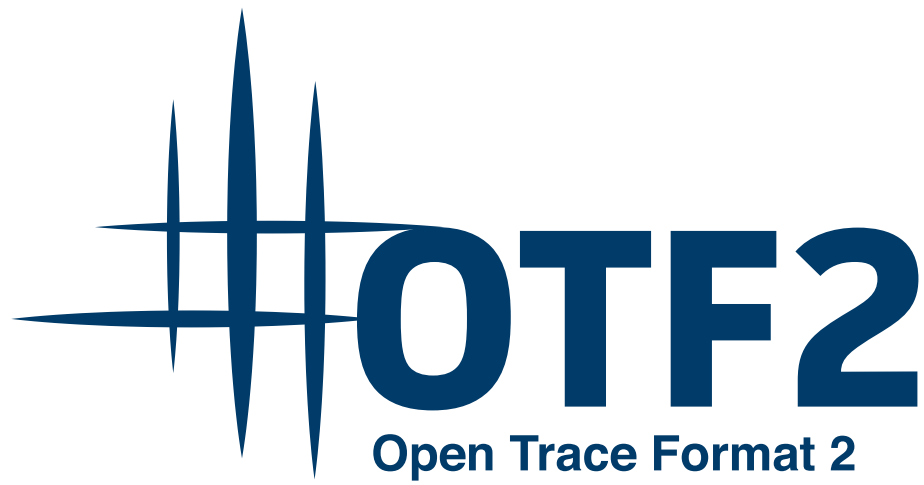


OPEN TRACE FORMAT 2  
USER MANUAL  
3.1-rc2 (revision 36151aaf)



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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 [PREFIX/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]

```

--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]
--pdfdir=DIR         pdf 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')
--disable-silent-rules    verbose build output (undo: 'make V=0')
--disable-dependency-tracking speeds up one-time build
--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-shared[=PKGS]   build shared libraries [default=yes]
--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
F77_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 compiler flags for the frontend build
CXXFLAGS_FOR_BUILD
    C++ compiler flags for the frontend build

```

---

```

FFLAGS_FOR_BUILD      Fortran 77 compiler flags for the frontend build
FCFLAGS_FOR_BUILD     Fortran compiler flags for the frontend build
LDFLAGS_FOR_BUILD     linker flags for the frontend build, e.g. -L<lib dir> if you
                      have libraries in a nonstandard directory <lib dir>
LIBS_FOR_BUILD        libraries to pass to the linker for the frontend build, e.g.
                      -l<library>
CC                    C compiler command
CFLAGS                C compiler flags
LDFLAGS               linker flags, e.g. -L<lib dir> if you have libraries in a
                      nonstandard directory <lib dir>
LIBS                  libraries to pass to the linker, e.g. -l<library>
CPPFLAGS              (Objective) C/C++ preprocessor flags, e.g. -I<include dir> if
                      you have headers in a nonstandard directory <include dir>
CXX                   C++ compiler command
CXXFLAGS              C++ compiler flags
CPP                   C preprocessor
CXXCPP                C++ preprocessor
PYTHON                The Python interpreter to be used for the Python bindings. Use
                      PYTHON=: to disable Python support.
PYTHON_FOR_GENERATOR  The Python interpreter used for the generator. Not a build
                      requirement, only needed for developing. Python version 2.5 or
                      above, but no support for Python 3. Use PYTHON_FOR_GENERATOR=:
                      to disable Python support.

```

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:

```
./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 3.6 or later
  - + Earlier versions may work, but are not tested.
  - + sphinx to build the python documentation
  - + Ubuntu package names: python python-sphinx

You can install the python bindings as a regular package, e.g., using pip

```
pip install .
```

Alternatively, the python module is installed as part of a full OTF2 installation. For more details see the Python-specific documentation.

#### 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 figure out how `'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 be 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 '--enable-FEATURE' 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.

`--config-cache`  
`-C`  
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 namespacing.
- 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

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

### 5.2.2 Overview article and citing

Please refer to the *Open Trace Format 2* by citing the overview article [Open Trace Format 2: The Next Generation of Scalable Trace Formats and Support Libraries](#) or use the DOI [10.3233/978-1-61499-041-3-481](#) directly.

Version-specific DOIs of the software can be found on [OTF2's Zenodo page](#).

See also the file `CITATION.cff` in `<otf2_prefix>/share/doc/otf2/` for machine-readable citation information.

### [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 for compiler consumption
--ltdlflags   prints the required linker flags for libtool consumption
--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 `otf2-print` has the following syntax:

Usage: `otf2-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 from 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 made 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
```

---

### .3 OTF2 snapshots tool

A call to `otf2-snapshots` has the following syntax:

```
Usage: otf2-snapshots [OPTION]... ANCHORFILE
Append snapshots to existing otf2 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:

```

    Print all markers sorted by group.
--def <GROUP> [<CATEGORY>]
    Print all marker definitions of group <GROUP> or of
    category <CATEGORY> from group <GROUP>.
--defs-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-START>-<TIMESTAMP-END>
      Two valid timestamps inside the trace range 'global
      offset' and 'global offset' + 'trace length', with
      <TIMESTAMP-START> <= <TIMESTAMP-END>.
    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:

<code>-V, --version</code>	Print version information.
<code>-h, --help</code>	Print this help information.

Commands:

<code>list definitions</code>	Lists all known definition names.
<code>list events</code>	Lists all known event names.
<code>list types</code>	Lists all known type names.
<code>set &lt;DEFINITION&gt; &lt;NUMBER&gt;</code>	Specifies the number of definitions of a type of definitions.
<code>get DefChunkSize</code>	Prints the estimated definition chunk size.
<code>get Timestamp</code>	Prints the size of a timestamp.
<code>get AttributeList [TYPES...]</code>	Prints the estimated size for an attribute list with the given number of entries and types.
<code>get &lt;EVENT&gt; [ARGS...]</code>	Prints the estimated size of records for <EVENT>.
<code>exit</code>	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 sent 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
```

## .6 OTF2 I/O recording

### .6.0.1 Known OTF2 I/O paradigms

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*

**"ISOC"** 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*

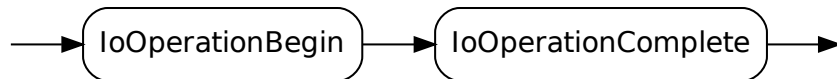
**Flags** *OTF2\_IO\_PARADIGM\_FLAG\_NONE*

---

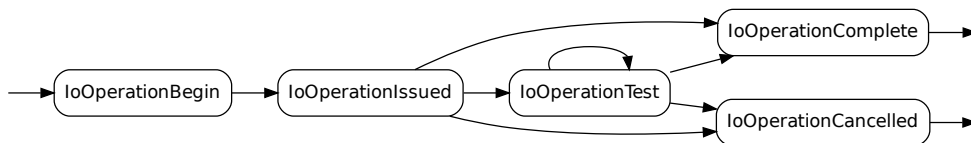
### .6.0.2 Event order for I/O operation records

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

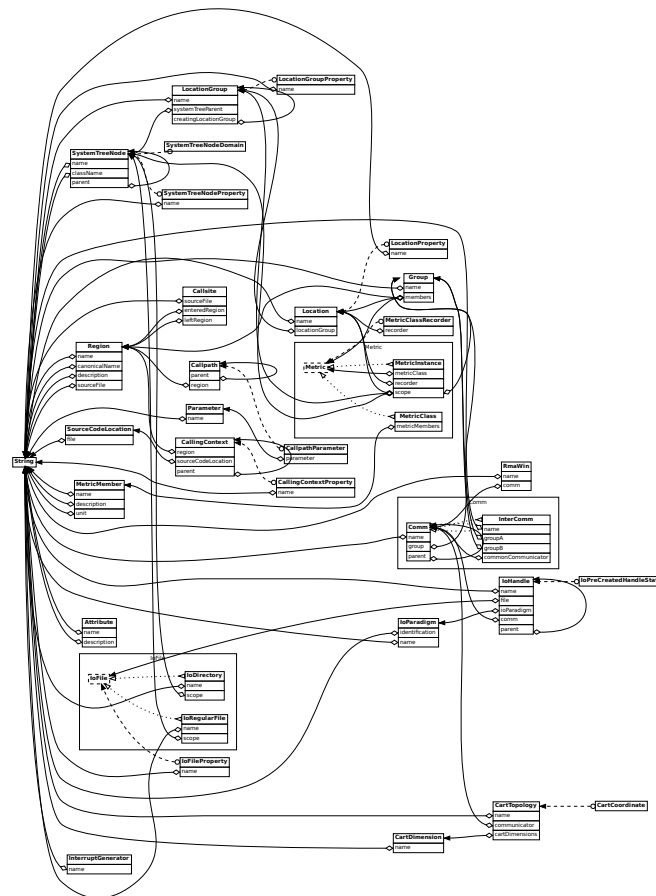
If the *OTF2\_IO\_OPERATION\_FLAG\_NON\_BLOCKING* is not set in the *IoOperationBegin* record, then the event order must follow:



If the *OTF2\_IO\_OPERATION\_FLAG\_NON\_BLOCKING* is set in the *IoOperationBegin* record, then the event order must follow:



## .7 List of all definition records



## .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

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

### See also

`OTF2_GlobalDefWriter_WriteClockProperties()`  
`OTF2_GlobalDefReaderCallbacks_SetClockPropertiesCallback()`

### Since

Version 1.0

---

## .9 Paradigm

Attests 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

<i>OTF2_↔ Paradigm</i>	paradigm	The paradigm to attest.
<i>OTF2_↔ StringRef</i>	name	The name of the paradigm. References a <a href="#">String</a> definition.
<i>OTF2_↔ Paradigm↔ Class</i>	paradigmClass	The class of this paradigm.

### 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

<i>OTF2_↔ Paradigm</i>	paradigm	The paradigm to annotate.
<i>OTF2_↔ Paradigm↔ Property</i>	property	The property.
<i>OTF2_↔ Type</i>	type	The type of this property. Must match with the defined type of the <i>property</i> .
<i>OTF2_↔ Attribute↔ Value</i>	value	The value of this property.

### See also

`OTF2_GlobalDefWriter_WriteParadigmProperty()`  
`OTF2_GlobalDefReaderCallbacks_SetParadigmPropertyCallback()`

### Since

Version 1.5



## .11 OTF2\_IoParadigmRef IoParadigm

Attests 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

<i>OTF2_↔ StringRef</i>	identification	The I/O paradigm identification. This should be used programmatically to identify a specific I/O paradigm. For a human-readable name use the <code>name</code> attribute. If this identification matches one of the known I/O paradigms listed in the OTF2 documentation <a href="#">Known OTF2 I/O paradigms</a> , then the attributes of this definition must match those specified there. References a <a href="#">String</a> definition.
<i>OTF2_↔ StringRef</i>	name	The name of the I/O paradigm. This should be presented to humans as the name of this I/O paradigm. References a <a href="#">String</a> definition.
<i>OTF2_Io↔ Paradigm↔ Class</i>	ioParadigmClass	The class of this I/O paradigm.
<i>OTF2_Io↔ Paradigm↔ Flag</i>	ioParadigmFlags	Boolean properties of this I/O paradigm.
<i>uint8_t</i>	numberOf↔ Properties	Number of properties.
<i>OTF2_Io↔ Paradigm↔ Property</i>	properties [ numberOf↔ Properties ]	The property.
<i>OTF2_↔ Type</i>	types [ numberOf↔ OfProperties ]	The type of this property. Must match with the defined type of the <i>property</i> .
<i>OTF2_↔ Attribute↔ Value</i>	values [ numberOf↔ Properties ]	The value of this property.

### 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

<i>OTF2_↔ Mapping↔ Type</i>	mappingType	Says to what type of ID the mapping table has to be applied.
<i>const OT↔ F2_IdMap*</i>	idMap	Mapping 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.

#### Attributes

<i>OTF2_↔ Time↔ Stamp</i>	time	Time when this offset was determined.
<i>int64_t</i>	offset	The offset to the global clock which was determined at <i>time</i> .
<i>double</i>	standard↔ Deviation	A possible standard deviation, which can be used as a metric for the quality of the offset.

#### See also

OTF2\_DefWriter\_WriteClockOffset()  
OTF2\_DefReaderCallbacks\_SetClockOffsetCallback()

#### Since

Version 1.0

## .14 *OTF2\_StringRef* String

The string definition.

## .15 Attribute

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### Attributes

<i>const char*</i>	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

<i>OTF2_↔ StringRef</i>	name	Name of the attribute. References a <a href="#">String</a> definition.
<i>OTF2_↔ StringRef</i>	description	Description of the attribute. References a <a href="#">String</a> definition. Since version 1.4.
<i>OTF2_↔ Type</i>	type	Type of the attribute value.

### 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

<a href="#">OTF2_↔StringRef</a>	name	Free form instance name of this node. References a <a href="#">String</a> definition.
<a href="#">OTF2_↔StringRef</a>	className	Free form class name of this node References a <a href="#">String</a> definition.
<a href="#">OTF2_↔System↔Tree↔NodeRef</a>	parent	Parent ID of this node. May be <code>OTF2_UNDEFINED_SYSTEM_TREE_NODE</code> to indicate that there is no parent. References a <a href="#">SystemTreeNode</a> definition.

#### Supplements

[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

<a href="#">OTF2_↔StringRef</a>	name	Name of the group. References a <a href="#">String</a> definition.
<a href="#">OTF2_↔Location↔GroupType</a>	<a href="#">locationGroup↔Type</a>	Type of this group.
<a href="#">OTF2_↔System↔Tree↔NodeRef</a>	<a href="#">systemTree↔Parent</a>	Parent of this location group in the system tree. References a <a href="#">SystemTree↔Node</a> definition.
<a href="#">OTF2_↔Location↔GroupRef</a>	<a href="#">creating↔LocationGroup</a>	The creating location group of this group. For type <code>OTF2_LOCATION_GROUP_TYPE_PROCESS</code> this may be another group of type <code>OTF2_LOCATION_GROUP_TYPE_PROCESS</code> or <code>OTF2_UNDEFINED_LOCATION_GROUP</code> . For type <code>OTF2_LOCATION_GROUP_TYPE_ACCELERATOR</code> , this must be a group of type <code>OTF2_LOCATION_GROUP_TYPE_PROCESS</code> . References a <a href="#">LocationGroup</a> definition. Since version 3.0.

#### Supplements

[LocationGroupProperty](#)

## .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

<i>OTF2_↔ StringRef</i>	name	Name of the location References a <i>String</i> definition.
<i>OTF2_↔ Location↔ Type</i>	locationType	Location type.
<i>uint64_t</i>	numberOfEvents	Number of events this location has recorded.
<i>OTF2_↔ Location↔ GroupRef</i>	locationGroup	Location group which includes this location. References a <i>LocationGroup</i> definition.

### 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.

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### Attributes

<i>OTF2_↔ StringRef</i>	name	Name of the region (demangled name if available). References a <a href="#">String</a> definition.
<i>OTF2_↔ StringRef</i>	canonicalName	Alternative name of the region (e.g. mangled name). References a <a href="#">String</a> definition. Since version 1.1.
<i>OTF2_↔ StringRef</i>	description	A more detailed description of this region. References a <a href="#">String</a> definition.
<i>OTF2_↔ Region↔ Role</i>	regionRole	Region role. Since version 1.1.
<i>OTF2_↔ Paradigm</i>	paradigm	Paradigm. Since version 1.1.
<i>OTF2_↔ Region↔ Flag</i>	regionFlags	Region flags. Since version 1.1.
<i>OTF2_↔ StringRef</i>	sourceFile	The source file where this region was declared. References a <a href="#">String</a> definition.
<i>uint32_t</i>	beginLine↔ Number	Starting line number of this region in the source file.
<i>uint32_t</i>	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

<i>OTF2_↔ StringRef</i>	sourceFile	The source file where this call was made. References a <a href="#">String</a> definition.
<i>uint32_t</i>	lineNumber	Line number in the source file where this call was made.
<i>OTF2_↔ RegionRef</i>	enteredRegion	The region which was called. References a <a href="#">Region</a> definition.
<i>OTF2_↔ RegionRef</i>	leftRegion	The region which made the call. References a <a href="#">Region</a> 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

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### .21 OTF2\_CallpathRef Callpath

The callpath definition.

#### Attributes

<i>OTF2_↔ Callpath↔ Ref</i>	parent	The parent of this callpath. References a <a href="#">Callpath</a> definition.
<i>OTF2_↔ RegionRef</i>	region	The region of this callpath. References a <a href="#">Region</a> 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

<i>OTF2_↔ StringRef</i>	name	Name of this group. References a <a href="#">String</a> definition.
<i>OTF2_↔ GroupType</i>	groupType	The type of this group. Since version 1.2.
<i>OTF2_↔ Paradigm</i>	paradigm	The paradigm of this communication group. Since version 1.2.
<i>OTF2_↔ GroupFlag</i>	groupFlags	Flags for this group. Since version 1.2.
<i>uint32_t</i>	numberOf↔ Members	The number of members in this group.
<i>uint32_t</i>	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

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## .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

<i>OTF2_↔ StringRef</i>	name	Name of the metric. References a <i>String</i> definition.
<i>OTF2_↔ StringRef</i>	description	Description of the metric. References a <i>String</i> definition.
<i>OTF2_↔ MetricType</i>	metricType	Metric type: PAPI, etc.
<i>OTF2_↔ Metric↔ Mode</i>	metricMode	Metric mode: accumulative, fix, relative, etc.
<i>OTF2_↔ Type</i>	valueType	Type of the value. Only <i>OTF2_TYPE_INT64</i> , <i>OTF2_TYPE_UINT64</i> , and <i>OTF2_TYPE_DOUBLE</i> are valid types. If this metric member is recorded in a <i>Metric</i> event, then this type and the type in the event must match.
<i>OTF2_↔ Base</i>	base	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.
<i>int64_t</i>	exponent	The values inside the Metric events should be scaled by the factor $\text{base}^{\text{exponent}}$ , to get the value in its base unit. For example, if the metric values come in as KiBi, then the base should be <i>OTF2_BASE_BINARY</i> and the exponent 10. Then 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.
<i>OTF2_↔ StringRef</i>	unit	Unit of the metric. This needs to be the scale free base unit, ie. "bytes", "operations", or "seconds". In particular this unit should not have any scale prefix. References a <i>String</i> definition.

### 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

<i>uint8_t</i>	numberOf↔ Metrics	Number of metrics within the set.
<i>OTF2_↔ Metric↔ Member↔ Ref</i>	metricMembers [ numberOf↔ Metrics ]	List of metric members. References a <a href="#">MetricMember</a> definition.
<i>OTF2_↔ Metric↔ Occurrence</i>	metric↔ Occurrence	Defines occurrence of a metric set.
<i>OTF2_↔ Recorder↔ Kind</i>	recorderKind	What kind of locations will record this metric class, or will this metric class only be recorded by metric instances. Since version 1.2.

### 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 metric instance is implicitly of type *OTF2\_METRIC\_ASYNCHRONOUS*.

### Attributes

<i>OTF2_↔ MetricRef</i>	metricClass	The instanced <a href="#">MetricClass</a> . This metric class must be of kind <i>OTF2_REC↔ ORDER_KIND_ABSTRACT</i> . References a <a href="#">MetricClass</a> , or a <a href="#">MetricInstance</a> definition.
<i>OTF2_↔ Location↔ Ref</i>	recorder	Recorder of the metric: location ID. References a <a href="#">Location</a> definition.
<i>OTF2_↔ Metric↔ Scope</i>	metricScope	Defines type of scope: location, location group, system tree node, or a generic group of locations.

<i>uint64_t</i>	scope	Scope of metric: ID of a location, location group, system tree node, or a generic group of locations.
-----------------	-------	---

**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**

<i>OTF2_↔ StringRef</i>	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 <a href="#">String</a> definition.
<i>OTF2_↔ GroupRef</i>	group	The describing MPI group of this MPI communicator The group needs to be of type <i>OTF2_GROUP_TYPE_COMM_GROUP</i> or <i>O↔TF2_GROUP_TYPE_COMM_SELF</i> . References a <a href="#">Group</a> definition.
<i>OTF2_↔ CommRef</i>	parent	The parent MPI communicator from which this communicator was created, if any. Use <i>OTF2_UNDEFINED_COMM</i> to indicate no parent. References a <a href="#">Comm</a> definition.
<i>OTF2_↔ CommFlag</i>	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

<i>OTF2_↔ StringRef</i>	name	Name of the parameter (variable name etc.) References a <a href="#">String</a> definition.
<i>OTF2_↔ Parameter↔ Type</i>	parameterType	Type of the parameter, <i>OTF2_ParameterType</i> for possible types.

### 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

<i>OTF2_↔ StringRef</i>	name	Name, e.g. 'GASPI Queue 1', 'Nvidia Card 2', etc.. References a <a href="#">String</a> definition.
<i>OTF2_↔ CommRef</i>	comm	Communicator object used to create the window. References a <a href="#">Comm</a> definition.
<i>OTF2_↔ RmaWin↔ Flag</i>	flags	Special characteristics of this RMA window. Since version 3.0.

### 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

<i>OTF2_↔ MetricRef</i>	metric	Parent <a href="#">MetricClass</a> , or <a href="#">MetricInstance</a> definition to which this one is a supplementary definition. References a <a href="#">MetricClass</a> , or a <a href="#">MetricInstance</a> definition.
<i>OTF2_↔ Location↔ Ref</i>	recorder	The location which recorded the referenced metric class. References a <a href="#">Location</a> 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

<i>OTF2_↔ System↔ Tree↔ NodeRef</i>	systemTreeNode	Parent <a href="#">SystemTreeNode</a> definition to which this one is a supplementary definition. References a <a href="#">SystemTreeNode</a> definition.
<i>OTF2_↔ StringRef</i>	name	Name of the property. References a <a href="#">String</a> definition.
<i>OTF2_↔ Type</i>	type	The type of this property. Since version 2.0.
<i>OTF2_↔ Attribute↔ Value</i>	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.

## .34 LocationGroupProperty

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### Attributes

<i>OTF2_↔</i> <i>System↔</i> <i>Tree↔</i> <i>NodeRef</i>	systemTreeNode	Parent <a href="#">SystemTreeNode</a> definition to which this one is a supplementary definition. References a <a href="#">SystemTreeNode</a> definition.
<i>OTF2_↔</i> <i>System↔</i> <i>Tree↔</i> <i>Domain</i>	systemTree↔ Domain	The domain in which the referenced <a href="#">SystemTreeNode</a> operates in.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>GroupRef</i>	locationGroup	Parent <a href="#">LocationGroup</a> definition to which this one is a supplementary definition. References a <a href="#">LocationGroup</a> definition.
<i>OTF2_↔</i> <i>StringRef</i>	name	Name of the property. References a <a href="#">String</a> definition.
<i>OTF2_↔</i> <i>Type</i>	type	The type of this property. Since version 2.0.
<i>OTF2_↔</i> <i>Attribute↔</i> <i>Value</i>	value	The value of this property. Since version 2.0.

### 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

<i>OTF2_↔ Location↔ Ref</i>	location	Parent <i>Location</i> definition to which this one is a supplementary definition. References a <i>Location</i> definition.
<i>OTF2_↔ StringRef</i>	name	Name of the property. References a <i>String</i> definition.
<i>OTF2_↔ Type</i>	type	The type of this property. Since version 2.0.
<i>OTF2_↔ Attribute↔ Value</i>	value	The value of this property. Since version 2.0.

#### 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

<i>OTF2_↔ StringRef</i>	name	The name of the Cartesian topology dimension. References a <i>String</i> definition.
<i>uint32_t</i>	size	The size of the Cartesian topology dimension.
<i>OTF2_↔ Cart↔ Periodicity</i>	cartPeriodicity	Periodicity of the Cartesian topology dimension.

#### 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

<i>OTF2_↔ StringRef</i>	name	The name of the topology. References a <a href="#">String</a> definition.
<i>OTF2_↔ CommRef</i>	communicator	Communicator object used to create the topology. References a <a href="#">Comm</a> definition.
<i>uint8_t</i>	numberOf↔ Dimensions	Number of dimensions.
<i>OTF2_↔ Cart↔ Dimension↔ Ref</i>	cartDimensions [ numberOf↔ Dimensions ]	The dimensions of this topology. References a <a href="#">CartDimension</a> 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

<i>OTF2_↔ Cart↔ Topology↔ Ref</i>	cartTopology	Parent <a href="#">CartTopology</a> definition to which this one is a supplementary definition. References a <a href="#">CartTopology</a> definition.
<i>uint32_t</i>	rank	The rank w.r.t. the communicator associated to the topology referencing this coordinate.
<i>uint8_t</i>	numberOf↔ Dimensions	Number of dimensions.
<i>uint8_t</i>	coordinates [ numberOf↔ Dimensions ]	Coordinates, indexed by dimension.

### See also

OTF2\_GlobalDefWriter\_WriteCartCoordinate()  
OTF2\_GlobalDefReaderCallbacks\_SetCartCoordinateCallback()  
OTF2\_DefWriter\_WriteCartCoordinate()  
OTF2\_DefReaderCallbacks\_SetCartCoordinateCallback()

### Since

Version 1.3

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## .39 *OTF2\_SourceCodeLocationRef* SourceCodeLocation

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

<i>OTF2_↔ StringRef</i>	file	The name of the file for the source code location. References a <i>String</i> definition.
<i>uint32_t</i>	lineNumber	The line number for the source code location.

### See also

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

### Since

Version 1.5

## .40 *OTF2\_CallingContextRef* CallingContext

Defines a node in the calling context tree. These nodes are referenced in the *CallingContextSample*, *Calling↔ContextEnter*, 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 *CallingContext↔Leave* 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

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### Attributes

<a href="#">OTF2_↔ RegionRef</a>	region	The region. References a <a href="#">Region</a> definition.
<a href="#">OTF2_↔ Source↔ Code↔ Location↔ Ref</a>	sourceCode↔ Location	The absolute source code location of this calling context. References a <a href="#">SourceCodeLocation</a> definition.
<a href="#">OTF2_↔ Calling↔ ContextRef</a>	parent	Parent ID of this context. References a <a href="#">CallingContext</a> 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

<a href="#">OTF2_↔ Calling↔ ContextRef</a>	callingContext	Parent <a href="#">CallingContext</a> definition to which this one is a supplementary definition. References a <a href="#">CallingContext</a> definition.
<a href="#">OTF2_↔ StringRef</a>	name	Property name. References a <a href="#">String</a> definition.
<a href="#">OTF2_↔ Type</a>	type	The type of this property. Must match with the defined type of the <i>property</i> .
<a href="#">OTF2_↔ Attribute↔ Value</a>	value	The value of this property.

### See also

OTF2\_GlobalDefWriter\_WriteCallingContextProperty()  
OTF2\_GlobalDefReaderCallbacks\_SetCallingContextPropertyCallback()  
OTF2\_DefWriter\_WriteCallingContextProperty()  
OTF2\_DefReaderCallbacks\_SetCallingContextPropertyCallback()

### Since

Version 2.0

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## .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

<i>OTF2_↔ StringRef</i>	name	The name of this interrupt generator. References a <i>String</i> definition.
<i>OTF2_↔ Interrupt↔ Generator↔ Mode</i>	interrupt↔ GeneratorMode	Mode of the interrupt generator.
<i>OTF2_↔ Base</i>	base	The base for the period calculation.
<i>int64_t</i>	exponent	The exponent for the period calculation.
<i>uint64_t</i>	period	The period this interrupt generator generates interrupts.

### See also

- OTF2\_GlobalDefWriter\_WriteInterruptGenerator()*
- OTF2\_GlobalDefReaderCallbacks\_SetInterruptGeneratorCallback()*
- OTF2\_DefWriter\_WriteInterruptGenerator()*
- OTF2\_DefReaderCallbacks\_SetInterruptGeneratorCallback()*

### Since

Version 1.5

## .43 *IoFileProperty*

Extensible annotation for the polymorphic *IoFile* definition class.

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

### Attributes

<i>OTF2_Io↔ FileRef</i>	ioFile	Parent <i>IoRegularFile</i> definition to which this one is a supplementary definition. References a <i>IoRegularFile</i> definition.
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## .44 *IoFile*

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<i>OTF2_↔ StringRef</i>	name	Property name. References a <i>String</i> definition.
<i>OTF2_↔ Type</i>	type	The type of this property.
<i>OTF2_↔ Attribute↔ Value</i>	value	The value of this property.

### 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

<i>OTF2_↔ StringRef</i>	name	Name of the file. References a <i>String</i> definition.
<i>OTF2_↔ System↔ Tree↔ NodeRef</i>	scope	Defines the physical scope of this <i>IoRegularFile</i> in the system tree. E.g., two <i>IoRegularFile</i> definitions with the same name but different <code>scope</code> values are physically different, thus I/O operations through <i>IoHandles</i> do not operate on the same file. References a <i>SystemTreeNode</i> definition.

### Supplements

*IoFileProperty*

### See also

*OTF2\_GlobalDefWriter\_WriteIoRegularFile()*  
*OTF2\_GlobalDefReaderCallbacks\_SetIoRegularFileCallback()*  
*OTF2\_DefWriter\_WriteIoRegularFile()*  
*OTF2\_DefReaderCallbacks\_SetIoRegularFileCallback()*

### Since

Version 2.1

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## .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

<i>OTF2_↔ StringRef</i>	name	Name of the directory. References a <i>String</i> definition.
<i>OTF2_↔ System↔ Tree↔ NodeRef</i>	scope	Defines the physical scope of this <i>IoDirectory</i> in the system tree. E.g., two <i>IoDirectory</i> definitions with the same name but different <i>scope</i> values are physically different, thus I/O operations through <i>IoHandles</i> do not operate on the same directory. References a <i>SystemTreeNode</i> 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 *IoDuplicate*↔*Handle* event. All *Locations* of a *LocationGroup* have access to an *active IoHandle*, regardless which *Location* of the *LocationGroup* activated the *IoHandle*.

### Attributes

<i>OTF2_↔ StringRef</i>	name	Handle name. References a <i>String</i> definition.
<i>OTF2_↔ Io↔ FileRef</i>	file	File identifier. References a <i>IoRegularFile</i> , or a <i>IoDirectory</i> definition.
<i>OTF2_↔ Io↔ Paradigm↔ Ref</i>	ioParadigm	The I/O paradigm. References a <i>IoParadigm</i> definition.
<i>OTF2_↔ Io↔ Handle↔ Flag</i>	ioHandleFlags	Special characteristics of this handle.
<i>OTF2_↔ CommRef</i>	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 <i>Comm</i> definition.
<i>OTF2_↔ Io↔ HandleRef</i>	parent	Parent, in case this I/O handle was created and operated by an higher- level I/O paradigm. References a <i>IoHandle</i> definition.

## .48 IoPreCreatedHandleState

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### 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

<i>OTF2_Io↔ HandleRef</i>	ioHandle	Parent <i>IoHandle</i> definition to which this one is a supplementary definition. References a <i>IoHandle</i> definition.
<i>OTF2_Io↔ Access↔ Mode</i>	mode	The access mode of the <i>pre-created IoHandle</i> .
<i>OTF2_Io↔ StatusFlag</i>	statusFlags	The status flags of the <i>pre-created IoHandle</i> .

### 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.

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**Attributes**

<i>OTF2_↔ Callpath↔ Ref</i>	callpath	Parent <i>Callpath</i> definition to which this one is a supplementary definition. References a <i>Callpath</i> definition.
<i>OTF2_↔ Parameter↔ Ref</i>	parameter	The parameter of this callpath. References a <i>Parameter</i> definition.
<i>OTF2_↔ Type</i>	type	The type of the attribute value. Must match the type of the parameter.
<i>OTF2_↔ Attribute↔ Value</i>	value	The value of the parameter for this callpath.

**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**

<i>OTF2_↔ StringRef</i>	name	The name given by calling <code>MPI_Comm_set_name</code> on this communicator. Or the empty name to indicate that no name was given. References a <i>String</i> definition.
<i>OTF2_↔ GroupRef</i>	groupA	One of the two MPI process groups in the intercommunicator. The group needs to be of type <code>OTF2_GROUP_TYPE_COMM_GROUP</code> or <code>O↔TF2_GROUP_TYPE_COMM_SELF</code> . References a <i>Group</i> definition.
<i>OTF2_↔ GroupRef</i>	groupB	The other of the two MPI process groups in the intercommunicator. The group needs to be of type <code>OTF2_GROUP_TYPE_COMM_GROUP</code> or <code>O↔TF2_GROUP_TYPE_COMM_SELF</code> . References a <i>Group</i> definition.
<i>OTF2_↔ CommRef</i>	common↔ Communicator	The common peer MPI communicator used to create this inter-communicator. Use <code>OTF2_UNDEFINED_COMM</code> if no such communicator was used. References a <i>Comm</i> , or a <i>InterComm</i> definition.
<i>OTF2_↔ CommFlag</i>	flags	Special characteristics of this communicator.

**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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	stopTime	The time the buffer flush finished.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Measurement↔</i> <i>Mode</i>	measurement↔ Mode	Is the measurement turned on ( <i>OTF2_MEASUREMENT_ON</i> ) or off ( <i>OTF2_↔</i> <i>_MEASUREMENT_OFF</i> )?

### 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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ RegionRef</i>	region	Needs to be defined in a definition record References a <a href="#">Region</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_REGION</i> is available.

#### See also

`OTF2_EvtWriter_Enter()`  
`OTF2_GlobalEvtReaderCallbacks_SetEnterCallback()`  
`OTF2_EvtReaderCallbacks_SetEnterCallback()`

#### Since

Version 1.0

## .55 Leave

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

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ RegionRef</i>	region	Needs to be defined in a definition record References a <a href="#">Region</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_REGION</i> is available.

#### See also

`OTF2_EvtWriter_Leave()`  
`OTF2_GlobalEvtReaderCallbacks_SetLeaveCallback()`  
`OTF2_EvtReaderCallbacks_SetLeaveCallback()`

#### Since

Version 1.0

## .56 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 Mpisend

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### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint32_t</i>	receiver	MPI rank of receiver in <code>communicator</code> .
<i>OTF2_↔ CommRef</i>	communicator	Communicator ID. References a <a href="#">Comm</a> , or a <a href="#">InterComm</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING↔ _COMM</code> is available.
<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length

### See also

`OTF2_EvtWriter_MpiSend()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpiSendCallback()`  
`OTF2_EvtReaderCallbacks_SetMpiSendCallback()`

### Since

Version 1.0

## .57 Mpisend

An *Mpisend* 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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint32_t</i>	receiver	MPI rank of receiver in <code>communicator</code> .
<i>OTF2_↔ CommRef</i>	communicator	Communicator ID. References a <a href="#">Comm</a> , or a <a href="#">InterComm</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING↔ _COMM</code> is available.
<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length
<i>uint64_t</i>	requestID	ID of the related request

### See also

`OTF2_EvtWriter_Mpisend()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpisendCallback()`  
`OTF2_EvtReaderCallbacks_SetMpisendCallback()`

### Since

Version 1.0

---

## .58 MpisendComplete

An *MpisendComplete* 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	requestID	ID of the related request

### See also

`OTF2_EvtWriter_MpisendComplete()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpisendCompleteCallback()`  
`OTF2_EvtReaderCallbacks_SetMpisendCompleteCallback()`

### Since

Version 1.0

## .59 MpilrecvRequest

An *MpilrecvRequest* record indicates that a non-blocking MPI receive operation was initiated (MPI\_IRecv).

### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	requestID	ID of the requested receive

### See also

`OTF2_EvtWriter_MpilrecvRequest()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpilrecvRequestCallback()`  
`OTF2_EvtReaderCallbacks_SetMpilrecvRequestCallback()`

### 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).

## .61 MpiRecv

---

### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>uint32_t</i>	sender	MPI rank of sender in <code>communicator</code> .
<i>OTF2_↔</i> <i>CommRef</i>	communicator	Communicator ID. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔_COMM</i> is available.
<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length

### See also

`OTF2_EvtWriter_MpiRecv()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpiRecvCallback()`  
`OTF2_EvtReaderCallbacks_SetMpiRecvCallback()`

### Since

Version 1.0

## .61 MpiRecv

An *MpiRecv* 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>uint32_t</i>	sender	MPI rank of sender in <code>communicator</code> .
<i>OTF2_↔</i> <i>CommRef</i>	communicator	Communicator ID. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔_COMM</i> is available.
<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length
<i>uint64_t</i>	requestID	ID of the related request

### See also

`OTF2_EvtWriter_MpiRecv()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpiRecvCallback()`  
`OTF2_EvtReaderCallbacks_SetMpiRecvCallback()`

### Since

Version 1.0

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## .62 MpiRequestTest

This events appears if the program tests if a request has already completed but the test failed.

## .63 **MpiRequestCancelled**

---

### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	requestID	ID of the related request

### See also

`OTF2_EvtWriter_MpiRequestTest()`  
`OTF2_GlobalEvtReaderCallbacks_SetMpiRequestTestCallback()`  
`OTF2_EvtReaderCallbacks_SetMpiRequestTestCallback()`

### Since

Version 1.0

## .63 **MpiRequestCancelled**

This events appears if the program canceled a request.

### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	requestID	ID of the related request

### 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.).

---

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.

#### See also

OTF2\_EvtWriter\_MpiCollectiveBegin()  
OTF2\_GlobalEvtReaderCallbacks\_SetMpiCollectiveBeginCallback()  
OTF2\_EvtReaderCallbacks\_SetMpiCollectiveBeginCallback()

#### Since

Version 1.0

## .65 MpiCollectiveEnd

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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ Collective↔ Op</i>	collectiveOp	Determines which collective operation it is.
<i>OTF2_↔ CommRef</i>	communicator	Communicator References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔ _COMM</i> is available.
<i>uint32_t</i>	root	Rank of root in <i>communicator</i> or any predefined constant of <i>OTF2_↔ CollectiveRoot</i> .
<i>uint64_t</i>	sizeSent	Size of the sent message.
<i>uint64_t</i>	sizeReceived	Size of the received message.

#### See also

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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint32_t</i>	numberOf↔ Requested↔ Threads	Requested size of the team.

### See also

`OTF2_EvtWriter_OmpFork()`  
`OTF2_GlobalEvtReaderCallbacks_SetOmpForkCallback()`  
`OTF2_EvtReaderCallbacks_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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.

### See also

`OTF2_EvtWriter_OmpJoin()`  
`OTF2_GlobalEvtReaderCallbacks_SetOmpJoinCallback()`  
`OTF2_EvtReaderCallbacks_SetOmpJoinCallback()`

### Since

Version 1.0

**Deprecated** In version 1.2

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## .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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">uint32_t</a>	lockID	ID of the lock.
<a href="#">uint32_t</a>	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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.



## .70 OmpTaskCreate

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<i>uint32_t</i>	lockID	ID of the lock.
<i>uint32_t</i>	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\_OmpReleaseLock()  
OTF2\_GlobalEvtReaderCallbacks\_SetOmpReleaseLockCallback()  
OTF2\_EvtReaderCallbacks\_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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	taskID	Identifier of the newly created task instance.

### See also

OTF2\_EvtWriter\_OmpTaskCreate()  
OTF2\_GlobalEvtReaderCallbacks\_SetOmpTaskCreateCallback()  
OTF2\_EvtReaderCallbacks\_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.

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#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	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

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### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ MetricRef</i>	metric	Could be a metric class or a metric instance. References a <a href="#">MetricClass</a> , or a <a href="#">MetricInstance</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_METRIC</i> is available.
<i>uint8_t</i>	numberOf↔ Metrics	Number of metrics with in the set.
<i>OTF2_↔ Type</i>	typeIds [ numberOf↔ Metrics ]	List of metric types. These types must match that of the corresponding <a href="#">MetricMember</a> definitions.
<i>OTF2_↔ Metric↔ Value</i>	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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ Parameter↔ Ref</i>	parameter	Parameter ID. References a <a href="#">Parameter</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_PARAMETER</i> is available.

<i>OTF2_↔ StringRef</i>	string	Value: Handle of a string definition References a <a href="#">String</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_↔ _STRING</i> is available.
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**See also**

OTF2\_EvtWriter\_ParameterString()  
 OTF2\_GlobalEvtReaderCallbacks\_SetParameterStringCallback()  
 OTF2\_EvtReaderCallbacks\_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**

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ Parameter↔ Ref</i>	parameter	Parameter ID. References a <a href="#">Parameter</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_PARAMETER</i> is available.
<i>int64_t</i>	value	Value of the recorded parameter.

**See also**

OTF2\_EvtWriter\_ParameterInt()  
 OTF2\_GlobalEvtReaderCallbacks\_SetParameterIntCallback()  
 OTF2\_EvtReaderCallbacks\_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

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### Attributes

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ Parameter↔ Ref</a>	parameter	Parameter ID. References a <a href="#">Parameter</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_PARAMETER</code> is available.
<a href="#">uint64_t</a>	value	Value of the recorded parameter.

### See also

[OTF2\\_EvtWriter\\_ParameterUnsignedInt\(\)](#)  
[OTF2\\_GlobalEvtReaderCallbacks\\_SetParameterUnsignedIntCallback\(\)](#)  
[OTF2\\_EvtReaderCallbacks\\_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_CO↔LLECTIVE_OP_CREATE_HANDLE_AND_ALLOCATE` as the operation type.

### Attributes

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ RmaWin↔ Ref</a>	win	ID of the window created. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_RMA_WIN</code> is available.

### See also

[OTF2\\_EvtWriter\\_RmaWinCreate\(\)](#)  
[OTF2\\_GlobalEvtReaderCallbacks\\_SetRmaWinCreateCallback\(\)](#)  
[OTF2\\_EvtReaderCallbacks\\_SetRmaWinCreateCallback\(\)](#)

### Since

Version 1.2

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## .78 RmaWinDestroy

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 *RmaCollectiveBegin* 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

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window destructed. References a <i>RmaWin</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔</i> <i>_RMA_WIN</i> is available.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.

### 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.

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Collective↔</i> <i>Op</i>	collectiveOp	Determines which collective operation it is.
<i>OTF2_↔</i> <i>Rma↔</i> <i>SyncLevel</i>	syncLevel	Synchronization level of this collective operation.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <i>RmaWin</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔</i> <i>PPING_RMA_WIN</i> is available.
<i>uint32_t</i>	root	Root process for this operation or any predefined constant of <i>OTF2_↔</i> <i>CollectiveRoot</i> .
<i>uint64_t</i>	bytesSent	Bytes sent in operation.
<i>uint64_t</i>	bytesReceived	Bytes receives in operation.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Rma↔</i> <i>SyncLevel</i>	syncLevel	Synchronization level of this collective operation.



## .82 RmaRequestLock

<i>OTF2_↔ RmaWin↔ Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔ PPING_RMA_WIN</i> is available.
<i>OTF2_↔ GroupRef</i>	group	Group of remote processes involved in synchronization. References a <a href="#">Group</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_GROUP</i> is available.

### See also

`OTF2_EvtWriter_RmaGroupSync()`  
`OTF2_GlobalEvtReaderCallbacks_SetRmaGroupSyncCallback()`  
`OTF2_EvtReaderCallbacks_SetRmaGroupSyncCallback()`

### Since

Version 1.2

## .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

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

### See also

`OTF2_EvtWriter_RmaRequestLock()`  
`OTF2_GlobalEvtReaderCallbacks_SetRmaRequestLockCallback()`  
`OTF2_EvtReaderCallbacks_SetRmaRequestLockCallback()`

### Since

Version 1.2

## .83 RmaAcquireLock

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

#### Attributes

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

#### See also

`OTF2_EvtWriter_RmaAcquireLock()`  
`OTF2_GlobalEvtReaderCallbacks_SetRmaAcquireLockCallback()`  
`OTF2_EvtReaderCallbacks_SetRmaAcquireLockCallback()`

#### Since

Version 1.2

## .84 RmaTryLock

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

#### Attributes

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

#### See also

`OTF2_EvtWriter_RmaTryLock()`  
`OTF2_GlobalEvtReaderCallbacks_SetRmaTryLockCallback()`  
`OTF2_EvtReaderCallbacks_SetRmaTryLockCallback()`

#### Since

Version 1.2

## **.85 RmaReleaseLock**

An *RmaReleaseLock* record denotes the time the lock was released.

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#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ RmaWin↔ Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint32_t</i>	remote	Rank of the locked remote process or <i>OTF2_UNDEFINED_UINT32</i> if all processes of the specified window are locked.
<i>uint64_t</i>	lockId	ID of the lock released, if multiple locks are defined on a window.

#### See also

`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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ RmaWin↔ Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint32_t</i>	remote	Rank of the locked remote process.
<i>OTF2_↔ Rma↔ SyncType</i>	syncType	Type of synchronization.

#### 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

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.

### See also

OTF2\_EvtWriter\_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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint32_t</i>	remote	Rank of the target process.
<i>uint64_t</i>	bytes	Bytes sent to target.
<i>uint64_t</i>	matchingId	ID used for matching the corresponding completion record.

### See also

OTF2\_EvtWriter\_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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ RmaWin↔ Ref</a>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <a href="#">OTF2_MA↔ PPING_RMA_WIN</a> is available.
<a href="#">uint32_t</a>	remote	Rank of the target process.
<a href="#">uint64_t</a>	bytes	Bytes received from target.
<a href="#">uint64_t</a>	matchingId	ID used for matching the corresponding completion record.

#### 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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ RmaWin↔ Ref</a>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <a href="#">OTF2_MA↔ PPING_RMA_WIN</a> is available.
<a href="#">uint32_t</a>	remote	Rank of the target process.
<a href="#">OTF2_↔ Rma↔ Atomic↔ Type</a>	type	Type of atomic operation.
<a href="#">uint64_t</a>	bytesSent	Bytes sent to target.
<a href="#">uint64_t</a>	bytesReceived	Bytes received from target.
<a href="#">uint64_t</a>	matchingId	ID used for matching the corresponding completion record.

#### See also

[OTF2\\_EvtWriter\\_RmaAtomic\(\)](#)  
[OTF2\\_GlobalEvtReaderCallbacks\\_SetRmaAtomicCallback\(\)](#)  
[OTF2\\_EvtReaderCallbacks\\_SetRmaAtomicCallback\(\)](#)

#### Since

Version 1.2

## **.91 RmaOpCompleteBlocking**

An *RmaOpCompleteBlocking* record denotes the local completion of a blocking RMA operation.

#### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint64_t</i>	matchingId	ID used for matching the corresponding RMA operation record.

#### See also

`OTF2_EvtWriter_RmaOpCompleteBlocking()`  
`OTF2_GlobalEvtReaderCallbacks_SetRmaOpCompleteBlockingCallback()`  
`OTF2_EvtReaderCallbacks_SetRmaOpCompleteBlockingCallback()`

#### Since

Version 1.2

## .92 RmaOpCompleteNonBlocking

An *RmaOpCompleteNonBlocking* record denotes the local completion of a non-blocking RMA operation.

#### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint64_t</i>	matchingId	ID used for matching the corresponding RMA operation record.

#### 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.



## .94 RmaOpCompleteRemote

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint64_t</i>	matchingId	ID used for matching the corresponding RMA operation record.

### See also

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

### Since

Version 1.2

## .94 RmaOpCompleteRemote

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

### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>RmaWin↔</i> <i>Ref</i>	win	ID of the window used for this operation. References a <a href="#">RmaWin</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔PPING_RMA_WIN</i> is available.
<i>uint64_t</i>	matchingId	ID used for matching the corresponding RMA operation record.

### See also

`OTF2_EvtWriter_RmaOpCompleteRemote()`  
`OTF2_GlobalEvtReaderCallbacks_SetRmaOpCompleteRemoteCallback()`  
`OTF2_EvtReaderCallbacks_SetRmaOpCompleteRemoteCallback()`

### Since

Version 1.2

## .95 ThreadFork

A *ThreadFork* record marks that a thread forks a thread team.

---

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ Paradigm</i>	model	The threading paradigm this event took place.
<i>uint32_t</i>	numberOf↔ Requested↔ Threads	Requested size of the team.

#### 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 joint and only the master thread continues execution.

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ Paradigm</i>	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

---

### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	threadTeam	Thread team References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPIN↔ G_COMM</i> is available.

### See also

OTF2\_EvtWriter\_ThreadTeamBegin()  
OTF2\_GlobalEvtReaderCallbacks\_SetThreadTeamBeginCallback()  
OTF2\_EvtReaderCallbacks\_SetThreadTeamBeginCallback()

### Since

Version 1.2

## .98 ThreadTeamEnd

The current location leaves the specified thread team.

### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	threadTeam	Thread team References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPIN↔ G_COMM</i> is available.

### See also

OTF2\_EvtWriter\_ThreadTeamEnd()  
OTF2\_GlobalEvtReaderCallbacks\_SetThreadTeamEndCallback()  
OTF2\_EvtReaderCallbacks\_SetThreadTeamEndCallback()

### Since

Version 1.2

## .99 ThreadAcquireLock

A *ThreadAcquireLock* record marks that a thread acquires a lock.

---

#### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Paradigm</i>	model	The threading paradigm this event took place.
<i>uint32_t</i>	lockID	ID of the lock.
<i>uint32_t</i>	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_ThreadAcquireLock()`  
`OTF2_GlobalEvtReaderCallbacks_SetThreadAcquireLockCallback()`  
`OTF2_EvtReaderCallbacks_SetThreadAcquireLockCallback()`

#### Since

Version 1.2

## .100 ThreadReleaseLock

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

#### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Paradigm</i>	model	The threading paradigm this event took place.
<i>uint32_t</i>	lockID	ID of the lock.
<i>uint32_t</i>	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_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

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### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	threadTeam	Thread team References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPIN↔ G_COMM</i> is available.
<i>uint32_t</i>	creatingThread	Creating thread of this task.
<i>uint32_t</i>	generation↔ Number	Thread-private generation number of task's creating thread.

### See also

OTF2\_EvtWriter\_ThreadTaskCreate()  
OTF2\_GlobalEvtReaderCallbacks\_SetThreadTaskCreateCallback()  
OTF2\_EvtReaderCallbacks\_SetThreadTaskCreateCallback()

### Since

Version 1.2

## .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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	threadTeam	Thread team References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPIN↔ G_COMM</i> is available.
<i>uint32_t</i>	creatingThread	Creating thread of this task.
<i>uint32_t</i>	generation↔ Number	Thread-private generation number of task's creating thread.

### See also

OTF2\_EvtWriter\_ThreadTaskSwitch()  
OTF2\_GlobalEvtReaderCallbacks\_SetThreadTaskSwitchCallback()  
OTF2\_EvtReaderCallbacks\_SetThreadTaskSwitchCallback()

### Since

Version 1.2

## .103 ThreadTaskComplete

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

---

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	threadTeam	Thread team References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPIN↔ G_COMM</i> is available.
<i>uint32_t</i>	creatingThread	Creating thread of this task.
<i>uint32_t</i>	generation↔ Number	Thread-private generation number of task's creating thread.

#### See also

`OTF2_EvtWriter_ThreadTaskComplete()`  
`OTF2_GlobalEvtReaderCallbacks_SetThreadTaskCompleteCallback()`  
`OTF2_EvtReaderCallbacks_SetThreadTaskCompleteCallback()`

#### Since

Version 1.2

## .104 ThreadCreate

The location created successfully a new thread.

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	thread↔ Contingent	The thread contingent. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔ PPING_COMM</i> is available.
<i>uint64_t</i>	sequenceCount	A <i>threadContingent</i> unique number. The corresponding <i>ThreadBegin</i> event does have the same number.

#### See also

`OTF2_EvtWriter_ThreadCreate()`  
`OTF2_GlobalEvtReaderCallbacks_SetThreadCreateCallback()`  
`OTF2_EvtReaderCallbacks_SetThreadCreateCallback()`

#### Since

Version 1.3

## .105 ThreadBegin

Marks the begin of a thread created by another thread.

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## .106 ThreadWait

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>CommRef</i>	thread↔ Contingent	The thread contingent. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔</i> <i>PPING_COMM</i> is available.
<i>uint64_t</i>	sequenceCount	A <i>threadContingent</i> unique number. The corresponding <i>ThreadCreate</i> event does have the same number.

### See also

`OTF2_EvtWriter_ThreadBegin()`  
`OTF2_GlobalEvtReaderCallbacks_SetThreadBeginCallback()`  
`OTF2_EvtReaderCallbacks_SetThreadBeginCallback()`

### Since

Version 1.3

## .106 ThreadWait

The location waits for the completion of another thread.

### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>CommRef</i>	thread↔ Contingent	The thread contingent. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔</i> <i>PPING_COMM</i> is available.
<i>uint64_t</i>	sequenceCount	A <i>threadContingent</i> unique number. The corresponding <i>ThreadEnd</i> event does have the same number.

### See also

`OTF2_EvtWriter_ThreadWait()`  
`OTF2_GlobalEvtReaderCallbacks_SetThreadWaitCallback()`  
`OTF2_EvtReaderCallbacks_SetThreadWaitCallback()`

### Since

Version 1.3

## .107 ThreadEnd

Marks the end of a thread.

---

#### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>CommRef</i>	thread↔ Contingent	The thread contingent. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MA↔</i> <i>PPING_COMM</i> is available.
<i>uint64_t</i>	sequenceCount	A <i>threadContingent</i> unique number. The corresponding <i>ThreadWait</i> event does have the same number. <i>OTF2_UNDEFINED_UINT64</i> in case no corresponding <i>ThreadWait</i> event exists.

#### See also

`OTF2_EvtWriter_ThreadEnd()`  
`OTF2_GlobalEvtReaderCallbacks_SetThreadEndCallback()`  
`OTF2_EvtReaderCallbacks_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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Calling↔</i> <i>ContextRef</i>	callingContext	The entered region as referenced by the <i>CallingContext</i> definition. References a <i>CallingContext</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_CALLING_CONTEXT</i> is available.



## .109 CallingContextLeave

<i>uint32_t</i>	unwindDistance	The unwindDistance for this <i>callingContext</i> . See the description in <a href="#">CallingContext</a> .
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### See also

OTF2\_EvtWriter\_CallingContextEnter()  
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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>Calling↔</i> <i>ContextRef</i>	callingContext	The left region as referenced by the <a href="#">CallingContext</a> definition. References a <a href="#">CallingContext</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_CALLING_CONTEXT</i> is available.

### See also

OTF2\_EvtWriter\_CallingContextLeave()  
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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ Calling↔ ContextRef</a>	callingContext	Describes the calling context of the thread when it was interrupted. References a <a href="#">CallingContext</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_CALLING_CONTEXT</code> is available.
<a href="#">uint32_t</a>	unwindDistance	The <code>unwindDistance</code> for this <code>callingContext</code> . See the description in <a href="#">CallingContext</a> .
<a href="#">OTF2_↔ Interrupt↔ Generator↔ Ref</a>	<a href="#">interrupt↔ Generator</a>	References a <a href="#">InterruptGenerator</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_INTERRUPT_GENERATOR</code> is available.

## See also

[OTF2\\_EvtWriter\\_CallingContextSample\(\)](#)  
[OTF2\\_GlobalEvtReaderCallbacks\\_SetCallingContextSampleCallback\(\)](#)  
[OTF2\\_EvtReaderCallbacks\\_SetCallingContextSampleCallback\(\)](#)

## Since

Version 1.5

## .111 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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_Io↔ HandleRef</a>	handle	A previously <i>inactive</i> I/O handle which will be activated by this record. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_IO_HANDLE</code> is available.
<a href="#">OTF2_Io↔ Access↔ Mode</a>	mode	Determines which I/O operations can be applied to this I/O handle (e.g., read-only, write-only, read-write).
<a href="#">OTF2_Io↔ Creation↔ Flag</a>	creationFlags	Requested I/O handle creation flags (e.g., create, exclusive, etc.).
<a href="#">OTF2_Io↔ StatusFlag</a>	statusFlags	I/O handle status flags which will be associated with the <code>handle</code> attribute (e.g., append, create, close-on-exec, async, etc).

## .112 IoDestroyHandle

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### See also

OTF2\_EvtWriter\_IoCreateHandle()  
OTF2\_GlobalEvtReaderCallbacks\_SetIoCreateHandleCallback()  
OTF2\_EvtReaderCallbacks\_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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle which will be inactivated by this records. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.

### See also

OTF2\_EvtWriter\_IoDestroyHandle()  
OTF2\_GlobalEvtReaderCallbacks\_SetIoDestroyHandleCallback()  
OTF2\_EvtReaderCallbacks\_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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_lo↔ HandleRef</i>	oldHandle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>OTF2_lo↔ HandleRef</i>	newHandle	A previously <i>inactive</i> I/O handle which will be activated by this record. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>OTF2_lo↔ StatusFlag</i>	statusFlags	The status flag for the new I/O handle <i>newHandle</i> . No status flags will be inherited from the I/O handle <i>oldHandle</i> .

#### 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.

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_lo↔ HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>int64_t</i>	offsetRequest	Requested offset.
<i>OTF2_lo↔ Seek↔ Option</i>	whence	Position inside the file from where <i>offsetRequest</i> should be applied (e.g., absolute from the start or end, relative to the current position).
<i>uint64_t</i>	offsetResult	Resulting offset, e.g., within the file relative to the beginning of the file.

#### See also

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

#### Since

Version 2.1

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## **.115 IoChangeStatusFlags**

An *IoChangeStatusFlags* record marks a change to the status flags associated with an *active* I/O handle.

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#### Attributes

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ HandleRef</a>	handle	An <i>active</i> I/O handle. References a <a href="#">IoHandle</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING_IO_HANDLE</code> is available.
<a href="#">OTF2_↔ StatusFlag</a>	statusFlags	Set flags (e.g., close-on-exec, append, etc.).

#### See also

[OTF2\\_EvtWriter\\_IoChangeStatusFlags\(\)](#)  
[OTF2\\_GlobalEvtReaderCallbacks\\_SetIoChangeStatusFlagsCallback\(\)](#)  
[OTF2\\_EvtReaderCallbacks\\_SetIoChangeStatusFlagsCallback\(\)](#)

#### Since

Version 2.1

## .116 IoDeleteFile

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

#### Attributes

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location where this event happened.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The time when this event happened.
<a href="#">OTF2_↔ Paradigm↔ Ref</a>	ioParadigm	The I/O paradigm which induced the deletion. References a <a href="#">IoParadigm</a> definition.
<a href="#">OTF2_↔ FileRef</a>	file	File identifier. References a <a href="#">IoRegularFile</a> , or a <a href="#">IoDirectory</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPI↔ NG_IO_FILE</code> is available.

#### See also

[OTF2\\_EvtWriter\\_IoDeleteFile\(\)](#)  
[OTF2\\_GlobalEvtReaderCallbacks\\_SetIoDeleteFileCallback\(\)](#)  
[OTF2\\_EvtReaderCallbacks\\_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

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### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_lo↔ HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>OTF2_lo↔ Operation↔ Mode</i>	mode	Mode of an I/O handle operation (e.g., read or write).
<i>OTF2_lo↔ Operation↔ Flag</i>	operationFlags	Special semantic of this operation.
<i>uint64_t</i>	bytesRequest	Requested bytes to write/read.
<i>uint64_t</i>	matchingId	Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced <i>IoHandle</i> .

### 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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_lo↔ HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>uint64_t</i>	matchingId	Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced <i>IoHandle</i> .

---

**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**

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>uint64_t</i>	matchingId	Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced <i>IoHandle</i> .

**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

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_lo↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>uint64_t</i>	bytesResult	Number of actual transferred bytes.
<i>uint64_t</i>	matchingId	Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced <i>IoHandle</i> .

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_lo↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>uint64_t</i>	matchingId	Identifier used to correlate associated event records of an I/O operation. This identifier is unique for the referenced <i>IoHandle</i> .

### See also

`OTF2_EvtWriter_IoOperationCancelled()`  
`OTF2_GlobalEvtReaderCallbacks_SetIoOperationCancelledCallback()`  
`OTF2_EvtReaderCallbacks_SetIoOperationCancelledCallback()`

### Since

Version 2.1

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## .122 IoAcquireLock

An *IoAcquireLock* record marks the acquisition of an I/O lock.

## .123 IoReleaseLock

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### Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>OTF2_↔</i> <i>LockType</i>	lockType	Type of the lock.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>OTF2_↔</i> <i>LockType</i>	lockType	Type of the lock.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>HandleRef</i>	handle	An <i>active</i> I/O handle. References a <i>IoHandle</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_IO_HANDLE</i> is available.
<i>OTF2_↔</i> <i>LockType</i>	lockType	Type of the lock.

### 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\_LOCAT↔*  
*ION\_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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location where this event happened.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔</i> <i>StringRef</i>	programName	The name of the program. References a <i>String</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_STRING</i> is available.

## .126 ProgramEnd

<i>uint32_t</i>	numberOf↔ Arguments	Number of additional arguments to the program.
<i>OTF2_↔ StringRef</i>	program↔ Arguments [ numberOf↔ Arguments ]	List of additional arguments to the program.

### See also

OTF2\_EvtWriter\_ProgramBegin()  
OTF2\_GlobalEvtReaderCallbacks\_SetProgramBeginCallback()  
OTF2\_EvtReaderCallbacks\_SetProgramBeginCallback()

### Since

Version 2.1

## .126 ProgramEnd

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\_LOCAT↔  
ION\_GROUP\_TYPE\_PROCESS*.

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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>int64_t</i>	exitStatus	The exit status of the program. Note, that on some systems only the least significant 8 bits may be visible to other processes. Use <i>OTF2_UNDEFINE↔ D_INT64</i> , if the exit status was not available.

### See also

OTF2\_EvtWriter\_ProgramEnd()  
OTF2\_GlobalEvtReaderCallbacks\_SetProgramEndCallback()  
OTF2\_EvtReaderCallbacks\_SetProgramEndCallback()

### Since

Version 2.1

## .127 NonBlockingCollectiveRequest

A *NonBlockingCollectiveRequest* record indicates that a non-blocking collective operation was initiated.

---

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>uint64_t</i>	requestID	ID of the requested operation.

#### See also

`OTF2_EvtWriter_NonBlockingCollectiveRequest()`  
`OTF2_GlobalEvtReaderCallbacks_SetNonBlockingCollectiveRequestCallback()`  
`OTF2_EvtReaderCallbacks_SetNonBlockingCollectiveRequestCallback()`

#### Since

Version 3.0

## .128 NonBlockingCollectiveComplete

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

#### Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ Collective↔ Op</i>	collectiveOp	Determines which collective operation it is.
<i>OTF2_↔ CommRef</i>	communicator	Communicator ID. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔ _COMM</i> is available.
<i>uint32_t</i>	root	Rank of root in <i>communicator</i> or any predefined constant of <i>OTF2_↔ CollectiveRoot</i> .
<i>uint64_t</i>	sizeSent	Size of the sent data.
<i>uint64_t</i>	sizeReceived	Size of the received data.
<i>uint64_t</i>	requestID	ID of the requested operation.

#### See also

`OTF2_EvtWriter_NonBlockingCollectiveComplete()`  
`OTF2_GlobalEvtReaderCallbacks_SetNonBlockingCollectiveCompleteCallback()`  
`OTF2_EvtReaderCallbacks_SetNonBlockingCollectiveCompleteCallback()`

#### Since

Version 3.0

## .129 CommCreate

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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	communicator	Communicator ID. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔_COMM</i> is available.

### See also

`OTF2_EvtWriter_CommCreate()`  
`OTF2_GlobalEvtReaderCallbacks_SetCommCreateCallback()`  
`OTF2_EvtReaderCallbacks_SetCommCreateCallback()`

### Since

Version 3.0

## .130 CommDestroy

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

<i>OTF2_↔ Location↔ Ref</i>	location	The location where this event happened.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The time when this event happened.
<i>OTF2_↔ CommRef</i>	communicator	Communicator ID. References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔_COMM</i> is available.

### See also

`OTF2_EvtWriter_CommDestroy()`  
`OTF2_GlobalEvtReaderCallbacks_SetCommDestroyCallback()`  
`OTF2_EvtReaderCallbacks_SetCommDestroyCallback()`

### Since

Version 3.0

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## .131 List of all marker records

## .132 *OTF2\_MarkerRef* DefMarker

Group markers by name and severity.

### Attributes

const char*	markerGroup	Group name, e.g., "MUST", ...
const char*	markerCategory	Marker category, e.g., "Argument type error", ...
<i>OTF2_MarkerSeverity</i>	severity	The severity for these markers.

### See also

`OTF2_MarkerWriter_WriteDefMarker()`  
`OTF2_MarkerReaderCallbacks_SetDefMarkerCallback()`

### Since

Version 1.2

## .133 Marker

A user marker instance, with implied time stamp.

### Attributes

<i>OTF2_TimeStamp</i>	timestamp	The time when this marker happened.
<i>OTF2_TimeStamp</i>	duration	A possible duration of this marker. May be 0.
<i>OTF2_MarkerRef</i>	marker	Groups this marker by name and severity. References a <a href="#">DefMarker</a> definition.
<i>OTF2_MarkerScope</i>	scope	The type of scope of this marker instance.
uint64_t	scopeRef	The scope instance of this marker. Depends on <code>scope</code> .
const char*	text	A textual description for this marker.

### See also

`OTF2_MarkerWriter_WriteMarker()`  
`OTF2_MarkerReaderCallbacks_SetMarkerCallback()`

### Since

Version 1.2



## .134 List of all snapshot records

### .135 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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location of the snapshot.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The snapshot time of this record.
<a href="#">uint64_t</a>	<a href="#">numberOf↔ Records</a>	Number of snapshot event records in this snapshot. Excluding the <a href="#">Snapshot↔ End</a> record.

#### See also

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

#### Since

Version 1.2

### .136 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

<a href="#">OTF2_↔ Location↔ Ref</a>	location	The location of the snapshot.
<a href="#">OTF2_↔ Time↔ Stamp</a>	timestamp	The snapshot time of this record.

<i>uint64_t</i>	contReadPos	Position to continue reading in the event trace.
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**See also**

OTF2\_SnapWriter\_SnapshotEnd()  
 OTF2\_GlobalSnapReaderCallbacks\_SetSnapshotEndCallback()  
 OTF2\_SnapReaderCallbacks\_SetSnapshotEndCallback()

**Since**

Version 1.2

### .137 MeasurementOnOffSnap

The last occurrence of a [MeasurementOnOff](#) event of this location, if any.

**Attributes**

<i>OTF2_↔ Location↔ Ref</i>	location	The location of the snapshot.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔ Time↔ Stamp</i>	origEventTime	The original time this event happened.
<i>OTF2_↔ Measurement↔ Mode</i>	measurement↔ Mode	Is the measurement turned on ( <i>OTF2_MEASUREMENT_ON</i> ) or off ( <i>OTF2↔ _MEASUREMENT_OFF</i> )?

**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`

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### Attributes

<code>OTF2_↔ Location↔ Ref</code>	location	The location of the snapshot.
<code>OTF2_↔ Time↔ Stamp</code>	timestamp	The snapshot time of this record.
<code>OTF2_↔ Time↔ Stamp</code>	origEventTime	The original time this event happened.
<code>OTF2_↔ RegionRef</code>	region	Needs to be defined in a definition record References a <a href="#">Region</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MA↔ PPING_REGION</code> is available.

### 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 [MpiIrecv](#) 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

<code>OTF2_↔ Location↔ Ref</code>	location	The location of the snapshot.
<code>OTF2_↔ Time↔ Stamp</code>	timestamp	The snapshot time of this record.
<code>OTF2_↔ Time↔ Stamp</code>	origEventTime	The original time this event happened.
<code>uint32_t</code>	receiver	MPI rank of receiver in <code>communicator</code> .
<code>OTF2_↔ CommRef</code>	communicator	Communicator ID. References a <a href="#">Comm</a> , or a <a href="#">InterComm</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING↔ _COMM</code> is available.

<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length

See also

[MpiSend](#) event  
 OTF2\_SnapWriter\_MpiSend()  
 OTF2\_GlobalSnapReaderCallbacks\_SetMpiSendCallback()  
 OTF2\_SnapReaderCallbacks\_SetMpiSendCallback()

Since

Version 1.2

## .140 MpilsendSnap

This record exists for each [Mpilsend](#) event where a corresponding [MpilsendComplete](#) or [MpiRequestCancelled](#) event did not occur on this location before the snapshot. Or the corresponding [MpilsendComplete](#) did occurred (the [MpilsendCompleteSnap](#) 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 [Mpilrecv](#) event.)

Attributes

<i>OTF2_↔ Location↔ Ref</i>	location	The location of the snapshot.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔ Time↔ Stamp</i>	origEventTime	The original time this event happened.
<i>uint32_t</i>	receiver	MPI rank of receiver in <code>communicator</code> .
<i>OTF2_↔ CommRef</i>	communicator	Communicator ID. References a <a href="#">Comm</a> , or a <a href="#">InterComm</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔_COMM</i> is available.
<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length
<i>uint64_t</i>	requestID	ID of the related request

See also

[Mpilsend](#) event  
 OTF2\_SnapWriter\_Mpilsend()  
 OTF2\_GlobalSnapReaderCallbacks\_SetMpilsendCallback()  
 OTF2\_SnapReaderCallbacks\_SetMpilsendCallback()

Since

Version 1.2

## .141 MpilsendCompleteSnap

This record exists for each [Mpilsend](#) event where the corresponding [MpilsendComplete](#) 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 [Mpilrecv](#) event.) .

## .142 `MpiRecvSnap`

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### Attributes

<code>OTF2_↔ Location↔ Ref</code>	location	The location of the snapshot.
<code>OTF2_↔ Time↔ Stamp</code>	timestamp	The snapshot time of this record.
<code>OTF2_↔ Time↔ Stamp</code>	origEventTime	The original time this event happened.
<code>uint64_t</code>	requestID	ID of the related request

### See also

[MpiSendComplete](#) event

`OTF2_SnapWriter_MpiSendComplete()`

`OTF2_GlobalSnapReaderCallbacks_SetMpiSendCompleteCallback()`

`OTF2_SnapReaderCallbacks_SetMpiSendCompleteCallback()`

### Since

Version 1.2

## .142 `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 [MpiSendComplete](#) event. Or a [MpiRecvRequest](#) occurred before this event but the corresponding [MpiRecv](#) event did not occur before this snapshot. In this case the message matching couldn't be performed yet, because the envelope of the ongoing [MpiRecvRequest](#) is not yet known.

### Attributes

<code>OTF2_↔ Location↔ Ref</code>	location	The location of the snapshot.
<code>OTF2_↔ Time↔ Stamp</code>	timestamp	The snapshot time of this record.
<code>OTF2_↔ Time↔ Stamp</code>	origEventTime	The original time this event happened.
<code>uint32_t</code>	sender	MPI rank of sender in <code>communicator</code> .
<code>OTF2_↔ CommRef</code>	communicator	Communicator ID. References a <a href="#">Comm</a> , or a <a href="#">InterComm</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING↔ _COMM</code> is available.

<i>uint32_t</i>	msgTag	Message tag
<i>uint64_t</i>	msgLength	Message length

See also

[MpiRecv](#) event  
 OTF2\_SnapWriter\_MpiRecv()  
 OTF2\_GlobalSnapReaderCallbacks\_SetMpiRecvCallback()  
 OTF2\_SnapReaderCallbacks\_SetMpiRecvCallback()

Since

Version 1.2

## .143 MpilrecvRequestSnap

This record exists for each [MpilrecvRequest](#) event where an corresponding [Mpilrecv](#) or [MpiRequestCancelled](#) event did not occur on this location before the snapshot. Or the corresponding [Mpilrecv](#) did occurred (the [MpilrecvSnap](#) 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 [Mpilrecv](#) event.

Attributes

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>uint64_t</i>	requestID	ID of the requested receive

See also

[MpilrecvRequest](#) event  
 OTF2\_SnapWriter\_MpilrecvRequest()  
 OTF2\_GlobalSnapReaderCallbacks\_SetMpilrecvRequestCallback()  
 OTF2\_SnapReaderCallbacks\_SetMpilrecvRequestCallback()

Since

Version 1.2

## .144 MpilrecvSnap

This record exists for each [Mpilrecv](#) 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 [MpilsendComplete](#) event. Or a [MpilrecvRequest](#) occurred before this event but the corresponding [Mpilrecv](#) event did not occurred before this snapshot. In this case the message matching couldn't performed yet, because the envelope of the ongoing [MpilrecvRequest](#) is not yet known.

## .145 `MpiCollectiveBeginSnap`

---

### Attributes

<code>OTF2_↔ Location↔ Ref</code>	location	The location of the snapshot.
<code>OTF2_↔ Time↔ Stamp</code>	timestamp	The snapshot time of this record.
<code>OTF2_↔ Time↔ Stamp</code>	origEventTime	The original time this event happened.
<code>uint32_t</code>	sender	MPI rank of sender in <code>communicator</code> .
<code>OTF2_↔ CommRef</code>	communicator	Communicator ID. References a <a href="#">Comm</a> , or a <a href="#">InterComm</a> definition and will be mapped to the global definition if a mapping table of type <code>OTF2_MAPPING↔ _COMM</code> is available.
<code>uint32_t</code>	msgTag	Message tag
<code>uint64_t</code>	msgLength	Message length
<code>uint64_t</code>	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

<code>OTF2_↔ Location↔ Ref</code>	location	The location of the snapshot.
<code>OTF2_↔ Time↔ Stamp</code>	timestamp	The snapshot time of this record.
<code>OTF2_↔ Time↔ Stamp</code>	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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>OTF2_↔</i> <i>Collective↔</i> <i>Op</i>	collectiveOp	Determines which collective operation it is.
<i>OTF2_↔</i> <i>CommRef</i>	communicator	Communicator References a <i>Comm</i> , or a <i>InterComm</i> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING↔_COMM</i> is available.
<i>uint32_t</i>	root	Rank of root in <i>communicator</i> or any predefined constant of <i>OTF2_↔CollectiveRoot</i> .
<i>uint64_t</i>	sizeSent	Size of the sent message.
<i>uint64_t</i>	sizeReceived	Size of the received message.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.

<i>uint32_t</i>	numberOf↔ Requested↔ Threads	Requested size of the team.
-----------------	------------------------------------	-----------------------------

**See also**

[OmpFork](#) event  
 OTF2\_SnapWriter\_OmpFork()  
 OTF2\_GlobalSnapReaderCallbacks\_SetOmpForkCallback()  
 OTF2\_SnapReaderCallbacks\_SetOmpForkCallback()

**Since**

Version 1.2

## .148 OmpAcquireLockSnap

This record exists for each [OmpAcquireLock](#) event where the corresponding [OmpReleaseLock](#) did not occurred before this snapshot yet.

**Attributes**

<i>OTF2_↔ Location↔ Ref</i>	location	The location of the snapshot.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔ Time↔ Stamp</i>	origEventTime	The original time this event happened.
<i>uint32_t</i>	lockID	ID of the lock.
<i>uint32_t</i>	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**

[OmpAcquireLock](#) event  
 OTF2\_SnapWriter\_OmpAcquireLock()  
 OTF2\_GlobalSnapReaderCallbacks\_SetOmpAcquireLockCallback()  
 OTF2\_SnapReaderCallbacks\_SetOmpAcquireLockCallback()

**Since**

Version 1.2

## .149 OmpTaskCreateSnap

This record exists for each [OmpTaskCreate](#) event where the corresponding [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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>uint64_t</i>	taskID	Identifier of the newly created task instance.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>uint64_t</i>	taskID	Identifier of the now active task instance.

### 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>OTF2_↔</i> <i>MetricRef</i>	metric	Could be a metric class or a metric instance. References a <a href="#">MetricClass</a> , or a <a href="#">MetricInstance</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_METRIC</i> is available.
<i>uint8_t</i>	numberOf↔ Metrics	Number of metrics with in the set.
<i>OTF2_↔</i> <i>Type</i>	typeIDs [ numberOf↔ Metrics ]	List of metric types. These types must match that of the corresponding <a href="#">MetricMember</a> definitions.
<i>OTF2_↔</i> <i>Metric↔</i> <i>Value</i>	metricValues [ numberOf↔ Metrics ]	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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>OTF2_↔</i> <i>Parameter↔</i> <i>Ref</i>	parameter	Parameter ID. References a <a href="#">Parameter</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_PARAMETER</i> is available.
<i>OTF2_↔</i> <i>StringRef</i>	string	Value: Handle of a string definition References a <a href="#">String</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_↔</i> <i>_STRING</i> 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

<i>OTF2_↔</i> <i>Location↔</i> <i>Ref</i>	location	The location of the snapshot.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔</i> <i>Time↔</i> <i>Stamp</i>	origEventTime	The original time this event happened.
<i>OTF2_↔</i> <i>Parameter↔</i> <i>Ref</i>	parameter	Parameter ID. References a <a href="#">Parameter</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_PARAMETER</i> is available.

---

<i>int64_t</i>	value	Value of the recorded parameter.
----------------	-------	----------------------------------

**See also**

[ParameterInt](#) event  
 OTF2\_SnapWriter\_ParameterInt()  
 OTF2\_GlobalSnapReaderCallbacks\_SetParameterIntCallback()  
 OTF2\_SnapReaderCallbacks\_SetParameterIntCallback()

**Since**

Version 1.2

## .154 ParameterUnsignedIntSnap

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**

<i>OTF2_↔ Location↔ Ref</i>	location	The location of the snapshot.
<i>OTF2_↔ Time↔ Stamp</i>	timestamp	The snapshot time of this record.
<i>OTF2_↔ Time↔ Stamp</i>	origEventTime	The original time this event happened.
<i>OTF2_↔ Parameter↔ Ref</i>	parameter	Parameter ID. References a <a href="#">Parameter</a> definition and will be mapped to the global definition if a mapping table of type <i>OTF2_MAPPING_PARAMETER</i> is available.
<i>uint64_t</i>	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

```
1 #!/usr/bin/env python
2 #
3 # This file is part of the Score-P software (http://www.score-p.org)
4 #
5 # Copyright (c) 2015-2017,
6 # Technische Universitaet Dresden, Germany
7 #
8 # This software may be modified and distributed under the terms of
9 # a BSD-style license. See the COPYING file in the package base
10 # directory for details.
11 #
12
13 import otf2
14
15
16 with otf2.reader.open('TestArchive/traces.otf2') as trace:
17     print("Read {} string definitions".format(len(trace.definitions.strings)))
18
19     for location, event in trace.events:
20         print("Encountered {} event {} on {}".format(type(event).__name__,
21                                                       event, location))
21
```

### A.2 otf2\_high\_level\_writer\_example.py

Python high-level writing example

```
1 #!/usr/bin/env python
2 #
3 # This file is part of the Score-P software (http://www.score-p.org)
4 #
5 # Copyright (c) 2015-2016, 2021,
6 # Technische Universitaet Dresden, Germany
7 #
8 # This software may be modified and distributed under the terms of
9 # a BSD-style license. See the COPYING file in the package base
10 # directory for details.
11 #
12
13 import otf2
14 from otf2.enums import Type
15 import time
16
17
18 TIMER_GRANULARITY = 1000000
19
```

```

20
21 def t():
22     return int(round(time.time() * TIMER_GRANULARITY))
23
24
25 with otf2.writer.open("TestArchive", timer_resolution=TIMER_GRANULARITY) as trace:
26
27     function = trace.definitions.region("My Function")
28
29     parent_node = trace.definitions.system_tree_node("node")
30     system_tree_node = trace.definitions.system_tree_node("myHost", parent=parent_node)
31
32     trace.definitions.system_tree_node_property(system_tree_node, "color", value="black")
33     trace.definitions.system_tree_node_property(system_tree_node, "rack #", value=42)
34
35     location_group = trace.definitions.location_group("Initial Process",
36                                                     system_tree_parent=system_tree_node)
37
38     attr = trace.definitions.attribute("StringTest", "A test attribute", Type.STRING)
39     float_attr = trace.definitions.attribute("FloatTest", "Another test attribute",
40                                           Type.DOUBLE)
41
42     writer = trace.event_writer("Main Thread", group=location_group)
43
44     # Write enter and leave event
45     writer.enter(t(), function, {attr: "Hello World"})
46     writer.leave(t(), function, attributes={float_attr: 42.0, attr: "Wurst?"})
47
48     # Get convenience metric object and write one metric event
49     temperature = trace.definitions.metric("Time since last coffee", unit="min")
50     writer.metric(t(), temperature, 72.0)
51
52     # Get metric members
53     temp_member = trace.definitions.metric_member("Temperature", "C", otf2.MetricType.OTHER,
54                                                  otf2.MetricMode.ABSOLUTE_POINT)
55     power_member = trace.definitions.metric_member("Power", "W")
56     # Add metric members to the metric class object
57     mclass = trace.definitions.metric_class([temp_member, power_member])
58     # Add metric object to the location object
59     writer.metric(t(), mclass, [42.0, 12345.6])

```

### A.3 otf2\_mpi\_reader\_example.c

#### MPI reading example

```

/*
 * This file is part of the Score-P software (http://www.score-p.org)
 *
 * Copyright (c) 2009-2013,
 * RWTH Aachen University, Germany
 *
 * Copyright (c) 2009-2013,
 * Gesellschaft fuer numerische Simulation mbH Braunschweig, Germany
 *
 * Copyright (c) 2009-2014,
 * Technische Universitaet Dresden, Germany
 *
 * Copyright (c) 2009-2013,
 * University of Oregon, Eugene, USA
 *
 * Copyright (c) 2009-2014,
 * Forschungszentrum Juelich GmbH, Germany
 *
 * Copyright (c) 2009-2013,
 * 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 <mpi.h>

```



### A.3 otf2\_mpi\_reader\_example.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_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 )
{
    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 );
        }
    }
    OTF2_EvtReader* evt_reader =
        OTF2_Reader_GetEvtReader( reader, locations->members[ i ] );
}

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 );

free( locations );

MPI_Finalize();

```

```
    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)
 *
 * Copyright (c) 2009-2013,
 * RWTH Aachen University, Germany
 *
 * Copyright (c) 2009-2013,
 * Gesellschaft fuer numerische Simulation mbH Braunschweig, Germany
 *
 * Copyright (c) 2009-2014,
 * Technische Universitaet Dresden, Germany
 *
 * Copyright (c) 2009-2013,
 * University of Oregon, Eugene, USA
 *
 * Copyright (c) 2009-2014,
 * Forschungszentrum Juelich GmbH, Germany
 *
 * Copyright (c) 2009-2013,
 * German Research School for Simulation Sciences GmbH, Juelich/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 <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_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_MPI_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 );
            }
        }
        OTF2_EvtReader* 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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 *
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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 <time.h>

#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_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,

```

```

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 );

MPI_Comm split_comm;
OTF2_EvtWriter_Enter( evt_writer,
                     NULL,
                     get_time(),
                     REGION_MPI_COMM_SPLIT );

OTF2_EvtWriter_MpiCollectiveBegin( evt_writer,
                                   NULL,
                                   get_time() );

MPI_Comm_split( MPI_COMM_WORLD, rank % 2, rank, &split_comm );

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(),
                                 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_INTERCOMM_CREATE );

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

OTF2_EvtWriter_MpiCollectiveBegin( evt_writer,
                                   NULL,
                                   get_time() );

MPI_Comm_free( &split_comm );

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,

```



## A.5 otf2\_mpi\_writer\_example.c

---

```
                                OTF2_COLLECTIVE_ROOT_NONE,
                                0 /* bytes provided */,
                                0 /* bytes obtained */ );
}

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,
                                    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,
```

```

        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,
                    get_time(),
                    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,
                    get_time(),
                    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,
                    get_time(),
                    REGION_MPI_FINALIZE );

uint64_t epoch_end = get_time();

OTF2_Archive_CloseEvtWriter( archive, evt_writer );

OTF2_Archive_CloseEvtFiles( archive );

```

## A.5 otf2\_mpi\_writer\_example.c

---

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

OTF2_Archive_CloseDefWriter( archive, def_writer );
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 */);
}
```

```

0 /* begin lno */,
0 /* end lno */ );

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,

```

```

        24 /* name */,
        2 /* group */,
        COMM_WORLD,
        OTF2_COMM_FLAG_CREATE_DESTROY_EVENTS /* flags */ );

    for ( int r = 1; r < size; r += 2 )
    {
        comm_locations[ r / 2 ] = r;
    }
    OTF2_GlobalDefWriter_WriteGroup( global_def_writer,
        3 /* id */,
        0 /* name */,
        OTF2_GROUP_TYPE_COMM_GROUP,
        OTF2_PARADIGM_MPI,
        OTF2_GROUP_FLAG_NONE,
        size / 2,
        comm_locations );

    OTF2_GlobalDefWriter_WriteComm( global_def_writer,
        COMM_SPLIT_1,
        25 /* name */,
        3 /* group */,
        COMM_WORLD,
        OTF2_COMM_FLAG_CREATE_DESTROY_EVENTS /* flags */ );

    OTF2_GlobalDefWriter_WriteInterComm( global_def_writer,
        COMM_INTERCOMM,
        26 /* name */,
        2 /* groupA */,
        3 /* groupB */,
        COMM_WORLD,
        OTF2_COMM_FLAG_CREATE_DESTROY_EVENTS /* flags */ );

    OTF2_Archive_CloseGlobalDefWriter( archive,
        global_def_writer );
}
MPI_Barrier( MPI_COMM_WORLD );

OTF2_Archive_Close( archive );

MPI_Finalize();

return EXIT_SUCCESS;
}

```

## A.6 otf2\_omp\_reader\_example.c

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

```

/*
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 *
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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 );
}

OTF2_EvtReaderCallbacks* event_callbacks = OTF2_EvtReaderCallbacks_New();
OTF2_EvtReaderCallbacks_SetEnterCallback( event_callbacks,
                                           &Enter_print );
OTF2_EvtReaderCallbacks_SetLeaveCallback( event_callbacks,
                                          &Leave_print );

#pragma omp parallel shared(reader)
{
    #pragma omp for
    for ( size_t i = 0; i < locations->size; i++ )
    {
        OTF2_EvtReader* 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 );
    }
}

OTF2_EvtReaderCallbacks_Delete( event_callbacks );

OTF2_Reader_CloseEvtFiles( reader );

OTF2_Reader_Close( reader );

free( locations );

return EXIT_SUCCESS;
}

```



## A.7 otf2\_openmp\_writer\_example.c

## OpenMP writing example

```

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 *
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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 <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,

```

```

        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 /* 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 */ );

```

## 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 = 7 + i;
        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

```
/*
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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 <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 )
```

```

{
    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 ] );
    }
}

```

```

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

```

/*
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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 );
            }
        }
        OTF2_EvtReader* 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 );
}

```

```

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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 * 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

---

```
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( global_def_writer,
```

```
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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