SAP Note

1056696 - Compiling and Linking RFC Programs with the SAP NW RFC SDK

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Symptom

You want to compile your C/C++ programs against the SAP NW RFC SDK.

Reason and Prerequisites

In general, you have to use an ANSI C compatible C-compiler and set the include and library search path to the installed NW RFC SDK include and lib directory. It is recommended to use the same compiler that has been used to compile the NW RFC SDK. The exact compiler versions and possible problems when using other compilers are listed at the end.

Solution

The following list shows the compile/link syntax for a <program> on different platforms.
On AIX, Linux and partly System i you have to execute a pre-compiling procedure in step two, before you can start the proper compiling task. This is done by running the Perl script u16lit.pl. Please see SAP Note 763741 for details on this procedure, the Perl script and its usage.

- Windows (x86, 32 bit)

```
cl -DBCDASM -nologo -Od -Ob1 -fp:strict -Gy -GF -EHs -Z7 -W3 -Wp64 -D_X86_ -
DWIN32 -DSAPwithUNICODE -DUNICODE -D_UNICODE -MD -D_AFXDLL -FR -J -RTC1 -
D_CRT_NON_CONFORMING_SWPRINTFS -D_CRT_SECURE_NO_DEPRECATE -D_CRT_NONSTDC_NO_DEPRECATE -DSAPonNT -
c /EHc- /TP <program>.cpp

link -nologo /NXCOMPAT -STACK:0x800000  ole32.lib rpcrt4.lib oleaut32.lib
oledb.lib uuid.lib kernel32.lib advapi32.lib user32.lib gdi32.lib winspool.lib ws2_32.lib
Iphlpapi.lib netapi32.lib comdlg32.lib shell32.lib dbghelp.lib version.lib mpr.lib secur32.lib -
OPT:REF -LARGEADDRESSAWARE -subsystem:console -out:<program>.exe <program>.obj sapnwrfc.lib
libsapucum.lib [and possibly sapdecfICUlib.lib]
```

- Windows (x86, 64 bit)

```
In the example for x86, 32bit, replace "-D_X86_ -DWIN32" with "-D_AMD64_ -
DWIN64" and add the additional linker option /MACHINE:AMD64.
```

- Windows (Itanium, 64 bit)

```
In the example for x86, 32bit, replace "-D_X86_ -DWIN32" with "-D_IA64_ -
DWIN64" and add the additional linker option /MASCHINE:IA64.
```

- HP-UX (PA-RISC, 64 bit)

```
aCC -DSAPonUNIX -DSAPonHPPA -DSAPwithUNICODE +DD64 -Aa +W392,829,818,887 -
DSAPwithTHREADS -mt -w +O2 -DNDEBUG +inst_compiletime -c <program>.cpp

aCC -Wl,+n,-z -Wl,-a,default +DD64 -o <program> <program>.o libsapnwrfc.sl
libsapucum.sl [and possibly libicudecnumber.sl]
```

- HP-UX (Itanium, 64bit)

```
aCC -DSAPonUNIX -DSAPonHPIA64 -DSAPwithUNICODE +DD64 +DSitanium2 -Aa
+Olibmerrno +Oinitcheck +We281 +W392,829,818,887 -DSAPwithTHREADS -mt -w +O2 +Onolimit +Oprocelim -
DNDEBUG -c <program>.cpp

aCC -Wl,+n,-z -lnsl -lpthread +DD64 -o <program> <program>.o -L. -
l:libsapnwrfc.so -l:libsapucum.so -Wl,-a,default -lpthread [and possibly -l:libicudecnumber.so]
```

- Solaris (SPARC, 64 bit)

```
CC -DSAPonUNIX -DSAPonSUN -DSAPwithUNICODE -DSAPwithTHREADS -D__EXTENSIONS__
-D__XPG4_CHAR_CLASS__ -D_POSIX_PTHREAD_SEMANTICS -xtarget=ultra -xarch=v9 -xchar=unsigned -
xustr=ascii_utf16_ushort -w -xO3 -DNDEBUG -xcode=pic32 -mt -c <program>.cpp

CC -norunpath -R -xtarget=ultra -xarch=v9 -z rescan -xO3 -xcode=pic32 -mt -o
```

<program> <program>.o libsapnwrfc.so libsapucum.so [and possibly libicudecnumber.so]

- Linux (x86, 32 bit)

```
g++ -DNDEBUG -D_LARGEFILE_SOURCE -D_FILE_OFFSET_BITS=64 -DSAPonUNIX -
DSAPwithUNICODE -D__NO_MATH_INLINES -DSAPwithTHREADS -DSAPonLIN -Wall -E <program>.cpp >
<program>.ii

/usr/bin/perl5 u16lit.pl -cpp  <program>.ii

g++ -O2 -march=i686 -fexceptions -funsigned-char -fno-strict-aliasing -Wall -
Wno-uninitialized -Wcast-align -Wno-trigraphs -fPIC -pthread -minline-all-stringops -c <program>.i

g++ -O2 -march=i686 -fexceptions -funsigned-char -fno-strict-aliasing -Wall -
Wno-uninitialized -Wcast-align -Wno-trigraphs -fPIC -pthread -minline-all-stringops -o <program>
<program>.o libsapnwrfc.so libsapucum.so [and possibly libicudecnumber.so]
```

- Linux (x86, 64 bit)

```
g++ -DNDEBUG -D_LARGEFILE_SOURCE -D_FILE_OFFSET_BITS=64 -DSAPonUNIX -
DSAPwithUNICODE -D__NO_MATH_INLINES -DSAPwithTHREADS -DSAPonLIN -E <program>.cpp > <program>.ii

/usr/bin/perl5 u16lit.pl -cpp  <program>.ii

g++ -O2 -minline-all-stringops -g -fno-strict-aliasing -fno-omit-frame-
pointer -m64 -fexceptions -funsigned-char -Wall -Wno-uninitialized -Wno-long-long -Wcast-align -
pthread -fPIC -c <program>.i

g++ -O2 -minline-all-stringops -g -fno-strict-aliasing -fno-omit-frame-
pointer  -m64 -fexceptions -funsigned-char -Wall -Wno-uninitialized -Wno-long-long -Wcast-align -
pthread -fPIC -o <program> <program>.o libsapnwrfc.so libsapucum.so [and possibly
libicudecnumber.so]
```

- Linux (Itanium, 64bit)

```
g++ -B/opt/binutils-2.16/bin -Wall -DSAPonUNIX -DSAPwithUNICODE -
DSAPwithTHREADS -DNDEBUG -DSAPonLIN -E <program>.cpp > <program>.ii

/usr/bin/perl5 u16lit.pl -cpp  <program>.ii

g++ -B/opt/binutils-2.16/bin -falign-functions=32 -fexceptions -funsigned-
char -fno-strict-aliasing -Wall -Wno-uninitialized -Wcast-align -Wno-trigraphs -fPIC -pthread -g -O2
-frename-registers -c <program>.i

g++ -B/opt/binutils-2.16/bin -falign-functions=32 -fexceptions -funsigned-
char -fno-strict-aliasing -Wall -Wno-uninitialized -Wcast-align -Wno-trigraphs -fPIC -pthread -g -O2
-frename-registers -Wl,-relax -ldl -pthread -lrt -o <program> <program>.o libsapnwrfc.so
libsapucum.so [and possibly libicudecnumber.so]
```

- AIX (64 bit)

```
xlC_r -DSAPonUNIX -DSAPwithUNICODE -D_AIX51 -D_LARGE_FILES -U__unix -q64 -DSAPwithTHREADS
-qtbtable=full -qhalt=e -qalias=noansi -O -qstrict -qlibansi -qinlglue -DNDEBUG -qarch=pwr4 -
qtune=balanced -qspill=2560 -DSAPonRS6000 -D__NO_XLC_BUILTIN_VA -E <program>.cpp > <program>.ii
/usr/bin/perl5 u16lit.pl -cpp -asciistring <program>. ii
xlC_r -DSAPonUNIX -DSAPwithUNICODE -D_AIX51 -D_LARGE_FILES -U__unix -q64 -DSAPwithTHREADS
-qtbtable=full -qhalt=e -qalias=noansi -O -qstrict -qlibansi -qinlglue -DNDEBUG -qarch=pwr4 -
qtune=balanced -qspill=2560 -DSAPonRS6000 -D__NO_XLC_BUILTIN_VA -c <program>.i
xlC_r -q64 -brtl -bnortllib -bloadmap:<program>.out -bmap:<program>.map -o <program>
<program>.o libsapnwrfc.so libsapucum.so [and possibly libicudecnumber.so]
```

- System i (64 Bit)

```
On this system we support 3 versions of the SAP NW RFC SDK.
A UNICODE version running in the PASE environment which can support all countries and
languages, an EBCDIC native ILE version for single byte encoded languages and an ASCII native ILE
version to support double byte asian languages only.
1. The UNICODE PASE version (to build on AIX with VAC 8. 0)
        xlC_r -DSAPonUNIX  -DSAPwithUNICODE -D_AIX51 -D_LARGE_FILES -U__unix -q64 -
qlonglong -qalign=natural -qldbl128 -DSAPwithTHREADS -qtbtable=full -qhalt=e -qalias=noansi -+ -
qfdpr -O -qstrict -qlibansi -qinlglue -qmaxmem=8192 -DNDEBUG -qarch=ppc -qtune=pwr5 -qspill=2560 -
DSAPonRS6000 -DSAPwithPASE400 -DOS_LEVEL=530 -D__NO_XLC_BUILTIN_VA -D_Packed= -c -E <program>.cpp >
<program>.ii
        /usr/bin/perl5 u16lit.pl -cpp -asciistring <program>.ii
        xlC_r -DSAPonUNIX  -DSAPwithUNICODE -D_AIX51 -D_LARGE_FILES -U__unix -q64 -
qlonglong -qalign=natural -qldbl128 -DSAPwithTHREADS -qtbtable=full -qhalt=e -qalias=noansi -+ -
qfdpr -O -qstrict -qlibansi -qinlglue -qmaxmem=8192 -DNDEBUG -qarch=ppc -qtune=pwr5 -qspill=2560 -
DSAPonRS6000 -DSAPwithPASE400 -DOS_LEVEL=530 -D__NO_XLC_BUILTIN_VA -D_Packed= -c <program>.i
        xlC_r -q64 -brtl -bnortllib -bloadmap:<program>.out -bmap:<program>.map -o
<program> <program>.o libsapnwrfc.so libsapucum.so
2. The EBCDIC ILE version
        CHGCURLIB <nwrfclib>
        CRTCPPMOD MODULE(JKNRFC/COMPANYCLT) SRCFILE(JKNRFC/C) OPTION(*NOSYSINCPATH
*RTTIALL) INLINE(*ON *AUTO 250 2000 ) MODCRTOPT(*KEEPILDTA ) OPTIMIZE(40) DBGVIEW(*NONE) DEFINE
('SAPwithCHAR_EBCDIC' 'SAPwithTHREADS' 'SAPonOS400' 'OS_LEVEL=530' '__OS400_NATIVE_JLONG' 'NDEBUG')
SYSIFCOPT(*IFS64IO) LOCALETYPE(*LOCALEUCS2) TGTRLS(V5R3M0) TERASPACE(*YES *NOTSIFC) STGMDL(*SNGLVL)
DTAMDL(*P128) ENUM(*INT) CSOPT('-qalias=noansi -qstaticinline -qconvliteral=500') DFTCHAR(*UNSIGNED)
TGTCCSID(500)
        CRTPGM PGM(JKNRFC/COMPANYCLT) MODULE(JKNRFC/COMPANYCLT) TEXT(*BLANK) BNDSRVPGM
(JKNRFC/LIBSAPNRFC) ACTGRP(*NEW) OPTION(*RSLVREF *DUPPROC *DUPVAR *NOWARN) DETAIL(*NONE) ALWUPD
(*YES) ALWLIBUPD(*YES) USRPRF(*USER) AUT(*EXCLUDE) TGTRLS(V5R3M0) STGMDL(*SNGLVL) IPA(*NO)
```

3. The ASCII ILE version
Install the ASCII runtime QADRT from http://www-03.ibm.com/servers/enable/site/asciirt/devkit.html
For the compile make library QADRT the first library in the liblist and your <nwrfclib> the current one.
CHGSYSLIBL LIB(QADRT)
CHGCZRLIB <nwrfclib>
CRTCPPMOD MODULE(JKNRFC/COMPANYCLT) SRCFILE(JKNRFC/C) OPTION(*NOSYSINCPATH *RTTIALL) INLINE(*ON *AUTO 250 2000) MODCRTOPT(*KEEPILDTA) OPTIMIZE(40) DBGVIEW(*NONE) DEFINE ('SAPwithCHAR_ASCII' 'SAPwithTHREADS' 'SAPonOS400' 'OS_LEVEL=530' '__OS400_NATIVE_JLONG' 'qadrt_use_ctype_inline' 'qadrt_use_rename_inline' 'qadrt_use_write_inline' 'qadrt_use_close_inline' 'qadrt_use_remove_inline' 'qadrt_use_open_inline' 'qadrt_use_fflush_inline' 'NDEBUG') SYSIFCOPT (*IFS64IO) LOCALETYPE(*LOCALEUCS2) TGTRLS(V5R3M0) TERASPACE(*YES *TSIFC) STGMDL(*SNGLVL) DTAMDL (*P128) ENUM(*INT) CSOPT('-qalias=noansi -qstaticinline -qconvliteral=819') DFTCHAR(*UNSIGNED) TGTCCSID(819)
CRTPGM PGM(JKNRFC/COMPANYCLT) MODULE(JKNRFC/COMPANYCLT QADRT/QADRTMAIN2) TEXT (*BLANK) BNDSRVPGM(QSYS/QADRTTS JKNRFC/LIBSAPNRFC) ACTGRP(*NEW) OPTION(*RSLVREF *DUPPROC *DUPVAR *NOWARN) DETAIL(*NONE) ALWUPD(*YES) ALWLIBUPD(*YES) USRPRF(*USER) AUT(*EXCLUDE) TGTRLS(V5R3M0) STGMDL(*SNGLVL) IPA(*NO)

Be aware of the fact, that using the UNICODE PASE version the data exchanged through the SAP NW RFC SDK is pure UNICODE, especially the japanese characters are UNICODE encoded, whereas using the ASCII version the data exchanged through the SAP NW RFC SDK is ASCII or JIS encoded (for Japanese characters). There is no further support for JIS encoded characters in the SAP NW RFC SDK. The developer of the client or server program has the full responsibility to process them correctly.

Compiler Versions

The NW RFC SDK has been compiled with the following compiler versions:

- Windows

  Microsoft Visual Studio 2005 SP1

  When using Microsoft Visual Studio 2008, please note the following limitation: the functions from libsapucum.dll (sapuc.h) cannot be used with VS 2008. Instead of these functions use the standard Microsoft w-functions (wchar.h). (On Windows the datatype "SAP_UC" is equivalent to "wchar_t".) For example, instead of printfU() use wprintf(), instead of getcU() use _getws().

- HP-UX PA-RISC

  037300 (VVRRPP. C++ Compiler)

- HP-UX Itanium

  HP C/aC++ B3910B A.06.16.01 [Jan 4 2008]

- Solaris

  580 (VRP. C++ Compiler)

- Linux Intel/AMD and Itanium

  GNU g++ 4.1.2 20070115

- AIX

  0800 (VVRR)

- System i

  PASE UNICODE Version: 0800 (VVRR)

Validity

Software Component	From Rel.	To Rel.	And Subsequent
NWRFCSDK	7.10	7.10	☑

References

This document refers to:

SAP Notes

1097997	Installing SAP NW RFC SDK on System i
763741	Skript for string literal support for Unicode RFC SDK

This document is referenced by:

SAP Notes (2)

763741	Skript for string literal support for Unicode RFC SDK
1097997	Installing SAP NW RFC SDK on System i