# MPI Implementation of some eigen libraries others

Generated by Doxygen 1.8.13

# Contents

# Chapter 1

# Hierarchical Index

## 1.1 Class Hierarchy

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

# Chapter 2

# Class Index

## 2.1 Class List

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

# Chapter 3

# Class Documentation

## 3.1 Genfun::Argument Class Reference

### Public Member Functions

- **Argument** (int ndim=0)
- **Argument** (const Argument &)
- **Argument** (std::initializer_list< double >)
- const Argument & **operator=** (const Argument &)
- double & **operator[ ]** (int I)
- const double & **operator[ ]** (int i) const
- unsigned int **dimension** () const

### Friends

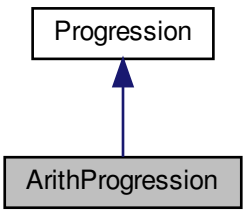
- std::ostream & **operator**<< (std::ostream &o, const Argument &a)

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

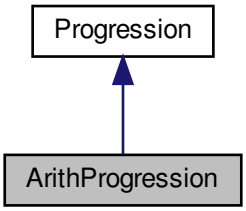
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/Argument.h

## 3.2 ArithProgression Class Reference

Inheritance diagram for ArithProgression:



Collaboration diagram for ArithProgression:




### Public Member Functions

- **ArithProgression** (long i=1)

### Protected Member Functions

- virtual long **nextValue** ()

### Protected Attributes

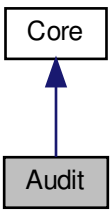
- long **inc**

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

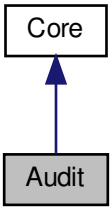
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp2.hpp

## 3.3 Audit Class Reference

Inheritance diagram for Audit:



Collaboration diagram for Audit:




### Public Member Functions

- **Audit** (std::istream &is)
- std::istream & **read** (std::istream &)
- double **grade** () const
- bool **valid** () const
- bool **fulfill_reqs** () const

### Additional Inherited Members

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp_dynamicbindingandinheritance.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp_dynamicbindingandinheritance.cxx

## 3.4 background_task Class Reference

### Public Member Functions

- void **operator()** () const

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp_thread.cxx

## 3.5 Complex Class Reference

### Public Member Functions

- **Complex** (double r, double i=0)

### Friends

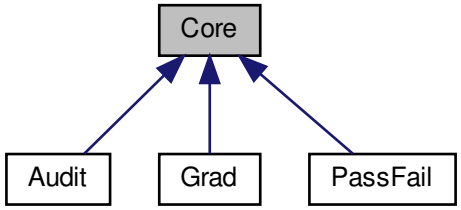
- bool **operator==** (const Complex &a, const Complex &b)

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp2.cxx

## 3.6 Core Class Reference

Inheritance diagram for Core:




### Public Member Functions

- **Core** (std::istream &is)
- std::string **name** () const
- virtual std::istream & **read** (std::istream &)
- virtual double **grade** () const
- virtual bool **valid** () const
- virtual bool **fulfill_reqs** () const

### Protected Member Functions

- std::istream & **read_common** (std::istream &)
- virtual Core * **clone** () const

### Protected Attributes

- std::string **n**
- double **midterm**
- double **final**
- std::vector< double > **homework**

### Friends

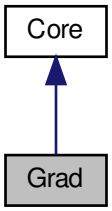
- class **Student_info**

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

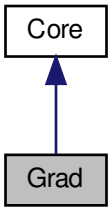
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp_dynamicbindingandinheritance.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp_dynamicbindingandinheritance.cxx

## 3.7 Grad Class Reference

Inheritance diagram for Grad:




Collaboration diagram for Grad:




### Public Member Functions

- **Grad** (std::istream &is)
- std::istream & **read** (std::istream &)
- double **grade** () const
- bool **fulfill_reqs** () const

### Additional Inherited Members

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp_dynamicbindingandinheritance.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp_dynamicbindingandinheritance.cxx

## 3.8 InitiateVectorMethod< ItemType > Class Template Reference

### Public Member Functions

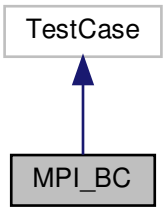
- **InitiateVectorMethod** (int, int)
- void **setup** (int *)
- void **traits** ()
- void **SendVector** ()
- void **GetData** ()

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

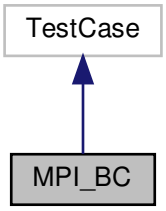
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/new.hpp

## 3.9 MPI_BC Class Reference

Inheritance diagram for MPI_BC:




Collaboration diagram for MPI_BC:



### Public Member Functions

- MPI_BC ()
  *MPI_BC class template filling.*
- void **packData** ()
- void **time_ellapsed** ()
- void **broadcast_input** ()
- void **broadcast_vector** ()
- void **buildMpiType** (double *, double *, int *, MPI_Datatype *)
- void **Send** (float, float, int, int)
- void **SendVector** ()
- void **Receive** (float *, float *, int *, int)
- void **parallelAllocateVec** (double *, double *, int, std::vector< int > *, MPI_Datatype *)

## 3.9.1 Constructor & Destructor Documentation

#### 3.9.1.1 MPI_BC()

```
MPI_BC::MPI_BC ( )
```

MPI_BC class template filling.

Placeholder

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/MPI_broadcast.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/MPI_broadcast.cxx

# 3.10 MPI_BC_Generic< T, Q, R > Class Template Reference

### Public Member Functions

- **MPI_BC_Generic** (std::size_t n)

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/MPI_broadcast.hpp

# 3.11 MPI_sorting_methods Class Reference

### Public Member Functions

- void **Bubble_sort** (int a[ ], int n)

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/MPI_reduce.cxx

## 3.12 MPIInput Class Reference

### Public Member Functions

- **MPIInput** (int, int)
- void **MPIStart** ()
- void **getData** ()
- void **bubbleSort** ()
- void **oddEvenSort** ()
- void **I_send** ()

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/MPI_IO.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/MPI_IO.cxx

## 3.13 OMP< T > Class Template Reference

### Public Member Functions

- **OMP** (int)
- **OMP** (const OMP &OMPCopy)
- OMP & **operator=** (const OMP &ref)
- void **add** (T)
- void **addup** ()
- void **pi** ()

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp1.hpp

## 3.14 Partstruct Struct Reference

### Public Attributes

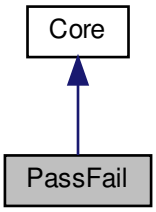
- int **class**
- double **d** [6]
- char **b** [7]

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

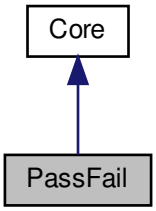
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/MPI_struct.cxx

## 3.15 PassFail Class Reference

Inheritance diagram for PassFail:




Collaboration diagram for PassFail:




### Public Member Functions

- **PassFail** (std::istream &is)
- double **grade** () const
- bool **valid** () const
- bool **fulfill_reqs** () const

### Additional Inherited Members

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp_dynamicbindingandinheritance.hpp

## 3.16 part1::Point Class Reference

```
#include <lib_mpi.hpp>
```

### Public Member Functions

- **Point** (float _x, float _y, float _z)

### Public Attributes

- float **x**
- float **y**
- float **z**

#### 3.16.1 Detailed Description

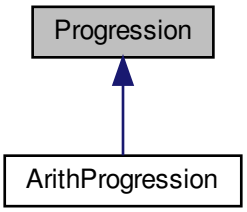
This is a simple 3D point class

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/lib_mpi.hpp

## 3.17 Progression Class Reference

Inheritance diagram for Progression:




### Public Member Functions

- **Progression** (long f=0)
- void **printProgression** (int n)

### Protected Member Functions

- virtual long **firstValue** ()
- virtual long **nextValue** ()

### Protected Attributes

- long **first**
- long **cur**

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp2.hpp

## 3.18 QTstyle_Test Class Reference

A test class - find and replace from this template for future class definitions.

```
#include <statistics.h>
```

### 3.18.1 Detailed Description

A test class - find and replace from this template for future class definitions.

One of the most common examples of concepts in quantitiative finance is that of a statistical distribtion. Random variables play a huge part in quantitive financial modelling. Derivatives, pricing, cash-flow forceasting and quantitive trading all make use of statitiscal methods in some fashion

Many of the chapters within this book have made use of random number generators in order to carry out pricing tasks.

In a nutshell, we are splitting the generation of (uniform integer) random numbers from draws of specific statistical distribution,s such taht we can use the statics classes elsewhere withut bringing along the heavy random number generation functions.

Equally useful is the fact taht we will be able to "swap out" different random number generators for out statisics classes for reliability, extensibility and efficiency

A more elaborate class definition

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/statistics.h

## 3.19 RandomNumberGenerator Class Reference

### Public Member Functions

- **RandomNumberGenerator** (unsigned long _num_draws, unsigned long _init_seed)
- virtual unsigned long **get_random_seed** () const
- virtual void **set_random_seed** (unsigned long _seed)
- virtual void **set_num_draws** (unsigned long _num_draws)
- virtual unsigned long **get_random_integer** ()=0

### Protected Attributes

- unsigned long **init_seed**
- unsigned long **cur_seed**
- unsigned long **num_draws**

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/random.hpp

## 3.20 Stack< T, CONT > Class Template Reference

### Public Member Functions

- void **push** (T const &)
- void **pop** ()
- T **top** () const
- bool **empty** () const

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

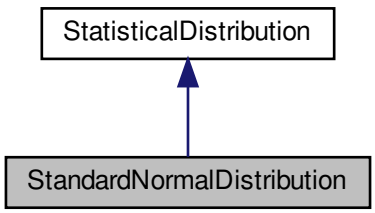
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp_templates.hpp

## 3.21 StandardNormalDistribution Class Reference

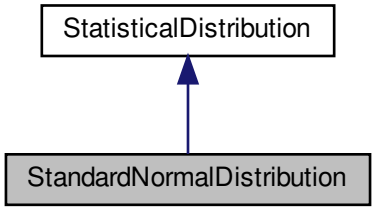
Standard Normal Distribution Implementation.

```
#include <statistics.h>
```

Inheritance diagram for StandardNormalDistribution:



Collaboration diagram for StandardNormalDistribution:




### Public Member Functions

- virtual double **pdf** (const double &x) const
- virtual double **cdf** (const double &x) const
- virtual double **inv_cdf** (const double &quantile) const
- virtual double **mean** () const
- virtual double var () const

  *Equal to 0.*
- virtual double stddev () const

  *Equal to 1.*
- virtual void random_draws (const std::vector< double > &uniform_draws, std::vector< double > &dist_↩ draws)

  *Variable 1.*

#### 3.21.1 Detailed Description

Standard Normal Distribution Implementation.

A more elaborate explanation here

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

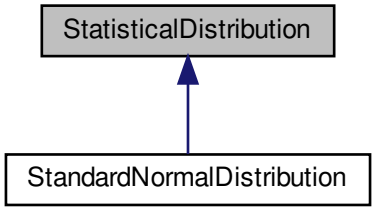
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/statistics.h
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/statistics.cxx

## 3.22 StatisticalDistribution Class Reference

Statistical Distribution Class.

`#include <statistics.h>`

Inheritance diagram for StatisticalDistribution:




### Public Member Functions

- StatisticalDistribution ()

  *A constructor.*
- virtual ~StatisticalDistribution ()

  *Virtual destructor.*
- virtual double **pdf** (const double &x) const =0
- virtual double **cdf** (const double &x) const =0
- virtual double **inv_cdf** (const double &quantile) const =0
- virtual double **mean** () const =0
- virtual double var () const =0

  *Variable 1.*
- virtual double stdev () const =0

  *Varable 2.*
- virtual void random_draws (const std::vector< double > &uniform_draws, std::vector< double > &dist_↩ draws)=0

  *Variable 3.*

#### 3.22.1 Detailed Description

Statistical Distribution Class.

We've specified pure virtual methods for the probability density function (pdf), cumulative density function (cdf), inverse cdf (inv_cdf), as well as descriptive statistics functions such as as mean, var (variance) and stdev.

Finally, we have a method that takes in a vector of uniform random variables on the open interval (0,1), then fills a vector of identical length with draws from the distribution

#### 3.22.2 Constructor & Destructor Documentation

#### 3.22.2.1 StatisticalDistribution()

```
StatisticalDistribution::StatisticalDistribution ( )
```

A constructor.

Statistical Distribution.

Statistical Distribution constructor

A more elaborate class definition

#### 3.22.2.2 ~StatisticalDistribution()

```
StatisticalDistribution::~StatisticalDistribution ( )  [virtual]
```

Virtual destructor.

Constructor.

A more elaborate explanation here

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/statistics.h
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/statistics.cxx

## 3.23 Str Class Reference

### Public Types

- typedef Vec< char >::size_type **size_type**
- typedef Vec< char >::size_type **size_type**

### Public Member Functions

- **Str** (size_type n, char c)
- **Str** (const char *cp)
- template<class In >
  **Str** (In b, In e)
- **Str** (size_type n, char c)
- **Str** (const char *cp)
- template<class In >
  **Str** (In b, In e)

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp2.cxx
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp2.hpp

## 3.24 Student_info Class Reference

### Public Member Functions

- **Student_info** (std::istream &is)
- **Student_info** (const Student_info &)
- Student_info & **operator=** (const Student_info &)
- std::istream & **read** (std::istream &)
- std::string **name** () const
- double **grade** () const

### Static Public Member Functions

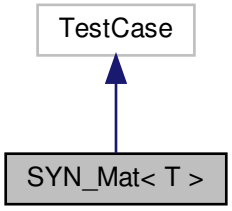
- static bool **compare** (const Student_info &s1, const Student_info &s2)

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

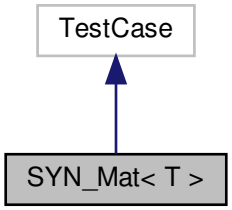
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/Student_info.h
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/Student_info.cxx

## 3.25 SYN_Mat< T > Class Template Reference

Inheritance diagram for SYN_Mat< T >:




Collaboration diagram for SYN_Mat< T >:



### Public Member Functions

- **SYN_Mat** (unsigned _rows, unsigned _cols, const T &_initial)
- **SYN_Mat** (const SYN_Mat< T > &alloc)
- SYN_Mat< T > & **operator=** (const SYN_Mat< T > &alloc)
- SYN_Mat< T > **operator+** (const SYN_Mat< T > &rhs)
- SYN_Mat< T > & **operator+=** (const SYN_Mat< T > &rhs)
- SYN_Mat< T > **operator-** (const SYN_Mat< T > &rhs)
- SYN_Mat< T > & **operator-=** (const SYN_Mat< T > &rhs)
- SYN_Mat< T > **operator*** (const SYN_Mat< T > &rhs)
- SYN_Mat< T > & **operator*=** (const SYN_Mat< T > &rhs)
- SYN_Mat< T > **transpose** ()
- SYN_Mat< T > **operator+** (const T &rhs)
- SYN_Mat< T > **operator-** (const T &rhs)
- SYN_Mat< T > **operator*** (const T &rhs)
- SYN_Mat< T > **operator/** (const T &rhs)
- std::vector< T > **operator*** (const std::vector< T > &rhs)
- std::vector< T > **diag_vec** ()
- T & **operator()** (const unsigned &row, const unsigned &col)
- const T & **operator()** (const unsigned &row, const unsigned &col) const
- unsigned **get_rows** () const
- unsigned **get_cols** () const
- void **test1** ()
- void **test2** ()

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp_LA.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/src/openmp_LA.cxx

## 3.26 TemplateUnderTest< T > Class Template Reference

### Public Member Functions

- **TemplateUnderTest** (T *t)
- void **SomeMethod** ()

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp2.hpp

## 3.27 Trap Class Reference

### Public Member Functions

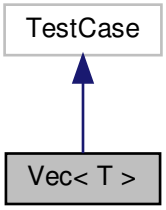
- void **read** ()
- void **computeTrapezium** ()

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

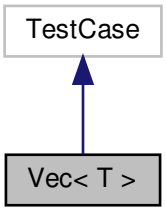
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/trapezoid.hpp

## 3.28 Vec< T > Class Template Reference

Inheritance diagram for Vec< T >:




Collaboration diagram for Vec< T >:




### Public Types

- typedef T * **iterator**
- typedef const T * **const_iterator**
- typedef size_t **size_type**
- typedef T * **iterator**
- typedef const T * **const_iterator**
- typedef size_t **size_type**
- typedef T **value_type**
- typedef T & **reference**
- typedef const T & **const_reference**

### Public Member Functions

- **Vec** (size_type n, const T &t=T())
- **Vec** (const Vec &v)
- Vec & **operator=** (const Vec &)

- const T & **operator[ ]** (size_type i) const
- void **push_back** (const T &t)
- size_type **size** () const
- iterator **begin** ()
- const_iterator **begin** () const
- iterator **end** ()
- const_iterator **end** () const
- void **runTest** ()

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/MPI_str.hpp
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/openmp1.hpp

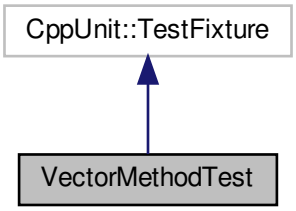
## 3.29 tutorial::Vec< T > Class Template Reference

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

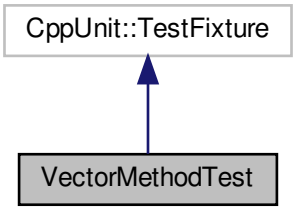
- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/lib_mpi.hpp

## 3.30 VectorMethodTest Class Reference

Inheritance diagram for VectorMethodTest:




Collaboration diagram for VectorMethodTest:



### Public Member Functions

- void **setUp** ()
- void **tearDown** ()
- void **testConstructor** ()

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

- /home/oohnohnoh1/Desktop/GIT/Research/Parallel/include/new.hpp

# Index