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Chapter 1

Open Trace Format 2

1.1 Introduction

The OTF2 library provides an interface to write and read trace data.

OTF2 is developed within the Score-P project. The Score-P project is funded by the German Federal Ministry of Education and Research. OTF2 is available under the BSD open source license that allows free usage for academic and commercial applications.

1.2 Getting started

OTF2 usage examples
Chapter 2

OTF2 INSTALL

For generic installation instructions see below. When building for an Intel MIC platform, carefully follow the platform-specific instructions below.

Configuration of OTF2
***************

'configure' configures OTF2 to adapt to many kinds of systems.

Usage: ./configure [OPTION]... [VAR=VALUE]...

To assign environment variables (e.g., CC, CFLAGS...), specify them as VAR=VALUE. See below for descriptions of some of the useful variables.

Defaults for the options are specified in brackets.

Configuration:
-h, --help display this help and exit
--help=short display options specific to this package
--help=recursive display the short help of all the included packages
-V, --version display version information and exit
-q, --quiet, --silent do not print 'checking ...' messages
--cache-file=FILE cache test results in FILE [disabled]
-C, --config-cache alias for '--cache-file=config.cache'
-n, --no-create do not create output files
--srcdir=DIR find the sources in DIR [configure dir or '..']

Installation directories:
--prefix=PREFIX install architecture-independent files in PREFIX [/opt/otf2]
--exec-prefix=EPREFIX install architecture-dependent files in EPREFIX [PREFIX]

By default, 'make install' will install all the files in '/opt/otf2/bin', '/opt/otf2/lib' etc. You can specify an installation prefix other than '/opt/otf2' using '--prefix', for instance '--prefix=$HOME'.

For better control, use the options below.

Fine tuning of the installation directories:
--bindir=DIR user executables [EPREFIX/bin]
--sbindir=DIR system admin executables [EPREFIX/sbin]
--libexecdir=DIR program executables [EPREFIX/libexec]
--sysconfdir=DIR read-only single-machine data [PREFIX/etc]
--sharedstatedir=DIR modifiable architecture-independent data [PREFIX/com]
--localstatedir=DIR modifiable single-machine data [PREFIX/var]
--libdir=DIR object code libraries [EPREFIX/lib]
--includedir=DIR C header files for non-gcc [/usr/include]
--oldincludedir=DIR C header files for non-gcc [/usr/include]
--datarootdir=DIR read-only arch.-independent data root [PREFIX/share]
--datadir=DIR read-only architecture-independent data [DATAROOTDIR]
CHAPTER 2. OTF2 INSTALL

--infodir=DIR info documentation [DATAROOTDIR/info]
--localedir=DIR locale-dependent data [DATAROOTDIR/locale]
--mandir=DIR man documentation [DATAROOTDIR/man]
--docdir=DIR documentation root [DATAROOTDIR/doc/otf2]
--htmldir=DIR html documentation [DOCDIR]
--dvidir=DIR dvi documentation [DOCDIR]
--psdir=DIR ps documentation [DOCDIR]

Program names:
--program-prefix=PREFIX prepend PREFIX to installed program names
--program-suffix=SUFFIX append SUFFIX to installed program names
--program-transform-name=PROGRAM run sed PROGRAM on installed program names

System types:
--build=BUILD configure for building on BUILD [guessed]
--host=HOST cross-compile to build programs to run on HOST [BUILD]

Optional Features:
--disable-option-checking ignore unrecognized --enable/--with options
--disable-FEATURE do not include FEATURE (same as --enable-FEATURE=no)
--enable-FEATURE[=ARG] include FEATURE [ARG=yes]
--enable-silent-rules less verbose build output (undo: 'make V=1')
--enable-dependency-tracking do not reject slow dependency extractors
--enable-platform-mic Force build for Intel Xeon Phi co-processors [no]. This option is only needed for Xeon Phi co-processors, like the Knights Corner (KNC). It is not needed for self-hosted Xeon Phis, like the Knights Landing (KNL); for these chips no special treatment is required.
--enable-debug activate internal debug output [no]
--enable-backend-test-runs Run tests at make check [no]. If disabled, tests are still build at make check. Additionally, scripts (scorep_*tests.sh) containing the tests are generated in <builddir>/build-backend.
--enable-static[=PKGS] build static libraries [default=yes]
--enable-fast-install[=PKGS] optimize for fast installation [default=yes]
--disable-libtool-lock avoid locking (might break parallel builds)

Optional Packages:
--with-PACKAGE[=ARG] use PACKAGE [ARG=yes]
--without-PACKAGE do not use PACKAGE (same as --with-PACKAGE=no)
--with-sionlib[=<sionlib-bindir>] Use an already installed sionlib. Provide path to sionconfig. Auto-detected if already in $PATH.
--with-pic try to use only PIC/non-PIC objects [default=use both]
--with-gnu-ld assume the C compiler uses GNU ld [default=no]
--with-sysroot=DIR Search for dependent libraries within DIR (or the compiler’s sysroot if not specified).

Some influential environment variables:
CC_FOR_BUILD C compiler command for the frontend build
CXX_FOR_BUILD C++ compiler command for the frontend build
FC77_FOR_BUILD Fortran 77 compiler command for the frontend build
FC_FOR_BUILD Fortran compiler command for the frontend build
CPPFLAGS_FOR_BUILD (Objective) C/C++ preprocessor flags for the frontend build, e.g. -I<include dir> if you have headers in a nonstandard directory <include dir>
CFLAGS_FOR_BUILD C flags for the frontend build
CXXFLAGS_FOR_BUILD C++ compiler flags for the frontend build
Use these variables to override the choices made by `configure` or to help it to find libraries and programs with nonstandard names/locations.

Please report bugs to <support@score-p.org>.

Platform-specific instructions
************************************

Intel Xeon Phi (aka. MIC) co-processors
----------------------------------------

[Note: The following instructions only apply to Intel Xeon Phi co-processors, like the Knights Corner (KNC). They do not apply to self-hosted Xeon Phis, like the Knights Landing (KNL); for these chips no special treatment is required.]

Building OTF2 for Intel Xeon Phi co-processors requires some extra care, and in some cases two installations into the same location. Therefore, we strongly recommend to strictly follow the procedure as described below.

1. Ensure that Intel compilers are installed and available in $PATH, and that the Intel Manycore Platform Software Stack (MPSS) is installed.

2. Configure OTF2 to use the MIC platform:

   ./configure --enable-platform-mic [other options, e.g., '--prefix']

3. Build and install:

   make; make install

   On non-cross compiling systems (e.g., typical Linux clusters), that’s it. On cross-compiling systems (e.g., Cray XC30 with Xeon Phi daughter board), a second installation of OTF2 on top of the just installed one is required to provide a single installation serving login nodes, compute nodes, and MIC.

4. Remove MIC program binaries, object files, and configure-generated files from the source code directory:

   make distclean

5. Reconfigure for login/compute nodes using *identical directory options* (e.g., '--prefix' or '--bindir') as in step 2:
CHAPTER 2. OTF2 INSTALL

./configure [other options as used in step 2]

This will automatically detect the already existing native MIC build and enable the required support in the login node tools.

6. Build and install:
make; make install

Note that this approach also works with VPATH builds (even with two separate build directories) as long as the same options defining directory locations are passed in steps 2 and 5.

Python bindings
---------------

1. Requirements:
   + python 2.7 or later or
   + python 3.5 or later
   + Earlier versions will probably work, but are not currently tested.
   + Required packages are "six" (>= 1.4.0) and "future" (providing the "builtins" module)
   + sphinx to build the python documentation
   + Ubuntu package names: python python-future python-six python-sphinx

Installation Instructions
*************************


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Basic Installation
==================

Briefly, the shell commands './configure; make; make install' should configure, build, and install this package. The following more-detailed instructions are generic; see the 'README' file for instructions specific to this package. Some packages provide this 'INSTALL' file but do not implement all of the features documented below. The lack of an optional feature in a given package is not necessarily a bug. More recommendations for GNU packages can be found in *note Makefile Conventions: (standards)Makefile Conventions.

The 'configure' shell script attempts to guess correct values for various system-dependent variables used during compilation. It uses those values to create a 'Makefile' in each directory of the package. It may also create one or more '.h' files containing system-dependent definitions. Finally, it creates a shell script 'config.status' that you can run in the future to recreate the current configuration, and a file 'config.log' containing compiler output (useful mainly for debugging 'configure').

It can also use an optional file (typically called 'config.cache' and enabled with `--cache-file=config.cache' or simply `--C') that saves the results of its tests to speed up reconfiguring. Caching is disabled by default to prevent problems with accidental use of stale cache files.

If you need to do unusual things to compile the package, please try to show 'configure' could check whether to do them, and mail diffs or instructions to the address given in the 'README' so they can be considered for the next release. If you are using the cache, and at some point 'config.cache' contains results you don't want to keep, you may remove or edit it.

The file 'configure.ac' (or 'configure.in') is used to create 'configure' by a program called 'autoconf'. You need 'configure.ac' if
you want to change it or regenerate 'configure' using a newer version of 'autoconf'.

The simplest way to compile this package is:

1. 'cd' to the directory containing the package's source code and type './configure' to configure the package for your system.

   Running 'configure' might take a while. While running, it prints some messages telling which features it is checking for.

2. Type 'make' to compile the package.

3. Optionally, type 'make check' to run any self-tests that come with the package, generally using the just-built uninstalled binaries.

4. Type 'make install' to install the programs and any data files and documentation. When installing into a prefix owned by root, it is recommended that the package be configured and built as a regular user, and only the 'make install' phase executed with root privileges.

5. Optionally, type 'make installcheck' to repeat any self-tests, but this time using the binaries in their final installed location. This target does not install anything. Running this target as a regular user, particularly if the prior 'make install' required root privileges, verifies that the installation completed correctly.

6. You can remove the program binaries and object files from the source code directory by typing 'make clean'. To also remove the files that 'configure' created (so you can compile the package for a different kind of computer), type 'make distclean'. There is also a 'make maintainer-clean' target, but that is intended mainly for the package's developers. If you use it, you may have to get all sorts of other programs in order to regenerate files that came with the distribution.

7. Often, you can also type 'make uninstall' to remove the installed files again. In practice, not all packages have tested that uninstallation works correctly, even though it is required by the GNU Coding Standards.

8. Some packages, particularly those that use Automake, provide 'make distcheck', which can by used by developers to test that all other targets like 'make install' and 'make uninstall' work correctly. This target is generally not run by end users.

Compilers and Options
=====================

Some systems require unusual options for compilation or linking that the 'configure' script does not know about. Run './configure --help' for details on some of the pertinent environment variables.

You can give 'configure' initial values for configuration parameters by setting variables in the command line or in the environment. Here is an example:

   ./configure CC=c99 CFLAGS=-g LIBS=-lposix

*Note Defining Variables:*, for more details.

Compiling For Multiple Architectures
===================================

You can compile the package for more than one kind of computer at the same time, by placing the object files for each architecture in their own directory. To do this, you can use GNU 'make'. 'cd' to the directory where you want the object files and executables to go and run the 'configure' script. 'configure' automatically checks for the source code in the directory that 'configure' is in and in './'. This is known as a "VPATH" build.
With a non-GNU 'make', it is safer to compile the package for one architecture at a time in the source code directory. After you have installed the package for one architecture, use 'make distclean' before reconfiguring for another architecture.

On MacOS X 10.5 and later systems, you can create libraries and executables that work on multiple system types--known as "fat" or "universal" binaries--by specifying multiple '-arch' options to the compiler but only a single '-arch' option to the preprocessor. Like this:

```
./configure CC="gcc -arch i386 -arch x86_64 -arch ppc -arch ppc64" \ 
  CXX="g++ -arch i386 -arch x86_64 -arch ppc -arch ppc64" \ 
  CPP="gcc -E" CXXCPP="g++ -E"
```

This is not guaranteed to produce working output in all cases, you may have to build one architecture at a time and combine the results using the 'lipo' tool if you have problems.

Installation Names
==================

By default, 'make install' installs the package's commands under '/usr/local/bin', include files under '/usr/local/include', etc. You can specify an installation prefix other than '/usr/local' by giving 'configure' the option '--prefix=PREFIX', where PREFIX must be an absolute file name.

You can specify separate installation prefixes for architecture-specific files and architecture-independent files. If you pass the option '--exec-prefix=PREFIX' to 'configure', the package uses PREFIX as the prefix for installing programs and libraries. Documentation and other data files still use the regular prefix.

In addition, if you use an unusual directory layout you can give options like '--bindir=DIR' to specify different values for particular kinds of files. Run 'configure --help' for a list of the directories you can set and what kinds of files go in them. In general, the default for these options is expressed in terms of '${prefix}', so that specifying just '--prefix' will affect all of the other directory specifications that were not explicitly provided.

The most portable way to affect installation locations is to pass the correct locations to 'configure'; however, many packages provide one or both of the following shortcuts of passing variable assignments to the 'make install' command line to change installation locations without having to reconfigure or recompile.

The first method involves providing an override variable for each affected directory. For example, 'make install prefix=/alternate/directory' will choose an alternate location for all directory configuration variables that were expressed in terms of '${prefix}'. Any directories that were specified during 'configure', but not in terms of '${prefix}', must each be overridden at install time for the entire installation to be relocated. The approach of makefile variable overrides for each directory variable is required by the GNU Coding Standards, and ideally causes no recompilation. However, some platforms have known limitations with the semantics of shared libraries that end up requiring recompilation when using this method, particularly noticeable in packages that use GNU Libtool.

The second method involves providing the 'DESTDIR' variable. For example, 'make install DESTDIR=/alternate/directory' will prepend '/alternate/directory' before all installation names. The approach of 'DESTDIR' overrides is not required by the GNU Coding Standards, and does not work on platforms that have drive letters. On the other hand, it does better at avoiding recompilation issues, and works well even when some directory options were not specified in terms of '${prefix}' at 'configure' time.

Optional Features
=================

If the package supports it, you can cause programs to be installed with an extra prefix or suffix on their names by giving 'configure' the option '--program-prefix=PREFIX' or '--program-suffix=SUFFIX'.

Some packages pay attention to '--enableFEATURE' options to 'configure', where FEATURE indicates an optional part of the package. They may also pay attention to '--with-PACKAGE' options, where PACKAGE is something like 'gnu-as' or 'x' (for the X Window System). The 'README' should mention any '--enable-' and '--with-' options that the package recognizes.

For packages that use the X Window System, 'configure' can usually find the X include and library files automatically, but if it doesn’t, you can use the 'configure' options '--x-includes=DIR' and '--x-libraries=DIR' to specify their locations.

Some packages offer the ability to configure how verbose the execution of 'make' will be. For these packages, running './configure --enable-silent-rules' sets the default to minimal output, which can be overridden with 'make V=1'; while running './configure --disable-silent-rules' sets the default to verbose, which can be overridden with 'make V=0'.

Particular systems
==================

On HP-UX, the default C compiler is not ANSI C compatible. If GNU CC is not installed, it is recommended to use the following options in order to use an ANSI C compiler:

```
./configure CC="cc -Ae -D_XOPEN_SOURCE=500"
```

and if that doesn’t work, install pre-built binaries of GCC for HP-UX.

On OSF/1 a.k.a. Tru64, some versions of the default C compiler cannot parse its '<wchar.h>' header file. The option '-nodtk' can be used as a workaround. If GNU CC is not installed, it is therefore recommended to try

```
./configure CC="cc"
```
and if that doesn’t work, try

```
./configure CC="cc -nodtk"
```

On Solaris, don’t put '/usr/ucb' early in your 'PATH'. This directory contains several dysfunctional programs; working variants of these programs are available in '/usr/bin'. So, if you need '/usr/ucb' in your 'PATH', put it _after_ '/usr/bin'.

On Haiku, software installed for all users goes in '/boot/common', not '/usr/local'. It is recommended to use the following options:

```
./configure --prefix=/boot/common
```

Specifying the System Type
==========================

There may be some features 'configure' cannot figure out automatically, but needs to determine by the type of machine the package will run on. Usually, assuming the package is built to be run on the _same_ architectures, 'configure' can figure that out, but if it prints a message saying it cannot guess the machine type, give it the '--build=TYPE' option. TYPE can either be a short name for the system type, such as 'sun4', or a canonical name which has the form:

```
CPU-COMPANY-SYSTEM
```

where SYSTEM can have one of these forms:

```
OS
KERNEL-OS
```
See the file 'config.sub' for the possible values of each field. If 'config.sub' isn't included in this package, then this package doesn't need to know the machine type.

If you are _building_ compiler tools for cross-compiling, you should use the option '--target=TYPE' to select the type of system they will produce code for.

If you want to _use_ a cross compiler, that generates code for a platform different from the build platform, you should specify the "host" platform (i.e., that on which the generated programs will eventually be run) with '--host=TYPE'.

Sharing Defaults
===============

If you want to set default values for 'configure' scripts to share, you can create a site shell script called 'config.site' that gives default values for variables like 'CC', 'cache_file', and 'prefix'. 'configure' looks for 'PREFIX/share/config.site' if it exists, then 'PREFIX/etc/config.site' if it exists. Or, you can set the 'CONFIG_SITE' environment variable to the location of the site script. A warning: not all 'configure' scripts look for a site script.

Defining Variables
=================

Variables not defined in a site shell script can be set in the environment passed to 'configure'. However, some packages may run configure again during the build, and the customized values of these variables may be lost. In order to avoid this problem, you should set them in the 'configure' command line, using 'VAR=value'. For example:

```
./configure CC=/usr/local2/bin/gcc
```

causes the specified 'gcc' to be used as the C compiler (unless it is overridden in the site shell script).

Unfortunately, this technique does not work for 'CONFIG_SHELL' due to an Autoconf bug. Until the bug is fixed you can use this workaround:

```
CONFIG_SHELL=/bin/bash /bin/bash ./configure CONFIG_SHELL=/bin/bash
```

'configure' Invocation
=======================

'configure' recognizes the following options to control how it operates.

'--help'
'--h'

Print a summary of all of the options to 'configure', and exit.

'--help=short'
'--help=recursive'

Print a summary of the options unique to this package’s 'configure', and exit. The 'short' variant lists options used only in the top level, while the 'recursive' variant lists options also present in any nested packages.

'--version'
'--v'

Print the version of Autoconf used to generate the 'configure' script, and exit.

'--cache-file=FILE'

Enable the cache: use and save the results of the tests in FILE, traditionally 'config.cache'. FILE defaults to '/dev/null' to disable caching.
Alias for ‘--cache-file=config.cache’.

‘--quiet’
‘--silent’
‘-q’
Do not print messages saying which checks are being made. To suppress all normal output, redirect it to ‘/dev/null’ (any error messages will still be shown).

‘--srcdir=DIR’
Look for the package’s source code in directory DIR. Usually ‘configure’ can determine that directory automatically.

‘--prefix=DIR’
Use DIR as the installation prefix. *note Installation Names:: for more details, including other options available for fine-tuning the installation locations.

‘--no-create’
‘-n’
Run the configure checks, but stop before creating any output files.

‘configure’ also accepts some other, not widely useful, options. Run ‘configure --help’ for more details.
Chapter 3

Attribute Conventions

While users have the liberty to select attribute names and formats as they like, the OTF2 project suggests certain conventions to enable interoperability between various OTF2 producers and consumers. The conventions used by Vampir and Score-P are as follows:

3.1 General Style and Formatting

Score-P and Vampir have historically used a variety of conventions for how attribute names should be formatted and whether they should be namespaced. Any OTF2 consumer that intends to read trace files produced by Score-P should read the following sections carefully and note the expected names and types of attributes. For future development, best practice is as follows:

- Place attributes in namespaces in the C++ style, with :: as a separator
- Use namespaces to disambiguate overlapping attributes, such as thread IDs assigned by different paradigms
- Namespaces may also be used to identify the tool that produced an attribute
- If namespaces are used, they should descend from the parent OTF2:: namespace
- Format attributes as ALL_CAPS_WITH_UNDERSCORES

As a reminder, tools that read OTF2 should gracefully handle the absence of any free-form optional attributes.

3.2 Memory Space Attributes

These attributes may be assigned to any data transfer operation. They should describe respectively the source and destination of the data transfer. They refer to an appropriate LocationGroup. In the case of unified memory, it should generally be possible to determine whether the source and target addresses are actually in main memory (corresponding to the location group of the associated CPU process) or in accelerator memory (corresponding to the location group of the accelerator context).

- OTF2_TYPE_LOCATION_GROUP OTF2::MEMORY_SPACE_SOURCE
- OTF2_TYPE_LOCATION_GROUP OTF2::MEMORY_SPACE_DESTINATION
3.3 Memory Allocation Attributes

These attributes are conventionally used to describe memory allocation performed within a region, as described by `Enter` and `Leave` events. They are conventionally of type `OTF2_TYPE_UINT64`. The Vampir tool uses the `_ADDRESS` suffix as a hint to format an attribute in hexadecimal style. The usage of these attributes is described with respect to standard memory allocation (e.g. `malloc` or `new`).

- `OTF2_TYPE_UINT64 ALLOCATION_SIZE` Associated with the entry of an allocation region.
- `OTF2_TYPE_UINT64 RESULT_ADDRESS` Associated with the exit of an allocation region.
- `OTF2_TYPE_UINT64 DEALLOCATION_SIZE` Associated with the entry of a deallocation region.
- `OTF2_TYPE_UINT64 ARGUMENT_ADDRESS` Associated with the entry of a deallocation region. Should typically correspond to a `RESULT_ADDRESS`.

More complex behavior may be modeled with combinations of these attributes: for instance, a `realloc` can be represented as a deallocation and allocation, as can a memory move.

3.4 I/O Attributes

This attribute is used in I/O recording to describe the starting point of an I/O operation in a file. This is conventionally of type `OTF2_TYPE_UINT64`. Score-P records this attribute for `IoOperationBegin` events.

- `OTF2_TYPE_UINT64 Offset`

3.5 Process and Thread Attributes

These attributes are recorded by Score-P upon process or thread creation, as reflected by `ProgramBegin` events for processes and `ThreadBegin` or `ThreadTeamBegin` events for threads. These are conventionally of type `OTF2_TYPE_UINT64`. Note that `ProgramBegin` accepts not only a process ID, but also a thread ID for the initial thread. This allows OTF2 users to omit thread creation events for the main thread of the program while still recording the associated thread ID somewhere. This style is produced by Score-P.

- `OTF2_TYPE_UINT64 ProcessId`
- `OTF2_TYPE_UINT64 ThreadId`

Tools writing OTF2 should take particular note of the following:

- If multiple threading paradigms are recorded, it may be necessary to disambiguate which thread IDs map to which paradigm. This may be done through namespaceing.
- If a tool creates thread events (begin/end and/or creation/destruction) for the program's main thread, it should either omit the thread ID attribute at program begin or ensure that the thread IDs used for creation of the program and its main thread are consistent.
- The IDs here are optional attributes which may be assigned semantics as desired (for example, values assigned by the operating system or the threading paradigm). This is distinct from the sequence number which is a mandatory attribute on OTF2 thread events. Note that Score-P uses the OS-provided process and thread IDs only; it does not consider any higher-level identifiers when writing these attributes.
Chapter 4

Deprecated List

Module records_definition
   In version 2.0

Module records_event
   In version 1.2
   In version 1.2
   In version 1.2
   In version 1.2
   In version 1.2
   In version 1.2
Chapter 5

Module Documentation

5.1 OTF2 usage examples

Listing of example code.
5.2 OTF2 records

Modules

- List of all definition records
- List of all event records
- List of all marker records
- List of all snapshot records

5.2.1 Detailed Description

OTF2 records

Listings of all OTF2 records.
5.3 OTF2 callbacks

OTF2 callbacks

Description of the non-records callbacks available in OTF2.
5.4 Usage of OTF2 tools

Modules

- OTF2 config tool
- OTF2 print tool
- OTF2 snapshots tool
- OTF2 marker tool
- OTF2 estimator tool

5.4.1 Detailed Description

Usage of OTF2 tools

OTF2 I/O recording
Appendices
Usage instructions of the OTF2 command line tools.
.1 OTF2 config tool

A call to otf2-config has the following syntax:

Usage: otf2-config [OPTION]... COMMAND

Commands:
--cflags prints additional compiler flags. They already contain the include flags
--cppflags prints the include flags for the OTF2 headers
--libs prints the required libraries for linking
--ldflags prints the required linker flags
--cc prints the C compiler name
--features <FEATURE-CATEGORY> prints available features selected by <FEATURE-CATEGORY>. Available feature categories:
* substrates
* compressions
* targets
--help prints this usage information
--version prints the version number of the OTF2 package
--revision prints the revision number of the OTF2 package
--interface-version prints the interface version number
--config-summary prints the configure summary of the OTF2 package
--pythonpath prints the python path for the OTF2 modules

Options:
--target <TARGET> displays the requested information for the given <TARGET>. On non-cross compiling systems, the 'backend' target is ignored.
--backend equivalent to '--target backend' (deprecated)
--cuda specifies that the required flags are for the CUDA compiler nvcc (deprecated)
.2 OTF2 print tool

A call to oft2-print has the following syntax:

Usage: oft2-print [OPTION]... [--] ANCHORFILE
Print selected content of the OTF2 archive specified by ANCHORFILE.

Options:
- -A, --show-all
  print all output including definitions and anchor file
- -G, --show-global-defs
  print all global definitions
- -I, --show-info
  print information from the anchor file
- -T, --show-thumbnails
  print the headers from all thumbnails
- -M, --show-mappings
  print mappings to global definitions
- -C, --show-clock-offsets
  print clock offsets to global timer
- --timestamps=<FORMAT>
  format of the timestamps. <FORMAT> is one of:
  plain - no formatting is done (default)
  offset - timestamps are relative to the global offset
  (taken form the ClockProperties definition)
- -L, --location <LID>
  limit output to location <LID>
- -s, --step <N>
  step through output by steps of <N> events
- --time <MIN> <MAX>
  limit output to events within time interval
- --system-tree
  output system tree to dot-file
- --silent
  only validate trace and do not print any events
- --unwind-calling-context
  unwind the calling context for each calling context event. Each calling context node is prefixed depending on the unwind distance of the current event:
  '?' - unwind distance is undefined
  '+' - region was newly entered
  '*' - region was not left
  ' ' - region did not make any progress
- -Werror, --warnings-as-errors
  all warnings are treated as errors
- -d, --debug
  turn on debug mode
- -V, --version
  print version information
- -h, --help
  print this help information
0.3 OTF2 snapshots tool

A call to oft2-snapshots has the following syntax:

Usage: oft2-snapshots [OPTION]... ANCHORFILE
Append snapshots to existing oft2 traces at given ‘break’ timestamps.

Options:
- `-n`, `--number <BREAKS>` Number of breaks (distributed regularly)
  if -p and -t are not set, the default for -n is 10 breaks.
- `-p <TICK_RATE>` Create break every <TICK_RATE> ticks
  if both, -n and -p are specified the one producing more breaks wins.
- `--progress` Brief mode, print progress information.
- `--verbose` Verbose mode, print break timestamps, i.e. snapshot informations to stdout.
- `-V`, `--version` Print version information.
- `-h`, `--help` Print this help information.
.4 OTF2 marker tool

A call to otf2-marker has the following syntax:

Usage: otf2-marker [OPTION] [ARGUMENTS]... ANCHORFILE
Read or edit a marker file.

Options:
- `--def <GROUP> [<CATEGORY>]` Print all marker definitions of group `<GROUP>` or of category `<CATEGORY>` from group `<GROUP>`.
- `--def-only` Print only marker definitions.
- `--add-def <GROUP> <CATEGORY> <SEVERITY>` Add a new marker definition.
- `--add <GROUP> <CATEGORY> <TIME> <SCOPE> <TEXT>` Add a marker to an existing definition.
- `--remove-def <GROUP> [<CATEGORY>]` Remove all marker classes of group `<GROUP>` or only the category `<CATEGORY>` of group `<GROUP>`; and all according markers.
- `--clear-def <GROUP> [<CATEGORY>]` Remove all markers of group `<GROUP>` or only of category `<CATEGORY>` of group `<GROUP>`.
- `--reset` Reset all marker.
- `-V, --version` Print version information.
- `-h, --help` Print this help information.

Argument descriptions:
- `<GROUP>`, `<CATEGORY>`, `<TEXT>` Arbitrary strings.
- `<SEVERITY>` One of:
  - NONE
  - LOW
  - MEDIUM
  - HIGH
- `<TIME>` One of the following formats:
  - `<TIMESTAMP>` A valid timestamp inside the trace range ‘global offset’ and ‘global offset’ + ‘trace length’.
  - `<TIMESTAMP>+</DURATION>` `<TIMESTAMP>` and `<TIMESTAMP> + <DURATION>` must be valid timestamps inside the trace range ‘global offset’ and ‘global offset’ + ‘trace length’.
  - `<TIMESTAMP>-<TIMESTAMP-END>` Two valid timestamps inside the trace range ‘global offset’ and ‘global offset’ + ‘trace length’, with `<TIMESTAMP-END>` <= `<TIMESTAMP-START>`.
See the CLOCK_PROPERTIES definition with the help of the ‘otf2-print -G’ tool.
- `<SCOPE>[::<SCOPE-REF>]` The `<SCOPE> must be one of:
  - GLOBAL
  - LOCATION:<LOCATION-REF>
  - LOCATION_GROUP:<LOCATION-GROUP-REF>
  - SYSTEM_TREE_NODE:<SYSTEM-TREE-NODE-REF>
  - GROUP:<GROUP-REF>
  - COMM:<COMMUNICATOR-REF>
 `<SCOPE-REF>` must be a valid definition reference of the specified scope. Use ‘otf2-print -G’ for a list of defined references.
There is no `<SCOPE-REF>` for `<SCOPE>` ‘GLOBAL’.
For a scope ‘GROUP’ the type of the referenced group must be ‘OTF2_GROUP_TYPE_LOCATIONS’ or ‘OTF2_GROUP_TYPE_COMM_LOCATIONS’.
.5 OTF2 estimator tool

A call to otf2-estimator has the following syntax:

Usage: otf2-estimator [OPTION]...
This tool estimates the size of OTF2 events.
It will open a prompt to type in commands.

Options:
- V, --version Print version information.
- h, --help Print this help information.

Commands:
list definitions Lists all known definition names.
list events Lists all known event names.
list types Lists all known type names.
set <DEFINITION> <NUMBER> Specifies the number of definitions of a
type of definitions.
get DefChunkSize Prints the estimated definition chunk size.
get Timestamp Prints the size of a timestamp.
get AttributeList [TYPES...] Prints the estimated size for an attribute
list with the given number of entries and
types.
get <EVENT> [ARGS...] Prints the estimated size of records for
<EVENT>.
exit Exits the tool.

This tool provides a command line interface to the estimator API of the OTF2
library. It is based on a stream based protocol. Commands are send to the
standard input stream of the program and the result is written to the standard
output stream of the program. All definition and event names are in there
canonical CamelCase form. Numbers are printed in decimal. The TYPES are in
ALL_CAPS. See the output of the appropriate ‘list’ commands. Arguments are
separated with an arbitrary number of white space. The ‘get’ commands are using
everything after the first white space separator verbatim as a key, which is
then printed in the output line and appended with the estimated size.

Here is a simple example. We have at most 4 region definitions and one metric
definition. We want to know the size of a timestamp, enter, and leave event,
and a metric event with 4 values.

cat <<EOC | otf2-estimator
set Region 4
set Metric 1
get Timestamp
get Enter
get Leave
get Metric 4
exit
EOC
Timestamp 9
Enter 3
Leave 3
Metric 4 44
The introduction of I/O recording with OTF2 made it necessary to distinguish different I/O paradigms. Like it is done with the parallel paradigms, like MPI, OpenMP. Though instead of the usual enum used to identify the paradigm, the I/O paradigms are expressed in a dynamic way with the help of a definition record. While this has the advantage that the API does not need to be changed only to add new I/O paradigms, it also lacks confidence in the definition. To overcome this, OTF2 textually defines known I/O paradigms and their expected definition.

"POSIX" This is the I/O interface of the POSIX standard.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_SERIAL
Flags  OTF2_IO_PARADIGM_FLAG_OS

"ISO C" This is the I/O interface of the ISO C standard.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_SERIAL

"MPI-IO" This is the I/O interface of the Message Passing Interface.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_PARALLEL
Flags  OTF2_IO_PARADIGM_FLAG_NONE

"netCDF" This is the Network Common Data Form. The class depends on whether the NetCDF library was built with or without MPI support.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_SERIAL or OTF2_IO_PARADIGM_CLASS_PARALLEL
Flags  OTF2_IO_PARADIGM_FLAG_NONE

"PnetCDF" This is the Parallel netCDF.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_PARALLEL
Flags  OTF2_IO_PARADIGM_FLAG_NONE

"HDF5" This is the I/O interface of The HDF Group. The class depends on whether the HDF5 library was built with or without MPI support.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_SERIAL or OTF2_IO_PARADIGM_CLASS_PARALLEL
Flags  OTF2_IO_PARADIGM_FLAG_NONE

"ADIOS" This is the Adaptable IO System.

Required properties

Class  OTF2_IO_PARADIGM_CLASS_PARALLEL
Flags  OTF2_IO_PARADIGM_FLAG_NONE
6.0.2 Event order for I/O operation records

These diagrams show valid event orders of I/O operations, which also denotes the lifetime of the \((\text{IoHandle}, \text{matchingId})\) tuple.

If the \textit{OTF2_IO_OPERATION_FLAG_NON_BLOCKING} is not set in the \texttt{IoOperationBegin} record, then the event order must follow:

![Diagram 1](image1)

If the \textit{OTF2_IO_OPERATION_FLAG_NON_BLOCKING} is set in the \texttt{IoOperationBegin} record, then the event order must follow:

![Diagram 2](image2)
.8 ClockProperties

Defines the timer resolution and time range of this trace. There will be no event with a timestamp less than globalOffset, and no event with timestamp greater than (globalOffset + traceLength).

This definition is only valid as a global definition.

Attributes

<table>
<thead>
<tr>
<th>uint64_t</th>
<th>timerResolution</th>
<th>Ticks per seconds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>uint64_t</td>
<td>globalOffset</td>
<td>A timestamp smaller than all event timestamps.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>traceLength</td>
<td>A timespan which includes the timespan between the smallest and greatest timestamp of all event timestamps.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>realtime</td>
<td>A realtime timestamp of the globalOffset timestamp in nanoseconds since 1970-01-01T00:00 UTC. Use OTF2_UNDEFINED_TIMESTAMP if no such timestamp exists. Since version 3.0.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteClockProperties()
OTF2_GlobalDefReaderCallbacks_SetClockPropertiesCallback()

Since

Version 1.0
.9 Paradigm

Attest that the following parallel paradigm was available at the time when the trace was recorded, and vice versa. Note that this does not attest that the paradigm was used. For convenience, this also includes a proper name for the paradigm and a classification. This definition is only allowed to appear at most once in the definitions per Paradigm.

This definition is only valid as a global definition.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2 Paragm paradigm</td>
<td>String</td>
<td>The paradigm to attest.</td>
</tr>
<tr>
<td>OTF2 StringRef name</td>
<td>String</td>
<td>The name of the paradigm. References a String definition.</td>
</tr>
<tr>
<td>OTF2 Paradigm paradigmClass</td>
<td>String</td>
<td>The class of this paradigm.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteParadigm()
OTF2_GlobalDefReaderCallbacks_SetParadigmCallback()

Since

Version 1.5

.10 ParadigmProperty

Extensible annotation for the Paradigm definition.

The tuple (paradigm, property) must be unique.

This definition is only valid as a global definition.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2 Paradigm paradigm</td>
<td>String</td>
<td>The paradigm to annotate.</td>
</tr>
<tr>
<td>OTF2 Paradigm property</td>
<td>String</td>
<td>The property.</td>
</tr>
<tr>
<td>OTF2 Type type</td>
<td>String</td>
<td>The type of this property. Must match with the defined type of the property.</td>
</tr>
<tr>
<td>OTF2 Attribute value</td>
<td>String</td>
<td>The value of this property.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteParadigmProperty()
OTF2_GlobalDefReaderCallbacks_SetParadigmPropertyCallback()

Since

Version 1.5
.11 IoParadigm

.11 OTF2_IoParadigmRef IoParadigm

Attestst that the following I/O paradigm was available at the time when the trace was recorded, and vice versa. Note that this does not attest that the paradigm was used. For convenience, this also includes a proper name for the paradigm and a classification.

This definition is only valid as a global definition.

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2__StringRef</td>
<td>identification</td>
</tr>
<tr>
<td></td>
<td>The I/O paradigm identification. This should be used programmatically to iden-</td>
</tr>
<tr>
<td></td>
<td>tify a specific I/O paradigm. For a human-readable name use the name attribute.</td>
</tr>
<tr>
<td></td>
<td>If this identification matches one of the known I/O paradigms listed in the</td>
</tr>
<tr>
<td></td>
<td>OTF2 documentation Known OTF2 I/O paradigms, then the attributes of this</td>
</tr>
<tr>
<td></td>
<td>definition must match those specified there. References a String definition.</td>
</tr>
<tr>
<td>OTF2__StringRef</td>
<td>name</td>
</tr>
<tr>
<td></td>
<td>The name of the I/O paradigm. This should be presented to humans as the</td>
</tr>
<tr>
<td></td>
<td>name of this I/O paradigm. References a String definition.</td>
</tr>
<tr>
<td>OTF2_IoParadigmClass</td>
<td>ioParadigmClass</td>
</tr>
<tr>
<td></td>
<td>The class of this I/O paradigm.</td>
</tr>
<tr>
<td>OTF2_IoParadigmFlag</td>
<td>ioParadigmFlags</td>
</tr>
<tr>
<td></td>
<td>Boolean properties of this I/O paradigm.</td>
</tr>
<tr>
<td>uint8_t</td>
<td>numberOfProperties</td>
</tr>
<tr>
<td></td>
<td>Number of properties.</td>
</tr>
<tr>
<td>OTF2_IoParadigmProperty</td>
<td>properties[numberOfProperties]</td>
</tr>
<tr>
<td></td>
<td>The property.</td>
</tr>
<tr>
<td>OTF2__Type</td>
<td>types[numberOfProperties]</td>
</tr>
<tr>
<td></td>
<td>The type of this property. Must match with the defined type of the property.</td>
</tr>
<tr>
<td>OTF2__AttributeValue</td>
<td>values[numberOfProperties]</td>
</tr>
<tr>
<td></td>
<td>The value of this property.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteIoParadigm()
OTF2_GlobalDefReaderCallbacks_SetIoParadigmCallback()

Since

Version 2.1

.12 MappingTable

Mapping tables are needed for situations where an ID is not globally known at measurement time. They are applied automatically at reading.

This definition is only valid as a local definition.
### Attributes

<table>
<thead>
<tr>
<th><strong>OTF2::Mapping::Type</strong></th>
<th>mappingType</th>
<th>Says to what type of ID the mapping table has to be applied.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>const OTF2::F2::IdMap</strong></td>
<td>idMap</td>
<td>Mapping table.</td>
</tr>
</tbody>
</table>

See also

- OTF2::DefWriter::WriteMappingTable()
- OTF2::DefReaderCallbacks::SetMappingTableCallback()

Since

Version 1.0

---

### .13 ClockOffset

Clock offsets are used for clock corrections.

This definition is only valid as a local definition.

<table>
<thead>
<tr>
<th><strong>OTF2::Time::Stamp</strong></th>
<th>time</th>
<th>Time when this offset was determined.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>int64_t</strong></td>
<td>offset</td>
<td>The offset to the global clock which was determined at time.</td>
</tr>
<tr>
<td><strong>double</strong></td>
<td>standardDeviation</td>
<td>A possible standard deviation, which can be used as a metric for the quality of the offset.</td>
</tr>
</tbody>
</table>

See also

- OTF2::DefWriter::WriteClockOffset()
- OTF2::DefReaderCallbacks::SetClockOffsetCallback()

Since

Version 1.0

---

### .14 OTF2::StringRef String

The string definition.
### .15 Attribute

**Attributes**

| const char* | string | The string, null terminated. |

See also

OTF2_GlobalDefWriter_WriteString()
OTF2_GlobalDefReaderCallbacks_SetStringCallback()
OTF2_DefWriter_WriteString()
OTF2_DefReaderCallbacks_SetStringCallback()

Since

Version 1.0

### .15 OTF2_AttributeRef Attribute

The attribute definition.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2StringRef</th>
<th>name</th>
<th>Name of the attribute. References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2StringRef</td>
<td>description</td>
<td>Description of the attribute. References a String definition. Since version 1.4.</td>
</tr>
<tr>
<td>OTF2Type</td>
<td>type</td>
<td>Type of the attribute value.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteAttribute()
OTF2_GlobalDefReaderCallbacks_SetAttributeCallback()
OTF2_DefWriter_WriteAttribute()
OTF2_DefReaderCallbacks_SetAttributeCallback()

Since

Version 1.0

### .16 OTF2_SystemTreeNodeRef SystemTreeNode

The system tree node definition.
### Attributes

<table>
<thead>
<tr>
<th>OTF2::StringRef</th>
<th>name</th>
<th>Free form instance name of this node. References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::StringRef</td>
<td>className</td>
<td>Free form class name of this node References a String definition.</td>
</tr>
<tr>
<td>OTF2::SystemTreeNodeRef</td>
<td>parent</td>
<td>Parent ID of this node. May be OTF2_UNDEFINED_SYSTEM_TREE_NODE to indicate that there is no parent. References a SystemTreeNode definition.</td>
</tr>
</tbody>
</table>

### Suplements

* SystemTreeNodeProperty
* SystemTreeNodeDomain

### See also

- OTF2::GlobalDefWriter::WriteSystemTreeNode()
- OTF2::GlobalDefReaderCallbacks::SetSystemTreeNodeCallback()
- OTF2::DefWriter::WriteSystemTreeNode()
- OTF2::DefReaderCallbacks::SetSystemTreeNodeCallback()

### Since

Version 1.0

### .17 OTF2::LocationGroupRef LocationGroup

The location group definition.

### Attributes

<table>
<thead>
<tr>
<th>OTF2::StringRef</th>
<th>name</th>
<th>Name of the group. References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::LocationGroupType</td>
<td>locationGroup</td>
<td>Type of this group.</td>
</tr>
<tr>
<td>OTF2::SystemTreeNodeRef</td>
<td>systemTree</td>
<td>Parent of this location group in the system tree. References a SystemTreeNode definition.</td>
</tr>
<tr>
<td>OTF2::LocationGroupRef</td>
<td>creating</td>
<td>The creating location group of this group. For type OTF2_LOCATION_GROUP_TYPE_PROCESS this may be another group of type OTF2_LOCATION_GROUP_TYPE_PROCESS or OTF2_UNDEFINED_LOCATION_GROUP. For type OTF2_LOCATION_GROUP_TYPE_ACCELERATOR, this must be a group of type OTF2_LOCATION_GROUP_TYPE_PROCESS. References a LocationGroup definition. Since version 3.0.</td>
</tr>
</tbody>
</table>

### Suplements

* LocationGroupProperty

36
.18 Location

See also

OTF2_GlobalDefWriter_WriteLocationGroup()
OTF2_GlobalDefReaderCallbacks_SetLocationGroupCallback()
OTF2_DefWriter_WriteLocationGroup()
OTF2_DefReaderCallbacks_SetLocationGroupCallback()

Since

Version 1.0

.18 OTF2_LocationRef Location

The location definition.

Attributes

<table>
<thead>
<tr>
<th>OTF2_StringRef</th>
<th>name</th>
<th>Name of the location References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationType</td>
<td>locationType</td>
<td>Location type.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>numberOfEvents</td>
<td>Number of events this location has recorded.</td>
</tr>
<tr>
<td>OTF2_LocationGroupRef</td>
<td>locationGroup</td>
<td>Location group which includes this location. References a LocationGroup definition.</td>
</tr>
</tbody>
</table>

Supplements

LocationProperty

See also

OTF2_GlobalDefWriter_WriteLocation()
OTF2_GlobalDefReaderCallbacks_SetLocationCallback()
OTF2_DefWriter_WriteLocation()
OTF2_DefReaderCallbacks_SetLocationCallback()

Since

Version 1.0

.19 OTF2_RegionRef Region

The region definition.
Attributes

| OTF2StringRef | name | Name of the region (demangled name if available). References a `String` definition. |
| OTF2StringRef | canonicalName | Alternative name of the region (e.g. mangled name). References a `String` definition. Since version 1.1. |
| OTF2StringRef | description | A more detailed description of this region. References a `String` definition. |
| OTF2RegionRef | regionRole | Region role. Since version 1.1. |
| OTF2Paradigm | paradigm | Paradigm. Since version 1.1. |
| OTF2RegionRef | regionFlags | Region flags. Since version 1.1. |
| OTF2StringRef | sourceFile | The source file where this region was declared. References a `String` definition. |
| uint32_t | beginLine | Starting line number of this region in the source file. |
| uint32_t | endLineNumber | Ending line number of this region in the source file. |

See also

- OTF2_GlobalDefWriter_WriteRegion()
- OTF2_GlobalDefReaderCallbacks_SetRegionCallback()
- OTF2_DefWriter_WriteRegion()
- OTF2_DefReaderCallbacks_SetRegionCallback()

Since

Version 1.0

.20 OTF2_CallsiteRef Callsite

The callsite definition.

Attributes

| OTF2StringRef | sourceFile | The source file where this call was made. References a `String` definition. |
| uint32_t | lineNumber | Line number in the source file where this call was made. |
| OTF2RegionRef | enteredRegion | The region which was called. References a `Region` definition. |
| OTF2RegionRef | leftRegion | The region which made the call. References a `Region` definition. |

See also

- OTF2_GlobalDefWriter_WriteCallsite()
- OTF2_GlobalDefReaderCallbacks_SetCallsiteCallback()
- OTF2_DefWriter_WriteCallsite()
- OTF2_DefReaderCallbacks_SetCallsiteCallback()

Since

Version 1.0

Deprecated In version 2.0
.21 Callpath

.21 OTF2_CallpathRef Callpath

The callpath definition.

Attributes

| OTF2_← CallpathRef | parent | The parent of this callpath. References a Callpath definition. |
| OTF2_← RegionRef   | region | The region of this callpath. References a Region definition. |

Supplements

CallpathParameter

See also

OTF2_GlobalDefWriter_WriteCallpath()
OTF2_GlobalDefReaderCallbacks_SetCallpathCallback()
OTF2_DefWriter_WriteCallpath()
OTF2_DefReaderCallbacks_SetCallpathCallback()

Since

Version 1.0

.22 OTF2_GroupRef Group

The group definition.

Attributes

| OTF2_← StringRef | name | Name of this group References a String definition. |
| OTF2_← GroupType | groupType | The type of this group. Since version 1.2. |
| OTF2_← Paradigm  | paradigm | The paradigm of this communication group. Since version 1.2. |
| OTF2_← GroupFlag | groupFlags | Flags for this group. Since version 1.2. |
| uint32_t          | numberOf Members | The number of members in this group. |
| uint32_t          | members [ numberOf Members ] | The identifiers of the group members. |

See also

OTF2_GlobalDefWriter_WriteGroup()
OTF2_GlobalDefReaderCallbacks_SetGroupCallback()
OTF2_DefWriter_WriteGroup()
OTF2_DefReaderCallbacks_SetGroupCallback()

Since

Version 1.0
.23 OTF2_MetricMemberRef MetricMember

A metric is defined by a MetricMember definition. A metric member is always a member of a metric class. Therefore, a single metric is a special case of a metric class with only one member. It is not allowed to reference a metric member ID in a Metric event, but only metric class IDs.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2StringRef name</td>
<td>Name of the metric. References a String definition.</td>
</tr>
<tr>
<td>OTF2StringRef description</td>
<td>Description of the metric. References a String definition.</td>
</tr>
<tr>
<td>OTF2MetricType metricType</td>
<td>Metric type: PAPI, etc.</td>
</tr>
<tr>
<td>OTF2MetricMode metricMode</td>
<td>Metric mode: accumulative, fix, relative, etc.</td>
</tr>
<tr>
<td>OTF2StringRef valueType</td>
<td>Type of the value. Only OTF2_TYPE_INT64, OTF2_TYPE_UINT64, and OTF2_TYPE_DOUBLE are valid types. If this metric member is recorded in a Metric event, than this type and the type in the event must match.</td>
</tr>
<tr>
<td>OTF2StringRef base</td>
<td>The recorded values should be handled in this given base, either binary or decimal. This information can be used if the value needs to be scaled.</td>
</tr>
<tr>
<td>int64_t exponent</td>
<td>The values inside the Metric events should be scaled by the factor base^exponent, to get the value in its base unit. For example, if the metric values come in as KiBi, than the base should be OTF2_BASE_BINARY and the exponent 10. Than the writer does not need to scale the values up to bytes, but can directly write the KiBi values into the Metric event. At reading time, the reader can apply the scaling factor to get the value in its base unit, ie. in bytes.</td>
</tr>
<tr>
<td>OTF2StringRef unit</td>
<td>Unit of the metric. This needs to be the scale free base unit, ie. &quot;bytes&quot;, &quot;operations&quot;, or &quot;seconds&quot;. In particular this unit should not have any scale prefix. References a String definition.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteMetricMember()
OTF2_GlobalDefReaderCallbacks_SetMetricMemberCallback()
OTF2_DefWriter_WriteMetricMember()
OTF2_DefReaderCallbacks_SetMetricMemberCallback()

Since

Version 1.0

.24 OTF2_MetricRef Metric

This is a polymorphic definition class.

Derivations

MetricClass
MetricInstance

.25 OTF2_MetricRef MetricClass

For a metric class it is implicitly given that the event stream that records the metric is also the scope. A metric class can contain multiple different metrics.
## .26 MetricInstance

**Attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>uint8_t</code></td>
<td>numberOfMetrics</td>
<td>Number of metrics within the set.</td>
</tr>
<tr>
<td><code>OTF2_metricMembers [numberOfMetrics]</code></td>
<td>List of metric members. References a <code>MetricMember</code> definition.</td>
<td></td>
</tr>
<tr>
<td><code>OTF2_metricOccurrence</code></td>
<td>Defines occurrence of a metric set.</td>
<td></td>
</tr>
<tr>
<td><code>OTF2_recorderKind</code></td>
<td>What kind of locations will record this metric class, or will this metric class only be recorded by metric instances. Since version 1.2.</td>
<td></td>
</tr>
</tbody>
</table>

**Supplements**

- `MetricClassRecorder`

**See also**

- `OTF2_GlobalDefWriter_WriteMetricClass()`
- `OTF2_GlobalDefReaderCallbacks_SetMetricClassCallback()`
- `OTF2_DefWriter_WriteMetricClass()`
- `OTF2_DefReaderCallbacks_SetMetricClassCallback()`

**Since**

- Version 1.0

### .26 OTF2_MetricRef MetricInstance

A `MetricInstance` is used to define metrics that are recorded at one location for multiple locations or for another location. The occurrence of a `MetricInstance` is implicitly of type `OTF2_METRIC_ASYNCHRONOUS`.

**Attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OTF2_metricClass</code></td>
<td>The instanced <code>MetricClass</code>. This metric class must be of kind <code>OTF2_RECORDER_KIND_ABSTRACT</code>. References a <code>MetricClass</code>, or a <code>MetricInstance</code> definition.</td>
<td></td>
</tr>
<tr>
<td><code>OTF2_recorder</code></td>
<td>Recorder of the metric: location ID. References a <code>Location</code> definition.</td>
<td></td>
</tr>
<tr>
<td><code>OTF2_metricScope</code></td>
<td>Defines type of scope: location, location group, system tree node, or a generic group of locations.</td>
<td></td>
</tr>
<tr>
<td>uint64_t</td>
<td>scope</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Scope of metric: ID of a location, location group, system tree node, or a generic group of locations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteMetricInstance()  
OTF2_GlobalDefReaderCallbacks_SetMetricInstanceCallback()  
OTF2_DefWriter_WriteMetricInstance()  
OTF2_DefReaderCallbacks_SetMetricInstanceCallback()  

Since

Version 1.0

.27 OTF2_CommRef Comm

This is a polymorphic definition class.

Derivations

Comm  
InterComm

.28 OTF2_CommRef Comm

The communicator definition.

Attributes

| OTF2StringRef | name | The name given by calling MPI_Comm_set_name on this communicator. Or the empty name to indicate that no name was given. References a String definition. |
| OTF2GroupRef | group | The describing MPI group of this MPI communicator. The group needs to be of type OTF2_GROUP_TYPE_COMM_GROUP or OTF2_GROUP_TYPE_COMM_SELF. References a Group definition. |
| OTF2CommRef | parent | The parent MPI communicator from which this communicator was created, if any. Use OTF2_UNDEFINED_COMM to indicate no parent. References a Comm definition. |
| OTF2CommFlag | flags | Special characteristics of this communicator. Since version 3.0. |

See also

OTF2_GlobalDefWriter_WriteComm()  
OTF2_GlobalDefReaderCallbacks_SetCommCallback()  
OTF2_DefWriter_WriteComm()  
OTF2_DefReaderCallbacks_SetCommCallback()  

Since

Version 1.0

.29 OTF2_ParameterRef Parameter

The parameter definition.
### .30 RmaWin

**Attributes**

<table>
<thead>
<tr>
<th>OTF2StringRef</th>
<th>name</th>
<th>Name of the parameter (variable name etc.) References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>parameterType</td>
<td>type</td>
<td>Type of the parameter, OTF2_ParameterType for possible types.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteParameter()
OTF2_GlobalDefReaderCallbacks_SetParameterCallback()
OTF2_DefWriter_WriteParameter()
OTF2_DefReaderCallbacks_SetParameterCallback()

Since

Version 1.0

### .30 OTF2_RmaWinRef RmaWin

A window defines the communication context for any remote-memory access operation.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2StringRef</th>
<th>name</th>
<th>Name, e.g. ‘GASPI Queue 1’, ‘NVidia Card 2’, etc.. References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CommRef</td>
<td>comm</td>
<td>Communicator object used to create the window. References a Comm definition.</td>
</tr>
<tr>
<td>RmaWinFlag</td>
<td>flags</td>
<td>Special characteristics of this RMA window. Since version 3.0.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteRmaWin()
OTF2_GlobalDefReaderCallbacks_SetRmaWinCallback()
OTF2_DefWriter_WriteRmaWin()
OTF2_DefReaderCallbacks_SetRmaWinCallback()

Since

Version 1.2

### .31 MetricClassRecorder

The metric class recorder definition.
Attributes

| OTF2 MetricRef | metric | Parent MetricClass, or MetricInstance definition to which this one is a supplementary definition. References a MetricClass, or a MetricInstance definition. |
| OTF2 LocationRef | recorder | The location which recorded the referenced metric class. References a Location definition. |

See also

OTF2_GlobalDefWriter_WriteMetricClassRecorder()
OTF2_GlobalDefReaderCallbacks_SetMetricClassRecorderCallback()
OTF2_DefWriter_WriteMetricClassRecorder()
OTF2_DefReaderCallbacks_SetMetricClassRecorderCallback()

Since

Version 1.2

.32 SystemTreeNodeProperty

An arbitrary key/value property for a SystemTreeNode definition.

Attributes

| OTF2 SystemTreeNodeRef | systemTreeNode | Parent SystemTreeNode definition to which this one is a supplementary definition. References a SystemTreeNode definition. |
| OTF2 StringRef | name | Name of the property. References a String definition. |
| OTF2 Type | type | The type of this property. Since version 2.0. |
| OTF2 AttributeValue | value | The value of this property. Since version 2.0. |

See also

OTF2_GlobalDefWriter_WriteSystemTreeNodeProperty()
OTF2_GlobalDefReaderCallbacks_SetSystemTreeNodePropertyCallback()
OTF2_DefWriter_WriteSystemTreeNodeProperty()
OTF2_DefReaderCallbacks_SetSystemTreeNodePropertyCallback()

Since

Version 1.2

.33 SystemTreeNodeDomain

The system tree node domain definition.
Attributes

<table>
<thead>
<tr>
<th>OTF2_&lt;-</th>
<th>System&lt;-</th>
<th>Tree&lt;-</th>
<th>NodeRef</th>
<th>systemTreeNode</th>
<th>Parent SystemTreeNode definition to which this one is a supplementary definition. References a SystemTreeNode definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_&lt;-</td>
<td>System&lt;-</td>
<td>Tree&lt;-</td>
<td>Domain</td>
<td>systemTree&lt;-</td>
<td>The domain in which the referenced SystemTreeNode operates in.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteSystemTreeNodeDomain()
OTF2_GlobalDefReaderCallbacks_SetSystemTreeNodeDomainCallback()
OTF2_DefWriter_WriteSystemTreeNodeDomain()
OTF2_DefReaderCallbacks_SetSystemTreeNodeDomainCallback()

Since

Version 1.2

.34 LocationGroupProperty

An arbitrary key/value property for a LocationGroup definition.

Attributes

<table>
<thead>
<tr>
<th>OTF2_&lt;-</th>
<th>Location&lt;-</th>
<th>GroupRef</th>
<th>locationGroup</th>
<th>Parent LocationGroup definition to which this one is a supplementary definition. References a LocationGroup definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_&lt;-</td>
<td>StringRef</td>
<td>name</td>
<td>Name of the property. References a String definition.</td>
<td></td>
</tr>
<tr>
<td>OTF2_&lt;-</td>
<td>Type</td>
<td>type</td>
<td>The type of this property. Since version 2.0.</td>
<td></td>
</tr>
<tr>
<td>OTF2_&lt;-</td>
<td>Attribute&lt;-</td>
<td>value</td>
<td>The value of this property. Since version 2.0.</td>
<td></td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteLocationGroupProperty()
OTF2_GlobalDefReaderCallbacks_SetLocationGroupPropertyCallback()
OTF2_DefWriter_WriteLocationGroupProperty()
OTF2_DefReaderCallbacks_SetLocationGroupPropertyCallback()

Since

Version 1.3

.35 LocationProperty

An arbitrary key/value property for a Location definition.
## Attributes

<table>
<thead>
<tr>
<th>OTF2::LocationRef</th>
<th>location</th>
<th>Parent Location definition to which this one is a supplementary definition. References a Location definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::StringRef</td>
<td>name</td>
<td>Name of the property. References a String definition.</td>
</tr>
<tr>
<td>OTF2::Type</td>
<td>type</td>
<td>The type of this property. Since version 2.0.</td>
</tr>
<tr>
<td>OTF2::AttributeValue</td>
<td>value</td>
<td>The value of this property. Since version 2.0.</td>
</tr>
</tbody>
</table>

See also

OTF2::GlobalDefWriter_WriteLocationProperty()
OTF2::GlobalDefReaderCallbacks_SetLocationPropertyCallback()
OTF2::DefWriter_WriteLocationProperty()
OTF2::DefReaderCallbacks_SetLocationPropertyCallback()

Since

Version 1.3

### 36 OTF2::CartDimensionRef CartDimension

Each dimension in a Cartesian topology is composed of a global ID, a name, its size, and whether it is periodic or not.

Attributes

<table>
<thead>
<tr>
<th>OTF2::StringRef</th>
<th>name</th>
<th>The name of the Cartesian topology dimension. References a String definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>uint32_t</td>
<td>size</td>
<td>The size of the Cartesian topology dimension.</td>
</tr>
<tr>
<td>OTF2::CartPeriodicity</td>
<td>cartPeriodicity</td>
<td>Periodicity of the Cartesian topology dimension.</td>
</tr>
</tbody>
</table>

See also

OTF2::GlobalDefWriter_WriteCartDimension()
OTF2::GlobalDefReaderCallbacks_SetCartDimensionCallback()
OTF2::DefWriter_WriteCartDimension()
OTF2::DefReaderCallbacks_SetCartDimensionCallback()

Since

Version 1.3

### 37 OTF2::CartTopologyRef CartTopology

Each topology is described by a global ID, a reference to its name, a reference to a communicator, the number of dimensions, and references to those dimensions. The topology type is defined by the paradigm of the group referenced by the associated communicator.
### .38 CartCoordinate

#### Attributes

| OTF2 ← StringRef | name | The name of the topology. References a *String* definition. |
| OTF2 ← CommRef | communicator | Communicator object used to create the topology. References a *Comm* definition. |
| uint8_t | numberOfDimensions | Number of dimensions. |
| OTF2 ← CartTopology ← Ref | cartDimensions [numberOfDimensions] | The dimensions of this topology. References a *CartDimension* definition. |

#### Supplements

*CartCoordinate*

See also

- OTF2_GlobalDefWriter_WriteCartTopology()
- OTF2_GlobalDefReaderCallbacks_SetCartTopologyCallback()
- OTF2_DefWriter_WriteCartTopology()
- OTF2_DefReaderCallbacks_SetCartTopologyCallback()

Since

Version 1.3

### .38 CartCoordinate

Defines the coordinate of the location referenced by the given rank (w.r.t. the communicator associated to the topology) in the referenced topology.

#### Attributes

| OTF2 ← CartTopology ← Ref | cartTopology | Parent *CartTopology* definition to which this one is a supplementary definition. References a *CartTopology* definition. |
| uint32_t | rank | The rank w.r.t. the communicator associated to the topology referencing this coordinate. |
| uint8_t | numberOfDimensions | Number of dimensions. |
| uint8_t | coordinates [numberOfDimensions] | Coordinates, indexed by dimension. |

See also

- OTF2_GlobalDefWriter_WriteCartCoordinate()
- OTF2_GlobalDefReaderCallbacks_SetCartCoordinateCallback()
- OTF2_DefWriter_WriteCartCoordinate()
- OTF2_DefReaderCallbacks_SetCartCoordinateCallback()

Since

Version 1.3
The definition of a source code location as tuple of the corresponding file name and line number.

When used to attach source code annotations to events, use the `OTF2_AttributeList` with an `Attribute` definition named "`SOURCE_CODE_LOCATION`" and of type `OTF2_TYPE_SOURCE_CODE_LOCATION`.

Attributes

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OTF2StringRef</code></td>
<td>The name of the file for the source code location. References a <code>String</code> definition.</td>
</tr>
<tr>
<td><code>uint32_t</code></td>
<td>The line number for the source code location.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_GlobalDefWriter_WriteSourceCodeLocation()`
- `OTF2_GlobalDefReaderCallbacks_SetSourceCodeLocationCallback()`
- `OTF2_DefWriter_WriteSourceCodeLocation()`
- `OTF2_DefReaderCallbacks_SetSourceCodeLocationCallback()`

Since

Version 1.5

Defines a node in the calling context tree. These nodes are referenced in the `CallingContextSample`, `CallingContextEnter`, and `CallingContextLeave` events.

The referenced `CallingContext` node in these events form a path which represents the calling context at this time. This path will be partitioned into at most three sub-paths by the `unwindDistance` attribute. For the `CallingContextLeave` event, the `unwindDistance` is defined to be 1.

Starting from the referenced `CallingContext` node, the first \( N \geq 0 \) nodes were newly entered regions since the previous calling context event. The next node is a region which was not left but made progress since the previous calling context event. All other nodes did not make progress at all, and thus the regions were neither left nor entered again. The `unwindDistance` is then \( N + 1 \). In case the `unwindDistance` is 0, there are neither newly entered regions nor regions which made progress.

It is guaranteed, that the node referenced by the `unwindDistance` exists in the previous and current calling context. All descendants of this node’s child in the previous calling context were left since the previous calling context event.

It is valid that this node is the `OTF2_UNDEFINED_CALLING_CONTEXT` node and that this node is already reached after `unwindDistance` – 1 steps. In the latter case, there exists no region which made progress, all regions in the previous calling context were left and all regions in the current calling context were newly entered.

Note that for `CallingContextLeave` events, the parent of the referenced `CallingContext` must be used as the previous calling context for the next event.

Regions which were entered with a `CallingContextEnter` event form an upper bound for the unwind distance, i.e., the `unwindDistance` points either to the parent of the last such entered region, or a node which is a descendant to this parent.

To summarize, an `unwindDistance` of 0 means that no regions were left, newly entered, or made any progress. An `unwindDistance` of 1 means that some regions were left regarding the previous calling context, no regions were newly entered, and there was progress in the region of the first node. An `unwindDistance` greater than 1 means that some regions were left regarding the previous calling context, there was progress in one region, and the first `unwindDistance` – 1 regions were newly entered.
.41 CallingContextProperty

Attributes

| OTF2← RegionRef | region | The region. References a Region definition. |
| OTF2← Source← Code← Location← Ref | sourceCode← Location | The absolute source code location of this calling context. References a SourceCodeLocation definition. |
| OTF2← Calling← ContextRef | parent | Parent ID of this context. References a CallingContext definition. |

Supplements

CallingContextProperty

See also

OTF2_GlobalDefWriter_WriteCallingContext()
OTF2_GlobalDefReaderCallbacks_SetCallingContextCallback()
OTF2_DefWriter_WriteCallingContext()
OTF2_DefReaderCallbacks_SetCallingContextCallback()

Since

Version 1.5

.41 CallingContextProperty

An arbitrary key/value property for a CallingContext definition.

Attributes

| OTF2← Calling← ContextRef | callingContext | Parent CallingContext definition to which this one is a supplementary definition. References a CallingContext definition. |
| OTF2← StringRef | name | Property name. References a String definition. |
| OTF2← Type | type | The type of this property. Must match with the defined type of the property. |
| OTF2← Attribute← Value | value | The value of this property. |

See also

OTF2_GlobalDefWriter_WriteCallingContextProperty()
OTF2_GlobalDefReaderCallbacks_SetCallingContextPropertyCallback()
OTF2_DefWriter_WriteCallingContextProperty()
OTF2_DefReaderCallbacks_SetCallingContextPropertyCallback()

Since

Version 2.0
.42  **OTF2\_InterruptGeneratorRef\ InterruptGenerator**

Defines an interrupt generator which periodically triggers *CallingContextSample* events. If the mode of the interrupt generator is set to `OTF2\_INTERRUPT\_GENERATOR\_MODE\_TIME`, the generator produces interrupts which are uniformly distributed over time, and the unit of the period is implicitly in seconds. If the mode is `OTF2\_INTERRUPT\_GENERATOR\_MODE\_COUNT`, the interrupt is triggered if a specific counter threshold is reached in the system. Therefore these samples are unlikely to be uniformly distributed over time. The unit of the period is then implicitly a number (threshold value).

The interrupts period in base unit (which is implicitly seconds or number, based on the mode) is derived out of the base, the exponent, and the period attributes by this formula:

\[
\text{base-period} = \text{period} \times \text{base}^\text{exponent}
\]

**Attributes**

<table>
<thead>
<tr>
<th><strong>OTF2_StringRef</strong></th>
<th><strong>name</strong></th>
<th>The name of this interrupt generator. References a <em>String</em> definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2_InterruptGenerator_Mode</strong></td>
<td><strong>interrupt_GeneratorMode</strong></td>
<td>Mode of the interrupt generator.</td>
</tr>
<tr>
<td><strong>OTF2_Base</strong></td>
<td><strong>base</strong></td>
<td>The base for the period calculation.</td>
</tr>
<tr>
<td><strong>int64_t</strong></td>
<td><strong>exponent</strong></td>
<td>The exponent for the period calculation.</td>
</tr>
<tr>
<td><strong>uint64_t</strong></td>
<td><strong>period</strong></td>
<td>The period this interrupt generator generates interrupts.</td>
</tr>
</tbody>
</table>

See also

- `OTF2\_GlobalDefWriter\_WriteInterruptGenerator()`
- `OTF2\_GlobalDefReader\_Callbacks\_SetInterruptGeneratorCallback()`
- `OTF2\_DefWriter\_WriteInterruptGenerator()`
- `OTF2\_DefReader\_Callbacks\_SetInterruptGeneratorCallback()`

Since

Version 1.5

.43  **IoFileProperty**

Extensible annotation for the polymorphic *IoFile* definition class.

The tuple (*ioFile, name*) must be unique.

**Attributes**

<table>
<thead>
<tr>
<th><strong>OTF2_IoFileRef</strong></th>
<th><strong>ioFile</strong></th>
<th>Parent <em>IoRegularFile</em> definition to which this one is a supplementary definition. References a <em>IoRegularFile</em> definition.</th>
</tr>
</thead>
</table>
.44 IoFile

<table>
<thead>
<tr>
<th><strong>OTF2StringRef</strong></th>
<th><strong>name</strong></th>
<th>Property name. References a <strong>String</strong> definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2Type</strong></td>
<td><strong>type</strong></td>
<td>The type of this property.</td>
</tr>
<tr>
<td><strong>OTF2Value</strong></td>
<td><strong>value</strong></td>
<td>The value of this property.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteIoFileProperty()
OTF2_GlobalDefReaderCallbacks_SetIoFilePropertyCallback()
OTF2_DefWriter_WriteIoFileProperty()
OTF2_DefReaderCallbacks_SetIoFilePropertyCallback()

Since

Version 2.1

.44 **OTF2_IoFileRef** IoFile

This is a polymorphic definition class.

Derivations

- **IoRegularFile**
- **IoDirectory**

.45 **OTF2_IoFileRef** IoRegularFile

Defines a regular file from which an **IoHandle** can be created.

This definition is member of the polymorphic **IoFile** definition class. All definitions of this polymorphic definition class share the same global identifier namespace.

Attributes

<table>
<thead>
<tr>
<th><strong>OTF2StringRef</strong></th>
<th><strong>name</strong></th>
<th>Name of the file. References a <strong>String</strong> definition.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2SystemTreeNodeRef</strong></td>
<td><strong>scope</strong></td>
<td>Defines the physical scope of this <strong>IoRegularFile</strong> in the system tree. E.g., two <strong>IoRegularFile</strong> definitions with the same name but different <strong>scope</strong> values are physically different, thus I/O operations through <strong>IoHandles</strong> do not operate on the same file. References a <strong>SystemTreeNode</strong> definition.</td>
</tr>
</tbody>
</table>

Supplements

- **IoFileProperty**

See also

OTF2_GlobalDefWriter_WriteIoRegularFile()
OTF2_GlobalDefReaderCallbacks_SetIoRegularFileCallback()
OTF2_DefWriter_WriteIoRegularFile()
OTF2_DefReaderCallbacks_SetIoRegularFileCallback()

Since

Version 2.1
.46 OTF2_IoFileRef IoDirectory

Defines a directory from which an IoHandle can be created.

This definition is member of the polymorphic IoFile definition class. All definitions of this polymorphic definition class share the same global identifier namespace.

Attributes

| OTF2StringRef | name | Name of the directory. References a String definition. |
| OTF2SystemTreeNodeRef | scope | Defines the physical scope of this IoDirectory in the system tree. E.g., two IoDirectory definitions with the same name but different scope values are physically different, thus I/O operations through IoHandles do not operate on the same directory. References a SystemTreeNode definition. |

See also

OTF2_GlobalDefWriter_WriteIoDirectory()  
OTF2_GlobalDefReaderCallbacks_SetIoDirectoryCallback()  
OTF2_DefWriter_WriteIoDirectory()  
OTF2_DefReaderCallbacks_SetIoDirectoryCallback()  

Since

Version 2.1

.47 OTF2_IoHandleRef IoHandle

Defines an I/O handle which will be used by subsequent I/O operations. I/O operations can only be applied to active I/O handles. An I/O handle gets active either if it was marked with the OTF2_IO_HANDLE_FLAG_PRE_CREATED flag, after it was referenced in an IoCreateHandle event, or it was referenced in the newHandle attribute of an IoDuplicateHandle event. It gets inactive if it was referenced in an IoDestroyHandle event. This life cycle can be repeated indefinitely. Though the OTF2_IO_HANDLE_FLAG_PRE_CREATED flag is unset after a IoDuplicateHandle event. All Locations of a LocationGroup have access to an active IoHandle, regardless which Location of the LocationGroup activated the IoHandle.

Attributes

| OTF2StringRef | name | Handle name. References a String definition. |
| OTF2IoFileRef | file | File identifier. References a IoRegularFile, or a IoDirectory definition. |
| OTF2IoParadigmRef | ioParadigm | The I/O paradigm. References a IoParadigm definition. |
| OTF2IoHandleFlagRef | ioHandleFlags | Special characteristics of this handle. |
| OTF2CommRef | comm | Scope of the file handle. This scope defines which process can access this file via this handle and also defines the collective context for this handle. References a Comm definition. |
| OTF2IoHandleRef | parent | Parent, in case this I/O handle was created and operated by an higher-level I/O paradigm. References a IoHandle definition. |
.48 IoPreCreatedHandleState

Supplements

 IoPreCreatedHandleState

See also

 OTF2_GlobalDefWriter_WriteIoHandle()  
 OTF2_GlobalDefReaderCallbacks_SetIoHandleCallback()  
 OTF2_DefWriter_WriteIoHandle()  
 OTF2_DefReaderCallbacks_SetIoHandleCallback()

Since

 Version 2.1

.48 IoPreCreatedHandleState

Provide the I/O access mode and status flags for pre-created IoHandles.

Only allowed once for a IoHandle definition with the OTF2_IO_HANDLE_FLAG_PRE_CREATED flag set.

Attributes

| OTF2_IoPreCreatedHandleState_HandleRef | ioHandle | Parent IoHandle definition to which this one is a supplementary definition. References a IoHandle definition. |
| OTF2_IoPreCreatedHandleState_AccessMode | mode | The access mode of the pre-created IoHandle. |
| OTF2_IoPreCreatedHandleState_StatusFlag | statusFlags | The status flags of the pre-created IoHandle. |

See also

 OTF2_GlobalDefWriter_WriteIoPreCreatedHandleState()  
 OTF2_GlobalDefReaderCallbacks_SetIoPreCreatedHandleStateCallback()  
 OTF2_DefWriter_WriteIoPreCreatedHandleState()  
 OTF2_DefReaderCallbacks_SetIoPreCreatedHandleStateCallback()

Since

 Version 2.1

.49 CallpathParameter

A parameter for a callpath definition.
Attributes

<table>
<thead>
<tr>
<th>OTF2 Calls</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_Callpath_Ref</td>
<td>callpath</td>
<td>Parent Callpath definition to which this one is a supplementary definition. References a Callpath definition.</td>
</tr>
<tr>
<td>OTF2_Parameter_Ref</td>
<td>parameter</td>
<td>The parameter of this callpath. References a Parameter definition.</td>
</tr>
<tr>
<td>OTF2_Type</td>
<td>type</td>
<td>The type of the attribute value. Must match the type of the parameter.</td>
</tr>
<tr>
<td>OTF2_Attribute_Value</td>
<td>value</td>
<td>The value of the parameter for this callpath.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteCallpathParameter()  
OTF2_GlobalDefReaderCallbacks_SetCallpathParameterCallback()  
OTF2_DefWriter_WriteCallpathParameter()  
OTF2_DefReaderCallbacks_SetCallpathParameterCallback()

Since

Version 2.2

50 OTF2_CommRef InterComm

The inter-communicator definition.

Attributes

<table>
<thead>
<tr>
<th>OTF2 Calls</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_StringRef</td>
<td>name</td>
<td>The name given by calling MPI_Comm_set_name on this communicator. Or the empty name to indicate that no name was given. References a String definition.</td>
</tr>
<tr>
<td>OTF2_GroupRef</td>
<td>groupA</td>
<td>One of the two MPI process groups in the intercommunicator. The group needs to be of type OTF2_GROUP_TYPE_COMM_GROUP or OTF2_GROUP_TYPE_COMM_SELF. References a Group definition.</td>
</tr>
<tr>
<td>OTF2_GroupRef</td>
<td>groupB</td>
<td>The other of the two MPI process groups in the intercommunicator. The group needs to be of type OTF2_GROUP_TYPE_COMM_GROUP or OTF2_GROUP_TYPE_COMM_SELF. References a Group definition.</td>
</tr>
<tr>
<td>OTF2_CommRef</td>
<td>communicator</td>
<td>The common peer MPI communicator used to create this inter- communicator. Use OTF2_UNDEFINED_COMM if no such communicator was used. References a Comm, or a InterComm definition.</td>
</tr>
<tr>
<td>OTF2_CommFlag</td>
<td>flags</td>
<td>Special characteristics of this communicator.</td>
</tr>
</tbody>
</table>

See also

OTF2_GlobalDefWriter_WriteInterComm()  
OTF2_GlobalDefReaderCallbacks_SetInterCommCallback()  
OTF2_DefWriter_WriteInterComm()  
OTF2_DefReaderCallbacks_SetInterCommCallback()

Since

Version 3.0
.51 List of all event records

.52 BufferFlush

This event signals that the internal buffer was flushed at the given time.

Attributes

<table>
<thead>
<tr>
<th>OTF2_Location→Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_Time→Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_Time→Stamp</td>
<td>stopTime</td>
<td>The time the buffer flush finished.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_BufferFlush()
OTF2_GlobalEvtReaderCallbacks_SetBufferFlushCallback()
OTF2_EvtReaderCallbacks_SetBufferFlushCallback()

Since

Version 1.0

.53 MeasurementOnOff

This event signals where the measurement system turned measurement on or off.

Attributes

<table>
<thead>
<tr>
<th>OTF2_Location→Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_Time→Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_Measurement→Mode</td>
<td>measurement→Mode</td>
<td>Is the measurement turned on (OTF2_MEASUREMENT_ON) or off (OTF2_MEASUREMENT_OFF)?</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_MeasurementOnOff()
OTF2_GlobalEvtReaderCallbacks_SetMeasurementOnOffCallback()
OTF2_EvtReaderCallbacks_SetMeasurementOnOffCallback()

Since

Version 1.0

.54 Enter

An Enter record indicates that the program enters a code region.
### Attributes

<table>
<thead>
<tr>
<th>OTF2_←оторчLocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_←оторчTimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_←оторчRegionRef</td>
<td>region</td>
<td>Needs to be defined in a definition record. References a Region definition and will be mapped to the global definition if a mapping table of type OTF2_MA←PPING_REGION is available.</td>
</tr>
</tbody>
</table>

#### Leave

A Leave record indicates that the program leaves a code region.

<table>
<thead>
<tr>
<th>OTF2_←оторчLocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_←оторчTimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_←оторчRegionRef</td>
<td>region</td>
<td>Needs to be defined in a definition record. References a Region definition and will be mapped to the global definition if a mapping table of type OTF2_MA←PPING_REGION is available.</td>
</tr>
</tbody>
</table>

#### See also

OTF2_EvtWriter_Enter()
OTF2_GlobalEvtReaderCallbacks_SetEnterCallback()
OTF2_EvtReaderCallbacks_SetEnterCallback()  

**Since**

Version 1.0

### .55 Leave

#### .55 MpiSend

An MpiSend record indicates that an MPI send operation was initiated (MPI_SEND). It keeps the necessary information for this event: receiver of the message, communicator, and the message tag. You can optionally add further information like the message length (size of the send buffer).
.57 MpiIsend

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_loc</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_timestamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>uint32_t receiver</td>
<td></td>
<td>MPI rank of receiver in communicator.</td>
</tr>
<tr>
<td>OTF2_commRef</td>
<td>communicator</td>
<td>Communicator ID. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_COMM is available.</td>
</tr>
<tr>
<td>uint32_t msgTag</td>
<td></td>
<td>Message tag</td>
</tr>
<tr>
<td>uint64_t msgLength</td>
<td></td>
<td>Message length</td>
</tr>
</tbody>
</table>

See also
- OTF2_EvtWriter_MpiIsend()
- OTF2_GlobalEvtReaderCallbacks_SetMpiIsendCallback()
- OTF2_EvtReaderCallbacks_SetMpiIsendCallback()

Since

Version 1.0

.57 MpiIsend

An MpiIsend record indicates that a non-blocking MPI send operation was initiated (MPI_ISEND). It keeps the necessary information for this event: receiver of the message, communicator, and the message tag. You can optionally add further information like the message length (size of the send buffer).

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_loc</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_timestamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>uint32_t receiver</td>
<td></td>
<td>MPI rank of receiver in communicator.</td>
</tr>
<tr>
<td>OTF2_commRef</td>
<td>communicator</td>
<td>Communicator ID. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_COMM is available.</td>
</tr>
<tr>
<td>uint32_t msgTag</td>
<td></td>
<td>Message tag</td>
</tr>
<tr>
<td>uint64_t msgLength</td>
<td></td>
<td>Message length</td>
</tr>
<tr>
<td>uint64_t requestID</td>
<td></td>
<td>ID of the related request</td>
</tr>
</tbody>
</table>

See also
- OTF2_EvtWriter_MpiIsend()
- OTF2_GlobalEvtReaderCallbacks_SetMpiIsendCallback()
- OTF2_EvtReaderCallbacks_SetMpiIsendCallback()

Since

Version 1.0
.58 MpiIsendComplete

An MpiIsendComplete record indicates the completion of a non-blocking MPI send operation. In the case where the send request is released before it is completed by MPI, this record will only indicate the release, as it becomes impossible to track the completion of the send operation afterwards. This case may be identified by the surrounding events.

Attributes

| OTF2_LocationRef | location | The location where this event happened. |
| OTF2_TimeStamp | timestamp | The time when this event happened. |
| uint64_t requestID | ID of the related request |

See also

OTF2_EvtWriter_MpiIsendComplete()
OTF2_GlobalEvtReaderCallbacks_SetMpiIsendCompleteCallback()
OTF2_EVTReaderCallbacks_SetMpiIsendCompleteCallback()

Since

Version 1.0

.59 MpiIrecvRequest

An MpiIrecvRequest record indicates that a non-blocking MPI receive operation was initiated (MPI_IRECV).

Attributes

| OTF2_LocationRef | location | The location where this event happened. |
| OTF2_TimeStamp | timestamp | The time when this event happened. |
| uint64_t requestID | ID of the requested receive |

See also

OTF2_EvtWriter_MpiIrecvRequest()
OTF2_GlobalEvtReaderCallbacks_SetMpiIrecvRequestCallback()
OTF2_EVTReaderCallbacks_SetMpiIrecvRequestCallback()

Since

Version 1.0

.60 MpiRecv

An MpiRecv record indicates that an MPI message was received (MPI_RECV). It keeps the necessary information for this event: sender of the message, communicator, and the message tag. You can optionally add further information like the message length (size of the receive buffer).
An MpiIrecv record indicates the completion of a non-blocking MPI receive operation completed (MPI_IRECV). It keeps the necessary information for this event: sender of the message, communicator, and the message tag. You can optionally add further information like the message length (size of the receive buffer).

Attributes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>location</code></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><code>timestamp</code></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><code>sender</code></td>
<td>MPI rank of sender in communicator.</td>
</tr>
<tr>
<td><code>communicator</code></td>
<td>Communicator ID. References a <code>Comm</code>, or a <code>InterComm</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING</code>, <code>COMM</code> is available.</td>
</tr>
<tr>
<td><code>msgTag</code></td>
<td>Message tag</td>
</tr>
<tr>
<td><code>msgLength</code></td>
<td>Message length</td>
</tr>
<tr>
<td><code>requestID</code></td>
<td>ID of the related request</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_MpiIrecv()
OTF2_GlobalEvtReaderCallbacks_SetMpiIrecvCallback()
OTF2_EvtReaderCallbacks_SetMpiIrecvCallback()

Since

Version 1.0
.62  MpiRequestTest

This event appears if the program tests if a request has already completed but the test failed.
.63 MpiRequestCancelled

Attributes

<table>
<thead>
<tr>
<th>OTF2_numRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_numTimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_MpiRequestTest()
OTF2_GlobalEvtReaderCallbacks_SetMpiRequestTestCallback()
OTF2_EvtReaderCallbacks_SetMpiRequestTestCallback()

Since

Version 1.0

.63 MpiRequestCancelled

This event appears if the program canceled a request.

Attributes

<table>
<thead>
<tr>
<th>OTF2_numRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_numTimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_MpiRequestCancelled()
OTF2_GlobalEvtReaderCallbacks_SetMpiRequestCancelledCallback()
OTF2_EvtReaderCallbacks_SetMpiRequestCancelledCallback()

Since

Version 1.0

.64 MpiCollectiveBegin

An MpiCollectiveBegin record marks the begin of an MPI collective operation (MPI_GATHER, MPI_SCATTER etc.).
An `MpiCollectiveEnd` record marks the end of an MPI collective operation (MPI_GATHER, MPI_SCATTER etc.). It keeps the necessary information for this event: type of collective operation, communicator, the root of this collective operation. You can optionally add further information like sent and received bytes.

### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>collectiveOp</td>
<td>Determines which collective operation it is.</td>
</tr>
<tr>
<td>communicator</td>
<td>Communicator References a <code>Comm</code>, or a <code>InterComm</code> definition and will be</td>
</tr>
<tr>
<td>root</td>
<td>Rank of root in communicator or any predefined constant of <code>OTF2_CollectiveRoot</code>.</td>
</tr>
<tr>
<td>sizeSent</td>
<td>Size of the sent message.</td>
</tr>
<tr>
<td>sizeReceived</td>
<td>Size of the received message.</td>
</tr>
</tbody>
</table>

### See also

- `OTF2_EvtWriter_MpiCollectiveBegin()`
- `OTF2_GlobalEvtReaderCallbacks_SetMpiCollectiveBeginCallback()`
- `OTF2_EvtReaderCallbacks_SetMpiCollectiveBeginCallback()`
- `OTF2_EvtWriter_MpiCollectiveEnd()`
- `OTF2_GlobalEvtReaderCallbacks_SetMpiCollectiveEndCallback()`
- `OTF2_EvtReaderCallbacks_SetMpiCollectiveEndCallback()`

### Since

Version 1.0
.66 OmpFork

An OmpFork record marks that an OpenMP Thread forks a thread team.

This event record is superseded by the ThreadFork event record and should not be used when the ThreadFork event record is in use.

Attributes

| OTF2_LocationRef | location | The location where this event happened. |
| OTF2_TimeStamp   | timestamp| The time when this event happened. |
| uint32_t          | numberOfRequestedThreads | Requested size of the team. |

See also

OTF2EvtWriter_OmpFork()
OTF2GlobalEvtReaderCallbacks_SetOmpForkCallback()
OTF2EvtReaderCallbacks_SetOmpForkCallback()

Since

Version 1.0

Deprecated In version 1.2

.67 OmpJoin

An OmpJoin record marks that a team of threads is joint and only the master thread continues execution.

This event record is superseded by the ThreadJoin event record and should not be used when the ThreadJoin event record is in use.

Attributes

| OTF2_LocationRef | location | The location where this event happened. |
| OTF2_TimeStamp   | timestamp| The time when this event happened. |

See also

OTF2EvtWriter_OmpJoin()
OTF2GlobalEvtReaderCallbacks_SetOmpJoinCallback()
OTF2EvtReaderCallbacks_SetOmpJoinCallback()

Since

Version 1.0

Deprecated In version 1.2
.68 OmpAcquireLock

An *OmpAcquireLock* record marks that a thread acquires an OpenMP lock.

This event record is superseded by the *ThreadAcquireLock* event record and should not be used when the *ThreadAcquireLock* event record is in use.

Attributes

| OTF2_Location_Ref | location | The location where this event happened. |
| OTF2_Time_Stamp   | timestamp| The time when this event happened.     |
| uint32_t           | lockID   | ID of the lock.                        |
| uint32_t           | acquisitionOrder | A monotonically increasing number to determine the order of lock acquisitions (with unsynchronized clocks this is otherwise not possible). Corresponding acquire-release events have same number. |

See also

OTF2_EvtWriter_OmpAcquireLock()
OTF2_GlobalEvtReaderCallbacks_SetOmpAcquireLockCallback()
OTF2_EvtReaderCallbacks_SetOmpAcquireLockCallback()

Since

Version 1.0

**Deprecated** In version 1.2

.69 OmpReleaseLock

An *OmpReleaseLock* record marks that a thread releases an OpenMP lock.

This event record is superseded by the *ThreadReleaseLock* event record and should not be used when the *ThreadReleaseLock* event record is in use.

Attributes

| OTF2_Location_Ref | location | The location where this event happened. |
| OTF2_Time_Stamp   | timestamp| The time when this event happened.     |
### .70 OmpTaskCreate

<table>
<thead>
<tr>
<th>uint32_t</th>
<th>lockID</th>
<th>ID of the lock.</th>
</tr>
</thead>
<tbody>
<tr>
<td>uint32_t</td>
<td>acquisitionOrder</td>
<td>A monotonically increasing number to determine the order of lock acquisitions (with unsynchronized clocks this is otherwise not possible). Corresponding acquire-release events have same number.</td>
</tr>
</tbody>
</table>

See also

- OTF2EvtWriter_OmpReleaseLock()
- OTF2_GlobalEvtReaderCallbacks_SetOmpReleaseLockCallback()
- OTF2EvtReaderCallbacks_SetOmpReleaseLockCallback()

Since

- Version 1.0

**Deprecated** In version 1.2

### .70 OmpTaskCreate

An *OmpTaskCreate* record marks that an OpenMP Task was/will be created in the current region.

This event record is superseded by the *ThreadTaskCreate* event record and should not be used when the *ThreadTaskCreate* event record is in use.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2_Location→Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_Time→Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
</tbody>
</table>

| uint64_t | taskID | Identifier of the newly created task instance. |

See also

- OTF2EvtWriter_OmpTaskCreate()
- OTF2_GlobalEvtReaderCallbacks_SetOmpTaskCreateCallback()
- OTF2EvtReaderCallbacks_SetOmpTaskCreateCallback()

Since

- Version 1.0

**Deprecated** In version 1.2

### .71 OmpTaskSwitch

An *OmpTaskSwitch* record indicates that the execution of the current task will be suspended and another task starts/restarts its execution. Please note that this may change the current call stack of the executing location.

This event record is superseded by the *ThreadTaskSwitch* event record and should not be used when the *ThreadTaskSwitch* event record is in use.
Attributes

| OTF2_←| Location← Ref | location | The location where this event happened. |
| OTF2_←| Time← Stamp | timestamp | The time when this event happened. |
| uint64_t | taskID | Identifier of the now active task instance. |

See also

- OTF2_EvtWriter_OmpTaskSwitch()
- OTF2_GlobalEvtReaderCallbacks_SetOmpTaskSwitchCallback()
- OTF2_EvtReaderCallbacks_SetOmpTaskSwitchCallback()

Since

- Version 1.0

**Deprecated** In version 1.2

.72 OmpTaskComplete

An OmpTaskComplete record indicates that the execution of an OpenMP task has finished.

This event record is superseded by the ThreadTaskComplete event record and should not be used when the ThreadTaskComplete event record is in use.

Attributes

| OTF2_←| Location← Ref | location | The location where this event happened. |
| OTF2_←| Time← Stamp | timestamp | The time when this event happened. |
| uint64_t | taskID | Identifier of the completed task instance. |

See also

- OTF2_EvtWriter_OmpTaskComplete()
- OTF2_GlobalEvtReaderCallbacks_SetOmpTaskCompleteCallback()
- OTF2_EvtReaderCallbacks_SetOmpTaskCompleteCallback()

Since

- Version 1.0

**Deprecated** In version 1.2

.73 Metric

A Metric event is always stored at the location that recorded the metric. The event can reference a MetricClass or MetricInstance. Therefore, metric classes and instances share same ID space. Synchronous metrics are always located right immediately the corresponding Enter and Leave event.
.74 ParameterString

Attributes

| OTF2<-- | Location<--Ref | location | The location where this event happened. |
| OTF2<-- | Time<--Stamp   | timestamp | The time when this event happened.     |
| OTF2<-- | MetricRef      | metric    | Could be a metric class or a metric instance. References a MetricClass, or a MetricInstance definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_METRIC is available. |
| uint8_t  |                | numberOf<--Metrics | Number of metrics with in the set. |
| OTF2<-- | Type           | typeIDs [ numberOf<--Metrics ] | List of metric types. These types must match that of the corresponding MetricMember definitions. |
| OTF2<-- | Metric<--Value | metricValues [ numberOf<--Metrics ] | List of metric values. |

See also

OTF2_EvtWriter_Metric()
OTF2_GlobalEvtReaderCallbacks_SetMetricCallback()
OTF2_EvtReaderCallbacks_SetMetricCallback()

Since

Version 1.0

.74 ParameterString

A ParameterString record marks that in the current region, the specified string parameter has the specified value.

Attributes

| OTF2<-- | Location<--Ref | location | The location where this event happened. |
| OTF2<-- | Time<--Stamp   | timestamp | The time when this event happened.     |
| OTF2<-- | Parameter<--Ref | parameter | Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_PARAMETER is available. |
| OTF2_\rightarrow StringRef | string | Value: Handle of a string definition References a String definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING\rightarrow _STRING is available. |

See also

OTF2EvtWriter_ParameterString()
OTF2GlobalEvtReaderCallbacks_SetParameterStringCallback()
OTFEvtReaderCallbacks_SetParameterStringCallback()

Since

Version 1.0

.75 ParameterInt

A ParameterInt record marks that in the current region, the specified integer parameter has the specified value.

Attributes

| OTF2_\rightarrow Location\rightarrow Ref | location | The location where this event happened. |
| OTF2_\rightarrow Time\rightarrow Stamp | timestamp | The time when this event happened. |
| OTF2_\rightarrow Parameter\rightarrow Ref | parameter | Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_PARAMETER is available. |

| int64_t | value | Value of the recorded parameter. |

See also

OTF2EvtWriter_ParameterInt()
OTF2GlobalEvtReaderCallbacks_SetParameterIntCallback()
OTFEvtReaderCallbacks_SetParameterIntCallback()

Since

Version 1.0

.76 ParameterUnsignedInt

A ParameterUnsignedInt record marks that in the current region, the specified unsigned integer parameter has the specified value.
.77 RmaWinCreate

Attributes

<table>
<thead>
<tr>
<th>OTF2_Location→Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_Time→Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_Parameter→Ref</td>
<td>parameter</td>
<td>Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_PARAMETER is available.</td>
</tr>
<tr>
<td>uint64_t value</td>
<td>value</td>
<td>Value of the recorded parameter.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_ParameterUnsignedInt()  
OTF2_GlobalEvtReaderCallback_SetParameterUnsignedIntCallback()  
OTF2_EvtReaderCallback_SetParameterUnsignedIntCallback()

Since

Version 1.0

.77 RmaWinCreate

An RmaWinCreate record denotes the creation of an RMA window. Only valid if the RmaWin definition was flagged with OTF2_RMA_WIN_FLAG_CREATE_DESTROY_EVENTS. This event can be enclosed by an RmaCollective→Begin and RmaCollectiveEnd event pair either with OTF2_COLLECTIVE_OP_CREATE_HANDLE or OTF2_COLLECTIVE_OP_CREATE_HANDLE_AND_ALLOCATE as the operation type.

Attributes

<table>
<thead>
<tr>
<th>OTF2_Location→Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_Time→Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_RmaWin→Ref</td>
<td>win</td>
<td>ID of the window created. References a RmaWin definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_RMA_WIN is available.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_RmaWinCreate()  
OTF2_GlobalEvtReaderCallback_SetRmaWinCreateCallback()  
OTF2_EvtReaderCallback_SetRmaWinCreateCallback()

Since

Version 1.2
An `RmaWinDestroy` record denotes the destruction of an RMA window. Only valid if the `RmaWin` definition was flagged with `OTF2_RMA_WIN_FLAG_CREATE_DESTROY_EVENTS`. This event can be enclosed by an `Rma←CollectiveBegin` and `RmaCollectiveEnd` event pair either with `OTF2_COLLECTIVE_OP_DESTROY_HANDLE` or `OTF2_COLLECTIVE_OP_DESTROY_HANDLE_AND_DEALLOCATE` as the operation type. In this case the RMA window is only marked for destruction, which will happen with the `RmaCollectiveEnd` event.
## .79 RmaCollectiveBegin

An `RmaCollectiveBegin` record denotes the beginning of a collective RMA operation.

### Attributes

<table>
<thead>
<tr>
<th>OTF2_{←} Location→</th>
<th>Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_{←} Time→ Stamp</td>
<td>win</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
</tbody>
</table>

### See also

- OTF2_EvtWriter_RmaWinDestroy()
- OTF2_GlobalEvtReaderCallbacks_SetRmaWinDestroyCallback()
- OTF2_EvtReaderCallbacks_SetRmaWinDestroyCallback()

### Since

Version 1.2

## .79 RmaCollectiveBegin

An `RmaCollectiveBegin` record denotes the beginning of a collective RMA operation.

### Attributes

<table>
<thead>
<tr>
<th>OTF2_{←} Location→</th>
<th>Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_{←} Time→ Stamp</td>
<td>win</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
</tbody>
</table>

### See also

- OTF2_EvtWriter_RmaCollectiveBegin()
- OTF2_GlobalEvtReaderCallbacks_SetRmaCollectiveBeginCallback()
- OTF2_EvtReaderCallbacks_SetRmaCollectiveBeginCallback()

### Since

Version 1.2

## .80 RmaCollectiveEnd

An `RmaCollectiveEnd` record denotes the end of a collective RMA operation.
Attributes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2.Location</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2.Time</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2.CollectiveOp</td>
<td>collectiveOp</td>
<td>Determines which collective operation it is.</td>
</tr>
<tr>
<td>OTF2.syncLevel</td>
<td>syncLevel</td>
<td>Synchronization level of this collective operation.</td>
</tr>
<tr>
<td>OTF2.RmaWin</td>
<td>win</td>
<td>ID of the window used for this operation. References a RmaWin definition and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>will be mapped to the global definition if a mapping table of type OTF2.Ma</td>
</tr>
<tr>
<td>RmaWinRef</td>
<td>root</td>
<td>Root process for this operation or any predefined constant of OTF2.CollectiveRoot.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>bytesSent</td>
<td>Bytes sent in operation.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>bytesReceived</td>
<td>Bytes receives in operation.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_RmaCollectiveEnd()
OTF2_GlobalEvtReaderCallbacks_SetRmaCollectiveEndCallback()
OTF2_EvtReaderCallbacks_SetRmaCollectiveEndCallback()

Since

Version 1.2

.81 RmaGroupSync

An RmaGroupSync record denotes the synchronization with a subgroup of processes on an RMA window.

Attributes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2.Location</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2.Time</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2.syncLevel</td>
<td>syncLevel</td>
<td>Synchronization level of this collective operation.</td>
</tr>
</tbody>
</table>
.82 RmaRequestLock

An RmaRequestLock record denotes the time a lock was requested and with it the earliest time it could have been granted. It is used to mark (possibly) non-blocking lock request, as defined by the MPI standard.

Attributes

<table>
<thead>
<tr>
<th>OTF2← RmaRequestLock Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2← Time Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2← RmaWin Ref</td>
<td>win</td>
<td>ID of the window used for this operation. References a RmaWin definition and will be mapped to the global definition if a mapping table of type OTF2_MA←PPING_RMA_WIN is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>remote</td>
<td>Rank of the locked remote process or OTF2_UNDEFINED_UINT32 if all processes of the specified window are locked.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>lockId</td>
<td>ID of the lock acquired, if multiple locks are defined on a window.</td>
</tr>
<tr>
<td>OTF2← LockType</td>
<td>lockType</td>
<td>Type of lock acquired.</td>
</tr>
</tbody>
</table>

See also

OTF2EvtWriter_RmaGroupSync()
OTF2_GlobalEvtReaderCallbacks_SetRmaGroupSyncCallback()
OTF2EvtReaderCallbacks_SetRmaGroupSyncCallback()

Since

Version 1.2

.83 RmaAcquireLock

An RmaAcquireLock record denotes the time a lock was acquired by the process.
Attributes

<table>
<thead>
<tr>
<th>OTF2_← Location← Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_← Time← Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_← RmaWin← Ref</td>
<td>win</td>
<td>ID of the window used for this operation. References a RmaWin definition and will be mapped to the global definition if a mapping table of type OTF2_MA← PPING_RMA_WIN is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>remote</td>
<td>Rank of the locked remote process or OTF2_UNDEFINED_UINT32 if all processes of the specified window are locked.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>lockId</td>
<td>ID of the lock acquired, if multiple locks are defined on a window.</td>
</tr>
<tr>
<td>OTF2_← LockType</td>
<td>lockType</td>
<td>Type of lock acquired.</td>
</tr>
</tbody>
</table>

See also

OTF2EvtWriter_RmaAcquireLock()  
OTF2_GlobalEvtReaderCallbacks_SetRmaAcquireLockCallback()  
OTF2EvtReaderCallbacks_SetRmaAcquireLockCallback()

Since

Version 1.2

.84 RmaTryLock

An RmaTryLock record denotes the time of an unsuccessful attempt to acquire the lock.

Attributes

<table>
<thead>
<tr>
<th>OTF2_← Location← Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_← Time← Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_← RmaWin← Ref</td>
<td>win</td>
<td>ID of the window used for this operation. References a RmaWin definition and will be mapped to the global definition if a mapping table of type OTF2_MA← PPING_RMA_WIN is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>remote</td>
<td>Rank of the locked remote process or OTF2_UNDEFINED_UINT32 if all processes of the specified window are locked.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>lockId</td>
<td>ID of the lock acquired, if multiple locks are defined on a window.</td>
</tr>
<tr>
<td>OTF2_← LockType</td>
<td>lockType</td>
<td>Type of lock acquired.</td>
</tr>
</tbody>
</table>

See also

OTF2EvtWriter_RmaTryLock()  
OTF2_GlobalEvtReaderCallbacks_SetRmaTryLockCallback()  
OTF2EvtReaderCallbacks_SetRmaTryLockCallback()

Since

Version 1.2
An `RmaReleaseLock` record denotes the time the lock was released.
### OTF2_EvtWriter_RmaReleaseLock()
### OTF2_GlobalEvtReaderCallbacks_SetRmaReleaseLockCallback()
### OTF2_EvtReaderCallbacks_SetRmaReleaseLockCallback()

Since
Version 1.2

### .86 RmaSync

An RmaSync record denotes the direct synchronization with a possibly remote process.

### Attributes

<table>
<thead>
<tr>
<th></th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2_Location</strong></td>
<td>location</td>
<td></td>
</tr>
<tr>
<td><strong>Ref</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>timestamp</th>
<th>The time when this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2_Time</strong></td>
<td>timestamp</td>
<td></td>
</tr>
<tr>
<td><strong>Stamp</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>win</th>
<th>ID of the window used for this operation. References a RmaWin definition and will be mapped to the global definition if a mapping table of type OTF2_MA is available.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2_RmaWin</strong></td>
<td>win</td>
<td></td>
</tr>
<tr>
<td><strong>Ref</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>remote</th>
<th>Rank of the locked remote process.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>uint32_t</strong></td>
<td>remote</td>
<td></td>
</tr>
<tr>
<td><strong>remote</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>lockId</th>
<th>ID of the lock released, if multiple locks are defined on a window.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>uint64_t</strong></td>
<td>lockId</td>
<td></td>
</tr>
<tr>
<td><strong>lockId</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See also
OTF2_EvtWriter_RmaSync()
OTF2_GlobalEvtReaderCallbacks_SetRmaSyncCallback()
OTF2_EvtReaderCallbacks_SetRmaSyncCallback()

Since
Version 1.2

### .87 RmaWaitChange

An RmaWaitChange record denotes the change of a window that was waited for.
### .88 RmaPut

**Attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2.Location</td>
<td>location</td>
</tr>
<tr>
<td>OTF2.Time</td>
<td>timestamp</td>
</tr>
<tr>
<td>OTF2.RmaWin</td>
<td>win</td>
</tr>
</tbody>
</table>

- **location**: The location where this event happened.
- **timestamp**: The time when this event happened.
- **win**: ID of the window used for this operation. References a `RmaWin` definition and will be mapped to the global definition if a mapping table of type `OTF2.MA.PPING_RMA_WIN` is available.

See also

- OTF2EvtWriter_RmaWaitChange()
- OTF2_GlobalEvtReaderCallbacks_SetRmaWaitChangeCallback()
- OTF2_EvtReaderCallbacks_SetRmaWaitChangeCallback()

Since

Version 1.2

### .88 RmaPut

An `RmaPut` record denotes the time a put operation was issued.

**Attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2.Location</td>
<td>location</td>
</tr>
<tr>
<td>OTF2.Time</td>
<td>timestamp</td>
</tr>
<tr>
<td>OTF2.RmaWin</td>
<td>win</td>
</tr>
<tr>
<td>uint32_t remote</td>
<td>Rank of the target process.</td>
</tr>
<tr>
<td>uint64_t bytes</td>
<td>Bytes sent to target.</td>
</tr>
<tr>
<td>uint64_t matchingId</td>
<td>ID used for matching the corresponding completion record.</td>
</tr>
</tbody>
</table>

See also

- OTF2EvtWriter_RmaPut()
- OTF2_GlobalEvtReaderCallbacks_SetRmaPutCallback()
- OTF2_EvtReaderCallbacks_SetRmaPutCallback()

Since

Version 1.2

### .89 RmaGet

An `RmaGet` record denotes the time a get operation was issued.
**Attributes**

<table>
<thead>
<tr>
<th>OTF2_event</th>
<th>Location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_time</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_win</td>
<td>win</td>
<td>ID of the window used for this operation. References a <code>RmaWin</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MA</code> is available.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTF2_rma</th>
<th>remote</th>
<th>Rank of the target process.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_atomic</td>
<td>type</td>
<td>Type of atomic operation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTF2_rma</th>
<th>bytesSent</th>
<th>Bytes sent to target.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_rma</td>
<td>bytesReceived</td>
<td>Bytes received from target.</td>
</tr>
<tr>
<td>OTF2_rma</td>
<td>matchingId</td>
<td>ID used for matching the corresponding completion record.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_EvtWriter_RmaGet()`
- `OTF2_GlobalEvtReaderCallbacks_SetRmaGetCallback()`
- `OTF2_EvtReaderCallbacks_SetRmaGetCallback()`

Since

Version 1.2

### .90 RmaAtomic

An `RmaAtomic` record denotes the time an atomic RMA operation was issued.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2_event</th>
<th>Location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_time</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_win</td>
<td>win</td>
<td>ID of the window used for this operation. References a <code>RmaWin</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MA</code> is available.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTF2_rma</th>
<th>remote</th>
<th>Rank of the target process.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_atomic</td>
<td>type</td>
<td>Type of atomic operation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTF2_rma</th>
<th>bytesSent</th>
<th>Bytes sent to target.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_rma</td>
<td>bytesReceived</td>
<td>Bytes received from target.</td>
</tr>
<tr>
<td>OTF2_rma</td>
<td>matchingId</td>
<td>ID used for matching the corresponding completion record.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_EvtWriter_RmaAtomic()`
- `OTF2_GlobalEvtReaderCallbacks_SetRmaAtomicCallback()`
- `OTF2_EvtReaderCallbacks_SetRmaAtomicCallback()`

Since

Version 1.2
An `RmaOpCompleteBlocking` record denotes the local completion of a blocking RMA operation.
An `RmaOpCompleteNonBlocking` record denotes the local completion of a non-blocking RMA operation.

### Attributes

<table>
<thead>
<tr>
<th>OTF2_Location</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_RmaWinRef</td>
<td>win</td>
<td>ID of the window used for this operation. References a <code>RmaWin</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MA_PPING_RMA_WIN</code> is available.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>matchingId</td>
<td>ID used for matching the corresponding RMA operation record.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_EvtWriter_RmaOpCompleteNonBlocking()`
- `OTF2_GlobalEvtReaderCallbacks_SetRmaOpCompleteNonBlockingCallback()`
- `OTF2_EvtReaderCallbacks_SetRmaOpCompleteNonBlockingCallback()`

Since

Version 1.2

### .93 RmaOpTest

An `RmaOpTest` record denotes that a non-blocking RMA operation has been tested for completion unsuccessfully.

### Attributes

<table>
<thead>
<tr>
<th>OTF2_Location</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_RmaWinRef</td>
<td>win</td>
<td>ID of the window used for this operation. References a <code>RmaWin</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MA_PPING_RMA_WIN</code> is available.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>matchingId</td>
<td>ID used for matching the corresponding RMA operation record.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_EvtWriter_RmaOpCompleteNonBlocking()`
- `OTF2_GlobalEvtReaderCallbacks_SetRmaOpCompleteNonBlockingCallback()`
- `OTF2_EvtReaderCallbacks_SetRmaOpCompleteNonBlockingCallback()`

Since

Version 1.2
### .94 RmaOpCompleteRemote

An `RmaOpCompleteRemote` record denotes the remote completion of an RMA operation.

#### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>location</strong></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><strong>timestamp</strong></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><strong>win</strong></td>
<td>ID of the window used for this operation. References a <code>RmaWin</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MA&lt;PPING_RMA_WIN&gt;</code> is available.</td>
</tr>
<tr>
<td><strong>matchingId</strong></td>
<td>ID used for matching the corresponding RMA operation record.</td>
</tr>
</tbody>
</table>

#### See also

- `OTF2_EvtWriter_RmaOpTest()`
- `OTF2_GlobalEvtReaderCallbacks_SetRmaOpTestCallback()`
- `OTF2_EvtReaderCallbacks_SetRmaOpTestCallback()`

#### Since

Version 1.2

### .95 ThreadFork

A `ThreadFork` record marks that a thread forks a thread team.
### Attributes

<table>
<thead>
<tr>
<th>OTF2_event</th>
<th>attribute</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2(location)</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2(Time)</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2(Paradigm)</td>
<td>model</td>
<td>The threading paradigm this event took place.</td>
</tr>
<tr>
<td>uint32_t numberOfRequestedThreads</td>
<td></td>
<td>Requested size of the team.</td>
</tr>
</tbody>
</table>

#### See also

- OTF2 EvtWriter_ThreadFork()
- OTF2_GlobalEvtReaderCallbacks_SetThreadForkCallback()
- OTF2_EvtReaderCallbacks_SetThreadForkCallback()

#### Since

Version 1.2

### .96 ThreadJoin

A **ThreadJoin** record marks that a team of threads is joined and only the master thread continues execution.

| OTF2(location) | location | The location where this event happened. |
| OTF2(Time) | timestamp | The time when this event happened. |
| OTF2(Paradigm) | model | The threading paradigm this event took place. |

#### See also

- OTF2 EvtWriter_ThreadJoin()
- OTF2_GlobalEvtReaderCallbacks_SetThreadJoinCallback()
- OTF2_EvtReaderCallbacks_SetThreadJoinCallback()

#### Since

Version 1.2

### .97 ThreadTeamBegin

The current location enters the specified thread team.
.98 ThreadTeamEnd

The current location leaves the specified thread team.

Attributes

<table>
<thead>
<tr>
<th>OTF2::LocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2::CommRef</td>
<td>threadTeam</td>
<td>Thread team References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPIN::G_COMM is available.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_ThreadTeamBegin()
OTF2_GlobalEvtReaderCallbacks_SetThreadTeamBeginCallback()
OTF2_EvtReaderCallbacks_SetThreadTeamBeginCallback()

Since

Version 1.2

.99 ThreadAcquireLock

A ThreadAcquireLock record marks that a thread acquires a lock.
### Attributes

<table>
<thead>
<tr>
<th>OTF2::LocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2::Paradigm</td>
<td>model</td>
<td>The threading paradigm this event took place.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>lockID</td>
<td>ID of the lock.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>acquisitionOrder</td>
<td>A monotonically increasing number to determine the order of lock acquisitions (with unsynchronized clocks this is otherwise not possible). Corresponding acquire-release events have same number.</td>
</tr>
</tbody>
</table>

See also

OTF2::EvtWriter_ThreadAcquireLock()
OTF2::GlobalEvtReaderCallbacks_SetThreadAcquireLockCallback()
OTF2::EvtReaderCallbacks_SetThreadAcquireLockCallback()

Since

Version 1.2

### .100 ThreadReleaseLock

A `ThreadReleaseLock` record marks that a thread releases a lock.

### Attributes

<table>
<thead>
<tr>
<th>OTF2::LocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2::Paradigm</td>
<td>model</td>
<td>The threading paradigm this event took place.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>lockID</td>
<td>ID of the lock.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>acquisitionOrder</td>
<td>A monotonically increasing number to determine the order of lock acquisitions (with unsynchronized clocks this is otherwise not possible). Corresponding acquire-release events have same number.</td>
</tr>
</tbody>
</table>

See also

OTF2::EvtWriter_ThreadReleaseLock()
OTF2::GlobalEvtReaderCallbacks_SetThreadReleaseLockCallback()
OTF2::EvtReaderCallbacks_SetThreadReleaseLockCallback()

Since

Version 1.2

### .101 ThreadTaskCreate

A `ThreadTaskCreate` record marks that a task in was/will be created and will be processed by the specified thread team.
.102 ThreadTaskSwitch

A **ThreadTaskSwitch** record indicates that the execution of the current task will be suspended and another task starts/restarts its execution. Please note that this may change the current call stack of the executing location.

### Attributes

<table>
<thead>
<tr>
<th>OTF2← Location← Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2← Time← Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2← CommRef</td>
<td>threadTeam</td>
<td>Thread team References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPINT← G_COMM is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>creatingThread</td>
<td>Creating thread of this task.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>generation← Number</td>
<td>Thread-private generation number of task’s creating thread.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_ThreadTaskCreate()  
OTF2_GlobalEvtReaderCallbacks_SetThreadTaskCreateCallback()  
OTF2_EvtReaderCallbacks_SetThreadTaskCreateCallback()  

Since

Version 1.2

.103 ThreadTaskComplete

A **ThreadTaskComplete** record indicates that the execution of an OpenMP task has finished.

### Attributes

<table>
<thead>
<tr>
<th>OTF2← Location← Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2← Time← Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2← CommRef</td>
<td>threadTeam</td>
<td>Thread team References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPINT← G_COMM is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>creatingThread</td>
<td>Creating thread of this task.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>generation← Number</td>
<td>Thread-private generation number of task’s creating thread.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_ThreadTaskSwitch()  
OTF2_GlobalEvtReaderCallbacks_SetThreadTaskSwitchCallback()  
OTF2_EvtReaderCallbacks_SetThreadTaskSwitchCallback()  

Since

Version 1.2
## Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OTF2_locationRef</code></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><code>OTF2_timeStamp</code></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><code>OTF2_commRef</code></td>
<td>Thread team References a <code>Comm</code>, or a <code>InterComm</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_TABLE_G_COMM</code> is available.</td>
</tr>
<tr>
<td><code>uint32_t creatingThread</code></td>
<td>Creating thread of this task.</td>
</tr>
<tr>
<td><code>uint32_t generation</code></td>
<td>Thread-private generation number of task's creating thread.</td>
</tr>
<tr>
<td><code>uint64_t sequenceCount</code></td>
<td>A <code>threadContingent</code> unique number. The corresponding <code>ThreadBegin</code> event does have the same number.</td>
</tr>
</tbody>
</table>

**See also**
- OTF2EvtWriter_ThreadTaskComplete()
- OTF2_GeneralEvtReaderCallbacks_SetThreadTaskCompleteCallback()
- OTF2EvtReaderCallbacks_SetThreadTaskCompleteCallback()

**Since**
- Version 1.2

### .104 ThreadCreate

The location created successfully a new thread.

**Attributes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OTF2_locationRef</code></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><code>OTF2_timeStamp</code></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><code>OTF2_commRef</code></td>
<td>The thread contingent. References a <code>Comm</code>, or a <code>InterComm</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_TABLE_PPING_COMM</code> is available.</td>
</tr>
<tr>
<td><code>uint64_t sequenceCount</code></td>
<td>A <code>threadContingent</code> unique number. The corresponding <code>ThreadBegin</code> event does have the same number.</td>
</tr>
</tbody>
</table>

**See also**
- OTF2EvtWriter_ThreadCreate()
- OTF2_GeneralEvtReaderCallbacks_SetThreadCreateCallback()
- OTF2EvtReaderCallbacks_SetThreadCreateCallback()

**Since**
- Version 1.3

### .105 ThreadBegin

Marks the begin of a thread created by another thread.
.106 ThreadWait

The location waits for the completion of another thread.

Attributes

<table>
<thead>
<tr>
<th>OTF2&lt;-- Location&lt;-- Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2&lt;-- Time&lt;-- Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2&lt;-- CommRef</td>
<td>thread&lt;-- Contingent</td>
<td>The thread contingent. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MA&lt;-- PPING_COMM is available.</td>
</tr>
<tr>
<td>uint64_t sequenceCount</td>
<td>A threadContingent unique number. The corresponding ThreadCreate event does have the same number.</td>
<td></td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_ThreadWait()  
OTF2_GlobalEvtReaderCallbacks_SetThreadWaitCallback()  
OTF2_EvtReaderCallbacks_SetThreadWaitCallback()

Since

Version 1.3

.107 ThreadEnd

Marks the end of a thread.

Attributes

<table>
<thead>
<tr>
<th>OTF2&lt;-- Location&lt;-- Ref</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2&lt;-- Time&lt;-- Stamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2&lt;-- CommRef</td>
<td>thread&lt;-- Contingent</td>
<td>The thread contingent. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MA&lt;-- PPING_COMM is available.</td>
</tr>
<tr>
<td>uint64_t sequenceCount</td>
<td>A threadContingent unique number. The corresponding ThreadEnd event does have the same number.</td>
<td></td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_ThreadWait()  
OTF2_GlobalEvtReaderCallbacks_SetThreadWaitCallback()  
OTF2_EvtReaderCallbacks_SetThreadWaitCallback()

Since

Version 1.3
### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationRef</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_CommRef</td>
<td>threadContingent</td>
<td>The thread contingent. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_Mapping_Comm is available.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>sequenceCount</td>
<td>A threadContingent unique number. The corresponding ThreadWait event does have the same number. OTF2_UNDEFINED_UINT64 in case no corresponding ThreadWait event exists.</td>
</tr>
</tbody>
</table>

See also

- OTF2EvtWriter_ThreadEnd()
- OTF2_GlobalEvtReaderCallbacks_SetThreadEndCallback()
- OTF2EvtReaderCallbacks_SetThreadEndCallback()

Since

Version 1.3

### .108 CallingContextEnter

The thread entered an instrumented region, represented by the referenced CallingContext. In contrast to the Enter event, it gives the full calling context through the CallingContext tree.

Events based on the CallingContext definition are mutually exclusive with the Enter/Leave events in a trace.

If no callback for this event is set but a callback for Enter events is defined, the reader will automatically generate an Enter callback call for the Region referenced by the CallingContext attribute of this event. Note that this emulation does not re-create the full calling context! It only re-creates the event order for instrumented regions.

### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationRef</td>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_CallingContextRef</td>
<td>callingContext</td>
<td>The entered region as referenced by the CallingContext definition. References a CallingContext definition and will be mapped to the global definition if a mapping table of type OTF2_Mapping_Calling_Context is available.</td>
</tr>
</tbody>
</table>
.109 CallingContextLeave

| uint32_t | unwindDistance | The unwindDistance for this callingContext. See the description in CallingContext. |

See also

OTF2_EvtWriter_CallContextEnter()
OTF2_GlobalEvtReaderCallbacks_SetCallingContextEnterCallback()
OTF2_EvtReaderCallbacks_SetCallingContextEnterCallback()

Since

Version 2.0

.109 CallingContextLeave

The thread left an instrumented region, represented by the referenced CallingContext. In contrast to the Leave event, it gives the full calling context through the CallingContext tree.

The unwind distance for this CallingContext is defined to be 1. Because it must be assumed that the instrumented region made progress since the previous CallingContext event.

Events based on the CallingContext definition are mutually exclusive with the Enter/Leave events in a trace.

The parent of the CallingContext must be used as the previous calling context for the next event.

If no callback for this event is set but a callback for Leave events is defined, the reader will automatically generate an Leave callback call for the Region referenced by the CallingContext attribute of this event. Note that this emulation does not re-create the full calling context! It only re-creates the event order for instrumented regions.

Attributes

| OTF2_Location_Ref | location | The location where this event happened. |
| OTF2_Time_Stamp | timestamp | The time when this event happened. |
| OTF2_CallContextRef | callingContext | The left region as referenced by the CallingContext definition. References a CallingContext definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_CALLING_CONTEXT is available. |

See also

OTF2_EvtWriter_CallContextLeave()
OTF2_GlobalEvtReaderCallbacks_SetCallingContextLeaveCallback()
OTF2_EvtReaderCallbacks_SetCallingContextLeaveCallback()

Since

Version 2.0

.110 CallingContextSample

The thread was interrupted to take a sample of its current state (region and source code location).

Events based on the CallingContext definition are mutually exclusive with the Enter/Leave events in a trace.
### Attributes

<table>
<thead>
<tr>
<th>OTF2_LocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_CallingContextRef</td>
<td>callingContext</td>
<td>Describes the calling context of the thread when it was interrupted. References a CallingContext definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_CALLING_CONTEXT is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>unwindDistance</td>
<td>The unwindDistance for this callingContext. See the description in CallingContext.</td>
</tr>
<tr>
<td>OTF2InterruptGeneratorRef</td>
<td>interruptGenerator</td>
<td>References a InterruptGenerator definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_INTERRUPT_GENERATOR is available.</td>
</tr>
</tbody>
</table>

See also

OTF2EvtWriter_CallingContextSample()
OTF2_GlobalEvtReaderCallbacks_SetCallingContextSampleCallback()
OTF2EvtReaderCallbacks_SetCallingContextSampleCallback()

Since

Version 1.5

#### 1.11 IoCreateHandle

An IoCreateHandle record marks the creation of a new active I/O handle that can be used by subsequent I/O operation events.

An IoHandle is active between a pair of consecutive IoCreateHandle and IoDestroyHandle events. All Locations of a LocationGroup have access to an active IoHandle.

If the Comm attribute of the IoHandle handle is not OTF2_UNDEFINED_COMM, this is a collective operation over Comm.

### Attributes

<table>
<thead>
<tr>
<th>OTF2_LocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_IoHandleRef</td>
<td>handle</td>
<td>A previously inactive I/O handle which will be activated by this record. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>OTF2_IoAccessMode</td>
<td>mode</td>
<td>Determines which I/O operations can be applied to this I/O handle (e.g., read-only, write-only, read-write).</td>
</tr>
<tr>
<td>OTF2_IoCreationFlag</td>
<td>creationFlags</td>
<td>Requested I/O handle creation flags (e.g., create, exclusive, etc.).</td>
</tr>
<tr>
<td>OTF2_IoStatusFlag</td>
<td>statusFlags</td>
<td>I/O handle status flags which will be associated with the handle attribute (e.g., append, create, close-on-exec, async, etc.).</td>
</tr>
</tbody>
</table>
### .112 IoDestroyHandle

See also

- OTF2EvtWriter_IoCreateHandle()
- OTF2GlobalEvtReaderCallbacks_SetIoCreateHandleCallback()
- OTF2EvtReaderCallbacks_SetIoCreateHandleCallback()

Since

Version 2.1

#### .112 IoDestroyHandle

An `IoDestroyHandle` record marks the end of an active I/O handle's lifetime.

An `IoHandle` is active between a pair of consecutive `IoCreateHandle` and `IoDestroyHandle` events. All `Locations` of a `LocationGroup` have access to an active `IoHandle`.

If the `Comm` attribute of the `IoHandle` handle is not `OTF2_UNDEFINED_COMM`, this is a collective operation over `Comm`.

Attributes

<table>
<thead>
<tr>
<th>OTF2_LocationRef</th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_HandleRef</td>
<td>handle</td>
<td>An active I/O handle which will be inactivated by this records. References a <code>IoHandle</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_IO_HANDLE</code> is available.</td>
</tr>
</tbody>
</table>

See also

- OTF2EvtWriter_IoDestroyHandle()
- OTF2GlobalEvtReaderCallbacks_SetIoDestroyHandleCallback()
- OTF2EvtReaderCallbacks_SetIoDestroyHandleCallback()

Since

Version 2.1

#### .113 IoDuplicateHandle

An `IoDuplicateHandle` record marks the duplication of an already existing active I/O handle.

The new I/O handle `newHandle` is active after this event.

Both `IoHandles` must reference the same `Comm` definition or be `OTF2_UNDEFINED_COMM`. If the `Comm` attribute of the `IoHandle` handles is not `OTF2_UNDEFINED_COMM`, this is a collective operation over `Comm`. 
### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2_Location</strong></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><strong>OTF2_Timestamp</strong></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><strong>OTF2_HandleRef</strong></td>
<td>An active I/O handle. References a <code>IoHandle</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_IO_HANDLE</code> is available.</td>
</tr>
<tr>
<td><strong>newHandle</strong></td>
<td>A previously inactive I/O handle which will be activated by this record. References a <code>IoHandle</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_IO_HANDLE</code> is available.</td>
</tr>
<tr>
<td><strong>statusFlags</strong></td>
<td>The status flag for the new I/O handle <code>newHandle</code>. No status flags will be inherited from the I/O handle <code>oldHandle</code>.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_EvtWriter_IoDuplicateHandle()`
- `OTF2_GlobalEvtReaderCallbacks_SetIoDuplicateHandleCallback()`
- `OTF2_EvtReaderCallbacks_SetIoDuplicateHandleCallback()`

Since

Version 2.1

### .114 IoSeek

An `IoSeek` record marks a change of the position, e.g., within a file.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTF2_Location</strong></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><strong>OTF2_Timestamp</strong></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><strong>handle</strong></td>
<td>An active I/O handle. References a <code>IoHandle</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_IO_HANDLE</code> is available.</td>
</tr>
<tr>
<td><strong>offsetRequest</strong></td>
<td>Requested offset.</td>
</tr>
<tr>
<td><strong>whence</strong></td>
<td>Position inside the file from where <code>offsetRequest</code> should be applied (e.g., absolute from the start or end, relative to the current position).</td>
</tr>
<tr>
<td><strong>offsetResult</strong></td>
<td>Resulting offset, e.g., within the file relative to the beginning of the file.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_EvtWriter_IoSeek()`
- `OTF2_GlobalEvtReaderCallbacks_SetIoSeekCallback()`
- `OTF2_EvtReaderCallbacks_SetIoSeekCallback()`

Since

Version 2.1
An `IoChangeStatusFlags` record marks a change to the status flags associated with an active I/O handle.
### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationRef</td>
<td>location The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_HandleRef</td>
<td>handle An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>OTF2_StatusFlag</td>
<td>statusFlags Set flags (e.g., close-on-exec, append, etc.).</td>
</tr>
</tbody>
</table>

See also

OTF2EvtWriter_IoChangeStatusFlags()  
OTF2GlobalEvtReaderCallbacks_SetIoChangeStatusFlagsCallback()  
OTFEvtReaderCallbacks_SetIoChangeStatusFlagsCallback()  

Since  
Version 2.1

#### .116 IoDeleteFile

An IoDeleteFile record marks the deletion of an I/O file.

#### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationRef</td>
<td>location The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_IoParadigmRef</td>
<td>ioParadigm The I/O paradigm which induced the deletion. References a IoParadigm definition.</td>
</tr>
<tr>
<td>OTF2_FileRef</td>
<td>file File identifier. References a IoRegularFile, or a IoDirectory definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_FILE is available.</td>
</tr>
</tbody>
</table>

See also

OTF2EvtWriter_IoDeleteFile()  
OTF2GlobalEvtReaderCallbacks_SetIoDeleteFileCallback()  
OTFEvtReaderCallbacks_SetIoDeleteFileCallback()  

Since  
Version 2.1

#### .117 IoOperationBegin

An IoOperationBegin record marks the begin of a file operation (read, write, etc.).

See Event order for I/O operation records for the possible event orders.
### .118 IoOperationTest

#### Attributes

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2→</td>
<td>Location→</td>
<td>location The location where this event happened.</td>
</tr>
<tr>
<td>OTF2→</td>
<td>Time→</td>
<td>timestamp The time when this event happened.</td>
</tr>
<tr>
<td>OTF2→</td>
<td>HandleRef→</td>
<td>handle An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>OTF2→</td>
<td>Operation→</td>
<td>mode Mode of an I/O handle operation (e.g., read or write).</td>
</tr>
<tr>
<td>OTF2→</td>
<td>OperationFlag→</td>
<td>operationFlags Special semantic of this operation.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>bytesRequest</td>
<td>requestedBytes Requested bytes to write/read.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>matchingId</td>
<td>identifier Used to correlate associated event records of an I/O operation. This identifier is unique for the referenced IoHandle.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_IoOperationBegin()
OTF2_GlobalEvtReaderCallbacks_SetIoOperationBeginCallback()
OTF2_EvtReaderCallbacks_SetIoOperationBeginCallback()

Since

Version 2.1

---

### .118 IoOperationTest

An IoOperationTest record marks an unsuccessful test whether an I/O operation has already finished.

See [Event order for I/O operation records](#) for the possible event orders.

#### Attributes

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2→</td>
<td>Location→</td>
<td>location The location where this event happened.</td>
</tr>
<tr>
<td>OTF2→</td>
<td>Time→</td>
<td>timestamp The time when this event happened.</td>
</tr>
<tr>
<td>OTF2→</td>
<td>HandleRef→</td>
<td>handle An active I/O handle. References a ioHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>matchingId</td>
<td>identifier Used to correlate associated event records of an I/O operation. This identifier is unique for the referenced IoHandle.</td>
</tr>
</tbody>
</table>
See also
OTF2_EvtWriter_IoOperationTest()
OTF2_GlobalEvtReaderCallbacks_SetIoOperationTestCallback()
OTF2_EvtReaderCallbacks_SetIoOperationTestCallback()

Since
Version 2.1

.119 IoOperationIssued

An IoOperationIssued record marks the successful initiation of a non-blocking operation (read, write, etc.) on an active I/O handle.

See Event order for I/O operation records for the possible event orders.

Attributes

| OTF2_LocationRef | location | The location where this event happened. |
| OTF2_TimeStamp   | timestamp | The time when this event happened.     |
| OTF2_IoHandleRef | handle    | An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available. |
| uint64_t          | matchingId | Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced IoHandle. |

See also
OTF2_EvtWriter_IoOperationIssued()
OTF2_GlobalEvtReaderCallbacks_SetIoOperationIssuedCallback()
OTF2_EvtReaderCallbacks_SetIoOperationIssuedCallback()

Since
Version 2.1

.120 IoOperationComplete

An IoOperationComplete record marks the end of a file operation (read, write, etc.) on an active I/O handle.

See Event order for I/O operation records for the possible event orders.
.121 IoOperationCancelled

Attributes

| OTF2_<-  |
| Location->  |
| Ref          |
| location     | The location where this event happened. |

| OTF2_<-  |
| Time->  |
| Stamp        | timestamp | The time when this event happened. |

| OTF2_Io--  |
| HandleRef    | handle | An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available. |

| uint64_t     | bytesResult | Number of actual transferred bytes. |
|              |             |                                         |

| uint64_t     | matchingId | Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced IoHandle. |

See also

OTF2_EvtWriter_IoOperationComplete()  
OTF2_GlobalEvtReaderCallbacks_SetIoOperationCompleteCallback()  
OTF2_EvtReaderCallbacks_SetIoOperationCompleteCallback()

Since

Version 2.1

.121 IoOperationCancelled

An IoOperationCancelled record marks the successful cancellation of a non-blocking operation (read, write, etc.) on an active I/O handle.

See Event order for I/O operation records for the possible event orders.

Attributes

| OTF2_<-  |
| Location->  |
| Ref          | location | The location where this event happened. |

| OTF2_<-  |
| Time->  |
| Stamp        | timestamp | The time when this event happened. |

| OTF2_Io--  |
| HandleRef    | handle | An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available. |

| uint64_t     | matchingId | Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced IoHandle. |

See also

OTF2_EvtWriter_IoOperationCancelled()  
OTF2_GlobalEvtReaderCallbacks_SetIoOperationCancelledCallback()  
OTF2_EvtReaderCallbacks_SetIoOperationCancelledCallback()

Since

Version 2.1
An *IoAcquireLock* record marks the acquisition of an I/O lock.
.123 IoReleaseLock

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>handle</td>
<td>An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>lockType</td>
<td>Type of the lock.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_IoAcquireLock()
OTF2_GlobalEvtReaderCallbacks_SetIoAcquireLockCallback()
OTF2_EvtReaderCallbacks_SetIoAcquireLockCallback()

Since

Version 2.1

.123 IoReleaseLock

An IoReleaseLock record marks the release of an I/O lock.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>location</td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td>handle</td>
<td>An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>lockType</td>
<td>Type of the lock.</td>
</tr>
</tbody>
</table>

See also

OTF2_EvtWriter_IoReleaseLock()
OTF2_GlobalEvtReaderCallbacks_SetIoReleaseLockCallback()
OTF2_EvtReaderCallbacks_SetIoReleaseLockCallback()

Since

Version 2.1

.124 IoTryLock

An IoTryLock record marks when an I/O lock was requested but not granted.
Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationRef</td>
<td>location The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_HandleRef</td>
<td>handle An active I/O handle. References a IoHandle definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_IO_HANDLE is available.</td>
</tr>
<tr>
<td>OTF2_LockType</td>
<td>lockType Type of the lock.</td>
</tr>
</tbody>
</table>

See also

- OTF2_EvtWriter_IoTryLock()
- OTF2_GlobalEvtReaderCallbacks_SetIoTryLockCallback()
- OTF2_EvtReaderCallbacks_SetIoTryLockCallback()

Since

Version 2.1

.125 ProgramBegin

The ProgramBegin record marks the begin of the program.

This event is restricted to happen at most once on any Location in a LocationGroup that is of type OTF2_LOCATIONION_GROUP_TYPE_PROCESS.

If there is a ProgramBegin record, a corresponding ProgramEnd record on any Location in the same LocationGroup is mandatory and vice versa.

None of the timestamps recorded within the same LocationGroup must be smaller than ProgramBegin's timestamp.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_LocationRef</td>
<td>location The location where this event happened.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp The time when this event happened.</td>
</tr>
<tr>
<td>OTF2_StringRef</td>
<td>programName The name of the program. References a String definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_STRING is available.</td>
</tr>
</tbody>
</table>
The *ProgramEnd* record marks the end of the program.

This event is restricted to happen at most once on any *Location* in a *LocationGroup* that is of type *OTF2_LOCATION*.

If there is a ProgramEnd record, a corresponding *ProgramBegin* record on any *Location* in the same *LocationGroup* is mandatory, and vice versa.

None of the timestamps recorded within the same *LocationGroup* must be larger than ProgramEnd’s timestamp.

**Attributes**

<table>
<thead>
<tr>
<th><em>OTF2_LocationRef</em></th>
<th>location</th>
<th>The location where this event happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>OTF2_TimeStamp</em></td>
<td>timestamp</td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><em>int64_t</em></td>
<td>exitStatus</td>
<td>The exit status of the program. Note, that on some systems only the least significant 8 bits may be visible to other processes. Use <em>OTF2_UNDEFINE</em> if the exit status was not available.</td>
</tr>
</tbody>
</table>

**See also**

- *OTF2_EvtWriter_ProgramEnd()*
- *OTF2_GlobalEvtReaderCallbacks_SetProgramEndCallback()*
- *OTF2_EvtReaderCallbacks_SetProgramEndCallback()*

**Since**

Version 2.1
## NonBlockingCollectiveComplete

A `NonBlockingCollectiveComplete` record indicates that a non-blocking collective operation completed.

### Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>location</code></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><code>timestamp</code></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><code>collectiveOp</code></td>
<td>Determines which collective operation it is.</td>
</tr>
<tr>
<td><code>communicator</code></td>
<td>Communicator ID. References a <code>Comm</code>, or a <code>InterComm</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING&lt;_,_&gt;_Comm</code> is available.</td>
</tr>
<tr>
<td><code>root</code></td>
<td>Rank of root in <code>communicator</code> or any predefined constant of <code>OTF2&lt;_,_&gt;CollectiveRoot</code>.</td>
</tr>
<tr>
<td><code>sizeSent</code></td>
<td>Size of the sent data.</td>
</tr>
<tr>
<td><code>sizeReceived</code></td>
<td>Size of the received data.</td>
</tr>
<tr>
<td><code>requestID</code></td>
<td>ID of the requested operation.</td>
</tr>
</tbody>
</table>

### See also

- `OTF2_EvtWriter_NonBlockingCollectiveComplete()`
- `OTF2_GlobalEvtReaderCallbacks_SetNonBlockingCollectiveCompleteCallback()`
- `OTF2EvtReaderCallbacks_SetNonBlockingCollectiveCompleteCallback()`

### Since

Version 3.0
A `CommCreate` record denotes the creation of a communicator. Only valid if the `Comm` definition was flagged with `OTF2_COMM_FLAG_CREATE_DESTROY_EVENTS`. This event must be enclosed by an `MpiCollectiveBegin` and `MpiCollectiveEnd` or `NonBlockingCollectiveRequest` and `NonBlockingCollectiveComplete` event pair with `OTF2_COLLECTIVE_OP_CREATE_HANDLE` as the operation type.

**Attributes**

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OTF2_CommCreateRefLocation</code></td>
<td><code>location</code></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><code>OTF2_CommCreateRefTimeStamp</code></td>
<td><code>timestamp</code></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><code>OTF2_CommCreateRefCommRef</code></td>
<td><code>communicator</code></td>
<td>Communicator ID. References a <code>Comm</code>, or a <code>InterComm</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_COMM</code> is available.</td>
</tr>
</tbody>
</table>

See also

- `OTF2EvtWriter_CommCreate()`
- `OTF2GlobalEvtReaderCallbacks_SetCommCreateCallback()`
- `OTF2EvtReaderCallbacks_SetCommCreateCallback()`

Since

- `Version 3.0`

---

A `CommDestroy` record marks the communicator for destruction at the end of the enclosing `MpiCollectiveBegin` and `MpiCollectiveEnd` event pair. Only valid if the `Comm` definition was flagged with `OTF2_COMM_FLAG_CREATE_DESTROY_EVENTS`. This event must be enclosed by an `MpiCollectiveBegin` and `MpiCollectiveEnd` event pair with `OTF2_COLLECTIVE_OP_DESTROY_HANDLE` as the operation type.

**Attributes**

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OTF2_CommDestroyRefLocation</code></td>
<td><code>location</code></td>
<td>The location where this event happened.</td>
</tr>
<tr>
<td><code>OTF2_CommDestroyRefTimeStamp</code></td>
<td><code>timestamp</code></td>
<td>The time when this event happened.</td>
</tr>
<tr>
<td><code>OTF2_CommDestroyRefCommRef</code></td>
<td><code>communicator</code></td>
<td>Communicator ID. References a <code>Comm</code>, or a <code>InterComm</code> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_COMM</code> is available.</td>
</tr>
</tbody>
</table>

See also

- `OTF2EvtWriter_CommDestroy()`
- `OTF2GlobalEvtReaderCallbacks_SetCommDestroyCallback()`
- `OTF2EvtReaderCallbacks_SetCommDestroyCallback()`

Since

- `Version 3.0`
List of all marker records

**OTF2_MarkerRef DefMarker**

Group markers by name and severity.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>markerGroup</td>
<td>Group name, e.g., “MUST”, ...</td>
</tr>
<tr>
<td>markerCategory</td>
<td>Marker category, e.g., “Argument type error”, ...</td>
</tr>
<tr>
<td>severity</td>
<td>The severity for these markers.</td>
</tr>
</tbody>
</table>

See also

- OTF2_MarkerWriter_WriteDefMarker()
- OTF2_MarkerReaderCallbacks_SetDefMarkerCallback()

Since

Version 1.2

**Marker**

A user marker instance, with implied time stamp.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>timestamp</td>
<td>The time when this marker happened.</td>
</tr>
<tr>
<td>duration</td>
<td>A possible duration of this marker. May be 0.</td>
</tr>
<tr>
<td>marker</td>
<td>Groups this marker by name and severity. References a DefMarker definition.</td>
</tr>
<tr>
<td>scope</td>
<td>The type of scope of this marker instance.</td>
</tr>
<tr>
<td>scopeRef</td>
<td>The scope instance of this marker. Depends on scope.</td>
</tr>
<tr>
<td>text</td>
<td>A textual description for this marker.</td>
</tr>
</tbody>
</table>

See also

- OTF2_MarkerWriter_WriteMarker()
- OTF2_MarkerReaderCallbacks_SetMarkerCallback()

Since

Version 1.2
List of all snapshot records

### SnapshotStart

This record marks the start of a snapshot.

A snapshot consists of a timestamp and a set of snapshot records. All these snapshot records have the same snapshot time. A snapshot starts with one `SnapshotStart` record and closes with one `SnapshotEnd` record. All snapshot records inbetween are ordered by the `origEventTime`, which are also less than the snapshot timestamp. I.e. The timestamp of the next event read from the event stream is greater or equal to the snapshot time.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2::LocationRef</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::TimeStamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>numberOfRecords</td>
<td>Number of snapshot event records in this snapshot. Excluding the <code>SnapshotEnd</code> record.</td>
</tr>
</tbody>
</table>

See also

- `OTF2_SnapWriter_SnapshotStart()`
- `OTF2_GlobalSnapReaderCallbacks_SetSnapshotStartCallback()`
- `OTF2_SnapReaderCallbacks_SetSnapshotStartCallback()`

Since

Version 1.2

### SnapshotEnd

This record marks the end of a snapshot. It contains the position to continue reading in the event trace for this location. Use `OTF2_EvtReader_Seek` with `contReadPos` as the position.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2::LocationRef</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2::TimeStamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
</tbody>
</table>
### .137 MeasurementOnOffSnap

The last occurrence of a `MeasurementOnOff` event of this location, if any.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2˓→LocationRef</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2˓→Timestamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2˓→origEventTimestamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
<tr>
<td>OTF2˓→MeasurementMode</td>
<td>measurementMode</td>
<td>Is the measurement turned on (OTF2_MEASUREMENT_ON) or off (OTF2_MEASUREMENT_OFF)?</td>
</tr>
</tbody>
</table>

**See also**

- `MeasurementOnOff` event
- OTF2_SnapWriter_MeasurementOnOff()
- OTF2_GlobalSnapReaderCallbacks_SetMeasurementOnOffCallback()
- OTF2_SnapReaderCallbacks_SetMeasurementOnOffCallback()

**Since**

Version 1.2

### .138 EnterSnap

This record exists for each `Enter` event where the corresponding `Leave` event did not occur before the snapshot.
.139 MpiSendSnap

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2__LocationRef</td>
<td>location</td>
</tr>
<tr>
<td>OTF2__TimeStamp</td>
<td>timestamp</td>
</tr>
<tr>
<td>OTF2__origEventTime</td>
<td>origEventTime</td>
</tr>
<tr>
<td>OTF2__RegionRef</td>
<td>region</td>
</tr>
</tbody>
</table>

See also

- Enter event
- OTF2_SnapWriter_Enter()
- OTF2_GlobalSnapReaderCallbacks_SetEnterCallback()
- OTF2_SnapReaderCallbacks_SetEnterCallback()

Since

Version 1.2

.139 MpiSendSnap

This record exists for each MpiSend event where the matching receive message event did not occur on the remote location before the snapshot. This could either be a MpiRecv or a MpiIrecv event. Note that it may so, that a previous MpiSend with the same envelope than this one is neither completed not canceled yet, thus the matching receive may already occurred, but the matching couldn't be done yet.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2__LocationRef</td>
<td>location</td>
</tr>
<tr>
<td>OTF2__TimeStamp</td>
<td>timestamp</td>
</tr>
<tr>
<td>OTF2__origEventTime</td>
<td>origEventTime</td>
</tr>
<tr>
<td>uint32_t receiver</td>
<td>MPI rank of receiver in communicator.</td>
</tr>
<tr>
<td>OTF2__CommRef</td>
<td>communicator ID. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING__COMM is available.</td>
</tr>
</tbody>
</table>
See also

*MpiSend* event

OTF2_SnapWriter_MpiSend()

OTF2_GlobalSnapReaderCallbacks_SetMpiSendCallback()

OTF2_SnapReaderCallbacks_SetMpiSendCallback()

Since

Version 1.2

.140  **MpiIsendSnap**

This record exists for each *MpiSend* event where a corresponding *MpiSendComplete* or *MpiRequestCancelled* event did not occur on this location before the snapshot. Or the corresponding *MpiSendComplete* did occurred (the *MpiSendCompleteSnap* record exists in the snapshot) but the matching receive message event did not occur on the remote location before the snapshot. (This could either be an *MpiRecv* or a *MpiIrecv* event.)

Attributes

<table>
<thead>
<tr>
<th>OTF2_LocationRef</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_TimeStamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2_TimeStamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
<tr>
<td>uint32_t receiver</td>
<td>communicator</td>
<td>MPI rank of receiver in communicator.</td>
</tr>
<tr>
<td>uint32_t msgTag</td>
<td>msgTag</td>
<td>Message tag</td>
</tr>
<tr>
<td>uint64_t msgLength</td>
<td>msgLength</td>
<td>Message length</td>
</tr>
<tr>
<td>uint64_t requestID</td>
<td>requestID</td>
<td>ID of the related request</td>
</tr>
</tbody>
</table>

See also

*MpiSend* event

OTF2_SnapWriter_MpiSend()

OTF2_GlobalSnapReaderCallbacks_SetMpiSendCallback()

OTF2_SnapReaderCallbacks_SetMpiSendCallback()

Since

Version 1.2

.141  **MpiIsendCompleteSnap**

This record exists for each *MpiSend* event where the corresponding *MpiSendComplete* event occurred, but where the matching receive message event did not occur on the remote location before the snapshot. (This could either be a *MpiRecv* or a *MpiIrecv* event.)
This record exists for each `MpiRecv` event where the matching send message event did not occur on the remote location before the snapshot. This could either be a `MpiSend` or a `MpiSendComplete` event. Or a `MpiRecvRequest` occurred before this event but the corresponding `MpiRecv` event did not occurred before this snapshot. In this case the message matching couldn’t performed yet, because the envelope of the ongoing `MpiRecvRequest` is not yet known.

Attributes

| OTF2_← Ref | location | The location of the snapshot. |
| OTF2_← Stamp | timestamp | The snapshot time of this record. |
| OTF2_← Stamp | origEventTime | The original time this event happened. |
| uint32_t | sender | MPI rank of sender in communicator. |
| OTF2_← CommRef | communicator | Communicator ID. References a `Comm`, or a `InterComm` definition and will be mapped to the global definition if a mapping table of type `OTF2_MAPPING_← _COMM` is available. |


<table>
<thead>
<tr>
<th>uint32_t</th>
<th>msgTag</th>
<th>Message tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>uint64_t</td>
<td>msgLength</td>
<td>Message length</td>
</tr>
</tbody>
</table>

See also

- **MpiRecv** event
  - OTF2_SnapWriter_MpiRecv()
  - OTF2_GlobalSnapReaderCallbacks_SetMpiRecvCallback()
  - OTF2_SnapReaderCallbacks_SetMpiRecvCallback()

Since

Version 1.2

.143 MpirecvRequestSnap

This record exists for each MpirecvRequest event where an corresponding Mpirecv or MpiRequestCancelled event did not occur on this location before the snapshot. Or the corresponding Mpirecv did occurred (the MpirecvSnap record exists in the snapshot) but the matching receive message event did not occur on the remote location before the snapshot. This could either be an MpiRecv or a Mpirecv event.

Attributes

<table>
<thead>
<tr>
<th>OTF2 REF Location</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2 REF Time Stamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2 REF Time Stamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
</tbody>
</table>

| uint64_t | requestID | ID of the requested receive |

See also

- **MpirecvRequest** event
  - OTF2_SnapWriter_MpirecvRequest()
  - OTF2_GlobalSnapReaderCallbacks_SetMpirecvRequestCallback()
  - OTF2_SnapReaderCallbacks_SetMpirecvRequestCallback()

Since

Version 1.2

.144 MpirecvSnap

This record exists for each Mpirecv event where the matching send message event did not occur on the remote location before the snapshot. This could either be a MpiSend or a MpsiSendComplete event. Or a MpirecvRequest occurred before this event but the corresponding Mpirecv event did not occurred before this snapshot. In this case the message matching couldn’t performed yet, because the envelope of the ongoing MpirecvRequest is not yet known.
.145 MpiCollectiveBeginSnap

Attributes

| OTF2← Location← Ref | location | The location of the snapshot. |
| OTF2← Time← Stamp | timestamp | The snapshot time of this record. |
| OTF2← Time← Stamp | origEventTime | The original time this event happened. |

| uint32_t | sender | MPI rank of sender in communicator. |
| OTF2← CommRef | communicator | Communicator ID. References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING← _COMM is available. |

| uint32_t | msgTag | Message tag |
| uint64_t | msgLength | Message length |
| uint64_t | requestID | ID of the related request |

See also

MpiIrecv event
OTF2_SnapWriter_MpiIrecv()
OTF2_GlobalSnapReaderCallbacks_SetMpiIrecvCallback()
OTF2_SnapReaderCallbacks_SetMpiIrecvCallback()

Since
Version 1.2

.145 MpiCollectiveBeginSnap

Indicates that this location started a collective operation but not all of the participating locations completed the operation yet, including this location.

Attributes

| OTF2← Location← Ref | location | The location of the snapshot. |
| OTF2← Time← Stamp | timestamp | The snapshot time of this record. |
| OTF2← Time← Stamp | origEventTime | The original time this event happened. |

See also

MpiCollectiveBegin event
OTF2_SnapWriter_MpiCollectiveBegin()
OTF2_GlobalSnapReaderCallbacks_SetMpiCollectiveBeginCallback()
OTF2_SnapReaderCallbacks_SetMpiCollectiveBeginCallback()

Since
Version 1.2
.146  MpiCollectiveEndSnap

Indicates that this location completed a collective operation locally but not all of the participating locations completed the operation yet. The corresponding MpiCollectiveBeginSnap record is still in the snapshot though.
.147 OmpForkSnap

Attributes

<table>
<thead>
<tr>
<th>OTF2←Location←Ref</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2←Time←Stamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2←Time←Stamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
<tr>
<td>OTF2←Collective←Op</td>
<td>collectiveOp</td>
<td>Determines which collective operation it is.</td>
</tr>
<tr>
<td>OTF2←CommRef</td>
<td>communicator</td>
<td>Communicator References a Comm, or a InterComm definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING←_COMM is available.</td>
</tr>
<tr>
<td>uint32_t</td>
<td>root</td>
<td>Rank of root in communicator or any predefined constant of OTF2←CollectiveRoot.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>sizeSent</td>
<td>Size of the sent message.</td>
</tr>
<tr>
<td>uint64_t</td>
<td>sizeReceived</td>
<td>Size of the received message.</td>
</tr>
</tbody>
</table>

See also

MpiCollectiveEnd event
OTF2_SnapWriter_MpiCollectiveEnd()
OTF2_GlobalSnapReaderCallbacks_SetMpiCollectiveEndCallback()
OTF2_SnapReaderCallbacks_SetMpiCollectiveEndCallback()

Since

Version 1.2

.147 OmpForkSnap

This record exists for each OmpFork event where the corresponding OmpJoin did not occurred before this snapshot.

Attributes

<table>
<thead>
<tr>
<th>OTF2←Location←Ref</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2←Time←Stamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2←Time←Stamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
</tbody>
</table>
\begin{verbatim}
uint32_t numberOf ← Requested Threads

Requested size of the team.

See also

\texttt{OmpFork} event

\texttt{OTF2\_SnapWriter\_OmpFork()}

\texttt{OTF2\_GlobalSnapReaderCallbacks\_SetOmpForkCallback()}

\texttt{OTF2\_SnapReaderCallbacks\_SetOmpForkCallback()}

Since

Version 1.2

.148 OmpAcquireLockSnap

This record exists for each \texttt{OmpAcquireLock} event where the corresponding \texttt{OmpReleaseLock} did not occurred before this snapshot yet.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2_{→} Location_{→} Ref</td>
<td>location</td>
</tr>
<tr>
<td>OTF2_{→} Time_{→} Stamp</td>
<td>timestamp</td>
</tr>
<tr>
<td>OTF2_{→} Time_{→} Stamp</td>
<td>origEventTime</td>
</tr>
<tr>
<td>uint32_t</td>
<td>lockID</td>
</tr>
<tr>
<td>uint32_t</td>
<td>acquisitionOrder</td>
</tr>
</tbody>
</table>

See also

\texttt{OmpAcquireLock} event

\texttt{OTF2\_SnapWriter\_OmpAcquireLock()}

\texttt{OTF2\_GlobalSnapReaderCallbacks\_SetOmpAcquireLockCallback()}

\texttt{OTF2\_SnapReaderCallbacks\_SetOmpAcquireLockCallback()}

Since

Version 1.2

.149 OmpTaskCreateSnap

This record exists for each \texttt{OmpTaskCreate} event where the corresponding \texttt{OmpTaskComplete} event did not occurred before this snapshot. Neither on this location nor on any other location in the current thread team.
.150 OmpTaskSwitchSnap

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>location</td>
<td></td>
<td>The location of the snapshot.</td>
</tr>
<tr>
<td>timestamp</td>
<td></td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>origEventTime</td>
<td></td>
<td>The original time this event happened.</td>
</tr>
<tr>
<td>taskID</td>
<td>uint64_t</td>
<td>Identifier of the newly created task instance.</td>
</tr>
</tbody>
</table>

See also

- OmpTaskCreate event
  - OTF2_SnapWriter_OmpTaskCreate()
  - OTF2_GlobalSnapReaderCallbacks_SetOmpTaskCreateCallback()
  - OTF2_SnapReaderCallbacks_SetOmpTaskCreateCallback()

Since

Version 1.2

.150 OmpTaskSwitchSnap

This record exists for each OmpTaskSwitch event where the corresponding OmpTaskComplete event did not occur before this snapshot. Neither on this location nor on any other location in the current thread team.

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>location</td>
<td></td>
<td>The location of the snapshot.</td>
</tr>
<tr>
<td>timestamp</td>
<td></td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>origEventTime</td>
<td></td>
<td>The original time this event happened.</td>
</tr>
<tr>
<td>taskID</td>
<td>uint64_t</td>
<td>Identifier of the now active task instance.</td>
</tr>
</tbody>
</table>

See also

- OmpTaskSwitch event
  - OTF2_SnapWriter_OmpTaskSwitch()
  - OTF2_GlobalSnapReaderCallbacks_SetOmpTaskSwitchCallback()
  - OTF2_SnapReaderCallbacks_SetOmpTaskSwitchCallback()

Since

Version 1.2
.151 MetricSnap

This record exists for each referenced metric class or metric instance event this location recorded metrics before and provides the last known recorded metric values.

As an exception for metric classes where the metric mode denotes an OTF2_METRIC_VALUE_RELATIVE mode the value indicates the accumulation of all previous metric values recorded.

Attributes

| OTF2_Location<Ref | location | The location of the snapshot. |
| OTF2_Time<Stamp   | timestamp| The snapshot time of this record. |
| OTF2_MetricRef    | metric   | Could be a metric class or a metric instance. References a MetricClass, or a MetricInstance definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_METRIC is available. |
|                   | numberOfMetrics | Number of metrics with in the set. |
| OTF2_Type         | typeIDs [numberOfMetrics] | List of metric types. These types must match that of the corresponding MetricMember definitions. |
| OTF2_MetricValue  | metricValues [numberOfMetrics] | List of metric values. |

See also

- Metric event
  - OTF2_SnapWriter_Metric()
  - OTF2_GlobalSnapReaderCallbacks_SetMetricCallback()
  - OTF2_SnapReaderCallbacks_SetMetricCallback()

Since

Version 1.2

.152 ParameterStringSnap

This record must be included in the snapshot until the leave event for the enter event occurs which has the greatest timestamp less or equal the timestamp of this record.
.153 ParameterIntSnap

Attributes

| OTF2_LocationRef | location | The location of the snapshot. |
| OTF2_TimeStamp  | timestamp | The snapshot time of this record. |
| OTF2_TimeStamp  | origEventTime | The original time this event happened. |
| OTF2_ParameterRef | parameter | Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_PARAMETER is available. |
| OTF2_StringRef  | string | Value: Handle of a string definition References a String definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_STRING is available. |

See also

ParameterString event
  OTF2_SnapWriter_ParameterString()
  OTF2_GlobalSnapReaderCallbacks_SetParameterStringCallback()
  OTF2_SnapReaderCallbacks_SetParameterStringCallback()

Since

Version 1.2

.153 ParameterIntSnap

This record must be included in the snapshot until the leave event for the enter event occurs which has the greatest timestamp less or equal the timestamp of this record.

Attributes

| OTF2_LocationRef | location | The location of the snapshot. |
| OTF2_TimeStamp  | timestamp | The snapshot time of this record. |
| OTF2_TimeStamp  | origEventTime | The original time this event happened. |
| OTF2_ParameterRef | parameter | Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_MAPPING_PARAMETER is available. |
### ParameterInt

This record must be included in the snapshot until the leave event for the enter event occurs which has the greatest timestamp less or equal the timestamp of this record.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2 Location Ref</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2 Time Stamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2 Time Stamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTF2 Parameter Ref</th>
<th>parameter</th>
<th>Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_Mapping_Parameter is available.</th>
</tr>
</thead>
</table>

| uint64_t value | Value of the recorded parameter. |

See also

- `ParameterInt` event
- `OTF2_SnapWriter_ParameterInt()`
- `OTF2_GlobalSnapReaderCallbacks_SetParameterIntCallback()`
- `OTF2_SnapReaderCallbacks_SetParameterIntCallback()`

**Since**

- Version 1.2

### ParameterUnsignedInt

This record must be included in the snapshot until the leave event for the enter event occurs which has the greatest timestamp less or equal the timestamp of this record.

**Attributes**

<table>
<thead>
<tr>
<th>OTF2 Location Ref</th>
<th>location</th>
<th>The location of the snapshot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTF2 Time Stamp</td>
<td>timestamp</td>
<td>The snapshot time of this record.</td>
</tr>
<tr>
<td>OTF2 Time Stamp</td>
<td>origEventTime</td>
<td>The original time this event happened.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTF2 Parameter Ref</th>
<th>parameter</th>
<th>Parameter ID. References a Parameter definition and will be mapped to the global definition if a mapping table of type OTF2_Mapping_Parameter is available.</th>
</tr>
</thead>
</table>

| uint64_t value | Value of the recorded parameter. |

See also

- `ParameterUnsignedInt` event
- `OTF2_SnapWriter_ParameterUnsignedInt()`
- `OTF2_GlobalSnapReaderCallbacks_SetParameterUnsignedIntCallback()`
- `OTF2_SnapReaderCallbacks_SetParameterUnsignedIntCallback()`

**Since**

- Version 1.2
Appendix A

Example Documentation

A.1 otf2_high_level_reader_example.py

Python high-level reading example

```
#!/usr/bin/env python
#
# This file is part of the Score-P software (http://www.score-p.org)
#
# Copyright (c) 2015-2017,
# Technische Universitaet Dresden, Germany
#
# This software may be modified and distributed under the terms of
# a BSD-style license. See the COPYING file in the package base
# directory for details.
#
import otf2

with otf2.reader.open('TestArchive/traces.otf2') as trace:
    print("Read {} string definitions".format(len(trace.definitions.strings)))
    for location, event in trace.events:
        print("Encountered {} event {} on {}".format(type(event).__name__,
                                                      event, location))
```

A.2 otf2_high_level_writer_example.py

Python high-level writing example

```
#!/usr/bin/env python
#
# This file is part of the Score-P software (http://www.score-p.org)
#
# Copyright (c) 2015-2016, 2021,
# Technische Universitaet Dresden, Germany
#
# This software may be modified and distributed under the terms of
# a BSD-style license. See the COPYING file in the package base
# directory for details.
#
import otf2
from otf2.enums import Type
import time

TIMER_GRANULARITY = 1000000
```
APPENDIX A. EXAMPLE DOCUMENTATION

include <stdlib.h>
include <stdio.h>
include <inttypes.h>
include <mpi.h>

A.3 otf2_mpi_reader_example.c

MPI reading example

# This file is part of the Score-P software (http://www.score-p.org)
#
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# Copyright (c) 2009-2013,
# German Research School for Simulation Sciences GmbH, Juelsch/Aachen, Germany
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# Technische Universitaet Muenchen, Germany
#
# This software may be modified and distributed under the terms of
# a BSD-style license. See the COPYING file in the package base
# directory for details.
#
#include <stdlib.h>
#include <stdio.h>
#include <inttypes.h>
#include <mpi.h>
```c
#include <otf2/otf2.h>
#if MPI_VERSION < 3
#define OTF2_MPI_UINT64_T MPI_UNSIGNED_LONG
#define OTF2_MPI_INT64_T MPI_LONG
#endif
#include <otf2/OTF2_MPI_Collectives.h>

static OTF2_CallbackCode
Enter_print( OTF2_LocationRef location,
OTF2_TimeStamp time,
void* userData,
OTF2_AttributeList* attributes,
OTF2_RegionRef region )
{
    printf( "Entering region %u at location %" PRIu64 " at time %" PRIu64 "\n", region, location, time );
    return OTF2_CALLBACK_SUCCESS;
}

static OTF2_CallbackCode
Leave_print( OTF2_LocationRef location,
OTF2_TimeStamp time,
void* userData,
OTF2_AttributeList* attributes,
OTF2_RegionRef region )
{
    printf( "Leaving region %u at location %" PRIu64 " at time %" PRIu64 "\n", region, location, time );
    return OTF2_CALLBACK_SUCCESS;
}

struct vector
{
    size_t capacity;
    size_t size;
    uint64_t members[];
};

static OTF2_CallbackCode
GlobDefLocation_Register( void* userData,
OTF2_LocationRef location,
OTF2_TimeStamp time,
void* userData,
OTF2_AttributeList* attributes,
OTF2_RegionRef region )
{
    struct vector* locations = userData;
    if ( locations->size == locations->capacity )
        return OTF2_CALLBACK_INTERRUPT;
    locations->members[ locations->size++ ] = location;
    return OTF2_CALLBACK_SUCCESS;
}

int
main( int argc,
char** argv )
{
    MPI_Init( &argc, &argv );
    int size;
    MPI_Comm_size( MPI_COMM_WORLD, &size );
    int rank;
    MPI_Comm_rank( MPI_COMM_WORLD, &rank );
    OTF2_Reader* reader = OTF2_Reader_Open( "ArchivePath/ArchiveName.otf2" );
    OTF2_MPI_Reader_SetCollectiveCallbacks( reader, MPI_COMM_WORLD );
    uint64_t number_of_locations;
    OTF2_Reader_GetNumberOfLocations( reader,
        &number_of_locations );
    struct vector* locations = malloc( sizeof( *locations )
        + number_of_locations
        * sizeof( *locations->members ) );
    locations->capacity = number_of_locations;
    locations->size = 0;
    OTF2_GlobalDefReader* global_def_reader = OTF2_Reader_GetGlobalDefReader( reader );
    ```
OTF2_GlobalDefReaderCallbacks* global_def_callbacks = OTF2_GlobalDefReaderCallbacks_New();
OTF2_GlobalDefReaderCallbacks_SetLocationCallback(global_def_callbacks, GlobDefLocation_Register);
OTF2_Reader_RegisterGlobalDefCallbacks(reader, global_def_reader, global_def_callbacks, locations);
OTF2_GlobalDefReaderCallbacks_Delete(global_def_callbacks);

uint64_t definitions_read = 0;
OTF2_Reader_ReadAllGlobalDefinitions(reader, global_def_reader, &definitions_read);

uint64_t number_of_locations_to_read = 0;
for (size_t i = 0; i < locations->size; i++) {
    if (locations->members[i] % size != rank) continue;
    number_of_locations_to_read++;
    OTF2_Reader_SelectLocation(reader, locations->members[i]);
}

bool successful_open_def_files = OTF2_Reader_OpenDefFiles(reader) == OTF2_SUCCESS;
OTF2_Reader_OpenEvtFiles(reader);
for (size_t i = 0; i < locations->size; i++) {
    if (locations->members[i] % size != rank) continue;
    if (successful_open_def_files) {
        OTF2_DefReader* def_reader = OTF2_Reader_GetDefReader(reader, locations->members[i]);
        if (def_reader) {
            uint64_t def_reads = 0;
            OTF2_Reader_ReadAllLocalDefinitions(reader, def_reader, &def_reads);
            OTF2_Reader_CloseDefReader(reader, def_reader);
        }
    }
    OTF2EvtReader* evt_reader = OTF2_Reader_GetEvtReader(reader, locations->members[i]);
}
if (successful_open_def_files) {
    OTF2EvtReader* def_reader = OTF2_Reader_GetDefReader(reader, locations->members[i]);
    if (def_reader) {
        uint64_t def_reads = 0;
        OTF2EvtReader_ReadAllLocalDefinitions(reader, def_reader, &def_reads);
        OTF2EvtReader_CloseDefReader(reader, def_reader);
    }
}
if (successful_open_def_files) {
    OTF2EvtReader* evt_reader = OTF2_Reader_GetEvtReader(reader, locations->members[i]);
}
if (number_of_locations_to_read > 0) {
    OTF2_GlobalEvtReader* global_evt_reader = OTF2_Reader_GetGlobalEvtReader(reader);
    OTF2_GlobalEvtReaderCallbacks* event_callbacks = OTF2_GlobalEvtReaderCallbacks_New();
    OTF2_GlobalEvtReaderCallbacks_SetEnterCallback(event_callbacks, Enter_print);
    OTF2_GlobalEvtReaderCallbacks_SetLeaveCallback(event_callbacks, Leave_print);
    OTF2_Reader_RegisterGlobalEvtCallbacks(reader, global_evt_reader, event_callbacks, NULL);
    OTF2_GlobalEvtReaderCallbacks_Delete(event_callbacks);
    uint64_t events_read = 0;
    OTF2_Reader_ReadAllGlobalEvents(reader, global_evt_reader, &events_read);
    OTF2_Reader_CloseGlobalEvtReader(reader, global_evt_reader);
}
OTF2_Reader_CloseEvtFiles(reader);
OTF2_Reader_Close(reader);
free(locations);
MPI_Finalize();
A.4 otf2_mpi_reader_example.cc

return EXIT_SUCCESS;

A.4 otf2_mpi_reader_example.cc

MPI reading example in C++

/*
 * This file is part of the Score-P software (http://www.score-p.org)
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 * Technische Universitaet Muenchen, Germany
 * This software may be modified and distributed under the terms of
 * a BSD-style license. See the COPYING file in the package base
 * directory for details.
 */

#include <stdlib.h>
#include <iostream>
#include <vector>
#include <mpi.h>
#include <otf2/otf2.h>
#if MPI_VERSION < 3
#define OTF2_MPI_UINT64_T MPI_UNSIGNED_LONG
#define OTF2_MPI_INT64_T MPI_LONG
#endif
#include <otf2/OTF2_MPI_Collectives.h>

static OTF2_CallbackCode
Enter_print( OTF2_LocationRef location,
            OTF2_TimeStamp time,
            void* userData,
            OTF2_AttributeList* attributes,
            OTF2_RegionRef region )
{
    std::cout << "Entering region " << region << " at location " << location << " at time " << time << std::endl;
    return OTF2_CALLBACK_SUCCESS;
}

static OTF2_CallbackCode
Leave_print( OTF2_LocationRef location,
             OTF2_TimeStamp time,
             void* userData,
             OTF2_AttributeList* attributes,
             OTF2_RegionRef region )
{
    std::cout << "Leaving region " << region << " at location " << location << " at time " << time << std::endl;
    return OTF2_CALLBACK_SUCCESS;
}

static OTF2_CallbackCode
GlobDefLocation_Register( void* userData,
                          OTF2_LocationRef location,
                          OTF2_TimeStamp time,
                          void* userData,
                          OTF2_AttributeList* attributes,
                          OTF2_RegionRef region )
{
OTF2_LocationRef location,
OTF2_StringRef name,
OTF2_LocationType locationType,
uint64_t numberOfEvents,
OTF2_LocationGroupRef locationGroup

}[
std::vector<OTF2_LocationRef>* locations =
{ std::vector<OTF2_LocationRef>* )userData;
locations->push_back( location );
return OTF2_CALLBACK_SUCCESS;
}

int
main(int argc,
char** argv )
{
MPI_Init( &argc, &argv );
int size;
MPI_Comm_size( MPI_COMM_WORLD, &size );
int rank;
MPI_Comm_rank( MPI_COMM_WORLD, &rank );
OTF2_Reader* reader = OTF2_Reader_Open( "ArchivePath/ArchiveName.otf2" );
OTF2_Reader_SetCollectiveCallbacks( reader, MPI_COMM_WORLD );
uint64_t number_of_locations;
OTF2_Reader_GetNumberOfLocations( reader,
&number_of_locations );
std::vector<OTF2_LocationRef> locations;locations.reserve( number_of_locations );
OTF2_GlobalDefReader* global_def_reader = OTF2_Reader_GetGlobalDefReader( reader );
OTF2_GlobalDefReaderCallbacks* global_def_callbacks = OTF2_GlobalDefReaderCallbacks_New();
OTF2_GlobalDefReaderCallbacks_SetLocationCallback( global_def_callbacks,
&GlobDefLocation_Register );
OTF2_Reader_RegisterGlobalDefCallbacks( reader,
global_def_reader,
global_def_callbacks,
&locations );
OTF2_GlobalDefReaderCallbacks_Delete( global_def_callbacks );
uint64_t definitions_read = 0;
OTF2_Reader_ReadAllGlobalDefinitions( reader,
global_def_reader,
&definitions_read );
uint64_t number_of_locations_to_read = 0;
for ( std::size_t i = 0; i < locations.size(); i++ )
{
if ( locations[i] % size != rank )
{
continue;
}
number_of_locations_to_read++;
OTF2_Reader_SelectLocation( reader, locations[i] );
}
bool successful_open_def_files =
OTF2_Reader_OpenDefFiles( reader ) == OTF2_SUCCESS;
OTF2_Reader_OpenEvtFiles( reader );
for ( std::size_t i = 0; i < locations.size(); i++ )
{
if ( locations[i] % size != rank )
{
continue;
}
if ( successful_open_def_files )
{
OTF2_DefReader* def_reader =
OTF2_Reader_GetDefReader( reader, locations[i] );
if ( def_reader )
{
uint64_t def_reads = 0;
OTF2_Reader_ReadAllLocalDefinitions( reader,
def_reader,
&def_reads );
OTF2_Reader_CloseDefReader( reader, def_reader );
}
OTF2EvtReader* evt_reader =
OTF2_Reader_GetEvtReader( reader, locations[i] );
A.5 otf2_mpi_writer_example.c

if ( successful_open_def_files ) {
    OTF2_Reader_CloseDefFiles( reader );
}

if ( number_of_locations_to_read > 0 ) {
    OTF2_GlobalEvtReader* global_evt_reader = OTF2_Reader_GetGlobalEvtReader( reader );
    OTF2_GlobalEvtReaderCallbacks* event_callbacks = OTF2_GlobalEvtReaderCallbacks_New();
    OTF2_GlobalEvtReaderCallbacks_SetEnterCallback( event_callbacks, &Enter_print );
    OTF2_GlobalEvtReaderCallbacks_SetLeaveCallback( event_callbacks, &Leave_print );
    OTF2_Reader_RegisterGlobalEvtCallbacks( reader, global_evt_reader, event_callbacks, NULL );
    OTF2_GlobalEvtReaderCallbacks_Delete( event_callbacks );
    uint64_t events_read = 0;
    OTF2_Reader_ReadAllGlobalEvents( reader, global_evt_reader, &events_read );
    OTF2_Reader_CloseGlobalEvtReader( reader, global_evt_reader );
}
OTF2_Reader_CloseEvtFiles( reader );
OTF2_Reader_Close( reader );
MPI_Finalize();
return EXIT_SUCCESS;

A.5 otf2_mpi_writer_example.c

MPI writing example

/*
 * This file is part of the Score-P software (http://www.score-p.org)
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 * RWTH Aachen University, Germany
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 * Gesellschaft fuer numerische Simulation mbH Braunschweig, Germany
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 * Copyright [c] 2009-2013,
 * University of Oregon, Eugene, USA
 * Copyright [c] 2009-2013,
 * Forschungszentrum Juelich GmbH, Germany
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 * German Research School for Simulation Sciences GmbH, Juelich/Aachen, Germany
 * Copyright [c] 2009-2013,
 * Technische Universitaet Muenchen, Germany
 * This software may be modified and distributed under the terms of
 * a BSD-style license. See the COPYING file in the package base
 * directory for details.
 */
#include <stdlib.h>
#include <stdio.h>
#include <inttypes.h>
#include <time.h>
#include <mpi.h>
#include <otf2/otf2.h>
APPENDIX A. EXAMPLE DOCUMENTATION

```c
#include <otf2/OTF2_MPI_Collectives.h>
static OTF2_TimeStamp
get_time( void )
{
  double t = MPI_Wtime() * 1e9;
  return ( uint64_t )t;
}
static OTF2_FlushType
pre_flush( void* userData,
  OTF2_FileType fileType,
  OTF2_LocationRef location,
  void* callerData,
  bool final )
{
  return OTF2_FLUSH;
}
static OTF2_TimeStamp
post_flush( void* userData,
  OTF2_FileType fileType,
  OTF2_LocationRef location )
{
  return get_time();
}
static OTF2_FlushCallbacks flush_callbacks =
  {
    .otf2_pre_flush = pre_flush,
    .otf2_post_flush = post_flush
  };
enum
{
  REGION_MPI_INIT,
  REGION_MPI_FINALIZE,
  REGION_MPI_COMM_SPLIT,
  REGION_MPI_INTERCOMM_CREATE,
  REGION_MPI_COMM_FREE,
  REGION_MPI_BCAST,
  REGION_MPI_IBARRIER,
  REGION_MPI_TEST,
  REGION_MPI_WAIT
};
enum
{
  COMM_WORLD,
  COMM_SPLIT_0,
  COMM_SPLIT_1,
  COMM_INTERCOMM
};
int
main( int argc,
     char** argv )
{
  MPI_Init(&argc, &argv);
  int size;
  MPI_Comm_size( MPI_COMM_WORLD, &size );
  int rank;
  MPI_Comm_rank( MPI_COMM_WORLD, &rank );
  OTF2_Archive* archive = OTF2_Archive_Open("ArchivePath",
                                           "ArchiveName",
                                           OTF2_FILEMODE_WRITE,
                                           1024 * 1024 /* event chunk size */,
                                           4 * 1024 * 1024 /* def chunk size */,
                                           OTF2_SUBSTRATE_POSIX,
                                           OTF2_COMPRESSION_NONE );
  OTF2_Archive_SetFlushCallbacks( archive, &flush_callbacks, NULL );
  OTF2_MPI_Archive_SetCollectiveCallbacks( archive,
                                           MPI_COMM_WORLD,
                                           MPI_COMM_NULL );
  OTF2_Archive_OpenEvtFiles( archive );
  OTF2_EvtWriter* evt_writer = OTF2_Archive_GetEvtWriter( archive,
```
A.5 of2_mpi_writer_example.c

rank);

struct timespec epoch_timestamp_spec;
clock_gettime( CLOCK_REALTIME, &epoch_timestamp_spec );
uint64_t epoch_start = get_time();

OTF2_EvtWriter_Enter( evt_writer, NULL, get_time(), REGION_MPI_INIT );

OTF2_EvtWriter_MpiCollectiveBegin( evt_writer, NULL, get_time() );

// fake MPI_Init
MPI_Barrier( MPI_COMM_WORLD );

OTF2_EvtWriter_CommCreate( evt_writer, NULL, get_time(), COMM_WORLD );

OTF2_EvtWriter_MpiCollectiveEnd( evt_writer, NULL, get_time(), OTF2_COLLECTIVE_OP_CREATE_HANDLE, COMM_WORLD, OTF2_COLLECTIVE_ROOT_NONE, 0 /* bytes provided */, 0 /* bytes obtained */ );

OTF2_EvtWriter_Leave( evt_writer, NULL, get_time(), REGION_MPI_INIT );

OTF2_EvtWriter_Enter( evt_writer, NULL, get_time(), REGION_MPI_IBARRIER );

uint64_t barrier_request_id = 1; /* freely chosen request ID */

OTF2_EvtWriter_NonBlockingCollectiveRequest( evt_writer, NULL, get_time(), barrier_request_id );

MPI_Request barrier_request;

MPI_Ibarrier( MPI_COMM_WORLD, &barrier_request );

OTF2_EvtWriter_Leave( evt_writer, NULL, get_time(), REGION_MPI_IBARRIER );

if ( 0 == rank % 2 ) { 

OTF2_EvtWriter_CommCreate( evt_writer, NULL, get_time(), COMM_SPLIT_0 );
}
else {

OTF2_EvtWriter_CommCreate( evt_writer, NULL, get_time(), COMM_SPLIT_1 );
}

OTF2_EvtWriter_MpiCollectiveEnd( evt_writer, NULL, get_time(), OTF2_COLLECTIVE_OP_CREATE_HANDLE,
COMM_WORLD,
OTF2_COLLECTIVE_ROOT_NONE,
0 /* bytes provided */,
0 /* bytes obtained */ );

OTF2_EvtWriter_Leave( evt_writer,
    NULL,
    get_time(),
    REGION_MPI_COMM_SPLIT );

MPI_Comm inter_comm;
OTF2_EvtWriter_Enter( evt_writer,
    NULL,
    get_time(),
    REGION_MPI_INTERCOMM_CREATE );

OTF2_EvtWriter_MpiCollectiveBegin( evt_writer,
    NULL,
    get_time() );

if ( 0 == rank % 2 )
{
    MPI_Intercomm_create( split_comm, 0, MPI_COMM_WORLD, 1, 1, &inter_comm );
} else {
    MPI_Intercomm_create( split_comm, 0, MPI_COMM_WORLD, 0, 1, &inter_comm );
}

OTF2_EvtWriter_CommCreate( evt_writer,
    NULL,
    get_time(),
    COMM_INTERCOMM );

OTF2_EvtWriter_MpiCollectiveEnd( evt_writer,
    NULL,
    get_time(),
    COMM_WORLD,
    OTF2_COLLECTIVE_OP_CREATE_HANDLE,
    0 /* bytes provided */,
    0 /* bytes obtained */ );

OTF2_EvtWriter_Leave( evt_writer,
    NULL,
    get_time(),
    REGION_MPI_INTERCOMM_CREATE );

OTF2_EvtWriter_Enter( evt_writer,
    NULL,
    get_time(),
    REGION_MPI_COMM_FREE );

if ( 0 == rank % 2 )
{
    OTF2_EvtWriter_CommDestroy( evt_writer,
        NULL,
        get_time(),
        COMM_SPLIT_0 );
    OTF2_EvtWriter_MpiCollectiveEnd( evt_writer,
        NULL,
        get_time(),
        OTF2_COLLECTIVE_OP_DESTROY_HANDLE,
        COMM_SPLIT_0,
        OTF2_COLLECTIVE_ROOT_NONE,
        0 /* bytes provided */,
        0 /* bytes obtained */ );
} else {
    OTF2_EvtWriter_CommDestroy( evt_writer,
        NULL,
        get_time(),
        COMM_SPLIT_1 );
    OTF2_EvtWriter_MpiCollectiveEnd( evt_writer,
        NULL,
        get_time(),
        OTF2_COLLECTIVE_OP_DESTROY_HANDLE,
        COMM_SPLIT_1,
        128}
A.5 oft2_mpi_writer_example.c

```c
OTF2_EvtWriter_Leave( evt_writer, NULL, get_time(), REGION_MPI_COMM_FREE );

OTF2_EvtWriter_Enter( evt_writer, NULL, get_time(), REGION_MPI_TEST );
/* fake failing MPI_Test( &barrier_request, &flag, &status ); */
OTF2_EvtWriter_MpiRequestTest( evt_writer, NULL, get_time(), barrier_request_id );

OTF2_EvtWriter_Leave( evt_writer, NULL, get_time(), REGION_MPI_TEST );
OTF2_EvtWriter_Enter( evt_writer, NULL, get_time(), REGION_MPI_BCAST );
OTF2_EvtWriter_MpiCollectiveBegin( evt_writer, NULL, get_time() );

int res = -1;
if ( rank % 2 == 0 ) {
  if ( rank == 0 ) {
    res = 1;
    MPI_Bcast( &res, 1, MPI_INT, MPI_ROOT, inter_comm );
    OTF2_EvtWriter_MpiCollectiveEnd( evt_writer, NULL, get_time(),
                                      OTF2_COLLECTIVE_OP_BCAST,
                                      COMM_INTERCOMM,
                                      OTF2_COLLECTIVE_ROOT_SELF,
                                      0 /* bytes provided */,
                                      0 /* bytes obtained */ );
  } else {
    MPI_Bcast( &res, 1, MPI_INT, MPI_PROC_NULL, inter_comm );
    OTF2_EvtWriter_MpiCollectiveEnd( evt_writer, NULL, get_time(),
                                      OTF2_COLLECTIVE_OP_BCAST,
                                      COMM_INTERCOMM,
                                      OTF2_COLLECTIVE_ROOT_THIS_GROUP,
                                      0 /* bytes provided */,
                                      0 /* bytes obtained */ );
  }
} else if ( rank % 2 == 1 ) {
  MPI_Bcast( &res, 1, MPI_INT, 0, inter_comm );
  OTF2_EvtWriter_MpiCollectiveEnd( evt_writer, NULL, get_time(),
                                   OTF2_COLLECTIVE_OP_BCAST,
                                   COMM_INTERCOMM,
                                   OTF2_COLLECTIVE_ROOT_NONES,
                                   0 /* root */,
                                   0 /* bytes provided */,
                                   0 /* bytes obtained */ );
}

OTF2_EvtWriter_Leave( evt_writer, NULL, get_time(), REGION_MPI_BCAST );
OTF2_EvtWriter_Enter( evt_writer, NULL,
```
APPENDIX A. EXAMPLE DOCUMENTATION

class

get_time(),
REGION_MPI_COMM_FREE);

OTF2_EvtWriter_MpiCollectiveBegin( evt_writer,
NULL,
get_time() );

MPI_Comm_free(&inter_comm);

OTF2_EvtWriter_CommDestroy( evt_writer,
NULL,
get_time(),
COMM_INTERCOMM);

OTF2_EvtWriter_MpiCollectiveEnd( evt_writer,
NULL,
get_time(),
OTF2_COLLECTIVE_OP_DESTROY_HANDLE,
COMM_INTERCOMM,
OTF2_COLLECTIVE_ROOT_NONE,
0 /* bytes provided */, 0 /* bytes obtained */);

OTF2_EvtWriter_Leave( evt_writer,
NULL,
REGION_MPI_COMM_FREE);

OTF2_EvtWriter_Enter( evt_writer,
NULL,
get_time(),
REGION_MPI_WAIT);

MPI_Status barrier_status;
MPI_Wait(&barrier_request, &barrier_status);

OTF2_EvtWriter_NonBlockingCollectiveComplete( evt_writer,
NULL,
get_time(),
OTF2_COLLECTIVE_OP_BARRIER,
COMM_WORLD,
OTF2_COLLECTIVE_ROOT_NONE,
0 /* bytes provided */, 0 /* bytes obtained */,
barrier_request_id);

OTF2_EvtWriter_Leave( evt_writer,
NULL,
REGION_MPI_WAIT);

OTF2_EvtWriter_Enter( evt_writer,
NULL,
get_time(),
REGION_MPI_FINALIZE);

OTF2_EvtWriter_MpiCollectiveBegin( evt_writer,
NULL,
get_time() );

// fake MPI_Finalize
MPI_Barrier(MPI_COMM_WORLD);

OTF2_EvtWriter_CommDestroy( evt_writer,
NULL,
get_time(),
COMM_WORLD);

OTF2_EvtWriter_MpiCollectiveEnd( evt_writer,
NULL,
get_time(),
OTF2_COLLECTIVE_OP_DESTROY_HANDLE,
COMM_WORLD,
OTF2_COLLECTIVE_ROOT_NONE,
0 /* bytes provided */, 0 /* bytes obtained */);

OTF2_EvtWriter_Leave( evt_writer,
NULL,
REGION_MPI_FINALIZE);

uint64_t epoch_end = get_time();

OTF2_Archive_CloseEvtWriter( archive, evt_writer);

OTF2_Archive_CloseEvtFiles( archive);
OTF2_Archive_OpenDefFiles( archive );
OTF2_DefWriter* def_writer = OTF2_Archive_GetDefWriter( archive, rank );
OTF2_Archive_CloseDefFiles( archive );

uint64_t epoch_timestamp = epoch_timestamp_spec.tv_sec * 1000000000 + epoch_timestamp_spec.tv_nsec;

struct {
    uint64_t timestamp;
    int index;
} epoch_start_pair, global_epoch_start_pair;

epoch_start_pair.timestamp = epoch_start;
epoch_start_pair.index = rank;
MPI_Allreduce( &epoch_start_pair, &global_epoch_start_pair, 1, MPI_LONG_INT, MPI_MINLOC, MPI_COMM_WORLD );

if ( epoch_start_pair.index != 0 )
{
    if ( rank == 0 )
    {
        MPI_Recv( &epoch_timestamp, 1, OTF2_MPI_UINT64_T, epoch_start_pair.index, 0, MPI_COMM_WORLD, MPI_STATUS_IGNORE );
    }
    else
    {
        MPI_Send( &epoch_timestamp, 1, OTF2_MPI_UINT64_T, 0, 0, MPI_COMM_WORLD );
    }
}

uint64_t global_epoch_end;
MPI_Reduce( &epoch_end, &global_epoch_end, 1, OTF2_MPI_UINT64_T, MPI_MAX, 0, MPI_COMM_WORLD );

if ( 0 == rank )
{
    OTF2_GlobalDefWriter* global_def_writer = OTF2_Archive_GetGlobalDefWriter( archive );

    OTF2_GlobalDefWriter_WriteClockProperties( global_def_writer,
        1000000000, global_epoch_start_pair.timestamp, global_epoch_end - global_epoch_start_pair.timestamp + 1,
        epoch_timestamp );

    OTF2_GlobalDefWriter_WriteString( global_def_writer, 0, "" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 1, "Initial Thread" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 2, "MPI_Init" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 3, "PMPI_Init" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 4, "MPI_Finalize" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 5, "PMPI_Finalize" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 6, "MPI_Comm_split" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 7, "PMPI_Comm_split" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 8, "MPI_Intercomm_create" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 9, "PMPI_Intercomm_create" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 10, "MPI_Comm_free" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 11, "PMPI_Comm_free" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 12, "MPI_Bcast" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 13, "PMPI_Bcast" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 14, "MPI_Ibarrier" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 15, "PMPI_Ibarrier" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 16, "MPI_Test" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 17, "PMPI_Test" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 18, "MPI_Wait" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 19, "PMPI_Wait" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 20, "MyHost" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 21, "node" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 22, "MPI" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 23, "MPI_COMM_WORLD" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 24, "SPLIT 0" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 25, "SPLIT 1" );
    OTF2_GlobalDefWriter_WriteString( global_def_writer, 26, "INTERCOMM" );

    OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_INIT, 2 /* region name */,
        3 / alternative name */,
        0 /* description */,
        OTF2_REGION_ROLE_FUNCTION,
        OTF2_PARADIGM_MPI,
        OTF2_REGION_FLAG_NONE,
        22 /* source file */,
    }
}
OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_FINALIZE, 4 /* region name */, 5 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_FUNCTION, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_COMM_SPLIT, 6 /* region name */, 7 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_FUNCTION, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_INTERCOMM_CREATE, 8 /* region name */, 9 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_FUNCTION, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_COMM_FREE, 10 /* region name */, 11 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_FUNCTION, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_BCAST, 12 /* region name */, 13 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_COLL_ONE2ALL, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_IBARRIER, 14 /* region name */, 15 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_BARRIER, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, REGION_MPI_TEST, 16 /* region name */, 17 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_BARRIER, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );
OTF2_GlobalDefWriter_WriteRegion( global_def_writer,
REGION_MPI_WAIT,
18 /* region name */, 19 /* alternative name */, 0 /* description */, OTF2_REGION_ROLE_FUNCTION, OTF2_PARADIGM_MPI, OTF2_REGION_FLAG_NONE, 22 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteSystemTreeNode( global_def_writer, 0 /* id */, 20 /* name */, 21 /* class */, OTF2_UNDEFINED_SYSTEM_TREE_NODE /* parent */ );

for( int r = 0; r < size; r++ )
{
    char process_name[ 32 ];
    snprintf( process_name, sizeof( process_name ), "MPI Rank %d", r );
    OTF2_GlobalDefWriter_WriteString( global_def_writer,
    27 + r, process_name );

    OTF2_GlobalDefWriter_WriteLocationGroup( global_def_writer,
    r /* id */, 27 + r /* name */, OTF2_LOCATION_GROUP_TYPE_PROCESS,
    0 /* system tree */, OTF2_UNDEFINED_LOCATION_GROUP /* creating process */ );

    OTF2_GlobalDefWriter_WriteLocation( global_def_writer,
    r /* id */, 1 /* name */, OTF2_LOCATION_TYPE_CPU_THREAD,
    43 /* # events */, r /* location group */ );
}

uint64_t comm_locations[ size ];
for( int r = 0; r < size; r++ )
{
    comm_locations[ r ] = r;
}

OTF2_GlobalDefWriter_WriteGroup( global_def_writer,
0 /* id */, 24 /* name */, OTF2_GROUP_TYPE_COMM_LOCATIONS, OTF2_PARADIGM_MPI, OTF2_GROUP_FLAG_NONE, size, comm_locations );

OTF2_GlobalDefWriter_WriteGroup( global_def_writer,
1 /* id */, 0 /* name */, OTF2_GROUP_TYPE_COMM_GROUP, OTF2_PARADIGM_MPI, OTF2_GROUP_FLAG_NONE, size, comm_locations );

OTF2_GlobalDefWriter_WriteComm( global_def_writer, COMM_WORLD, 23 /* name */, 1 /* group */, OTF2_UNDEFINED_COMM /* parent */, OTF2_COMM_FLAG_CREATE_DESTROY_EVENTS /* flags */ );

for( int r = 0; r < size; r += 2 )
{
    comm_locations[ r | 2 ] = r;
}

OTF2_GlobalDefWriter_WriteGroup( global_def_writer,
2 /* id */, 0 /* name */, OTF2_GROUP_TYPE_COMM_GROUP, OTF2_PARADIGM_MPI, OTF2_GROUP_FLAG_NONE, ( size + 1 ) / 2, comm_locations );

OTF2_GlobalDefWriter_WriteComm( global_def_writer, COMM_SPLIT_0,
APPENDIX A. EXAMPLE DOCUMENTATION

A.6 otf2_openmp_reader_example.c

OpenMP reader example which reads one location per thread at a time

/ *
 * This file is part of the Score-P software (http://www.score-p.org)
 *
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 * a BSD-style license. See the COPYING file in the package base
 * directory for details.
 */
#include <stdlib.h>
A.6 otf2_openmp_reader_example.c

#include <otf2/otf2.h>
#include <otf2/OTF2_OpenMP_Locks.h>
#include <stdlib.h>
#include <stdio.h>
#include <inttypes.h>

static OTF2_CallbackCode
Enter_print( uint64_t locationID, 
uint64_t time, 
uint64_t eventPosition, 
void* userData, 
OTF2_AttributeList* attributeList, 
OTF2_RegionRef region )
{
    printf( "Entering region %u at location %" PRIu64 " at time %" PRIu64 "\n", 
        region, location, time );
    return OTF2_CALLBACK_SUCCESS;
}

static OTF2_CallbackCode
Leave_print( uint64_t locationID, 
uint64_t time, 
uint64_t eventPosition, 
void* userData, 
OTF2_AttributeList* attributeList, 
OTF2_RegionRef region )
{
    printf( "Leaving region %u at location %" PRIu64 " at time %" PRIu64 "\n", 
        region, location, time );
    return OTF2_CALLBACK_SUCCESS;
}

struct vector
{
    size_t capacity;
    size_t size;
    uint64_t members[];
};

static OTF2_CallbackCode
register_location( void* userData, 
OTF2_LocationRef location, 
OTF2_StringRef name, 
OTF2_LocationType locationType, 
uint64_t numberOfEvents, 
OTF2_LocationGroupRef locationGroup )
{
    struct vector* locations = userData;
    if ( locations->size == locations->capacity )
    {
        return OTF2_CALLBACK_INTERRUPT;
    }
    locations->members[ locations->size++ ] = location;
    return OTF2_CALLBACK_SUCCESS;
}

int
main( int argc, 
char** argv )
{
    OTF2_Reader* reader = OTF2_Reader_Open( argv[ 1 ] );
    OTF2_OpenMP_Reader_SetLockingCallbacks( reader );
    OTF2_Reader_SetSerialCollectiveCallbacks( reader );
    uint64_t number_of_locations;
    OTF2_Reader_GetNumberOfLocations( reader, 
        &number_of_locations );
    struct vector* locations = malloc( sizeof( *locations ) + 
        number_of_locations * sizeof( *locations->members ) );
    locations->capacity = number_of_locations;
    locations->size = 0;
    OTF2_GlobalDefReader* global_def_reader = OTF2_Reader_GetGlobalDefReader( reader );
    OTF2_GlobalDefReaderCallbacks* global_def_callbacks = OTF2_GlobalDefReaderCallbacks_New();
    OTF2_GlobalDefReaderCallbacks_SetLocationCallback( global_def_callbacks, 
        register_location );
OTF2_Reader_RegisterGlobalDefCallbacks( reader, 
global_def_reader, 
global_def_callbacks, 
locations );

OTF2_GlobalDefReaderCallbacks_Delete( global_def_callbacks );

uint64_t definitions_read = 0;
OTF2_Reader_ReadAllGlobalDefinitions( reader, 
global_def_reader, 
&definitions_read );

for ( size_t i = 0; i < locations->size; i++ )
{
    OTF2_Reader_SelectLocation( reader, locations->members[i] );
}

bool successful_open_def_files = 
OTF2_Reader_OpenDefFiles( reader ) == OTF2_SUCCESS;
OTF2_Reader_OpenEvtFiles( reader );

for ( size_t i = 0; i < locations->size; i++ )
{
    if ( successful_open_def_files )
    {
        OTF2_DefReader* def_reader = 
OTF2_Reader_GetDefReader( reader, locations->members[i] );
        if ( def_reader )
        {
            uint64_t def_reads = 0;
            OTF2_Reader_ReadAllLocalDefinitions( reader, 
def_reader, 
&def_reads );
            OTF2_Reader_CloseDefReader( reader, def_reader );
        }
    }
}

if ( successful_open_def_files )
{
    OTF2_Reader_CloseDefFiles( reader );
}

OTF2EvtReaderCallbacks* event_callbacks = OTF2EvtReaderCallbacks_New();
OTF2EvtReaderCallbacks_SetEnterCallback( event_callbacks, 
&Enter_print );
OTF2EvtReaderCallbacks_SetLeaveCallback( event_callbacks, 
&Leave_print );

#pragma omp parallel shared(reader)
{
#pragma omp for
for ( size_t i = 0; i < locations->size; i++ )
{
    OTF2EvtReader* evt_reader = 
OTF2_Reader_GetEvtReader( reader, locations->members[i] );
    OTF2_Reader_RegisterEvtCallbacks( reader, 
evt_reader, 
event_callbacks, 
NULL );

    uint64_t events_read = 0;
    OTF2_Reader_ReadAllLocalEvents( reader, 
evt_reader, 
events_read );

    OTF2_Reader_CloseEvtReader( reader, 
evt_reader );
}
}

OTF2EvtReaderCallbacks_Delete( event_callbacks );
OTF2_Reader_CloseEvtFiles( reader );
OTF2_Reader_Close( reader );
free( locations );
return EXIT_SUCCESS;
OpenMP writing example

#include <stdlib.h>
#include <stdio.h>
#include <inttypes.h>
#include <time.h>
#include <otf2/otf2.h>
#include <otf2/OTF2_OpenMP_Locks.h>

static OTF2_TimeStamp
get_time( void )
{
    static uint64_t sequence;
    #pragma omp threadprivate(sequence)
    return sequence++;
}

static OTF2_FlushType
pre_flush( void* userData, OTF2_FileType fileType, OTF2_LocationRef location, void* callerData, bool final )
{
    return OTF2_FLUSH;
}

static OTF2_TimeStamp
post_flush( void* userData, OTF2_FileType fileType, OTF2_LocationRef location )
{
    return get_time();
}

static OTF2_FlushCallbacks flush_callbacks =
{
    .otf2_pre_flush = pre_flush,
    .otf2_post_flush = post_flush
};

int
main( int argc, char** argv )
{
    OTF2_Archive* archive = OTF2_Archive_Open( "ArchivePath",
        "ArchiveName",
        OTF2_FILEMODE_WRITE,
        ...
APPENDIX A. EXAMPLE DOCUMENTATION

1024 * 1024 /* event chunk size */,
4 * 1024 * 1024 /* def chunk size */,
OTF2_SUBSTRATE_POSIX,
OTF2_COMPRESSION_NONE
);

OTF2_Archive_SetFlushCallbacks( archive, &flush_callbacks, NULL );
OTF2_Archive_SetSerialCollectiveCallbacks( archive );
OTF2_OpenMP_Archive_SetLockingCallbacks( archive );
OTF2_Archive_OpenEvtFiles( archive );

int number_of_threads;
#pragma omp parallel shared(archive)
{
    #pragma omp master
    number_of_threads = omp_get_num_threads();
    OTF2_EvtWriter* evt_writer;
    evt_writer = OTF2_Archive_GetEvtWriter( archive, omp_get_thread_num() );
    printf( "%p\n", evt_writer );
    OTF2_EvtWriter_Enter( evt_writer, NULL, get_time(), 0 /* region */ );
    OTF2_EvtWriter_Leave( evt_writer, NULL, get_time(), 0 /* region */ );
    OTF2_Archive_CloseEvtWriter( archive, evt_writer );
}

OTF2_Archive_CloseEvtFiles( archive );
OTF2_Archive_OpenDefFiles( archive );
for ( int thread = 0; thread < number_of_threads; thread++ )
{
    OTF2_DefWriter* def_writer = OTF2_Archive_GetDefWriter( archive, thread );
    OTF2_Archive_CloseDefWriter( archive, def_writer );
}
OTF2_Archive_CloseDefFiles( archive );

OTF2_GlobalDefWriter* global_def_writer = OTF2_Archive_GetGlobalDefWriter( archive );

OTF2_GlobalDefWriter_WriteClockProperties( global_def_writer,
    1 /* 1 tick per second */,
    0 /* epoch */,
    2 /* length */,
    OTF2_UNDEFINED_TIMESTAMP );

OTF2_GlobalDefWriter_WriteString( global_def_writer, 0, " ");
OTF2_GlobalDefWriter_WriteString( global_def_writer, 1, "Initial Process" );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 2, "Main Thread" );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 3, "MyFunction" );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 4, "Alternative function name (e.g. mangled one)" );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 5, "Computes something" );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 6, "MyHost" );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 7, "node" );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer,
    0 /* id */,
    3 /* region name */,
    4 /* alternative name */,
    5 /* description */,
    OTF2_REGION_ROLE_FUNCTION,
    OTF2_PARADIGM_USER,
    OTF2_REGION_FLAG_NONE,
    0 /* start file */,
    0 /* begin line */,
    0 /* end line */ );

OTF2_GlobalDefWriter_WriteSystemTreeNode( global_def_writer,
    0 /* id */,
    6 /* name */,
    7 /* class */,
    OTF2_UNDEFINED_SYSTEM_TREE_NODE /* parent */ );

OTF2_GlobalDefWriter_WriteLocationGroup( global_def_writer,
    0 /* id */,
    1 /* name */,
    OTF2_LOCATION_GROUP_TYPE_PROCESS,
    0 /* system tree */ );

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A.8 otf2_pthread_writer_example.c

OTF2_UNDEFINED_LOCATION_GROUP /* creating process */
{
    for ( int i = 0; i < number_of_threads; i++ )
    {
        OTF2_StringRef name = 2;
        if ( i > 0 )
        {
            name = i + 1;
            char name_buf[ 32 ];
            snprintf( name_buf, sizeof( name_buf ), "OpenMP Thread %d", i );
            OTF2_GlobalDefWriter_WriteString( global_def_writer, name, name_buf );
        }
        OTF2_GlobalDefWriter_WriteLocation( global_def_writer,
            i /* id */, name,
            OTF2_LOCATION_TYPE_CPU_THREAD,
            2 /* # events */, 0 /* location group */ );
    }

    OTF2_Archive_Close( archive );

    return EXIT_SUCCESS;
}

A.8 otf2_pthread_writer_example.c

Pthread writing example

/*
 * This file is part of the Score-P software (http://www.score-p.org)
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 * a BSD-style license. See the COPYING file in the package base
 * directory for details.
 */
#include <stdlib.h>
#include <stdio.h>
#include <inttypes.h>
#include <otf2/otf2.h>
#include <otf2/OTF2_Pthread_Locks.h>

struct thread_data
{
    OTF2_Archive* archive;
    uint64_t sequence;
    pthread_t tid;
    uint64_t lid;
};
static pthread_key_t tpd;
static OTF2_TimeStamp
get_time( void )
{
```c
struct thread_data* data = pthread_getspecific( tpd );
return data->sequence++;
}

static OTF2_FlushType
pre_flush( void* userData,
    OTF2_FileType fileType,
    OTF2_LocationRef location,
    void* callerData,
    bool final )
{
    return OTF2_FLUSH;
}

static OTF2_TimeStamp
post_flush( void* userData,
    OTF2_FileType fileType,
    OTF2_LocationRef location )
{
    return get_time();
}

static OTF2_FlushCallbacks flush_callbacks =
{
    .otf2_pre_flush = pre_flush,
    .otf2_post_flush = post_flush
};

void*
event_writer( void* arg )
{
    struct thread_data* data = arg;
    pthread_setspecific( tpd, data );
    OTF2_EvtWriter* evt_writer = OTF2_Archive_GetEvtWriter( data->archive,
        data->lid );
    OTF2_EvtWriter_Enter( evt_writer,
        NULL,
        get_time(),
        0 /* region */ );
    OTF2_EvtWriter_Leave( evt_writer,
        NULL,
        get_time(),
        0 /* region */ );
    OTF2_Archive_CloseEvtWriter( data->archive, evt_writer );
    return NULL;
}

int
main( int argc,
    char** argv )
{
    int number_of_threads = 1;
    if ( argc > 1 )
    {
        number_of_threads = atoi( argv[ 1 ] );
    }
    pthread_key_create( &tpd, NULL );
    OTF2_Archive* archive = OTF2_Archive_Open( "ArchivePath",
        "ArchiveName",
        OTF2_FILEMODE_WRITE,
        1024 * 1024 /* event chunk size */,
        4 * 1024 * 1024 /* def chunk size */,
        OTF2_SUBSTRATE_POSIX,
        OTF2_COMPRESSION_NONE );
    OTF2_Archive_SetFlushCallbacks( archive, &flush_callbacks, NULL );
    OTF2_Archive_SetSerialCollectiveCallbacks( archive );
    OTF2_Pthread_Archive_SetLockingCallbacks( archive, NULL );
    OTF2_Archive_OpenEvtFiles( archive );
    struct thread_data* threads = calloc( number_of_threads, sizeof( *threads ) );
    for ( int i = 0; i < number_of_threads; i++ )
    {
        threads[ i ].archive = archive;
        threads[ i ].lid = i;
        pthread_create( &threads[ i ].tid, NULL, event_writer, &threads[ i ] );
    }
}```
A.8 otf2_pthread_writer_example.c

```c
for ( int i = 0; i < number_of_threads; i++ )
{
    pthread_join( threads[ i ].tid, NULL );
}

OTF2_Archive_CloseEvtFiles( archive );
OTF2_Archive_OpenDefFiles( archive );
for ( int thread = 0; thread < number_of_threads; thread++ )
{
    OTF2_DefWriter* def_writer = OTF2_Archive_GetDefWriter( archive, thread );
    OTF2_Archive_CloseDefWriter( archive, def_writer );
}
OTF2_Archive_CloseDefFiles( archive );

OTF2_GlobalDefWriter* global_def_writer = OTF2_Archive_GetGlobalDefWriter( archive );
OTF2_GlobalDefWriter_WriteClockProperties( global_def_writer,
    1 /* 1 tick per second */, 0 /* epoch */, 2 /* length */, OTF2_UNDEFINED_TIMESTAMP );

OTF2_GlobalDefWriter_WriteString( global_def_writer, 0 /* "" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 1 /* "Initial Process" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 2 /* "Main Thread" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 3 /* "MyFunction" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 4 /* "Alternative function name (e.g. mangled one)" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 5 /* "Computes something" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 6 /* "MyHost" */ );
OTF2_GlobalDefWriter_WriteString( global_def_writer, 7 /* "node" */ );

OTF2_GlobalDefWriter_WriteRegion( global_def_writer, 0 /* id */, 3 /* region name */, 4 /* alternative name */, 5 /* description */, OTF2_REGION_ROLE_FUNCTION, OTF2_PARADIGM_USER, OTF2_REGION_FLAG_NONE, 0 /* source file */, 0 /* begin lno */, 0 /* end lno */ );

OTF2_GlobalDefWriter_WriteSystemTreeNode( global_def_writer, 0 /* id */, 6 /* name */, 7 /* class */, OTF2_UNDEFINED_SYSTEM_TREE_NODE /* parent */ );
OTF2_GlobalDefWriter_WriteLocationGroup( global_def_writer, 0 /* id */, 1 /* name */, OTF2_LOCATION_GROUP_TYPE_PROCESS, 0 /* system tree */, OTF2_UNDEFINED_LOCATION_GROUP /* creating process */);

for ( int i = 0; i < number_of_threads; i++ )
{
    OTF2_StringRef name = 2;
    if ( i > 0 )
    {
        name = 7 + i;
        char name_buf[ 32 ];
        snprintf( name_buf, sizeof( name_buf ), "Pthread %d", i );
        OTF2_GlobalDefWriter_WriteString( global_def_writer, name, name_buf );
    }
    OTF2_GlobalDefWriter_WriteLocation( global_def_writer, i /* id */, name, OTF2_LOCATION_TYPE_CPU_THREAD, 2 /* # events */, 0 /* location group */ );
}

OTF2_Archive_Close( archive );
pthread_key_delete( tpd );
return EXIT_SUCCESS;
```
A.9  otf2_reader_example.c

Simple reading example

/*
 * This file is part of the Score-P software (http://www.score-p.org)
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 * a BSD-style license. See the COPYING file in the package base
 * directory for details.
 */

#include <otf2/otf2.h>
#include <stdlib.h>
#include <stdio.h>
#include <inttypes.h>

static OTF2_CallbackCode
Enter_print( OTF2_LocationRef location,
OTF2_TimeStamp time,
void* userData,
OTF2_AttributeList* attributes,
OTF2_RegionRef region )
{
    printf( "Entering region %u at location %" PRIu64 " at time %" PRIu64 ".\n",
region, location, time );
    return OTF2_CALLBACK_SUCCESS;
}

static OTF2_CallbackCode
Leave_print( OTF2_LocationRef location,
OTF2_TimeStamp time,
void* userData,
OTF2_AttributeList* attributes,
OTF2_RegionRef region )
{
    printf( "Leaving region %u at location %" PRIu64 " at time %" PRIu64 ".\n",
region, location, time );
    return OTF2_CALLBACK_SUCCESS;
}

struct vector
{
    size_t capacity;
    size_t size;
    uint64_t members[];
};

static OTF2_CallbackCode
GlobDefLocation_Register( void* userData,
OTF2_LocationRef location,
OTF2_StringRef name,
OTF2_LocationType locationType,
uint64_t numberOfEvents,
OTF2_LocationGroupRef locationGroup )
{
    struct vector* locations = userData;
}
if ( locations->size == locations->capacity )
{
    return OTF2_CALLBACK_INTERRUPT;
}
locations->members[ locations->size++ ] = location;
return OTF2_CALLBACK_SUCCESS;
}
int main( int argc,
char** argv )
{
    OTF2_Reader* reader = OTF2_Reader_Open( "ArchivePath/ArchiveName.otf2" );
    OTF2_Reader_SetSerialCollectiveCallbacks( reader );
    uint64_t number_of_locations;
    OTF2_Reader_GetNumberOfLocations( reader,
        &number_of_locations );
    struct vector* locations = malloc( sizeof( *locations )
            + number_of_locations
            * sizeof( *locations->members ) );
    locations->capacity = number_of_locations;
    locations->size = 0;
    OTF2_GlobalDefReader* global_def_reader = OTF2_Reader_GetGlobalDefReader( reader );
    OTF2_GlobalDefReaderCallbacks* global_def_callbacks = OTF2_GlobalDefReaderCallbacks_New();
    OTF2_GlobalDefReaderCallbacks_SetLocationCallback( global_def_callbacks,
        &GlobDefLocation_Register );
    OTF2_Reader_RegisterGlobalDefCallbacks( reader,
        global_def_reader,
        global_def_callbacks,
        locations );
    OTF2_GlobalDefReaderCallbacks_Delete( global_def_callbacks );
    uint64_t definitions_read = 0;
    OTF2_Reader_ReadAllGlobalDefinitions( reader,
        global_def_reader,
        &definitions_read );
    for ( size_t i = 0; i < locations->size; i++ )
    {
        OTF2_Reader_SelectLocation( reader, locations->members[ i ] );
    }
    bool successful_open_def_files =
        OTF2_Reader_OpenDefFiles( reader ) == OTF2_SUCCESS;
    OTF2_Reader_OpenEvtFiles( reader );
    for ( size_t i = 0; i < locations->size; i++ )
    {
        if ( successful_open_def_files )
        {
            OTF2_DefReader* def_reader =
                OTF2_Reader_GetDefReader( reader, locations->members[ i ] );
            if ( def_reader )
            {
                uint64_t def_reads = 0;
                OTF2_Reader_ReadAllLocalDefinitions( reader,
                    def_reader,
                    &def_reads );
                OTF2_Reader_CloseDefReader( reader, def_reader );
            }
        }
        OTF2EvtReader* evt_reader =
            OTF2_Reader_GetEvtReader( reader, locations->members[ i ] );
    }
    if ( successful_open_def_files )
    {
        OTF2_Reader_CloseDefFiles( reader );
    }
    OTF2_GlobalEvtReader* global_evt_reader = OTF2_Reader_GetGlobalEvtReader( reader );
    OTF2_GlobalEvtReaderCallbacks* event_callbacks = OTF2_GlobalEvtReaderCallbacks_New();
    OTF2_GlobalEvtReaderCallbacks_SetEnterCallback( event_callbacks,
        &Enter_print );
    OTF2_GlobalEvtReaderCallbacks_SetLeaveCallback( event_callbacks,
        &Leave_print );
    OTF2_Reader_RegisterGlobalEvtCallbacks( reader,
        global_evt_reader,
        event_callbacks,
        NULL );
APPENDIX A. EXAMPLE DOCUMENTATION

OTF2_GlobalEvtReaderCallbacks_Delete( event_callbacks );

uint64_t events_read = 0;
OTF2_Reader_ReadAllGlobalEvents( reader,
    global_evt_reader,
    &events_read );

OTF2_Reader_CloseGlobalEvtReader( reader, global_evt_reader );
OTF2_Reader_CloseEvtFiles( reader );

OTF2_Reader_Close( reader );
free( locations );
return EXIT_SUCCESS;

A.10 otf2_writer_example.c

Simple writing example

/*
 * This file is part of the Score-P software (http://www.score-p.org)
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 * This file is part of the Score-P software (http://www.score-p.org)
 * This software may be modified and distributed under the terms of a BSD-style license. See the COPYING file in the package base directory for details.
 */

#include <otf2/otf2.h>
#include <stdlib.h>

static OTF2_TimeStamp
get_time( void )
{
    static uint64_t sequence;
    return sequence++;}

static OTF2_FlushType
pre_flush( void* userData,
            OTF2_FileType fileType,
            OTF2_LocationRef location,
            void* callerData,
            bool final )
{
    return OTF2_FLUSH;
}

static OTF2_TimeStamp
post_flush( void* userData,
            OTF2_FileType fileType,
            OTF2_LocationRef location )
{
    return get_time();
}
A.10 otf2_writer_example.c

```c
static OTF2_FlushCallbacks flush_callbacks =
{ 
  .otf2_pre_flush = pre_flush, 
  .otf2_post_flush = post_flush 
};

int main( int argc, 
        char** argv )
{
  OTF2_Archive* archive = OTF2_Archive_Open( 
      "ArchivePath", 
      "ArchiveName", 
      OTF2_FILEMODE_WRITE, 
      1024 * 1024 /* event chunk size */, 
      4 * 1024 * 1024 /* def chunk size */, 
      OTF2_SUBSTRATE_POSIX, 
      OTF2_COMPRESSION_NONE );
  OTF2_Archive_SetFlushCallbacks( archive, &flush_callbacks, NULL );
  OTF2_Archive_SetSerialCollectiveCallbacks( archive );
  OTF2_Archive_OpenEvtFiles( archive );
  OTF2_EvtWriter* evt_writer = OTF2_Archive_GetEvtWriter( archive, 0 );
  OTF2_EvtWriter_Enter( evt_writer, 
                        NULL, 
                        get_time(), 
                        0 /* region */ );
  OTF2_EvtWriter_Leave( evt_writer, 
                        NULL, 
                        get_time(), 
                        0 /* region */ );
  OTF2_Archive_CloseEvtWriter( archive, evt_writer );
  OTF2_Archive_CloseEvtFiles( archive );
  OTF2_Archive_OpenDefFiles( archive );
  OTF2_DefWriter* def_writer = OTF2_Archive_GetDefWriter( archive, 0 );
  OTF2_Archive_CloseDefWriter( archive, def_writer );
  OTF2_Archive_CloseDefFiles( archive );
  OTF2_GlobalDefWriter* global_def_writer = OTF2_Archive_GetGlobalDefWriter( archive );
  OTF2_GlobalDefWriter_WriteClockProperties( 
      global_def_writer, 
      1 /* 1 tick per second */, 
      0 /* epoch */, 
      2 /* length */, 
      OTF2_UNDEFINED_TIMESTAMP );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 0, "" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 1, "Initial Process" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 2, "Main Thread" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 3, "MyFunction" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 4, "Alternative function name (e.g. mangled one)" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 5, "Computes something" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 6, "MyHost" );
  OTF2_GlobalDefWriter_WriteString( 
      global_def_writer, 7, "node" );
  OTF2_GlobalDefWriter_WriteRegion( 
      global_def_writer, 
      0 /* id */, 
      3 /* region name */, 
      4 /* alternative name */, 
      5 /* description */, 
      OTF2_REGION_ROLE_FUNCTION, 
      OTF2_PARADIGM_USER, 
      OTF2_REGION_FLAG_NONE, 
      0 /* source file */, 
      0 /* begin lno */, 
      0 /* end lno */ );
  OTF2_GlobalDefWriter_WriteSystemTreeNode( 
      global_def_writer, 
      0 /* id */, 
      6 /* name */, 
      7 /* class */, 
      OTF2_UNDEFINED_SYSTEM_TREE_NODE /* parent */ );
  OTF2_GlobalDefWriter_WriteLocationGroup( 
      global_def_writer, 
      0 /* id */, 
      1 /* name */, 
      OTF2_LOCATION_GROUP_TYPE_PROCESS, 
      0 /* system tree */, 
      OTF2_UNDEFINED_LOCATION_GROUP /* creating process */ );
  OTF2_GlobalDefWriter_WriteLocation( 
```
APPENDIX A. EXAMPLE DOCUMENTATION

```c
0 /* id */,
2 /* name */,
OTF2_LOCATION_TYPE_CPU_THREAD,
2 /* # events */,  
0 /* location group */ );

OTF2_Archive_Close( archive );

return EXIT_SUCCESS;
```

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