

pFUnit

Generated by Doxygen 1.7.6

Mon Apr 21 2014 08:26:53



# Contents

<b>1</b>	<b>pFUnit 3 - Documentation - Version 2014-0401-1636-00-UTC MLR</b>	<b>1</b>
1.1	Overview . . . . .	1
1.2	Contents . . . . .	1
1.3	See Also . . . . .	2
1.4	LICENSE . . . . .	2
1.5	Copyright . . . . .	2
<b>2</b>	<b>Obtaining pFUnit</b>	<b>3</b>
<b>3</b>	<b>Installation</b>	<b>5</b>
3.1	Installing pFUnit . . . . .	5
3.2	Prerequisites . . . . .	5
3.3	Obtaining pFUnit . . . . .	6
3.4	Manifest - What's in the directory? . . . . .	6
3.5	Configuration . . . . .	7
3.6	Building pFUnit . . . . .	8
3.6.1	Building pFUnit for testing serial codes (Non-MPI) . . . . .	8
3.6.2	Building pFUnit for testing parallel codes (MPI) . . . . .	8
3.6.3	OPENMP . . . . .	9
3.6.4	Cleaning . . . . .	9
3.6.5	Documentation . . . . .	9
3.6.6	CMAKE . . . . .	10
3.7	Installation . . . . .	10

3.7.1	Installation - Serial . . . . .	10
3.7.2	Installation - MPI . . . . .	11
3.7.3	Installation - OPENMP . . . . .	11
3.7.4	Installation - DEFAULT DIRECTORY . . . . .	11
<b>4</b>	<b>Usage</b>	<b>13</b>
4.1	Usage . . . . .	13
4.1.1	Usage - Configuration . . . . .	13
4.1.2	Usage - Hello World . . . . .	13
4.2	Usage - Preprocessor . . . . .	14
4.3	Compiling and Executing The Test . . . . .	14
4.3.1	- Compiling and Executing the Tests (MPI PARALLEL) . . . . .	14
4.3.2	Command Line Options . . . . .	15
<b>5</b>	<b>Development</b>	<b>17</b>
<b>6</b>	<b>Feedback &amp; Support</b>	<b>19</b>
6.1	Feedback . . . . .	19
6.2	Support . . . . .	19
<b>7</b>	<b>FAQ and Tips</b>	<b>21</b>
7.1	FAQ . . . . .	21
7.1.1	Zero Tests Run . . . . .	21
7.1.2	Some Tests Are Not Running . . . . .	22
7.1.3	Intel Fortran Version 13: -DINTEL_13 . . . . .	22
7.2	Tips . . . . .	22
7.2.1	Environment Modules . . . . .	22
7.2.2	Compile Time Errors . . . . .	22
7.2.3	Intermediate files used by pFUnit . . . . .	23
<b>8</b>	<b>Platform Specific Notes</b>	<b>25</b>
8.1	Mac OSX . . . . .	25
8.2	Windows/CYGWIN . . . . .	25

---

8.3 Intel Fortran Version 13: -DINTEL_13 . . . . .	25
<b>9 Acknowledgments</b>	<b>27</b>
<b>10 Known Installations &amp; Versions</b>	<b>29</b>
<b>11 TODO</b>	<b>31</b>
<b>12 The Preprocessor - pFUnitParser</b>	<b>33</b>
12.1 Using The Preprocessor . . . . .	33
12.1.1 Configuration - testSuites.inc . . . . .	34
12.1.2 Invocation . . . . .	34
12.1.3 Preprocessor Input File (.pf) . . . . .	34
12.1.4 Directives . . . . .	35
12.1.4.1 @Test . . . . .	35
12.1.4.2 @MPITest . . . . .	35
12.1.4.3 @Assert . . . . .	36
12.1.4.4 @Parameters . . . . .	37
12.1.4.5 @TestCase . . . . .	37
<b>13 @Assert Preprocessor Directives</b>	<b>39</b>
13.1 @Assert Preprocessor Directives . . . . .	40
13.1.1 @assertEqual . . . . .	40
13.1.2 @assertTrue . . . . .	40
13.1.3 @assertFalse . . . . .	40
13.1.4 @assertLessThan . . . . .	40
13.1.5 @assertLessThanOrEqual . . . . .	40
13.1.6 @assertGreaterThan . . . . .	40
13.1.7 @assertGreaterThanOrEqual . . . . .	40
13.1.8 @assertIsMemberOf . . . . .	40
13.1.9 @assertContains . . . . .	40
13.1.10 @assertAny . . . . .	40
13.1.11 @assertAll . . . . .	40

13.1.12 @assertNotAll . . . . .	40
13.1.13 @assertNone . . . . .	40
13.1.14 @assertIsPermutationOf . . . . .	40
13.1.15 @assertExceptionRaised . . . . .	40
13.1.16 @assertSameShape . . . . .	40
13.1.17 @assertIsNaN . . . . .	40
13.1.18 @assertIsFinite . . . . .	40
<b>14 Revision Notes</b>	<b>41</b>
<b>15 Data Type Index</b>	<b>43</b>
15.1 Class Hierarchy . . . . .	43
<b>16 Data Type Index</b>	<b>47</b>
16.1 Data Types List . . . . .	47
<b>17 Data Type Documentation</b>	<b>53</b>
17.1 AbstractTestParameter_mod Module Reference . . . . .	53
17.2 AbstractTestResult_mod Module Reference . . . . .	53
17.3 pFUnitParser::Action Class Reference . . . . .	54
17.4 add_mod Module Reference . . . . .	54
17.5 addComplex_mod Module Reference . . . . .	55
17.6 CodeUtilities::ArrayDescription Class Reference . . . . .	55
17.7 Assert_mod Module Reference . . . . .	56
17.7.1 Detailed Description . . . . .	56
17.8 AssertBasic_mod Module Reference . . . . .	56
17.8.1 Detailed Description . . . . .	57
17.9 AssertInteger_mod Module Reference . . . . .	57
17.9.1 Detailed Description . . . . .	58
17.10GenerateAssertsOnArrays::AssertRealArrayArgument Class Reference . . . . .	58
17.11pFUnitParser::AtAfter Class Reference . . . . .	59
17.12pFUnitParser::AtAssert Class Reference . . . . .	60
17.13pFUnitParser::AtBefore Class Reference . . . . .	60

17.14pUnitParser::AtBegin Class Reference . . . . .	61
17.15pUnitParser::AtMpiAssert Class Reference . . . . .	62
17.16pUnitParser::AtMpiTest Class Reference . . . . .	62
17.17pUnitParser::AtSuite Class Reference . . . . .	63
17.18pUnitParser::AtTest Class Reference . . . . .	64
17.19pUnitParser::AtTestCase Class Reference . . . . .	64
17.20pUnitParser::AtTestParameter Class Reference . . . . .	65
17.21TestCaseB_mod::B_Parameter Type Reference . . . . .	66
17.22BaseTestRunner_mod Module Reference . . . . .	66
17.22.1 Detailed Description . . . . .	66
17.23BeforeAfter_mod Module Reference . . . . .	67
17.24BrokenSetUpCase_mod Module Reference . . . . .	67
17.25BrokenTestCase_mod Module Reference . . . . .	68
17.26TestCaseC_mod::C_Parameter Type Reference . . . . .	68
17.27Cases_mod Module Reference . . . . .	69
17.28GenerateAssertsOnArrays::constraintASSERT Class Reference . . . . .	69
17.28.1 Constructor & Destructor Documentation . . . . .	70
17.28.1.1 __init__ . . . . .	70
17.28.2 Member Data Documentation . . . . .	70
17.28.2.1 name1 . . . . .	70
17.28.2.2 tolerance . . . . .	70
17.29mods::pre::pre2::dataString Class Reference . . . . .	70
17.30DebugListener_mod Module Reference . . . . .	71
17.30.1 Detailed Description . . . . .	72
17.31CodeUtilities::declaration Class Reference . . . . .	72
17.32DynamicTestCase_mod Module Reference . . . . .	73
17.32.1 Detailed Description . . . . .	73
17.33Exception_mod Module Reference . . . . .	73
17.34Fixture_mod Module Reference . . . . .	74
17.35FixtureTestCase_mod Module Reference . . . . .	74
17.36CodeUtilities::fortranSubroutineSignature Class Reference . . . . .	75

17.37AbstractTestResult_mod::getErrors Interface Reference . . . . .	75
17.38AbstractTestResult_mod::getSuccesses Interface Reference . . . . .	75
17.39Halo_mod Module Reference . . . . .	76
17.40mods::pre::pre_If::IfDirective Class Reference . . . . .	76
17.41CodeUtilities::implementation Class Reference . . . . .	76
17.42CodeUtilities::interfaceBlock Class Reference . . . . .	77
17.43mods::pre::pre_If::interval Class Reference . . . . .	77
17.44GenerateAssertsOnArrays::IsWithinTolerance Class Reference . . . . .	78
17.45Test_RestrictSphericalCoordinates_mod::LatLonCase Type Reference . . . . .	78
17.46LinearInterpolator_mod Module Reference . . . . .	79
17.47MakeInfinity_mod Module Reference . . . . .	79
17.47.1 Detailed Description . . . . .	79
17.48MakeNaN_mod Module Reference . . . . .	80
17.48.1 Detailed Description . . . . .	80
17.49MockCall_mod Module Reference . . . . .	80
17.49.1 Detailed Description . . . . .	81
17.50MockListener_mod Module Reference . . . . .	81
17.51testParser::MockParser Class Reference . . . . .	82
17.52MockRepository_mod Module Reference . . . . .	82
17.52.1 Detailed Description . . . . .	83
17.53MockSUT_mod Module Reference . . . . .	83
17.54testParser::MockWriter Class Reference . . . . .	84
17.55CodeUtilities::module Class Reference . . . . .	84
17.56MpiContext_mod Module Reference . . . . .	85
17.56.1 Detailed Description . . . . .	85
17.57MpiStubs_mod Module Reference . . . . .	85
17.57.1 Detailed Description . . . . .	86
17.58MpiTestCase_mod Module Reference . . . . .	86
17.58.1 Detailed Description . . . . .	87
17.59MpiTestCaseB_mod::MpiTestCaseB Type Reference . . . . .	87
17.60MpiTestCaseB_mod Module Reference . . . . .	88



17.61MpiTestMethod_mod Module Reference . . . . .	88
17.61.1 Detailed Description . . . . .	88
17.62MpiTestParameter_mod Module Reference . . . . .	89
17.63pUnitParser::MyError Class Reference . . . . .	89
17.64Cases_mod::MyParamType Type Reference . . . . .	90
17.65Cases_mod::MyTestCase Type Reference . . . . .	90
17.66TestCaseC_mod::newC_Parameter Interface Reference . . . . .	90
17.67ParallelContext_mod Module Reference . . . . .	91
17.67.1 Detailed Description . . . . .	91
17.68ParallelException_mod Module Reference . . . . .	92
17.68.1 Detailed Description . . . . .	92
17.69ParameterizedTestCase_mod Module Reference . . . . .	92
17.69.1 Detailed Description . . . . .	93
17.70Params_mod Module Reference . . . . .	93
17.70.1 Detailed Description . . . . .	94
17.71pUnitParser::Parser Class Reference . . . . .	94
17.72Test_Parameters_mod::peCase Type Reference . . . . .	95
17.73pUnit Module Reference . . . . .	96
17.73.1 Detailed Description . . . . .	96
17.74pUnit_mod Module Reference . . . . .	96
17.74.1 Detailed Description . . . . .	97
17.75PrivateException_mod Module Reference . . . . .	97
17.75.1 Detailed Description . . . . .	98
17.76mods::pre::pre2::procDirective Class Reference . . . . .	98
17.76.1 Member Function/Subroutine Documentation . . . . .	99
17.76.1.1 addTokenRE . . . . .	99
17.77RemoteProxyTestCase_mod Module Reference . . . . .	99
17.77.1 Detailed Description . . . . .	99
17.78mods::pre::pre_Repeat::RepeatDirective Class Reference . . . . .	100
17.79ResultPrinter_mod Module Reference . . . . .	100
17.79.1 Detailed Description . . . . .	101

17.80RobustRunner_mod Module Reference . . . . .	101
17.80.1 Detailed Description . . . . .	102
17.81robustTestSuite_mod Module Reference . . . . .	102
17.82CodeUtilities::routineUnit Class Reference . . . . .	103
17.83SerialContext_mod Module Reference . . . . .	103
17.83.1 Detailed Description . . . . .	104
17.84SimpleTestCase_mod Module Reference . . . . .	104
17.85SourceLocation_mod Module Reference . . . . .	105
17.85.1 Detailed Description . . . . .	105
17.86SphericalCoordinates_mod Module Reference . . . . .	106
17.87TestListener_mod::startTest Interface Reference . . . . .	106
17.88StringConversionUtilities_mod Module Reference . . . . .	106
17.88.1 Detailed Description . . . . .	107
17.89SubsetRunner_mod Module Reference . . . . .	107
17.89.1 Detailed Description . . . . .	107
17.90SurrogateTestCase_mod Module Reference . . . . .	108
17.90.1 Detailed Description . . . . .	108
17.91SUT_mod Module Reference . . . . .	109
17.92Test_Assert_mod Module Reference . . . . .	109
17.93Test_AssertBasic_mod Module Reference . . . . .	109
17.94Test_AssertComplex_mod Module Reference . . . . .	109
17.95Test_AssertInteger_mod Module Reference . . . . .	110
17.96Test_AssertReal_mod Module Reference . . . . .	111
17.97Test_BasicOpenMP_mod Module Reference . . . . .	112
17.98Test_Exception_mod Module Reference . . . . .	112
17.99Test_FixtureTestCase_mod Module Reference . . . . .	113
17.100Test_LinearInterpolator_mod::Test_LinearInterpolator Type Reference . . . . .	113
17.101Test_LinearInterpolator_mod Module Reference . . . . .	113
17.102Test_MockCall_mod Module Reference . . . . .	114
17.103Test_MockRepository_mod Module Reference . . . . .	114
17.104Test_mod Module Reference . . . . .	114

17.104. Detailed Description . . . . .	115
17.105 Test_MpiContext_mod Module Reference . . . . .	115
17.106 Test_MpiException_mod Module Reference . . . . .	115
17.107 Test_MpiParameterizedTestCase_mod Module Reference . . . . .	116
17.108 Test_MpiTestCase_mod Module Reference . . . . .	116
17.109 Test_Parameters_mod::Test_Parameters Type Reference . . . . .	117
17.110 Test_Parameters_mod Module Reference . . . . .	117
17.111 Test_RestrictSphericalCoordinates_mod::Test_RestrictSpherical- Coordinates Type Reference . . . . .	118
17.112 Test_RestrictSphericalCoordinates_mod Module Reference . . . . .	118
17.113 Test_RobustRunner_mod Module Reference . . . . .	119
17.114 Test_SimpleTestCase_mod Module Reference . . . . .	119
17.115 Test_StringConversionUtilities_mod Module Reference . . . . .	119
17.116 Test_TestMethod_mod Module Reference . . . . .	120
17.117 Test_TestResult_mod Module Reference . . . . .	120
17.118 Test_TestSuite_mod Module Reference . . . . .	120
17.119 Test_UnixProcess_mod Module Reference . . . . .	121
17.120 TestA_mod Module Reference . . . . .	121
17.121 TestCase_mod Module Reference . . . . .	121
17.121. Detailed Description . . . . .	122
17.122 TestCaseA_mod::TestCaseA Type Reference . . . . .	122
17.123 TestCaseA_mod Module Reference . . . . .	123
17.124 TestCaseB_mod::TestCaseB Type Reference . . . . .	123
17.125 TestCaseB_mod Module Reference . . . . .	124
17.126 TestCaseC_mod::TestCaseC Type Reference . . . . .	125
17.127 TestCaseC_mod Module Reference . . . . .	125
17.128 TestFailure_mod Module Reference . . . . .	126
17.128. Detailed Description . . . . .	126
17.129 nodes::pre::pre_if::TestIfDirective Class Reference . . . . .	127
17.130 nodes::pre::interleavedp::TestInterleaved Class Reference . . . . .	127
17.131 TestListener_mod Module Reference . . . . .	128

17.131. Detailed Description . . . . .	128
17.132. TestMethod_mod Module Reference . . . . .	128
17.132. Detailed Description . . . . .	129
17.133. nodes::pre::parseArgs::TestParseArgs Class Reference . . . . .	129
17.134. TestParser::TestParseLine Class Reference . . . . .	130
17.134. Member Function/Subroutine Documentation . . . . .	130
17.134.1. testAtMpiTest . . . . .	130
17.134.1. testAtTest . . . . .	130
17.134.1. testAtTestFail . . . . .	131
17.134.1. testAtTestNoParens . . . . .	131
17.134.1. testAtTestSkipComment . . . . .	131
17.134.1. testMatchAtAfter . . . . .	131
17.134.1. testMatchAtAssertEqual . . . . .	131
17.134.1. testMatchAtAssertOther . . . . .	131
17.134.1. testMatchAtBefore . . . . .	131
17.134.1. testMatchAtMpiAssert . . . . .	131
17.134.1. testMatchAtSuite . . . . .	132
17.134.1. testMatchAtTestCase . . . . .	132
17.135. nodes::pre::pre_Repeat::TestRepeatDirective Class Reference . . . . .	132
17.136. TestResult_mod Module Reference . . . . .	132
17.136. Detailed Description . . . . .	133
17.137. TestRunner_mod Module Reference . . . . .	133
17.137. Detailed Description . . . . .	134
17.138. TestSuite_mod Module Reference . . . . .	134
17.138. Detailed Description . . . . .	134
17.139. ThrowFundamentalTypes_mod Module Reference . . . . .	135
17.139. Detailed Description . . . . .	135
17.140. UnixPipeInterfaces_mod Module Reference . . . . .	136
17.140. Detailed Description . . . . .	136
17.141. UnixProcess_mod Module Reference . . . . .	137
17.141. Detailed Description . . . . .	137

17.142	GenerateAssertsOnArrays::VECTOR_NORM Class Reference . . . . .	137
17.143	AbstractTestResult_mod::wasSuccessful Interface Reference . . . . .	138
17.144	WrapbeforeAfter Module Reference . . . . .	138
17.145	WrapMpiTestCaseB_mod Module Reference . . . . .	139
17.146	Wrapsimple Module Reference . . . . .	139
17.147	WrapTestA_mod Module Reference . . . . .	139
17.148	WrapTestCaseA_mod Module Reference . . . . .	139
17.149	WrapTestCaseB_mod Module Reference . . . . .	140
17.150	WrapTestCaseC_mod Module Reference . . . . .	140
17.151	XmlPrinter_mod Module Reference . . . . .	141
17.151.1	Detailed Description . . . . .	141



## Chapter 1

# pFUnit 3 - Documentation - Version 2014-0401-1636-00-UTC MLR

[Quick link to the code!](#)

### 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](https://sourceforge.net/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., Chief, Software Systems Support Office Code 610.3, NASA Goddard Space Flight Center.

Please refer revisions and comments about the documentation to [Mike Rilee](#), Ph.D., Rilee Systems Technologies.

### 1.2 Contents

- [Installation](#)
  - [Obtaining pFUnit](#)
- [Usage](#)

- [Development](#)
- [Feedback & Support](#)
- [FAQ and Tips](#)
- [Platform Specific Notes](#)
- [Acknowledgments](#)
- [Known Installations & Versions](#)
- [TODO](#)
- [The Preprocessor - pFUnitParser](#)
- [Revision Notes](#)

### 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 N-ASA Open Source Agreement (version 1.3). The LICENSE document may be found in the head directory of the [pFUnit](#) distribution.

### 1.5 Copyright

Copyright 2005,2013 United States Government as represented by the Administrator of the National Aeronautics and Space Administration. All Rights Reserved.



## 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/latest/download`

Extracting this tarfile via a command like

```
'$ tar xzf ./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.

- [Prerequisites](#)
- [Obtaining pFUnit](#)
- [Manifest - What's in the directory?](#)
- [Configuration](#)
- [Building pFUnit](#)
  - [Building pFUnit for testing serial codes \(Non-MPI\)](#)
  - [Building pFUnit for testing parallel codes \(MPI\)](#)
  - [OPENMP](#)
  - [Cleaning](#)
  - [Documentation](#)
- [Installation](#)

### 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/latest/download>

Extracting this tarfile via a command like

```
'$ tar xzf ./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](#).

## 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 queuing 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.

3. Execute make as follows.

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

4. 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.

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

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

4. 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.

3. 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.

4. 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 privileges 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

- [Usage - Configuration](#)
- [Usage - Hello World](#)
- [Usage - Preprocessor](#)
- [Compiling and Executing The Test](#)

### 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 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 <a href="#">pFUnit</a> 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

- [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

- [FAQ](#)
  - [Zero Tests Run](#)
  - [Some Tests Are Not Running](#)
  - [Intel Fortran Version 13: -DINTEL\\_13](#)
- [Tips](#)
  - [Environment Modules](#)
  - [Compile Time Errors](#)
  - [Intermediate files used by pFUnit](#)

## 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 invocation. 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 `FPPFLAGS`.

## 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](#) hierarchy, 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
```



## 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 FPPFLAGS.





## Chapter 9

# Acknowledgments

Thanks to the following 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).

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 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)

- [Using The Preprocessor](#)
  - [Configuration - testSuites.inc](#)
  - [Invocation](#)
  - [Command Line Options](#)
  - [Preprocessor Input File \(.pf\)](#)
  - [Directives](#)
    - \* [@Test](#)
    - \* [@MPITest](#)
    - \* [@Assert](#) (or [Preprocessor Directives](#))
    - \* [@Parameters](#)
    - \* [@TestCase](#)

//

### 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 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

- `@assertEqual`
- `@assertTrue`
- `@assertFalse`
- `@assertLessThan`
- `@assertLessThanOrEqualTo`
- `@assertGreaterThan`
- `@assertGreaterThanOrEqualTo`
- `@assertIsMemberOf`
- `@assertContains`
- `@assertAny`
- `@assertAll`
- `@assertNotAll`
- `@assertNone`
- `@assertIsPermutationOf`
- `@assertExceptionRaiseded`
- `@assertSameShape`
- `@assertIsNaN`
- `@assertIsFinite`

## 13.1 @Assert Preprocessor Directives

13.1.1 @assertEqual

13.1.2 @assertTrue

13.1.3 @assertFalse

13.1.4 @assertLessThan

13.1.5 @assertLessThanOrEqual

13.1.6 @assertGreaterThan

13.1.7 @assertGreaterThanOrEqual

13.1.8 @assertIsMemberOf

13.1.9 @assertContains

13.1.10 @assertAny

13.1.11 @assertAll

13.1.12 @assertNotAll

13.1.13 @assertNone

13.1.14 @assertIsPermutationOf

13.1.15 @assertExceptionRaised

13.1.16 @assertSameShape

13.1.17 @assertIsNaN

13.1.18 @assertIsFinite

## Chapter 14

### Revision Notes

- 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:

AbstractTestParameter_mod . . . . .	53
AbstractTestResult_mod . . . . .	53
pUnitParser::Action . . . . .	54
pUnitParser::AtAfter . . . . .	59
pUnitParser::AtAssert . . . . .	60
pUnitParser::AtBefore . . . . .	60
pUnitParser::AtBegin . . . . .	61
pUnitParser::AtMpiAssert . . . . .	62
pUnitParser::AtSuite . . . . .	63
pUnitParser::AtTest . . . . .	64
pUnitParser::AtMpiTest . . . . .	62
pUnitParser::AtTestCase . . . . .	64
pUnitParser::AtTestParameter . . . . .	65
add_mod . . . . .	54
addComplex_mod . . . . .	55
CodeUtilities::ArrayDescription . . . . .	55
Assert_mod . . . . .	56
AssertBasic_mod . . . . .	56
AssertInteger_mod . . . . .	57
GenerateAssertsOnArrays::AssertRealArrayArgument . . . . .	58
TestCaseB_mod::B_Parameter . . . . .	66
BaseTestRunner_mod . . . . .	66
BeforeAfter_mod . . . . .	67
BrokenSetUpCase_mod . . . . .	67
BrokenTestCase_mod . . . . .	68

TestCaseC_mod::C_Parameter . . . . .	68
Cases_mod . . . . .	69
mods::pre::pre2::dataString . . . . .	70
DebugListener_mod . . . . .	71
CodeUtilities::declaration . . . . .	72
DynamicTestCase_mod . . . . .	73
Exception_mod . . . . .	73
Fixture_mod . . . . .	74
FixtureTestCase_mod . . . . .	74
CodeUtilities::fortranSubroutineSignature . . . . .	75
AbstractTestResult_mod::getErrors . . . . .	75
AbstractTestResult_mod::getSuccesses . . . . .	75
Halo_mod . . . . .	76
CodeUtilities::implementation . . . . .	76
CodeUtilities::interfaceBlock . . . . .	77
mods::pre::pre_if::interval . . . . .	77
Test_RestrictSphericalCoordinates_mod::LatLonCase . . . . .	78
LinearInterpolator_mod . . . . .	79
MakeInfinity_mod . . . . .	79
MakeNaN_mod . . . . .	80
MockCall_mod . . . . .	80
MockListener_mod . . . . .	81
MockRepository_mod . . . . .	82
MockSUT_mod . . . . .	83
testParser::MockWriter . . . . .	84
CodeUtilities::module . . . . .	84
MpiContext_mod . . . . .	85
MpiStubs_mod . . . . .	85
MpiTestCase_mod . . . . .	86
MpiTestCaseB_mod::MpiTestCaseB . . . . .	87
MpiTestCaseB_mod . . . . .	88
MpiTestMethod_mod . . . . .	88
MpiTestParameter_mod . . . . .	89
pFUnitParser::MyError . . . . .	89
Cases_mod::MyParamType . . . . .	90
Cases_mod::MyTestCase . . . . .	90
TestCaseC_mod::newC_Parameter . . . . .	90
ParallelContext_mod . . . . .	91
ParallelException_mod . . . . .	92
ParameterizedTestCase_mod . . . . .	92
Params_mod . . . . .	93
pFUnitParser::Parser . . . . .	94
testParser::MockParser . . . . .	82
Test_Parameters_mod::peCase . . . . .	95
pFUnit . . . . .	96

pFUnit_mod . . . . .	96
PrivateException_mod . . . . .	97
mods::pre::pre2::procDirective . . . . .	98
mods::pre::pre_If::IfDirective . . . . .	76
mods::pre::pre_Repeat::RepeatDirective . . . . .	100
RemoteProxyTestCase_mod . . . . .	99
ResultPrinter_mod . . . . .	100
RobustRunner_mod . . . . .	101
robustTestSuite_mod . . . . .	102
CodeUtilities::routineUnit . . . . .	103
GenerateAssertsOnArrays::constraintASSERT . . . . .	69
GenerateAssertsOnArrays::IsWithinTolerance . . . . .	78
GenerateAssertsOnArrays::VECTOR_NORM . . . . .	137
SerialContext_mod . . . . .	103
SimpleTestCase_mod . . . . .	104
SourceLocation_mod . . . . .	105
SphericalCoordinates_mod . . . . .	106
TestListener_mod::startTest . . . . .	106
StringConversionUtilities_mod . . . . .	106
SubsetRunner_mod . . . . .	107
SurrogateTestCase_mod . . . . .	108
SUT_mod . . . . .	109
Test_Assert_mod . . . . .	109
Test_AssertBasic_mod . . . . .	109
Test_AssertComplex_mod . . . . .	109
Test_AssertInteger_mod . . . . .	110
Test_AssertReal_mod . . . . .	111
Test_BasicOpenMP_mod . . . . .	112
Test_Exception_mod . . . . .	112
Test_FixtureTestCase_mod . . . . .	113
Test_LinearInterpolator_mod::Test_LinearInterpolator . . . . .	113
Test_LinearInterpolator_mod . . . . .	113
Test_MockCall_mod . . . . .	114
Test_MockRepository_mod . . . . .	114
Test_mod . . . . .	114
Test_MpiContext_mod . . . . .	115
Test_MpiException_mod . . . . .	115
Test_MpiParameterizedTestCase_mod . . . . .	116
Test_MpiTestCase_mod . . . . .	116
Test_Parameters_mod::Test_Parameters . . . . .	117
Test_Parameters_mod . . . . .	117
Test_RestrictSphericalCoordinates_mod::Test_RestrictSphericalCoordinates . . . . .	118
Test_RestrictSphericalCoordinates_mod . . . . .	118
Test_RobustRunner_mod . . . . .	119
Test_SimpleTestCase_mod . . . . .	119

Test_StringConversionUtilities_mod . . . . .	119
Test_TestMethod_mod . . . . .	120
Test_TestResult_mod . . . . .	120
Test_TestSuite_mod . . . . .	120
Test_UnixProcess_mod . . . . .	121
TestA_mod . . . . .	121
TestCase_mod . . . . .	121
TestCaseA_mod::TestCaseA . . . . .	122
TestCaseA_mod . . . . .	123
TestCaseB_mod::TestCaseB . . . . .	123
TestCaseB_mod . . . . .	124
TestCaseC_mod::TestCaseC . . . . .	125
TestCaseC_mod . . . . .	125
TestFailure_mod . . . . .	126
mods::pre::pre_If::TestIfDirective . . . . .	127
mods::pre::interleavedp::TestInterleaved . . . . .	127
TestListener_mod . . . . .	128
TestMethod_mod . . . . .	128
mods::pre::parseArgs::TestParseArgs . . . . .	129
testParser::TestParseLine . . . . .	130
mods::pre::pre_Repeat::TestRepeatDirective . . . . .	132
TestResult_mod . . . . .	132
TestRunner_mod . . . . .	133
TestSuite_mod . . . . .	134
ThrowFundamentalTypes_mod . . . . .	135
UnixPipeInterfaces_mod . . . . .	136
UnixProcess_mod . . . . .	137
AbstractTestResult_mod::wasSuccessful . . . . .	138
WrapbeforeAfter . . . . .	138
WrapMpiTestCaseB_mod . . . . .	139
Wrapsimple . . . . .	139
WrapTestA_mod . . . . .	139
WrapTestCaseA_mod . . . . .	139
WrapTestCaseB_mod . . . . .	140
WrapTestCaseC_mod . . . . .	140
XmlPrinter_mod . . . . .	141

## Chapter 16

# Data Type Index

### 16.1 Data Types List

Here are the data types with brief descriptions:

<a href="#">AbstractTestParameter_mod</a>	53
<a href="#">AbstractTestResult_mod</a>	53
<a href="#">pUnitParser::Action</a>	54
<a href="#">add_mod</a>	54
<a href="#">addComplex_mod</a>	55
<a href="#">CodeUtilities::ArrayDescription</a>	55
<a href="#">Assert_mod</a>	
<a href="#">&lt;BriefDescription&gt;</a>	56
<a href="#">AssertBasic_mod</a>	
<a href="#">&lt;BriefDescription&gt;</a>	56
<a href="#">AssertInteger_mod</a>	
<a href="#">&lt;BriefDescription&gt;</a>	57
<a href="#">GenerateAssertsOnArrays::AssertRealArrayArgument</a>	58
<a href="#">pUnitParser::AtAfter</a>	59
<a href="#">pUnitParser::AtAssert</a>	60
<a href="#">pUnitParser::AtBefore</a>	60
<a href="#">pUnitParser::AtBegin</a>	61
<a href="#">pUnitParser::AtMpiAssert</a>	62
<a href="#">pUnitParser::AtMpiTest</a>	62
<a href="#">pUnitParser::AtSuite</a>	63
<a href="#">pUnitParser::AtTest</a>	64
<a href="#">pUnitParser::AtTestCase</a>	64
<a href="#">pUnitParser::AtTestParameter</a>	65
<a href="#">TestCaseB_mod::B_Parameter</a>	66

BaseTestRunner_mod	
<BriefDescription>	66
BeforeAfter_mod	67
BrokenSetUpCase_mod	67
BrokenTestCase_mod	68
TestCaseC_mod::C_Parameter	68
Cases_mod	69
GenerateAssertsOnArrays::constraintASSERT	69
mods::pre::pre2::dataString	70
DebugListener_mod	
<BriefDescription>	71
CodeUtilities::declaration	72
DynamicTestCase_mod	
<BriefDescription>	73
Exception_mod	73
Fixture_mod	74
FixtureTestCase_mod	74
CodeUtilities::fortranSubroutineSignature	75
AbstractTestResult_mod::getErrors	75
AbstractTestResult_mod::getSuccesses	75
Halo_mod	76
mods::pre::pre_If::IfDirective	76
CodeUtilities::implementation	76
CodeUtilities::interfaceBlock	77
mods::pre::pre_If::interval	77
GenerateAssertsOnArrays::IsWithinTolerance	78
Test_RestrictSphericalCoordinates_mod::LatLonCase	78
LinearInterpolator_mod	79
MakeInfinity_mod	
<BriefDescription>	79
MakeNaN_mod	
<BriefDescription>	80
MockCall_mod	
<BriefDescription>	80
MockListener_mod	81
testParser::MockParser	82
MockRepository_mod	
<BriefDescription>	82
MockSUT_mod	83
testParser::MockWriter	84
CodeUtilities::module	84
MpiContext_mod	
<BriefDescription>	85
MpiStubs_mod	
<BriefDescription>	85

MpiTestCase_mod	
<BriefDescription>	86
MpiTestCaseB_mod::MpiTestCaseB	87
MpiTestCaseB_mod	88
MpiTestMethod_mod	
<BriefDescription>	88
MpiTestParameter_mod	89
pUnitParser::MyError	89
Cases_mod::MyParamType	90
Cases_mod::MyTestCase	90
TestCaseC_mod::newC_Parameter	90
ParallelContext_mod	
<BriefDescription>	91
ParallelException_mod	
<BriefDescription>	92
ParameterizedTestCase_mod	
<BriefDescription>	92
Params_mod	
<BriefDescription>	93
pUnitParser::Parser	94
Test_Parameters_mod::peCase	95
pUnit	
<BriefDescription>	96
pUnit_mod	
<BriefDescription>	96
PrivateException_mod	
<BriefDescription>	97
mods::pre::pre2::procDirective	98
RemoteProxyTestCase_mod	
<BriefDescription>	99
mods::pre::pre_Repeat::RepeatDirective	100
ResultPrinter_mod	
<BriefDescription>	100
RobustRunner_mod	
<BriefDescription>	101
robustTestSuite_mod	102
CodeUtilities::routineUnit	103
SerialContext_mod	
<BriefDescription>	103
SimpleTestCase_mod	104
SourceLocation_mod	
<BriefDescription>	105
SphericalCoordinates_mod	106
TestListener_mod::startTest	106
StringConversionUtilities_mod	
<BriefDescription>	106

SubsetRunner_mod	
<BriefDescription>	107
SurrogateTestCase_mod	
<BriefDescription>	108
SUT_mod	109
Test_Assert_mod	109
Test_AssertBasic_mod	109
Test_AssertComplex_mod	109
Test_AssertInteger_mod	110
Test_AssertReal_mod	111
Test_BasicOpenMP_mod	112
Test_Exception_mod	112
Test_FixtureTestCase_mod	113
Test_LinearInterpolator_mod::Test_LinearInterpolator	113
Test_LinearInterpolator_mod	113
Test_MockCall_mod	114
Test_MockRepository_mod	114
Test_mod	
<BriefDescription>	114
Test_MpiContext_mod	115
Test_MpiException_mod	115
Test_MpiParameterizedTestCase_mod	116
Test_MpiTestCase_mod	116
Test_Parameters_mod::Test_Parameters	117
Test_Parameters_mod	117
Test_RestrictSphericalCoordinates_mod::Test_RestrictSphericalCoordinates	118
Test_RestrictSphericalCoordinates_mod	118
Test_RobustRunner_mod	119
Test_SimpleTestCase_mod	119
Test_StringConversionUtilities_mod	119
Test_TestMethod_mod	120
Test_TestResult_mod	120
Test_TestSuite_mod	120
Test_UnixProcess_mod	121
TestA_mod	121
TestCase_mod	
<BriefDescription>	121
TestCaseA_mod::TestCaseA	122
TestCaseA_mod	123
TestCaseB_mod::TestCaseB	123
TestCaseB_mod	124
TestCaseC_mod::TestCaseC	125
TestCaseC_mod	125
TestFailure_mod	
<BriefDescription>	126
mods::pre::pre_if::TestIfDirective	127



<a href="#">mods::pre::interleavedp::TestInterleaved</a>	127
<a href="#">TestListener_mod</a>	
<BriefDescription>	128
<a href="#">TestMethod_mod</a>	
<BriefDescription>	128
<a href="#">mods::pre::parseArgs::TestParseArgs</a>	129
<a href="#">testParser::TestParseLine</a>	130
<a href="#">mods::pre::pre_Repeat::TestRepeatDirective</a>	132
<a href="#">TestResult_mod</a>	
<BriefDescription> Note: A possible extension point for user-	
specialized TestResults	132
<a href="#">TestRunner_mod</a>	
<BriefDescription>	133
<a href="#">TestSuite_mod</a>	
<BriefDescription>	134
<a href="#">ThrowFundamentalTypes_mod</a>	
<BriefDescription>	135
<a href="#">UnixPipeInterfaces_mod</a>	
<BriefDescription>	136
<a href="#">UnixProcess_mod</a>	
<BriefDescription>	137
<a href="#">GenerateAssertsOnArrays::VECTOR_NORM</a>	137
<a href="#">AbstractTestResult_mod::wasSuccessful</a>	138
<a href="#">WrapbeforeAfter</a>	138
<a href="#">WrapMpiTestCaseB_mod</a>	139
<a href="#">Wrapsimple</a>	139
<a href="#">WrapTestA_mod</a>	139
<a href="#">WrapTestCaseA_mod</a>	139
<a href="#">WrapTestCaseB_mod</a>	140
<a href="#">WrapTestCaseC_mod</a>	140
<a href="#">XmlPrinter_mod</a>	
<BriefDescription>	141



## Chapter 17

# Data Type Documentation

### 17.1 AbstractTestParameter\_mod Module Reference

#### Data Types

- type **AbstractTestParameter**
- interface **toString**

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

- AbstractTestParameter.F90

### 17.2 AbstractTestResult\_mod Module Reference

#### Data Types

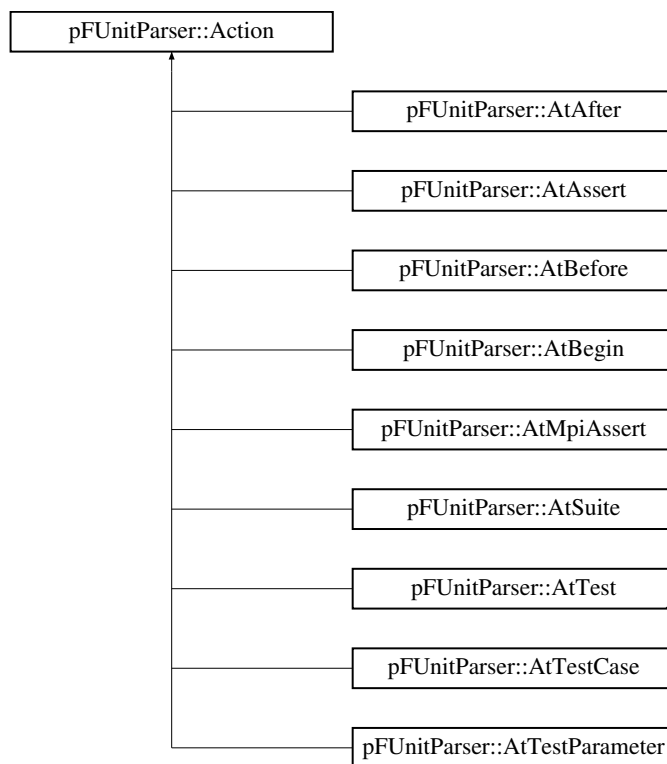
- type **AbstractTestResult**
- interface **errorCount**
- interface **failureCount**
- interface **getErrors**
- interface **getFailures**
- interface **getRunTime**
- interface **getSuccesses**
- interface **runCount**
- interface **wasSuccessful**

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 files:

- Robust/src/add.F90
- Simple/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

<BriefDescription>

### Data Types

- interface **assertEqual**
- interface **assertExceptionRaised**
- interface **assertFail**
- interface **assertFalse**
- interface **assertIsFinite**
- interface **assertIsNaN**
- interface **assertTrue**
- interface **fail**
- type **UnusableArgument**

## 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

<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:

- AssertBasic.F90

## 17.9 AssertInteger\_mod Module Reference

<BriefDescription>

## Data Types

- interface **assertEqual**
- interface **assertGreaterThan**
- interface **assertGreaterThanOrEqual**
- interface **assertLessThan**
- interface **assertLessThanOrEqual**
- interface **locationOfFirstNonzero**

## 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

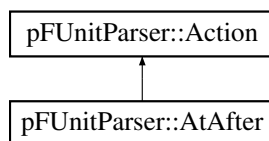
- **assertionName**
- **expectedFType**
- **expectedPrecision**
- **expectedRank**
- **foundFType**
- **foundPrecision**
- **foundRank**
- **tolerance**
- **expectedDescription**
- **foundDescription**

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

- GenerateAssertsOnArrays.py

## 17.11 pUnitParser::AtAfter Class Reference

Inheritance diagram for pUnitParser::AtAfter:



#### Public Member Functions

- def **\_\_init\_\_**
- def **match**
- def **action**

### Public Attributes

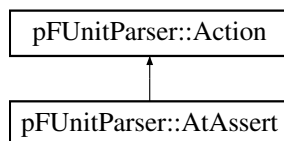
- **parser**

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

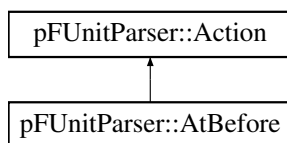
- **parser**

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

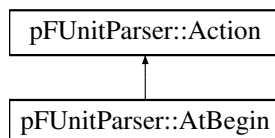
- `parser`

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

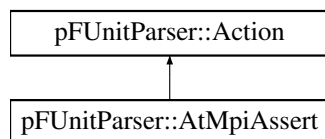
- **parser**

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

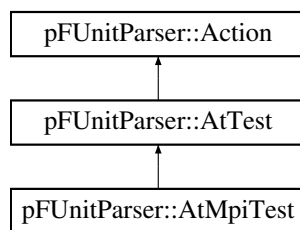
- **parser**

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

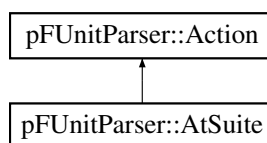
- **parser**
- **keyword**

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

- pUnitParser.py

## 17.17 pUnitParser::AtSuite Class Reference

Inheritance diagram for pUnitParser::AtSuite:



### Public Member Functions

- def **\_\_init\_\_**
- def **match**
- def **action**

### Public Attributes

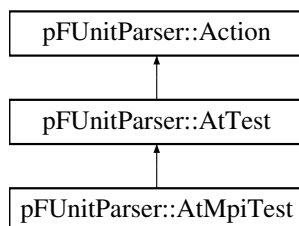
- **parser**

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

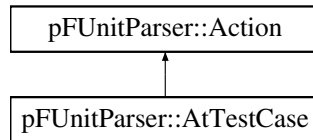
- **parser**
- **keyword**

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

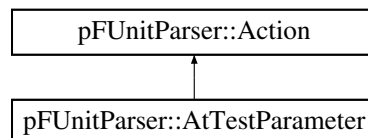
- `parser`

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

### 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>

### Data Types

- type **BaseTestRunner**
- interface **run2**

### 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 **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

**Data Types**

- type **BrokenSetUpCase**

### 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

### Data Types

- type **BrokenTestCase**

### 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

### 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

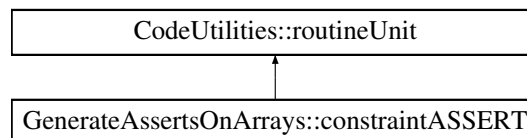
- type([MyParamType](#)) function **newMyParam** (i)
- type([MyTestCase](#)) function **newMyTestCase** (param)
- subroutine **test\_odd** (this)
- subroutine **test\_even** (this)
- character(:) function, allocatable **toString** (this)

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>

#### Data Types

- interface **DebugListener**

### 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>

### Data Types

- interface **delete**
- type **DynamicTestCase**
- interface **testmethod**

### Public Member Functions

- type(DynamicTestCase) function, pointer, public **newDynamicTestCase** (test-Method, 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

### Data Types

- interface **anyExceptions**
- interface **catch**
- interface **getNumExceptions**
- interface **throw**

### 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 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

## 17.35 FixtureTestCase\_mod Module Reference

### Data Types

- interface **delete**
- type **FixtureTestCase**

### 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

## 17.36 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

## 17.37 AbstractTestResult\_mod::getErrors Interface Reference

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

- AbstractTestResult.F90

## 17.38 AbstractTestResult\_mod::getSuccesses Interface Reference

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

- AbstractTestResult.F90

## 17.39 Halo\_mod Module Reference

### Public Member Functions

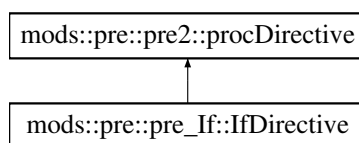
- subroutine **haloFill** (array, communicator)

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

- Halo.F90

## 17.40 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

## 17.41 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

## 17.42 CodeUtilities::interfaceBlock Class Reference

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

- CodeUtilities.py

## 17.43 mods::pre::pre\_If::interval Class Reference

### Public Member Functions

- def **\_\_init\_\_**
- def **getInterval**
- def **setInterval**
- def **getStart**
- def **getEnd**

### Public Attributes

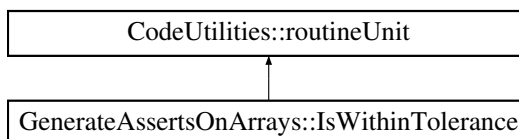
- **start**
- **end**
- **interval**

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

- pre\_If.py

## 17.44 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

## 17.45 Test\_RestrictSphericalCoordinates\_mod::LatLonCase Type - Reference

### 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

## 17.46 LinearInterpolator\_mod Module Reference

### Data Types

- interface **LinearInterpolator**
- type **Node**

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

- LinearInterpolator.F90

## 17.47 MakeInfinity\_mod Module Reference

<BriefDescription>

### Public Member Functions

- real(r32) function, public **makeInf\_32** ()
- real(r64) function, public **makeInf\_64** ()

### 17.47.1 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

## 17.48 MakeNaN\_mod Module Reference

<BriefDescription>

### Public Member Functions

- real(r32) function, public **makeNaN\_32** ()
- real(r64) function, public **makeNaN\_64** ()

### 17.48.1 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

## 17.49 MockCall\_mod Module Reference

<BriefDescription>

## Data Types

- type **MockCall**

## Public Member Functions

- type(MockCall) function, public **newMockCall** (name)

### 17.49.1 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

## 17.50 MockListener\_mod Module Reference

## Data Types

- type **MockListener**

## Public Member Functions

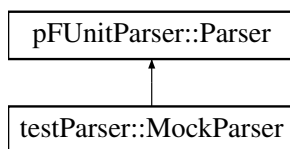
- subroutine **startTest** (this, testName)

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

- MockListener.F90

## 17.51 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

## 17.52 MockRepository\_mod Module Reference

<BriefDescription>

### Data Types

- type **MockRepository**



## Public Member Functions

- type(MockRepository) function, pointer, public **newMockRepository** ()
- subroutine **expectCall** (this, obj, method)

### 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:

- MockRepository.F90

## 17.53 MockSUT\_mod Module Reference

### Data Types

- type **MockSUT**

### 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

## 17.54 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

## 17.55 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

## 17.56 `MpiContext_mod` Module Reference

<BriefDescription>

### Data Types

- type **MpiContext**
- interface **newMpiContext**

### Public Member Functions

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

#### 17.56.1 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`

## 17.57 `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

### 17.57.1 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

### 17.58 MpiTestCase\_mod Module Reference

<BriefDescription>

#### Data Types

- type **MpiTestCase**

### Public Member Functions

- recursive subroutine **runBare** (this)
- integer function **getMpiCommunicator** (this)
- integer function **getProcessRank** (this)

#### 17.58.1 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`

## 17.59 `MpiTestCaseB_mod::MpiTestCaseB` Type Reference

### 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`

## 17.60 `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`

## 17.61 `MpiTestMethod_mod` Module Reference

<BriefDescription>

### Data Types

- interface **mpiMethod**
- type **MpiTestMethod**
- interface **newMpiTestMethod**

### 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:

- `MpiTestMethod.F90`

## 17.62 `MpiTestParameter_mod` Module Reference

**Data Types**

- type **`MpiTestParameter`**

**Public Member Functions**

- `type(MpiTestParameter)` function, public **`newMpiTestParameter`** (`num-ProcessesRequested`)

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

- `MpiTestParameter.F90`

## 17.63 `pFUnitParser::MyError` Class Reference

Inherits `Exception`.

**Public Member Functions**

- `def __init__`
- `def __str__`

### Public Attributes

- **value**

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

- pFUnitParser.py

## 17.64 Cases\_mod::MyParamType Type Reference

### Public Member Functions

- procedure **toString**

### Public Attributes

- integer **i**

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

- Test\_Cases.pf

## 17.65 Cases\_mod::MyTestCase Type Reference

### Public Attributes

- integer **i**

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

- Test\_Cases.pf

## 17.66 TestCaseC\_mod::newC\_Parameter Interface Reference

### Public Member Functions

- type([C\\_Parameter](#)) function **newC\_Parameter\_phiTheta** (npes, phi, theta)
- elemental function **newC\_Parameter\_case** (i)



- type([C\\_Parameter](#)) function **newC\_Parameter\_phiTheta** (npes, phi, theta)
- elemental function **newC\_Parameter\_case** (i)

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

- `MpiParameterizedTestCaseC.F90`
- `MpiParameterizedTestCaseC.pf`

## 17.67 ParallelContext\_mod Module Reference

<BriefDescription>

### Data Types

- interface **allReduceLogical**
- interface **gatherInteger**
- interface **gatherLogical**
- interface **gatherString**
- interface **getNumProcesses**
- type **ParallelContext**
- interface **processRank**
- interface **sum**

### 17.67.1 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`

## 17.68 ParallelException\_mod Module Reference

<BriefDescription>

### Data Types

- interface **anyExceptions**
- interface **getNumExceptions**

### Public Member Functions

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

### 17.68.1 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

## 17.69 ParameterizedTestCase\_mod Module Reference

<BriefDescription>

### Data Types

- type **ParameterizedTestCase**

### Public Attributes

- integer, parameter, public **MAX\_LEN\_LABEL** = 32

#### 17.69.1 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

## 17.70 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

### 17.70.1 Detailed Description

<BriefDescription>

**Author**

Tom Clune, NASA/GSFC

**Date**

07 Nov 2013

**Note**

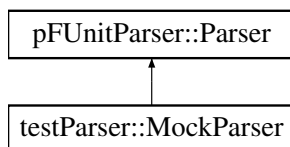
<A note here.> <Or starting here...>

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

- Params.F90

## 17.71 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

## 17.72 Test\_Parameters\_mod::peCase Type Reference

#### Public Member Functions

- procedure **toString**

#### Public Attributes

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

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

- parameterizedTests.pf

## 17.73 pFUnit Module Reference

<BriefDescription>

### Public Member Functions

- integer function **run** ()

### 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:

- pFUnitPackage.F90

## 17.74 pFUnit\_mod Module Reference

<BriefDescription>

### Public Member Functions

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

### 17.74.1 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

## 17.75 PrivateException\_mod Module Reference

<BriefDescription>

### Data Types

- type **Exception**
- type **ExceptionList**
- interface **newException**

### 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** = "

### 17.75.1 Detailed Description

<BriefDescription>

**Author**

Tom Clune, NASA/GSFC

**Date**

07 Nov 2013

**Note**

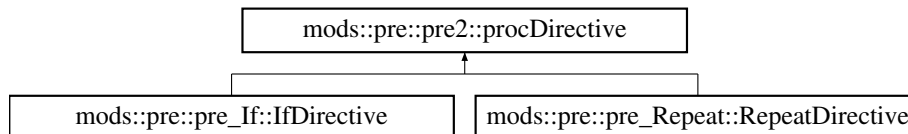
<A note here.> <Or starting here...>

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

- Exception.F90

## 17.76 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**

## 17.76.1 Member Function/Subroutine Documentation

**17.76.1.1** `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

## 17.77 RemoteProxyTestCase\_mod Module Reference

<BriefDescription>

## Data Types

- interface **RemoteProxyTestCase**

## 17.77.1 Detailed Description

<BriefDescription>

### Author

Tom Clune, NASA/GSFC

### Date

07 Nov 2013

**Note**

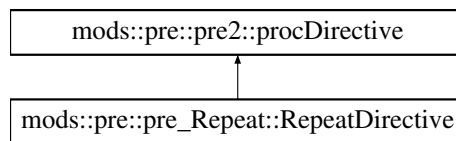
<A note here.> <Or starting here...>

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

- RemoteProxyTestCase.F90

## 17.78 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

## 17.79 ResultPrinter\_mod Module Reference

<BriefDescription>

**Data Types**

- type **ResultPrinter**

## 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)

### 17.79.1 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

## 17.80 RobustRunner\_mod Module Reference

<BriefDescription>

### Data Types

- interface **RobustRunner**
- type **TestCaseMonitor**

### 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)

#### 17.80.1 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:

- RobustRunner.F90

## 17.81 robustTestSuite\_mod Module Reference

### Public Member Functions

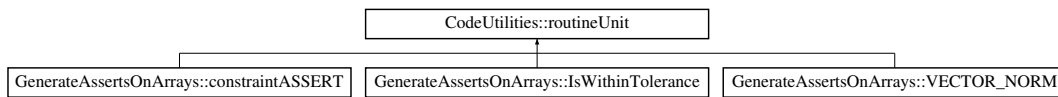
- type(TestSuite) function, public **suite** ()
- subroutine **testRunSucceeds** ()
- subroutine **testRunStops** ()

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

- robustTestSuite.F90

## 17.82 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

## 17.83 SerialContext\_mod Module Reference

<BriefDescription>

### Data Types

- type **SerialContext**

### Public Member Functions

- type(`SerialContext`) function, public **newSerialContext** ()

### Public Attributes

- type(`SerialContext`), parameter, public **THE\_SERIAL\_CONTEXT** = `SerialContext()`

#### 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:

- `SerialContext.F90`

## 17.84 SimpleTestCase\_mod Module Reference

### Data Types

- interface **method**
- type **SimpleTestCase**

### Public Member Functions

- type(`TestSuite`) function, public **suite** ()
- type(`SimpleTestCase`) function, public **newSimpleTestCase** (name, user-Method)

- 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

## 17.85 SourceLocation\_mod Module Reference

<BriefDescription>

### Data Types

- type **SourceLocation**

### 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()

### 17.85.1 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

## 17.86 SphericalCoordinates\_mod Module Reference

### Data Types

- interface **SphericalCoordinates**

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

- SphericalCoordinates.F90

## 17.87 TestListener\_mod::startTest Interface Reference

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

- TestListener.F90

## 17.88 StringConversionUtilities\_mod Module Reference

<BriefDescription>

### Data Types

- interface **toString**

### 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)

### Public Attributes

- integer, parameter, public **MAXLEN\_STRING** = 80



### 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:

- StringConversionUtilities.F90

## 17.89 SubsetRunner\_mod Module Reference

<BriefDescription>

**Data Types**

- interface **SubsetRunner**

**Public Member Functions**

- subroutine **addFailure** (this, testName, exceptions)
- subroutine **startTest** (this, testName)

### 17.89.1 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

## 17.90 SurrogateTestCase\_mod Module Reference

<BriefDescription>

**Data Types**

- interface **getName**
- interface **runBare**
- interface **setName**
- type **SurrogateTestCase**

### 17.90.1 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

## 17.91 SUT\_mod Module Reference

### Data Types

- type **SUT**

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

- Test\_MockRepository.F90

## 17.92 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

## 17.93 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

## 17.94 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\_4DPCComplex\_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`

## 17.95 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

## 17.96 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 **assertCatch** (string, location)

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

- Test\_AssertReal.F90

## 17.97 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

## 17.98 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

## 17.99 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

## 17.100 Test\_LinearInterpolator\_mod::Test\_LinearInterpolator Type Reference

### 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

## 17.101 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

## 17.102 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

## 17.103 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

## 17.104 Test\_mod Module Reference

<BriefDescription>



## Data Types

- interface **countTestCases**
- interface **run**
- type **Test**

### 17.104.1 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

## 17.105 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

## 17.106 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

## 17.107 Test\_MpiParameterizedTestCase\_mod Module Reference

### Data Types

- type **ExtendedTestParameter**
- interface **method**
- type **Test\_MpiTestCase**

### Public Member Functions

- type(TestSuite) function, public **suite** ()
- type(Test\_MpiTestCase) function, public **newTest\_MpiTestCase** (name, user-Method, testParameter)
- subroutine **testToString** (this)
- recursive subroutine **runMethod** (this)

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

- Test\_MpiParameterizedTestCase.F90

## 17.108 Test\_MpiTestCase\_mod Module Reference

### Data Types

- interface **method**
- type **Test\_MpiTestCase**

### Public Member Functions

- type(TestSuite) function, public **suite** ()

- type(`Test_MpiTestCase`) function, public **newTest\_MpiTestCase** (name, user-Method, 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`

## 17.109 Test\_Parameters\_mod::Test\_Parameters Type Reference

### Public Attributes

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

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

- `parameterizedTests.pf`

## 17.110 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

### 17.111 Test\_RestrictSphericalCoordinates\_mod::Test\_RestrictSphericalCoordinates Type Reference

#### 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

### 17.112 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

## 17.113 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

## 17.114 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

## 17.115 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

## 17.116 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

## 17.117 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

## 17.118 Test\_TestSuite\_mod Module Reference

### Data Types

- type **Verbose**

### 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

## 17.119 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

## 17.120 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

## 17.121 TestCase\_mod Module Reference

<BriefDescription>

### Data Types

- type **ConcreteSurrogate**
- type **TestCase**
- type **TestCaseReference**

### Public Member Functions

- recursive subroutine **runBare** (this)
- recursive subroutine **runBare\_surrogate** (this)

#### 17.121.1 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

## 17.122 TestCaseA\_mod::TestCaseA Type Reference

### 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

## 17.123 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

## 17.124 TestCaseB\_mod::TestCaseB Type Reference

### 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

## 17.125 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

## 17.126 `TestCaseC_mod::TestCaseC` Type Reference

### 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`

## 17.127 `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 function **newC\_Parameter\_case** (i)
- type([C\\_Parameter](#)) function, 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 function **newC\_Parameter\_case** (i)
- type([C\\_Parameter](#)) function, allocatable **paramGenerator** ()
- character(:) function, allocatable **toString** (this)

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

- `MpiParameterizedTestCaseC.F90`
- `MpiParameterizedTestCaseC.pf`

## 17.128 TestFailure\_mod Module Reference

<BriefDescription>

### Data Types

- type **TestFailure**

### 17.128.1 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`

## 17.129 mods::pre::pre\_If::TestIfDirective Class Reference

### 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

## 17.130 mods::pre::interleavedp::TestInterleaved Class Reference

### 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

## 17.131 TestListener\_mod Module Reference

<BriefDescription>

### Data Types

- interface **addFailure**
- interface **endRun**
- interface **endTest**
- type **ListenerPointer**
- interface [startTest](#)
- type **TestListener**

### Public Member Functions

- subroutine **addError** (this, testName, exceptions)
- subroutine **setDebug** (this)

### 17.131.1 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

## 17.132 TestMethod\_mod Module Reference

<BriefDescription>

## Data Types

- interface **empty**
- interface **newTestMethod**
- type **TestMethod**

### 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:

- TestMethod.F90

## 17.133 mods::pre::parseArgs::TestParseArgs Class Reference

### 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`

## 17.134 testParser::TestParseLine Class Reference

### 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](#)

### 17.134.1 Member Function/Subroutine Documentation

#### 17.134.1.1 def testParser::TestParseLine::testAtMpiTest ( *self* )

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

#### 17.134.1.2 def testParser::TestParseLine::testAtTest ( *self* )

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



**17.134.1.3 def testParser::TestParseLine::testAtTestFail ( self )**

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

**17.134.1.4 def testParser::TestParseLine::testAtTestNoParens ( self )**

Check that test procedure with no parens is accepted.

**17.134.1.5 def testParser::TestParseLine::testAtTestSkipComment ( self )**

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

**17.134.1.6 def testParser::TestParseLine::testMatchAtAfter ( self )**

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

**17.134.1.7 def testParser::TestParseLine::testMatchAtAssertEqual ( self )**

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

**17.134.1.8 def testParser::TestParseLine::testMatchAtAssertOther ( self )**

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

**17.134.1.9 def testParser::TestParseLine::testMatchAtBefore ( self )**

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

**17.134.1.10 def testParser::TestParseLine::testMatchAtMpiAssert ( self )**

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

#### 17.134.1.11 `def testParser::TestParseLine::testMatchAtSuite ( self )`

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

#### 17.134.1.12 `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

### 17.135 `mods::pre::pre_Repeat::TestRepeatDirective` Class Reference

#### 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

### 17.136 `TestResult_mod` Module Reference

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

#### Data Types

- type `TestResult`

### Public Member Functions

- type(TestResult) function, public **newTestResult** ()
- subroutine **addError** (this, aTest, exceptions)
- subroutine **addSuccess** (this, aTest)
- integer function **failureCount** (this)
- subroutine **addListener** (this, listener)

#### 17.136.1 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

## 17.137 TestRunner\_mod Module Reference

<BriefDescription>

### Data Types

- interface **newTestRunner**
- type **TestRunner**

### Public Member Functions

- type(TestResult) function **run** (this, aTest, context)
- subroutine **startTest** (this, testName)
- subroutine **addFailure** (this, testName, exceptions)

### 17.137.1 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

## 17.138 TestSuite\_mod Module Reference

<BriefDescription>

### Data Types

- interface **newTestSuite**
- type **TestReference**
- type **TestSuite**

### Public Member Functions

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

### 17.138.1 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

## 17.139 ThrowFundamentalTypes\_mod Module Reference

<BriefDescription>

**Data Types**

- interface **throwDifferentValues**
- interface **throwDifferentValuesWithLocation**

**Public Member Functions**

- subroutine, public **throwNonConformable** (shapeExpected, shapeFound, location)
- character(len=MAXLEN\_SHAPE) function, public **locationFormat** (iLocation)

### 17.139.1 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

## 17.140 UnixPipeInterfaces\_mod Module Reference

<BriefDescription>

**Data Types**

- interface **fgets**
- interface **free**
- interface **getdelim**
- interface **getline**
- interface **pclose**
- interface **popen**

**Public Attributes**

- integer(C\_INT), parameter, public **CLOSE\_FAILED** = -1

### 17.140.1 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

## 17.141 UnixProcess\_mod Module Reference

<BriefDescription>

### Data Types

- interface **UnixProcess**

### Public Member Functions

- character(len=:) function, allocatable **makeCommand** (baseCommand, runIn-Background)
- logical function **isActive** (this)
- character(len=:) function, allocatable **getDelim** (this, delimiter)
- integer function **getPid** (this)

### 17.141.1 Detailed Description

<BriefDescription>

#### Author

Tom Clune, NASA/GSFC

#### Date

07 Nov 2013

#### Note

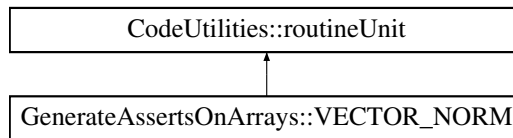
<A note here.> <Or starting here...>

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

- UnixProcess.F90

## 17.142 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`

## 17.143 AbstractTestResult\_mod::wasSuccessful Interface Reference

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

- `AbstractTestResult.F90`

## 17.144 WrapbeforeAfter Module Reference

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

- `beforeAfter.F90`



## 17.145 WrapMpiTestCaseB\_mod Module Reference

### Data Types

- interface **userTestMethod**
- type **WrapUserTestCase**

### 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

## 17.146 Wrapsimple Module Reference

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

- simple.F90

## 17.147 WrapTestA\_mod Module Reference

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

- TestA.F90

## 17.148 WrapTestCaseA\_mod Module Reference

### Data Types

- interface **userTestMethod**
- type **WrapUserTestCase**

### 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

## 17.149 WrapTestCaseB\_mod Module Reference

### Data Types

- interface **userTestMethod**
- type **WrapUserTestCase**

### 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

## 17.150 WrapTestCaseC\_mod Module Reference

### Data Types

- interface **userTestMethod**
- type **WrapUserTestCase**

### 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`

## 17.151 XmlPrinter\_mod Module Reference

<BriefDescription>

### Data Types

- type **XmlPrinter**

### Public Member Functions

- `type(XmlPrinter)` function, public **newXmlPrinter** (unit)
- subroutine **addError** (this, testName, exceptions)
- subroutine **startTest** (this, testName)
- subroutine **print** (this, result, runTime)
- subroutine **printHeader** (this, result)
- subroutine **printFailures** (this, label, failures)
- subroutine **printFooter** (this, result)

### 17.151.1 Detailed Description

<BriefDescription>

#### Author

Halvor Lund, SINTEF Energy Research

#### Date

30 Jan 2014

#### Note

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

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

- `XmlPrinter.F90`