Fujitsu Software BS2000 CRTE

*4 Version 10.0B
*4 June 2018

Release Notice

1 General

*4 The Common Run-Time Environment CRTE V10.0B is the common runtime system for all variants of the following compilers:
COBOL85 as of V2.1, COBOL2000 as of V1.0, C and C++ as of V2.1 or C/C++ as of V3.0 in OSD/BC as of V10.0 and OSD/XC as of V10.0.

CRTE comprises language-specific and non-language-specific libraries, e.g. for program linking, mathematics and uniform event and error handling as well as memory and I/O management. The header files of the C and C++ library functions are also part of the CRTE.

The CRTE is software prerequisite for COBOL85, COBOL2000, C and C++ applications and for the above-mentioned versions of the compilers for the languages COBOL, C and C++. CRTE is also a prerequisite for applications with a "foreign" language mix. CRTE also supports the COBOL85, COBOL2000, C and C++ compilers and their applications in POSIX.

Some of the CRTE libraries are shareable and can be preloaded as a subsystem.

*4 This Release Notice is a summary of the major extensions, requirements and operating information with regard to CRTE V10.0B under the operating system OSD/BC as of V10.0 and OSD/XC as of V10.0.

*4 The release level is that of June 2018.

*4 Changes to release level June 2017 are marked with “*4”.

*3 Changes to release level June 2016 are marked with “*3”.

*2 Changes to release level November 2015 are marked with “*2”.

*1 Changes to release level April 2015 are marked with “*1”.

This and other current Release Notices are shipped on the SoftBooks DVD and are available online at http://manuals.ts.fujitsu.com/.

If one or more previous versions are skipped when this product version is used, the information from the Release Notices (and README files) of the previous versions must be noted.

1.1 Ordering

*4 CRTE V10.0B can be ordered from your local distributors.

*4 CRTE V10.0B can be purchased from your local distributors and is subject to the general terms and conditions of the software product use and service agreement.

*4 CRTE V10.0B is included in OSD/XC as of V10.0 (see section 3.2 "Software configuration" for details).

1.2 Delivery

*4 The CRTE V10.0B files are supplied via SOLIS.

The following delivery components are required, regardless of the hardware type (HSI):

	SINLIB.CRTE.100	Library for installation in POSIX
	SINPRC.CRTE.100	Library with installation procedures
	SKULNK.CRTE.100	C runtime system including macros (X86)
	SKULNK.CRTE.100.COMPL	Modules for complete partial bind (X86)
	SKULNK.CRTE.100.CPP-COMPL	Modules for complete partial bind of ANSI-C++ programs (X86)
	SKULNK.CRTE.100.PARTIAL-BIND	Modules for standard partial bind (X86)
	SKULNK.CRTE.100.POSIX	POSIX link switch (X86)
	SKULNK.CRTE.100.RTSCPP	Standard-C++ runtime system for C/C++ V3.2 (X86)
	SKULNK.CRTE.100.STDCPP	Standard-C++ library for C/C++ V3.2 (X86)
	SKULNK.CRTE.100.TIME	Time link switch (X86)
	SKULNK.CRTE.100.TIMESHIFT	Timeshift link switch (X86)
	SKULNK.CRTE.100.TIME38	Time functions for special Applications (X86)
*4	SKULNK.CRTE.100.TIME50	Timeshift link switch (X86)
	SKULNK.CRTE.100.TOOLS	C++ library Tools.h++ for C/C++ V3.2 (X86)
	SYSFGM.CRTE.100.D	Release Notice (German)
	SYSFGM.CRTE.100.E	Release Notice (English)
	SYSLIB.CRTE.100	Header and macros for C, C++, Tools.h++
	SYSLIB.CRTE.100.CPP	Headers and macros for C++-Cfront mode
	SYSLNK.CRTE.100	C/COBOL runtime system including macros
	SYSLNK.CRTE.100.CFCPP	Macro/module library for C/C++ compiler as of V3.0B (Cfront)
	SYSLNK.CRTE.100.COMPL	Modules for complete partial bind
	SYSLNK.CRTE.100.COMPV1	Compatibility library C V1.0
	SYSLNK.CRTE.100.COMPV2	Compatibility library C V2.0
	SYSLNK.CRTE.100.CPP	Macro/module library for C++ compiler as of V2.1 (Cfront)

	SYSLNK.CRTE.100.CPP-COMPL	Modules for complete partial bind of ANSI-C++ programs
	SYSLNK.CRTE.100.PARTIAL-BIND	Modules for standard partial bind
	SYSLNK.CRTE.100.POSIX	POSIX link switch
	SYSLNK.CRTE.100.RTSCPP	Standard C++ runtime system for C/C++ as of V3.0
	SYSLNK.CRTE.100.SHARE	Shareable components
	SYSLNK.CRTE.100.STDCPP	Standard C++ library for C/C++ as of V3.0
	SYSLNK.CRTE.100.TIME	Time link switch
	SYSLNK.CRTE.100.TIMESHIFT	Timeshift link switch
	SYSLNK.CRTE.100.TIME38	Time functions for special applications
*4	SYSLNK.CRTE.100.TIME50	Timeshift link switch
	SYSLNK.CRTE.100.TOOLS	C++ library Tools.h++ for C/C++ as of V3.0
	SYSSSC.CRTE.100.C SYSSSC.CRTE.100.C.LOW	Subsystem declarations (CRTEC)
	SYSSSC.CRTE.100.COBOL SYSSSC.CRTE.100.COBOL.LOW	Subsystem declarations (CRTECOB)
	SYSSSC.CRTE.100.COB-PART SYSSSC.CRTE.100.COB-PART.LOW	Subsystem declarations (COBPART)
	SYSSSC.CRTE.100.PARTIAL SYSSSC.CRTE.100.PARTIAL.LOW	Subsystem declarations (CRTEPART)
	SYSSSC.CRTE.100.SIS SYSSSC.CRTE.100.SIS.LOW	Subsystem declarations (CRTESIS)
	SYSSII.CRTE.100	IMON information file

The files identified as X86 can only be used for producing applications for X86 hardware. They are not needed for normal operation, but are supplied for optimizing availability if required. Their use is not generally released.

*3 The following delivery components are only required on SQ Servers and on each
*3 x86 server unit in SE Servers:

SKUSSC.CRTE.100.PARTIAL	Subsystem declarations (CRTEPARK)
SKUSSC.CRTE.100.SIS	Subsystem declarations (CRTESIK)

POSIX-HEADER and the message files for CRTE are component parts of OSD/BC and OSD/XC (see section 3.2 "Software configuration" for details).

The current file and volume characteristics are listed in the SOLIS2 delivery cover letter.

1.3 Documentation

You will find a description of the language-specific application options in the user guides and in the language reference manuals for each compiler as well as in the descriptions of the C and C++ library functions.

*4 The following documentation is available for CRTE V10.0B:

*4 CRTE V10.0B Common Runtime Environment
Benutzerhandbuch

*4 CRTE V10.0B Common Runtime Environment
User Guide

*4 The following documentation is available for the C library functions as of CRTE V10.0B:

*1 C-Bibliotheksfunktionen
Referenzhandbuch
*4 Ausgabe Juni 2018

*1 C Library Functions
Reference Manual
*4 Edition June 2018

*4 The following additional manual is available for the C library functions in POSIX as of CRTE V10.0B:

*1 C-Bibliotheksfunktionen für POSIX-Anwendungen
*1 Referenzhandbuch
*4 Ausgabe Juni 2018

*1 C Library Functions for POSIX Applications
*1 Reference Manual
*4 Edition June 2018

The manuals of the BS2000 basic configuration are additionally required for operating CRTE.

The BS2000 documentation is available in German and English on DVD with the title “BS2000 SoftBooks”.

The documentation is also available on the internet at http://manuals.ts.fujitsu.com. Manuals which are displayed with an order number can also be ordered in printed form.

The manuals may be supplemented with README files. These contain changes and extensions to the manual of the product concerned. The file names are made up as follows:

SYSRME.<product>.<version>.E (file with English text)
SYSRME.<product>.<version>.D (file with German text)

The README files are available on the SoftBooks-DVD or online under http://manuals.ts.fujitsu.com.

2 Software extensions

2.1 Last Byte Pointer Support

In CRTE V10.0A a last byte pointer support for PAM files has been implemented.
*1 A description of this functionality can be found in the manual “C Library Functions”
*1 (Edition November 2015).

2.2 Functions setenv and unsetenv

In CRTE V10.0A the functions setenv and unsetenv have been implemented.
*1 A description of these functions can be found in the manuals “C Library Functions
*1 for POSIX Applications” and “C Library Functions”.

2.3 New POSIX functions for operations on files and directories

*1 The new POSIX-functions allow operations on files or file directories, if those files
*1 or file directories:
*1 - are designated by a relative path and
*1 - are not in the current directory, but in a directory associated to a file descriptor
*1
*1 These are the following functions:
*1
*1 - openat, openat64
*1 - renameat
*1 - unlinkat
*1 - fstatat, fstatat64
*1 - utimensat
*1 - linkat
*1 - mkdirat
*1 - readlinkat
*1 - symlinkat
*1 - fchownat
*1 - fchmodat
*1 - mknodat
*1 - faccessat
*1 - mkfifoat
*1 - futimesat
*1 - fdopendir
*1 - strnlen
*1
*1 A description of these functions can be found in the manual “C Library Functions
*1 for POSIX Applications”.

2.4 Extensions of open functions

*1 For processing SAM files with variable and maximum record length the following
*1 functions have been extended:
*1
*1 - open , open64
*1 extension of the mode flag: O_NOSPLIT, O_RECORD
*1
*1 - fopen , fopen64 , freopen , freopen64
*1 extension of the mode flag: split=yes/no
*1
*1 A description of these enhancements can be found in the manual “C Library Func-
*1 tions”.

2.5 Extension of POSIX function sysconf

*2 The POSIX function sysconf has been extended by information about number of
*2 processors. Detailed description can be found in the README file at
*2 http://manuals.ts.fujitsu.com.

2.6 New epoll functions in POSIX

*2 In CRTE V10.0A functions to support the epoll systemcall have been
*4 implemented: epoll_create, epoll_ctl and epoll_wait.
*4 These functions are described in the manual "C Library Functions for POSIX
*4 Applications" (June, 2018 edition).

2.7 New POSIX function dirfd

*4 The dirfd function extracts the file descriptor from a DIR object. A description of
*4 these function can be found in the manual "C Library Functions for POSIX
*4 Applications" (June, 2018 edition).

2.8 New functions clock_gettime, clock_gettime64

*4 In CRTE V10.0B, there are new functions for determining the time of a specified
*4 clock. Only the system-wide real-time clock CLOCK_REALTIME is supported.
*4 A description of the functions can be found in the manuals "C Library Functions"
*4 (June 2018 edition) and "C Library Functions for POSIX Applications" (June, 2018
*4 edition).

2.9 Changed function strptime

*4 The restriction that a space character or a non-alphanumeric character must exist
*4 between two conversion specifications is eliminated. For details, refer to the "C Li-
*4 brary Functions" (June, 2018 edition) and "C Library Functions for POSIX Applica-
*4 tions" (June, 2018 edition).

2.10 Default epoch for BS2000 time functions

*4 As of CRTE V10.0B, the time functions ctime, difftime, ftime, gmtime, localtime,
*4 mktime and time use the 01.01.1970 00:00:00 by default as the reference date
*4 (epoch). Thus they deliver correct results from 13.12.1901 20:45:52 to 19.01.2038
*4 03:14:07. This is an incompatible change. In older versions since V2.9A, this
*4 behavior has been achieved by using the TIMESHIFT link switch. In CRTE
*4 V10.0B, the link switch TIME50 (included in SYSLNK.CRTE.TIME50 or
*4 SKULNK.CRTE.TIME50 libraries) can be used to achieve a behavior compatible
*4 with previous versions. Details can be found in the "C Library Functions" manual
*4 (June, 2018 edition) and in the CRTE V10.0B User Guide.

2.11 Error corrections

*4 The bugs fixed in CRTE V10.0B are listed in the delivery cover letter.

3 Technical information

3.1 Resource requirements

*4 Depending on the application concerned, CRTE V10.0B requires
approx. 1 MB static virtual address space.

The files supplied with the product occupy
*4 approx. 94,000 PAM pages

where
*2 approx. 47,000 PAM pages
are occupied by files that are provided exclusively for producing X86 applications for X86 hardware.

The later files can be deleted on the S-servers to save hard disk space, as long as the production of X86 applications is not intended.

The following space is required in class 4 memory for loading the subsystems:

*4	CRTEC	1901 KB
*4	CRTECOB	246 KB
*4	CRTESIK	3167 KB (only for X86 systems)
*4	CRTESIS	967 KB
*4	CRTEPARK	5972 KB (only for X86 systems)
*2	CRTEPART	2659 KB
*4	COBPART	197 KB

All subsystems are loaded by default into the class 4 memory above 16 MB.

3.2 Software configuration

*4 CRTE V10.0B is released for OSD/BC as of V10.0 and is included in OSD/XC as of V10.0.

*4 The POSIX subsystem must be loaded for the CRTE V10.0B POSIX support.
*4 POSIX applications produced with CRTE V10.0B require the version of POSIX-BC that is released for the OSD version concerned.

*4 CRTE V10.0B requires the following SOLIS correction package of the technical delivery unit CRTE-BAS:

*4 BS2GA.CRTE-BAS V10.0 (as of SOLIS-change state B01)

*4 Among other things, this delivery unit includes release of CRTE-MSG V10.0B and
*4 POSIX-HEADER V10.0B.

3.3 Product installation

Installation of the product CRTE with the installation monitor IMON is mandatory. The information concerning installation in the delivery cover letter and in the product documentation must be followed as well as the information in this Release Notice.

The necessary inputs and the sequence of the installation are described in the IMON documentation. You will find all important information on product installation in the CRTE V10.0A User Guide.

The standard installation of CRTE in the POSIX file system is made either directly with IMON or with the POSIX installation tool after installation with IMON.

The following additional installation forms are also described in the manual:

- Installation to a non-standard ID
- Private installation
- Installation of header files and link switches in any desired POSIX directory

3.3.1 Important information regarding upgrades

CRTE V10.0 is the subsequent version of CRTE V2.9.

Upgrading from previous CRTE versions:

The headers from an earlier CRTE version installed in POSIX must first be removed. For this, refer to the information in the CRTE V10.0A User Guide.

Subsequently, all files from previous CRTE versions can be deleted.

*4 *4 Any preloaded CRTEC, CRTECOB, CRTESIS, CRTEPART, CRTEPARK, COBPART subsystems from a previous version may not be accessed while or after installing CRTE V10.0B. These subsystems should be stopped before CRTE V10.0B is installed, and either replaced by the new version of the subsystem concerned (in the case of a standard installation, IMON automatically generates the appropriate entries in the subsystem catalog) or removed from the subsystem catalog.

CRTE replaces ILCS. Parallel operation of CRTE and ILCS will result in undefined program behavior. Therefore, you should take note of the following:

*4 *4 You may not access an existing ILCS subsystem while or after installing CRTE V10.0B. ILCS must be stopped and removed from the subsystem catalog before CRTE V10.0B is installed.

If ILCS is supplied with another product, you cannot install this ILCS as long as CRTE is installed.

3.4 Product use

The CRTE V10.0A User Guide contains all the main information on using the product.

The libraries (SKULNK...) and subsystems (SKUSSC...), supplied exclusively for use on X86 systems are not released for use. If necessary, these files can be deleted (see section 3.1 "Resource requirements" for details).

Note on optional REP A0434953-294:
This optional REP ensures that page 0 is not allocated after ILCS initialization. This REP should only be used in debug operation to detect erroneous access to page 0.

3.5 Discontinued functions (and those to be discontinued)

The following functions are no longer supported as of this version:

none

The following functions are supported for the last time in this version:

none

3.6 Incompatibilities

*4 The time functions ctime, difftime, ftime, gmtime, localtime, mktime and time
*4 from CRTE V10.0B use the 01.01.1970 00:00:00 as reference date (epoch) and
*4 deliver correct results from 13.12.1901 20:45:52 to 19.01.2038 03:14:07, so using
*4 TIMESHIFT link switch is no more necessary. To achieve the previous behavior,
*4 you can use the TIME50 link switch. Details can be found in the "C Library Func-
*4 tions" manual (June, 2018 edition) and in the CRTE V10.0B User Guide.
*4 See also chapter 2.6 Default epoch for BS2000 time functions.

3.7 Restrictions

none

3.8 Procedure in the event of errors

If an error occurs, the following error documents are needed for diagnostics:

- a detailed description of the error condition
- indication as to whether and how the error can be reproduced
- options, source and error listing including expansion of the COPY and INCLUDE elements (LISTING option)
- execution log
- source including the COPY and INCLUDE elements and COSSD if required
- linker listing
- input/output files
- expected result
- brief description of execution
- product version number
- Rep files used
- CONSLOG (in special cases)
- DUMP, if available
- subsystems used

4 Hardware requirements

*4 CRTE V10.0B will run on all business servers supported by

- OSD/BC as of V10.0 and
- OSD/XC as of V10.0

5 Firmware versions

not applicable