

Language Grid

NICT Language Grid Project

Language Grid Collaboration Tool Developer's Manual

NICT Language Grid Project



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1. Introduction

Language Grid is a multi-language service platform developed by the National Institute of Information and Communications Technology (NICT) that enables users to link language resources on the Internet, such as machine translations or dictionaries, to construct new language services. For example, when a machine translation between two languages is not available, a user can combine several machine translations to create a new desired language pair. A user can also connect a bilingual dictionary with a certain specialty to a machine translation to create a new machine translation for the specified area.

This manual describes how to invoke the functions provided by the Language Grid.

1.1. Intended Users

There are three types of stakeholders in Language Grid:

- Language Service Users
Users who invoke the various language services registered in the Language Grid
- Language Resource Providers
Providers who provide language resources to the Language Grid
- Computation Resource Providers
Providers who provide a Language Grid core node and/or a Language Grid service node

This manual provides instructions for Language Grid use, especially for language service users. Language service users include developers of collaboration tools using language services on the Language Grid, users who operate those tools to support collaboration among end-users, and end-users who collaborate with people who speak different languages. This manual focuses only on the developers of the collaboration tools, since the operators and the end-users of those tools use the Language Grid only indirectly through the tools. Therefore, this manual assumes knowledge of programming and Web service technologies. For information about programming and Web service technologies, please refer to textbooks or information on individual web sites.

1.2. Provisioning Features of the Language Grid

The Language Grid provides the three following services to language service users:

- Language Service Search
This is a search with criteria specialized for machine translations and dictionaries. For example, users can search language services for a certain language pair.
- Language Service Data Acquisition
Users can search language services registered in the Language Grid with queries about service profile data and receive profile data or WSDL data as search results.
- Execution of Language Services

This service executes various language services registered in the Language Grid in response to given input. Translation services, dictionary services, bilingual dictionary services, parallel texts services, morphological analysis services, paraphrasing services, similarity calculation services, adjacency pairs services, back translation services, and multi-hop translation services are all provided.

2. Language Grid API

In this section, we explain the APIs provided by Language Grid. In the APIs, users can use the language codes, which are defined in RFC 3066 (<http://www.ietf.org/rfc/rfc3066.txt>) for arguments related to language.

2.1. Language Service Search API

2.1.1. Search Service

Assertion	ServiceEntrySearchResult searchServices (int startIndex, int maxCount, MatchingCondition[] conditions, Order[] orders, String scope) throws AccessLimitExceededException, InvalidParameterException, NoAccessPermissionException, ServiceConfigurationException, UnknownException, UnsupportedMatchingMethodException;	
Argument	startIndex	Start index of search results.
	maxCount	Total number of search results. Maximum is 30.
	conditions	Matching condition for searching. AND search.
	orders	Sort method of search results
	scope	Range of service for search (specifies scope value in text).
Return value	Search results for startIndex and maxCount.	
Comment	This method searches the service set in the Language Grid (both external service and BPEL service). The range of searches is set by startIndex and maxCount.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.

	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedMatchingMethodException	This exception occurs when the available matching method is not specified in the arguments.

2.1.2. Search Composite Service

Assertion	CompositeServiceEntrySearchResult searchCompositeServices (int startIndex, int maxCount, MatchingCondition[] conditions, Order[] orders, String scope) throws AccessLimitExceededException, InvalidParameterException, NoAccessPermissionException, ServiceConfigurationException, UnknownException, UnsupportedMatchingMethodException;	
Argument	startIndex	Start index of search results.
	maxCount	Total number of search results. Maximum is 30.
	conditions	Matching condition for searching. AND search.
	orders	Sort method of search results
	scope	Range of service for search. (specifies scope value in text)
Return value	Search results for startIndex and maxCount.	
Comment	Searches services registered on the Language Grid (BPEL Service only). The results include atomic service information used by that service. The range of searches is set by startIndex and maxCount.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.

	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedMatchingMethodException	This exception occurs when the available matching method is not specified in the arguments.

2.2. Language Service Data Acquisition API

2.2.1. Acquire Service Profile

Assertion	ServiceProfile getServiceProfile (String serviceId) throws AccessLimitExceededException, InvalidParameterException, NoAccessPermissionException, ServiceConfigurationException, ServiceNotFoundException, UnknownException;	
Argument	serviceId	Service ID
Return value	Information of service profile	
Comment	This method obtains service profiles that have been registered in the Language Grid.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception is occurred when the service is invoked with an invalid argument.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotFoundException	This exception occurs when the method cannot find the specified service ID.
	UnknownException	This exception occurs when the service fails for unknown reasons.

2.2.2. Acquire WSDL

Assertion	byte[] getServiceWSDL (String serviceId) throws AccessLimitExceededException, InvalidParameterException, NoAccessPermissionException, ServiceConfigurationException, ServiceNotFoundException, UnknownException;	
Argument	serviceId	Service ID
Return value	WSDL of the service.	
Comment	Acquires WSDL to invoke services registered on Language Grid	

Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotFoundException	This exception occurs when the method cannot find the specified service ID.
	UnknownException	This exception occurs when the service fails for unknown reasons.

2.3. Language Service Execution API

2.3.1. Translation Service Interface

Assertion	String translate (String sourceLang, String targetLang, String source) throws AccessLimitExceededException, InvalidParameterException, LanguagePairNotUniquelyDecidedException, NoAccessPermissionException, ServiceConfigurationException, TranslationFailedException, UnknownException, UnsupportedLanguagePairException;	
Argument	sourceLang	Source language
	targetLang	Target language
	source	Sentence to be translated.
Return value	Translation result	
Comment	This translates a sentence in a source language into a target language. The source and target languages are specified in the arguments, sourceLang and targetLang, respectively. If the language pair is not uniquely decided, this throws LanguagePairNotUniquelyDecidedException. To avoid this exception, it is necessary to specify a more concrete language code for the arguments. (e.g. (“jp”, “zh”) -> (“jp”, “zh-CN”))	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.

	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguagePairNotUniquelyDecidedException	This exception occurs when the language pair is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	TranslationFailedException	This exception occurs when the invoked service fails to translate.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguagePairException	This exception occurs when the available language pair is not specified in the arguments.

2.3.2. Bilingual Dictionary Search Service Interface

Assertion	<p>Translation[] search (String headLang, String targetLang, String headWord, String matchingMethod)</p> <p>throws AccessLimitExceededException, InvalidParameterException, LanguagePairNotUniquelyDecidedException, NoAccessPermissionException, SearchFailedException, ServiceConfigurationException, UnknownException, UnsupportedLanguagePairException;</p>	
Argument	headLang	Language of head word
	targetLang	Language of translation
	headWord	Head word to be looked up in a bilingual dictionary
	matchingMethod	Matching method (Value of MatchingMethod)
Return value	Search results	
Comment	This method looks up a word in a bilingual dictionary by language and head word. In	

	searching the bilingual dictionary, it uses the matching method specified by the matchingMethod argument and returns the translation of the head word.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguagePairNotUniquelyDecidedException	This exception occurs when the language pair is not decided uniquely.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	SearchFailedException	This exception occurs when the service fails to look up the word in the bilingual dictionary.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguagePairException	This exception occurs when the available language pair is not specified in the arguments.

2.3.3. Parallel Text Search Service Interface

Assertion	ParallelText[] search (String sourceLang, String targetLang, String text, String matchingMethod) throws AccessLimitExceededException, InvalidParameterException, LanguagePairNotUniquelyDecidedException, NoAccessPermissionException, SearchFailedException, ServiceConfigurationException, UnknownException, UnsupportedLanguagePairException;	
Argument	sourceLang	Language of an input sentence
	targetLang	Language of translation
	source	Input sentence
	matchingMethod	Matching method (Value of MatchingMethod)

Return value	Search results	
Comment	This method searches translation of an input text. For the search, this function uses the matching method specified in the matchingMethod argument and returns a translation corresponding to the input sentence.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when this service is invoked with an invalid argument.
	LanguagePairNotUniquelyDecidedException	This exception occurs when the language pair is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	SearchFailedException	This exception occurs when the service fails to look up the input sentence in the parallel texts.
	ServiceConfigurationException	This exception occurs when this service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	UnknownException	This exception occurs when the service fails for unknown reasons.
UnsupportedLanguagePairException	This exception occurs when the available language pair is not specified in the arguments.	

2.3.4. Morphological Analysis Service Interface

Assertion	Morpheme[] analyze (String language, String text) throws AccessLimitExceededException, AnalysisFailedException, InvalidParameterException, LanguageNotUniquelyDecidedException, NoAccessPermissionException, ServiceConfigurationException, UnknownException, UnsupportedLanguageException;	
Argument	language	Language of a sentence to be analyzed
	text	Sentence to be analyzed
Return	Analysis result	

value		
Comment	This method executes morphological analysis.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	AnalysisFailedException	This exception occurs when the service fails to analyze an input sentence.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguageNotUniquelyDecidedException	This exception occurs when the language is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguageException	This exception occurs when the available language is not specified in the arguments.

2.3.5. Paraphrase Service Interface

Assertion	String[] paraphrase (String language, String text) throws AccessLimitExceededException, InvalidParameterException, LanguageNotUniquelyDecidedException, NoAccessPermissionException, ParaphraseFailedException, ServiceConfigurationException, UnknownException, UnsupportedLanguageException;	
Argument	language	Language of a sentence to be paraphrased
	text	Sentence to be paraphrased
Return value	Paraphrase result	
Comment	This method paraphrases an input text.	

Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguageNotUniquelyDecidedException	This exception occurs when the language is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ParaphraseFailedException	This exception occurs when the service fails to paraphrase the input sentence.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguageException	This exception occurs when the available language is not specified in the arguments.

2.3.6. Similarity Calculation Service Interface

Assertion	double calculate (String language, String text1, String text2) throws AccessLimitExceededException, CalculationFailedException, InvalidParameterException, LanguageNotUniquelyDecidedException, NoAccessPermissionException, ServiceConfigurationException, UnknownException, UnsupportedLanguageException;	
Argument	language	Language of sentences between which similarity is calculated
	text1	Sentence whose similarity with text2 is calculated
	text2	Sentence whose similarity with text1 is calculated
Return value	Similarity. Value between 0 and 1 (1 means the languages are the same.)	
Comment	This method calculates the similarity between text1 and text2 and returns the	

	similarity value.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguageNotUniquelyDecidedException	This exception occurs when the language is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	CalculationFailedException	This exception occurs when the service fails to calculate the similarity between input sentences.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguageException	This exception occurs when the available language is not specified in the arguments.

2.3.7. Adjacency Pair Search Service Interface

Assertion	AdjacencyPair[] search (String category, String language, String firstTurn, String matchingMethod) throws AccessLimitExceededException, InvalidParameterException, NoAccessPermissionException, LanguageNotUniquelyDecidedException, SearchFailedException, ServiceNotActiveException, ServiceConfigurationException, UnknownException, UnsupportedLanguageException;	
Argument	category	Dialog category
	language	Language in a dialogue
	firstTurn	Request in a dialogue
	matchingMethod	Matching method (Value of matchingMethod)
Return	Search results	

value		
Comment	This method searches responses to the input request and returns a list of responses.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguageNotUniquelyDecidedException	This exception occurs when the language is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	SearchFailedException	This exception occurs when the service fails to search the input request in a set of adjacency pairs.
	ServiceNotActiveException	This exception occurs when the service is not configured correctly.
	ServiceConfigurationException	This exception occurs when the invoked service is not active.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguageException	This exception occurs when the available language is not specified in the arguments.

2.3.8. Backtranslation Service Interface

Assertion	BackTranslationResult backTranslate (String sourceLang, String intermediateLang, String source) throws AccessLimitExceededException, InvalidParameterException, LanguagePairNotUniquelyDecidedException, NoAccessPermissionException, ServiceConfigurationException, TranslationFailedException, UnknownException, UnsupportedLanguagePairException;	
Argument	sourceLang	Source language
	intermediateLang	Intermediate language
	source	Sentence to be backtranslated.
Return value	Result of backtranslation	
Comment	This method back translates the input sentence. This method translates the input sentence from sourceLang to intermediateLang, and translates the result from	

	intermediateLang to sourceLang again.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguagePairNotUniquelyDecidedException	This exception occurs when the language is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceNotActiveException	This exception occurs when the service is not configured correctly.
	ServiceConfigurationException	This exception occurs when the invoked service is not active.
	TranslationFailedException	This exception occurs when the invoked service fails to translate.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguagePairException	This exception occurs when the available language pair is not specified in the arguments.

2.3.9. Multi-hop Translation Service Interface

Assertion	<p>MultihopTranslationResult multihopTranslate (String sourceLang, String[] intermediateLangs, String targetLang, String source)</p> <p>throws AccessLimitExceededException, InvalidParameterException, LanguagePathNotUniquelyDecidedException, NoAccessPermissionException, ServiceConfigurationException, TranslationFailedException, UnknownException, UnsupportedLanguagePathException;</p>	
Argument	sourceLang	Source language
	intermediateLangs	An array of intermediate languages
	targetLang	Target language
	source	Input sentence
Return Value	Result of multi-hop translation	
Comment	This method translates the input sentence by sequentially connecting several	

	translation services.	
Exception	AccessLimitExceededException	This exception occurs when the number of service invocations exceeds an access limit.
	InvalidParameterException	This exception occurs when the service is invoked with an invalid argument.
	LanguagePairNotUniquelyDecidedException	This exception occurs when the language is not uniquely decided.
	NoAccessPermissionException	This exception occurs when the service is invoked without access permission.
	ServiceConfigurationException	This exception occurs when the service is not configured correctly.
	ServiceNotActiveException	This exception occurs when the invoked service is not active.
	TranslationFailedException	This exception occurs when the invoked service fails to translate.
	UnknownException	This exception occurs when the service fails for unknown reasons.
	UnsupportedLanguagePairException	This exception occurs when the available language pair is not specified in the arguments.

2.4. Class, Enumerated Type

The classes and the enumerated type of API, which are mentioned above, are defined as follows. In the enumerated type, the defined identifiers are saved as a string. Therefore, they are used as a string type in the web service interface.

2.4.1. ServiceEntrySearchResult

Field:

```
ServiceEntry[] elements; //sequence of entry
int totalCount; //Number of entries hit by a search operation
boolean totalCountFixed; //Boolean of the fix of the number of hit entries
```

Comment:

Information about ServiceEntrySearchResult is obtained when the system invokes searchServices. When the number of hit entries is not fixed in one invocation (ex. complex search), CountFixed is false. In this case, when a user wants it to be true, the system should continue

searching using the same conditions.

2.4.2. ServiceEntry

Field:

String serviceId; //Service ID.
String displayName; //Service display name. (about 50 characters per line)
ServiceType serviceType; //Service type
LanguagePath[] supportedLanguages; //Language
String endpointUrl; // Endpoint URL
String ownerId; //User ID of registered member
Calendar registeredDate; //Date of registration
Calendar updatedDate; //Date of update
boolean active; //Boolean of active Service

Comment:

Information about ServiceEntrySearchResult is obtained when the system invokes searchServices. It consists of part of the information about ServiceProfile and ServiceInstance and of the information about the system that is saved automatically.

2.4.3. CompositeServiceEntrySearchResult

Field:

CompositeServiceEntry[] elements; //sequence of entry
int totalCount; //Number of entries hit by a search operation
boolean totalCountFixed; //Boolean of the fix of the number of hit entries

Comment:

This is information acquirable at the time of the composite service search (searchCompositeServices). When the number of hit entries is not fixed in one call (ex. complex search), CountFixed is false. In this case, when a user wants it to be true, the system should continue searching using the same conditions.

2.4.4. CompositeServiceEntry

Field:

String serviceId; //Service ID
String displayName; //Service display name. (about 50 characters per line)
ServiceType serviceType; //Service type
LanguagePath[] supportedLanguages; //Language
String endpointUrl; //Endpoint URL

String ownerId; //User ID of registered member
Calendar registeredDate; //Date of registration
Calendar updatedDate; //Date of update
boolean active; //Boolean of active Service
ServiceEntry[] servicesInUse; //atomic service that uses this composite service

Comment:

This is information acquirable at the time of the composite service search (searchCompositeServices). Added to part of the information stored in ServiceProfile and ServiceInstance, it stores information automatically set by the system and atomic service information used by the composite service.

2.4.5. ServiceProfile

Field:

String displayName; //Service display name. (about 50 characters per line)
String serviceProviderName; //Name of service provider
String serviceProviderUri; //URL of service provider
String registerName; //Name of registered member
String registerUri; //URL of registered member
String copyrightInfo; //Copyright information
String contactName; //contact name
String contactUri; //contact URI
String contactEmail; //contact email address

Comment:

This is information about the service profile. It consists of the information a user can modify in the Language Grid service information.

2.4.6. ServiceType (Enumerated Type)

Value of enumeration:

ADJACENCYPAIR //adjacency pair
BACKTRANSLATION //back translation
BILINGUALDICTIONARY //bilingual dictionary
DICTIONARY //dictionary
MORPHOLOGICALANALYSYS //morphological analysis
MULTIHOPTRANSLATION //multi hop translation
PARALLELTEXT //parallel text
PARAPHRASE //paraphrase

SIMILARITYCALCULATION //similarity calculation

TRANSLATION //translation

OTHER //others

Comment:

This is the enumerated type that specifies service type.

2.4.7. LanguagePath

Field:

String[] languages; //sequence of language expressions

Comment:

This saves the language path. Each language expression obeys RFC 3066.

2.4.8. InstanceType (Enumerated Type)

Value of enumeration:

EXTERNAL //External service (atomic service)

BPEL //BPEL service (complex service)

Comment:

This is an enumerated type that defines the type of service.

2.4.9. MatchingCondition

Field:

String fieldName; //Field name

String matchingValue; //Matching value with field

String matchingMethod; //Matching method (MatchingMethod value shown as text)

Comment:

This consists of service and user's search criteria. MatchingField specifies the target data field (ServiceEntry, UserEntry) and target attribute (getServiceAttributes/getUserAttributes).

2.4.10. MatchingMethod (Enumerated Type)

Value of enumeration:

COMPLETE //Complete matching

PARTIAL //Partial matching

PREFIX //Prefix matching

SUFFIX //Suffix matching

REGEX //Regular expression matching

Comment:

This defines the matching method between the query and the data during the search. Which values are supported depends on the invoked services.

2.4.11. Order

Field:

String fieldName; //Field name

String direction; // Resort direction (OrderDirection value shown as text)

Comment:

Specifies resort method for searches returned by API. fieldName is specifiable for each search subject data field (ServiceEntry, UserEntry).

2.4.12. OrderDirection (Enumerated Type)

Value of enumeration:

ASCENDANT // Ascendant

DESCENDANT // Descendant

Comment:

Enumeration type that defines resort method for returned search results at the time of search.

2.4.13. Scope (Enumerated Type)

Value of enumeration:

ALL // All services

MINE // User registration service executing search

ACCESSIBLE // Service accessible to user performing search

Comment:

Enumeration type that defines range of services subject to search at the time of search. When specified as ACCESSIBLE, results are returned according to accessibility (AccessRight). Whether access limit (AccessLimit) is exceeded is not considered.

2.4.14. PartOfSpeech (Enumerated Type)

Value of enumeration:

noun.common // Constant indicating a general noun

noun.proper // Constant indicating a proper noun

noun.other // Constant indicating the other nouns except for general nouns and proper nouns (e.g. pronoun, numeral)

noun // Constant indicating nouns that are not classified into the above types of nouns. (e.g. listed simply as “noun” in a dictionary)

verb // Constant indicating a verb
adjective // Constant indicating an adjective
adverb // Constant indicating an adverb
other // Constant indicating the other part of speech except for the above ones
unknown // Constant indicating a unknown word

Comment:

Enumeration type that defines a part of speech.

2.4.15. Translation

Field:

String headWord; // Head word
String[] targetWords; // Array of translations

Comment:

This consists of a head word and an array of translations of the head word that is acquired by bilingual dictionary search service.

2.4.16. Morpheme

Field:

String word; // Word
String lemma; // Lemma
String partOfSpeech; // Part of speech

Comment:

This consists of a word, a lemma of the word, and a part of speech of the word.

2.4.17. BackTranslationResult

Field:

String intermediate; // Intermediate translation result
String target; // Back_translation result

Comment:

This consists of a backtranslation result and an intermediate result.

2.4.18. MultihopTranslationResult

Field:

String[] intermediates; // Array of intermediate translation results
String target; // Translation result

Comment:

This consists of a multi-hop translation result and an array of intermediate results.

3. Use Cases

This section describes cases of use when the Language Grid is invoked. The example code to invoke a translation service on the Language Grid is described in Java and C# on the assumption that a user will have stubs generated from WSDL.

3.1. Sample Code in Java

1. Create a stub to invoke a translation service.
2. Set authentication information (user ID and password).
3. Set input language, output language, and input sentence to obtain translation results.

```
package jp.go.nict.langrid.sample;

import java.rmi.RemoteException;
import javax.xml.rpc.ServiceException;
import jp.go.nict.langrid.langrid_service_1_2.services.JServer.NICTJServerLocator;
import jp.go.nict.langrid.langrid_service_1_2.services.JServer.Translation;
import jp.go.nict.langrid.ws_1_2.AccessLimitExceededException;
import jp.go.nict.langrid.ws_1_2.InvalidParameterException;
import jp.go.nict.langrid.ws_1_2.LanguagePairNotUniquelyDecidedException;
import jp.go.nict.langrid.ws_1_2.NoAccessPermissionException;
import jp.go.nict.langrid.ws_1_2.ServiceConfigurationException;
import jp.go.nict.langrid.ws_1_2.ServiceNotActiveException;
import jp.go.nict.langrid.ws_1_2.UnknownException;
import jp.go.nict.langrid.ws_1_2.UnsupportedLanguagePairException;
import jp.go.nict.langrid.ws_1_2.translation.TranslationFailedException;
import org.apache.axis.client.Stub;

public class TranslationSample {

    public static void main(String[] args) {
        try {
            translate();
        } catch (Exception e) {
        }
    }

    public static void translate() throws ServiceException,
        LanguagePairNotUniquelyDecidedException,
        UnsupportedLanguagePairException, NoAccessPermissionException,
        ServiceConfigurationException, AccessLimitExceededException,
        TranslationFailedException, ServiceNotActiveException,
        UnknownException, InvalidParameterException, RemoteException {

        NICTJServerLocator locator = new NICTJServerLocator(); // 1
        Translation translation = (Translation) locator.getTranslation(); // 1

        Stub translationStub = (Stub) translation; // 1

        translationStub.setUsername("your ID"); // 2
        translationStub.setPassword("your Password"); // 2

        String translationResult= translation.translate("ja", "en", "こんにちは");//3
    }
}
```

```

        System.out.println(translationResult);
    }
}

```

3.2. Sample Code in C#

1. Add the following method to override GetWebRequest to Web Service Stub file (Reference.cs)
(This is an example in Visual Studio .NET 2003)

```

protected override System.Net.WebRequest GetWebRequest(Uri uri)
{
    // User ID and password for authentication
    string username = "";
    string password = "";

    // Create WebRequest object
    System.Net.WebRequest request = base.GetWebRequest (uri);

    // Create Basic authentication code
    byte[] bytecode = System.Text.Encoding.ASCII.GetBytes(username + ":" + password);
    string authhash = System.Convert.ToBase64String(bytecode);

    // Set authentication header in WebRequest to the above authentication code
    request.Headers.Add("Authorization: Basic " + authhash);

    return request;
}

```

2. Create an instance of translation service. Set input language, output language, and input sentence to obtain translation results.

```

public void translate()
{
    WebReference.NICTJServer service = new NICTJServer();

    String translationResult = service.translate("ja", "en", "こんにちは");

    System.Diagnostics.Debug.WriteLine(translationResult);
}

```

4. Contact

Please contact the following address if you have any questions about this manual.

Language Grid Support: langrid@khn.nict.go.jp

A help desk page for the use of the Language Grid will be open on the Language Grid Association site. Please use it if you wish to exchange information with other users about usage.

Language Grid Association site: <http://www.langrid.org/>