Rational Environment
Reference Manual

Text Input/Output (TIO)

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Note the Reader's Comments form on the last page of this book, which requests the user's evaluation to assist Rational in preparing future documentation.

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Contents

RATIONAL

How to Use This Book

The Text Input/Output (TIO) book of the *Rational Environment Reference Manual* contains reference information describing some of the I/O packages for manipulating text files provided by the Rational Environment™. This includes reference information on the Ada®-predefined packages Text_Io and Io_Exceptions, as well as information on Rational®-developed I/O packages. Note that packages for performing I/O on binary data and to devices or editor windows are documented in the Data and Device Input/Output (DIO) of the *Rational Environment Reference Manual.* The reference entries for package !Io.Io_Exceptions are duplicated in both TIO and DIO, because these exceptions can be raised by any of the I/O packages.

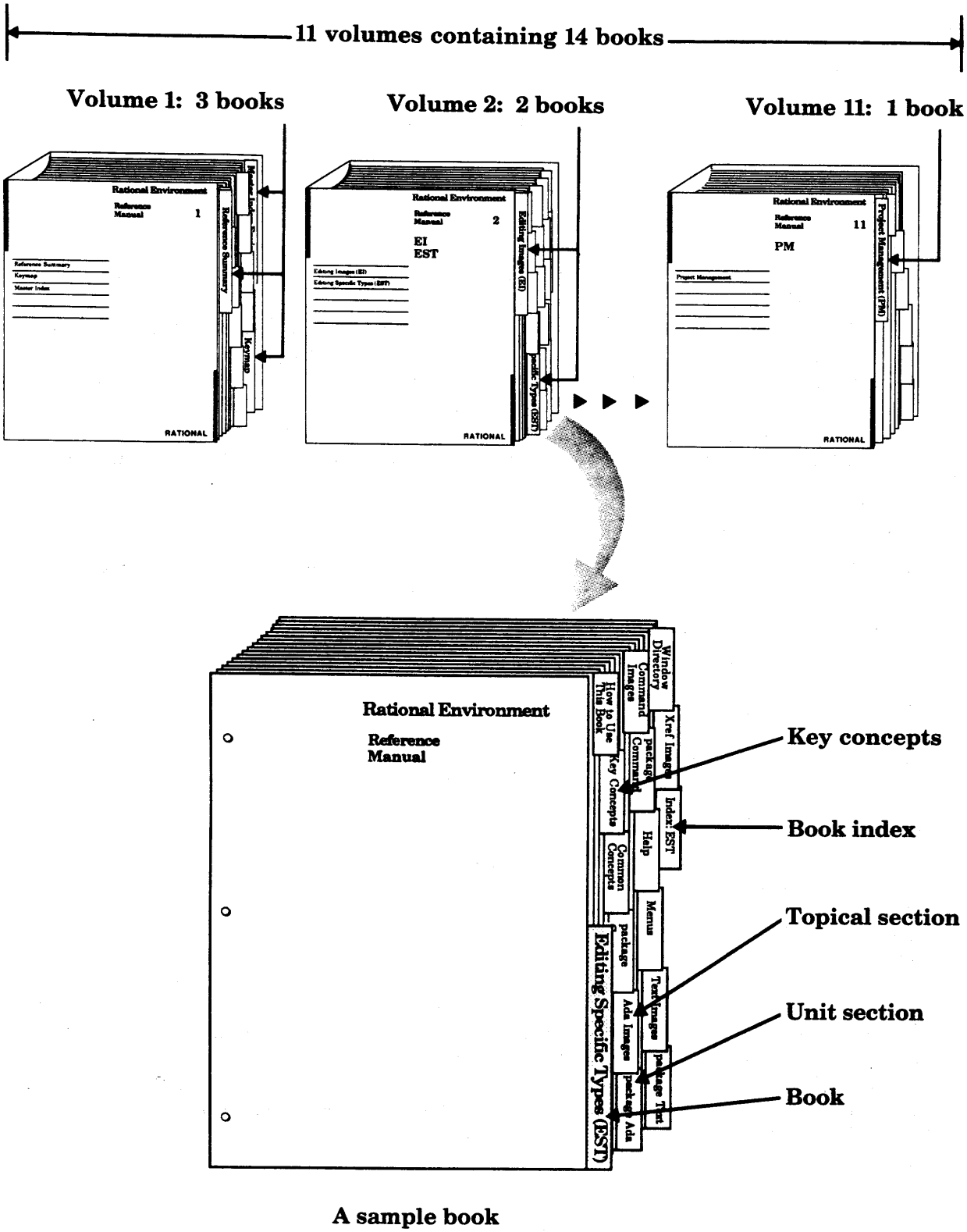
Organization of the Reference Manual

The *Rational Environment Reference Manual* (Reference Manual for brevity) includes the following volumes (see accompanying illustration):

1	Reference Summary Keymap Master Index
2	Editing Images (EI) Editing Specific Types (EST)
3	Debugging (DEB)
4	Session and Job Management (SJM)
5	Library Management (LM)
6	Text Input/Output (TIO)
7	Data and Device Input/Output (DIO)
8	String Tools (ST)
9	Programming Tools (PT)
10	System Management Utilities (SMU)
11	Project Management (PM)

Each *volume* of the Reference Manual contains one or more ***books*** separated by large colored tabs. Each book contains information on particular features or areas of application in the Environment. The abbreviation for the name of each book (for example, EI for Editing Images) appears on the binder cover and spine, and this abbreviation is used in page numbers and cross-references. The books grouped into one volume are not necessarily logically related.

Organization of the *Rational Environment Reference Manual*



A sample book

The Reference Manual provides reference information organized to efficiently answer specific questions about the Rational Environment. The *Rational Environment User's Guide* complements this manual, providing a user-oriented introduction to the facilities of the Environment. Products other than the Rational Environment (for example, Rational Networking—TCP/IP or Rational Target Build Utility) are documented in individual manuals, which are not part of the Reference Manual.

Volume 1

Volume 1, intended to be used as a quick reference to the resources provided by the Environment, contains the following books:

- **Reference Summary**: The Reference Summary contains the full Ada specification for each unit in the standard Environment. The unit specifications are organized by their pathnames. The World ! section provides a list of the units in the library system of the Environment and the manual/book in which they are documented.
- **Keymap**: The Rational Environment Keymap presents the standard Environment key bindings, organized by topic and by command name. The topical section includes both a quick reference for commonly used commands and a more detailed reference for key bindings.
- **Master Index**: The Master Index combines all of the index information for each of the books in the Reference Manual.

Volumes 2–11

Each book in Volumes 2–11 begins with a colored tab on which the name of the book appears. Each book typically contains the following sections:

- **Contents**: The table of contents provides a complete list of all the units in the book and their reference entries.
- **Key Concepts section**: Most of the books contain a section describing key concepts that pertain to all of the Environment facilities documented in that book. This section is located behind its own tab after the table of contents.
- **Unit sections**: Each of the commands, tools, and so on has a declaration within an Ada compilation unit (typically a package) in the Environment library system. For each unit, there is a section that contains reference entries for the declarations (for example, procedures, functions, and types) within that unit. Each section is preceded by a tab.

  The sections for units are alphabetized by the simple names of the units. For example, the section for package !Tools.String_Utilities is alphabetized under String_Utilities.

  For many units, introductory material and/or examples specific to the unit appear after the section tabs.

  Within the section for a given unit, the reference entries describing the unit's declarations are organized alphabetically after the section introduction. Appearing at the top of each page in a reference entry are the simple name of the given declaration and the fully qualified pathname of the enclosing unit.

- **Explanatory/topical sections**: Like the unit sections, explanatory/topical sections are preceded by tabs, and they are alphabetized with the unit sections. The topical sections, such as Help, located in Editing Specific Types (EST), discuss Environment facilities.
- **Index**: Preceded by a tab, the Index appears as the last section of each book. It contains entries for each unit or declaration, along with additional topical references. Each book index covers only the material documented in that particular book. The Master Index (in Volume 1) provides entries for the information documented in all the books within the Reference Manual.

  Italic page numbers indicate the page on which the primary reference entry for a declaration appears; nonitalic page numbers indicate key concepts, defined terms, cross-references, and exceptions raised.

Suggestions for Finding Information

The following suggestions may help you in finding various kinds of information in the documentation for Rational's products.

Learning about Environment Facilities

If you are a novice user starting to use the Environment, consult the *Rational Environment User's Guide.*

If you are familiar with the Environment but are interested in learning about the Environment's library-management commands, for example, you might start by scanning the specifications for these units in the Reference Summary to get an idea of the kinds of things these tools can do. You should also look at the Key Concepts for the particular book, which describes important concepts and gives examples.

It may also be useful to glance through the introductions provided for some of the units in the book. These introductions, located immediately after the tabs for the units, often contain helpful examples.

Finding Information on a Specific Item

If you know the name of the item and the book in which it is documented, consult either the table of contents or the index for that book. You can also turn through the pages of the book using the names and pathnames of the reference entries to locate the entry you want. Remember that the reference entries for a unit are organized alphabetically within the unit, and the units are organized alphabetically by simple name within the book.

If you know the simple name of the entry but do not know the book in which it is documented, look in the Master Index (in Volume 1) to find the book abbreviation and page number.

If you know the pathname of the entry but do not know the book in which it is documented, the World ! section of the Reference Summary (in Volume 1) provides a map of the units in the library system of the Environment and the books in which they are documented.

If you cannot find an item in the Master Index, the item either is not documented or is documented in the manuals for a product other than the Rational Environment (for example, Rational Networking—TCP/IP or Rational Target Build Utility). If you know the pathname, consult the World ! section of the Reference Summary to determine whether that item is documented and in which manual.

Using the Index

The index of each book contains entries for each unit and its declarations, organized alphabetically by simple name. When using the index to find a specific item, consult the italic page number for the primary reference for that item. Nonitalic page numbers indicate key concepts, defined terms, cross-references, and exceptions raised.

Viewing Specifications On-Line

If you know the pathname of a declaration and want to see its specification in a window of the Rational Environment, provide its pathname to the Common.Definition procedure—for example, `Definition ("!Commands.Library");`. If you know the simple name of the unit in which the declaration appears, in most cases you can use searchlist naming as a quick way of viewing the unit—for example, `Definition ("\Library");`.

Using On-Line Help

Most of the information contained in the reference entries for each unit is available through the on-line help facilities of the Environment. Press the Help on Help key or consult the *Rational Environment User's Guide* or the *Rational Environment Reference Manual*, EST, Help, for more information on using this on-line help facility.

Cross-Reference Conventions

The following conventions are used in cross-references to information:

- **Specific page/book**: For references to a specific place in a specific book, the book abbreviation is followed by the page number in the book (for example, LM-322). If the book abbreviation is omitted, the current book is implied (for example, the page numbers in the table of contents for a book do not include the book prefix).
- **Declaration in same unit**: References to the documentation for a declaration in the same unit are indicated by the simple name of the desired declaration. For example, within the reference entry for the Library.Copy procedure, a reference to the Library.Move procedure would be simply "procedure Move." Note that if there are nested packages in the unit, references to nested declarations use qualified pathnames.
- **Declaration in different unit, same book**: References to the documentation for a declaration in another unit are indicated by the qualified pathname of the desired declaration. For example, within the reference entry for the Library.Copy procedure, a reference to the Compilation.Delete procedure would be "procedure Compilation.Delete."

- **Declaration in different book**: References to the documentation for a declaration in another book are indicated by the addition of the abbreviation for that book. For example, within the reference entry for the Library.Copy procedure, a reference to the Editor.Region.Copy procedure in the Editing Images book would be "EI, procedure Editor.Region.Copy."

References to specific declarations in the library system of the Rational Environment (not the documentation for them) are typically indicated by fully qualified pathnames—for example, "procedure !Commands.Library.Copy." When the context is clear, however, a shorter name will be used. If the unit in which the declaration appears is undocumented, you may want to see its explanatory comments to understand what it does. To see these comments, either look at the unit's specification in the Reference Summary or view it on-line using the Rational Environment.

Feedback to Rational: Reader's Comments Form

Rational wants to make its documentation as useful and error-free as possible. Please provide us with feedback. The last page of each book contains a Reader's Comments form that you can use to send us comments or to report errors. You can also submit problem reports and make suggestions electronically by using the SIMS problem-reporting system. If you use SIMS to submit documentation comments, please indicate the manual name, book name, and page number.

Key Concepts

Text Input/Output (TIO) contains reference information describing the I/O packages for manipulating *text files*. Text files are files that contain ASCII characters, which are of the Character type intended for viewing, editing, and so on.

The packages documented in this book include the Ada-predefined packages Text_Io and Io_Exceptions as well as an additional, more powerful, Rational-provided package called package Io.

Package Io provides all of the facilities of package Text_Io and other additional useful facilities, including a functional form of the Get_Line procedure; preinstantiated Get and Put procedures for the Integer, Float, and Boolean types; and facilities for performing I/O on the Message window. It provides the mechanism of the Standard_Error and Current_Error functions, which is similar to the mechanism in the Standard_Output and Current_Output functions, but which defaults output to the Message window. The Io file type is private, rather than limited private, making some applications easier to develop. Package Io also provides file-type conversion operations to Text_Io and Device_Independent_Io file types and a generic iterator for performing a generic operation on a set of files matching a wildcard.

Other packages available in the Environment for performing I/O are documented in Data and Device Input/Output (DIO).

Files

The I/O packages manipulate information in objects stored in the library system of the Rational Environment. This includes files, Ada units, and devices such as windows and terminals. Since the Rational Environment offers a richer definition of the file than does the *Reference Manual for the Ada Programming Language*, in the description of all the I/O facilities in the Rational Environment, the term *files* may at times be used to denote any one of these entities.

Files that are objects of the file class in the library system of the Environment can be read from or written to. In the Rational Environment, a file is identified in a library display with an entry of the form:

```
name : file;
```

where name is the identifier of the simple name of the file. Files can exist only in libraries—that is, directories or worlds. Files can be created, opened, closed, deleted, and otherwise read from/written to by any of the Environment I/O packages. EST, package Text, provides facilities for text-specific editing of files, and a file append operation is available in LM, package File_Utilities, and in package Io. It is common for a file to be created by the user with the facilities of package Text (EST) and then later read by the I/O packages discussed in this section.

Files thus provide the conventional notion of file storage. When a file is modified using the Rational Editor, changes to the file are not preserved until the file is committed. When a file is modified from a program, the updated value of the object is committed only when the file is closed. Thus, if a program does not explicitly close a file, the permanent contents of the file are unchanged by the execution of the program. This may be the intended result, but caution is warranted, especially in error situations in which exception handlers must determine whether to save the contents of a file by closing it. Not closing the file effectively abandons the changes made by the program.

Ada units are generally created through normal program development using the resources of the Rational Editor. Since Ada units can be read as streams of characters, the I/O facilities discussed in this book can be used to read this image. Ada units cannot be written directly. However, facilities exist in the Rational Environment for transforming a file into an Ada unit (see, for example, LM, procedure Compilation.Parse).

Files and Ada units are subject to the standard read/write synchronization protocols used throughout the Rational Environment. This synchronization permits multiple jobs to have simultaneous access to the same file for reading, but it allows only a single job to write to a file at any instant in time (with no readers allowed while a writer has the file open). Attempting to gain access to an object in a manner that violates this protocol results in the Io_Exceptions.Use_Error exception being raised. Attempting to open an Ada unit for writing also results in the Use_Error exception being raised.

Devices and Windows

The Rational Environment supports I/O to or from several *devices*, including windows and terminals. In general, all of the I/O packages documented in this book can use any of these devices. I/O to tapes is permitted and is provided by package Tape (SMU). The exact effect of I/O with a particular device is, of course, unique to that device and is explained in the following paragraphs.

For each user session, one or more windows can be created to provide a medium for the files Standard_Input and Standard_Output, as defined in packages Text_Io and Io. Multiple windows are created when more than one job is simultaneously performing output. These windows are given names corresponding to the name of the job that is currently accessing them, or that accessed them most recently, and is of Text type. This window can be moved or expanded, and its contents can

be cut, copied, and otherwise manipulated with the Rational Editor commands, as explained in Editing Images (EI) and Editing Specific Types (EST), package Text, in the *Rational Environment Reference Manual.* In general, this window automatically pops up when I/O is requested of the standard files. Output to Standard_Output appears in the window as characters (with control characters highlighted in a special font). Input requested from Standard_Input is denoted with the typical editor prompt, with the name *[input]*. The usual editing paradigm offered by the Rational Editor applies, so input can be typed ahead, edited, and even copied from other windows. Input is not sent to the waiting program until it is committed.

Session I/O windows optionally accumulate all I/O to standard files during one session, so the windows can be used to keep scripts of program interaction. Between jobs, I/O to these windows is separated by a job separator. The files Standard_Input and Standard_Output are automatically created at the start of each job and are automatically closed at the end of each job. If more than one job is initiated in a single session, and each job uses the resources of Standard_Input or Standard_Output, additional windows are created as necessary. If a job is executed and a session does not exist, Standard_Input and Standard_Output map to files with the names Standard_Input and Standard_Output, respectively. These files are created in the default context of the job that initiated the I/O.

Package Io introduces the notion of a Standard_Error file. This file maps to the Rational Editor Message window, so it typically is used to provide a common error-reporting mechanism among tools. If a job is executed and a session does not exist, Standard_Error maps to a file with the name Standard_Error, created in the default context of the job that initiated the I/O.

A programmatic interface for performing I/O to windows is provided with package Window_Io (DIO). In this case, the file abstraction is associated with an image. This image is displayed in a window on the terminal screen. Interfaces are provided to open images, put characters to any part of the image, get characters from the image, and close or delete the image when finished.

I/O also can be initiated directly to terminals using any of the I/O packages. Files can be opened using a name (of String type) in the form !Machine.Devices.Terminal_n, where *n* is an integer corresponding to a physical port on the processor. The exact names available on any particular machine can be found in !Machine.Devices. Once the file is opened, I/O can proceed as with any other file. Of course, the effect of the I/O depends on the nature of the physical device attached to the port. Physical devices other than the Rational Terminal can be attached to any port. If a program attempts to open a terminal that is already assigned to a job, the Io_Exceptions.Use_Error exception is raised.

Note that other lower-level operations for performing I/O on terminals that are logged in are available from package !Io.Device_Independent_Io, using the operations in package !Io.Terminal_Specific. They are not documented in the *Rational Environment Reference Manual.*

File Handles

File handles are used for performing operations on files within Ada programs using the facilities provided by the I/O packages. When a file is opened or created, a file handle is returned. This handle is then used to refer to the file when calling the subprograms in the I/O packages.

The following is an example of a program that reads the lines from a text file named !Users.Blb.A_Text_File and displays them in the output window. The program first opens the file, which returns a file handle. This file handle is then used for reading the lines from the file and checking for an end of file condition.

```
with Io;
procedure Display_File is

    -- This program reads lines from a text file and displays them
    -- in the output window.

    File_Handle : Io.File_Type;
    -- This is the object that will contain the file handle.

begin

    Io.Open (File => File_Handle,
             Mode => Io.In_File,
             Name => "!users.blb.a_text_file");
    -- Opens the named file for reading and returns a file handle for
    -- performing I/O operations on that file within this program.

    while not Io.End_Of_File (File_Handle) loop
        declare
            Line : constant String := Io.Get_Line (File_Handle);
            -- Reads a line from the file.
        begin
            Io.Put_Line (Line);
            -- Writes the line to the output window (Standard_Output).
        end;
    end loop;

end Display_File;
```

Filenames

Filenames supplied to the Create and Open procedures in the various I/O packages can be any legal Environment object name that uniquely identifies an object. Such names, for example, can contain wildcards and so on as long as the name can be resolved to a single object. Note that special names (for example, "<SELECTION>") can also be used to designate the name of a file. For more information on naming objects, see SJM, Key Concepts.

Access Control

The Rational Environment provides access-control mechanisms that can be used to restrict the access that users and programs have to the objects in the library system. The operations provided in the I/O packages are subject to these access controls.

The access specified in Table 1-1 is required for performing I/O operations on files. If the required access does not exist, the Io_Exceptions.Use_Error exception will be raised by the attempted operation. See LM, Key Concepts, for more information on access control.

Table 1-1. Access Required for I/O Operations.

Operation	Access Required
All operations	Read access for all worlds enclosing the file
Creating a file	Create access to the world in which the file is to be created
Deleting a file	Read access to the file
Opening a file for reading (mode In)	Read access to the file
Opening a file for writing (mode Out)	Write access to the file

Concurrency

The execution of any command or subprogram in the Rational Environment constitutes a *job*. Within a job, there may be several tasks that use I/O resources. If multiple tasks all share that same file handle, I/O may be arbitrarily interleaved and the results can unpredictable. Thus, the I/O resources documented in this book may not offer or imply synchronization of the I/O activity. The Rational Environment does provide synchronization of I/O among different jobs, as discussed in "Devices and Windows," above.

Representations of Terminators

Since packages Text_Io and Io observe the abstraction required by the *Reference Manual for the Ada Programming Language* of files containing line, page, and file terminators, it is sometimes useful to permit the user to simulate these terminators when creating or reading text files from programs. In the Environment, the line terminator is denoted by the character Ascii.Lf, the page terminator is denoted by the character Ascii.Ff, and the end-of-file terminator is implicit at the end of the file. A line terminator directly followed by a page terminator is compressed to the single character Ascii.Ff. Also, the line and page terminators preceding the file terminator are implicit and do not appear as characters in the file. For the sake of portability, programs should not depend on this representation, although it can be necessary to use this representation when importing text files from another system or exporting text files from the Rational Environment.

Exceptions

Note that although most of the I/O packages contain renaming declarations for the exceptions defined in package Io_Exceptions, descriptions of these renaming declarations are omitted from the packages. Refer to the descriptions of the exceptions in the reference entries for package Io_Exceptions.

The Rational Environment provides additional information about exceptions raised by the I/O packages. This information, which describes why a given exception occurred, is typically displayed in parentheses after the exception name. See the reference entries for the exceptions in package Io_Exceptions for descriptions of this additional information.

Error Reactions

When errors are discovered in a command, the command can respond by:

- Ignoring the error and trying to continue
- Issuing a warning message and trying to continue
- Raising an exception and abandoning the operation

For each job, the Environment maintains a default action for commands in package Profile (SJM) to take if an error occurs. There are commands for specifying and displaying the default error reaction for a job. Regardless of the default error reaction, any error reaction can be specified for any command.

The Environment has three default specifications for the profile it should use when responding to errors in a command. These are "<PROFILE>", "<SESSION>", and "<DEFAULT>", which refer, respectively, to the job response profile, the session response profile, and the default profile returned by the Profile.Default_Profile function.

package Io

This package provides a superset of the capabilities required for Text_Io in the *Reference Manual for the Ada Programming Language*, Chapter 14. In addition to the nested generic packages that deal with I/O for arbitrary discrete or real types, package Io provides virtually preinstantiated operations for the Standard.Integer, Standard.Float, and Standard.Boolean types.

The fundamental abstraction provided by package Io is the File_Type type. Objects of this type denote file handles that can be mapped to external files. Each file is read or written sequentially, as a sequence of characters grouped into lines and a sequence of lines grouped into pages. Conversion operations are provided to convert Text_Io file handles to Io file handles and vice versa (as well as Device_Independent_Io files).

At the beginning of program execution, the default input and output files are the *standard input file* and *standard output file*. These files are open, have the In_File and Out_File modes, respectively, and are associated with two implementation-defined external files. These files are implicitly closed at the end of each job. Package Io also introduces the notion of the *standard error file*, which follows the same semantics as the standard output file, except that it maps to the Message window by default.

From a logical point of view, a *text file* is a sequence of pages, a *page* is a sequence of lines, and a *line* is a sequence of characters. The characters of a line are numbered, starting from 1; the number of a character is called its *column number*. For a line terminator, a column number is also defined; it is one more than the number of characters in the line. The lines of a page, and the pages of a file, are similarly numbered. The current column number is the column number of the next character or line terminator to be transferred. The current line number is the number of the current line. The current page number is the number of the current page. These numbers are values of the Positive_Count subtype of the Count subtype (by convention, the value 0 of the Count subtype is used to indicate special conditions).

For an output file, a maximum line length and a maximum page length can be specified. If a value to be output cannot fit on the current line, for a specified maximum line length, then a new line is automatically started before the value is output. Further, if this new line cannot fit on the current page, for a specified maximum page length, then a new page is automatically started before the value is output. Functions are provided to determine the maximum line length and the maximum

page length. When a file is opened with the Out_File mode, both values are 0; by convention, this means that the line lengths and page lengths are unbounded. (Consequently, output consists of a single line if the subprograms for explicit control of line and page structure are not used.) The Unbounded constant is provided for this purpose.

Package Io provides a stack mechanism for managing current I/O files. This is the same mechanism that is accessible with the operations in package Log (SJM). It can be used, for example, in managing output or log files and the like when nested calls to output or logging procedures need to be coordinated. This mechanism allows all I/O to be performed on the current input, output, and error files. It provides push operations (the Set_Input, Set_Output, and Set_Error procedures) that push files on the stack and make them the current input, output, and error files. Pop and reset operations are also provided. Pop removes a file from the stack. Reset is equivalent to performing a close operation and then a pop of the top element of the stack. Any files on the stack when a job terminates are automatically closed.

The package also provides a generic iterator, the Wildcard_Iterator procedure, that can be used to perform a generic operation on a set of files matching a wildcard.

function "="

```
function "=" (L, R : Count) return Boolean renames Text_Io."=";
function "=" (L, R : File_Mode) return Boolean renames Text_Io."=";
function "=" (L, R : Type_Set) return Boolean renames Text_Io."=";
```

Description

Gives visibility to the Text_Io equality operators.

function "<"

```
function "<" (L, R : Count) return Boolean renames Text_Io."<";
```

Description

Gives visibility to the Text_Io comparison operator.

function ">"

```
function ">" (L, R : Count) return Boolean renames Text_Io.">";
```

Description

Gives visibility to the Text_Io comparison operator.

procedure Append

```
procedure Append (File : in out File_Type;
                 Name :        String;
                 Form :        String     := "");

procedure Append (File   : in out File_Type;
                 Object :        Directory.Version;
                 Form   :        String             := "");
```

Description

Opens the specified file for writing at the end of the file.

This procedure associates the specified file with an existing file having the specified name and form; if a file does not exist, it creates one. The current mode of the file is set to Out_File.

Output starting after an Append procedure will begin on a new line but on the same page as the previous end of the file.

The specified file is left open. After the file is opened, the page and line lengths are unbounded, and the current line and current page numbers are set to the current size of the file.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

`Name : String;`
Specifies the name of the external file to be appended.

`Object : Directory.Version;`
Specifies the object that is the external file to be appended.

`Form : String := "";`
Currently, the Form parameter, if specified, has no effect.

Errors

If the file handle is already open, the Io_Exceptions.Status_Error exception is raised.

If the string specified in the Name parameter does not allow the unique identification of a file, the Io_Exceptions.Name_Error exception is raised. In particular, this exception is raised if no file with the specified name exists.

The Io_Exceptions.Use_Error exception is raised when an attempt is made to perform an Append operation on objects on which the Out_File mode is not supported or if the file is locked by another job.

procedure Close

```
procedure Close (File : in out File_Type);
```

Description

Severs the association between the file handle and its associated file.

If the file has the current Out_File mode, it has the effect of calling the New_Page procedure. If the current page is already terminated, the procedure outputs a file terminator.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

Errors

If the specified file is not open, the Io_Exceptions.Status_Error exception is raised.

References

procedure New_Page

function Col

```
function Col (File : File_Type) return Positive_Count;

function Col return Positive_Count;
```

Description

Returns the current column number.

If a File parameter is omitted, the default file is the current output file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Positive_Count;`
Returns the current column number of the specified file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the Positive_Count value exceeds Count'Last, the Io_Exceptions.Layout_Error exception is raised.

function Convert

```
function Convert (File: File_Type) return Text_Io.File_Type;
function Convert (File: Text_Io.File_Type) return File_Type;
```

Description

Converts a file handle of Io.File_Type to Text_Io.File_Type and vice versa.

When one type is converted to another, all file attributes are maintained.

Parameters

`File : File_Type;`
Specifies the file handle to be converted.

`return Text_Io.File_Type;`
Returns the file handle resulting from the conversion.

`File : Text_Io.File_Type;`
Specifies the file handle to be converted.

`return File_Type;`
Returns the file handle resulting from the conversion.

function Convert

```
function Convert (File: File_Type) return Device_Independent_Io.File_Type;

function Convert (File: Device_Independent_Io.File_Type) return File_Type;
```

Description

Converts a file handle of Io.File_Type to !Io.Device_Independent_Io.File_Type and vice versa to allow access to device-specific options when the file is opened.

Parameters

`File : File_Type;`
Specifies the file handle to be converted.

`return Device_Independent_Io.File_Type;`
Returns the file handle resulting from the conversion.

`File : Device_Independent_Io.File_Type;`
Specifies the file handle to be converted.

`return File_Type;`
Returns the file handle resulting from the conversion.

Restrictions

Interchange of get/put and read/write operations between packages Io and !Io.Device_Independent_Io is undefined because of internal buffering in package Io. Use the Flush procedure to force the buffers to be written between these usages.

References

procedure Flush

procedure Convert

```
procedure Convert (From :        Device_Independent_Io.File_Type;
                   To   : in out Text_Io.File_Type);
```

Description

Converts a file handle of !Io.Device_Independent_Io.File_Type to Text_Io.File_Type.

This procedure can be used, for example, to save file handles in variables of Text_Io-.File_Type type, which are limited private.

Parameters

`From : Device_Independent_Io.File_Type;`
Specifies the file handle to be converted.

`To : in out Text_Io.File_Type;`
Specifies the file handle that results from the conversion.

subtype Count

```
subtype Count is Text_Io.Count;
```

Description

Specifies the range of possible values of the line and page count and the line and page length.

procedure Create

```
procedure Create (File : in out File_Type;
                 Mode :        File_Mode := Out_File;
                 Name :        String    := "";
                 Form :        String    := "");
```

Description

Establishes a new file with the specified name and associates this file with the specified file handle.

The specified file is left open.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

`Mode : File_Mode := Out_File;`
Specifies the access mode for which the file is to be used.

`Name : String := "";`
Specifies the name of the file to be created. A null string for the Name parameter specifies a file that is not accessible after the completion of the main program (a temporary file).

`Form : String := "";`
Currently, the Form parameter, if specified, has no effect.

Restrictions

Files can be created only in directories or worlds.

Errors

If the specified file handle is already open, the Io_Exceptions.Status_Error exception is raised.

The Io_Exceptions.Name_Error exception is raised under any of the following conditions:

- The filename does not conform to the syntax of a legal filename.
- An object of a nonfile class with the same name as the filename already exists in the context in which the creation is attempted.
- The context in which the creation is attempted cannot contain files. Files are allowed only in directories or worlds.

The Io_Exceptions.Use_Error exception will be raised under any of the following conditions:

- The file cannot be opened with the specified mode.
- The executing job does not have create access.
- Another job has locked the file.

function Current_Error

```
function Current_Error return File_Type;

function Current_Error return Text_Io.File_Type;
```

Description

Returns the handle to the current default error file.

function Current_Input

```
function Current_Input return File_Type;
```

Description

Returns the handle to the current default input file.

function Current_Output

```
function Current_Output return File_Type;
```

Description

Returns the handle to the current default output file.

procedure Delete

```
procedure Delete (File : in out File_Type);
```

Description

Deletes the file associated with the specified file handle.

The file handle is closed, and the file ceases to exist.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

Errors

If the specified file handle is not open, the Io_Exceptions.Status_Error exception is raised.

The Io_Exceptions.Use_Error exception is raised under any of the following conditions:

- The Environment does not support deletion on the file.
- The executing job does not have the access rights required to delete the file.
- Another job has locked the file.

procedure Echo

```
procedure Echo (Item : Character);
```

Description

Writes a character to the current error file (by default, the Message window).

If the line length of the specified output file is bounded (that is, does not have the conventional value of 0) and the current column number exceeds it, this procedure has the effect of calling the New_Line procedure with a spacing of 1 for the current error file. Then the procedure outputs the specified character to the file.

Parameters

```
Item : Character;
```

Specifies the value of the item to be written.

procedure Echo

```
procedure Echo (Item : String := "");
```

Description

Writes a string to the current error file (by default, the Message window).

This procedure determines the length of the specified string and attempts that number of echo operations for successive characters of the string. No operation is performed if the string is null.

Parameters

`Item : String := "";`
Specifies the value of the item to be written.

procedure Echo

```
procedure Echo (Item  : Integer;
                Width : Field       := Ø;
                Base  : Number_Base := 1Ø);
```

Description

Writes an integer value to the current error file (by default, the Message window).

Values are output as decimal or based literals, without underline characters or exponents, and are preceded by a minus sign if negative. The format (which includes any leading spaces and a minus sign) can be specified by an optional field Width parameter. Values of widths of fields in output formats are of the nonnegative integer Field subtype. Values of bases are of the integer Number_Base subtype.

This procedure outputs the value of the Item parameter as an integer literal, with no underlines, no exponent, and no leading zeros (but a single zero for the value 0), and with a preceding minus sign for a negative value.

If the resulting sequence of characters to be output has fewer characters than specified in the Width parameter, leading spaces are output to make up the difference.

The procedure uses the syntax for decimal literal if the Base parameter has the value 10; otherwise, it uses the syntax for based literal, with any letters in uppercase.

Parameters

`Item : Integer;`
Specifies the value to be written.

`Width : Field := Ø;`
Specifies the number of characters to be output.

`Base : Number_Base := 1Ø;`
Specifies the radix base with which to output the form of the number.

procedure Echo

```
procedure Echo (Item : Float;
                Fore : Field := 2;
                Aft  : Field := 14;
                Exp  : Field := 3);
```

Description

Writes a floating-point value to the current error file (by default, the Message window).

Values are output as decimal literals without underline characters. The format of each value output consists of a Fore field, a decimal point, an Aft field, and (if a nonzero Exp parameter is supplied) the letter E and an Exp field. The two possible formats thus correspond to:

```
Fore . Aft
```

and:

```
Fore . Aft E Exp
```

with no spaces between these fields. The Fore field can include leading spaces and a minus sign for negative values. The Aft field includes only decimal digits (possibly with trailing zeros). The Exp field includes the sign (plus or minus) and the exponent (possibly with leading zeros).

The Echo procedure outputs the value of the Item parameter as a decimal literal with the format defined by the Fore, Aft, and Exp parameters. If the value is negative, a minus sign is included in the integer part. If Exp has the value 0, then the integer part to be output has as many digits as needed to represent the integer part of the value of the Item parameter, overriding Fore if necessary, or it consists of the digit 0 if the value of Item has no integer part.

If Exp has a value greater than 0, the integer part to be output has a single digit, which is nonzero except for the value 0.0 of the Item parameter.

In both cases, however, if the integer part to be output has fewer than Fore characters, including any minus sign, leading spaces are output to make up the difference. The number of digits of the fractional part is specified by Aft, or it is 1 if Aft equals 0. The value is rounded; a value of exactly one-half in the last place can be rounded either up or down.

If Exp has the value 0, there is no exponent part. If Exp has a value greater than 0, the exponent part to be output has as many digits as needed to represent the exponent part of the value of the Item parameter (for which a single-digit integer part is used), and it includes an initial sign (plus or minus). If the exponent part to be output has fewer than Exp characters, including the sign, leading zeros precede the digits to make up the difference. For the value 0.0 of the Item parameter, the exponent has the value 0.

Parameters

```
Item : Float;
```

Specifies the value to be written.

```
Fore : Field := 2;
```

Specifies the number of characters to be output before the decimal point.

```
Aft : Field := 14;
```

Specifies the number of characters to be output after the decimal point.

```
Exp : Field := 3;
```

Specifies the number of exponent characters to be output.

---

procedure Echo

```
procedure Echo (Item  : Boolean;
                Width : Field    := Ø);
```

Description

Writes the Boolean value to the current error file (by default, the Message window).

Values are output using either uppercase or lowercase letters for identifiers.

The format (which includes any trailing spaces) can be specified by an optional field Width parameter.

The procedure outputs the value of the Item parameter as an enumeration literal. If the sequence of characters produced has fewer than the characters specified by the Width parameter, trailing spaces are output to make up the difference.

Parameters

`Item : Boolean;`
Specifies the value to be written.

`Width : Field := Ø;`
Specifies the number of characters to be written.

procedure Echo_Line

```
procedure Echo_Line (Item : String := "");
```

Description

Writes a string to the current error file (by default, the Message window) and advances the line.

This procedure calls the Put procedure for the specified string and then calls the New_Line procedure with a spacing of 1 on the current error file.

Parameters

`Item : String := "";`

Specifies the value of the string to be written.

function End_Of_File

```
function End_Of_File (File : File_Type) return Boolean;

function End_Of_File return Boolean;
```

Description

Returns true if a file terminator or the combination of a line, a page, and a file terminator is the next item to be read from the file; otherwise, the function returns false.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if a file terminator or the combination of a line, a page, and a file terminator is the next item to be read from the file; otherwise, the function returns false.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

function End_Of_Line

```
function End_Of_Line (File : File_Type) return Boolean;

function End_Of_Line return Boolean;
```

Description

Returns true if a line terminator or a file terminator is the next item to be read from the file; otherwise, the function returns false.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if a line terminator or a file terminator is the next item to be read from the file; otherwise, the function returns false.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

---

function End_Of_Page

```
function End_Of_Page (File : File_Type) return Boolean;

function End_Of_Page return Boolean;
```

Description

Returns true if a file terminator or the combination of a line and a page terminator is the next item to be read from the file; otherwise, the function returns false.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if a file terminator or the combination of a line and a page terminator is the next item to be read from the file; otherwise, the function returns false.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

subtype Field

```
subtype Field is Integer range Ø .. Integer'Last;
```

Description

Specifies the range of possible values for the number of character positions used in formatting strings that represent discrete or real values.

subtype File_Mode

```
subtype File_Mode is Text_Io.File_Mode;
```

Description

Specifies the mode of access for which a file is open.

In_File mode denotes a file with read-only access; Out_File mode denotes a file with write-only access.

type File_Type

```
type File_Type is private;
```

Description

Defines a file handle type for files to be processed by operations in this package.

procedure Flush

```
procedure Flush (File : File_Type);
```

Description

Causes any characters currently in internal buffers and not yet in the file to be forced out to the file.

The procedure can be used to force logging output from programs at key points out to files so that the intermediate contents of the log can be viewed by the Rational Editor.

Parameters

`File : File_Type;`
Specifies the file to be forced.

References

procedure Save

function Form

```
function Form (File : File_Type) return String;
```

Description

Currently returns the null string ("") in all cases.

When the Form parameter to the Create and Open procedures is supported in the future, this function will return the Form value provided in the call to the Create or the Open procedure.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return String;`
Currently returns the null string ("") in all cases.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

References

procedure Create

procedure Open

---

procedure Get

```
procedure Get (File :     File_Type;
               Item : out Character);

procedure Get (Item : out Character);
```

Description

Reads a character from a file.

After skipping any line and page terminators, this procedure reads the next character from the specified input file and returns the value of this character in the Item parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Character;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

procedure Get

```
procedure Get (File :     File_Type;
               Item : out String);

procedure Get (Item : out String);
```

Description

Reads a string from a file.

This procedure determines the length of the specified string and attempts that number of get operations for successive characters of the string. No operation is performed if the string is null.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out String;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

procedure Get

```
procedure Get (File        :     File_Type;
               Item        : out String;
               Last        : out Natural;
               End_Of_Line : out Boolean;
               End_Of_Page : out Boolean;
               End_Of_File : out Boolean);
```

Description

Reads part or all of a line from a file.

This procedure determines the length of the specified string and attempts that number of get operations for successive characters of the string up to the end of the current line, not including terminators (no operation is performed if the string is null). The index of the last character read is returned in the Last parameter. If no characters are read, the Last parameter contains a value one less than Item'First.

The procedure also returns an indication of whether or not various terminators are encountered.

Parameters

`File : File_Type;`

Specifies the handle for the file.

`Item : out String;`

Specifies the object that receives the value read.

`Last : out Natural;`

Returns the index of the last character read. If no characters are read, the parameter returns a value one less than Item'First.

`End_Of_Line : out Boolean;`

Returns true if and only if the Item parameter contains the end-of-line terminator (possibly null).

`End_Of_Page : out Boolean;`

Returns true if and only if the value returned by End_Of_Line is true and this is the last line of the page.

```
End_Of_File :  out Boolean;
```

Returns true if and only if the value returned by End_Of_Page is true and this is the last page of the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

---

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Integer;
               Width :     Field      := Ø);

procedure Get (Item  : out Integer;
               Width :     Field    := Ø);
```

Description

Reads an integer value from a file.

If the value of the Width parameter is 0, the Get procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of an integer literal (which may be a based literal). If a nonzero value of Width is supplied, then exactly Width characters or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Integer type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Integer;`
Specifies the object that receives the value read.

`Width : Field := Ø;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the input sequence does not have the required syntax or if the value obtained is not of the Integer type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

---

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Float;
               Width :     Field      := 0);

procedure Get (Item  : out Float;
               Width :     Field  := 0);
```

Description

Reads a floating-point number from a file.

If the value of the Width parameter is 0, the Get procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of a real literal (which may be a based literal). If a nonzero value of Width is supplied, then exactly Width characters or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of Float type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Float;`
Specifies the object that receives the value read.

`Width : Field := 0;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax or if the value obtained is not of the Float type, the Io_Exceptions.Data_Error exception is raised. For this test, leading blanks are ignored. When a sign is input, this rule applies to the succeeding numeric literal.

---

procedure Get

```
procedure Get (File :     File_Type;
               !tem : out Boolean);

procedure Get (!tem : out Boolean);
```

Description

Reads the Boolean value from a file.

After skipping any leading blanks, line terminators, or page terminators, the Get procedure reads a Boolean literal in either lowercase or uppercase.

The procedure returns, in the Item parameter, the value of the Boolean type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is read.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`!tem : out Boolean;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax or if the identifier or character literal does not correspond to a value of the Boolean type, the Io_Exceptions.Data_Error exception is raised.

function Get_Line

```
function Get_Line (File : File_Type) return String;

function Get_Line return String;
```

Description

Returns all remaining characters on the current line except for the line terminator.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return String;`
Returns all remaining characters on the current line except for the line terminator.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

---

procedure Get_Line

```
procedure Get_Line (File :     File_Type;
                    Item : out String;
                    Last : out Natural);

procedure Get_Line (Item : out String;
                    Last : out Natural);
```

Description

Reads a string on a single line from a file, not including the line terminator.

This procedure replaces successive characters of the specified string by successive characters read from the specified input file. Reading stops if the end of the line is encountered, in which case the Skip_Line procedure is called (in effect) with a spacing of 1; reading also stops if the end of the string is encountered. Characters not replaced are left undefined.

If characters are read, the Last parameter contains the index value such that `Item(Last)` is the last character replaced (the index of the first character replaced is `Item'First`). If no characters are read, the Last parameter contains an index value that is one less than `Item'First`.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out String;`
Specifies the object that receives the value read.

`Last : out Natural;`
Specifies the index for the last character read into the string.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

References

procedure Skip_Line

---

constant In_File

```
In_File : constant File_Mode := Text_Io.In_File;
```

Description

Defines a named constant for the In_File mode.

function Is_Open

```
function Is_Open (File : File_Type) return Boolean;
```

Description

Returns true if the file handle is open (that is, if it is associated with a file); otherwise, the function returns false.

Parameters

`File : File_Type;`

Specifies the handle for the file.

`return Boolean;`

Returns true if the file handle is open (that is, if it is associated with a file); otherwise, the function returns false.

function Line

```
function Line (File : File_Type) return Positive_Count;

function Line return Positive_Count;
```

Description

Returns the current line number.

If a File parameter is omitted, the default file is the current output file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Positive_Count;`
Returns the current line number.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the Positive_Count value exceeds Count'Last, the Io_Exceptions.Layout_Error exception is raised.

function Line_Length

```
function Line_Length (File : File_Type) return Count;

function Line_Length return Count;
```

Description

Returns the maximum line length currently set for the specified output file; returns 0 if the line length is unbounded.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Count;`
Returns the maximum line length currently set for the specified output file; returns 0 if the line length is unbounded.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

constant Lower_Case

```
Lower_Case : constant Type_Set := Text_Io.Lower_Case;
```

Description

Defines a value indicating that enumeration literals are to be displayed in lowercase.

function Mode

```
function Mode (File : File_Type) return File_Mode;
```

Description

Returns the current mode of the specified file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return File_Mode;`
Returns the current mode of the specified file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

function Name

```
function Name (File : File_Type) return String;
```

Description

Returns the name of the file currently associated with the specified file handle.

For temporary files, the function returns the unique name provided by the Rational Environment during the creation of the file.

Parameters

`File : File_Type ;`
Specifies the handle for the file.

`return String;`
Returns the name of the file currently associated with the specified file handle.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

procedure New_Line

```
procedure New_Line (File    : File_Type;
                    Spacing : Positive_Count := 1);

procedure New_Line (Spacing : Positive_Count := 1);
```

Description

Adds the specified number of line terminators to the current file, forcing subsequent output to the following line.

For a spacing of 1, the procedure outputs a line terminator, sets the current column number to 1, and then adds 1 to the current line number. If the current line number is already greater than or equal to the maximum page length for a bounded page length, a page terminator is output, the current page number is increased by 1, and the current line number is set to 1.

For a spacing greater than 1, the above actions are performed the number of times specified by the Spacing parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Spacing : Positive_Count := 1;`
Specifies the number of new lines to be added.

Errors

If the specified file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure New_Page

```
procedure New_Page (File : File_Type);

procedure New_Page;
```

Description

Outputs a page terminator.

The procedure outputs a line terminator if the current line is not terminated or if the current page is empty (that is, if the current column and line numbers are both equal to 1). It then outputs a page terminator, which terminates the current page, adds 1 to the current page number, and sets the current column and line numbers to 1.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

subtype Number_Base

```
subtype Number_Base is Integer range 2 .. 16;
```

Description

Specifies the range of possible values for the radix of numeric values to be written or read.

procedure Open

```
procedure Open (File : in out File_Type;
                Mode :        File_Mode := Out_File;
                Name :        String;
                Form :        String    := "");

procedure Open (File   : in out File_Type;
                Mode   :        File_Mode;
                Object :        Directory.Version;
                Form   :        String             := "");
```

Description

Associates the file handle with an existing file having the specified name or version and sets the mode of the file to the specified mode.

After a file is opened with the Out_File mode, the page length and line length are unbounded. After a file is opened with the In_File or Out_File mode, the current column, current line, and current page numbers are set to 1.

Parameters

`File : in out File_Type;`

Specifies the handle for the file.

`Mode : File_Mode := Out_File;`

Specifies the access mode for which the file is to be used.

`Mode : File_Mode;`

Specifies the access mode for which the file is to be used; by default, it will be a file that is open for writing.

`Name : String;`

Specifies the name of the external file to be opened.

`Object : Directory.Version;`

Specifies the object that is the external file to be opened.

`Form : String := "";`

Currently, the Form parameter, if specified, has no effect.

Errors

If the file handle is already open, the Io_Exceptions.Status_Error exception is raised.

If the string specified in the Name parameter does not allow unique identification of a file, the Io_Exceptions.Name_Error exception is raised. In particular, this exception is raised if no file with the specified name exists.

The Io_Exceptions.Use_Error exception is raised if the file cannot be opened with the specified mode or if another job has locked the file.

---

constant Out_File

```
Out_File : constant File_Mode := Text_Io.Out_File;
```

Description

Defines a named constant for the Out_File mode.

function Page

```
function Page (File : File_Type) return Positive_Count;

function Page return Positive_Count;
```

Description

Returns the current page number.

If a File parameter is omitted, the default file is the current output file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Positive_Count;`
Returns the current page number.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the Positive_Count value exceeds Count'Last, the Io_Exceptions.Layout_Error exception is raised.

function Page_Length

```
function Page_Length (File : File_Type) return Count;

function Page_Length return Count;
```

Description

Returns the maximum page length currently set for the specified output file; returns 0 if the page length is unbounded.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Count;`
Returns the maximum page length currently set for the specified output file; returns 0 if the page length is unbounded.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Pop_Error

```
procedure Pop_Error;
```

Description

Pops the current error file off the stack of error files.

The procedure sets the current error file to be a file value previously saved by a Set_Error procedure. The current value of the error file is not closed and will not be closed automatically at the end of the job because it is no longer on the stack.

References

procedure Reset_Error

procedure Set_Error

procedure Pop_Input

```
procedure Pop_Input;
```

Description

Pops the current input file off the stack of input files.

The procedure sets the current input file to be a file value previously saved by a Set_Input procedure. The current value of the input file is not closed and will not be closed automatically at the end of the job because it is no longer on the stack.

References

procedure Reset_Input

procedure Set_Input

procedure Pop_Output

```
procedure Pop_Output;
```

Description

Pops the current output file off the stack of output files.

The procedure sets the current output file to be a file value previously saved by a Set_Output procedure. The current value of the output file is not closed and will not be closed automatically at the end of the job because it is no longer on the stack.

References

procedure Reset_Output

procedure Set_Output

subtype Positive_Count

```
subtype Positive_Count is Count range 1 .. Count'Last;
```

Description

Specifies the range of possible values for the number of lines to be skipped or inserted.

References

procedure New_Line

procedure Skip_Line

procedure Put

```
procedure Put (File : File_Type;
               Item : Character);

procedure Put (Item : Character);
```

Description

Writes a character to a file.

If the line length of the specified output file is bounded (that is, does not have the conventional value 0) and the current column number exceeds it, the procedure has the effect of calling the New_Line procedure with a spacing of 1. Then the procedure outputs the specified character to the file.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Character;`
Specifies the value of the item to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

References

procedure New_Line

procedure Put

```
procedure Put (File : File_Type;
               Item : String);

procedure Put (Item : String);
```

Description

Writes a string to a file.

Determines the length of the specified string and attempts that number of put operations for successive characters of the string. No operation is performed if the string is null.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : String;`
Specifies the value of the string to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Put

```
procedure Put (File  : File_Type;
               Item  : Integer;
               Width : Field       := 0;
               Base  : Number_Base := 10);

procedure Put (Item  : Integer;
               Width : Field       := 0;
               Base  : Number_Base := 10);
```

Description

Writes an integer value to a file.

Values are output as decimal or based literals, without underline characters or exponents, and are preceded by a minus sign if negative. The format (which includes any leading spaces and a minus sign) can be specified by an optional field Width parameter. Values of widths of fields in output formats are of the nonnegative integer Field subtype. Values of bases are of the integer Number_Base subtype.

This procedure outputs the value of the Item parameter as an integer literal, with no underlines, no exponent, and no leading zeros (but a single zero for the value 0), and with a preceding minus sign for a negative value.

If the resulting sequence of characters to be output has fewer characters than specified in the Width parameter, leading spaces are output to make up the difference.

This procedure uses the syntax for decimal literal if the Base parameter has the value 10; otherwise, it uses the syntax for based literal, with any letters in uppercase.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Integer;`
Specifies the value to be written.

`Width : Field := 0;`
Specifies the number of characters to be output.

```
Base : Number_Base := 10;
```

Specifies the radix base with which to output the form of the number.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (File : File_Type;
               Item : Float;
               Fore : Field     := 2;
               Aft  : Field     := 14;
               Exp  : Field     := 3);

procedure Put (Item : Float;
               Fore : Field := 2;
               Aft  : Field := 14;
               Exp  : Field := 3);
```

Description

Writes a floating-point value to a file.

Values are output as decimal literals without underline characters. The format of each value output consists of a Fore field, a decimal point, an Aft field, and (if a nonzero Exp parameter is supplied) the letter E and an Exp field. The two possible formats thus correspond to:

```
Fore . Aft
```

and:

```
Fore . Aft E Exp
```

with no spaces between these fields. The Fore field can include leading spaces and a minus sign for negative values. The Aft field includes only decimal digits (possibly with trailing zeros). The Exp field includes the sign (plus or minus) and the exponent (possibly with leading zeros).

The Put procedure outputs the value of the Item parameter as a decimal literal with the format defined by the Fore, Aft, and Exp parameters. If the value is negative, a minus sign is included in the integer part. If Exp has the value 0, the integer part to be output has as many digits as needed to represent the integer part of the value of the Item parameter, overriding Fore if necessary, or it consists of the digit 0 if the value of Item has no integer part.

If Exp has a value greater than 0, the integer part to be output has a single digit, which is nonzero except for the value 0.0 of the Item parameter.

In both cases, however, if the integer part to be output has fewer than Fore characters, including any minus sign, leading spaces are output to make up the difference. The number of digits of the fractional part is specified by Aft, or it is 1 if Aft equals 0. The value is rounded; a value of exactly one-half in the last place can be rounded either up or down.

If Exp has the value 0, there is no exponent part. If Exp has a value greater than 0, the exponent part to be output has as many digits as needed to represent the exponent part of the value of the Item parameter (for which a single-digit integer part is used), and it includes an initial sign (plus or minus). If the exponent part to be output has fewer than Exp characters, including the sign, leading zeros precede the digits to make up the difference. For the value 0.0 of the Item parameter, the exponent has the value 0.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

```
File : File_Type;
```
Specifies the handle for the file.

```
Item : Float;
```
Specifies the value to be written.

```
Fore : Field := 2;
```
Specifies the number of characters to be output before the decimal point.

```
Aft : Field := 14;
```
Specifies the number of characters to be output after the decimal point.

```
Exp : Field := 3;
```
Specifies the number of exponent characters to be output.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (File  : File_Type;
               Item  : Boolean;
               Width : Field      := Ø);

procedure Put (Item  : Boolean;
               Width : Field    := Ø);
```

Description

Writes the Boolean value to a file.

Values are output using either uppercase or lowercase letters for identifiers.

The format (which includes any trailing spaces) can be specified by an optional field Width parameter.

The procedure outputs the value of the Item parameter as an enumeration literal. If the sequence of characters produced has fewer characters than specified by the Width parameter, trailing spaces are output to make up the difference.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Boolean;`
Specifies the value to be written.

`Width : Field := Ø;`
Specifies the number of characters to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Put_Line

```
procedure Put_Line (File : File_Type;
                    Item : String);

procedure Put_Line (Item : String);
```

Description

Writes a string to a file and advances the line.

This procedure calls the Put procedure for the specified string and then calls the New_Line procedure with a spacing of 1.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : String;`
Specifies the value of the string to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

References

procedure New_Line

procedure Put

procedure Reset

```
procedure Reset (File : in out File_Type;
                 Mode :        File_Mode);

procedure Reset (File : in out File_Type);
```

Description

Resets the specified file so that reading from or writing to its elements can be restarted from the beginning of the file.

If a Mode parameter is supplied, the mode of the specified file handle is set to the specified mode.

If the file has the current Out_File mode, this procedure terminates the current page and outputs a file terminator.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

`Mode : File_Mode;`
Specifies the mode for which the file is to be used when the reset is completed.

Errors

If the file handle is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to change the mode of a file that is either the current default input file or the current default output file, the Io_Exceptions.Mode_Error exception is raised.

The Io_Exceptions.Use_Error exception is raised under any of the following conditions:

- The Environment does not support resetting for the file.
- The file cannot be reset to the specified mode.
- Another job has locked the file.

procedure Reset_Error

```
procedure Reset_Error;
```

Description

Closes the current error file and pops it off the stack of error files.

The procedure sets the current error file to be a file value previously saved by a Set_Error procedure. The current value of the error file is closed.

References

procedure Pop_Error

procedure Set_Error

procedure Reset_Input

```
procedure Reset_Input;
```

Description

Closes the current input file and pops it off the stack of input files.

The procedure sets the current input file to be a file value previously saved by a Set_Input procedure. The current value of the input file is closed.

References

procedure Pop_Input

procedure Set_Input

procedure Reset_Output

```
procedure Reset_Output;
```

Description

Closes the current output file and pops it off the stack of output files.

The procedure sets the current output file to be a file value previously saved by a Set_Output procedure. The current value of the output file is closed.

References

procedure Pop_Output

procedure Set_Output

procedure Save

```
procedure Save (File : File_Type);
```

Description

Causes the current contents of the file to be permanently saved after any characters currently in internal buffers and not yet in the file are forced out to the file using the Flush procedure.

The procedure can be used to force logging output from programs at key points out to files so that the intermediate snapshots of the logs can be saved if the program terminates before the file is closed normally.

Parameters

`File : File_Type;`
Specifies the file to be saved.

References

procedure Flush

procedure Set_Col

```
procedure Set_Col (File : File_Type;
                   To   : Positive_Count);

procedure Set_Col (To : Positive_Count);
```

Description

Sets the current column number of the specified file.

If the file mode is Out_File:

If the value specified by the To parameter is greater than the current column number, this procedure outputs spaces, adding 1 to the current column number after each space, until the current column number equals the specified value. If the value specified by To is equal to the current column number, there is no effect. If the value specified by To is less than the current column number, the procedure has the effect of calling the New_Line procedure (with a spacing of 1), and then it outputs (To − 1) spaces and sets the current column number to the specified value.

If the file mode is In_File:

The procedure reads (and discards) individual characters, line terminators, and page terminators until the next character to be read has a column number that equals the value specified by To; there is no effect if the current column number already equals this value. Each transfer of a character or terminator maintains the current column, line, and page numbers in the same way that a Get or a Get_Line procedure does.

If a File parameter is omitted, the default file is the current output file.

The column number, line number, and page number are allowed to exceed Count'Last (as a consequence of the input or output of sufficiently many characters, lines, or pages).

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Positive_Count;`
Specifies the value of the column.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the file mode is Out_File, the Io_Exceptions.Layout_Error exception is raised if the value specified by the To parameter exceeds Line_Length when the line length is bounded (that is, when it does not have the conventional value of 0).

If the file mode is In_File, the Io_Exceptions.End_Error exception is raised if an attempt is made to read a file terminator.

References

procedure Get

procedure Get_Line

procedure New_Line

---

procedure Set_Error

```
procedure Set_Error (File : File_Type);

procedure Set_Error (Name : String := ">>FILE NAME<<");
```

Description

Sets the current default error file to the specified file handle or file and pushes the file onto the stack of error files.

If a filename is specified, the file is opened with Out_File mode before it is set to be the default output file. A file is created if one does not exist.

Any files on the stack when a job terminates are automatically closed.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Name : String := ">>FILE NAME<<";`
Specifies the filename to open (and create if necessary) and set to be the current default output file.

Errors

If a file handle is specified and it is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

The Io_Exceptions.Name_Error exception is raised under the following conditions:

- The filename does not conform to the syntax of a name.
- An object of a nonfile class with the same name as the filename already exists in the context in which the creation is attempted.
- The context in which the creation is attempted cannot contain files. Files are allowed only in directories or worlds.

The Io_Exceptions.Use_Error exception is raised under the following conditions:

- The file cannot be opened with Out_File mode.
- A create is attempted and the executing job does not have create access.
- The file is locked by another job.

References

procedure Pop_Error

procedure Reset_Error

---

procedure Set_Input

```
procedure Set_Input (File : File_Type);

procedure Set_Input (Name : String := "<SELECTION>");
```

Description

Sets the current default input file to the specified file handle or file and pushes the file onto the stack of input files.

If a filename is specified, the file is opened with In_File mode before it is set to be the default input file. A file is created if one does not exist.

Any files on the stack when a job terminates are automatically closed.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Name : String := "<SELECTION>";`
Specifies the file to open (and create if necessary) and set to be the current default input file. By default, the file designated by the current selection will be used.

Errors

If a file handle is specified and it is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

The Io_Exceptions.Name_Error exception is raised under the following conditions:

- The Name parameter does not allow unique identification of a file.
- An object of a nonfile class already exists with the same name.
- The context for creating the file is not a library.

The Io_Exceptions.Use_Error exception is raised under the following conditions:

- The file cannot be opened with the In_File mode.
- A create is attempted and the executing job does not have create access.
- Another job has locked the file.

References

procedure Pop_Input

procedure Reset_Input

---

procedure Set_Line

```
procedure Set_Line (File : File_Type;
                    To   : Positive_Count);

procedure Set_Line (To : Positive_Count);
```

Description

Sets the current line number of the file.

If the file mode is Out_File:

If the value specified by the To parameter is greater than the current line number, the procedure has the effect of repeatedly calling the New_Line procedure (with a spacing of 1) until the current line number equals the specified value. If the value specified by To is equal to the current line number, there is no effect. If the value specified by To is less than the current line number, the procedure has the effect of calling the New_Page procedure followed by a call to the New_Line procedure with a spacing equal to (To − 1).

If the file mode is In_File:

The procedure has the effect of repeatedly calling the Skip_Line procedure (with a spacing of 1) until the current line number equals the value specified by To; there is no effect if the current line number already equals this value. (Short pages will be skipped until a page is reached that has a line at the specified line position.)

If a File parameter is omitted, the default file is the current output file.

The column number, line number, and page number are allowed to exceed Count'Last (as a consequence of the input or output of sufficiently many characters, lines, or pages).

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Positive_Count;`
Specifies the value of the line.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the file mode is Out_File, the Io_Exceptions.Layout_Error exception is raised if the value specified by the To parameter exceeds Page_Length when the page length is bounded (that is, when it does not have the conventional value of 0).

If the file mode is In_File, the Io_Exceptions.End_Error exception is raised if an attempt is made to read a file terminator.

References

procedure New_Line

procedure New_Page

procedure Skip_Line

---

procedure Set_Line_Length

```
procedure Set_Line_Length (File : File_Type;
                           To   : Count);

procedure Set_Line_Length (To : Count);
```

Description

Sets the maximum line length of the specified output file to the number of characters specified by the To parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Count;`
Specifies the value of the line length.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the specified line length is inappropriate for the associated file, the Io_Exceptions.Use_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Set_Output

```
procedure Set_Output (File : File_Type);

procedure Set_Output (Name : String := ">>FILE NAME<<");
```

Description

Sets the current default output file to the specified file handle or file and pushes the file onto the stack of output files.

If a filename is specified, the file is opened with Out_File mode before it is set to be the default output file. A file is created if one does not exist.

Any files on the stack when a job terminates are automatically closed.

Parameters

`File : File_Type;`

Specifies the handle for the file.

`Name : String := ">>FILE NAME<<";`

Specifies the filename to open (and create if necessary) and set to be the current default output file.

Errors

If a file handle is specified and it is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

The Io_Exceptions.Name_Error exception is raised under the following conditions:

- The filename does not conform to the syntax of a name.
- An object of a nonfile class with the same name as the filename already exists in the context in which the creation is attempted.
- The context in which the creation is attempted cannot contain files. Files are allowed only in directories or worlds.

The Io_Exceptions.Use_Error exception is raised under the following conditions:

- The file cannot be opened with Out_File mode.
- The file must be created and the executing job does not have create access.
- The file is locked by another job.

References

procedure Pop_Output

procedure Reset_Output

procedure Set_Page_Length

```
procedure Set_Page_Length (File : File_Type;
                           To   : Count);

procedure Set_Page_Length (To : Count);
```

Description

Sets the maximum page length of the specified output file to the number of lines specified by the To parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Count;`
Specifies the value of the page length.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the specified page length is inappropriate for the associated file, the Io_Exceptions.Use_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Skip_Line

```
procedure Skip_Line (File    : File_Type;
                     Spacing : Positive_Count := 1);

procedure Skip_Line (Spacing : Positive_Count := 1);
```

Description

Ignores all remaining characters in the subsequent lines (specified by the Spacing parameter) and sets the current line to the following line.

For a spacing of 1, this procedure reads and discards all characters until a line terminator has been read, and then sets the current column number to 1. If the line terminator is not immediately followed by a page terminator, the current line number is increased by 1. Otherwise, if the line terminator is immediately followed by a page terminator, the page terminator is skipped, the current page number is increased by 1, and the current line number is set to 1.

For a spacing greater than 1, the above actions are performed the number of times specified by the Spacing parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Spacing : Positive_Count := 1;`
Specifies the number of lines to be skipped.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to read a file terminator, the Io_Exceptions.End_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Skip_Page

```
procedure Skip_Page (File : File_Type);

procedure Skip_Page;
```

Description

Skips past all input until a page terminator is read.

This procedure reads and discards all characters and line terminators until a page terminator has been read. It then adds 1 to the current page number and sets the current column and line numbers to 1.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to read a file terminator, the Io_Exceptions.End_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

---

function Standard_Error

```
function Standard_Error return File_Type;

function Standard_Error return Text_Io.File_Type;
```

Description

Returns the handle to the standard error file (by default, the Message window).

function Standard_Input

```
function Standard_Input return File_Type;
```

Description

Returns the handle to the standard input file.

function Standard_Output

```
function Standard_Output return File_Type;
```

Description

Returns the handle to the standard output file.

subtype Type_Set

```
subtype Type_Set is Text_Io.Type_Set;
```

Description

Specifies the case in which enumeration literals are to be displayed.

constant Unbounded

```
Unbounded : constant Count := Text_Io.Unbounded;
```

Description

Denotes an unbounded line and/or page length.

constant Upper_Case

```
Upper_Case : constant Type_Set := Text_Io.Upper_Case;
```

Description

Defines a value indicating that enumeration literals are to be displayed in uppercase.

generic procedure Wildcard_Iterator

This procedure calls a procedure once with an open file handle with mode In_File corresponding to each of the files matched by the wildcard or filename specified by the input parameter. It can be used to perform an operation repeatedly over a set of files.

The procedure's formal parameter list is:

```
generic
  with procedure Process (File : in out File_Type) is <>;
  with procedure Note_Error (Message : String) is Io.Put_Line;
procedure Wildcard_Iterator (Names : String);
```

The Process procedure is called for each file. The Note_Error procedure is used to report exceptions.

generic formal procedure Note_Error

```
with procedure Note_Error (Message : String) is Io.Put_Line;
```

Description

Reports errors and exceptions encountered in the processing of each file matched by the wildcard passed to the Wildcard_Iterator procedure.

If no procedure is provided for this generic formal in an instantiation of the Wildcard_Iterator, the Put_Line procedure will be used.

Parameters

```
Message : String;
```

Specifies the error message to be output.

generic formal procedure Process

```
with procedure Process (File : in out File_Type) is <>;
```

Description

Performs the processing on each file matched by the wildcard.

This procedure will be called once for each file matched by the wildcard. The file will be opened with In_File mode before the Process procedure is called by the Wildcard_Iterator procedure.

If no procedure is provided for this generic formal in an instantiation of the Wildcard_Iterator, a procedure (visible at the point of instantiation) with the name Process and a matching parameter profile will be used. Lack of either an explicit parameter or such a visible procedure is a semantic error.

Parameters

`File : in out File_Type;`

Specifies the file to be processed.

procedure Wildcard_Iterator

```
procedure Wildcard_Iterator (Names : String);
```

Description

Resolves the wildcard or filename provided.

For each file matched, the procedure performs the following processing in sequence:

- Opens the file with In_File mode
- Calls the Process procedure
- Closes the file

If errors are encountered, the Note_Error procedure is called and processing continues.

Parameters

`Names : String;`
Specifies the wildcard or filename denoting a set of files.

end Wildcard_Iterator;

generic package Enumeration_Io

This package provides facilities for enumeration I/O.

Values are output using either uppercase or lowercase letters for identifiers. This is specified by the Set parameter, which is of the enumeration Type_Set subtype.

The format (which includes any trailing spaces) can be specified by an optional field Width parameter.

constant Default_Setting

```
Default_Setting : Type_Set := Upper_Case;
```

Description

Denotes the default type set of values to be output.

constant Default_Width

```
Default_Width : Field := 0;
```

Description

Denotes the default number of characters to be output.

generic formal type Enum

```
type Enum is (<>);
```

Description

Denotes the enumeration type to be used in instantiating this package.

procedure Get

```
procedure Get (File :     File_Type;
               Item : out Enum);

procedure Get (Item : out Enum);
```

Description

Reads an enumeration value from a file.

After skipping any leading blanks, line terminators, or page terminators, the procedure reads an enumeration literal of Enum type in either lowercase or uppercase. If Enum is of Character type, the literal value must include the apostrophes.

The procedure returns, in the Item parameter, the value of the Enum type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Enum;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the identifier or character literal does not correspond to a value of the Enum type, the Io_Exceptions.Data_Error exception is raised.

procedure Get

```
procedure Get (From :     String;
               Item : out Enum;
               Last : out Positive);
```

Description

Reads an enumeration value from a string.

The procedure reads an enumeration value from the beginning of the specified string, following the same rule as the Get procedure that reads an enumeration value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Enum type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Enum;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the identifier or character literal does not correspond to a value of the Enum type, the Io_Exceptions.Data_Error exception is raised.

procedure Put

```
procedure Put (File  : File_Type;
               Item  : Enum;
               Width : Field     := Default_Width;
               Set   : Type_Set  := Default_Setting);

procedure Put (Item  : Enum;
               Width : Field     := Default_Width;
               Set   : Type_Set  := Default_Setting);
```

Description

Writes an enumeration value to a file.

The procedure outputs the value of the Item parameter as an enumeration literal (either an identifier or a character literal). The optional Set parameter indicates whether lowercase or uppercase letters are used for identifiers; it has no effect for character literals. If the sequence of characters produced has fewer than the number of characters specified by the Width parameter, trailing spaces are output to make up the difference.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Enum;`
Specifies the value to be written.

`Width : Field := Default_Width;`
Specifies the number of characters to be written.

`Set : Type_Set := Default_Setting;`
Specifies the type set of the value to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Put

```
procedure Put (To   : out String;
               Item :     Enum;
               Set  :     Type_Set := Default_Setting);
```

Description

Writes an enumeration value to a string.

The procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using the length of the specified string as the value for the Width parameter.

Parameters

`To : out String;`
Specifies the string to which the value is to be written.

`Item : Enum;`
Specifies the value to be written.

`Set : Type_Set := Default_Setting;`
Specifies the type set of the value to be written.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

end Enumeration_Io;

RATIONAL

generic package Fixed_Io

This package provides facilities for fixed-point I/O.

Values are output as decimal literals without underline characters. The format of each value output consists of a Fore field, a decimal point, an Aft field, and (if a nonzero Exp parameter is supplied) the letter E and an Exp field. The two possible formats thus correspond to:

```
Fore . Aft
```

and:

```
Fore . Aft E Exp
```

with no spaces between these fields. The Fore field can include leading spaces and a minus sign for negative values. The Aft field includes only decimal digits (possibly with trailing zeros). The Exp field includes the sign (plus or minus) and the exponent (possibly with leading zeros).

constant Default_Aft

```
Default_Aft : Field := Num'Aft;
```

Description

Denotes the default number of characters to be used after the decimal point in output procedures.

constant Default_Exp

```
Default_Exp : Field := Ø;
```

Description

Denotes the default number of exponent characters to be used in output procedures.

constant Default_Fore

```
Default_Fore : Field := Num'Fore;
```

Description

Denotes the default number of characters to be used before the decimal point in output procedures.

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Num;
               Width :     Field      := 0);

procedure Get (Item  : out Num;
               Width :     Field := 0);
```

Description

Reads a fixed-point value from a file.

If the value of the Width parameter is 0, the procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of a real literal (which may be a based literal). If a nonzero value of the Width parameter is supplied, then exactly Width characters are input, or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Num;`
Specifies the object that receives the value read.

`Width : Field := 0;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. For this test, leading blanks are ignored. When a sign is input, this rule applies to the succeeding numeric literal.

procedure Get

```
procedure Get (From :     String;
               Item : out Num;
               Last : out Positive);
```

Description

Reads a fixed-point value from a string.

This procedure reads a real value from the beginning of the specified string, following the same rule as the Get procedure that reads a real value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Num;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

generic formal type Num

```
type Num is delta <>;
```

Description

Denotes the fixed-point type for which the package is being instantiated.

procedure Put

```
procedure Put (File : File_Type;
               Item : Num;
               Fore : Field     := Default_Fore;
               Aft  : Field     := Default_Aft;
               Exp  : Field     := Default_Exp);

procedure Put (Item : Num;
               Fore : Field := Default_Fore;
               Aft  : Field := Default_Aft;
               Exp  : Field := Default_Exp);
```

Description

Writes a fixed-point value to a file.

The Put procedure outputs the value of the Item parameter as a decimal literal with the format defined by the Fore, Aft, and Exp parameters. If the value is negative, a minus sign is included in the integer part. If Exp has the value 0, the integer part to be output has as many digits as needed to represent the integer part of the value of the Item parameter, overriding Fore if necessary, or it consists of the digit 0 if the value of Item has no integer part.

If Exp has a value greater than 0, the integer part to be output has a single digit, which is nonzero except for the value 0.0 of the Item parameter.

In both cases, however, if the integer part to be output has fewer than Fore characters, including any minus sign, leading spaces are output to make up the difference. The number of digits of the fractional part is specified by Aft, or it is 1 if Aft equals 0. The value is rounded; a value of exactly one-half in the last place can be rounded either up or down.

If Exp has the value 0, there is no exponent part. If Exp has a value greater than 0, the exponent part to be output has as many digits as needed to represent the exponent part of the value of the Item parameter (for which a single-digit integer part is used) and includes an initial sign (plus or minus). If the exponent part to be output has fewer than Exp characters, including the sign, leading zeros precede the digits to make up the difference. For the value 0.0 of Item, the exponent has the value 0.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Num;`
Specifies the value to be written.

`Fore : Field := Default_Fore;`
Specifies the number of characters to be output before the decimal point.

`Aft : Field := Default_Aft;`
Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`
Specifies the number of exponent characters to be output.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Put

```
procedure Put (To   : out String;
               Item :     Num;
               Aft  :     Field  := Default_Aft;
               Exp  :     Field  := Default_Exp);
```

Description

Writes a fixed-point value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using a value for the width of the Fore field such that the sequence of characters output exactly fills the string, including any leading spaces.

For an item with a positive value, if output to a string exactly fills the string without leading spaces, then output of the corresponding negative value raises the Io_Exceptions.Layout_Error exception.

Parameters

`To : out String;`
Specifies the string to which the value is to be written.

`Item : Num;`
Specifies the value to be written.

`Aft : Field := Default_Aft;`
Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`
Specifies the number of exponent characters to be output.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

end Fixed_Io;

generic package Float_Io

This package provides facilities for floating-point I/O.

Values are output as decimal literals without underline characters. The format of each value output consists of a Fore field, a decimal point, an Aft field, and (if a nonzero Exp parameter is supplied) the letter E and an Exp field. The two possible formats thus correspond to:

```
Fore . Aft
```

and:

```
Fore . Aft E Exp
```

with no spaces between these fields. The Fore field can include leading spaces and a minus sign for negative values. The Aft field includes only decimal digits (possibly with trailing zeros). The Exp field includes the sign (plus or minus) and the exponent (possibly with leading zeros).

constant Default_Aft

```
Default_Aft : Field := Num'Digits - 1;
```

Description

Denotes the default width to be used after the decimal point in output procedures.

constant Default_Exp

```
Default_Exp : Field := 3;
```

Description

Denotes the default exponent width to be used in output procedures.

constant Default_Fore

```
Default_Fore : Field := 2;
```

Description

Denotes the default width to be used before the decimal point in output procedures.

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Num;
               Width :     Field      := Ø);

procedure Get (Item  : out Num;
               Width :     Field := Ø);
```

Description

Reads a floating-point number from a file.

If the value of the Width parameter is 0, the procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of a real literal (which may be a based literal). If a nonzero value of the Width parameter is supplied, then exactly Width characters are input, or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Num;`
Specifies the object that receives the value read.

`Width : Field := Ø;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. For this test, leading blanks are ignored. When a sign is input, this rule applies to the succeeding numeric literal.

---

procedure Get

```
procedure Get (From :     String;
               Item : out Num;
               Last : out Positive);
```

Description

Reads a floating-point value from a string.

This procedure reads a real value from the beginning of the specified string, following the same rule as the Get procedure that reads a real value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Num;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

generic formal type Num

```
type Num is digits <>;
```

Description

Defines the floating-point type of the items that form the elements in the I/O stream.

procedure Put

```
procedure Put (File : File_Type;
               Item : Num;
               Fore : Field     := Default_Fore;
               Aft  : Field     := Default_Aft;
               Exp  : Field     := Default_Exp);

procedure Put (Item : Num;
               Fore : Field := Default_Fore;
               Aft  : Field := Default_Aft;
               Exp  : Field := Default_Exp);
```

Description

Writes a floating-point value to a file.

This procedure outputs the value of the Item parameter as a decimal literal with the format defined by the Fore, Aft, and Exp parameters. If the value is negative, a minus sign is included in the integer part. If Exp has the value 0, the integer part to be output has as many digits as needed to represent the integer part of the value of the Item parameter, overriding Fore if necessary, or it consists of the digit 0 if the value of Item has no integer part.

If Exp has a value greater than 0, the integer part to be output has a single digit, which is nonzero except for the value 0.0 of the Item parameter.

In both cases, however, if the integer part to be output has fewer than Fore characters, including any minus sign, leading spaces are output to make up the difference. The number of digits of the fractional part is specified by Aft, or it is 1 if Aft equals 0. The value is rounded; a value of exactly one-half in the last place can be rounded either up or down.

If Exp has the value 0, there is no exponent part. If Exp has a value greater than 0, the exponent part to be output has as many digits as needed to represent the exponent part of the value of the Item parameter (for which a single-digit integer part is used) and includes an initial sign (plus or minus). If the exponent part to be output has fewer than Exp characters, including the sign, leading zeros precede the digits to make up the difference. For the value 0.0 of Item, the exponent has the value 0.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Num;`
Specifies the value to be written.

`Fore : Field := Default_Fore;`
Specifies the number of characters to be output before the decimal point.

`Aft : Field := Default_Aft;`
Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`
Specifies the number of exponent characters to be output.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (To   : out String;
               Item :     Num;
               Aft  :     Field  := Default_Aft;
               Exp  :     Field  := Default_Exp);
```

Description

Writes a floating-point value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using a value for the width of the Fore field such that the sequence of characters output exactly fills the string, including any leading spaces.

For an item with a positive value, if output to a string exactly fills the string without leading spaces, then output of the corresponding negative value raises the Io_Exceptions.Layout_Error exception.

Parameters

`To : out String;`

Specifies the string to which the value is to be written.

`Item : Num;`

Specifies the value to be written.

`Aft : Field := Default_Aft;`

Specifies the number of characters to be written after the decimal point.

`Exp : Field := Default_Exp;`

Specifies the number of exponent characters to be written.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

Example

```
package Real_Io is new Float_Io(Real); use Real_Io;
-- default format used at instantiation, Default_Exp = 3

X : Real := -123.4567;  --  digits 8      (see 3.5.7)

Put(X); -- default format                      "-1.2345670E+02"
Put(X, Fore => 5, Aft => 3, Exp => 2);  --  "bbb-1.235E+2"
Put(X, 5, 3, 0);                        --  "b-123.457"
```

end Float_Io;

generic package Integer_Io

This package provides facilities for integer I/O.

Values are output as decimal or based literals, without underline characters or exponents, and preceded by a minus sign if negative. The format (which includes any leading spaces and a minus sign) can be specified by an optional field Width parameter. Values of widths of fields in output formats are of the nonnegative integer Field subtype. Values of bases are of the integer Number_Base subtype.

constant Default_Base

```
Default_Base : Number_Base := 10;
```

Description

Denotes the default radix base to be used in output procedures.

constant Default_Width

```
Default_Width : Field := Num'Width;
```

Description

Denotes the default width to be used in output procedures.

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Num;
               Width :     Field      := Ø);

procedure Get (Item  : out Num;
               Width :     Field := Ø);
```

Description

Reads an integer value from a file.

If the value of the Width parameter is 0, the procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of an integer literal (which may be a based literal). If a nonzero value of the Width parameter is supplied, then exactly Width characters are input, or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Num;`
Specifies the object that receives the value read.

`Width : Field := Ø;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

---

procedure Get

```
procedure Get (From :     String;
               Item : out Num;
               Last : out Positive);
```

Description

Reads an integer value from a string.

This procedure reads an integer value from the beginning of the specified string, following the same rules as the Get procedure that reads an integer value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Num;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

generic formal type Num

```
type Num is range <>;
```

Description

Defines the integer type of the items that form the elements in the I/O stream.

procedure Put

```
procedure Put (File  : File_Type;
               Item  : Num;
               Width : Field       := Default_Width;
               Base  : Number_Base := Default_Base);

procedure Put (Item  : Num;
               Width : Field       := Default_Width;
               Base  : Number_Base := Default_Base);
```

Description

Writes an integer value to a file.

This procedure outputs the value of the Item parameter as an integer literal, with no underlines, no exponent, and no leading zeros (but a single zero for the value 0), and with a preceding minus sign for a negative value.

If the resulting sequence of characters to be output has fewer characters than specified by the Width parameter, leading spaces are output to make up the difference.

The procedure uses the syntax for decimal literal if the Base parameter has the value 10 (either explicitly or through Default_Base); otherwise, it uses the syntax for based literal, with any letters in uppercase.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Num;`
Specifies the value to be written.

`Width : Field := Default_Width;`
Specifies the number of characters to be output.

`Base : Number_Base := Default_Base;`
Specifies the radix base with which to output the form of the number.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Put

```
procedure Put (To    : out String;
               Item  :     Num;
               Base  :     Number_Base := Default_Base);
```

Description

Writes an integer value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using the length of the specified string as the value for the Width parameter.

Parameters

`To : out String;`

Specifies the string to which the integer is to be written.

`Item : Num;`

Specifies the value of the integer to be written.

`Base : Number_Base := Default_Base;`

Specifies the radix base to be used in writing the number.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

Example

```
package Int_Io is new Integer_Io(Small_Int); use Int_Io;
-- default format used at instantiation, Default_Width = 4,
--                                       Default_Base = 10

    Put(126);                                -- "b126"
    Put(-126, 7);                            -- "bbb-126"
    Put(126, Width => 13, Base => 2);        -- "bbb2#1111110#"
```

end Integer_Io;

```
end Io;
```

package Io_Exceptions

The exceptions in package Io_Exceptions can be raised by I/O operations. The general conditions under which these exceptions can be raised are described in this section. Specific circumstances under which they can be raised are provided for each operation exported by an I/O package. If more than one error condition exists, the corresponding exception that appears earliest in the package is the one that is raised.

Every other I/O package renames one or more of the exceptions exported from this package. Rather than repeat the following descriptions in each of these packages, documentation of the renaming declarations is omitted in the subsequent sections.

The Rational Environment provides additional information about exceptions raised by the I/O packages that describes why a given exception occurred. This information, typically displayed in parentheses after the exception name, is documented in the reference entry for each exception.

exception Data_Error

```
Data_Error : exception;
```

Description

Defines an exception raised by the Read procedure if the element read cannot be interpreted as a value of the required type.

This exception is also raised by a Get or Read procedure if an input sequence fails to satisfy the required syntax or if the value input does not belong to the range of the required type or subtype.

This exception is also raised by the Read and Write procedures of package Polymorphic_Sequential_Io (DIO) if these operations are attempted on files containing unsafe types (that is, containing access or task types as any of their components).

The additional information supplied by the Environment when this exception is raised has the following meaning:

- Input_Syntax_Error: The input value has incorrect syntax.
- Input_Value_Error: The input value is out of range.
- Output_Type_Error: The output value is an unsafe type.
- Output_Value_Error: An attempt has been made to write a value out of range.

exception Device_Error

```
Device_Error : exception;
```

Description

Defines an exception raised if an I/O operation cannot be completed because of a malfunction of the underlying system.

The additional information supplied by the Environment when this exception is raised has the following meaning:

- Device_Data_Error: A hardware error such as a parity error has occurred.
- Illegal_Reference_Error: An illegal reference has been attempted.
- Illegal_Heap_Access_Error: An Illegal_Heap_Access exception was raised when the operation was attempted.
- Page_Nonexistent_Error: A nonexistent page was referenced.
- Write_To_Read_Only_Page_Error: A write to a read-only page was attempted.

exception End_Error

```
End_Error : exception;
```

Description

Defines an exception raised by an attempt to skip (read past) the end of a file.

exception Layout_Error

```
Layout_Error : exception;
```

Description

Defines an exception raised in TIO, packages Text_Io and Io, by a call to operations that violate the limits of Count and by an attempt to put too many characters to a string; also raised in package Window_Io (DIO) by an attempt to position the cursor outside the image boundary.

The additional information supplied by the Environment when this exception is raised has the following meaning:

- Column_Error: A column exceeds the line or page length.
- Illegal_Position_Error: A position parameter is illegal.
- Item_Length_Error: An item length is too big or small.

exception Mode_Error

```
Mode_Error : exception;
```

Description

Defines an exception raised by specifying a file whose mode conflicts with the desired operation.

For example, this exception is raised by a call to Set_Input or Get when a file of the Out_File mode is provided.

The additional information supplied by the Environment when this exception is raised is:

- Illegal_Operation_On_Infile
- Illegal_Operation_On_Outfile

exception Name_Error

```
Name_Error : exception;
```

Description

Defines an exception raised by a call to the Create or Open procedure if the string given for the Name parameter does not allow the identification of a legal unique file.

The Name_Error exception is raised by the Create procedure under any of the following conditions:

- The filename does not conform to the syntax of a name.
- An object of the nonfile class with the same name as the filename already exists in the context in which the creation is attempted.
- The context in which the creation is attempted cannot contain files. Files are allowed only in directories or worlds.

The additional information supplied by the Environment when this exception is raised has the following meaning:

- Ambiguous_Name_Error: A name does not identify a unique object.
- Illformed_Name_Error: A name does not conform to the syntax for a legal Environment filename.
- Nonexistent_Directory_Error: A library in the name does not exist.
- Nonexistent_Object_Error: The specified object does not exist.
- Nonexistent_Version_Error: The specified version of the object does not exist.

exception Status_Error

```
Status_Error : exception;
```

Description

Defines an exception raised by an attempt to operate upon a file handle that is not open and by an attempt to open a file handle that is already open.

The additional information supplied by the Environment when this exception is raised has the following meaning:

- Already_Open_Error: The file handle is already open.
- Not_Open_Error: The file handle is not open.

exception Use_Error

```
Use_Error : exception;
```

Description

Defines an exception raised if an operation is attempted that is not possible for reasons that depend on the file and the executing job's access rights.

This exception is raised by an attempt to create when there are objects of nonfile classes with similar names, by an attempt to open or reset with a mode that is not supported for the file, and by a call to the Open parameter for a terminal object if the terminal is already assigned to a job.

This exception is raised by the Delete procedure, among other circumstances, when the corresponding file is an object that cannot be deleted.

This exception is raised by the Create and Open procedures in packages Direct_Io and Sequential_Io (DIO) if they are attempted with instantiations on unsafe types (that is, types containing access or task types as any of their components).

The additional information supplied by the Environment when this exception is raised has the following meaning:

- Access_Error: There are insufficient access rights to perform the operation.
- Capacity_Error: The output file is full.
- Check_Out_Error: The object is not checked out using the configuration management and version control system.
- Class_Error: There is an existing object of a different class.
- Frozen_Error: An attempt is made to change a frozen object.
- Line_Page_Length_Error: An improper value for line or page length is encountered.
- Lock_Error: Another job has locked the object.
- Reset_Error: The file cannot be reset or have its mode changed.
- Unsupported_Error: The operation is not supported.

end Io_Exceptions;

RATIONAL

package Text_Io

This package provides the capabilities for Text_Io as required by the *Reference Manual for the Ada Programming Language*, Chapter 14.

The fundamental abstraction provided by package Text_Io is the File_Type type. Objects of this type denote file handles that can be mapped to files. Each file is read or written sequentially, as a sequence of characters grouped into lines and a sequence of lines grouped into pages.

At the beginning of program execution, the default input and output files are the *standard input file* and *standard output file*. These files are open, have the In_File and Out_File modes, respectively, and are associated with two implementation-defined files. These files are implicitly closed at the end of each job.

From a logical point of view, a text file is a sequence of pages, a page is a sequence of lines, and a line is a sequence of characters. The characters of a line are numbered, starting from 1; the number of a character is called its column number. For a line terminator, a column number is also defined; it is one more than the number of characters in the line. The lines of a page and the pages of a file are similarly numbered. The current column number is the column number of the next character or line terminator to be transferred. The current line number is the number of the current line. The current page number is the number of the current page. These numbers are values of the Positive_Count subtype of the Count type (by convention, the value 0 of the Count type is used to indicate special conditions).

```
type Count is range 0 .. 1_000_000_000

subtype Positive_Count is Count range 1 .. Count'Last;
```

For an output file, a maximum line length and a maximum page length can be specified. If a value to be output cannot fit on the current line, for a specified maximum line length, a new line is automatically started before the value is output. Further, if this new line cannot fit on the current page, for a specified maximum page length, a new page is automatically started before the value is output. Functions are provided to determine the maximum line and page lengths. When a file is opened with the Out_File mode, both values are 0; by convention, this means that the line and page lengths are unbounded. (Consequently, output consists of a single line if the subprograms for explicit control of line and page structure are not used.) The Unbounded constant is provided for this purpose.

procedure Close

```
procedure Close (File : in out File_Type);
```

Description

Severs the association between the specified file and its associated file.

If the file has the current Out_File mode, it has the effect of calling the New_Page procedure, unless the current page is already terminated; then it outputs a file terminator.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

Restrictions

The standard input and output files cannot be closed.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

References

procedure New_Page

function Col

```
function Col (File : File_Type) return Positive_Count;

function Col return Positive_Count;
```

Description

Returns the current column number.

If a File parameter is omitted, the default file is the current output file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Positive_Count;`
Returns the current column number for the specified file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the Positive_Count value exceeds Count'Last, the Io_Exceptions.Layout_Error exception is raised.

type Count

```
type Count is range 0 .. 1_000_000_000;
```

Description

Specifies the range of possible values of the line and page counts and the line and page lengths.

procedure Create

```
procedure Create (File : in out File_Type;
                 Mode :        File_Mode := Out_File;
                 Name :        String    := "";
                 Form :        String    := "");
```

Description

Establishes a new file with the specified name and associates this file with the specified file.

The specified file is left open.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

`Mode : File_Mode := Out_File;`
Specifies the access mode for which the file is to be used.

`Name : String := "";`
Specifies the name of the file to be created. A null string for the Name parameter specifies a file that is not accessible after the completion of the main program (a temporary file).

`Form : String := "";`
Currently, the Form parameter, if specified, has no effect.

Restrictions

Files can be created only in directories or worlds.

Errors

If the specified file handle is already open, the Io_Exceptions.Status_Error exception is raised.

The Io_Exceptions.Name_Error exception is raised under any of the following conditions:

- The filename does not conform to the syntax of a name.
- An object of a nonfile class with the same name as the filename already exists in the context in which the creation is attempted.
- The context in which the creation is attempted cannot contain files. Files are allowed only in directories or worlds.

The Io_Exceptions.Use_Error exception is raised under any of the following conditions:

- The file cannot be opened with the specified mode.
- The job attempting the create does not have create access for the world in which the file is being created.
- Another job has locked the file.

---

function Current_Input

```
function Current_Input return File_Type;
```

Description

Returns the handle to the current default input file.

function Current_Output

```
function Current_Output return File_Type;
```

Description

Returns the handle to the current default output file.

procedure Delete

```
procedure Delete (File : in out File_Type);
```

Description

Deletes the file associated with the specified file.

The specified file is closed, and the file ceases to exist.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

Restrictions

The standard input and output files cannot be deleted.

Errors

If the file handle is not open, the Io_Exceptions.Status_Error exception is raised.

The Io_Exceptions.Use_Error exception is raised under any of the following conditions:

- The Environment does not support deletion on the file.
- The executing job does not have the access rights required to delete the file.
- Another job has locked the file.

function End_Of_File

```
function End_Of_File (File : File_Type) return Boolean;

function End_Of_File return Boolean;
```

Description

Returns true if a file terminator or the combination of a line, a page, and a file terminator is the next item to be read from the file; otherwise, the function returns false.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if a file terminator or the combination of a line, a page, and a file terminator is the next item to be read from the file; otherwise, the function returns false.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

---

function End_Of_Line

```
function End_Of_Line (File : File_Type) return Boolean;

function End_Of_Line return Boolean;
```

Description

Returns true if a line terminator or a file terminator is the next item to be read from the file; otherwise, the function returns false.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if a line terminator or a file terminator is the next item to be read from the file; otherwise, the function returns false.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

function End_Of_Page

```
function End_Of_Page (File : File_Type) return Boolean;

function End_Of_Page return Boolean;
```

Description

Returns true if a file terminator or the combination of a line terminator and a page terminator is the next item to be read from the file; otherwise, the function returns false.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if a file terminator or the combination of a line terminator and a page terminator is the next item to be read from the file; otherwise, the function returns false.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

subtype Field

```
subtype Field is Integer range 0 .. Integer'Last;
```

Description

Specifies the range of possible values for the number of character positions used in formatting strings that represent discrete or real values.

type File_Mode

```
type File_Mode is (In_File, Out_File);
```

Description

Specifies the mode of access for which a file is open.

In_File denotes a file with read-only access; Out_File denotes a file with write-only access.

type File_Type

```
type File_Type is limited private;
```

Description

Defines a file handle type for files to be processed by operations in this package.

function Form

```
function Form (File : File_Type) return String;
```

Description

Returns the null string ("") in all cases.

When the Form parameter to the Create and Open procedures is supported in the future, this function will return the Form value provided in the call to the Create or the Open procedure.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return String;`
Returns the null string ("") in all cases.

References

procedure Create

procedure Open

---

procedure Get

```
procedure Get (File :     File_Type;
               Item : out Character);

procedure Get (Item : out Character);
```

Description

Reads a character from a file.

After skipping any line and page terminators, this procedure reads the next character from the specified input file and returns the value of this character in the Item parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Character;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

procedure Get

```
procedure Get (File :     File_Type;
               Item : out String);

procedure Get (Item : out String);
```

Description

Reads a string from a file.

This procedure determines the length of the specified string and attempts that number of get operations for successive characters of the string. No operation is performed if the string is null.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out String;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

procedure Get_Line

```
procedure Get_Line (File :     File_Type;
                    Item : out String;
                    Last : out Natural);

procedure Get_Line (Item : out String;
                    Last : out Natural);
```

Description

Reads a string on a single line from a file, not including the line terminator.

This procedure replaces successive characters of the string by successive characters read from the specified input file. Reading stops if the end of the line is encountered, in which case the Skip_Line procedure is called (in effect) with a spacing of 1; reading also stops if the end of the string is encountered. Characters not replaced are left undefined.

If characters are read, the Last parameter contains the index value such that `Item(Last)` is the last character replaced (the index of the first character replaced is `Item'First`). If no characters are read, the Last parameter contains an index value that is one less than `Item'First`.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out String;`
Specifies the object that receives the value read.

`Last : out Natural;`
Specifies the index for the last character read into the string.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

References

procedure Skip_Line

---

function Is_Open

```
function Is_Open (File : File_Type) return Boolean;
```

Description

Returns true if the file handle is open (that is, if it is associated with a file); otherwise, the function returns false.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Boolean;`
Returns true if the file handle is open (that is, if it is associated with a file); otherwise, the function returns false.

function Line

```
function Line (File : File_Type) return Positive_Count;

function Line return Positive_Count;
```

Description

Returns the current line number.

If a File parameter is omitted, the default file is the current output file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Positive_Count;`
Returns the current line number for the specified file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the Positive_Count value exceeds Count'Last, the Io_Exceptions.Layout_Error exception is raised.

function Line_Length

```
function Line_Length (File : File_Type) return Count;

function Line_Length return Count;
```

Description

Returns the maximum line length currently set for the specified output file; returns 0 if the line length is unbounded.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Count;`
Returns the maximum line length currently set for the specified output file; returns 0 if the line length is unbounded.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

function Mode

```
function Mode (File : File_Type) return File_Mode;
```

Description

Returns the current mode of the specified file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return File_Mode;`
Returns the current mode of the specified file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

function Name

```
function Name (File : File_Type) return String;
```

Description

Returns the name of the file currently associated with the specified file handle.

For temporary files, this function returns the unique name provided by the Rational Environment during the creation of the file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return String;`
Returns the name of the file currently associated with the specified file handle.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

procedure New_Line

```
procedure New_Line (File    : File_Type;
                    Spacing : Positive_Count := 1);

procedure New_Line (Spacing : Positive_Count := 1);
```

Description

Outputs a line terminator.

For a spacing of 1, this procedure outputs a line terminator, sets the current column number to 1, and adds 1 to the current line number. If the current line number is already greater than or equal to the maximum page length for a bounded page length, a page terminator is output, the current page number is increased by 1, and the current line number is set to 1.

For a spacing greater than 1, the above actions are performed the number of times specified by the Spacing parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Spacing : Positive_Count := 1;`
Specifies the value denoting the number of new lines to be added.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure New_Page

```
procedure New_Page (File : File_Type);

procedure New_Page;
```

Description

Outputs a page terminator.

This procedure outputs a line terminator if the current line is not terminated or if the current page is empty (that is, if the current column and line numbers are both equal to 1). It then outputs a page terminator, which terminates the current page, adds 1 to the current page number, and sets the current column and line numbers to 1.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

subtype Number_Base

```
subtype Number_Base is Integer range 2 .. 16;
```

Description

Specifies the range of possible values for the radix of numeric values to be written or read.

procedure Open

```
procedure Open (File : in out File_Type;
                Mode :        File_Mode := Out_File;
                Name :        String;
                Form :        String    := "");
```

Description

Associates the specified file with an existing file having the specified name and sets the mode of the file to the specified mode.

After a file is opened with the Out_File mode, the page and line lengths are unbounded. After a file is opened with the In_File or Out_File mode, the current column, current line, and current page numbers are set to 1.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

`Mode : File_Mode := Out_File;`
Specifies the access mode for which the file is to be used.

`Name : String;`
Specifies the name of the file to be created.

`Form : String := "";`
Currently, the Form parameter, if specified, has no effect.

Restrictions

The standard input and output files cannot be opened.

Errors

If the specified file handle is already open, the Io_Exceptions.Status_Error exception is raised.

If the string specified in the Name parameter does not allow the unique identification of a file, the Io_Exceptions.Name_Error exception is raised. In particular, this exception is raised if no file with the specified name exists.

The Io_Exceptions.Use_Error exception is raised if the file cannot be opened with the specified mode or if another job has locked the file.

---

function Page

```
function Page (File : File_Type) return Positive_Count;

function Page return Positive_Count;
```

Description

Returns the current page number.

If a File parameter is omitted, the default file is the current output file.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Positive_Count;`
Returns the current page number.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the Positive_Count value exceeds Count'Last, the Io_Exceptions.Layout_Error exception is raised.

---

function Page_Length

```
function Page_Length (File : File_Type) return Count;

function Page_Length return Count;
```

Description

Returns the maximum page length currently set for the specified output file; returns 0 if the page length is unbounded.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`return Count;`
Returns the maximum page length currently set for the specified output file; returns 0 if the page length is unbounded.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

subtype Positive_Count

```
subtype Positive_Count is Count range 1 .. Count'Last;
```

Description

Specifies the range of possible values for the current line and page number.

procedure Put

```
procedure Put (File : File_Type;
               Item : Character);

procedure Put (Item : Character);
```

Description

Writes a character to a file.

If the line length of the specified output file is bounded (that is, does not have the conventional value 0) and the current column number exceeds it, this procedure has the effect of calling the New_Line procedure with a spacing of 1. It then outputs the specified character to the file.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Character;`
Specifies the value of the item to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

References

procedure New_Line

procedure Put

```
procedure Put (File : File_Type;
               Item : String);

procedure Put (Item : String);
```

Description

Writes a string to a file.

This procedure determines the length of the specified string and attempts that number of put operations for successive characters of the string. No operation is performed if the string is null.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : String;`
Specifies the value of the item to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Put_Line

```
procedure Put_Line (File : File_Type;
                    Item : String);

procedure Put_Line (Item : String);
```

Description

Writes a string to a file and advances the line.

This procedure calls the Put procedure for the specified string and then calls the New_Line procedure with a spacing of 1.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : String;`
Specifies the value of the string to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

References

procedure New_Line

procedure Put

procedure Reset

```
procedure Reset (File : in out File_Type;
                 Mode :        File_Mode);

procedure Reset (File : in out File_Type);
```

Description

Resets the specified file so that reading from or writing to its elements can be restarted from the beginning of the file.

If a Mode parameter is supplied, the current mode of the specified file is set to the specified mode.

If the file has the current Out_File mode, this procedure has the effect of calling the New_Page procedure, unless the current page is already terminated, and it then outputs a file terminator. If the new file mode is Out_File, the page and line lengths are unbounded. For all modes, the current column, line, and page numbers are set to 1.

Parameters

`File : in out File_Type;`
Specifies the handle for the file.

`Mode : File_Mode;`
Specifies the mode for which the file is to be used when the reset is completed.

Restrictions

The standard input and output files cannot be reset.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to change the mode of a file that is either the current default input file or the current default output file, the Io_Exceptions.Mode_Error exception is raised.

The Io_Exceptions.Use_Error exception is raised under any of the following conditions:

- The Environment does not support resetting for the file.
- The file cannot be opened with the specified mode.
- Another job has locked the file.

References

procedure New_Page

procedure Set_Col

```
procedure Set_Col (File : File_Type;
                   To   : Positive_Count);

procedure Set_Col (To : Positive_Count);
```

Description

Sets the current column number of the specified file.

If the file mode is Out_File:

If the value specified by the To parameter is greater than the current column number, this procedure outputs spaces, adding 1 to the current column number after each space, until the current column number equals the specified value. If the value specified by To is equal to the current column number, there is no effect. If the value specified by To is less than the current column number, the procedure has the effect of calling the New_Line procedure (with a spacing of 1). It then outputs (To − 1) spaces and sets the current column number to the specified value.

If the file mode is In_File:

This procedure reads (and discards) individual characters, line terminators, and page terminators until the next character to be read has a column number that equals the value specified by To; there is no effect if the current column number already equals this value. Each transfer of a character or terminator maintains the current column, line, and page numbers in the same way that a Get or a Get_Line procedure does.

If a File parameter is omitted, the default file is the current output file.

The column, line, and page numbers are allowed to exceed Count'Last (as a consequence of the input or output of sufficiently many characters, lines, or pages).

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Positive_Count;`
Specifies the value of the column.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the file mode is Out_File, the Io_Exceptions.Layout_Error exception is raised if the value specified by the To parameter exceeds Line_Length when the line length is bounded (that is, when it does not have the conventional value of 0).

If the file mode is In_File, the Io_Exceptions.End_Error exception is raised when an attempt is made to read a file terminator.

References

procedure Get

procedure Get_Line

procedure New_Line

---

procedure Set_Input

```
procedure Set_Input (File : File_Type);
```

Description

Sets the current default input file to the specified file handle.

Parameters

`File : File_Type;`
Specifies the handle for the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Set_Line

```
procedure Set_Line (File : File_Type;
                    To   : Positive_Count);

procedure Set_Line (To : Positive_Count);
```

Description

Sets the current line number of the file.

If the file mode is Out_File:

If the value specified by the To parameter is greater than the current line number, this procedure has the effect of repeatedly calling the New_Line procedure (with a spacing of 1) until the current line number equals the specified value. If the value specified by To is equal to the current line number, there is no effect. If the value specified by To is less than the current line number, it has the effect of calling the New_Page procedure followed by a call to the New_Line procedure with a spacing equal to (To − 1).

If the mode is In_File:

This procedure has the effect of repeatedly calling the Skip_Line procedure (with a spacing of 1) until the current line number equals the value specified by To; there is no effect if the current line number already equals this value. (Short pages will be skipped until a page is reached that has a line at the specified line position.)

If a File parameter is omitted, the default file is the current output file.

The column, line, and page numbers are allowed to exceed Count'Last (as a consequence of the input or output of sufficiently many characters, lines, or pages).

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Positive_Count;`
Specifies the value of the line.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the file mode is Out_File, the Io_Exceptions.Layout_Error exception is raised if the value specified by the To parameter exceeds Page_Length when the page length is bounded (that is, when it does not have the conventional value of 0).

If the file mode is In_File, the Io_Exceptions.End_Error exception is raised when an attempt is made to read a file terminator.

References

procedure New_Line

procedure New_Page

procedure Skip_Line

---

procedure Set_Line_Length

```
procedure Set_Line_Length (File : File_Type;
                           To   : Count);

procedure Set_Line_Length (To : Count);
```

Description

Sets the maximum line length of the specified output file to the number of characters specified by the To parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Count;`
Specifies the value of the line length.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the specified line length is inappropriate for the associated file, the Io_Exceptions.Use_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Set_Output

```
procedure Set_Output (File : File_Type);
```

Description

Sets the current default output file to the specified file handle.

Parameters

`File : File_Type;`
Specifies the handle for the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Set_Page_Length

```
procedure Set_Page_Length (File : File_Type;
                           To   : Count);

procedure Set_Page_Length (To : Count);
```

Description

Sets the maximum page length of the specified output file to the number of lines specified by the To parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`To : Count;`
Specifies the value of the page length.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the specified page length is inappropriate for the associated file, the Io_Exceptions.Use_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Skip_Line

```
procedure Skip_Line (File    : File_Type;
                     Spacing : Positive_Count := 1);

procedure Skip_Line (Spacing : Positive_Count := 1);
```

Description

Skips all subsequent input until the next line terminator.

For a spacing of 1, this procedure reads and discards all characters until a line terminator has been read, and then it sets the current column number to 1. If the line terminator is not immediately followed by a page terminator, the current line number is increased by 1. Otherwise, if the line terminator is immediately followed by a page terminator, the page terminator is skipped, the current page number is increased by 1, and the current line number is set to 1.

For a spacing greater than 1, the above actions are performed the number of times specified by the Spacing parameter.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Spacing : Positive_Count := 1;`
Specifies the value denoting the number of lines to be skipped.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to read a file terminator, the Io_Exceptions.End_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

procedure Skip_Page

```
procedure Skip_Page (File : File_Type);

procedure Skip_Page;
```

Description

Skips past all input until a page terminator is read.

This procedure reads and discards all characters and line terminators until a page terminator has been read. Then it adds 1 to the current page number and sets the current column and line numbers to 1.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If an attempt is made to read a file terminator, the Io_Exceptions.End_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

function Standard_Input

```
function Standard_Input return File_Type;
```

Description

Returns the handle to the standard input file.

Restrictions

The standard input file cannot be opened, closed, reset, or deleted.

function Standard_Output

```
function Standard_Output return File_Type;
```

Description

Returns the handle to the standard output file.

Restrictions

The standard output file cannot be opened, closed, reset, or deleted.

type Type_Set

```
type Type_Set is (Lower_Case, Upper_Case);
```

Description

Specifies the case in which enumeration literals are to be displayed.

constant Unbounded

```
Unbounded: constant Count := Ø;
```

Description

Denotes an unbounded line and/or page length.

generic package Enumeration_Io

This package provides facilities for enumeration I/O.

Values are output using either uppercase or lowercase letters for identifiers. This is specified by the Set parameter, which is of the enumeration Type_Set type.

The format (which includes any trailing spaces) can be specified by an optional field Width parameter.

constant Default_Setting

```
Default_Setting : Type_Set := Upper_Case;
```

Description

Denotes the default type set of values to be output.

constant Default_Width

```
Default_Width : Field := 0;
```

Description

Denotes the default number of characters to be output.

generic formal type Enum

```
type Enum is (<>);
```

Description

Denotes the enumeration type to be used in instantiating this package.

procedure Get

```
procedure Get (File :     File_Type;
               Item : out Enum);

procedure Get (Item : out Enum);
```

Description

Reads an enumeration value from a file.

After skipping any leading blanks, line terminators, or page terminators, this procedure reads an enumeration literal of Enum type in either lowercase or uppercase. If Enum is of Character type, the literal value must include the apostrophes.

The procedure returns, in the Item parameter, the value of the Enum type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Enum;`
Specifies the object that receives the value read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the identifier or character literal does not correspond to a value of the Enum type, the Io_Exceptions.Data_Error exception is raised.

procedure Get

```
procedure Get (From :     String;
               Item : out Enum;
               Last : out Positive);
```

Description

Reads an enumeration value from a string.

This procedure reads an enumeration value from the beginning of the specified string, following the same rule as the Get procedure that reads an enumeration value from a file treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Enum type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Enum;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the identifier or character literal does not correspond to a value of the Enum type, the Io_Exceptions.Data_Error exception is raised.

procedure Put

```
procedure Put (File  : File_Type;
               Item  : Enum;
               Width : Field     := Default_Width;
               Set   : Type_Set  := Default_Setting);

procedure Put (Item  : Enum;
               Width : Field     := Default_Width;
               Set   : Type_Set  := Default_Setting);
```

Description

Writes an enumeration value to a file.

This procedure outputs the value of the Item parameter as an enumeration literal (either an identifier or a character literal). The optional Set parameter indicates whether lowercase or uppercase letters are used for identifiers; it has no effect for character literals. If the sequence of characters produced has fewer than Width characters, trailing spaces are output to make up the difference.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Enum;`
Specifies the value to be written.

`Width : Field := Default_Width;`
Specifies the number of characters to be written.

`Set : Type_Set := Default_Setting;`
Specifies the type set of the value to be written.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (To   : out String;
               Item :     Enum;
               Set  :     Type_Set := Default_Setting);
```

Description

Writes an enumeration value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using the length of the specified string as the value for the Width parameter.

Parameters

`To : out String;`
Specifies the string to which the value is to be written.

`Item : Enum;`
Specifies the value to be written.

`Set : Type_Set := Default_Setting;`
Specifies the type set of the value to be written.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

end Enumeration_Io;

RATIONAL

generic package Fixed_Io

This package provides facilities for fixed-point I/O.

Values are output as decimal literals without underline characters. The format of each value output consists of a Fore field, a decimal point, an Aft field, and (if a nonzero Exp parameter is supplied) the letter E and an Exp field. The two possible formats thus correspond to:

```
Fore . Aft
```

and:

```
Fore . Aft E Exp
```

with no spaces between these fields. The Fore field can include leading spaces and a minus sign for negative values. The Aft field includes only decimal digits (possibly with trailing zeros). The Exp field includes the sign (plus or minus) and the exponent (possibly with leading zeros).

constant Default_Aft

```
Default_Aft : Field := Num'Aft;
```

Description

Denotes the default number of characters to be used after the decimal point in output procedures.

constant Default_Exp

```
Default_Exp : Field := 0;
```

Description

Denotes the default number of exponent characters to be used in output procedures.

constant Default_Fore

```
Default_Fore : Field := Num'Fore;
```

Description

Denotes the default number of characters to be used after the decimal point in output procedures.

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Num;
               Width :     Field      := 0);

procedure Get (Item  : out Num;
               Width :     Field := 0);
```

Description

Reads a fixed-point value from a file.

If the value of the Width parameter is 0, this procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of a real literal (which may be a based literal). If a nonzero value of the Width parameter is supplied, then exactly Width characters are input, or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Num;`
Specifies the object that receives the value read.

`Width : Field := 0;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. For this test, leading blanks are ignored. When a sign is input, this rule applies to the succeeding numeric literal.

---

procedure Get

```
procedure Get (From :     String;
               Item : out Num;
               Last : out Positive);
```

Description

Reads a fixed-point value from a string.

This procedure reads a real value from the beginning of the specified string, following the same rule as the Get procedure that reads a real value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Num;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

generic formal type Num

```
type Num is delta <>;
```

Description

Denotes the fixed-point type for which the package is being instantiated.

procedure Put

```
procedure Put (File : File_Type;
               Item : Num;
               Fore : Field     := Default_Fore;
               Aft  : Field     := Default_Aft;
               Exp  : Field     := Default_Exp);

procedure Put (Item : Num;
               Fore : Field := Default_Fore;
               Aft  : Field := Default_Aft;
               Exp  : Field := Default_Exp);
```

Description

Writes a fixed-point value to a file.

The Put procedure outputs the value of the Item parameter as a decimal literal with the format defined by the Fore, Aft, and Exp parameters. If the value is negative, a minus sign is included in the integer part. If Exp has the value 0, the integer part to be output has as many digits as needed to represent the integer part of the value of the Item parameter, overriding Fore if necessary, or it consists of the digit 0 if the value of Item has no integer part.

If Exp has a value greater than 0, the integer part to be output has a single digit, which is nonzero except for the value 0.0 of the Item parameter.

In both cases, however, if the integer part to be output has fewer than Fore characters, including any minus sign, leading spaces are output to make up the difference. The number of digits of the fractional part is specified by Aft, or it is 1 if Aft equals 0. The value is rounded; a value of exactly one-half in the last place can be rounded either up or down.

If Exp has the value 0, there is no exponent part. If Exp has a value greater than 0, the exponent part to be output has as many digits as needed to represent the exponent part of the value of Item (for which a single-digit integer part is used), and it includes an initial sign (plus or minus). If the exponent part to be output has fewer than Exp characters, including the sign, leading zeros precede the digits to make up the difference. For the value 0.0 of Item, the exponent has the value 0.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Num;`
Specifies the value to be written.

`Fore : Field := Default_Fore;`
Specifies the number of characters to be output before the decimal point.

`Aft : Field := Default_Aft;`
Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`
Specifies the number of exponent characters to be output.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (To   : out String;
               Item :     Num;
               Aft  :     Field  := Default_Aft;
               Exp  :     Field  := Default_Exp);
```

Description

Writes a fixed-point value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using a value for the width of the Fore field such that the sequence of characters output exactly fills the string, including any leading spaces.

For an item with a positive value, if output to a string exactly fills the string without leading spaces, then output of the corresponding negative value raises the Io_Exceptions.Layout_Error exception.

Parameters

`To : out String;`

Specifies the string to which the value is to be written.

`Item : Num;`

Specifies the value to be written.

`Aft : Field := Default_Aft;`

Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`

Specifies the number of exponent characters to be output.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

```
end Fixed_Io;
```

generic package Float_Io

This package provides facilities for floating-point I/O.

Values are output as decimal literals without underline characters. The format of each value output consists of a Fore field, a decimal point, an Aft field, and (if a nonzero Exp parameter is supplied) the letter E and an Exp field. The two possible formats thus correspond to:

```
Fore . Aft
```

and:

```
Fore . Aft E Exp
```

with no spaces between these fields. The Fore field can include leading spaces and a minus sign for negative values. The Aft field includes only decimal digits (possibly with trailing zeros). The Exp field includes the sign (plus or minus) and the exponent (possibly with leading zeros).

constant Default_Aft

```
Default_Aft : Field := Num'Digits - 1;
```

Description

Denotes the default width to be used after the decimal point in output procedures.

constant Default_Exp

```
Default_Exp : Field := 3;
```

Description

Denotes the default exponent width to be used in output procedures.

constant Default_Fore

```
Default_Fore : Field := 2;
```

Description

Denotes the default width to be used before the decimal point in output procedures.

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Num;
               Width :     Field      := 0);

procedure Get (Item  : out Num;
               Width :     Field := 0);
```

Description

Reads a floating-point number from a file.

If the value of the Width parameter is 0, this procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of a real literal (which may be a based literal). If a nonzero value of the Width parameter is supplied, then exactly Width characters are input, or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Num;`
Specifies the object that receives the value read.

`Width : Field := 0;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. For this test, leading blanks are ignored. When a sign is input, this rule applies to the succeeding numeric literal.

procedure Get

```
procedure Get (From :     String;
               Item : out Num;
               Last : out Positive);
```

Description

Reads a floating-point value from a string.

This procedure reads a real value from the beginning of the specified string, following the same rule as the Get procedure that reads a real value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Num;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

generic formal type Num

```
type Num is digits <>;
```

Description

Defines the floating-point type of the items that form the elements in the I/O stream.

procedure Put

```
procedure Put (File : File_Type;
               Item : Num;
               Fore : Field     := Default_Fore;
               Aft  : Field     := Default_Aft;
               Exp  : Field     := Default_Exp);

procedure Put (Item : Num;
               Fore : Field := Default_Fore;
               Aft  : Field := Default_Aft;
               Exp  : Field := Default_Exp);
```

Description

Writes a floating-point value to a file.

This procedure outputs the value of the Item parameter as a decimal literal with the format defined by the Fore, Aft, and Exp parameters. If the value is negative, a minus sign is included in the integer part. If Exp has the value 0, the integer part to be output has as many digits as needed to represent the integer part of the value of the Item parameter, overriding Fore if necessary, or it consists of the digit 0 if the value of Item has no integer part.

If Exp has a value greater than 0, the integer part to be output has a single digit, which is nonzero except for the value 0.0 of the Item parameter.

In both cases, however, if the integer part to be output has fewer than Fore characters, including any minus sign, leading spaces are output to make up the difference. The number of digits of the fractional part is specified by Aft, or it is 1 if Aft equals 0. The value is rounded; a value of exactly one-half in the last place can be rounded either up or down.

If Exp has the value 0, there is no exponent part. If Exp has a value greater than 0, the exponent part to be output has as many digits as needed to represent the exponent part of the value of Item (for which a single-digit integer part is used), and it includes an initial sign (plus or minus). If the exponent part to be output has fewer than Exp characters, including the sign, leading zeros precede the digits to make up the difference. For the value 0.0 of Item, the exponent has the value 0.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Num;`
Specifies the value to be written.

`Fore : Field := Default_Fore;`
Specifies the number of characters to be output before the decimal point.

`Aft : Field := Default_Aft;`
Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`
Specifies the number of exponent characters to be output.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (To   : out String;
               Item :     Num;
               Aft  :     Field  := Default_Aft;
               Exp  :     Field  := Default_Exp);
```

Description

Writes a floating-point value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using a value for the width of the Fore field such that the sequence of characters output exactly fills the string, including any leading spaces.

For an item with a positive value, if output to a string, the parameter exactly fills the string without leading spaces, then output of the corresponding negative value raises the Io_Exceptions.Layout_Error exception.

Parameters

`To : out String;`
Specifies the string to which the value is to be written.

`Item : Num;`
Specifies the value to be written.

`Aft : Field := Default_Aft;`
Specifies the number of characters to be output after the decimal point.

`Exp : Field := Default_Exp;`
Specifies the number of exponent characters to be output.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

Example

```
package Real_Io is new Float_Io(Real); use Real_Io;
-- default format used at instantiation, Default_Exp = 3

X : Real := -123.4567;  --  digits 8      (see 3.5.7)

Put(X); -- default format                          "-1.2345670E+02"
Put(X, Fore => 5, Aft => 3, Exp => 2);  --  "bbb-1.235E+2"
Put(X, 5, 3, 0);                        --  "b-123.457"
```

end Float_Io;

generic package Integer_Io

This package provides facilities for integer I/O.

Values are output as decimal or based literals, without underline characters or exponents, and preceded by a minus sign if negative. The format (which includes any leading spaces and a minus sign) can be specified by an optional field Width parameter. Values of widths of fields in output formats are of the nonnegative integer Field subtype. Values of bases are of the integer Number_Base subtype.

constant Default_Base

```
Default_Base : Number_Base := 10;
```

Description

Denotes the default radix base to be used in output procedures.

constant Default_Width

```
Default_Width : Field := Num'Width;
```

Description

Denotes the default width to be used in output procedures.

procedure Get

```
procedure Get (File  :     File_Type;
               Item  : out Num;
               Width :     Field      := Ø);

procedure Get (Item  : out Num;
               Width :     Field := Ø);
```

Description

Reads an integer value from a file.

If the value of the Width parameter is 0, this procedure skips any leading blanks, line terminators, or page terminators, reads a plus or a minus sign if present, and then reads according to the syntax of an integer literal (which may be a based literal). If a nonzero value of the Width parameter is supplied, then exactly Width characters are input, or the characters (possibly none) up to a line terminator are input, whichever comes first; any skipped leading blanks are included in the count.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : out Num;`
Specifies the object that receives the value read.

`Width : Field := Ø;`
Specifies the number of characters to be read.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not In_File, the Io_Exceptions.Mode_Error exception is raised.

If an attempt is made to skip a file terminator, the Io_Exceptions.End_Error exception is raised.

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

procedure Get

```
procedure Get (From :     String;
               Item : out Num;
               Last : out Positive);
```

Description

Reads an integer value from a string.

This procedure reads an integer value from the beginning of the specified string, following the same rules as the Get procedure that reads an integer value from a file but treating the end of the string as a file terminator.

The procedure returns, in the Item parameter, the value of the Num type that corresponds to the sequence input. It returns, in the Last parameter, the index value such that `From(Last)` is the last character read.

Parameters

`From : String;`
Specifies the string to be read.

`Item : out Num;`
Specifies the object that receives the value read.

`Last : out Positive;`
Specifies the index of the last character read.

Errors

If the sequence input does not have the required syntax, or if the value obtained is not of the Num type, the Io_Exceptions.Data_Error exception is raised. When a sign is input, this rule applies to the succeeding numeric literal.

generic formal type Num

```
type Num is range <>;
```

Description

Defines the integer type of the items that form the elements in the I/O stream.

procedure Put

```
procedure Put (File  : File_Type;
               Item  : Num;
               Width : Field       := Default_Width;
               Base  : Number_Base := Default_Base);

procedure Put (Item  : Num;
               Width : Field       := Default_Width;
               Base  : Number_Base := Default_Base);
```

Description

Writes an integer value to a file.

This procedure outputs the value of the Item parameter as an integer literal, with no underlines, no exponent, and no leading zeros (but a single zero for the value 0), and with a preceding minus sign for a negative value.

If the resulting sequence of characters to be output has fewer characters than specified by the Width parameter, leading spaces are output to make up the difference.

The procedure uses the syntax for decimal literal if the Base parameter has the value 10 (either explicitly or through Default_Base); otherwise, it uses the syntax for based literal, with any letters in uppercase.

If a File parameter is omitted, the current default file is understood to be specified.

Parameters

`File : File_Type;`
Specifies the handle for the file.

`Item : Num;`
Specifies the value to be written.

`Width : Field := Default_Width;`
Specifies the number of characters to be output.

`Base : Number_Base := Default_Base;`
Specifies the radix base with which to output the form of the number.

Errors

If the file is not open, the Io_Exceptions.Status_Error exception is raised.

If the mode of the file is not Out_File, the Io_Exceptions.Mode_Error exception is raised.

---

procedure Put

```
procedure Put (To   : out String;
               Item :     Num;
               Base :     Number_Base := Default_Base);
```

Description

Writes an integer value to a string.

This procedure outputs the value of the Item parameter to the specified string, following the same rule as for output to a file, using the length of the specified string as the value for the Width parameter.

Parameters

`To : out String;`

Specifies the string to which the integer is to be written.

`Item : Num;`

Specifies the value of the integer to be written.

`Base : Number_Base := Default_Base;`

Specifies the radix base to be used in writing the number.

Errors

If the length of the actual string is insufficient for the output of the item, the Io_Exceptions.Layout_Error exception is raised.

Example

```
package Int_Io is new Integer_Io(Small_Int); use Int_Io;
-- default format used at instantiation, Default_Width = 4,
--                                       Default_Base = 10

    Put(126);                                -- "b126"
    Put(-126, 7);                            -- "bbb-126"
    Put(126, Width => 13, Base => 2);        -- "bbb2#1111110#"
```

end Integer_Io;

```
end Text_Io;
```

Index

This index contains entries for each unit and its declarations as well as definitions, topical cross-references, exceptions raised, errors, enumerations, pragmas, switches, and the like. The entries for each unit are arranged alphabetically by simple name. An italic page number indicates the primary reference for an entry.

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RATIONAL

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