

## Fujitsu Software BS2000

### C/C++ V4.0

The C/C++ compiler supports object-oriented programming (OOP) with the modern C++ on BS2000 business servers.

## Topics

### Product characteristic

Depending on the selected language mode, the C/C++ V4.0 compiler in BS2000 supports:

- C code conforming to the Kernighan & Ritchie C definition,
- C code conforming to the ISO/IEC Standard 9899: 2011,
- C++ code conforming to the Stroustrup C++ definition (C/C++ V3.0B or later),
- C++ code conforming to the ISO/IEC 14882: 2017, known as C++17 with few limitations.

C++ is a powerful programming language, which supports the principles of object-oriented programming, such as encapsulation, inheritance and polymorphism. C++ is particularly suitable for use in the development of reusable software building blocks in the form of class libraries.

C/C++ permits selective use of the advantages of object-oriented programming. The C language set is also available.

The C/C++ V4.0 programming system is available in the following selectable units:



### C/C++ full configuration for /390:

- with AID support,
- with /390 code generator,
- without x86 code generator.

The language set of the C++ compiler supports the following functions:

- Templates with variable argument list
- Inline Functions and variables with external linkage
- Methods for calculating expressions at compile time

### C/C++-RS (shipment via special release only):

Full configuration for business servers with x86 processor architecture:

- with AID support,
- with /390 code generator,
- with x86 code generators for business servers with x86 processor architecture (SE-series).

C/C++ V4.0 supports the POSIX functionality and the POSIX file system in BS2000.

CRTE is the common runtime environment for C/C++, COBOL85 and COBOL2000. CRTE is a software requirement for use of the C/C++ compiler and for running C/C++ applications.

CRTE is not shipped in combination with the C/C++ compiler and must be ordered separately.

## Functional description

C++ supports object-oriented programming. This is still based on the already known principles: encapsulation, inheritance, and polymorphism.

With support for the C++17 standard, the following important functions/features are available:

### Templates with variable argument lists

Templates can have a variable number of parameters. This allows you to build generic templates that can be used more widely.

### Inline functions and variables with external linkage

Inline functions now have external linkage by default. They behave just like normal functions without losing inline optimization.

Inline variables allow you to define variables only in header files. There is no need for a module that contains the unique definition of the variables.

### Methods for calculating expressions at compile time

The language feature `constexpr` can now be used to specify that certain expressions can be calculated at compile time. This allows a better performance. Such expressions can also be used in places that previously required constants.

C++ supports the creation of class libraries. Class libraries are reusable software building blocks.

C/C++ supports the POSIX functionality in OSD/BC.

The C/C++ compiler can be invoked under the POSIX shell in accordance with XPG4 specifications. Sources and includes can be read from the POSIX file system UFS. Generated objects and compiler listings can be stored in UFS.

Input/output operations on UFS files are possible via the C/C++ POSIX RTS. This is particularly useful for

processing unstructured data streams, which are a common feature in UNIX-systems environments.

AID can be used for symbolic and non-symbolic debugging of C++ programs in BS2000.

This provides the same test environment for C/C++ that many developers are familiar with from ASSEMBH, COBOL85, COBOL2000, FORTRAN or PLI1.

## Program description

The C/C++ development system comprises the C/C++ compiler and the Common Runtime Environment CRTE.

The C/C++ compiler supports almost the complete language set of the ISO/IEC 14882:2017 as defined in the International Standard Programming Language - C++ from Dec.2017. The deviation in the supported language range is caused by BS2000, such as the lack of thread support, which BS2000 does not offer.

The C language set as defined by Kernighan & Ritchie and C 2011 is also supported.

Code is generated directly as machine code for business servers with /390 instruction architecture.

The generated /390 format guarantees object compatibility for the execution of BS2000 customer applications even in the event of future changes in architecture.

CRTE includes language-specific and language-neutral libraries, e.g., for program linking, mathematics, standardized event and error handling, as well as for storage and I/O management.

The header files for the C and C++ library functions are also included in CRTE. Some CRTE libraries are shareable and can be preloaded as a subsystem.

With CRTE the C++ libraries are also shipped.

The following functions can be used in BS2000 versions with activated POSIX subsystem:

- Input/output of POSIX files during compilation
  - Use of POSIX library functions conforming to XPG4
  - Control of the C/C++ compiler via the POSIX shell
- CRTE is required as the runtime environment for the C/C++ compiler and programs generated with it. CRTE is the common runtime environment for C/C++, COBOL85 and COBOL2000 programs.

# Technical Details

## Requirements

<b>Technical Requirements Hardware</b>	BS2000 Business Server
<b>Technical Requirements Software</b>	BS2000 OS DX V1.0 BS2000 OSD/BC V11.0, OSD/XC V11.0 CRTE V11.0 or higher SDF V4.1 or higher BINDER V2.3 or higher BUILDER V1.0 or higher LLMAM V3.4 or higher PLAM ab V3.1 or higher <b>Optional software:</b> EDT V16.6 or higher AID for symbolic debugging POSIX-BC for the C/C++ compiler under POSIX DAB to speed up load times
<b>User Requirements</b>	Knowledge of C/C++ and BS2000

## Installation

<b>Operating Mode</b>	Batch and interactive dialog
<b>Implementation Language</b>	C/C++, SPL4 and Assembler
<b>User Interface</b>	Commands in English Messages in English or German
<b>Installation</b>	Please refer to the relevant release notices.

## Documentation and Training

<b>Documentation</b>	<b>Documentation in English and German:</b> C/C++ Compiler User Guide POSIX Commands of the C/C++ Compiler User Guide CRTE User Guide AID Debugger for C/C++ User Guide BS2000 C Libraries Reference Manual BS2000 C++ Libraries Reference Manual POSIX C Libraries Reference Manual <b>Documentation in English only:</b> Standard C++ Library User Guide and Reference Tools.h++ © User Guide Tools.h++ © Class Reference Tools.h++ Copyright © Rogue Wave Software, Inc. These manuals are available on the <a href="#">manual server</a> .
<b>Training</b>	See <a href="#">course offer</a> (German only)

## Purchase and Delivery

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<b>Order and Delivery</b>	This software product may be obtained from your local Fujitsu regional office.

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