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Information technology — Programming languages — Fortran —

Part 3: Conditional compilation

*Technologies de l'information — Langages de programmation — Fortran —
Partie 3: Compilation conditionnelle*

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 1539-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 22, *Programming languages, their environments and system software interfaces*.

ISO/IEC 1539 consists of the following parts, under the general title *Information technology — Programming languages — Fortran*:

- *Part 1: Base language*
- *Part 2: Varying length character strings*
- *Part 3: Conditional compilation*

Annex A of this part of ISO/IEC 1539 is for information only.

Introduction

Programmers often need to maintain several versions of code to allow for different systems and different applications. Keeping several copies of the source code is error prone. It is far better to maintain a master code from which any of the versions may be selected.

This conditional compilation facility has deliberately been kept very simple. The additional lines inserted to control the process and all the lines that are not selected are omitted from the output or are converted to comments. Those that are selected are copied to the output completely unchanged. Which version is selected is controlled by directives in a file known as the SET file.

Examples of the need for such a facility are:

- (1) Parameterized types do not solve all the problems associated with different precisions. Parameterized derived types are not part of Fortran 95.
- (2) A version of a code for complex arithmetic may differ little from the version for real arithmetic.
- (3) The relative efficiency of different algorithms or constructions may vary from processor to processor.
- (4) Versions may be required for different message-passing libraries.
- (5) Additional print statements may be inserted into a program when under development. It may be very helpful to have these readily available in case some unexpected results are found in production use.
- (6) Versions may be required with character constants in different languages (internationalization).
- (7) For OPEN statements, the file naming convention varies between systems.

Some of these cases may be addressed within the Fortran code itself by run-time tests, but this will result in a large object code and some run-time overhead. Without conditional compilation, however, most of them can only be solved by maintaining separate versions of the code.

Information technology — Programming languages — Fortran —

Part 3: Conditional compilation

1 General

1.1 Scope

This part of ISO/IEC 1539 defines facilities for conditional compilation in Fortran. This part of ISO/IEC 1539 provides an auxiliary standard for the version of the Fortran language specified by ISO/IEC 1539-1 and informally known as Fortran 95.

1.2 Normative References

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 1539. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 1539 are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 1539-1 : 1997, *Information technology – Programming languages – Fortran – Part 1: Base language*.

2 Overview

2.1 Conditional compilation

Conditional compilation (coco) is described in this document as an independent process that yields a source program for a Fortran processor. It is expected that implementations will usually integrate the two processes.

The coco process is controlled by directives that are either omitted from the coco output or are converted to Fortran comments. Coco comments may be introduced to explain the actions and these, too, are either omitted from the coco output or are converted to Fortran comments. Other lines (noncoco lines) are either copied unchanged to the output, omitted, or converted to Fortran comments. There is no requirement that the coco output is a valid Fortran program. The lines of the coco output are in the same order as the corresponding lines of the coco program.

Coco execution is a sequence of actions specified by the coco directives and performed in the order that they appear. The combination of a computing system and the mechanism by which these actions are performed is called a **coco processor** in this part of this standard.

2.2 Clause numbers and syntax rules

The notation used in this part of ISO/IEC 1539 is described in ISO/IEC 1539-1, 1.6. However, item (4) in ISO/IEC 1539-1, 1.6.2 is replaced with:

- (4) Each syntax rule is given a unique identifying number of the form CCR snn , where s is a one or two-digit clause number and nn is a two-digit sequence number within that clause. The syntax rules are distributed as appropriate throughout the text, and are referenced by number as needed.

2.3 Coco program conformance

A coco program is a standard-conforming coco program if it uses only those forms and relationships herein and if the program has an interpretation according to this part of this standard.

A coco processor conforms to this part of this standard if:

- (1) It executes any standard-conforming coco program and its SET file in a manner that fulfills the interpretations herein, subject to any limits that the processor may impose on the size and complexity of the coco program and its SET file.
- (2) It contains the capability to detect and report the use within the executed part of a coco program and its SET file of an additional form or relationship that is not permitted by the numbered syntax rules or their associated constraints.
- (3) It contains the capability to detect and report the use within the executed part of a coco program and its SET file of source form not permitted by clause 3.
- (4) It contains the capability to detect and report the reason for rejecting a submitted coco program and its SET file.

If a coco program contains a STOP directive that is executed, there is no requirement for the processor to report on any directives that follow the STOP directive.

2.4 High level syntax

This subclause introduces the terms associated with the conditional compilation program.

CCR201 *coco-program* is *pp-input-item* [*pp-input-item*] ...

CCR202 *pp-input-item* is *coco-construct*
or *noncoco-line*

The term *noncoco-line* refers to any line without the characters "??" in character positions 1 and 2.

CCR203 *coco-construct* is *coco-type-declaration-directive*
or *coco-action-construct*

CCR204 *coco-action-construct* is *coco-action-directive*
or *coco-if-construct*

CCR205 *coco-action-directive* is *coco-assignment-directive*
or *coco-message-directive*
or *coco-stop-directive*

Note 2.1

A coco program is not required to contain any coco directives.

3 Constants, source form and text inclusion

3.1 Coco constants

CCR301 *coco-constant* is *coco-literal-constant*
or *coco-named-constant*

CCR302 *coco-literal-constant* is *coco-int-literal-constant*
or *coco-logical-literal-constant*

CCR303 *coco-int-literal-constant* is *digit* [*digit*] ...

CCR304 *coco-logical-literal-constant* is *.TRUE.*
or *.FALSE.*

CCR305 *coco-char-literal* is ' [*rep-char*] ... '
or " [*rep-char*] ... "

CCR306 *coco-named-constant* is *name*

Constraint: *coco-named-constant* shall have the *PARAMETER* attribute.

CCR307 *name* is *letter* [*alphanumeric-character*] ...

Constraint: The maximum length of a *name* is 31 characters.