



Client Development Guide for Maestro 5-Series Web Services



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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 I.I 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 I.I 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 an 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>/webservices/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.
- UserExistsByUniqueId([string](#) uniqueId)
 - 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. <ul style="list-style-type: none"> 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.
EHRIEmployeeID	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/Aqtau	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/Guadalcanal
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