asia/Dili | Asia/Tehran |

| Time Zone List (continued) | | |
|----------------------------|---------------------|----------------------|
| Asia/Thimphu | Europe/Helsinki | Indian/Comoro |
| Asia/Tokyo | Europe/Isle_of_Man | Indian/Kerguelen |
| Asia/Ulaanbaatar | Europe/Istanbul | Indian/Mahe |
| Asia/Urumqi | Europe/Jersey | Indian/Maldives |
| Asia/Vientiane | Europe/Kaliningrad | Indian/Mauritius |
| Asia/Vladivostok | Europe/Kiev | Indian/Mayotte |
| Asia/Yakutsk | Europe/Lisbon | Indian/Reunion |
| Asia/Yekaterinburg | Europe/Ljubljana | Pacific/Apia |
| Asia/Yerevan | Europe/London | Pacific/Auckland |
| Atlantic/Azores | Europe/Luxembourg | Pacific/Chatham |
| Atlantic/Bermuda | Europe/Madrid | Pacific/Easter |
| Atlantic/Canary | Europe/Malta | Pacific/Efate |
| Atlantic/Cape_Verde | Europe/Mariehamn | Pacific/Enderbury |
| Atlantic/Faeroe | Europe/Minsk | Pacific/Fakaofu |
| Atlantic/Jan_Mayen | Europe/Monaco | Pacific/Fiji |
| Atlantic/Madeira | Europe/Moscow | Pacific/Funafuti |
| Atlantic/Reykjavik | Europe/Oslo | Pacific/Galapagos |
| Atlantic/South_Georgia | Europe/Paris | Pacific/Gambier |
| Atlantic/St_Helena | Europe/Podgorica | Pacific/Guadacanal |
| Atlantic/Stanley | Europe/Prague | Pacific/Guam |
| Australia/Adelaide | Europe/Riga | Pacific/Honolulu |
| Australia/Brisbane | Europe/Rome | Pacific/Johnston |
| Australia/Broken_Hill | Europe/Samara | Pacific/Kiritimati |
| Australia/Currie | Europe/San_Marino | Pacific/Kosrae |
| Australia/Darwin | Europe/Sarajevo | Pacific/Kwajalein |
| Australia/Hobart | Europe/Simferopol | Pacific/Majuro |
| Australia/Lindeman | Europe/Skopje | Pacific/Marquesas |
| Australia/Lord_Howe | Europe/Sofia | Pacific/Midway |
| Australia/Melbourne | Europe/Stockholm | Pacific/Nauru |
| Australia/Perth | Europe/Tallinn | Pacific/Niue |
| Australia/Sydney | Europe/Tirane | Pacific/Norfolk |
| Europe/Amsterdam | Europe/Uzhgorod | Pacific/Noumea |
| Europe/Andorra | Europe/Vaduz | Pacific/Pago_Pago |
| Europe/Athens | Europe/Vatican | Pacific/Palau |
| Europe/Belgrade | Europe/Vienna | Pacific/Pitcairn |
| Europe/Berlin | Europe/Vilnius | Pacific/Ponape |
| Europe/Bratislava | Europe/Volgograd | Pacific/Port_Moresby |
| Europe/Brussels | Europe/Warsaw | Pacific/Rarotonga |
| Europe/Bucharest | Europe/Zagreb | Pacific/Saipan |
| Europe/Budapest | Europe/Zaporozhye | Pacific/Tahiti |
| Europe/Chisinau | Europe/Zurich | Pacific/Tarawa |
| Europe/Copenhagen | Indian/Antananarivo | Pacific/Tongatapu |
| Europe/Dublin | Indian/Chagos | Pacific/Truk |
| Europe/Gibraltar | Indian/Christmas | Pacific/Wake |
| Europe/Guernsey | Indian/Cocos | Pacific/Wallis |

Language Lookup Table

The value for the element Language must exactly match a value in the table below.

Note: Values are case-sensitive.

| Language List | |
|--------------------------|-------------|
| Language | Valid Value |
| Deutsch (Deutschland) | de-DE |
| English (United Kingdom) | en-GB |
| English (United States) | en-US |
| Español (América Latina) | es-LA |
| Français (Canada) | fr-CA |
| Français (France) | fr-FR |
| Italiano (Italia) | it-IT |
| 日本語 (日本) | ja-JP |
| Nederlands (Nederland) | nl-NL |
| Português (Brasil) | pt-BR |
| 中文(中华人民共和国) | zh-CN |