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Chapter 1
Introduction

The Xpress Natural Language Support (XPRNLS) component comes as a command line tool and a library.

- The command line tool supports various commands for transcoding text files (such as converting a text file from one encoding to another encoding) and managing message catalogs (for message translations).
- The library offers a system-independent set of routines for converting text buffers and streams from/to some encoding to/from UTF-8. It also implements a mechanism to handle message translation.

1.1 Character encoding conversion

The main feature of the XPRNLS library is character encoding conversion: it provides dedicated routines to ease the writing of programs that work with text data encoded with heterogeneous encodings. The reference encoding used by the XPRNLS library is UTF-8 and the functions it publishes handle conversions between UTF-8 and other encodings.

The functionality of the library is made accessible from the command line via the `xprnls` command tool that enables shell scripts to convert text files from one encoding to another.

Character encodings are identified by encoding names. The library supports natively the encodings UTF-8, UTF-16, UTF-32, ISO-8859-1, ISO-8859-15, CP1252 and US-ASCII: these encodings are therefore available on all systems. By default UTF-16 and UTF-32 use the byte order of the architecture of the running system (e.g. big endian on a Sparc processor) but the byte order may be selected by appending LE (Little Endian) or BE (Big Endian) to the encoding name (e.g. UTF-16LE).

The availability and names of other encodings depend on the operating system:

- On Windows the library relies on the win32 API routines `MultiByteToWideChar` and `WideCharToMultiByte`. The encoding names (that are not case sensitive) can be either the code page number prefixed by CP (like CP28605) or the usual name (e.g. ISO-8859-15). Except for GB18030 (that is a variable size encoding), only single and 2-bytes encodings are supported.
- On Posix systems the library is based on the `iconv` function of the standard C library. Depending on the implementation the encoding names may be case sensitive.

An encoding name may also be one of the following aliases: RAW (no encoding), SYS (default system encoding), WCHAR (wide character for the C library), FNAME (encoding used for file names), TTY (encoding of the output stream of the console), TTYIN (encoding of the input stream of the console), STDIN, STDOUT, STDERR (encoding of the default input/output/error stream).
1.2 Message translation with XPRNLS

The creation of message translations typically involves three steps:

1. extraction of the message texts to be translated from a program source (⇒ Portable Object Template (POT) file)
2. instantiation with the translations for a particular language (⇒ Portable Object (PO) file)
3. compilation of the message translations (⇒ Machine Object (MO) file)

Translations are stored in a set of message catalog files: each of these files is specific to a language and a domain. A domain is a collection of messages, typically all messages of an application are grouped under a given domain. The xprnls command tool supports the necessary operations for building and managing these message catalog files.

Translations are applied in programs via the XPRNLS gettext framework for message translation: in a program using this system all strings to be translated are passed to a translation function (XNLSSgettext). During the execution of the program this function returns a version of the message for the current language or the original English text itself if no translation can be found.

1.2.1 Example

The following example shows a minimal program using the message translation functionality:

```c
int main(int argc,char *argv[])
{
    XNLSdomain dom;
    dom=XNLSopenmsgdom("myprg",NULL); /* Open domain 'myprg' */
    printf(XNLSSgettext(dom,"Hello!\n")); /* Display translation of "hello" */
    XNLSClosemsgdom(dom); /* Close domain */
    return 0;
}
```

This example requires message catalog files for the domain "myprg". The first step in the generation of the message catalogs is to produce a Portable Object Template (POT) file for the domain: this text file collects all messages to be translated. For our example the file myprg.pot includes only one message (the generation of such a file can be automated using tools like GNU xgettext):

```plaintext
msgid "Hello!\n"
msgstr ""
```

From this template one Portable Object (PO) file per supported language has to be produced. The creation of an initial PO file can be done using the XPRNLS command tool (see Section 2). For instance, to generate the file myprg.fr.po (we assume that the operating system is configured for French):

```
xprnls init -o myprg.fr.po myprg.pot
```

The contents of the file myprg.fr.po generated by this command looks as follows:

```plaintext
msgid ""
msgstr ""
"Project-Id-Version: PACKAGE VERSION\n"
```
In addition to the message to translate the command tool has created a header record: this portion is mostly just informative (it is however recommended to complete the missing entries) but 2 entries are exploited by XPRNLs, namely the language (of this translation) and content type (encoding of the file) must be correct: here, the language is French (fr) and the encoding is ISO-8859-15 — these settings correspond to the configuration of the system on which we have performed the xprnls command. It will be necessary to edit these values when preparing translations for a language that is different from the configuration of the operating system.

Completing a PO file consists in entering a translation for each of the messages (i.e. make sure that every msgid entry is followed by a non-empty msgstr record). Our example has only one message, the minimal form of our translation file for French therefore is the following:

```plaintext
msgid ""
msgstr ""

msgid "Hello!"
msgstr "Bonjour!"
```

Once all translations have been prepared, the message catalogs are created by running the following command:

```
xprnls mogen -d locale myprg.*.po
```

This command creates the directory `locale` (if necessary) that contains one subdirectory per language. In each of these language specific subdirectories another directory (`LC_MESSAGES`) is created to store the message catalogs. Each message catalog is named after the domain name with the extension `.mo` (*Machine Object*): this is the binary version of the corresponding PO file. When executing our example program on a system configured for French the function `XNLSgettext` looks for the file `locale/fr/LC_MESSAGES/myprg.mo` to locate the required translations.

### 1.2.2 PO, POT and MO file formats

Portable Object (PO) and Portable Object Template (POT) files are text files consisting in a list of pairs of entries of the form:

```
msgid message
msgstr translation
```

Where `message` is a text identifying the message to translate (it is usually expressed in English) and `translation` its translation in the language associated to the file. A POT file has only empty msgstr entries and serves as a basis for the creation of the PO files.

The `'#' symbol marks the beginning of a comment: any text following after it up to the end of line is ignored.

Both the message and its translation must be expressed in the form of lists of double-quoted strings separated by spaces or newlines (each list is merged into a single text string by the PO
processor). Text strings may contain C escape sequences (like "\n") as well as format markers (e.g. "%%s"). A translation must include the same format markers as the original text and they must appear in the same order (otherwise the translation will be ignored).

Usually PO files include the special message empty string ("") the translation of which is used to record management information (like name of the author, date of creation etc) instead of an actual translation. The syntax of such a record is a succession of definitions of the form:

    property : value \n
Although the command xprnls init (used to create an initial PO file from a POT file) will generate a certain number of assignments for this header, only two of them are effectively used by XPRNLS: the language associated to the file (e.g. "Language: it\n") and its encoding (e.g. "Content-Type: text/plain; charset=ISO8859-1\n").

A Machine Object (MO) file is a compiled version of a PO file that is created by the command xprnls mogen: this is the format required by the translation routines of XPRNLS. The binary MO format used by XPRNLS is platform independent and compatible with the GNU version of gettext (GMO).
The command line tool xprnls is typically used with the following syntax from an operating system console:

```bash
xprnls command command_arguments
```

The `command` parameter is one of the following commands and `command_arguments` are the associated arguments (square brackets indicate optional arguments):

- **info**
  Display system configuration information relative to native language support: current system language, character encodings of system, console, file system, and actual encoding of the C type wchar (wide characters).

- **conv**
  Convert the text file `file` from the character encoding `fren` (default: UTF-8) to character encoding `toenc` (default: UTF-8). The resulting file is saved into `dest` (default: console). By default encoding errors are ignored (e.g. an incomplete sequence is replaced by some default symbol) but using option `-s` makes the conversion fail in case of error. The option `-nobom` disables the insertion of a BOM (Byte Order Mark) at the beginning of the file when it is required (a BOM is inserted when producing UTF-16 or UTF-32 documents) while option `-bom` forces insertion of a BOM when creating an UTF-8 document (this is usually not required for this encoding). The options `-dos` and `-unix` select the appropriate settings regarding BOM and line termination for the specified environment. The option `-sys` selects the system encoding for the destination file and enables option `-dos` or `-unix` depending on the executing environment.

- **poconv**
  This command is a special version of the `conv` command described above specifically designed for PO (Portable Object) files (see Section 1.2): it retrieves the source encoding from the file header and updates the output header according to the destination encoding.

- **init**
  Create an initial PO file from the provided POT (Portable Objecy Template) file `potfile`. The resulting data is sent to the console or saved into `dest`.

- **mogen**
  Compile a PO file `pofile` into an MO (Machine Object) file. If no destination name `dest` is provided the resulting file has the same name as the source file with the file extension `.mo` instead of `.po`. If a locale directory `dir` is specified then the resulting file is saved under `dir/lang/LC_MESSAGES` where `lang` is the language specified in the PO file (missing directories are automatically created). The destination file name is of the form `domain.mo` assuming the source file name is of the form `domain.lang.po`. Several PO files may be specified for a single operation.
update [-f] [-m] pofile [pofile ...] potfile
Update a group of PO files with the POT file potfile: messages of the POT file that are missing from the PO files are added and messages not included in the POT file are turned into comments. If the option ‘-m’ is used then the comment ‘#, missing’ is put before missing translations (to ease their localisation). The PO file is not changed if it already contains all messages of the POT file unless option ‘-f’ is selected.

merge [-o dest] [-c] pofile [pofile ...]
Merge a collection of PO (or POT) files, the resulting data is saved into dest (default: console). If the option ‘-c’ is used then the first PO file is completed with the other files (i.e. missing translations of the first file are searched for in the other files but no additional message is added).
3.1 General

The XPRNLS library must be initialized with a call to `XNLSinit` before being used. This initialization function may be called several times and each call must be matched with a call to `XNLSfinish` after terminating the use of the library.

All encoding conversion routines expect an encoding ID to identify an encoding. This numerical identifier is obtained from an encoding name via `XNLSgetencid`.

- **XNLSfinish**: Release resources used by the library. p. 9
- **XNLSgetencid**: Get the ID associated with an encoding name. p. 10
- **XNLSgetencname**: Get the name corresponding to an encoding ID. p. 11
- **XNLSinit**: Initialize the library. p. 8
XNLSinit

**Purpose**
Initialize the library.

**Synopsis**
```
int XNLSinit(void);
```

**Return value**
0 if executed successfully, any other value indicates a failure.

**Further information**
1. This function initializes the library. It must be called before any other function described in this document may be executed.
2. This initialisation procedure may be called more than once. In this case the termination routine `XNLSfinish` must be used the same number of times in order for all resources to be cleared.

**Related topics**
`XNLSfinish`. 
**XNLSfinish**

**Purpose**
Release resources used by the library.

**Synopsis**

```c
void XNLSfinish(void);
```

**Further information**
This function should be called when the library is not longer required. It releases all resources allocated by the library since its initialization.

**Related topics**

[XNLSinit](#)
XNLSgetencid

**Purpose**
Get the ID associated with an encoding name.

**Synopsis**
```c
int XNLSgetencid(char *enc);
```

**Argument**
- **enc**  Encoding name

**Return value**
- Encoding ID or a negative value in case of failure.

**Further information**
1. All encoding conversion routines require an encoding ID to identify the encoding to use: this routine returns the ID associated with a given encoding name.
2. XPRNLS supports natively UTF-8, UTF-16LE (Little Endian), UTF-16BE (big endian), UTF-32LE, UTF-32BE, US-ASCII, ISO-8859-1, ISO-8859-15, CP1252 and RAW (no encoding). For these encodings the same IDs are always returned and a call to this function can be replaced by the corresponding constants: XNLS_ENC_UTF8, XNLS_ENC_UTF16LE, XNLS_ENC_UTF16BE, XNLS_ENC_UTF32LE, XNLS_ENC_UTF32BE, XNLS_ENC_ASCII, XNLS_ENC_88591, XNLS_ENC_885915, XNLS_ENC_CP1252 and XNLS_ENC_RAW. With other encoding names the function may return a different ID for a given encoding after the library has been reset or the program restarted.
3. The availability of not natively supported encodings (for instance "iso-8859-3") depends on the operating system.
4. In addition to proper encoding names the function also accepts the following aliases: "SYS" (default system encoding), "WCHAR" (wide char representation for the system), "FNAME" (file names, on most systems this is the same as "SYS"), "TTY" (encoding of the console output stream), "TTYIN" (encoding of the input stream of the console, this is usually the same as "TTY"), "STDIN" (encoding of the default input stream), "STDOUT" (encoding of the default output stream), "STDERR" (encoding of the default error stream), "UTF-16" (UTF-16LE or UTF-16BE depending on the architecture), "UTF-32" (UTF-32LE or UTF-32BE depending on the architecture).

**Related topics**
- XNLSgetencname.
**XNLSgetencname**

**Purpose**  
Get the name corresponding to an encoding ID.

**Synopsis**  
```c
const char *XNLSgetencname(int eid);
```

**Argument**  
edi Encoding ID

**Return value**  
Encoding name or an empty string if the ID is not valid.

**Related topics**  
XNLSgetencid.
3.2 Handling of program parameters

In addition to transcoding routines the library also provides an operating system independent method for retrieving program parameters (namely argc and argv of the main function of the C program) encoded as UTF-8. The procedure requires the main program to be named XNLS_MAIN and the argv parameter to be of type XNLSargv. The function XNLSconvargv can then be called to get the converted arguments. The following example shows how to organise the main function of a program using this feature:

```c
int XNLS_MAIN(int argc,XNLSargv sargv[])
{
    char **argv;

    argv=XNLSconvargv(&argc,sargv); /* 'argv' is encoded in UTF-8 */

    /* Insert here the body of the function using 'argc' and 'argv' as usual */

    XNLSfreeargv(argv);
    return 0;
}
```

- **XNLSconvargv** Generate a UTF-8 version of the program parameters. p. 13
- **XNLSfreeargv** Release the datastructures allocated by XNLSconvargv. p. 14
- **XNLSproargpath** Get the full path to the running program. p. 15
XNLSconvargv

**Purpose**
Generate a UTF-8 version of the program parameters.

**Synopsis**
```c
char **XNLSconvargv(int *argc, XNLSargv argv[]);
```

**Arguments**
- `argc` Number of program parameters
- `argv` Array of program parameters

**Return value**
A version of `argv` encoded in UTF-8.

**Further information**
1. This function calls `XNLSinit`, it is therefore not necessary to initialise the library when using this routine.
2. Under Windows the arguments including wildcard characters are expanded (on Posix systems this is done by the shell). As a consequence the number of arguments `argc` may be increased by the call.

**Related topics**
- `XNLSfreeargv`
**XNLSfreeargv**

**Purpose**
Release the datastructures allocated by XNLSconvargv.

**Synopsis**
```c
void XNLSfreeargv(char **argv);
```

**Argument**
`argv`  
Array of program parameters returned by a previous call to `XNLSconvargv`.

**Further information**
This function calls `XNLSfinish`.

**Related topics**
`XNLSconvargv`.
**XNLSprogpah**

**Purpose**
Get the full path to the running program.

**Synopsis**

```c
const char *XNLSprogpah(const char *name);
```

**Argument**

name
Program name or path (e.g. argv[0]) encoded in UTF-8.

**Return value**

Full path to running program or name in case of error.

**Further information**

1. On Posix systems the argument name should be argv[0]: it is expanded in order to get a full path. Under Windows it is not used (unless an error occurs).

2. The string returned by this function is the result of a call to XNLSconvstrfrom.

**Related topics**

XNLSfreeargv.
3.3 Buffer and string encoding conversion

The functions in this section serve for converting character strings from and to UTF-8 encoding. The functions XNLSconvstrfrom and XNLSconvbuffrom return a statically allocated buffer (that is re-used each time any of these functions is called) while XNLSconvbuffrom and XNLSconvbufto require a destination buffer.

- **XNLScodetoutf8**: Generate a UTF-8 sequence from a Unicode code point. p. 22
- **XNLSconvbuffrom**: Convert a text buffer to UTF-8. p. 19
- **XNLSconvbufto**: Convert a text buffer from UTF-8 to a given encoding. p. 20
- **XNLSconvstrfrom**: Convert a text string to UTF-8. p. 17
- **XNLSconvstrto**: Convert a UTF-8 text string to a given encoding. p. 18
- **XNLSutf8tocode**: Get the corresponding code point of a UTF-8 sequence. p. 21
XNLSconvstrfrom

Purpose
Convert a text string to UTF-8.

Synopsis
const char *XNLSconvstrfrom(int eid, const char *src, int srclen, int *dstlen);

Arguments
- **eid**: Encoding ID of the source
- **src**: Text buffer to transcode
- **srclen**: Length in bytes of the source text buffer (or -1 for a null terminated string)
- **dstlen**: A location where to return the length (in bytes) of the generated string

Return value
The converted null terminated string or `NULL` in case of memory allocation error.

Further information
1. This function returns a thread-specific statically allocated buffer that it shares with `XNLSconvstrto`: each call to any of these functions will overwrite the result of the previous call.
2. Any invalid character is replaced by a default symbol (`middle dot`) in the converted string.
3. Mosel uses this function extensively: it is therefore recommended to duplicate any string returned by this routine if you need to pass it to a Mosel API function. Alternatively, use the `XNLSconvbuffrom` form of this function where you can specify your own buffer.

Related topics
`XNLSconvbuffrom`, `XNLSconvstrto`.
XNLSconvstrto

**Purpose**
Convert a UTF-8 text string to a given encoding.

**Synopsis**
```c
const char *XNLSconvstrto(int eid, const char *src, int srclen, int *dstlen);
```

**Arguments**
- `eid` Encoding ID of the destination
- `src` Text buffer to transcode
- `srclen` Length in bytes of the source text buffer (or -1 for a null terminated string)
- `dstlen` A location where to return the length (in bytes) of the generated string (can be `NULL`)

**Return value**
The converted null terminated string or `NULL` in case of memory allocation error.

**Further information**
1. This function returns a thread-specific statically allocated buffer that it shares with `XNLSconvstrfrom`: each call to any of these functions will overwrite the result of the previous call.
2. Any invalid character is replaced by a default symbol (specific to the destination encoding) in the converted string.
3. Mosel uses this function extensively: it is therefore recommended to duplicate any string returned by this routine if you need to pass it to a Mosel API function. Alternatively, use the `XNLSconvbufto` form of this function where you can specify your own buffer.

**Related topics**
- `XNLSconvbufto`, `XNLSconvstrfrom`
XNLSconvbuffrom

**Purpose**
Convert a text buffer to UTF-8.

**Synopsis**

```
int XNLSconvbuffrom(int eid, char **srcstart, char *srcend, char **dststart, char *dstend, int flags);
```

**Arguments**

- **eid**: Encoding ID of the source
- **srcstart**: Reference to a pointer at the beginning of the input buffer
- **srcend**: Pointer to the character after the end of the input buffer
- **dststart**: Reference to a pointer at the beginning of the output buffer
- **dstend**: Pointer to the character after the end of the output buffer
- **flags**: Conversion flags (can be combined):
  - **XNLS_UTF_FLAG_STRICT**: Fail in case of invalid sequence (otherwise skip it)
  - **XNLS_UTF_FLAG_PARTIAL**: Stop and return XNLS_CONV_PARTIAL when buffer ends on an incomplete sequence (instead of failing)

**Return value**

- **XNLS_CONV_OK**: Function executed sucessfully
- **XNLS_CONV_PARTIAL**: Input buffer terminates on an incomplete sequence (process stopped at the beginning of the sequence)
- **XNLS_CONV_DSTOUT**: Output buffer not large enough
- **XNLS_CONV_FAIL**: Process stopped at an invalid sequence

**Further information**
The arguments **srcstart** and **dststart** are updated such that they point to the byte following the decoded sequence (input buffer) or the first unused byte (output buffer) after the function returns.

**Related topics**

- XNLSconvbufto
- XNLSconvstrfrom
XNLSconvbufto

**Purpose**
Convert a text buffer from UTF-8 to a given encoding.

**Synopsis**
```c
int XNLSconvbufto(int eid, char **srcstart, char *srcend, char **dststart, char *dstend, int flags);
```

**Arguments**
- `eid`: Encoding ID of the destination
- `srcstart`: Reference to a pointer at the beginning of the input buffer
- `srcend`: Pointer to the character after the end of the input buffer
- `dststart`: Reference to a pointer at the beginning of the output buffer
- `dstend`: Pointer to the character after the end of the output buffer
- `flags`: Conversion flags (can be combined):
  - `XNLS_UTF_FLAG_STRICT`: Fail in case of invalid sequence (otherwise skip it)
  - `XNLS_UTF_FLAG_PARTIAL`: Stop and return XNLS_CONV_PARTIAL buffer ends on an incomplete sequence (instead of failing)

**Return value**
- `XNLS_CONV_OK`: Function executed successfully
- `XNLS_CONV_PARTIAL`: Input buffer terminates on an incomplete sequence (process stopped at the beginning of the sequence)
- `XNLS_CONV_DSTOUT`: Output buffer not large enough
- `XNLS_CONV_FAIL`: Process stopped at an invalid sequence

**Further information**
The arguments `srcstart` and `dststart` are updated such that they point to the byte following the decoded sequence (input buffer) or the first unused byte (output buffer) after the function returns.

**Related topics**
`XNLSconvbuffrom, XNLSconvstrto.`
XNLSutf8tocode

**Purpose**
Get the corresponding code point of a UTF-8 sequence.

**Synopsis**
```
int XNLSutf8tocode(const char **src, const char *srcend);
```

**Arguments**
- `src` Reference to a pointer at the beginning of the sequence
- `srcend` Pointer to the character after the end of the buffer

**Return value**
Unicode code point or -1 if the sequence is not valid or incomplete

**Further information**
The argument `src` is updated such that it points to the byte following the decoded sequence after the function returns.

**Related topics**
XNLScodetoutf8.
XNLScodetoutf8

Purpose
Generate a UTF-8 sequence from a Unicode code point.

Synopsis
int XNLScodetoutf8(unsigned int ucp, char *dst);

Arguments
ucp    Code point
dst    Destination buffer (must be of at least 4 bytes length)

Return value
Number of bytes written to the output buffer (between 1 and 4)

Related topics
XNLStoutf8tocode.
3.4 Stream encoding conversion

These functions are designed for the transcoding of text streams. The creation of a stream with \texttt{XNLSopenconv} requires an additional function used to read (or write for an output stream) a block of data: it is called whenever the internal buffer of the transcoder is empty (or full if writing). When the stream is open for reading the user calls iteratively the reader routine \texttt{XNLSconvread} to get the data of the stream encoded in UTF-8. If the stream is open for writing the data sent to \texttt{XNLSconvwrite} is expected to be encoded in UTF-8 and it is transcoded to the encoding specified at the creation of the stream.

\begin{itemize}
\item \texttt{XNLScloseconv} \hspace{1cm} Close a transcoder stream. \hspace{1cm} p. 30
\item \texttt{XNLSconvread} \hspace{1cm} Read from an input transcoder stream. \hspace{1cm} p. 26
\item \texttt{XNLSconvwrite} \hspace{1cm} Write to an output transcoder stream. \hspace{1cm} p. 25
\item \texttt{XNLSgetenc} \hspace{1cm} Get the encoding ID and status of a transcoder stream. \hspace{1cm} p. 28
\item \texttt{XNLSgetfd} \hspace{1cm} Get reader/writer file descriptor of a transcoder stream. \hspace{1cm} p. 27
\item \texttt{XNLSgetoffset} \hspace{1cm} Get the current offset in a transcoder stream. \hspace{1cm} p. 29
\item \texttt{XNLSopenconv} \hspace{1cm} Open a transcoder stream. \hspace{1cm} p. 24
\end{itemize}
XNLSopenconv

Purpose
Open a transcoder stream.

Synopsis
XNLStream XNLSopenconv(int eid, int flags, long (*fsync)(void *vctx,void *fd,void *buf,unsigned long bufsize), void *fd);

Arguments
- **eid**: Encoding ID of the destination
- **flags**: Conversion flags:
  - XNLS_OPT_READ: Convert to UTF-8
  - XNLS_OPT_WRITE: Convert from UTF-8
  - XNLS_OPT_STRICT: Fail in case of invalid sequence (otherwise skip it)
  - XNLS_OPT_NOBOM: Do not put a BOM when writing (by default a BOM is emitted for UTF-16 and UTF-32) and do not look for a BOM when reading
  - XNLS_OPT_BOM: Force BOM (by default no BOM is emitted for UTF-8), option ignored for a reader stream
- **fsync**: Data reader or writer function
- **fd**: Data reader/writer file descriptor

Return value
A stream context or NULL in case of error.

Further information
1. When a stream is created for reading (i.e. option *flags* is XNLS_OPT_READ), input data is expected to be encoded in the specified encoding *eid*. The converter gets the stream of data to process from a callback function: the provided read function *fsync* takes as parameters some general context vctx (provided to XNLSconvread), the file descriptor for this stream (specified with this call as *fd*) and a buffer *buf* where it puts up to *bufsize* bytes of data. This function must return the amount of data transferred, 0 when the end of file has been reached or a negative value to indicate an error condition.

2. When a stream is created for writing (i.e. option *flags* is XNLS_OPT_WRITE), output data is encoded in the specified encoding *eid*. The converter outputs the stream of data it has processed using a callback function: the provided write function *fsync* takes as parameters some general context vctx (provided to XNLSconvwrite), the file descriptor for this stream (specified with this call as *fd*) and a buffer *buf* of *bufsize* bytes of data to save. This function is expected to return a non-zero value on success (i.e. all data has been saved) and 0 on failure.

3. The option XNLS_OPT_NOBOM tells the routine not to try to find a BOM (Byte Order Mark) when opening a stream for reading. This BOM consists in a sequence of bytes at the beginning of the stream to identify the Unicode encoding used for the stream. Unless the option XNLS_OPT_NOBOM is used, this BOM detection is effective when the selected encoding is Unicode (either UTF-8, UTF-16 or UTF-32). When applied to a stream open for writing, this option disables the insertion of a BOM when creating a stream encoded in UTF-16 or UTF-32 (it is ignored for all other encodings).

4. The option XNLS_OPT_BOM forces the insertion of the BOM when opening a stream encoded in UTF-8 for writing (this encoding usually does not require a BOM).

Related topics
XNLScloseconv.
XNLSconvwrite

Purpose
Write to an output transcoder stream.

Synopsis
long XNLSconvwrite(void *vctx,XNLSstream stream,const void *buf,unsigned long size);

Arguments
vctx  Runtime context for data writer
stream Stream open for writing
buf Buffer to output encoded in UTF-8
size size of buf

Return value
1 if successful, -1 in case of conversion error and 0 for other errors.

Further information
The parameter vctx is passed as the first argument to the sync function defined when opening the stream.

Related topics
XNLSopenconv.
XNLSconvread

**Purpose**
Read from an input transcoder stream.

**Synopsis**
```c
long XNLSconvread(void *vctx, XNLSstream stream, void *buf, unsigned long size);
```

**Arguments**
- `vctx`  
  Runtime context for data reader
- `stream`  
  Stream open for reading
- `buf`  
  Destination buffer for the UTF-8 encoded string
- `size`  
  Size of `buf`

**Return value**
The number of bytes read if successful, -1 in case of conversion error, -2 for other errors and 0 when the end of file has been reached.

**Further information**
The parameter `vctx` is passed as the first argument to the `sync` function defined when opening the stream.

**Related topics**
- `XNLSopenconv`
XNLSgetfd

Purpose
Get reader/writer file descriptor of a transcoder stream.

Synopsis
void *XNLSgetfd(XNLSstream stream);

Argument
stream A stream

Return value
Data reader/writer file descriptor as passed to XNLSopenconv.

Related topics
XNLSgetenc, XNLSopenconv.
XNLSgetenc

Purpose
Get the encoding ID and status of a transcoder stream.

Synopsis
```
int XNLSgetenc(XNLSstream stream, int *status);
```

Arguments
- `stream`: A stream
- `status`: An area where to return the current status of the stream (may be NULL)
  - 0: initial state
  - 1: normal processing
  - 2: a BOM has been found
  - 3: end of file
  - 4: error

Return value
Current encoding ID of the stream.

Related topics
- `XNLSgetfd`, `XNLSopenconv`
**XNLSgetoffset**

**Purpose**
Get the current offset in a transcoder stream.

**Synopsis**
```c
int XNLSgetoffset(XNLSstream stream);
```

**Argument**
- stream: A stream

**Return value**
Current offset in the stream.

**Further information**
The offset corresponds to the total amount of data written (for an output stream) or read (for an input stream).

**Related topics**
- XNLSgetfd.
XNLScloseconv

**Purpose**
Close a transcoder stream.

**Synopsis**
```c
int XNLScloseconv(void *vctx, XNLSstream stream);
```

**Arguments**
- `vctx` Runtime context for data reader/writer
- `stream` Stream to close

**Return value**
0 if successful, any other value indicates an error.

**Related topics**
- XNLSopenconv.
3.5 Translation

The library publishes an implementation of the so-called gettext system for automatic translation of text strings in a program. This system relies on message catalog files containing for each message of the application both the English version and its translation in a particular language (there is therefore one message catalog file per language and application). The message catalog files are organised in a dedicated directory hierarchy: the root directory of the localisation data (usually named `locale`) contains one sub-directory per language named after its ISO 639 code (for instance `de` for German, `it` for Italian etc). The message catalogs for a given language are stored under the `LC_MESSAGES` sub-directory of this language specific directory. Each message catalog file has the name of the domain it provides translations for (typically the name of the application) with the extension `.mo` (Machine Object). An `.mo` file is generated using the command `xprnls mogen` (see Section 2) from a `.po` file (Portable Object).

A program using the XPRNLS translation framework must first open the domain for which it needs translations using `XNLSopenmsgdom` in order to get a domain descriptor. Then each message translation can be obtained by applying `XNLSgettext` to the English version of the text: the translated message is returned if the message catalog file for the current language has been found and includes the translation. Otherwise the original English text is used as the return value.

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XNLSsetlang

Purpose
Set or get the active language for message translation.

Synopsis
const char *XNLSsetlang(const char *lang);

Argument
lang An ISO 639 language code (e.g. en, de, ja, zh...), or NULL or an empty string ""

Return value
The new language code.

Further information
1. The language code is used to select the locale directory in which catalog files are searched from. During the library initialisation the language is set according to the current system settings.
2. If NULL is used as the language code the function returns the current language. If an empty string is given then the language is set to the system default setting (as after library initialisation).
3. Special language names "C", "POSIX" as well as "en" disable translation (since initial messages are written in English).
4. All loaded message catalogs are unloaded when a call to this routine modifies the current language.

Related topics
XNLSgettext, XNLSsetlocaledir.
XNLSopenmsgdom

Purpose
Open a message domain.

Synopsis
XNLSDomain XNLSopenmsgdom(const char *name, const char *localedir);

Arguments
- **name**: Domain name
- **localedir**: Locale directory for this domain (can be NULL)

Return value
A context for the domain or NULL in case of error.

Further information
1. The default locale directory is used if the `localedir` parameter is NULL. The current working directory will be used if the resulting locale directory is NULL.

2. The domain name `name` is used to build file names of message catalogs. For instance the message catalog for domain "mosel", language "es" in the locale directory "/usr/share/locale" is "/usr/share/locale/es/LC_MESSAGES/mosel.mo"

3. Message catalogs are opened when the first `XNLSgettext` call is issued, not at the time of opening the domain.

4. The same domain context will be returned if a given domain name is open several times (the `localedir` parameter is ignored when the domain is already open). The system keeps track of the number of times each domain context has been returned and requires an equal number of calls to `XNLSclosemsgdom` to release properly the resources associated with the domain.

Related topics
`XNLSgettext`, `XNLSsetlocaledir`, `XNLSclosemsgdom`. 
XNLSclosemsgdom

**Purpose**
Close a message domain.

**Synopsis**
```c
void XNLSclosemsgdom(XNLSdomain domain);
```

**Argument**
domain  Domain to close

**Further information**
Every call to XNLSopenmsgdom should be completed by a matching call to this procedure once the domain is no longer required in order to release the resources associated with the domain.

**Related topics**
XNLSopenmsgdom.
XNLSfindmsgdom

**Purpose**
Find an open message domain based on its name.

**Synopsis**
```c
XNLSdomain XNLSfindmsgdom(const char *name);
```

**Argument**
- **name**
  Name of the domain

**Return value**
- A context for the domain or `NULL` if no domain of this name has been open so far.

**Further information**
This function does not modify the reference count of the domain.

**Related topics**
- XNLSopenmsgdom.
XNLSsetlocaledir

**Purpose**
Define the default or domain specific locale directory.

**Synopsis**
const char *XNLSsetlocaledir(XNLSdomain domain, const char *localedir);

**Arguments**
- **domain**  Domain (NULL to change the global default setting)
- **localedir**  Locale directory (can be NULL)

**Return value**
The new locale directory.

**Further information**
1. Modifying the locale directory of a domain has no effect on already loaded message catalogs (i.e. they are not reloaded from the new location).
2. Changing the default locale directory does not affect the domains that are already open.

**Related topics**
XNLSopenmsgdom.
**XNLSgettext**

**Purpose**
Get the translation of a text string.

**Synopsis**
```c
const char *XNLSgettext(XNLSdomain domain, const char *txt);
```

**Arguments**
- `domain` Domain
- `txt` Message to translate

**Return value**
Translated message or `txt` if no translation could be found.

**Further information**
The function returns its argument `txt` if the current language is English or no translation is found or the text to translate is `NULL` or an empty string.

**Related topics**
- `XNLSopenmsgdom`
APPENDIX A

Contacting FICO

FICO provides clients with support and services for all our products. Refer to the following sections for more information.

Product support

FICO offers technical support and services ranging from self-help tools to direct assistance with a FICO technical support engineer. Support is available to all clients who have purchased a FICO product and have an active support or maintenance contract. You can find support contact information on the Product Support home page (www.fico.com/support).

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Please include ‘Xpress’ in the subject line of your support queries.

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