



C4B

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USER MANUAL

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REVISIONS

Version	Date	Comment
1.0	23/12/2010	Initial version
1.1	08/07/2014	New translation profil 01 (§II.2.1 and II.2.2)
1.2	19/09/2016	Remove Comenc reference

REFERENCE

Reference	Date	Title
[R1]		B reference manual
[R2]		ComenC specification

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I INTRODUCTION

This document is the User manual for the tool C4B. It describes how the tool must be used to translate B0 implementations in C sources.

Main C translation principles will be explained, and different ways to launch the tool will be described.

II TRANSLATING INTO C

II.1 Input B0 language

The subset of B0 language that can be handled by the tool and the produced result are described in the document [R2].

II.2 Translation profile

C4B allows user to choose between several translation profiles. Profiles are used to custom some element translations, as integer or Boolean types.

This section presents the different profiles.

II.2.1 Provided profiles

The different provided translation profiles are: C9X, LIGHT, 01 and PROJECT. The three first ones use predefined values.

The last one necessitates a parameter file in which custom values can be defined.

The way to choose between all profiles will be described in further sections.

This section will now present how elements are translated by each profile.

Default profile	
Element	Translation
Boolean type	unsigned char
Boolean true literal	true
Boolean false literal	false
Integer type	int
Added headers	<stdint.h> <stdbool.h>
uint8_t	uint8_t
uint16_t	uint16_t
uint32_t	uint32_t
int8_t	int8_t
int16_t	int16_t
int32_t	int32_t
SBOOL	SBOOL
Disable prefixing operation	0

Profile C9X	
Element	Translation
Boolean type	bool

Boolean true literal	true
Boolean false literal	false
Integer type	int32_t
Added headers	<stdint.h> <stdbool.h>
uint8_t	uint8_t
uint16_t	uint16_t
uint32_t	uint32_t
int8_t	int8_t
int16_t	int16_t
int32_t	int32_t
SBOOL	SBOOL
Disable prefixing operation	0

Profile LIGHT	
Element	Translation
Boolean type	unsigned char
Boolean true literal	1
Boolean false literal	0
Integer type	long
Added headers	-
uint8_t	unsigned char
uint16_t	unsigned short
uint32_t	unsigned long
int8_t	signed char
int16_t	signed short
int32_t	long
SBOOL	unsigned char
Disable prefixing operation	0

Profile 01	
Element	Translation
Boolean type	bool
Boolean true literal	true
Boolean false literal	false
Integer type	int32_t
Added headers	<stdint.h> <stdbool.h>
uint8_t	uint8_t
uint16_t	uint16_t
uint32_t	uint32_t
int8_t	int8_t
int16_t	int16_t
int32_t	int32_t
SBOOL	SBOOL
Disable prefixing operation	1

Profile PROJECT	
Element	Translation
Boolean type	User defined
Boolean true literal	User defined
Boolean false literal	User defined
Integer type	User defined

Added headers	User defined
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Values of elements for profile PROJECT are those of default profile if they are not defined in provided profile file.

II.2.2 Profile file syntax

Profile file for C4B must contain a set of lines shaped like this:
 PARAMETER_NAME=PARAMETER_VALUE.

An unique parameter can be set by line, and PARAMETER_NAME element must belong to the set of resources recognized by the translator, and described above.

As said in II.2.1, values not set in the profile file will be those of default profile.

This table lists all parameters that can be set in the translator profile file.

Parameter	Description
BOOLEAN_TYPE	Translation of B BOOL type
BOOLEAN_TRUE	Translation of B TRUE literal
BOOLEAN_FALSE	Translation of B FALSE literal
INT_TYPE	Translation of B INT type
MAXINT_VALUE	Translation of B MAXINT literal
MININT_VALUE	Translation of B MININT literal
ADD_HEADER	Adds a header
UINT8_TYPE	Translation of uint8_t
UINT16_TYPE	Translation of uint16_t
UINT32_TYPE	Translation of uint32_t
INT8_TYPE	Translation of int8_t
INT16_TYPE	Translation of int16_t
INT32_TYPE	Translation of int32_t
SBOOL_TYPE	Translation of SBOOL
DISABLE_OP_PREFIXING	Disable operation prefixing translation.

ADD_HEADER parameter can appear several times in a profile file. Each line will add a header to the list added in each generated file.

String value of this parameter will be added as given in the generated code.

For example, ADD_HEADER="test.h" will produce #include "test.h", whereas ADD_HEADER=<test.h> will generate #include <test.h>.

III LAUNCHING C4B IN ATELIERB

III.1 Configuration ressources

The resource that is used to launch C4B from AtelierB tools is **ATB*ATB*ComenC_Translator_Command**. It must contain the path of the translator executable.

The resource is automatically positioned at the installation of AtelierB 4.

III.2 Translating a component

To translate a component in AtelierB, "Generate code" entry of component menu must be selected on treated component. Then "C" translator must be selected.

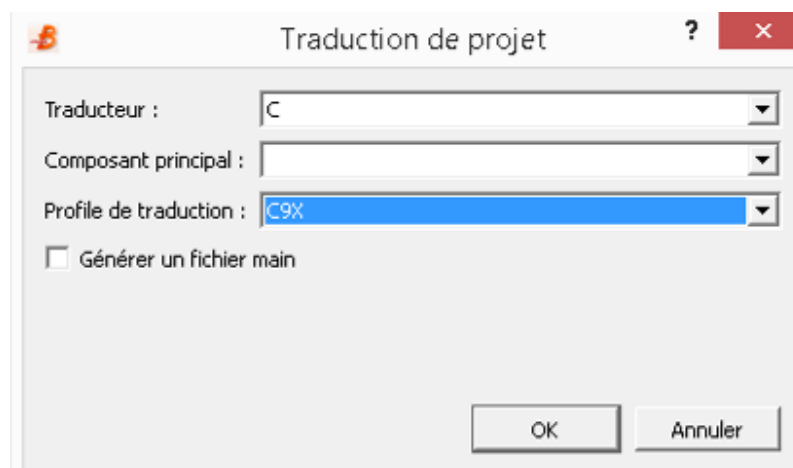


Figure 1 - Component translation window

When C translator is selected, profile selector is added to the pop-up. If PatchTranslator file is present in project BDP, PROJECT profile will be pre-selected.

If PROJECT profile is chosen by user and no PatchTranslator file is present in BDP, default profile will be used.

Then the selected component can be translated by clicking on OK.

III.3 Translating a project

To translate a project in AtelierB, "Translate" entry of project menu must be selected on treated project. Then "C" translator must be selected.

When C translator is selected, it is necessary to select two elements: the translation profile and the main component of the project.

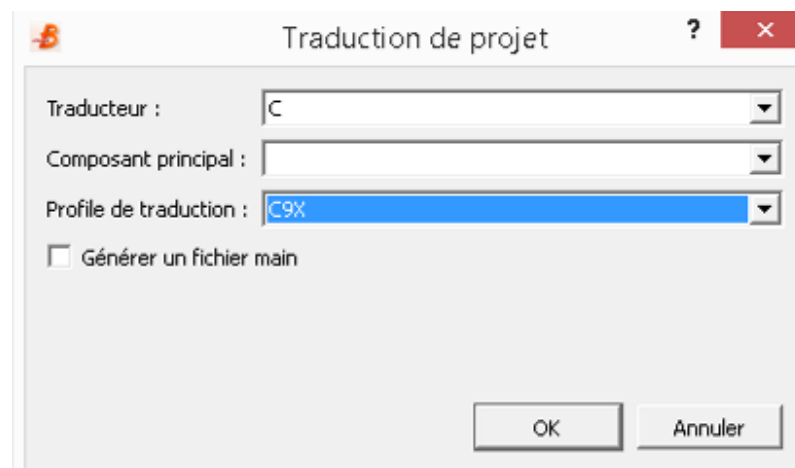


Figure 2 - Project translation window

If PatchTranslator file is present in project BDP, PROJECT profile will be pre-selected.

If PROJECT profile is chosen by user and no PatchTranslator file is present in BDP, default profile will be used.

The project translation pop-up also allows generating the file b_main.c (cf. V.4). If this box is checked, given main component must contain an unique operation with no parameters.

Then the project translation can be launched by clicking on OK. Main component and implementations of its importation graph are translated. Utility files (CMakeLists.txt and initialisation file) are generated, as eventually b_main.c file.

III.4 Output directory

Produced files are written in subdirectory "c" of project translation directory.

IV LAUNCHING C4B IN B BATCH

IV.1 Configuration ressources

The resource that is used to launch C4B from AtelierB tools is **ATB*ATB*ComenC_Translator_Command**. It must contain the path of the translator executable.

The resource is automatically positioned at the installation of AtelierB 4.

IV.2 Translating a component

Command used to translate a component in bbatch is command **b2c**. A project must have been opened with *op* command for this one to be used.

b2c command syntax is as follow (help can be obtained in bbatch via *help b2c* command):

b2c <name> [profile]

name: Implementation of the project that must be translated

profile: Optional parameter. May be one of profiles described in II.2.1.

If given profile is "PROJECT", C4B searches for the file PatchTranslator in the project BDP. It must be a file as described in II.2.2. If it is present, its parameters are used. Otherwise, default profile is used.

If no profile is given, PROJECT one is used if PatchTranslator is present, otherwise default profile is used.

This command translates given implementation using chosen profile.

IV.3 Translating a project

Command used to translate a project in bbatch is command **p2c**. A project must have been opened with *op* command for this one to be used.

p2c command syntax is as follow (help can be obtained in bbatch via *help p2c* command):

p2c <name> <profile> [mode]

name: Main machine of the project
profile: Selected translation profile
mode: May contain main if b_main.c (cf.V.4) file must be generated

Project translation in bbatch translates given main component and all components present in its importation graph.

It also generates utility files (CMakeLists.txt and initialisation file as in V.4).

If main mode is used, main component provided as first parameter must contain an unique operation with no parameter.

IV.4 Output directory

Produced files are written in subdirectory "c" of project translation directory.

V LAUNCHING C4B IN COMMAND LINE

V.1 Syntax

Usage: b2c options components.

Following table lists b2c command parameters.

Parameter	Description
-h	Displays this help message
-D db_file	Uses the given .db file to obtain information on the project
-P	Project translation
-m file	Project main component
-x	Display messages as xml
-s	Silent mode
-I dir	Add dir to the list of searched directories
-i dir	File to include, with "" characters
-e dir	File to include, with <> characters
-v	Displays translator version
-r res	Load the given resource file
-C out_dir	Uses the given output directory
-H file	Include the content of file as header within the generated files
-p [C9X LIGHT 01 PROJECT]	Translation profile
-f	Profile file to be used with -p PROJECT option
-E	File encoding
-c	style used for converting constants. Possible values: defines : use #define for constants variables: use variables for constants consts: use const variables for constants
-w	Without warning message in translations for type checker uses

V.2 Setting translation environment

To custom directory where result must be produced, -C parameter must be used.

To indicate to the translator where B source files must be searched, -D parameter can be used to provide an AtelierB project file, or -I (eventually several times) to add a research directory.

If both options (-D or -I) are used, the AtelierB project will be used.

To load an AtelierB resource file, -r option must be used.

To include C header files in generated sources, -i (inclusion between "") or -e (inclusion between <>) can be used.

V.3 Translating a component

To translate a component, the file must be simply be provided to b2c. Other necessary parameters may have been given as described in V.2.

For example, command:

```
b2c -I . -C out test_i.imp
```

will produce result of translation in out directory, by searching other input files in current directory.

V.4 Translating a project

To translate a project, -P option must be used. In this mode, -D parameter is mandatory.

Project translation in command line produces first two initialisation files called b_init.h, and b_init.c. These files contain a C function called b_initialisation, which call initialisation functions of all components of the project.

This mode also creates a CMakeLists.txt file to use with cmake tool in order to compile the program.

It is also possible in this mode to provide a main component for the project. This implementation must contain an unique operation, with no output or input parameters. The tool will then generate a file named b_main.c. It will contain a C main function calling this operation.

If a main component is provided, it will be also added in the file CMakeLists.txt, and the result of compilation will be an executable.

If no main component is given, the result of compilation will be a library.

In command line, project translation only generates these utility files, and does not translate all implementations of the project.

V.5 Using profiles

Selection of a translation profile is done on command line by using `-p` parameter followed by one of the keywords C9X, LIGHT, 01 or PROJECT (cf. II.2).

If chosen profile is PROJECT, the option `-f` is mandatory. It indicates path of the profile file to use.

If no profile file is given, default settings are used.