

White Paper

FUJITSU Software BS2000 BS2IDE

Integrated Development Environment for BS2000 based on Eclipse™



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BS2IDE supports developers of BS2000 applications on typical tasks and integrates the benefits of modern development environments. By combining the most important tools of the software development process in one unified user interface, BS2IDE supports developers throughout the whole development cycle and raises the productivity in BS2000 software development and service.

The most important features are:

- Syntax aware editors (e.g. for SDF-P)
- Remote launching of compilers and binder on BS2000
- Placement of problem markers directly in the corresponding lines of code
- Source oriented, graphical remote debugging (based on AID)
- openFT connection to BS2000 (Remote System Explorer)
- Local or remote source storage
- Support of open revision control systems (e.g. git)

BS2000 supports the most common programming languages of BS2000:

- COBOL85 and COBOL2000 (incl. ESQL)
- Assembler
- C/C++

BS2IDE is based on the open source Eclipse framework which offers a huge number of additional plug-ins. It is also possible to integrate BS2IDE in existing Eclipse based environments.

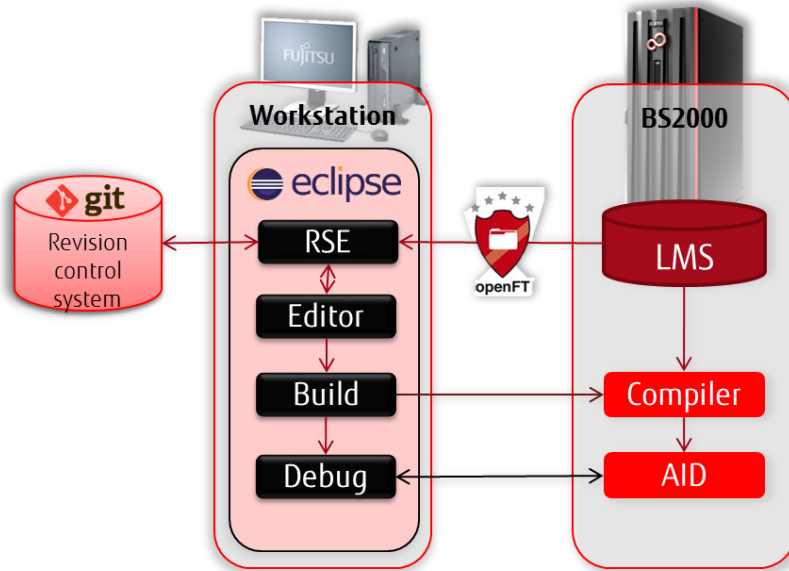
BS2IDE is continuously developed further according to customer needs. New releases are provided as online updates in regular intervals. The current releases' User Guide as well as news are published on the BS2IDE homepage:

<http://bs2000.ts.fujitsu.com/bs2ide>

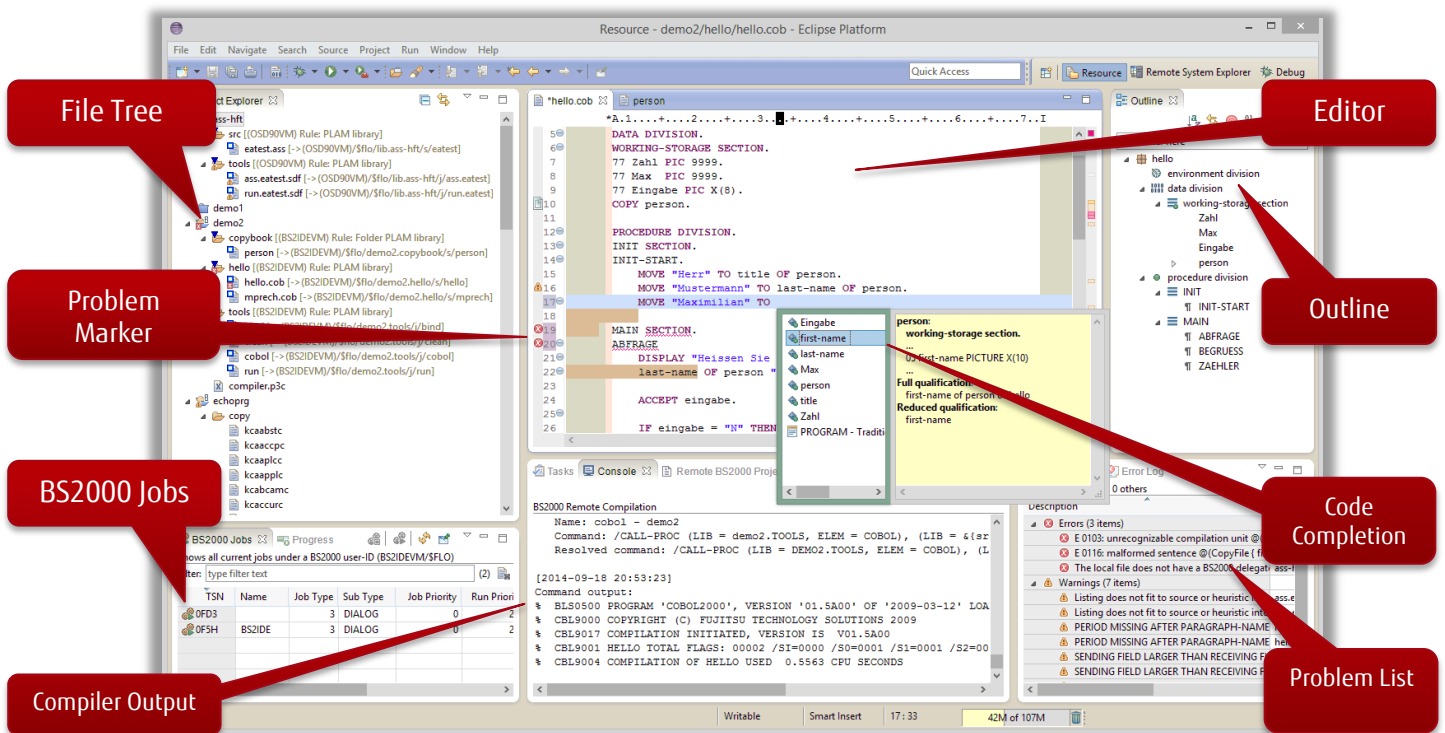


Overview

BS2IDE establishes a connection to BS2000 via openFT. An openFT client is necessary on the developer's workstation to achieve this. Furthermore a dialog connection is established to retrieve further information (e.g. file attributes). This connection is independent of other terminal emulations and is also used for source oriented debugging.



The default view shows the developer all relevant information in a clearly arranged user interface. Depending on the usage scenario, this interface can be individually customized.



Requirements

BS2IDE is available from BS2000 OSD/BC V10.0 on as a free of charge component of the Basic Configuration. Customer individual consulting, support and training services are available by request.

On BS2000 openFT from version 11.0 and at least one compiler/assembler is necessary to use BS2IDE. For source oriented debugging also AID from version 3.4 on is necessary.

On the developer's PC openFT V11.0 or from V12.0 on the client version as well as the Eclipse Framework Version 4.3 ("Kepler") or 4.4 ("Luna") are necessary. Furthermore the Eclipse Plug-In Remote System Explorer (RSE) from version 3.4 on is necessary. In most cases it is reasonable to install further Eclipse Plug-Ins for example for revision control systems.

For the PC all operating systems supporting openFT as well as Eclipse can be considered. These are especially Windows, Linux and Solaris.

Eclipse and RSE are open source products, published under the Eclipse Public License. All other products mentioned are Fujitsu products.

Compile

By using pre-defined rules and change tracking, BS2IDE detects automatically what sources need to be compiled. If necessary, locally changed sources are transferred to BS2000 via openFT and a previously defined compile procedure is started. After compilation the resulting source listing is fetched and analysed by BS2IDE. Possible error and warning messages are then marked in the corresponding line of code. By putting the cursor on those markers, the user can retrieve the original message of the compiler and therefore concentrate on error correction.

Syntax-aware Editors

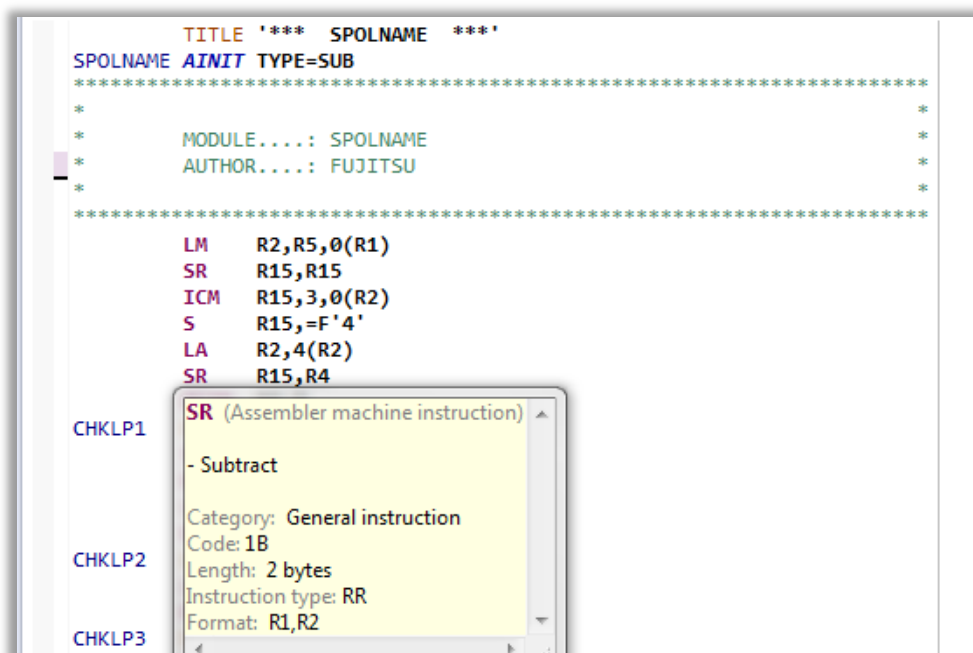
Eclipse offers a basic text editor to edit all kind of text files. Syntax-aware editors are available for the programming languages COBOL, Assembler and C/C++ as well as for the command language SDF/SDF-P. Apart from syntax highlighting these editors offer code completion and outline features.

C/C++ Editor

A syntax aware editor for C and C++ is part of the so called Eclipse C Development Toolkit (CDT) and can also be used together with BS2IDE.

ASSEMBH Editor (BS2000 Assembler Language)

A syntax aware editor for the BS2000 Assembler Language is part of BS2IDE itself. This editor highlights assembler instructions and provides a mouse-over help and auto completion.



SDF/SDF-P Editor

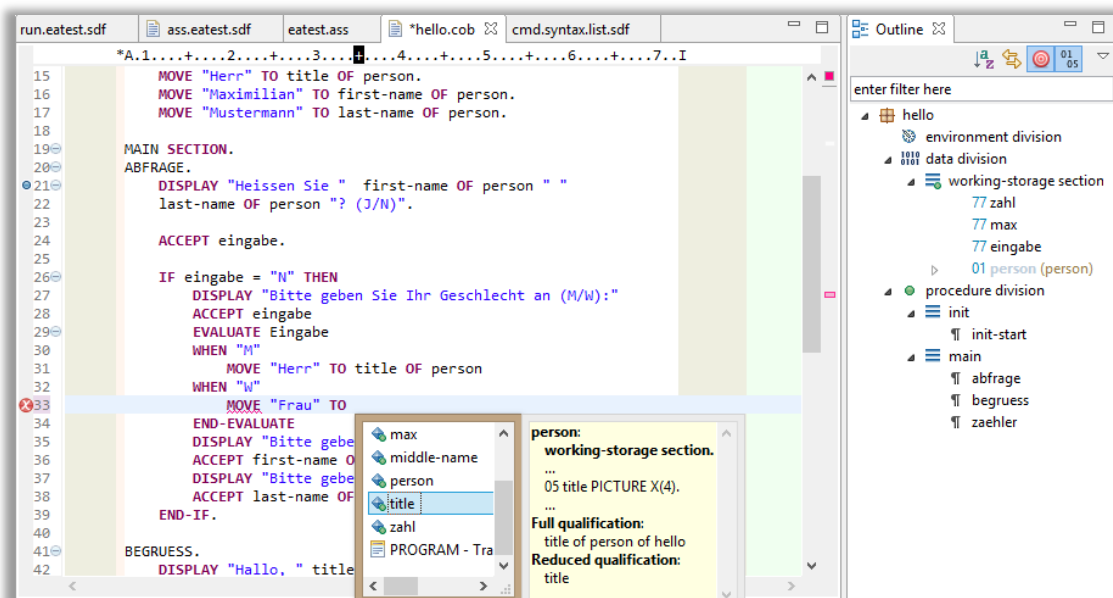
Even for the BS2000 job control and command language SDF a syntax aware editor is part of BS2IDE. This editor recognises distinct abbreviated SDF commands and highlights those. The mouse over help shows the full command as well as its guaranteed abbreviation.

```

/SET-PROCEDURE-OPTIONS
/ LOGGING      =*YES,
/ DATA-ESCAPE-CHAR =STD,
/ JV-REPLACEMENT =*AFTER-BUILTIN
/BEGIN-PARAMETER-DECLARATION
/ DECLARE-PAR NAME=(
/   UTMV      ( INIT='061'),
/   UTMU      ( INIT='TSOS'),
/   LIB       ( INIT='LIB.TRNG'),
/   PROG      ( INIT='ECHOPRG'))
/END-PARAMETER-DECLARATION
/*****
/"" PROC: COB      (COBOL2000 COMPILER) ""
/*****
/ SET-JV-LINK JV=#JV.MONJVC2000
/ SET-FILE-LINK LINK=COBLIB, FI-NA=&LIB
/ SET-FILE-LINK LINK=COBLIB1, FI-NA=$&UTMU..SYSLIB.UTM.&UTMV..COB
/ SET-FILE-LINK LINK=SRCLIB, FI-NA=&LIB
/ SET-FILE-LINK LINK=LIBLINK, FI-NA=&LIB
/ SET-FILE-LINK LINK=ERRLINK, FI-NA=ERR.&PROG
/ SET-FILE-LINK LINK=OPTLINK, FI-NA=OPT.&PROG
/ SET-FILE-LINK LINK=SRCLINK, FI-NA=SRC.&PROG
/ ASSIGN-SYSDTA TO=*SYSCMD
/START-COBOL2000-COMPILER
/ SOURCE=*LIB(LIB=&LIB, ELEM=&PROG),
/ MODULE-OUTPUT=*LIB(LIB=&LIB, ELEM=*STD),
    
```

COBOL Editor

Our partner EasiRun Europe has adapted a COBOL-Editor for use with BS2IDE. This editor is provided by Fujitsu as an optional add-on against a surcharge. Apart from syntax highlighting this editor offers a wide range of features to support the developer. It provides an outline of the current source and offers code completion.

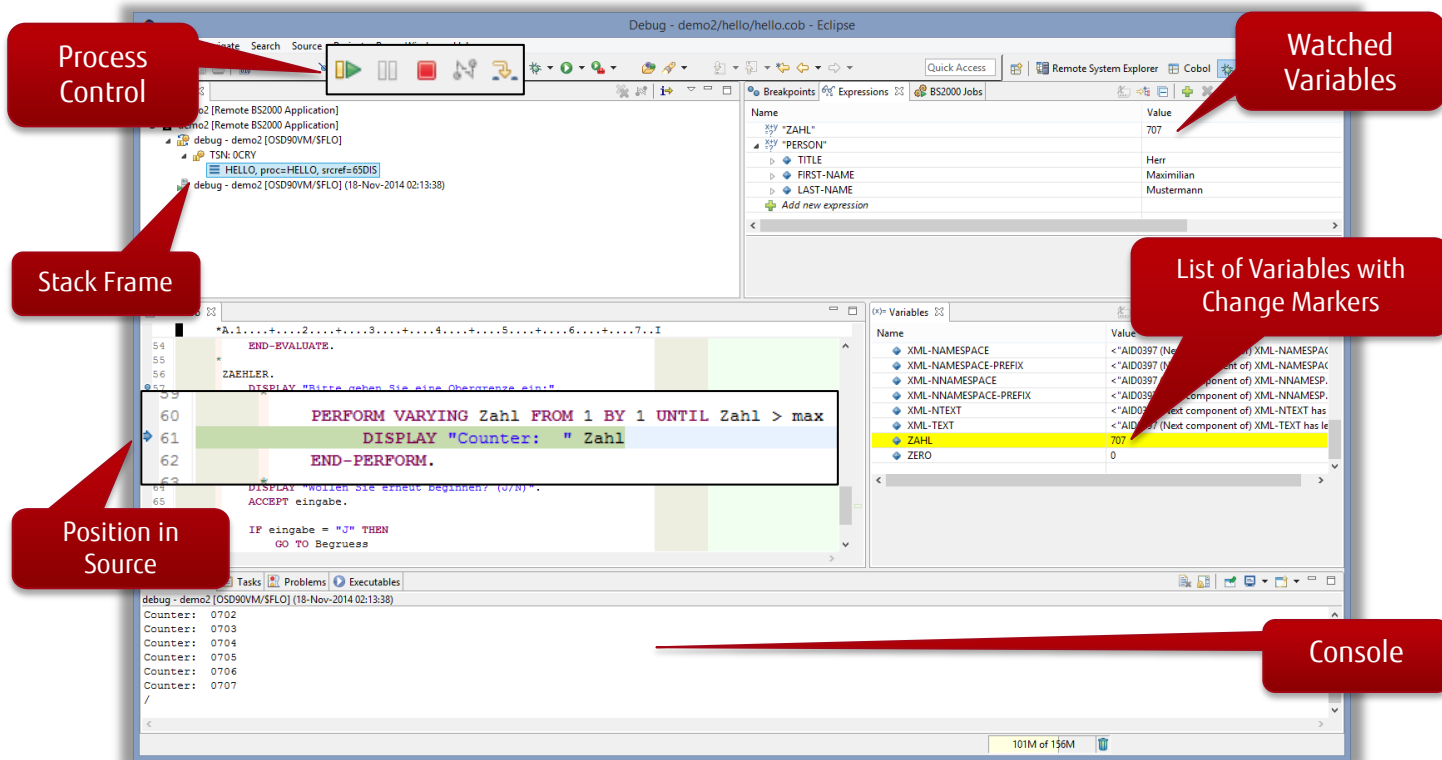


Furthermore, this editor detects a range of typical mistakes while typing and indicates those to the developer by markers similar to spell-checkers of common word processors. The input method (insert/replace) changes automatically depending on the cursor's position.

By providing a Java-like Look&Feel this editor especially helps programmers of Java or similar languages to familiarize themselves with COBOL.

Source-oriented Debugging

The so called Debug Perspective of Eclipse lets programmers remotely debug their BS2000 application and offers all common advantages of the open world. As soon as a program is suspended, the current line of code is highlighted directly in the source. At this point the user has the possibility to step through the code line by line while being notified of any variables changing their values. It is also possible to watch the values of a specific set of variables or to change variable values. Of course the Debug Perspective can also be customized by the user.



Conclusion

BS2IDE integrates the advantages of open world development environments into the BS2000 mainframe area. By using the open source framework Eclipse, a strong focus is set on scalability and integration potential.

Java and .NET developers will find the BS2IDE appealing to use because of its familiar user interface. Experienced mainframe programmers will find a lot of help to search for and avoid mistakes, which can co-exist with existing mainframe development environments.

BS2IDE increases the productivity of existing development personnel and saves time and money for the education of new personnel.

Contact
 FUJITSU
 Mies-van-der-Rohe-Str. 8, 80807 Munich
 Germany
 E-Mail: bs2ide@ts.fujitsu.com
 Website: de.fujitsu.com
 bs2000.ts.fujitsu.com/bs2ide
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