pFUnit

Generated by Doxygen 1.8.7

Fri Oct 31 2014 08:02:12

Contents

Chapter 1

pFUnit 3 - Documentation - Version 2014-1031-1201-14-UTC MLR

Quick links to the code or the project's SourceForge site.

1.1 Overview

pFUnit is a unit testing framework enabling JUnit-like testing of serial and MPI-parallel software written in Fortran. Initial support for OPENMP has been implemented. pFUnit makes use of modern Fortran programming techniques, including object oriented programming, offering a convenient, lightweight mechanism for Fortran developers to create and run software tests that specify the desired behavior for a given piece of code. The framework was originally created by developers from NASA and NGC TASC. The project is hosted at sourceforge/projects/pfunit.

If you are using pFUnit, please leave a note/topic at Applications of pFUnit, or send a note to Tom Clune, Ph.D., Computational & Information Sciences & Technology, Code 606, NASA Goddard Space Flight Center.

Please refer revisions and comments about the documentation to Mike Rilee, Ph.D., Rilee Systems Technologies.

1.2 Contents

1.3 See Also

- sourceforge/projects/pfunit
- NASA Modeling Guru
- JUnit.org

1.4 LICENSE

Rights of use for GSC-15,137-1 F-UNIT, also known as pFUnit, are defined by the NASA Open Source Agreement (version 1.3). The LICENSE document may be found in the head directory of the pFUnit distribution.

1.5 Copyright

Chapter 2

Obtaining pFUnit

The best way to obtain pFUnit is to clone pFUnit from the git repository from SourceForge as follows.

```
# Read Only Access
git clone git://git.code.sf.net/p/pfunit/code pFUnit
```

This will create the directory pFUnit in the current working directory.

You may also visit the project page at SourceForge and download the source tarfile "pFUnit.tar.gz" there.

http://sourceforge.net/projects/pfunit/ or http://sourceforge.net/projects/pfunit/files/lates

Extracting this tarfile via a command like

```
$ tar zxf ./pFUnit.tar.gz
```

will place the pFUnit files into the current working directory.

For other ways to acquire the code visit

https://sourceforge.net/p/pfunit/code/ci/master/tree/

or contact the pFUnit team.

Chapter 3

Installation

3.1 Installing pFUnit

Comentatry for the page.

3.2 Prerequisites

The development work for pFUnit has mostly been carried out on a mixture of systems, including high-end computers, Apple Mac OSX, and linux-based systems. A preliminary Windows/CYGWIN port has been contributed by a user. Full use of the system depends on the following being available.

- Fortran 2003+ (Tested with Intel 13.1+, NAG 5.3, GCC 4.8.3, 4.9.0, IBM's XLF)
- The Message Passing Interface (MPI)
- OpenMP
- GNU Make
- Python

Note: Recent changes have exposed a latent bug in GCC 4.8.2. The fix is available in the GCC 4.9 development branch and will also appear in GCC 4.8.3 when that is released. Users that require older versions of GCC should use pFUnit 2.1.x.

Doxygen is used to generate documentation.

The system routinely undergoes regression testing with GNU, Intel, and NAG fortran compilers and OpenMPI.

3.3 Obtaining pFUnit

The best way to obtain pFUnit is to clone pFUnit from the git repository from SourceForge as follows.

```
# Read Only Access
git clone git://git.code.sf.net/p/pfunit/code pFUnit
```

This will create the directory pFUnit in the current working directory.

You may also visit the project page at SourceForge and download the source tarfile "pFUnit.tar.gz" there.

http://sourceforge.net/projects/pfunit/ or http://sourceforge.net/projects/pfunit/files/lates

Extracting this tarfile via a command like

```
$ tar zxf ./pFUnit.tar.gz
```

will place the pFUnit files into the current working directory.

For other ways to acquire the code visit

https://sourceforge.net/p/pfunit/code/ci/master/tree/

or contact the pFUnit team.

3.4 Manifest - What's in the directory?

In the top level of the pFUnit distribution you will see the following files.

CMakeLists.txt - Initial support for cmake-based builds.

COPYRIGHT - Contains information pertaining to the use and distribution of pFUnit.

Examples - Contains examples of how to use pFUnit once it is installed.

GNUmakefile - The top level makefile for building and installing pFUnit.

LICENSE - The NASA Open Source Agreement for GSC-15,137-1 F-UNIT, also known as pFUnit.

README-INSTALL - Basic documentation on pFUnit installation and use.

bin - Executables used to construct and perform unit tests.

include - Files to be included into makefiles or source, including use code.

source - Source code and scripts of the pFUnit library and framework.

tests - Source code for unit testing pFUnit itself.

tools - Tools used to help develop, build, and install pFUnit.

VERSION - Contains a string describing the current version of the framework.

3.5 Configuration

Little needs to be done to configure pFUnit for the build, however there are several environment variables on which the package depends.

`F90_VENDOR` - is set to include the correct makefile in /include, i.e. GNU, Intel, NAG, or PGI. Case insensitive file systems may cause some confusion from time-to-time.

`F90` - is set to the Fortran compiler being used: e.g. ifort for Intel, gfortran for GNU.

`COMPILER` - is set according to `F90_VENDOR` and is automatically set in the top level makefile.

For MPI-based unit testing, your setup may require the following as well.

`MPIF90`

```
$ export MPIF90=mpif90
```

As a convenience for working with multiple MPI configurations, you may also set the following.

`MPIRUN`

```
$ export MPIRUN=/some.path/mpirun
```

`PFUNIT_MAX_RANK` - controls the maximum size of the arrays asserts are defined over. If PFUNIT_MAX_RANK is not set, the default is 5 and pFUnit's assertions will be able to handle arrays up to rank 5.

```
$ export PFUNIT_MAX_RANK=5
```

`DOXYGEN` - To generate documentation, set DOXYGEN to the desired executable. NOTE: Doxygen Version 1.8.5 does not respect CamelCase names from Fortran source code by currently converting all to lowercase. It does this to get HTML links correct for references in the source code that also do not respect the CamelCase convention. The Fortran standard specifies case insensitivity. Doxygen 1.7.x seems to better respect CamelCase.

```
$ export DOXYGEN=/opt/local/share/doxygen/doxygen-1.7.6/bin/doxygen
```

3.6 Building pFUnit

3.6.1 Building pFUnit for testing serial codes (Non-MPI)

1. Change to the directory into which pFUnit has been placed.
2. Set the environment variables (for example in bash):

   ```
   $ export F90=gfortran-mp-4.8
   $ export F90_VENDOR=GNU
   ```

3. To build pFUnit for unit testing of serial codes, execute make. The unit tests for pFUnit itself will run automatically.

   ```
   $ make tests
   ```

   3.1 Occasionally on the first run through, one will get a spurious (runtime) error, for example in the unix process component.

   ```
   Re-execute "make tests" to check again.
   ```

4. At this point the pFUnit object library is in the source directory, along with a large number of Fortran module files.

3.6.2 Building pFUnit for testing parallel codes (MPI)

To build pFUnit for unit testing MPI-based codes, be sure that the environment is properly set up for the MPI implementation you are using. Depending on your local environment, you may need execute the build within a batch or other job queing system, e.g. an interactive batch job under PBS. The steps for building pFUnit start out the same as for the serial case above, but add MPI=YES to the environment to switch on MPI support. The MPI-based unit tests for pFUnit itself will run automatically. Again, occasionally a spurious (runtime) error may appear on the first execution.

1. Execute make as follows.

```
$ make tests MPI=YES
```

2. At this point an MPI-enabled pFUnit object library is in the source directory, along with a large number of Fortran module files.

Also, one may get some harmless "no symbols" warnings when the pFUnit library is constructed.

3.6.3 OPENMP

Initial (limited) support for OPENMP has been implemented. At this writing, a basic functionality is available.

The process for building pFUnit for testing OPENMP-based codes is similar to that for other paradigms.

1. To compile for OPENMP support execute make as follows.

```
$ make tests OPENMP=YES
```

2. At this point the OPENMP-enabled pFUnit is ready to be installed.

3.6.4 Cleaning

To clean the pFUnit build directory for the space or to rebuild there are two options.

1. Make clean to remove object files and other intermediate products.

```
$ make clean
```

2. Make distclean to remove libraries and other more final products.

```
$ make distclean
```

3. Some directories support a `make src_clean` to remove intermediate products in subdirectories.

3.6.5 Documentation

A start at documentation for pFUnit is in the documentation directory. `Doxygen` is our primary documentation tool. To make the documentation, which will be generated in the documentation directory, please invoke the following from the top level of your pFUnit distribution.

```
$ make documentation
```

Or to make a reference manual.

```
$ make documentation/pFUnit2-ReferenceManual.pdf
```

To select a specific version of Doxygen, please set the DOXYGEN environment variable as in Configuration. You may wish to do this if your code uses CamelCase names as current versions of Doxygen (1.8.5) do not respect this convention for Fortran.

3.6.6 CMAKE

Initial support for CMAKE has been implemented. At this writing, a basic functionality is available.

1. The process for building pFUnit using cmake is as follows. In the top directory of the distribution make a new directory to support the build, then change to that directory and run cmake (pointing back to the source) to generate the required makefiles.

```
$ mkdir build
$ cd build
$ # e.g. cmake -DMPI=YES -DOPENMP=NO -DINSTALL_PATH=<A path> <path to source>
$ cmake -DMPI=NO ..
$ make tests
```

One may also set the environment variable PFUNIT instead of setting INSTALL_PATH on the cmake command line as given above.

1. If the build is successful, then at this point make install should work.

3.7 Installation

3.7.1 Installation - Serial

To install pFUnit for regular use, set INSTALL_DIR to the location in which to place pFUnit. This can be done on the make command line. For example, after compiling pFUnit for serial use (MPI absent or MPI=NO), please try.

```
$ # In the top of the pFUnit build directory.
$ make install INSTALL_DIR=/opt/pfunit/pfunit-serial
```

Note: you may need special priveleges to install in some locations, e.g. via sudo.

To test the installation set PFUNIT to INSTALL_DIR, then change the working directory to Examples in pFUnit distribution and execute "buildIt," which will run a number of examples. These include some expected failures.

```
$ # In the top pFUnit build directory...
$ export PFUNIT=/opt/pfunit/pfunit-serial
$ cd Examples
$ ./buildIt
```

3.7.2 Installation - MPI

For installing an MPI-enabled pFUnit library, change to the top of the distribution and execute make with MPI=YES. You may need to "make distclean" first. After compilation and pFUnit passes its self-tests, then installation proceeds as for the serial case above.

```
$ make install INSTALL_DIR=/opt/pfunit/pfunit-parallel
```

To test, set PFUNIT and go into Examples/MPI_Halo directory.

```
$ # In the top pFUnit build directory...
$ export PFUNIT=/opt/pfunit/pfunit-parallel
$ # The variable MPIF90 must be set to the appropriate build script.
$ export MPIF90=mpif90
$ cd Examples/MPI_Halo
$ make
```

This will compile and run a set of parallel examples that includes intentional failures.

3.7.3 Installation - OPENMP

At this time the OPENMP version of pFUnit can be installed in the same way as for the serial or MPI-parallel codes. OPENMP support, tests, and examples are limited as of this writing.

3.7.4 Installation - DEFAULT DIRECTORY

If INSTALL_DIR is not set, "make install" will attempt to install pFUnit into the top build directory. This will create directories such as lib and mod in the top level of the build directory and will overwrite the include/base.mk with include/base-install.mk. If this is not desired, then "make develop" will put back the original base.mk, which is the file to be used for development and building pFUnit. In general, we recommend installing to a directory that is not also the build directory.

Chapter 4

Usage

4.1 Usage

4.1.1 Usage - Configuration

For regular use, after installation, the same compiler/MPI development configuration that was used to build pFUnit should be used. Once the environment variables and paths associated with the environment are set, to configure pFUnit, please set the following.

`PFUNIT` - set to the directory into which pFUnit was installed.

`F90_VENDOR` - set to Intel, GNU, NAG, or PGI accordingly.

4.1.2 Usage - Hello World

For an example of a simple usage of pFUnit, see Examples/Simple/tests.

The simplest way to write a test is to write a preprocessor input file (extension ".pf"), which is a Fortran free format file with preprocessor directives added. An example from "helloWorld.pf" follows.

```
! from helloWorld.pf
@test
subroutine testHelloWorld()
   use pfunit_mod
   implicit none
   @assertEqual("Hello World!","Hello World!")
end subroutine testHelloWorld
```

One then instructs the preprocessor to construct a suite to execute these tests via the "testSuites.inc" file as follows.

```
! from testSuites.inc
ADD_TEST_SUITE(helloWorld_suite)
```

At this point, one can invoke the preprocessor to generate a Fortran file that when compiled and linked with pFUnit will execute the tests. For more information please see The Preprocessor - pFUnitParser or try out the examples in Example/Simple.

4.2 Usage - Preprocessor

Please see The Preprocessor - pFUnitParser.

4.3 Compiling and Executing The Test

An example of a GNU make rule for for the final step of compiling a test follows.

```
# This step presumes "include $(PFUNIT)/include/base.mk" earlier in the makefile.
tests.x: testSuites.inc myTests.pf
         $(F90) -o $@ -I$(PFUNIT)/mod -I$(PFUNIT)/include \
                $(PFUNIT)/include/driver.F90 \
                ./*$(OBJ_EXT) $(LIBS) $(FFLAGS)
```

To execute the tests, one invokes "./tests.x" with the appropriate command line options (see below).

4.3.1 - Compiling and Executing the Tests (MPI PARALLEL)

One invokes MPI-based parallel tests according to the MPI framework being used. For example:

```
$ mpirun -np 4 tests.x
```

4.3.2 Command Line Options

The executable test program provides several command line options, when "include/driver.F90" is used, as it is automatically when using the PFUNIT preprocessor.

-v or -verbose	Verbose execution.
-d or -debug	Provide debugging information.
-h	Print help message.
-o <outputfile>	Direct pFUnit messages to a file.
-robust	Use the robust runner. Runs tests as processes so failures do not halt testing.
-skip <number of tests to skip>	Use the subset runner, which runs a subset of the tests in a suite.

An example from Examples/Robust:

```
$ ./tests.x -robust
```

Chapter 5

Development

Generally pFUnit development is performed in the build directory structure. Care should be taken to make clean or distclean in between configuration changes. As stated in Installation, it is best to set INSTALL_DIR and "make install" pFUnit to another directory that can be placed in a user's paths.

Chapter 6

Feedback & Support

6.1 Feedback

Feedback is welcome, please use the facilities at sourceforge/projects/pfunit to share your views.

Open a ticket for bugs, features, and patch recommendations.

If you use pFUnit, please let us know by leaving a note in our Applications of pFUnit forum, or email Tom Clune, Ph.D., NASA Goddard Space Flight Center. Letting us know about your application helps us seek support for pFUnit's continued development and improvement.

6.2 Support

Please open a ticket for bugs, features, and patch recommendations. For longer term needs or considerations, please visit our discussion forums or contact Tom Clune, Ph.D., NASA Goddard Space Flight Center.

You may also find some help at FAQ and Tips.

pFUnit supports the software development of several weather and climate simulations efforts. We constantly seek to improve and correct pFUnit for our users' benefit, granting priority to the needs of our major users. Please share with us information about your application on our Applications of pFUnit forum.

Chapter 7

FAQ and Tips

7.1 FAQ

7.1.1 Zero Tests Run

Symptom: The system under test compiles and runs fine, but reports zero tests run.

Solutions:

- There is no `testSuites.inc` file. Please add a `testSuites.inc` that lists the suites to add via `ADD_TEST_SUITE(`*the_suite_to_add*`)` , one to a line.
- There is no `-DUSE_MPI` passed to the compiler during the build. Please add to the compiler invokation. Please see Some Tests Are Not Running.

7.1.2 Some Tests Are Not Running

Symptom: The system under test compiles and runs fine, but reports that some tests don't run.

Solutions:

- There is no `-DUSE_MPI` passed to the compiler during the build. Please add as in the following example.

```
% $PFUNIT/bin/pFUnitParser.py test_pio.pf test_pio.F90
% mpif90 -DUSE_MPI $PFUNIT/include/driver.F90 \
%     -I$PFUNIT/mod -L$PFUNIT/lib -lpfunit test_pio.F90

% mpirun -np 8 ./a.out

.
Time:         0.004 seconds

 OK
```

7.1.3 Intel Fortran Version 13: -DINTEL_13

To make pFUnit work with Intel Fortran Version 13, please ensure that `-DINTEL_13` is passed to the compiler when building or using pFUnit. In the build process for pFUnit, this is added to the make variables CPPFLAGS and FPPFL↩ AGS.

7.1.4 Segmentation Faults and Odd Link Errors

Q. pFUnit fails to build or now leads to segmentation faults. Did something change?

A. One cause for failure to build or odd runtime segmentation faults is when we change compiler configurations and some object or library files are left over from a previous environment. This might be hard to spot, for example, during compiler upgrades. Switching from one compiler to another, e.g. from Intel to GNU, is more likely to generate link-time errors if old code is still around. A few items to check follow.

- Execute *make distclean* or remove objects (or their directories if using CMAKE) associated with previous builds.
- Ensure pFUnit and user applications are compiled using compatible (or the same) compilers.
- Ensure the environment variable PFUNIT is set to the appropriate install directory.

Finally, it is quite possible that a bug has been uncovered. Please contact the development team or open a bug ticket.

7.2 Tips

7.2.1 Environment Modules

Though not strictly required, the Environment Modules package can be a convenient way to package, maintain, and switch between environments. This can be particularly important for pFUnit, which must be built using the same tool suite being used for development, e.g. compilers, linkers, etc. [To do: A sample pFUnit modulefile is provided in the OTHER directory.]

7.2.2 Compile Time Errors

Compile time errors like '"include [...]include/.mk" not found' likely signify that you are not executing make in the top level directory during a build. Alternatively, during regular usage after installation, PFUNIT has not been set.

During building, if you wish to compile in a subdirectory within the pFUnit heriarchy, please try setting the COMPILER environment variable on the make command line. For example:

```
$ make all COMPILER=Intel
```

7.2.3 Intermediate files used by pFUnit

If you wish to see the intermediate files, use the target .PRECIOUS in the makefile to keep them from being deleted. For example:

```
# In GNUmakefile
.PRECIOUS: %_cpp.F90
```

7.2.4 Ignoring whitespace differences in assertions on strings.

Several options exist for how to compare strings with assertEqual.

```
call assertEqual(expectedString, foundString, &
               & whitespace=IGNORE_DIFFERENCES )
```

WhitespaceOptions:

- **IGNORE_DIFFERENCES** ignores whitespace differences (number and value).
- **IGNORE_ALL** strictly ignores all whitespace (spaces & tabs).
- **TRIM_ALL** strictly ignores leading and trailing whitespace.
- **KEEP_ALL** keeps all whitespace as significant, even discriminating between tabs and spaces.

Example usages can be seen in tests/Test_AssertBasic.F90 or Examples/Simple/tests/helloWorld.pf.

Chapter 8

Platform Specific Notes

8.1 Mac OSX

The MacPorts package management system is a convenient way to install and maintain many packages, including gcc which includes gfortran.

8.2 Windows/CYGWIN

User contributed code for Windows/CYGWIN has been added, but is currently not tested and supported by the pFUnit team. At this writing, 2013-1031, serial Examples and MPI are not known to be supported. Please contact us if you wish to either contribute or otherwise discuss this port.

8.3 Intel Fortran Version 13: -DINTEL_13

To make pFUnit work with Intel Fortran Version 13, please ensure that `-DINTEL_13` is passed to the compiler when building or using pFUnit. In the build process for pFUnit, this is added to the make variables CPPFLAGS and FPPFL↩ AGS.

Chapter 9

Acknowledgments

Thanks to the follwing for their review and comments: B. Van Aartsen, T. Clune.

Windows/CYGWIN contributions from E. Lezar.

Other acknowledgments: S.P. Santos (NCAR), M. Hambley (UK Met Office)., J. Krishna (ANL).

The design of pFUnit is strongly influenced by `JUnit`.

Initial pFUnit 2 documentation by Michael Rilee (Rilee Systems Technologies).

Chapter 10

Known Installations & Versions

master - The current release.

development - The cutting edge of pFUnit development.

pfunit_2.1.0 - A feature freeze prior to a major upgrade of the preprocessor.

Chapter 11

TODO

- Make other directory.
- Make Environment Modules example in other directory.
- Other build systems, e.g. CMake.

Chapter 12

The Preprocessor - pFUnitParser

Overview of Preprocessor (pFUnitParser.py)

//

12.1 Using The Preprocessor

How to write tests using the ".pf" files. We expect this to be the main way people write pFUnit-based tests. Please see the Examples directory for a wide range of examples. The .pf files themselves are generally to be found in an example's "tests" subdirectory.

12.1.1 Configuration - testSuites.inc

The include file "testSuites.inc" tells the preprocessor to generate code for TestSuites listed therein. The suite names are based on the TestCases provided in the preprocessor input file or the name of the preprocessor input file (.pf) itself. For example, if no module is defined in a .pf file, i.e. the preprocessor will define the module, one can set up a "testSuites.inc" as follows.

```
! To load "exampleTestsNoModule.pf".
ADD_TEST_SUITE(exampleTestsNoModule_suite)
```

For a .pf file that contains a module associated with a test suite the syntax is as follows.

```
! To load "exampleTests.pf" implementing the module exampleTests_mod.
ADD_TEST_SUITE(exampleTests_mod_suite)
```

12.1.2 Invocation

To run the preprocessor on on a preprocessor input file "exampleTests.pf", invoke:

```
$ ${PFUNIT}/bin/pFUnitParser.py exampleTests.pf exampleTests.F90
```

A convenient GNUmakefile rule is as follows.

```
%.F90: %.pf
       $(PFUNIT)/bin/pFUnitParser.py $<  $@
```

12.1.3 Preprocessor Input File (.pf)

The preprocessor input file is a Fortran free format file that contains subroutines, including those implementing the suite of tests, or a module with the tests, TestCases, and support for parameters. The preprocessor reads and parses this file producing a fortran file implementing the tests, automating some boilerplate code. Embedded "@" directives inform the preprocessor about information needed to generate the test suite. If the .pf file does not implement a module providing a test suite, the preprocessor will use the name of .pf file referred to by "testSuites.inc". Currently only one test suite per .pf file is allowed, a limitation of the current implementation of the parser.

Many example .pf files may be found in the examples' "tests" subdirectories in the Examples directory.

Below we present the most commonly used directives first, but in a .pf file using all of these capabilities, the most common order is as follows.

- @Parameters
- @TestCase
- @Test or @MPITest
  - @Assert

12.1.4 Directives

Preprocessor "@" directives, which in keeping with Fortran style are not case sensitive, instruct the preprocessor how to interpret parts of the code relevant to the generation of the test suite. The most important directives follow.

12.1.4.1 @Test

This directive is used to indicate a test routine to the preprocessor, which then includes it in the test suite. There may be multiple tests in the .pf file, each annotated by the directive.

also supports MPI-parallel tests (see @MPITest).

An example, from Examples/Fixture:

```
@Test
   subroutine testBracketInterior(this)
      class (Test_LinearInterpolator), intent(inout) :: this
      @assertEqual([3,4], this%interpolator%getBracket(at=4.))
   end subroutine testBracketInterior

@Test
   subroutine testInterpolateAtNode(this)
      class (Test_LinearInterpolator), intent(inout) :: this
      @assertEqual(2., this%interpolator%interpolate(at=3.))
   end subroutine testInterpolateAtNode
```

12.1.4.2 @MPITest

is deprecated as now handles this case.

This directive indicates an MPI parallel test to the preprocessor, which then includes it in an MPI enabled test suite. The directive takes a single argument, the requested number of MPI processes to run. The syntax, exemplified by one of the tests from Examples/MPI_Halo:

```
@Test( npes=[1,2,3])
subroutine testHaloInterior(this)
   use Halo_mod
   use pfunit_mod
   implicit none
   class (MpiTestMethod) :: this

   integer, parameter :: N = 2
   real :: a(N,0:N+1)
   integer :: p

   p = this%getProcessRank()
   a(:,1:N) = p
   a(:,0) = -1
   a(:,N+1) = -1

   call haloFill(a, this%getMpiCommunicator())

   @assertEqual(real(p), a(1,1))
   @assertEqual(real(p), a(2,1))
   @assertEqual(real(p), a(1,2))
   @assertEqual(real(p), a(2,2))

end subroutine testHaloInterior
```

12.1.4.3 @Assert

The directives are expanded into calls to similarly named pFUnit library routines. The syntax for the directives follows the pattern for below.

```
@assertEqual(expected,found,'An identifying or explanatory message.')
```

The preprocessor will automatically add information about source location (file & line number) to the call emitted to the test suite code. It also adds the check for exceptions.

For more information about directives, please refer to the following.

- @assertEqual
- @assertTrue
- @assertFalse
- @assertLessThan
- @assertLessThanOrEqual
- @assertGreaterThan
- @assertGreaterThanOrEqual
- @assertIsMemberOf
- @assertContains
- @assertAny
- @assertAll

- @assertNotAll
- @assertNone
- @assertIsPermutationOf
- @assertExceptionRaised
- @assertSameShape
- @assertIsNaN
- @assertIsFinite

12.1.4.4 @Parameters

The directive indicates the declaration of the parameterized type used to generate the iteration over the multiple parameter values. It also identifies the names of the parameters to be iterated over. The preprocessor extracts type information from the declaration of the parameter type collection that immediately follows the directive. This directive will set up the iteration. To define the parameter values per iteration the `getParameters` method of the abstract ParameterizedTest must be implemented. For example:

```
@Parameters = [p1,p2]
type, extends(AbstractTestParameter) :: exampleCase
   integer :: i
   real :: x
end type exampleCase
```

12.1.4.5 @TestCase

This directive identifies to the preprocessor the TestCase declaration. The type declared at this point extends TestCase (or its extension), which includes setting methods such as the following: setUp, tearDown, runMethod, userMethod. For the extension MPITestCase, as with ParameterizedTestCase, you have the option (requirement if parameters are used) to set getParameters and getParameterString. For example:

```
@TestCase
type, extends(MPITestCase) :: Test_Parameters
   integer :: p1, p2
   procedure(runMethod), pointer :: userMethod => null()
 contains
   procedure, nopass :: getParameters
   procedure :: getParameterString => getParameterString_
   procedure :: runMethod
end type Test_Parameters
```

Chapter 13

@Assert Preprocessor Directives

13.1 @Assert Preprocessor Directives

13.1.1 @assertEqual

13.1.2 @assertTrue

Chapter 14

Revision Notes

- 2014-1031 Minor edits. MLR
- 2014-0915 Minor updates for 3.0.1. MLR
- 2014-0404 Updated for release of 3.0. TLC
- 2014-0131, 2014-0205. Updated. MLR
- 2013-1227. First note of OPENMP additions by T. Clune. MLR.
- 2013-1212. Initial draft of Doxygen version. MLR
- 2013-1107. Minor edits. MLR
- 2013-1031. Added user contributed code for Windows/CYGWIN & IBM's XLF. MLR
- 2013-0830-1359. Minor corrections and added MPIF90 to 6.2. MLR
- 2013-0806-1345. Corrected git reference. Was using old URL. MLR
- 2013-0805. Initial draft. MLR

Chapter 15

Data Type Index

15.1 Class Hierarchy

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

Chapter 16

Data Type Index

16.1 Data Types List

Here are the data types with brief descriptions:

Chapter 17

Data Type Documentation

17.1 abstracttestparameter_mod Module Reference

The documentation for this module was generated from the following file:

- AbstractTestParameter.F90

17.2 abstracttestresult_mod Module Reference

Data Types

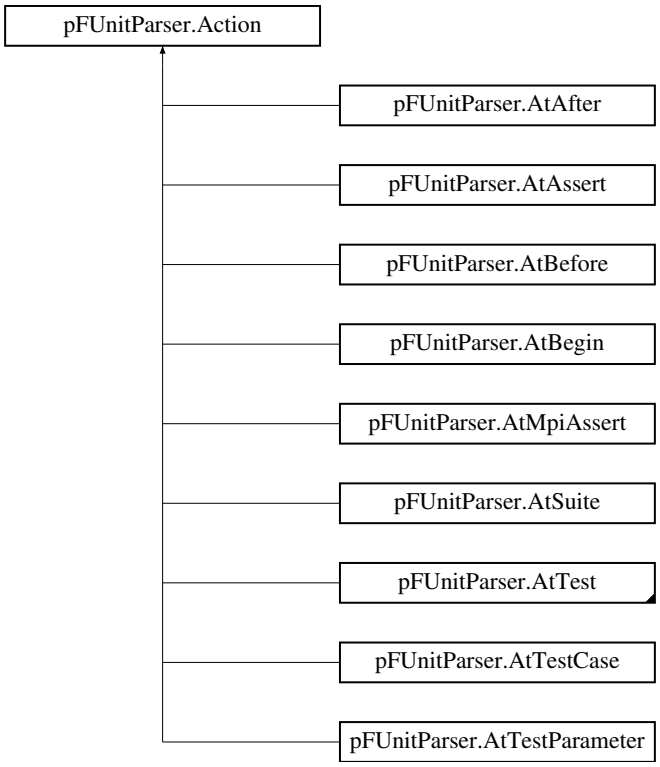
- interface getErrors
- interface getSuccesses
- interface wasSuccessful

The documentation for this module was generated from the following file:

- AbstractTestResult.F90

17.3 pFUnitParser.Action Class Reference

Inheritance diagram for pFUnitParser.Action:



Public Member Functions

- def **apply**

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

- pFUnitParser.py

17.4 add_mod Module Reference

Public Member Functions

- real function **add** (x, y)
- real function **add** (x, y)

The documentation for this module was generated from the following file:

- Robust/src/add.F90

17.5 addcomplex_mod Module Reference

Public Member Functions

- complex function, dimension(size(z0)) **add** (z0, z1)

The documentation for this module was generated from the following file:

- addComplex.F90

17.6 CodeUtilities.ArrayDescription Class Reference

Public Member Functions

- def **__init__**
- def **NAME**
- def **DECLARE**
- def **DECLARESCALAR**
- def **KIND**
- def **RANK**
- def **FTYPE**
- def **EXPANDSHAPE**
- def **FailureMessageFork**

Public Attributes

- **fType**
- **kind**
- **rank**

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

- CodeUtilities.py

17.7 assert_mod Module Reference

<BriefDescription>

17.7.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- Assert.F90

17.8 assertbasic_mod Module Reference

Provides fundamental assertions over the most basic types, a foundation for providing test services to end users.

Public Member Functions

- subroutine **assertexceptionraisedmessage** (message, location)
- subroutine, public **assertsameshape** (shapeA, shapeB, message, location)
- logical function, public **conformable** (shapeA, shapeB)
- logical function, public **nonconformable** (shapeA, shapeB)
- subroutine, public **assertany** (conditions, message, location)
- subroutine, public **assertall** (conditions, message, location)
- subroutine, public **assertnone** (conditions, message, location)
- subroutine, public **assertnotall** (conditions, message, location)
- subroutine **assertisnan_double** (x, message, location)
- subroutine **assertisfinite_single** (x, message, location)
- subroutine **assertisfinite_double** (x, message, location)

17.8.1 Detailed Description

Provides fundamental assertions over the most basic types, a foundation for providing test services to end users.

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

For assertions on strings whitespace may or may not be significant to a test. We now have several options for dealing with whitespace via the optional argument `Whitespace`. These options are IGNORE_ALL, TRIM_ALL, and KEEP_ALL. Usage is as follows.

```
call assertEqual(expectedString, foundString, & & Whitespace=IGNORE_ALL )
```

WhitespaceOptions:

- **TRIM_ALL** ignores leading and trailing whitespace.
- **KEEP_ALL** keeps all whitespace as significant, even discriminating between tabs and spaces.
- **IGNORE_ALL** ignores all whitespace (spaces & tabs).

Example usages can be seen in tests/Test_AssertBasic.F90 or Examples/Simple/tests/helloWorld.pf.

The documentation for this module was generated from the following file:

- AssertBasic.F90

17.9 assertinteger_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine **assertequalinteger1d1d_** (expected, found, message, location)
- subroutine **assertequalinteger0d1d_** (expected, found, message, location)
- subroutine **assertequalinteger2d2d_** (expected, found, message, location)
- subroutine **assertequalinteger0d2d_** (expected, found, message, location)
- subroutine **assertlessthan_** (a, b, message, location)

17.9.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- AssertInteger.F90

17.10 GenerateAssertsOnArrays.AssertRealArrayArgument Class Reference

Public Member Functions

- def **__init__**
- def **updateDescriptions**
- def **getAssertionName**
- def **getExpectedDescription**
- def **getFoundDescription**
- def **getTolerance**

Public Attributes

- **assertionName**
- **expectedFType**
- **expectedPrecision**

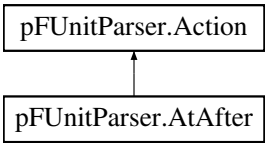
- **expectedRank**
- **foundFType**
- **foundPrecision**
- **foundRank**
- **tolerance**
- **expectedDescription**
- **foundDescription**

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

- GenerateAssertsOnArrays.py

17.11 pFUnitParser.AtAfter Class Reference

Inheritance diagram for pFUnitParser.AtAfter:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

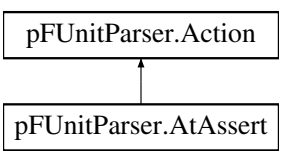
- **parser**

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

- pFUnitParser.py

17.12 pFUnitParser.AtAssert Class Reference

Inheritance diagram for pFUnitParser.AtAssert:



Public Member Functions

- def **__init__**
- def **match**
- def **appendSourceLocation**
- def **action**

Public Attributes

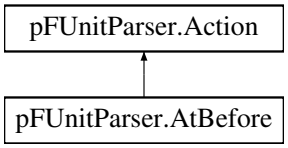
- **parser**

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

- pFUnitParser.py

17.13 pFUnitParser.AtBefore Class Reference

Inheritance diagram for pFUnitParser.AtBefore:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

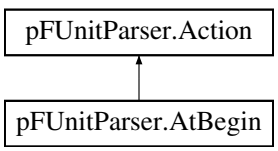
- **parser**

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

- pFUnitParser.py

17.14 pFUnitParser.AtBegin Class Reference

Inheritance diagram for pFUnitParser.AtBegin:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

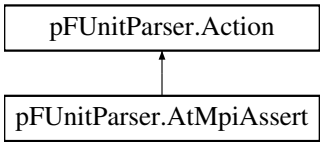
- **parser**

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

- pFUnitParser.py

17.15 pFUnitParser.AtMpiAssert Class Reference

Inheritance diagram for pFUnitParser.AtMpiAssert:



Public Member Functions

- def **__init__**
- def **match**
- def **appendSourceLocation**
- def **action**

Public Attributes

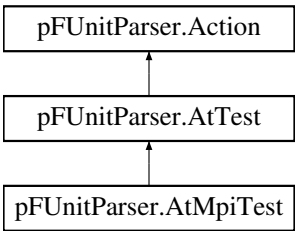
- **parser**

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

- pFUnitParser.py

17.16 pFUnitParser.AtMpiTest Class Reference

Inheritance diagram for pFUnitParser.AtMpiTest:



Public Member Functions

- def **__init__**

Public Attributes

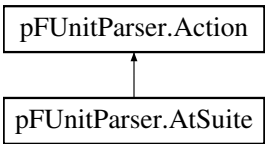
- **parser**
- **keyword**

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

- pFUnitParser.py

17.17 pFUnitParser.AtSuite Class Reference

Inheritance diagram for pFUnitParser.AtSuite:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

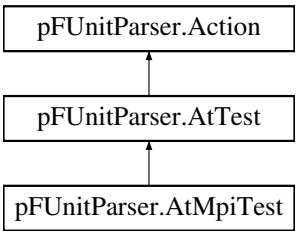
- **parser**

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

- pFUnitParser.py

17.18 pFUnitParser.AtTest Class Reference

Inheritance diagram for pFUnitParser.AtTest:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

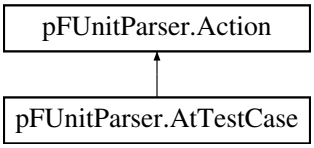
- **parser**
- **keyword**

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

- pFUnitParser.py

17.19 pFUnitParser.AtTestCase Class Reference

Inheritance diagram for pFUnitParser.AtTestCase:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

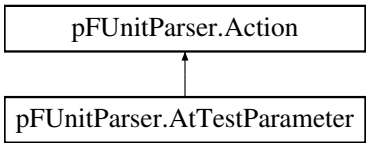
- **parser**

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

- pFUnitParser.py

17.20 pFUnitParser.AtTestParameter Class Reference

Inheritance diagram for pFUnitParser.AtTestParameter:



Public Member Functions

- def **__init__**
- def **match**
- def **action**

Public Attributes

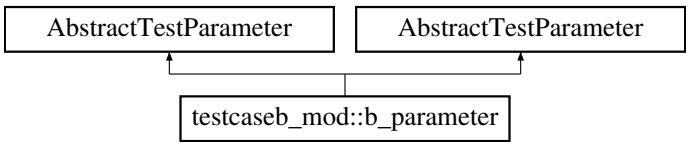
- **parser**

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

- pFUnitParser.py

17.21 testcaseb_mod::b_parameter Type Reference

Inheritance diagram for testcaseb_mod::b_parameter:



Public Member Functions

- procedure **tostring**
- procedure **tostring**

Public Attributes

- real **phi**
- real **theta**

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

- ParameterizedTestCaseB.F90
- ParameterizedTestCaseB.pf

17.22 basetestrunner_mod Module Reference

<BriefDescription>

17.22.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- BaseTestRunner.F90

17.23 beforeafter_mod Module Reference

Public Member Functions

- subroutine **first** (this)
- subroutine **last** (this)
- subroutine **firstandlastcalled** (this)
- subroutine **succeeds** (this)
- subroutine **fails** (this)

Public Attributes

- integer **countstart** = 0
- integer **countcomplete** = 0

The documentation for this module was generated from the following file:

- Examples/MPI_Halo/tests/beforeAfter.pf

17.24 brokensetupcase_mod Module Reference

Public Member Functions

- type(brokensetupcase) function,
  pointer, public **newbrokensetupcase** ()

The documentation for this module was generated from the following file:

- BrokenSetUpCase.F90

17.25 brokentestcase_mod Module Reference

Public Member Functions

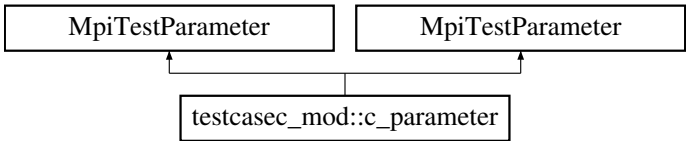
- subroutine **teardown** (this)

The documentation for this module was generated from the following file:

- BrokenTestCase.F90

17.26 testcasec_mod::c_parameter Type Reference

Inheritance diagram for testcasec_mod::c_parameter:



Public Member Functions

- procedure **tostring**
- procedure **tostring**

Public Attributes

- real **phi**
- real **theta**

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

- MpiParameterizedTestCaseC.F90
- MpiParameterizedTestCaseC.pf

17.27 cases_mod Module Reference

Data Types

- type myparamtype
- type mytestcase

Public Member Functions

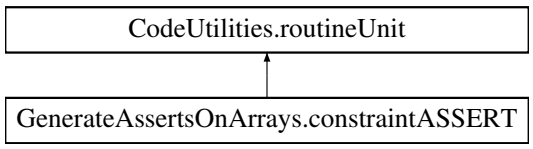
- type(myparamtype) function **newmyparam** (i)
- type(mytestcase) function **newmytestcase** (param)
- subroutine **test_odd** (this)
- subroutine **test_even** (this)
- character(:) function, allocatable **tostring** (this)

The documentation for this module was generated from the following file:

- Test_Cases.pf

17.28 GenerateAssertsOnArrays.constraintASSERT Class Reference

Inheritance diagram for GenerateAssertsOnArrays.constraintASSERT:



Public Member Functions

- def __init__

  Dependency injection.

Public Attributes

- **expectedDescr**
- **foundDescr**
- **name**
- name1

  Add in the extra module procedures...
- tolerance

  If you need another kind of code generator, perhaps conditioned on eDesc., fDesc., or tol, then that logic would go here...

17.28.1 Constructor & Destructor Documentation

17.28.1.1 def GenerateAssertsOnArrays.constraintASSERT.__init__ (*self, assertionName, expectedDescr, foundDescr, tolerance*)

Dependency injection.

Will generate "assert"+assertionName assertionName="Equal" This next line actually generates the text of the code.

17.28.2 Member Data Documentation

17.28.2.1 GenerateAssertsOnArrays.constraintASSERT.name1

Add in the extra module procedures...

If needed... Kluge. Need to make makeSubroutineNames and load the extra interface entries there.

17.28.2.2 GenerateAssertsOnArrays.constraintASSERT.tolerance

If you need another kind of code generator, perhaps conditioned on eDesc., fDesc., or tol, then that logic would go here...

E.g. to implement assertEqual(Logical(...))

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

- GenerateAssertsOnArrays.py

17.29 mods.pre.pre2.dataString Class Reference

Public Member Functions

- def **__init__**
- def **insert**
- def **getLength**
- def **getPosition**
- def **setPosition**
- def **getItem**
- def **getDataAtPosition**
- def **getData**
- def **getSlice**
- def **getSliceForward**
- def **removeSlice**
- def **getCurrentData**
- def **insertAtCurrent**
- def **append**
- def **advanceAndGetNextData**
- def **validPosition**
- def **findToEnd**
- def **match**
- def **matchToEnd**

- def **searchToEnd**
- def **searchToPosition**
- def **finditerToEnd**
- def **finditerToPosition**

Public Attributes

- **data**
- **position**

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

- pre2.py

17.30 debuglistener_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine **addfailure** (this, testName, exceptions)
- subroutine **starttest** (this, testName)

17.30.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- DebugListener.F90

17.31 CodeUtilities.declaration Class Reference

Public Member Functions

- def **__init__**
- def **generate**

Public Attributes

- **simpleDeclaration**
- **fullDeclaration**
- **name**

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

- CodeUtilities.py

17.32 dynamictestcase_mod Module Reference

<BriefDescription>

Public Member Functions

- type(dynamictestcase) function,
  pointer, public **newdynamictestcase** (testMethod, name)

17.32.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- DynamicTestCase.F90

17.33 exception_mod Module Reference

Public Member Functions

- subroutine, public **initializeglobalexceptionlist** ()
- type(exception) function, public **catchnext** (preserve)
- type(exception) function,
  dimension(:), allocatable,
  public **getexceptions** ()

- logical function, public **noexceptions** ()
- logical function, public **anyerrors** ()
- subroutine, public **gatherexceptions** (context)
- subroutine, public **clearall** ()

The documentation for this module was generated from the following file:

- Exception.F90

17.34 expectation_mod Module Reference

Public Member Functions

- type(predicate) function, public **newpredicate** (name)
- type(subject) function, public **newsubject** (name, sub)
- type(subject) function, public **newsubjectnameonly** (name)
- type(expectation) function, public **newexpectation** (subj, pred)

Public Attributes

- type(predicate), parameter, public **wascalled** = Predicate('wasCalled')
- type(predicate), parameter, public **wasnotcalled** = Predicate('wasNotCalled')
- type(predicate), parameter, public **wascalledonce** = Predicate('wasCalledOnce')

The documentation for this module was generated from the following file:

- Expectation.F90

17.35 fixture_mod Module Reference

Public Member Functions

- subroutine **mysetup** ()
- subroutine **myteardown** ()
- subroutine **testread** ()
- subroutine **testeof** ()

The documentation for this module was generated from the following file:

- fixtureTests.pf

17.36 fixturetestcase_mod Module Reference

Public Member Functions

- type(fixturetestcase) function,
  public **newfixturetestcase** ()

- subroutine, public **simpletestmethod** (this)
- subroutine, public **methoda** (this)
- subroutine, public **methodb** (this)

The documentation for this module was generated from the following file:

- FixtureTestCase.F90

17.37 CodeUtilities.fortranSubroutineSignature Class Reference

Public Member Functions

- def **__init__**
- def **setReturnFType**
- def **addArg**
- def **generateInterfaceEntry**
- def **generateImplementationSignature**
- def **generateImplementationClose**

Public Attributes

- **name**
- **ArgumentToFType**
- **ReturnFType**
- **SubroutineType**

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

- CodeUtilities.py

17.38 abstracttestresult_mod::getErrors Interface Reference

The documentation for this interface was generated from the following file:

- AbstractTestResult.F90

17.39 test_mod::getName Interface Reference

The documentation for this interface was generated from the following file:

- Test.F90

17.40 abstracttestresult_mod::getSuccesses Interface Reference

The documentation for this interface was generated from the following file:

- AbstractTestResult.F90

17.41 halo_mod Module Reference

Public Member Functions

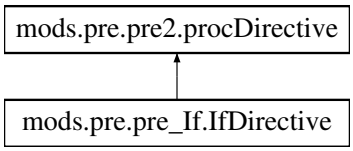
- subroutine **halofill** (array, communicator)

The documentation for this module was generated from the following file:

- Halo.F90

17.42 mods.pre.pre_If.IfDirective Class Reference

Inheritance diagram for mods.pre.pre_If.IfDirective:



Public Member Functions

- def **evaluate**

Public Attributes

- **startPosition**
- **newPosition**

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

- pre_If.py

17.43 CodeUtilities.implementation Class Reference

Public Member Functions

- def **__init__**
- def **generate**

Public Attributes

- **name**
- **source**

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

- CodeUtilities.py

17.44 CodeUtilities.interfaceBlock Class Reference

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

- CodeUtilities.py

17.45 mods.pre.pre_If.interval Class Reference

Public Member Functions

- def **__init__**
- def **getInterval**
- def **setInterval**
- def **getStart**
- def **getEnd**

Public Attributes

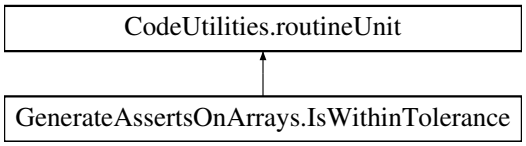
- **start**
- **end**
- **interval**

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

- pre_If.py

17.46 GenerateAssertsOnArrays.IsWithinTolerance Class Reference

Inheritance diagram for GenerateAssertsOnArrays.IsWithinTolerance:



Public Member Functions

- def **__init__**

Public Attributes

- **rank**
- **precision**
- **name**
- **fType**

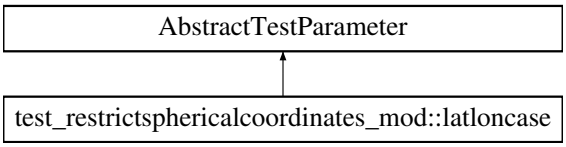
- **declaration**
- **declarations**

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

- GenerateAssertsOnArrays.py

17.47 test_restrictsphericalcoordinates_mod::latloncase Type Reference

Inheritance diagram for test_restrictsphericalcoordinates_mod::latloncase:



Public Member Functions

- procedure **tostring**

Public Attributes

- real **lat**
- real **lon**
- real **restrictedlat**
- real **restrictedlon**

The documentation for this type was generated from the following file:

- Test_RestrictedSphericalCoordinates.pf

17.48 linearinterpolator_mod Module Reference

The documentation for this module was generated from the following file:

- LinearInterpolator.F90

17.49 makeinfinity_mod Module Reference

<BriefDescription>

Public Member Functions

- real(r32) function, public **makeinf_32** ()
- real(r64) function, public **makeinf_64** ()

17.49.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC SIVO

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MakeInfinity.F90

17.50 makenan_mod Module Reference

<BriefDescription>

Public Member Functions

- real(r32) function, public **makenan_32** ()
- real(r64) function, public **makenan_64** ()

17.50.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MakeNaN.F90

17.51 mock_mod Module Reference

<BriefDescription>

17.51.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

12 May 2014

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- Mock.F90

17.52 mockcall_mod Module Reference

<BriefDescription>

Public Member Functions

- type(mockcall) function, public **newmockcall** (name)

17.52.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MockCall.F90

17.53 mocklistener_mod Module Reference

Public Member Functions

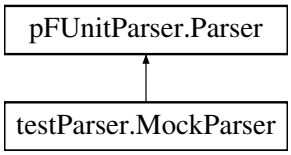
- subroutine **starttest** (this, testName)

The documentation for this module was generated from the following file:

- MockListener.F90

17.54 testParser.MockParser Class Reference

Inheritance diagram for testParser.MockParser:



Public Member Functions

- def **__init__**
- def **nextLine**
- def **reset**

Public Attributes

- **saveLines**
- **lines**
- **outputFile**
- **outLines**
- **userTestCase**
- **userTestMethods**
- **currentSelfObjectName**

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

- testParser.py

17.55 mockrepository_mod Module Reference

<BriefDescription>

Public Member Functions

- type(mockrepository) function,
  pointer, public **newmockrepository** ()
- subroutine **expectcall** (this, obj, method)

Public Attributes

- integer, parameter, public **max_len_method_name** = 32
- integer, parameter, public **max_len_call_registration** = 32
- class(mockrepository), pointer,
  public **mockrepositorypointer** => null()

17.55.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MockRepository.F90

17.56 mocksut_mod Module Reference

Public Member Functions

- type(mocksut) function,
  allocatable, public **newmocksut** (repository)
- subroutine **method1** (this)

The documentation for this module was generated from the following file:

- Test_MockRepository.F90

17.57 testParser.MockWriter Class Reference

Public Member Functions

- def **__init__**
- def **write**

Public Attributes

- **parser**

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

- testParser.py

17.58 CodeUtilities.module Class Reference

Public Member Functions

- def **__init__**
- def **generate**
- def **addDeclaration**
- def **addImplementation**
- def **addRoutineUnit**
- def **addInterfaceBlock**
- def **getName**
- def **setFileName**
- def **getFileName**

Public Attributes

- **name**
- **declarations**
- **implementations**
- **generation**
- **fileName**

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

- CodeUtilities.py

17.59 mpicontext_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine **barrier** (this)
- integer function **getmpicommunicator** (this)

17.59.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MpiContext.F90

17.60 mpistubs_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine, public **mpi_comm_rank** (comm, rank, ier)
- subroutine, public **mpi_comm_size** (comm, size, ier)
- subroutine, public **mpi_comm_dup** (comm, newComm, ier)
- subroutine, public **mpi_comm_group** (comm, group, ier)
- subroutine, public **mpi_group_range_incl** (group, n, ranges, newGroups, ier)
- subroutine, public **mpi_comm_create** (comm, group, newComm, ier)

Public Attributes

- integer, parameter, public **mpi_comm_world** = -1
- integer, parameter, public **mpi_comm_null** = -1
- integer, parameter, public **mpi_comm_success** = 0

17.60.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MpiStubs.F90

17.61 mpitestcase_mod Module Reference

<BriefDescription>

Public Member Functions

- recursive subroutine **runbare** (this)
- integer function **getmpicommunicator** (this)
- integer function **getprocessrank** (this)

17.61.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

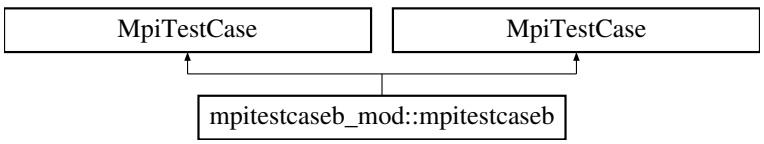
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MpiTestCase.F90

17.62 mpitestcaseb_mod::mpitestcaseb Type Reference

Inheritance diagram for mpitestcaseb_mod::mpitestcaseb:



Public Member Functions

- procedure **setup**
- procedure **teardown**
- procedure **setup**
- procedure **teardown**

Public Attributes

- integer **componenti**

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

- MpiTestCaseB.F90
- MpiTestCaseB.pf

17.63 mpitestcaseb_mod Module Reference

Data Types

- type mpitestcaseb

Public Member Functions

- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)

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

- MpiTestCaseB.F90
- MpiTestCaseB.pf

17.64 mpitestmethod_mod Module Reference

<BriefDescription>

17.64.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- MpiTestMethod.F90

17.65 mpitestparameter_mod Module Reference

Public Member Functions

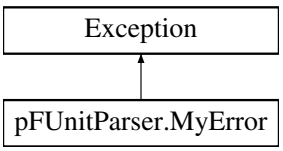
- type(mpitestparameter)
  function, public **newmpitestparameter** (numProcessesRequested)

The documentation for this module was generated from the following file:

- MpiTestParameter.F90

17.66 pFUnitParser.MyError Class Reference

Inheritance diagram for pFUnitParser.MyError:



Public Member Functions

- def **__init__**
- def **__str__**

Public Attributes

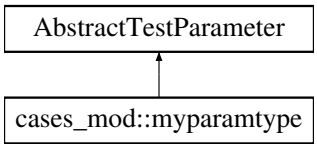
- **value**

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

- pFUnitParser.py

17.67 cases_mod::myparamtype Type Reference

Inheritance diagram for cases_mod::myparamtype:



Public Member Functions

- procedure **tostring**

Public Attributes

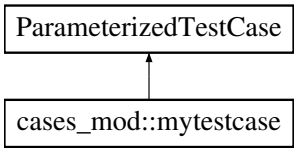
- integer **i**

The documentation for this type was generated from the following file:

- Test_Cases.pf

17.68 cases_mod::mytestcase Type Reference

Inheritance diagram for cases_mod::mytestcase:



Public Attributes

- integer **i**

The documentation for this type was generated from the following file:

- Test_Cases.pf

17.69 testcasec_mod::newc_parameter Interface Reference

Public Member Functions

- type(c_parameter) function **newc_parameter_phitheta** (npes, phi, theta)
- elemental type(c_parameter)
  function **newc_parameter_case** (i)
- type(c_parameter) function **newc_parameter_phitheta** (npes, phi, theta)
- elemental type(c_parameter)
  function **newc_parameter_case** (i)

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

- MpiParameterizedTestCaseC.F90
- MpiParameterizedTestCaseC.pf

17.70 parallelcontext_mod Module Reference

<BriefDescription>

17.70.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- ParallelContext.F90

17.71 parallelexception_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine, public **gather** (context)

17.71.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- ParallelException.F90

17.72 parameterizedtestcase_mod Module Reference

<BriefDescription>

Public Attributes

- integer, parameter, public **max_len_label** = 32

17.72.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- ParameterizedTestCase.F90

17.73 params_mod Module Reference

<BriefDescription>

Public Attributes

- integer, parameter **r32** = selected_real_kind(p=6)
- integer, parameter **r64** = selected_real_kind(p=14)
- integer, parameter **c32** = selected_real_kind(p=6)
- integer, parameter **c64** = selected_real_kind(p=14)
- integer, parameter **neqp** =0
- integer, parameter **eqp** =1
- integer, parameter **gtp** =2
- integer, parameter **gep** =3
- integer, parameter **ltp** =4
- integer, parameter **lep** =5
- integer, parameter **releqp** =6

17.73.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

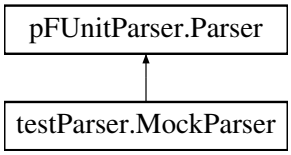
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- Params.F90

17.74 pFUnitParser.Parser Class Reference

Inheritance diagram for pFUnitParser.Parser:



Public Member Functions

- def **__init__**
- def **commentLine**
- def **run**

- def **isComment**
- def **nextLine**
- def **printHeader**
- def **printTail**
- def **printWrapUserTestCase**
- def **printRunMethod**
- def **printParameterHeader**
- def **printMakeSuite**
- def **addSimpleTestMethod**
- def **addMpiTestMethod**
- def **addUserTestMethod**
- def **printMakeCustomTest**
- def **makeWrapperModule**
- def **final**

Public Attributes

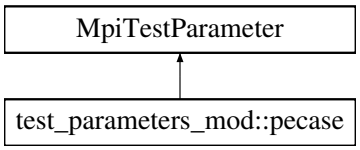
- **fileName**
- **inputFile**
- **outputFile**
- **defaultSuiteName**
- **suiteName**
- **currentLineNumber**
- **userModuleName**
- **userTestCase**
- **userTestMethods**
- **wrapModuleName**
- **actions**

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

- pFUnitParser.py

17.75 test_parameters_mod::pecase Type Reference

Inheritance diagram for test_parameters_mod::pecase:



Public Member Functions

- procedure **tostring**

Public Attributes

- integer **p1**
- integer **p2**

The documentation for this type was generated from the following file:

- parameterizedTests.pf

17.76 pfunit Module Reference

<BriefDescription>

Public Member Functions

- integer function **run** ()

17.76.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- pFUnitPackage.F90

17.77 pfunit_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine, public **initialize** (useMpi)
- subroutine, public **finalize** (successful)

17.77.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- pFUnit.F90

17.78 privateexception_mod Module Reference

<BriefDescription>

Public Member Functions

- type(exceptionlist) function,
  public **newexceptionlist** ()
- logical function **noexceptions** (this)

Public Attributes

- integer, parameter, public **maxlen_message** = 80∗15
- integer, parameter, public **maxlen_file_name** = 80
- character(len=∗), parameter, public **null_message** = ”

17.78.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

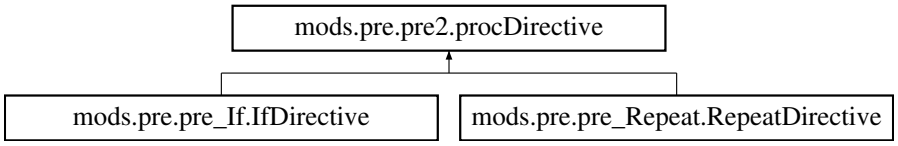
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- Exception.F90

17.79 mods.pre.pre2.procDirective Class Reference

Inheritance diagram for mods.pre.pre2.procDirective:



Public Member Functions

- def **__init__**
- def **getLength**
- def **match**
- def **evaluate**
- def **getNewPosition**
- def addTokenRE
- def **searchTokenToEnd**
- def **searchTokenToPosition**
- def **finditerTokenToPosition**
- def **makeTokenErrorMessage**

Public Attributes

- **name**
- **newPosition**
- **tokens**
- **TokenREs**

17.79.1 Member Function Documentation

17.79.1.1 def mods.pre.pre2.procDirective.addTokenRE (*self, args, key, defaultToken, prefix* = `r"'(?i)[ \t]*"'`, *postfix* = `''`)

```
Add a token/create an RE with a prefix that by default ignores preceding whitespace.
Stores the RE in a dictionary for this directive.
```

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

- pre2.py

17.80 remoteproxytestcase_mod Module Reference

<BriefDescription>

17.80.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

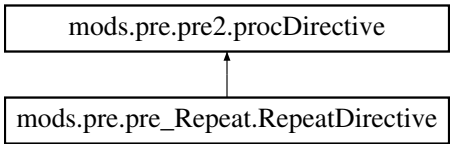
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- RemoteProxyTestCase.F90

17.81 mods.pre.pre_Repeat.RepeatDirective Class Reference

Inheritance diagram for mods.pre.pre_Repeat.RepeatDirective:



Public Member Functions

- def **evaluate**

Public Attributes

- **startPosition**
- **newPosition**

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

- pre_Repeat.py

17.82 resultprinter_mod Module Reference

<BriefDescription>

Public Member Functions

- type(resultprinter) function,
  public **newresultprinter** (unit)
- subroutine **adderror** (this, testName, exceptions)
- subroutine **starttest** (this, testName)
- subroutine **print** (this, result)
- subroutine **printheader** (this, runTime)
- subroutine **printfooter** (this, result)

17.82.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- ResultPrinter.F90

17.83 robustrunner_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine **runwithresult** (this, aTest, context, result)
- subroutine **launchremoterunner** (this, numSkip)
- subroutine **starttest** (this, testName)
- subroutine **addfailure** (this, testName, exceptions)
- subroutine **adderror** (this, testName, exceptions)
- type(testresult) function **createtestresult** (this)

17.83.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- RobustRunner.F90

17.84 robusttestsuite_mod Module Reference

Public Member Functions

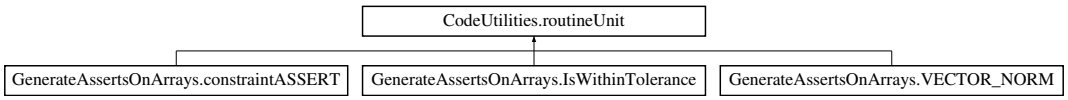
- type(testsuite) function, public **suite** ()
- subroutine **testrunsucceeds** ()
- subroutine **testrunstops** ()

The documentation for this module was generated from the following file:

- robustTestSuite.F90

17.85 CodeUtilities.routineUnit Class Reference

Inheritance diagram for CodeUtilities.routineUnit:



Public Member Functions

- def **__init__**
- def **setName**
- def **getName**
- def **setDeclaration**
- def **addDeclaration**

- def **setImplementation**
- def **getDeclaration**
- def **getDeclarations**
- def **getImplementation**
- def **clearDeclarations**

Public Attributes

- **name**
- **declaration**
- **declarations**
- **implementation**

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

- CodeUtilities.py

17.86 serialcontext_mod Module Reference

<BriefDescription>

Public Member Functions

- type(serialcontext) function,
  public **newserialcontext** ()

Public Attributes

- type(serialcontext), parameter,
  public **the_serial_context** = SerialContext()

17.86.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- SerialContext.F90

17.87 simpletestcase_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- type(simpletestcase) function,
  public **newsimpletestcase** (name, userMethod)
- subroutine, public **method1** (this)
- subroutine, public **method2** (this)
- subroutine, public **methodwith2exceptions** (this)
- subroutine **delete_** (this)

The documentation for this module was generated from the following file:

- SimpleTestCase.F90

17.88 sourcelocation_mod Module Reference

<BriefDescription>

Public Attributes

- character(len=maxlen_file_name),
  parameter, public **unknown_file_name** = '<unknown file>'
- integer, parameter, public **unknown_line_number** = -1
- type(sourcelocation),
  parameter, public **unknown_source_location** = SourceLocation()

17.88.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- SourceLocation.F90

17.89 sphericalcoordinates_mod Module Reference

The documentation for this module was generated from the following file:

- SphericalCoordinates.F90

17.90 testlistener_mod::startTest Interface Reference

The documentation for this interface was generated from the following file:

- TestListener.F90

17.91 stringconversionutilities_mod Module Reference

A collection of utilities used throughout the framework.

Public Member Functions

- character(len=len_trim(a)+1+len_trim(b))
  function, public **appendwithspace** (a, b)
- character(len=:) function,
  allocatable, public **nullterminate** (string)
- character(len=:) function,
  allocatable, public **unlessscalar** (vShape, string)
- logical function, public **whitespacep** (c)
- character(len=:) function,
  allocatable, public **trimall** (s)
- character(len=:) function,
  allocatable, public **trimtrailingwhitespace** (s)

Public Attributes

- integer, parameter, public **maxlen_string** = 80
- type(whitespaceoptions),
  parameter, public **ignore_all** =WhitespaceOptions(IGNORE_ALL_)
- type(whitespaceoptions),
  parameter, public **trim_all** =WhitespaceOptions(TRIM_ALL_)
- type(whitespaceoptions),
  parameter, public **keep_all** =WhitespaceOptions(KEEP_ALL_)
- type(whitespaceoptions),
  parameter, public **ignore_differences** =WhitespaceOptions(IGNORE_DIFFERENCES_)

17.91.1 Detailed Description

A collection of utilities used throughout the framework.

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- StringConversionUtilities.F90

17.92 subsetrunner_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine **addfailure** (this, testName, exceptions)
- subroutine **starttest** (this, testName)

17.92.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- SubsetRunner.F90

17.93 surrogatetestcase_mod Module Reference

<BriefDescription>

17.93.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- SurrogateTestCase.F90

17.94 sut_mod Module Reference

The documentation for this module was generated from the following file:

- Test_MockRepository.F90

17.95 test_assert_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testassertequalstringdiffer1st** ()

The documentation for this module was generated from the following file:

- Test_Assert.F90

17.96 test_assertbasic_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testasserttruef** ()
- subroutine **testassertisfinite** ()
- subroutine **testassertexceptionraised** ()
- subroutine **testassertfail** ()

The documentation for this module was generated from the following file:

- Test_AssertBasic.F90

17.97 test_assertcomplex_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testequals_c_complexscalar** ()
- subroutine **testequals_c_0d1d** ()
- subroutine **testequals_c_1d_nonconformable1** ()
- subroutine **testequals_c_2d_singleelementdifferent** ()
- subroutine **testequals_c_multid_singleelementdifferent** ()
- subroutine **testequals_c_multid_singleelementdifferent1**
- subroutine **testequals_c_multid_singleelementdifferent2**
- subroutine **testequals_c_multid_singleelementdifferent3**
- subroutine **testequals_c_multid_singleelementdifferent4**
- subroutine **testequals_c_multid_singleelementdifferent5**
- subroutine **testequals_c_multidmultiprec_singleeltdiff** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff1** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff2** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff3** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff4** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff5** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff6** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff7** ()
- subroutine **testequals_c_multidmultiprec_singleeltdiff8** ()
- subroutine **testequals_scalarwithtolerance** ()
- subroutine **testequals_c_multidwithtolerance** ()
- subroutine **testequals_c_multidwithtolerance1** ()
- subroutine **testequals_c_multidwithtolerance64** ()
- subroutine **testequals_c_multidwithtolerance64_1** ()
- subroutine **testequals_c_multidwithtolerance64_2** ()
- subroutine **testequals_c_multidsourcelocation** ()
- subroutine **testequals_4dpcomplex_differencereport** ()
- subroutine **testequals_complexmultid_singleelementne1**
- subroutine **testequals_complexmultid_singleelementre1**
- subroutine **testequals_complexmultid_singleeltvarious1**
- subroutine **assertcatch** (string, location)

The documentation for this module was generated from the following file:

- Test_AssertComplex.F90

17.98 test_assertinteger_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testassertequal_equal** ()

The documentation for this module was generated from the following file:

- Test_AssertInteger.F90

17.99 test_assertreal_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testequals_0d1d** ()
- subroutine **testequals_1d_nonconformable1** ()
- subroutine **testequals_2d_singleelementdifferent** ()
- subroutine **testequals_multid_singleelementdifferent** ()
- subroutine **testequals_multid_singleelementdifferent1**
- subroutine **testequals_multid_singleelementdifferent2**
- subroutine **testequals_multid_singleelementdifferent3**
- subroutine **testequals_multid_singleelementdifferent4**
- subroutine **testequals_multid_singleelementdifferent5**
- subroutine **testequals_multidmultiprec_singleeltdiff** ()
- subroutine **testequals_multidmultiprec_singleeltdiff1** ()
- subroutine **testequals_multidmultiprec_singleeltdiff2** ()
- subroutine **testequals_multidmultiprec_singleeltdiff3** ()
- subroutine **testequals_multidmultiprec_singleeltdiff4** ()
- subroutine **testequals_multidmultiprec_singleeltdiff5** ()
- subroutine **testequals_multidmultiprec_singleeltdiff6** ()
- subroutine **testequals_multidmultiprec_singleeltdiff7** ()
- subroutine **testequals_multidmultiprec_singleeltdiff8** ()
- subroutine **testequals_scalarwithtolerance** ()
- subroutine **testequals_scalarwithtolerancenomsg** ()
- subroutine **testequals_vectorwithtolerancenomsg** ()
- subroutine **testequals_multidwithtolerance** ()
- subroutine **testequals_multidwithtolerance1** ()
- subroutine **testequals_multidwithtolerance64** ()
- subroutine **testequals_multidwithtolerance64_1** ()
- subroutine **testequals_multidwithtolerance64_2** ()
- subroutine **testequals_multidsourcelocation** ()
- subroutine **testequals_scalarandlocation** ()
- subroutine **testequals_scalarinfinity_equal** ()
- subroutine **testequals_scalarinfinity_unequal_a** ()
- subroutine **testequals_scalarinfinity_unequal_b** ()
- subroutine **testequals_scalarinfinity_unequal_c** ()
- subroutine **testequals_multid_singleelementgt1**
- subroutine **testequals_multid_singleelementgt2**
- subroutine **testequals_multid_singleeltvarious1**
- subroutine **testequals_multid_singleeltvarious2**
- subroutine **assertcatch** (string, location)

The documentation for this module was generated from the following file:

- Test_AssertReal.F90

17.100 test_basicopenmp_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testrunwithopenmp** ()
- subroutine **testserializeexceptions** ()

The documentation for this module was generated from the following file:

- Test_BasicOpenMP.F90

17.101 test_exception_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testgetnumexceptions** ()
- subroutine **testcatchsucceed** ()
- subroutine **testgetlinenumber** ()
- subroutine **testgetfilename** ()

The documentation for this module was generated from the following file:

- Test_Exception.F90

17.102 test_fixturetestcase_mod Module Reference

Public Member Functions

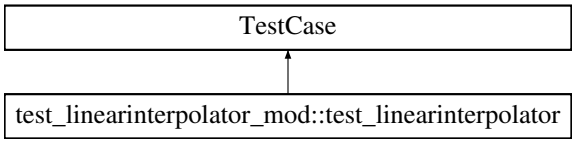
- type(testsuite) function, public **suite** ()
- subroutine **testrunwithfixture** ()
- subroutine **testbrokentestcase** ()
- subroutine **testbrokensetupcase** ()

The documentation for this module was generated from the following file:

- Test_FixtureTestCase.F90

17.103 test_linearinterpolator_mod::test_linearinterpolator Type Reference

Inheritance diagram for test_linearinterpolator_mod::test_linearinterpolator:



Public Member Functions

- procedure **setup**
- procedure **teardown**

Public Attributes

- type(linearinterpolator) **interpolator**

The documentation for this type was generated from the following file:

- Test_LinearInterpolator.pf

17.104 test_linearinterpolator_mod Module Reference

Data Types

- type test_linearinterpolator

Public Member Functions

- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testbracketatnode** (this)
- subroutine **testbracketinterior** (this)
- subroutine **testinterpolateatnode** (this)
- subroutine **testinterpolateconstant** (this)

The documentation for this module was generated from the following file:

- Test_LinearInterpolator.pf

17.105 test_mockcall_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testexpectoneintegerargument**
- subroutine **testfailexpectoneintegerargument**

The documentation for this module was generated from the following file:

- Test_MockCall.F90

17.106 test_mockrepository_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testnoaction** ()

The documentation for this module was generated from the following file:

- Test_MockRepository.F90

17.107 test_mod Module Reference

<BriefDescription>

Data Types

- interface getName

Public Attributes

- integer, parameter, public **max_length_name** = 64

17.107.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- Test.F90

17.108 test_mpicontext_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testnumprocesses1** (context)

The documentation for this module was generated from the following file:

- Test_MpiContext.F90

17.109 test_mpiexception_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **test_anyexceptions_none** (this)
- subroutine **test_getnumexceptions** (this)
- subroutine **test_gather** (this)

The documentation for this module was generated from the following file:

- Test_MpiException.F90

17.110 test_mpiparameterizedtestcase_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- type(test_mpitestcase)
  function, public **newtest_mpitestcase** (name, userMethod, testParameter)
- subroutine **testtostring** (this)
- recursive subroutine **runmethod** (this)

The documentation for this module was generated from the following file:

- Test_MpiParameterizedTestCase.F90

17.111 test_mpitestcase_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- type(test_mpitestcase)
  function, public **newtest_mpitestcase** (name, userMethod, numProcesses)
- subroutine **testrunon2processors** (this)
- subroutine **brokenprocess1** (this)

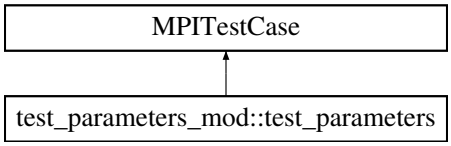
- subroutine **brokenonprocess2** (this)
- subroutine **testfailon1** (this)
- subroutine **testfailon2** (this)
- subroutine **testtoofewprocs** (this)
- recursive subroutine **runmethod** (this)

The documentation for this module was generated from the following file:

- Test_MpiTestCase.F90

17.112 test_parameters_mod::test_parameters Type Reference

Inheritance diagram for test_parameters_mod::test_parameters:



Public Attributes

- integer **p1**
- integer **p2**

The documentation for this type was generated from the following file:

- parameterizedTests.pf

17.113 test_parameters_mod Module Reference

Data Types

- type pecase
- type test_parameters

Public Member Functions

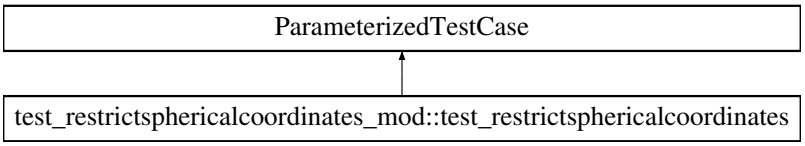
- type(test_parameters) function **newtest** (testParameter)
- type(pecase) function **newpecase** (p1, p2)
- type(pecase) function,
  dimension(:), allocatable **getparameters** ()
- character(:) function, allocatable **tostring** (this)
- subroutine **testparambroken** (this)

The documentation for this module was generated from the following file:

- parameterizedTests.pf

17.114 test_restrictsphericalcoordinates_mod::test_restrictsphericalcoordinates Type Reference

Inheritance diagram for test_restrictsphericalcoordinates_mod::test_restrictsphericalcoordinates:



Public Attributes

- real **lat**
- real **lon**
- real **restrictedlat**
- real **restrictedlon**
- type(sphericalcoordinates) **unrestricted**
- type(sphericalcoordinates) **restricted**

The documentation for this type was generated from the following file:

- Test_RestrictedSphericalCoordinates.pf

17.115 test_restrictsphericalcoordinates_mod Module Reference

Data Types

- type latloncase
- type test_restrictsphericalcoordinates

Public Member Functions

- type(test_restrictsphericalcoordinates) function **newtest** (testParameter)
- type(latloncase) function, dimension(:), allocatable **getparameters** ()
- subroutine **testrestrict** (this)
- character(:) function, allocatable **tostring** (this)

The documentation for this module was generated from the following file:

- Test_RestrictedSphericalCoordinates.pf

17.116 test_robustrunner_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testrunvariety** ()

The documentation for this module was generated from the following file:

- Test_RobustRunner.F90

17.117 test_simpletestcase_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- type(testsuite) function **internalsuite** ()
- subroutine **testworks** ()
- subroutine **testfails** ()
- subroutine **testrunsuite** ()
- subroutine **testrunmethodshouldfail** ()

The documentation for this module was generated from the following file:

- Test_SimpleTestCase.F90

17.118 test_stringconversionutilities_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testtostringinteger1d** ()

The documentation for this module was generated from the following file:

- Test_StringConversionUtilities.F90

17.119 test_testmethod_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testmethodwasrun** ()
- subroutine **testwasrun** ()

The documentation for this module was generated from the following file:

- Test_TestMethod.F90

17.120 test_testresult_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testgetnumrun** ()
- subroutine **testgetnumfailed** ()
- subroutine **testaddlistenerend** ()
- subroutine **testaddlistenerstart** ()
- subroutine **testaddlistenerfailure** ()

The documentation for this module was generated from the following file:

- Test_TestResult.F90

17.121 test_testsuite_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testcounttestcases** ()
- subroutine **testcounttestcasesnesteda** ()
- subroutine **testcounttestcasesnestedb** ()
- subroutine **testcounttestcasesnestedc** ()
- subroutine **testgettestcases** ()
- subroutine **mytestmethod** ()

The documentation for this module was generated from the following file:

- Test_TestSuite.F90

17.122 test_unixprocess_mod Module Reference

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testisactive** ()

The documentation for this module was generated from the following file:

- Test_UnixProcess.F90

17.123 test_xmlprinter_mod Module Reference

Output test messages in junit.xsd-compatible XML.

Public Member Functions

- type(testsuite) function, public **suite** ()
- subroutine **testvalidxml** ()
- subroutine **comparexmlfiletoexpectation** (xmlFile)

17.123.1 Detailed Description

Output test messages in junit.xsd-compatible XML.

Author

Halvor Lund

Date

2014 July

Note

Set up a test failure and feed it to an XML-based printer so that we can test its output. Use command line call (via "system") to try to find "xmllint," and if available, use it to validate the output against junit.xsd. Either way, check the output against a hard-coded expected result (a regression test).

The documentation for this module was generated from the following file:

- Test_XmlPrinter.F90

17.124 testa_mod Module Reference

Public Member Functions

- subroutine **testmethoda** ()
- subroutine **testmethodb** ()
- subroutine **testmethodc** (this)
- subroutine **testmethoda** ()
- subroutine **testmethodb** ()
- subroutine **testmethodc** (this)

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

- TestA.F90
- TestA.pf

17.125 testcase_mod Module Reference

<BriefDescription>

Public Member Functions

- recursive subroutine **runbare** (this)
- recursive subroutine **runbare_surrogate** (this)

17.125.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

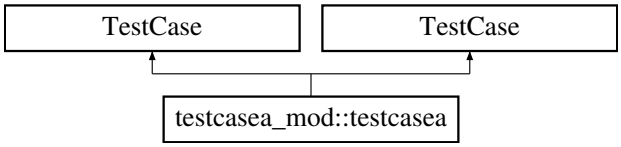
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestCase.F90

17.126 testcasea_mod::testcasea Type Reference

Inheritance diagram for testcasea_mod::testcasea:



Public Member Functions

- procedure **setup**
- procedure **teardown**
- procedure **setup**
- procedure **teardown**

Public Attributes

- integer **componenti**

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

- TestCaseA.F90
- TestCaseA.pf

17.127 testcasea_mod Module Reference

Data Types

- type testcasea

Public Member Functions

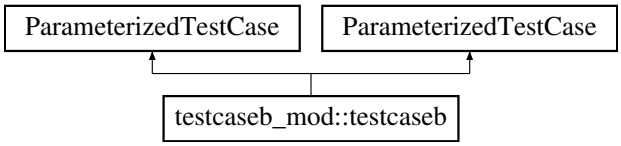
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)

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

- TestCaseA.F90
- TestCaseA.pf

17.128 testcaseb_mod::testcaseb Type Reference

Inheritance diagram for testcaseb_mod::testcaseb:



Public Member Functions

- procedure **setup**
- procedure **teardown**
- procedure **setup**
- procedure **teardown**

Public Attributes

- integer, dimension(:), allocatable **table**
- real **phi**
- real **theta**

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

- ParameterizedTestCaseB.F90
- ParameterizedTestCaseB.pf

17.129 testcaseb_mod Module Reference

Data Types

- type b_parameter
- type testcaseb

Public Member Functions

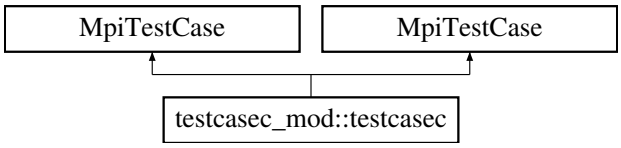
- type(testcaseb) function **newtestcaseb** (testParameter)
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)
- character(:) function, allocatable **tostring** (this)
- type(testcaseb) function **newtestcaseb** (testParameter)
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)
- character(:) function, allocatable **tostring** (this)

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

- ParameterizedTestCaseB.F90
- ParameterizedTestCaseB.pf

17.130 testcasec_mod::testcasec Type Reference

Inheritance diagram for testcasec_mod::testcasec:



Public Member Functions

- procedure **setup**
- procedure **teardown**
- procedure **setup**
- procedure **teardown**

Public Attributes

- integer, dimension(:), allocatable **table**
- real **phi**
- real **theta**

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

- MpiParameterizedTestCaseC.F90
- MpiParameterizedTestCaseC.pf

17.131 testcasec_mod Module Reference

Data Types

- type c_parameter
- interface newc_parameter
- type testcasec

Public Member Functions

- type(testcasec) function **newtestcasec** (testParameter)
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)
- subroutine **testc** (this)
- type(c_parameter) function **newc_parameter_phitheta** (npes, phi, theta)
- elemental type(c_parameter)
  function **newc_parameter_case** (i)
- type(c_parameter) function,
  dimension(:), allocatable **paramgenerator** ()
- character(:) function, allocatable **tostring** (this)
- type(testcasec) function **newtestcasec** (testParameter)
- subroutine **setup** (this)
- subroutine **teardown** (this)
- subroutine **testa** (this)
- subroutine **testb** (this)
- subroutine **testc** (this)
- type(c_parameter) function **newc_parameter_phitheta** (npes, phi, theta)
- elemental type(c_parameter)
  function **newc_parameter_case** (i)
- type(c_parameter) function,
  dimension(:), allocatable **paramgenerator** ()
- character(:) function, allocatable **tostring** (this)

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

- MpiParameterizedTestCaseC.F90
- MpiParameterizedTestCaseC.pf

17.132 testfailure_mod Module Reference

<BriefDescription>

17.132.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

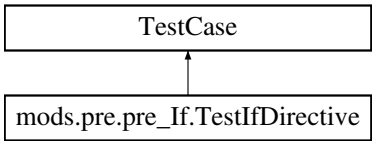
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestFailure.F90

17.133 mods.pre.pre_If.TestIfDirective Class Reference

Inheritance diagram for mods.pre.pre_If.TestIfDirective:



Public Member Functions

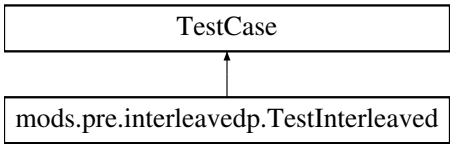
- def **testTokenNotFound1**
- def **testNoTest**
- def **testIFTestFalse**
- def **testIFTestTrue1**
- def **testIFTestTrue2**
- def **testIFClearTokens**
- def **testIFClearTokensUntilEnd1**

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

- pre_If.py

17.134 mods.pre.interleavedp.TestInterleaved Class Reference

Inheritance diagram for mods.pre.interleavedp.TestInterleaved:



Public Member Functions

- def **test_InOrder**
- def **test_NumberMismatch**
- def **test_OrderMismatch1**
- def **test_OrderMismatch2**
- def **test_OrderMismatch3**
- def **test_ElseMid1**
- def **test_ElseMid2**
- def **test_ElseMid3**
- def **test_ElseMid4**
- def **test_ElseMid5**
- def **test_ElseMid6**
- def **test_ElseMid7**
- def **test_ElseMid8**
- def **test_ElseMid9**
- def **test_ElseMid10**

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

- interleavedp.py

17.135 testlistener_mod Module Reference

<BriefDescription>

Data Types

- interface startTest

Public Member Functions

- subroutine **adderror** (this, testName, exceptions)
- subroutine **setdebug** (this)

17.135.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestListener.F90

17.136 testmethod_mod Module Reference

<BriefDescription>

17.136.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

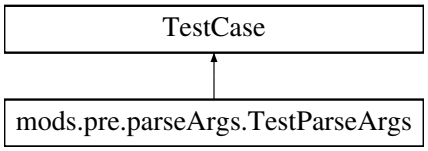
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestMethod.F90

17.137 mods.pre.parseArgs.TestParseArgs Class Reference

Inheritance diagram for mods.pre.parseArgs.TestParseArgs:



Public Member Functions

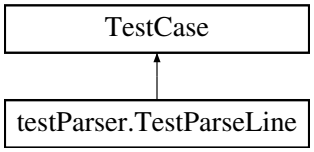
- def **test_ParseArgs_OneArgWithBrackets1**
- def **test_ParseArgs_OneArgWithBrackets2**
- def **test_ParseArgs_OneArgWithBrackets3**
- def **test_ParseArgs_OneArgWithBrackets4**
- def **test_ParseArgs_OneArgWithBrackets5**
- def **test_ParseArgs_OneArgWithBrackets6**
- def **test_ParseArgs_OneArgWithBrackets7**
- def **test_ParseArgs_oneArg**
- def **test_ParseArgs_twoArgs1**
- def **test_ParseArgs_twoArgs2**
- def **test_ParseArgs_oneArgArray1**
- def **test_ParseArgs_TwoArgArray**
- def **test_ParseArgs_ThreeArgs**

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

- parseArgs.py

17.138 testParser.TestParseLine Class Reference

Inheritance diagram for testParser.TestParseLine:



Public Member Functions

- def **testCppSetLineAndFile**
- def **testGetSubroutineName**
- def **testGetSelfObjectName**
- def **testGetTypeName**
- def testAtTest
- def testAtTestNoParens
- def testAtTestFail
- def testAtTestSkipComment
- def testAtMpiTest
- def testMatchAtTestCase
- def testMatchAtAssertEqual
- def testMatchAtAssertOther
- def testMatchAtMpiAssert
- def testMatchAtBefore
- def testMatchAtAfter
- def testMatchAtSuite

17.138.1 Member Function Documentation

17.138.1.1 def testParser.TestParseLine.testAtMpiTest (*self*)

```
Check that a line starting with '@mpitest' is detected as an
annotation and that optional parameters are collected.
```

17.138.1.2 def testParser.TestParseLine.testAtTest (*self*)

```
Check that a line starting with '@test' is detected as an
annotation.
```

17.138.1.3 def testParser.TestParseLine.testAtTestFail (*self*)

```
Check that useful error is sent if next line is not properly formatted.
```

17.138.1.4 def testParser.TestParseLine.testAtTestNoParens (*self*)

```
Check that test procedure with no parens is accepted.
```

17.138.1.5 def testParser.TestParseLine.testAtTestSkipComment (*self*)

```
Ignore comment lines between @test and subroutine foo().
```

17.138.1.6 def testParser.TestParseLine.testMatchAtAfter (*self*)

```
Check that a line starting with '@after*' ...
```

17.138.1.7 def testParser.TestParseLine.testMatchAtAssertEqual (*self*)

```
Check that a line starting with '@assertEqual' is detected
as an annotation.
```

17.138.1.8 def testParser.TestParseLine.testMatchAtAssertOther (*self*)

```
Check that a line starting with '@assert*' is detected
as an annotation.
```

17.138.1.9 def testParser.TestParseLine.testMatchAtBefore (*self*)

```
Check that a line starting with '@before*' ...
```

17.138.1.10 def testParser.TestParseLine.testMatchAtMpiAssert (*self*)

```
Check that a line starting with '@mpiAssert*' is detected
as an annotation.
```

17.138.1.11 def testParser.TestParseLine.testMatchAtSuite (*self*)

```
Check that a line starting with '@suite changes the suite name ...
```

17.138.1.12 def testParser.TestParseLine.testMatchAtTestCase (*self*)

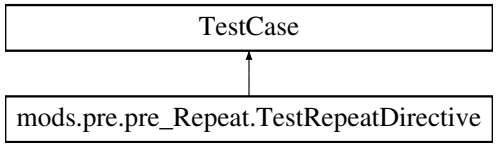
```
Check that a line starting with '@testcase' is detected as an
annotation.
```

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

- testParser.py

17.139 mods.pre.pre_Repeat.TestRepeatDirective Class Reference

Inheritance diagram for mods.pre.pre_Repeat.TestRepeatDirective:



Public Member Functions

- def **test_copyBlock1**
- def **test_copyBlock2**
- def **test_copyBlock2Vars**
- def **test_copyBlock2VarsMulti**
- def **test_copyBlock2VarsMultiWithStrings**
- def **test_copyNaiveRecursion**
- def **test_copyNaiveRecursion1**
- def **test_copyFunction1**

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

- pre_Repeat.py

17.140 testresult_mod Module Reference

<BriefDescription> Note: A possible extension point for user-specialized TestResults.

Public Member Functions

- type(testresult) function, public **newtestresult** (name)
- subroutine **adderror** (this, aTest, exceptions)
- subroutine **addsuccess** (this, aTest)
- integer function **failurecount** (this)
- subroutine **addlistener** (this, listener)

17.140.1 Detailed Description

<BriefDescription> Note: A possible extension point for user-specialized TestResults.

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestResult.F90

17.141 testrunner_mod Module Reference

<BriefDescription>

Public Member Functions

- type(testresult) function **run** (this, aTest, context)
- subroutine **starttest** (this, testName)
- subroutine **addfailure** (this, testName, exceptions)

17.141.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestRunner.F90

17.142 testsuite_mod Module Reference

<BriefDescription>

Public Member Functions

- recursive subroutine **addtest** (this, aTest)

17.142.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- TestSuite.F90

17.143 throwfundamentaltypes_mod Module Reference

<BriefDescription>

Public Member Functions

- subroutine, public **thrownonconformable** (shapeExpected, shapeFound, location)
- character(len=maxlen_shape)
  function, public **locationformat** (iLocation)

17.143.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- ThrowFundamentalTypes.F90

17.144 unixpipeinterfaces_mod Module Reference

<BriefDescription>

Public Attributes

- integer(c_int), parameter, public **close_failed** = -1

17.144.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- UnixPipeInterfaces.F90

17.145 unixprocess_mod Module Reference

<BriefDescription>

Public Member Functions

- character(len=:) function,
  allocatable **makecommand** (baseCommand, runInBackground)
- logical function **isactive** (this)
- character(len=:) function,
  allocatable **getdelim** (this, delimeter)
- integer function **getpid** (this)

17.145.1 Detailed Description

<BriefDescription>

Author

Tom Clune, NASA/GSFC

Date

07 Nov 2013

Note

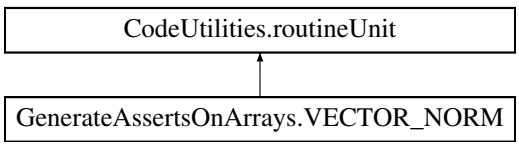
<A note here.> <Or starting here...>

The documentation for this module was generated from the following file:

- UnixProcess.F90

17.146 GenerateAssertsOnArrays.VECTOR_NORM Class Reference

Inheritance diagram for GenerateAssertsOnArrays.VECTOR_NORM:



Public Member Functions

- def **__init__**

Public Attributes

- **rank**
- **fType**
- **precision**

- **name**
- **declaration**
- **declarations**

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

- GenerateAssertsOnArrays.py

17.147 abstracttestresult_mod::wasSuccessful Interface Reference

The documentation for this interface was generated from the following file:

- AbstractTestResult.F90

17.148 wrapbeforeafter Module Reference

The documentation for this module was generated from the following file:

- beforeAfter.F90

17.149 wrapmpitestcaseb_mod Module Reference

Public Member Functions

- subroutine **runmethod** (this)
- type(wrapusertestcase)
  function, public **makecustomtest** (methodName, testMethod, npesRequested)

The documentation for this module was generated from the following file:

- MpiTestCaseB.F90

17.150 wrapsimple Module Reference

The documentation for this module was generated from the following file:

- simple.F90

17.151 wraptesta_mod Module Reference

The documentation for this module was generated from the following file:

- TestA.F90

17.152 wraptestcasea_mod Module Reference

Public Member Functions

- subroutine **runmethod** (this)
- type(wrapusertestcase)
  function, public **makecustomtest** (methodName, testMethod)

The documentation for this module was generated from the following file:

- TestCaseA.F90

17.153 wraptestcaseb_mod Module Reference

Public Member Functions

- subroutine **runmethod** (this)
- type(wrapusertestcase)
  function, public **makecustomtest** (methodName, testMethod, testParameter)

The documentation for this module was generated from the following file:

- ParameterizedTestCaseB.F90

17.154 wraptestcasec_mod Module Reference

Public Member Functions

- subroutine **runmethod** (this)
- type(wrapusertestcase)
  function, public **makecustomtest** (methodName, testMethod, testParameter, npesRequested)

The documentation for this module was generated from the following file:

- MpiParameterizedTestCaseC.F90

17.155 xmlprinter_mod Module Reference

<BriefDescription>

Public Member Functions

- type(xmlprinter) function, public **newxmlprinter** (unit)
- subroutine **adderror** (this, testName, exceptions)
- subroutine **starttest** (this, testName)
- subroutine **print** (this, result)

- subroutine **printheader** (this, result)
- subroutine **printfailure** (this, label, aFailedTest)
- subroutine **printexceptions** (this, label, testName, exceptions)
- subroutine **printfailure1** (this, label, aFailedTest)
- subroutine **printfailures** (this, label, failures)
- subroutine **printtestname** (this, testName)
- subroutine **printsuccess** (this, aSuccessTest)
- subroutine **printsuccesses** (this, successes)
- subroutine **printfooter** (this, result)
- character(:) function, allocatable **cleanxml** (string_in)

17.155.1 Detailed Description

<BriefDescription>

Author

Halvor Lund, SINTEF Energy Research

Date

30 Jan 2014

Note

<A note here.> Need to improve the handling of nested quotes.

The documentation for this module was generated from the following file:

- XmlPrinter.F90

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