BacktraceException

Generated by Doxygen 1.8.6

Sun Feb 17 2019 21:44:24

Contents

1 Main Page

BacktraceException

`BacktraceException` is a C++ exception type that produces a stack backtrace when thrown. It can capture this backtrace with several methods and the backtrace can be disabled. The goal is for the library to work on both Linux and windows 64-bit.

Documentation

The BacktraceException Doxygen documentation can be build with the `OPT_DOC` CMake option and is also available on online:

- `BacktraceException HTML Manual`
- `BacktraceException PDF Manual`
- `BacktraceException github repository`

Background

Some exceptions are never meant to be thrown in the absence of programming or system error. If on of these exceptions is thrown, it normally will be passed far up the stack before it is handled. When debugging an application it can be useful to quickly identify where a critical exception is being thrown. However, once the high-level exception handler has received the critical exception, there may not sufficient information to determine exactly which part of the execution is producing the exception.

Clearly a debugger can be used to catch the exception as it is being thrown and eventually trace down the problem. But, the process of opening up the debugger, setting catchpoints or breakpoints, restarting the application/computation, and waiting for the failure to reoccur is tedious, especially if the error occurs seconds, minutes, or hours after the program is started. A full debugging session is often overkill as well. A programmer actively debugging will often know exactly what the problem is immediately on inspection of the throwing line of code or upon a quick scan of the stack-backtrace.

With BacktraceException, there is no need to break out the debugger every time a critical exception escapes your numerical simulation or long-running application. The BacktraceException object will capture a stack backtrace as it is being constructed, giving you a quick but very useful view of exactly what was happening when it all went south.

This works well in interactive environments like Python and Matlab when running compiled C++ numerical code. Rather than getting a mysterious `NumericalError("Non finite")` exception message three hours into the computation with no further explanation, you now can get a stack backtrace.

Features

- Linux: Can use `glibc backtrace`, fast efficient, moderately informative.
- Linux: Can use `gdb backtraces`: much slower, but includes arguments and other info not present in glibc backtraces.
- Windows: Currently cross-compiles but stack walker traces are not yet implemented.
- Used `Glibc demangling` for C++ symbols name
- Easily installed as a standalone package or built alongside CMake or autotools projects.

Using Backtrace Exception

A `BacktraceException` is used a a base class for application-defined classes of critical errors that would not be recoverable, and a backtrace of the exception throwing site would be useful.

```
struct UnrecoverableError : public BacktraceException {
    UnrecoverableError(std::string what) : BacktraceException("UnrecoverableError",what) {}
};
```

- Use `backtrace_exception::enable_backtraces()` or `backtrace_exception::disable_backtraces()` to control the generation of backtraces. When disabled backtrace_exception behaves like a normal `std::exception`.
- Build examples from the examples sub-directory with `OPT_EXAMPLES=1` $ ./build.debug.sh -DOPT_EXAMPLES=1 $ ./_build/Debug/examples/backtrace_exception_example1

Limitations

- In order to get a backtrace, the exception must derive from `BacktraceException`. Exceptions from third-party libraries or based on `'std::exception'` will not generate a backtrace.

CMake configuration options

- `BUILD_SHARED_LIBS` - Build shared libraries [Default: ON]
- `BUILD_STATIC_LIBS` - Build static libraries [Default: ON]

2 Namespace Index

2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

3 Hierarchical Index

3.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

4 Class Index

4.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

5 File Index

5.1 File List

Here is a list of all files with brief descriptions:

6 Namespace Documentation

6.1 backtrace_exception Namespace Reference

Classes

- class BacktraceException

  Extension of std::exception that produces saved backtraces for debugging.

Enumerations

- enum BacktraceMethod { BacktraceMethod::glibc, BacktraceMethod::gdb, BacktraceMethod::stackwalk }

Functions

- BacktraceMethod get_backtrace_method ()
- void set_backtrace_method (BacktraceMethod method)
- void disable_backtraces ()
- void enable_backtraces ()
- bool backtraces_enabled ()

6.1.1 Enumeration Type Documentation

6.1.1.1 enum backtrace_exception::BacktraceMethod [strong]

Enumerator

glibc

gdb

stackwalk

Definition at line 16 of file BacktraceException.h.

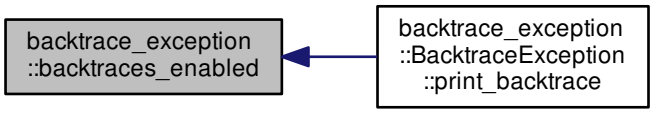
6.1.2 Function Documentation

6.1.2.1 bool backtrace_exception::backtraces_enabled ( )

Definition at line 84 of file BacktraceException.cpp.

Referenced by backtrace_exception::BacktraceException::print_backtrace().

Here is the caller graph for this function:



6.1.2.2 void backtrace_exception::disable_backtraces ( )

Definition at line 74 of file BacktraceException.cpp.

6.1.2.3 void backtrace_exception::enable_backtraces ( )

Definition at line 79 of file BacktraceException.cpp.

6.1.2.4 BacktraceMethod backtrace_exception::get_backtrace_method ( )

Definition at line 46 of file BacktraceException.cpp.

6.1.2.5 void backtrace_exception::set_backtrace_method (BacktraceMethod *method*)

Definition at line 51 of file BacktraceException.cpp.

References gdb, glibc, and stackwalk.

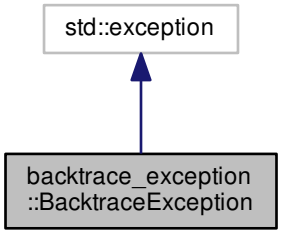
7 Class Documentation

7.1 backtrace_exception::BacktraceException Class Reference

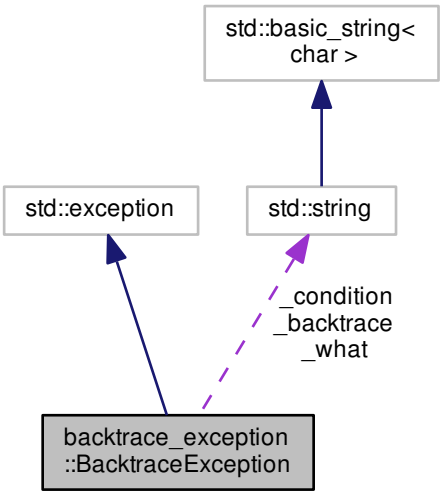
Extension of std::exception that produces saved backtraces for debugging.

`#include </home/travis/build/markjolah/BacktraceException/include/Backtrace-Exception/BacktraceException.h>`

Inheritance diagram for backtrace_exception::BacktraceException:



Collaboration diagram for backtrace_exception::BacktraceException:



Public Member Functions

- BacktraceException (std::string what)
- BacktraceException (std::string condition, std::string what)

  Create a BacktraceException with specified condition.
- virtual const char * condition () const noexcept
- const char * what () const noexceptoverride
- virtual const char * backtrace () const noexcept

Static Public Member Functions

- static std::string print_backtrace ()

Protected Attributes

- std::string _condition
- std::string _what
- std::string _backtrace

7.1.1 Detailed Description

Extension of std::exception that produces saved backtraces for debugging.

Definition at line 28 of file BacktraceException.h.

7.1.2 Constructor & Destructor Documentation

7.1.2.1 backtrace_exception::BacktraceException::BacktraceException (std::string *what*)

Definition at line 195 of file BacktraceException.cpp.

7.1.2.2 backtrace_exception::BacktraceException::BacktraceException (std::string *condition,* std::string *what*)

Create a BacktraceException with specified condition.

Parameters

condition	A string further classifying the error condition
what	A general string describing the error condition.

Definition at line 199 of file BacktraceException.cpp.

7.1.3 Member Function Documentation

7.1.3.1 const char * backtrace_exception::BacktraceException::backtrace ( ) const [inline], [virtual], [noexcept]

Definition at line 58 of file BacktraceException.h.

References _backtrace.

7.1.3.2 const char * backtrace_exception::BacktraceException::condition ( ) const [inline], [virtual], [noexcept]

Definition at line 50 of file BacktraceException.h.

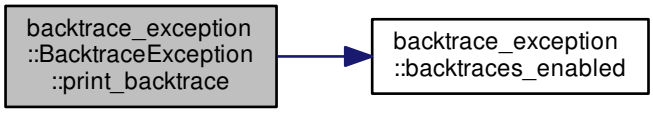
References _condition.

7.1.3.3 std::string backtrace_exception::BacktraceException::print_backtrace ( ) [static]

Definition at line 203 of file BacktraceException.cpp.

References backtrace_exception::backtraces_enabled(), backtrace_exception::gdb, and backtrace_exception::glibc.

Here is the call graph for this function:



7.1.3.4 const char * backtrace_exception::BacktraceException::what ( ) const [inline],[override],[noexcept]

Definition at line 54 of file BacktraceException.h.

References _what.

7.1.4 Member Data Documentation

7.1.4.1 std::string backtrace_exception::BacktraceException::_backtrace [protected]

Definition at line 46 of file BacktraceException.h.

Referenced by backtrace().

7.1.4.2 std::string backtrace_exception::BacktraceException::_condition [protected]

Definition at line 44 of file BacktraceException.h.

Referenced by condition().

7.1.4.3 std::string backtrace_exception::BacktraceException::_what [protected]

Definition at line 45 of file BacktraceException.h.

Referenced by what().

The documentation for this class was generated from the following files:

- BacktraceException.h
- BacktraceException.cpp

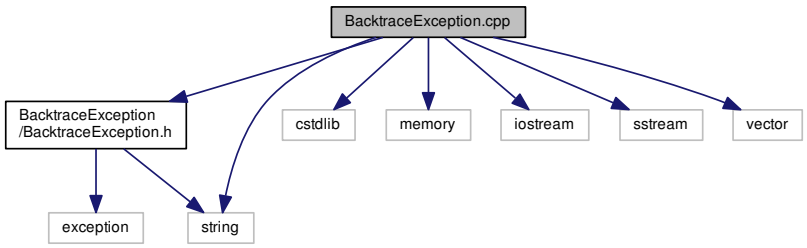
8 File Documentation

8.1 BacktraceException.cpp File Reference

BacktraceException class member function definitions.

```
#include "BacktraceException/BacktraceException.h"
#include <cstdlib>
#include <memory>
#include <iostream>
#include <string>
#include <sstream>
#include <vector>
```

Include dependency graph for BacktraceException.cpp:



Namespaces

- backtrace_exception

Functions

- BacktraceMethod backtrace_exception::get_backtrace_method ()
- void backtrace_exception::set_backtrace_method (BacktraceMethod method)
- void backtrace_exception::disable_backtraces ()
- void backtrace_exception::enable_backtraces ()
- bool backtrace_exception::backtraces_enabled ()

8.1.1 Detailed Description

BacktraceException class member function definitions.

Author

Mark J. Olah (mjo@cs.unm DOT edu)

Date

2017 - 2018

Copyright

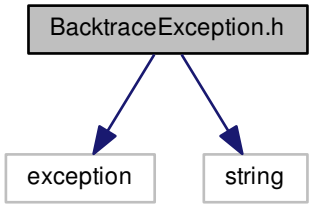
Definition in file BacktraceException.cpp.

8.2 BacktraceException.h File Reference

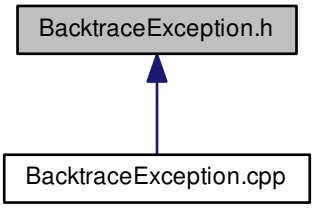
BacktraceException class declaration and inline member functions.

```
#include <exception>
#include <string>
```

Include dependency graph for BacktraceException.h:



This graph shows which files directly or indirectly include this file:



Classes

- class backtrace_exception::BacktraceException

  Extension of std::exception that produces saved backtraces for debugging.

Namespaces

- backtrace_exception

Enumerations

- enum backtrace_exception::BacktraceMethod { backtrace_exception::BacktraceMethod::glibc, backtrace_exception::BacktraceMethod::gdb, backtrace_exception::BacktraceMethod::stackwalk }

Functions

- void backtrace_exception::disable_backtraces ()
- void backtrace_exception::enable_backtraces ()
- bool backtrace_exception::backtraces_enabled ()
- BacktraceMethod backtrace_exception::get_backtrace_method ()
- void backtrace_exception::set_backtrace_method (BacktraceMethod method)

8.2.1 Detailed Description

BacktraceException class declaration and inline member functions.

Author

Mark J. Olah (mjo@cs.unm DOT edu)

Date

2017 - 2018

Copyright

Definition in file BacktraceException.h.

8.3 README.md File Reference

Index