

ARC Data Library libarcdata

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Contents

1	Data Structure Index	1
1.1	Class Hierarchy	1
2	Data Structure Index	3
2.1	Data Structures	3
3	Data Structure Documentation	5
3.1	Arc::Adler32Sum Class Reference	5
3.1.1	Detailed Description	5
3.2	Arc::CacheParameters Struct Reference	5
3.2.1	Detailed Description	5
3.3	Arc::Checksum Class Reference	6
3.3.1	Detailed Description	6
3.4	Arc::ChecksumAny Class Reference	6
3.4.1	Detailed Description	6
3.5	Arc::CRC32Sum Class Reference	7
3.5.1	Detailed Description	7
3.6	Arc::DataBuffer Class Reference	7
3.6.1	Detailed Description	8
3.6.2	Constructor & Destructor Documentation	9
3.6.2.1	DataBuffer	9
3.6.2.2	DataBuffer	9
3.6.3	Member Function Documentation	9
3.6.3.1	add	9
3.6.3.2	buffer_size	9
3.6.3.3	checksum_object	9

3.6.3.4	checksum_valid	10
3.6.3.5	eof_read	10
3.6.3.6	eof_read	10
3.6.3.7	eof_write	10
3.6.3.8	eof_write	10
3.6.3.9	error	10
3.6.3.10	error_read	10
3.6.3.11	error_write	11
3.6.3.12	for_read	11
3.6.3.13	for_read	11
3.6.3.14	for_write	11
3.6.3.15	for_write	11
3.6.3.16	is_notwritten	11
3.6.3.17	is_notwritten	12
3.6.3.18	is_read	12
3.6.3.19	is_read	12
3.6.3.20	is_written	12
3.6.3.21	is_written	12
3.6.3.22	set	13
3.6.3.23	wait_any	13
3.7	Arc::DataCallback Class Reference	13
3.7.1	Detailed Description	13
3.8	Arc::DataHandle Class Reference	13
3.8.1	Detailed Description	14
3.9	Arc::DataMover Class Reference	14
3.9.1	Detailed Description	15
3.9.2	Member Function Documentation	15
3.9.2.1	checks	15
3.9.2.2	checks	15
3.9.2.3	force_to_meta	15
3.9.2.4	secure	15
3.9.2.5	set_default_max_inactivity_time	16
3.9.2.6	set_default_min_average_speed	16
3.9.2.7	set_default_min_speed	16

3.9.2.8	Transfer	16
3.9.2.9	Transfer	16
3.9.2.10	verbose	17
3.10	Arc::DataPoint Class Reference	17
3.10.1	Detailed Description	20
3.10.2	Member Enumeration Documentation	21
3.10.2.1	DataPointAccessLatency	21
3.10.2.2	DataPointInfoType	21
3.10.3	Constructor & Destructor Documentation	21
3.10.3.1	DataPoint	22
3.10.4	Member Function Documentation	22
3.10.4.1	AddChecksumObject	22
3.10.4.2	AddLocation	22
3.10.4.3	Check	22
3.10.4.4	CompareLocationMetadata	23
3.10.4.5	CompareMeta	23
3.10.4.6	CurrentLocationMetadata	23
3.10.4.7	FinishReading	23
3.10.4.8	FinishWriting	23
3.10.4.9	GetFailureReason	24
3.10.4.10	List	24
3.10.4.11	NextLocation	24
3.10.4.12	Passive	24
3.10.4.13	PostRegister	25
3.10.4.14	PrepareReading	25
3.10.4.15	PrepareWriting	25
3.10.4.16	PreRegister	26
3.10.4.17	PreUnregister	26
3.10.4.18	ProvidesMeta	27
3.10.4.19	Range	27
3.10.4.20	ReadOutOfOrder	27
3.10.4.21	Registered	27
3.10.4.22	Resolve	27
3.10.4.23	SetAdditionalChecks	28

3.10.4.24 SetMeta	28
3.10.4.25 SetSecure	28
3.10.4.26 SetURL	28
3.10.4.27 SortLocations	28
3.10.4.28 StartReading	29
3.10.4.29 StartWriting	29
3.10.4.30 Stat	29
3.10.4.31 StopReading	30
3.10.4.32 StopWriting	30
3.10.4.33 TransferLocations	30
3.10.4.34 Unregister	30
3.10.4.35 WriteOutOfOrder	31
3.10.5 Field Documentation	31
3.10.5.1 valid_url_options	31
3.11 Arc::DataPointDirect Class Reference	31
3.11.1 Detailed Description	32
3.11.2 Member Function Documentation	32
3.11.2.1 AddChecksumObject	32
3.11.2.2 AddLocation	33
3.11.2.3 CompareLocationMetadata	33
3.11.2.4 CurrentLocationMetadata	33
3.11.2.5 NextLocation	33
3.11.2.6 Passive	33
3.11.2.7 PostRegister	34
3.11.2.8 PreRegister	34
3.11.2.9 PreUnregister	34
3.11.2.10 ProvidesMeta	35
3.11.2.11 Range	35
3.11.2.12 ReadOutOfOrder	35
3.11.2.13 Registered	35
3.11.2.14 Resolve	35
3.11.2.15 SetAdditionalChecks	35
3.11.2.16 SetSecure	36
3.11.2.17 SortLocations	36

3.11.2.18 Unregister	36
3.11.2.19 WriteOutOfOrder	36
3.12 Arc::DataPointIndex Class Reference	37
3.12.1 Detailed Description	38
3.12.2 Member Function Documentation	38
3.12.2.1 AddChecksumObject	38
3.12.2.2 AddLocation	38
3.12.2.3 Check	39
3.12.2.4 CompareLocationMetadata	39
3.12.2.5 CurrentLocationMetadata	39
3.12.2.6 FinishReading	39
3.12.2.7 FinishWriting	40
3.12.2.8 NextLocation	40
3.12.2.9 Passive	40
3.12.2.10 PrepareReading	40
3.12.2.11 PrepareWriting	41
3.12.2.12 ProvidesMeta	41
3.12.2.13 Range	42
3.12.2.14 ReadOutOfOrder	42
3.12.2.15 Registered	42
3.12.2.16 SetAdditionalChecks	42
3.12.2.17 SetMeta	42
3.12.2.18 SetSecure	43
3.12.2.19 SortLocations	43
3.12.2.20 StartReading	43
3.12.2.21 StartWriting	43
3.12.2.22 StopReading	44
3.12.2.23 StopWriting	44
3.12.2.24 TransferLocations	44
3.12.2.25 WriteOutOfOrder	44
3.13 Arc::DataPointLoader Class Reference	44
3.13.1 Detailed Description	45
3.14 Arc::DataPointPluginArgument Class Reference	45
3.14.1 Detailed Description	45

3.15 Arc::DataSpeed Class Reference	45
3.15.1 Detailed Description	46
3.15.2 Constructor & Destructor Documentation	46
3.15.2.1 DataSpeed	46
3.15.2.2 DataSpeed	46
3.15.3 Member Function Documentation	47
3.15.3.1 hold	47
3.15.3.2 set_base	47
3.15.3.3 set_max_data	47
3.15.3.4 set_max_inactivity_time	47
3.15.3.5 set_min_average_speed	47
3.15.3.6 set_min_speed	48
3.15.3.7 set_progress_indicator	48
3.15.3.8 transfer	48
3.15.3.9 verbose	48
3.15.3.10 verbose	48
3.16 Arc::DataStatus Class Reference	49
3.16.1 Detailed Description	49
3.16.2 Member Enumeration Documentation	50
3.16.2.1 DataStatusType	50
3.17 Arc::FileCache Class Reference	51
3.17.1 Detailed Description	52
3.17.2 Constructor & Destructor Documentation	52
3.17.2.1 FileCache	52
3.17.2.2 FileCache	53
3.17.2.3 FileCache	53
3.17.2.4 FileCache	53
3.17.3 Member Function Documentation	54
3.17.3.1 AddDN	54
3.17.3.2 CheckCreated	54
3.17.3.3 CheckDN	54
3.17.3.4 CheckValid	54
3.17.3.5 Copy	55
3.17.3.6 File	55

3.17.3.7	GetCreated	55
3.17.3.8	GetValid	55
3.17.3.9	Link	55
3.17.3.10	operator bool	56
3.17.3.11	operator==	56
3.17.3.12	Release	56
3.17.3.13	SetValid	56
3.17.3.14	Start	56
3.17.3.15	Stop	57
3.17.3.16	StopAndDelete	57
3.18	Arc::FileCacheHash Class Reference	57
3.18.1	Detailed Description	57
3.19	Arc::FileInfo Class Reference	58
3.19.1	Detailed Description	58
3.20	Arc::MD5Sum Class Reference	58
3.20.1	Detailed Description	58
3.21	Arc::URLMap Class Reference	58

Chapter 1

Data Structure Index

1.1 Class Hierarchy

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

Arc::CacheParameters	5
Arc::Checksum	6
Arc::Adler32Sum	5
Arc::ChecksumAny	6
Arc::CRC32Sum	7
Arc::MD5Sum	58
Arc::DataBuffer	7
Arc::DataCallback	13
Arc::DataHandle	13
Arc::DataMover	14
Arc::DataPoint	17
Arc::DataPointDirect	31
Arc::DataPointIndex	37
Arc::DataPointLoader	44
Arc::DataPointPluginArgument	45
Arc::DataSpeed	45
Arc::DataStatus	49
Arc::FileCache	51
Arc::FileCacheHash	57
Arc::FileInfo	58
Arc::URLMap	58

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Arc::Adler32Sum (Implementation of Adler32 checksum)	5
Arc::CacheParameters (Contains data on the parameters of a cache)	5
Arc::Checksum (Defines interface for various checksum manipulations)	6
Arc::ChecksumAny (Wrapper for Checksum class)	6
Arc::CRC32Sum (Implementation of CRC32 checksum)	7
Arc::DataBuffer (Represents set of buffers)	7
Arc::DataCallback (This class is used by DataHandle to report missing space on local filesystem)	13
Arc::DataHandle (This class is a wrapper around the DataPoint class)	13
Arc::DataMover (DataMover provides an interface to transfer data between two DataPoints)	14
Arc::DataPoint (A DataPoint represents a data resource and is an abstraction of a URL)	17
Arc::DataPointDirect (This is a kind of generalized file handle)	31
Arc::DataPointIndex (Complements DataPoint with attributes common for Indexing Service URLs)	37
Arc::DataPointLoader (Class used by DataHandle to load the required DMC)	44
Arc::DataPointPluginArgument (Class representing the arguments passed to DMC plugins)	45
Arc::DataSpeed (Keeps track of average and instantaneous transfer speed)	45
Arc::DataStatus (Status code returned by many DataPoint methods)	49
Arc::FileCache (FileCache provides an interface to all cache operations)	51
Arc::FileCacheHash (FileCacheHash provides methods to make hashes from strings)	57
Arc::FileInfo (FileInfo stores information about files (metadata))	58
Arc::MD5Sum (Implementation of MD5 checksum)	58
Arc::URLMap	58

Chapter 3

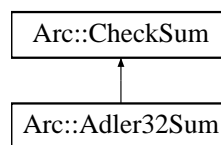
Data Structure Documentation

3.1 Arc::Adler32Sum Class Reference

Implementation of Adler32 checksum.

```
#include <CheckSum.h>
```

Inheritance diagram for Arc::Adler32Sum:



3.1.1 Detailed Description

Implementation of Adler32 checksum.

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

- CheckSum.h

3.2 Arc::CacheParameters Struct Reference

Contains data on the parameters of a cache.

```
#include <FileCache.h>
```

3.2.1 Detailed Description

Contains data on the parameters of a cache.

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

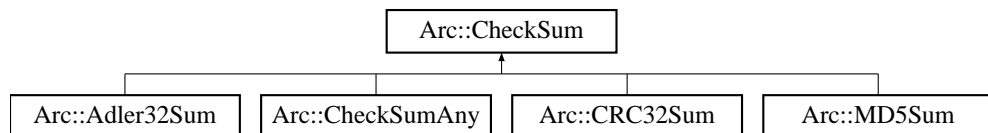
- `FileCache.h`

3.3 Arc::Checksum Class Reference

Defines interface for various checksum manipulations.

```
#include <Checksum.h>
```

Inheritance diagram for Arc::Checksum:



3.3.1 Detailed Description

Defines interface for various checksum manipulations.

This class is used during data transfers through [DataBuffer](#) class

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

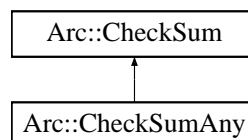
- `Checksum.h`

3.4 Arc::ChecksumAny Class Reference

Wrapper for [Checksum](#) class.

```
#include <Checksum.h>
```

Inheritance diagram for Arc::ChecksumAny:



3.4.1 Detailed Description

Wrapper for [Checksum](#) class.

To be used for manipulation of any supported checksum type in a transparent way.

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

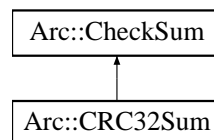
- CheckSum.h

3.5 Arc::CRC32Sum Class Reference

Implementation of CRC32 checksum.

```
#include <CheckSum.h>
```

Inheritance diagram for Arc::CRC32Sum:



3.5.1 Detailed Description

Implementation of CRC32 checksum.

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

- CheckSum.h

3.6 Arc::DataBuffer Class Reference

Represents set of buffers.

```
#include <DataBuffer.h>
```

Data Structures

- struct **buf_desc**
- class **checksum_desc**

Public Member Functions

- [operator bool](#) () const
- [DataBuffer](#) (unsigned int size=65536, int blocks=3)
- [DataBuffer](#) ([Checksum](#) *cksum, unsigned int size=65536, int blocks=3)
- [~DataBuffer](#) ()

- bool [set](#) ([Checksum](#) *cksum=NULL, unsigned int size=65536, int blocks=3)
- int [add](#) ([Checksum](#) *cksum)
- char * [operator\[\]](#) (int n)
- bool [for_read](#) (int &handle, unsigned int &length, bool wait)
- bool [for_read](#) ()
- bool [is_read](#) (int handle, unsigned int length, unsigned long long int offset)
- bool [is_read](#) (char *buf, unsigned int length, unsigned long long int offset)
- bool [for_write](#) (int &handle, unsigned int &length, unsigned long long int &offset, bool wait)
- bool [for_write](#) ()
- bool [is_written](#) (int handle)
- bool [is_written](#) (char *buf)
- bool [is_notwritten](#) (int handle)
- bool [is_notwritten](#) (char *buf)
- void [eof_read](#) (bool v)
- void [eof_write](#) (bool v)
- void [error_read](#) (bool v)
- void [error_write](#) (bool v)
- bool [eof_read](#) ()
- bool [eof_write](#) ()
- bool [error_read](#) ()
- bool [error_write](#) ()
- bool [error_transfer](#) ()
- bool [error](#) ()
- bool [wait_any](#) ()
- bool [wait_used](#) ()
- bool [wait_for_read](#) ()
- bool [wait_for_write](#) ()
- bool [checksum_valid](#) () const
- const [Checksum](#) * [checksum_object](#) () const
- bool [wait_eof_read](#) ()
- bool [wait_read](#) ()
- bool [wait_eof_write](#) ()
- bool [wait_write](#) ()
- bool [wait_eof](#) ()
- unsigned long long int [eof_position](#) () const
- unsigned int [buffer_size](#) () const

Data Fields

- [DataSpeed](#) speed

3.6.1 Detailed Description

Represents set of buffers.

This class is used during data transfer using [DataPoint](#) classes.

3.6.2 Constructor & Destructor Documentation

3.6.2.1 Arc::DataBuffer::DataBuffer (unsigned int *size* = 65536, int *blocks* = 3)

Constructor

Parameters

<i>size</i>	size of every buffer in bytes.
<i>blocks</i>	number of buffers.

3.6.2.2 Arc::DataBuffer::DataBuffer (CheckSum * *cksum*, unsigned int *size* = 65536, int *blocks* = 3)

Constructor

Parameters

<i>size</i>	size of every buffer in bytes.
<i>blocks</i>	number of buffers.
<i>cksum</i>	object which will compute checksum. Should not be destroyed till DataBuffer itself.

3.6.3 Member Function Documentation

3.6.3.1 int Arc::DataBuffer::add (CheckSum * *cksum*)

Add a checksum object which will compute checksum of buffer.

Parameters

<i>cksum</i>	object which will compute checksum. Should not be destroyed till DataBuffer itself.
--------------	---

Returns

integer position in the list of checksum objects.

3.6.3.2 unsigned int Arc::DataBuffer::buffer_size () const

Returns size of buffer in object. If not initialized then this number represents size of default buffer.

3.6.3.3 const CheckSum* Arc::DataBuffer::checksum_object () const

Returns [CheckSum](#) object specified in constructor, returns NULL if index is not in list.

Parameters

<i>index</i>	of the checksum in question.
--------------	------------------------------

3.6.3.4 bool Arc::DataBuffer::checksum_valid () const

Returns true if checksum was successfully computed, returns false if index is not in list.

Parameters

<i>index</i>	of the checksum in question.
--------------	------------------------------

3.6.3.5 bool Arc::DataBuffer::eof_read ()

Returns true if object was informed about end of transfer on 'read' side.

3.6.3.6 void Arc::DataBuffer::eof_read (bool v)

Informs object if there will be no more request for 'read' buffers. v true if no more requests.

3.6.3.7 void Arc::DataBuffer::eof_write (bool v)

Informs object if there will be no more request for 'write' buffers. v true if no more requests.

3.6.3.8 bool Arc::DataBuffer::eof_write ()

Returns true if object was informed about end of transfer on 'write' side.

3.6.3.9 bool Arc::DataBuffer::error ()

Returns true if object was informed about error or internal error occurred.

3.6.3.10 void Arc::DataBuffer::error_read (bool v)

Informs object if error occurred on 'read' side.

Parameters

<i>v</i>	true if error.
----------	----------------

3.6.3.11 void Arc::DataBuffer::error_write (bool v)

Informs object if error accured on 'write' side.

Parameters

<i>v</i>	true if error.
----------	----------------

3.6.3.12 bool Arc::DataBuffer::for_read (int & handle, unsigned int & length, bool wait)

Request buffer for READING INTO it.

Parameters

<i>handle</i>	returns buffer's number.
<i>length</i>	returns size of buffer
<i>wait</i>	if true and there are no free buffers, method will wait for one.

Returns

true on success

3.6.3.13 bool Arc::DataBuffer::for_read ()

Check if there are buffers which can be taken by [for_read\(\)](#). This function checks only for buffers and does not take eof and error conditions into account.

3.6.3.14 bool Arc::DataBuffer::for_write (int & handle, unsigned int & length, unsigned long long int & offset, bool wait)

Request buffer for WRITING FROM it.

Parameters

<i>handle</i>	returns buffer's number.
<i>length</i>	returns size of buffer
<i>wait</i>	if true and there are no free buffers, method will wait for one.

3.6.3.15 bool Arc::DataBuffer::for_write ()

Check if there are buffers which can be taken by [for_write\(\)](#). This function checks only for buffers and does not take eof and error conditions into account.

3.6.3.16 bool Arc::DataBuffer::is_notwritten (int handle)

Informs object that data was NOT written from buffer (and releases buffer).

Parameters

<i>handle</i>	buffer's number.
---------------	------------------

3.6.3.17 bool Arc::DataBuffer::is_notwritten (char * *buf*)

Informs object that data was NOT written from buffer (and releases buffer).

Parameters

<i>buf</i>	- address of buffer
------------	---------------------

3.6.3.18 bool Arc::DataBuffer::is_read (char * *buf*, unsigned int *length*, unsigned long long int *offset*)

Informs object that data was read into buffer.

Parameters

<i>buf</i>	- address of buffer
<i>length</i>	amount of data.
<i>offset</i>	offset in stream, file, etc.

3.6.3.19 bool Arc::DataBuffer::is_read (int *handle*, unsigned int *length*, unsigned long long int *offset*)

Informs object that data was read into buffer.

Parameters

<i>handle</i>	buffer's number.
<i>length</i>	amount of data.
<i>offset</i>	offset in stream, file, etc.

3.6.3.20 bool Arc::DataBuffer::is_written (int *handle*)

Informs object that data was written from buffer.

Parameters

<i>handle</i>	buffer's number.
---------------	------------------

3.6.3.21 bool Arc::DataBuffer::is_written (char * *buf*)

Informs object that data was written from buffer.

Parameters

<i>buf</i>	- address of buffer
------------	---------------------

3.6.3.22 `bool Arc::DataBuffer::set (CheckSum * cksum = NULL, unsigned int size = 65536, int blocks = 3)`

Reinitialize buffers with different parameters.

Parameters

<i>size</i>	size of every buffer in bytes.
<i>blocks</i>	number of buffers.
<i>cksum</i>	object which will compute checksum. Should not be destroyed till DataBuffer itself.

3.6.3.23 `bool Arc::DataBuffer::wait_any ()`

Wait (max 60 sec.) till any action happens in object. Returns true if action is eof on any side.

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

- `DataBuffer.h`

3.7 Arc::DataCallback Class Reference

This class is used by [DataHandle](#) to report missing space on local filesystem.

```
#include <DataCallback.h>
```

3.7.1 Detailed Description

This class is used by [DataHandle](#) to report missing space on local filesystem.

One of 'cb' functions here will be called if operation initiated by `DataHandle::StartReading` runs out of disk space.

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

- `DataCallback.h`

3.8 Arc::DataHandle Class Reference

This class is a wrapper around the [DataPoint](#) class.

```
#include <DataHandle.h>
```

Public Member Functions

- [DataHandle](#) (const URL &url, const UserConfig &usercfg)
- [~DataHandle](#) ()
- [DataPoint](#) * [operator->](#) ()
- const [DataPoint](#) * [operator->](#) () const
- [DataPoint](#) & [operator*](#) ()
- const [DataPoint](#) & [operator*](#) () const
- bool [operator!](#) () const
- [operator bool](#) () const

3.8.1 Detailed Description

This class is a wrapper around the [DataPoint](#) class.

It simplifies the construction, use and destruction of [DataPoint](#) objects and should be used instead of [DataPoint](#) classes directly. The appropriate [DataPoint](#) subclass is created automatically and stored internally in [DataHandle](#). A [DataHandle](#) instance can be thought of as a pointer to the [DataPoint](#) instance and the [DataPoint](#) can be accessed through the usual dereference operators. A [DataHandle](#) cannot be copied.

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

- DataHandle.h

3.9 Arc::DataMover Class Reference

[DataMover](#) provides an interface to transfer data between two DataPoints.

```
#include <DataMover.h>
```

Public Member Functions

- [DataMover](#) ()
- [~DataMover](#) ()
- [DataStatus Transfer](#) ([DataPoint](#) &source, [DataPoint](#) &destination, [FileCache](#) &cache, const [URLMap](#) &map, callback cb=NULL, void *arg=NULL, const char *prefix=NULL)
- [DataStatus Transfer](#) ([DataPoint](#) &source, [DataPoint](#) &destination, [FileCache](#) &cache, const [URLMap](#) &map, unsigned long long int min_speed, time_t min_speed_time, unsigned long long int min_average_speed, time_t max_inactivity_time, callback cb=NULL, void *arg=NULL, const char *prefix=NULL)
- [DataStatus Delete](#) ([DataPoint](#) &url, bool errcont=false)
- bool [verbose](#) ()
- void [verbose](#) (bool)
- void [verbose](#) (const std::string &prefix)
- bool [retry](#) ()

- void [retry](#) (bool)
- void [secure](#) (bool)
- void [passive](#) (bool)
- void [force_to_meta](#) (bool)
- bool [checks](#) ()
- void [checks](#) (bool v)
- void [set_default_min_speed](#) (unsigned long long int min_speed, time_t min_speed_time)
- void [set_default_min_average_speed](#) (unsigned long long int min_average_speed)
- void [set_default_max_inactivity_time](#) (time_t max_inactivity_time)
- void [set_progress_indicator](#) (DataSpeed::show_progress_t func=NULL)
- void [set_preferred_pattern](#) (const std::string &pattern)

3.9.1 Detailed Description

[DataMover](#) provides an interface to transfer data between two DataPoints.

Its main action is represented by Transfer methods

3.9.2 Member Function Documentation

3.9.2.1 bool Arc::DataMover::checks ()

Check if check for existence of remote file is done before initiating 'reading' and 'writing' operations.

3.9.2.2 void Arc::DataMover::checks (bool v)

Set if to make check for existence of remote file (and probably other checks too) before initiating 'reading' and 'writing' operations.

Parameters

v	true if allowed (default is true).
-------------------	------------------------------------

3.9.2.3 void Arc::DataMover::force_to_meta (bool)

Set if file should be transferred and registered even if such LFN is already registered and source is not one of registered locations.

3.9.2.4 void Arc::DataMover::secure (bool)

Set if high level of security (encryption) will be used during transfer if available.

3.9.2.5 `void Arc::DataMover::set_default_max_inactivity_time (time_t max_inactivity_time)`
`[inline]`

Set maximal allowed time for waiting for any data. For more information see description of [DataSpeed](#) class.

3.9.2.6 `void Arc::DataMover::set_default_min_average_speed (unsigned long long int min_average_speed)`
`[inline]`

Set minimal allowed average transfer speed (default is 0 averaged over whole time of transfer. For more information see description of [DataSpeed](#) class.

3.9.2.7 `void Arc::DataMover::set_default_min_speed (unsigned long long int min_speed, time_t min_speed_time)`
`[inline]`

Set minimal allowed transfer speed (default is 0) to '*min_speed*'. If speed drops below for time longer than '*min_speed_time*' error is raised. For more information see description of [DataSpeed](#) class.

3.9.2.8 `DataStream Arc::DataMover::Transfer (DataPoint & source, DataPoint & destination, FileCache & cache, const URLMap & map, callback cb = NULL, void * arg = NULL, const char * prefix = NULL)`

Initiates transfer from '*source*' to '*destination*'.

Parameters

<i>source</i>	source URL.
<i>destination</i>	destination URL.
<i>cache</i>	controls caching of downloaded files (if destination url is "file:///"). If caching is not needed default constructor FileCache() can be used.
<i>map</i>	URL mapping/conversion table (for ' <i>source</i> ' URL).
<i>cb</i>	if not NULL, transfer is done in separate thread and ' <i>cb</i> ' is called after transfer completes/fails.
<i>arg</i>	passed to ' <i>cb</i> '.
<i>prefix</i>	if ' <i>verbose</i> ' is activated this information will be printed before each line representing current transfer status.

3.9.2.9 `DataStream Arc::DataMover::Transfer (DataPoint & source, DataPoint & destination, FileCache & cache, const URLMap & map, unsigned long long int min_speed, time_t min_speed_time, unsigned long long int min_average_speed, time_t max_inactivity_time, callback cb = NULL, void * arg = NULL, const char * prefix = NULL)`

Initiates transfer from '*source*' to '*destination*'.

Parameters

<i>min_speed</i>	minimal allowed current speed.
<i>min_speed_time</i>	time for which speed should be less than 'min_speed' before transfer fails.
<i>min_average_speed</i>	minimal allowed average speed.
<i>max_inactivity_time</i>	time for which should be no activity before transfer fails.

3.9.2.10 void Arc::DataMover::verbose (const std::string & *prefix*)

Activate printing information about transfer status.

Parameters

<i>prefix</i>	use this string if 'prefix' in DataMover::Transfer is NULL.
---------------	---

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

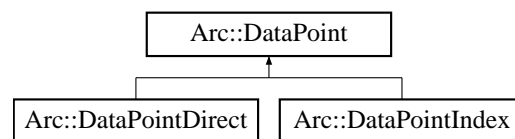
- DataMover.h

3.10 Arc::DataPoint Class Reference

A [DataPoint](#) represents a data resource and is an abstraction of a URL.

```
#include <DataPoint.h>
```

Inheritance diagram for Arc::DataPoint:

**Public Types**

- enum [DataPointAccessLatency](#) { [ACCESS_LATENCY_ZERO](#), [ACCESS_LATENCY_SMALL](#), [ACCESS_LATENCY_LARGE](#) }
- enum [DataPointInfoType](#) {
[INFO_TYPE_MINIMAL](#) = 0, [INFO_TYPE_NAME](#) = 1, [INFO_TYPE_TYPE](#) = 2,
[INFO_TYPE_TIMES](#) = 4,
[INFO_TYPE_CONTENT](#) = 8, [INFO_TYPE_ACCESS](#) = 16, [INFO_TYPE_STRUCT](#)
= 32, [INFO_TYPE_REST](#) = 64,

`INFO_TYPE_ALL = 127 }`

Public Member Functions

- virtual `~DataPoint ()`
- virtual const URL & `GetURL () const`
- virtual const UserConfig & `GetUserConfig () const`
- virtual bool `SetURL (const URL &url)`
- virtual std::string `str () const`
- virtual `operator bool () const`
- virtual `operator!` `() const`
- virtual `DataStatus PrepareReading` (unsigned int timeout, unsigned int &wait_time, const std::list< std::string > &transport_protocols)
- virtual `DataStatus PrepareWriting` (unsigned int timeout, unsigned int &wait_time, const std::list< std::string > &transport_protocols)
- virtual `DataStatus StartReading` (`DataBuffer` &buffer)=0
- virtual `DataStatus StartWriting` (`DataBuffer` &buffer, `DataCallback` *space_cb=NULL)=0
- virtual `DataStatus StopReading` ()=0
- virtual `DataStatus StopWriting` ()=0
- virtual `DataStatus FinishReading` (bool error=false)
- virtual `DataStatus FinishWriting` (bool error=false)
- virtual `DataStatus Check` ()=0
- virtual `DataStatus Remove` ()=0
- virtual `DataStatus Stat` (`FileInfo` &file, `DataPointInfoType` verb=INFO_TYPE_ALL)=0
- virtual `DataStatus List` (std::list< `FileInfo` > &files, `DataPointInfoType` verb=INFO_TYPE_ALL)=0
- virtual void `ReadOutOfOrder` (bool v)=0
- virtual bool `WriteOutOfOrder` ()=0
- virtual void `SetAdditionalChecks` (bool v)=0
- virtual bool `GetAdditionalChecks` () const =0
- virtual void `SetSecure` (bool v)=0
- virtual bool `GetSecure` () const =0
- virtual void `Passive` (bool v)=0
- virtual `DataStatus GetFailureReason` (void) const
- virtual void `Range` (unsigned long long int start=0, unsigned long long int end=0)=0
- virtual `DataStatus Resolve` (bool source)=0
- virtual bool `Registered` () const =0
- virtual `DataStatus PreRegister` (bool replication, bool force=false)=0
- virtual `DataStatus PostRegister` (bool replication)=0
- virtual `DataStatus PreUnregister` (bool replication)=0
- virtual `DataStatus Unregister` (bool all)=0
- virtual bool `CheckSize` () const
- virtual void `SetSize` (const unsigned long long int val)
- virtual unsigned long long int `GetSize` () const
- virtual bool `CheckChecksum` () const
- virtual void `SetChecksum` (const std::string &val)

- virtual const std::string & [GetChecksum](#) () const
- virtual const std::string [DefaultChecksum](#) () const
- virtual bool [CheckCreated](#) () const
- virtual void [SetCreated](#) (const Time &val)
- virtual const Time & [GetCreated](#) () const
- virtual bool [CheckValid](#) () const
- virtual void [SetValid](#) (const Time &val)
- virtual const Time & [GetValid](#) () const
- virtual void [SetAccessLatency](#) (const [DataPointAccessLatency](#) &latency)
- virtual [DataPointAccessLatency](#) [GetAccessLatency](#) () const
- virtual long long int [BufSize](#) () const =0
- virtual int [BufNum](#) () const =0
- virtual bool [Cache](#) () const
- virtual bool [Local](#) () const =0
- virtual int [GetTries](#) () const
- virtual void [SetTries](#) (const int n)
- virtual void [NextTry](#) (void)
- virtual bool [IsIndex](#) () const =0
- virtual bool [IsStageable](#) () const
- virtual bool [AcceptsMeta](#) () const =0
- virtual bool [ProvidesMeta](#) () const =0
- virtual void [SetMeta](#) (const [DataPoint](#) &p)
- virtual bool [CompareMeta](#) (const [DataPoint](#) &p) const
- virtual std::vector< URL > [TransferLocations](#) () const
- virtual const URL & [CurrentLocation](#) () const =0
- virtual const std::string & [CurrentLocationMetadata](#) () const =0
- virtual [DataStatus](#) [CompareLocationMetadata](#) () const =0
- virtual bool [NextLocation](#) ()=0
- virtual bool [LocationValid](#) () const =0
- virtual bool [LastLocation](#) ()=0
- virtual bool [HaveLocations](#) () const =0
- virtual [DataStatus](#) [AddLocation](#) (const URL &url, const std::string &meta)=0
- virtual [DataStatus](#) [RemoveLocation](#) ()=0
- virtual [DataStatus](#) [RemoveLocations](#) (const [DataPoint](#) &p)=0
- virtual [DataStatus](#) [ClearLocations](#) ()=0
- virtual int [AddChecksumObject](#) ([Checksum](#) *cksum)=0
- virtual const [Checksum](#) * [GetChecksumObject](#) (int index) const =0
- virtual void [SortLocations](#) (const std::string &pattern, const [URLMap](#) &url_map)=0

Protected Member Functions

- [DataPoint](#) (const URL &url, const UserConfig &usercfg)

Protected Attributes

- std::list< std::string > [valid_url_options](#)

3.10.1 Detailed Description

A [DataPoint](#) represents a data resource and is an abstraction of a URL.

[DataPoint](#) uses ARC's Plugin mechanism to dynamically load the required Data Manager Component (DMC) when necessary. A DMC typically defines a subclass of [DataPoint](#) (e.g. [DataPointHTTP](#)) and is responsible for a specific protocol (e.g. http). DataPoints should not be used directly, instead the [DataHandle](#) wrapper class should be used, which automatically loads the correct DMC.

[DataPoint](#) defines methods for access to the data resource. To transfer data between two DataPoints, [DataMover::Transfer\(\)](#) can be used.

There are two subclasses of [DataPoint](#), [DataPointDirect](#) and [DataPointIndex](#). None of these three classes can be instantiated directly. [DataPointDirect](#) and its subclasses handle "physical" resources through protocols such as file, http and gsiftp. These classes implement methods such as [StartReading\(\)](#) and [StartWriting\(\)](#). [DataPointIndex](#) and its subclasses handle resources such as indexes and catalogs and implement methods like [Resolve\(\)](#) and [PreRegister\(\)](#).

When creating a new DMC, a subclass of either [DataPointDirect](#) or [DataPointIndex](#) should be created, and the appropriate methods implemented. [DataPoint](#) itself has no direct external dependencies, but plugins may rely on third-party components. The new DMC must also add itself to the list of available plugins and provide an [Instance\(\)](#) method which returns a new instance of itself, if the supplied arguments are valid for the protocol. Here is an example implementation of a new DMC for protocol MyProtocol which represents a physical resource accessible through protocol my://

```
#include <arc/data/DataPointDirect.h>

namespace Arc {

class DataPointMyProtocol : public DataPointDirect {
public:
    DataPointMyProtocol(const URL& url, const UserConfig& usercfg);
    static Plugin* Instance(PluginArgument *arg);
    virtual DataStatus StartReading(DataBuffer& buffer);
    ...
};

DataPointMyProtocol::DataPointMyProtocol(const URL& url, const UserConfig& userc
fg) {
    ...
}

DataPointMyProtocol::StartReading(DataBuffer& buffer) { ... }

...

Plugin* DataPointMyProtocol::Instance(PluginArgument *arg) {
    DataPointPluginArgument *dmcarg = dynamic_cast<DataPointPluginArgument*>(arg);

    if (!dmcarg)
        return NULL;
    if ((const URL &)(*dmcarg)).Protocol() != "my")
        return NULL;
    return new DataPointMyProtocol(*dmcarg, *dmcarg);
}
```

```
} // namespace Arc

Arc::PluginDescriptor PLUGINS_TABLE_NAME[] = {
    { "my", "HED:DMC", 0, &Arc::DataPointMyProtocol::Instance },
    { NULL, NULL, 0, NULL }
};
```

3.10.2 Member Enumeration Documentation

3.10.2.1 enum Arc::DataPoint::DataPointAccessLatency

Describes the latency to access this URL.

For now this value is one of a small set specified by the enumeration. In the future with more sophisticated protocols or information it could be replaced by a more fine-grained list of possibilities such as an int value.

Enumerator:

ACCESS_LATENCY_ZERO URL can be accessed instantly.

ACCESS_LATENCY_SMALL URL has low (but non-zero) access latency, for example staged from disk.

ACCESS_LATENCY_LARGE URL has a large access latency, for example staged from tape.

3.10.2.2 enum Arc::DataPoint::DataPointInfoType

Describes type of information about URL to request.

Enumerator:

INFO_TYPE_MINIMAL Whatever protocol can get with no additional effort.

INFO_TYPE_NAME Only name of object (relative).

INFO_TYPE_TYPE Type of object - currently file or dir.

INFO_TYPE_TIMES Timestamps associated with object.

INFO_TYPE_CONTENT Metadata describing content, like size, checksum, etc.

INFO_TYPE_ACCESS Access control - ownership, permission, etc.

INFO_TYPE_STRUCT Fine structure - replicas, transfer locations, redirections.

INFO_TYPE_REST All the other parameters.

INFO_TYPE_ALL All the parameters.

3.10.3 Constructor & Destructor Documentation

3.10.3.1 `Arc::DataPoint::DataPoint (const URL & url, const UserConfig & usercfg)` [protected]

Constructor.

Constructor is protected because DataPoints should not be created directly. Subclasses should however call this in their constructors to set various common attributes.

Parameters

<i>url</i>	The URL representing the DataPoint
<i>usercfg</i>	User configuration object

3.10.4 Member Function Documentation

3.10.4.1 `virtual int Arc::DataPoint::AddChecksumObject (CheckSum * cksum)` [pure virtual]

Add a checksum object which will compute checksum during transmission.

Parameters

<i>cksum</i>	object which will compute checksum. Should not be destroyed till Data-Pointer itself.
--------------	---

Returns

integer position in the list of checksum objects.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.2 `virtual DataStatus Arc::DataPoint::AddLocation (const URL & url, const std::string & meta)` [pure virtual]

Add URL to list.

Parameters

<i>url</i>	Location URL to add.
<i>meta</i>	Location meta information.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.3 `virtual DataStatus Arc::DataPoint::Check ()` [pure virtual]

Query the [DataPoint](#) to check if object is accessible.

If possible this method will also try to provide meta information about the object. It returns positive response if object's content can be retrieved.

Implemented in [Arc::DataPointIndex](#).

3.10.4.4 `virtual DataStatus Arc::DataPoint::CompareLocationMetadata () const` [pure virtual]

Compare metadata of [DataPoint](#) and current location.

Returns inconsistency error or error encountered during operation, or success

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.5 `virtual bool Arc::DataPoint::CompareMeta (const DataPoint & p) const` [virtual]

Compare meta information from another object.

Undefined values are not used for comparison.

Parameters

<i>p</i>	object to which to compare.
----------	-----------------------------

3.10.4.6 `virtual const std::string& Arc::DataPoint::CurrentLocationMetadata () const` [pure virtual]

Returns meta information used to create current URL.

Usage differs between different indexing services.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.7 `virtual DataStatus Arc::DataPoint::FinishReading (bool error = false)` [virtual]

Finish reading from the URL.

Must be called after transfer of physical file has completed and if [PrepareReading\(\)](#) was called, to free resources, release requests that were made during preparation etc.

Parameters

<i>error</i>	If true then action is taken depending on the error.
--------------	--

Reimplemented in [Arc::DataPointIndex](#).

3.10.4.8 `virtual DataStatus Arc::DataPoint::FinishWriting (bool error = false)` [virtual]

Finish writing to the URL.

Must be called after transfer of physical file has completed and if [PrepareWriting\(\)](#) was called, to free resources, release requests that were made during preparation etc.

Parameters

<i>error</i>	If true then action is taken depending on the error.
--------------	--

Reimplemented in [Arc::DataPointIndex](#).

3.10.4.9 `virtual DataStatus Arc::DataPoint::GetFailureReason (void) const` `[virtual]`

Returns reason of transfer failure, as reported by callbacks. This could be different from the failure returned by the methods themselves.

3.10.4.10 `virtual DataStatus Arc::DataPoint::List (std::list< FileInfo > & files, DataPointInfoType verb = INFO_TYPE_ALL)` `[pure virtual]`

List hierarchical content of this object.

If the [DataPoint](#) represents a directory or something similar its contents will be listed.

Parameters

<i>files</i>	will contain list of file names and requested attributes. There may be more attributes than requested. There may be less if object can't provide particular information.
<i>verb</i>	defines attribute types which method must try to retrieve. It is not a failure if some attributes could not be retrieved due to limitation of protocol or access control.

3.10.4.11 `virtual bool Arc::DataPoint::NextLocation ()` `[pure virtual]`

Switch to next location in list of URLs.

At last location switch to first if number of allowed retries is not exceeded. Returns false if no retries left.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.12 `virtual void Arc::DataPoint::Passive (bool v)` `[pure virtual]`

Request passive transfers for FTP-like protocols.

Parameters

<i>true</i>	to request.
-------------	-------------

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.13 `virtual DataStatus Arc::DataPoint::PostRegister (bool replication)` `[pure virtual]`

Index Service postregistration.

Used for same purpose as PreRegister. Should be called after actual transfer of file successfully finished.

Parameters

<i>replication</i>	if true, the file is being replicated between two locations registered in Indexing Service under same name.
--------------------	---

Implemented in [Arc::DataPointDirect](#).

3.10.4.14 `virtual DataStatus Arc::DataPoint::PrepareReading (unsigned int timeout, unsigned int & wait_time, const std::list< std::string > & transport_protocols)` `[virtual]`

Prepare [DataPoint](#) for reading.

This method should be implemented by protocols which require preparation or staging of physical files for reading. It can act synchronously or asynchronously (if protocol supports it). In the first case the method will block until the file is prepared or the specified timeout has passed. In the second case the method can return with a ReadPrepareWait status before the file is prepared. The caller should then wait some time (a hint from the remote service may be given in *wait_time*) and call [PrepareReading\(\)](#) again to poll for the preparation status, until the file is prepared. In this case it is also up to the caller to decide when the request has taken too long and if so cancel it by calling [FinishReading\(\)](#). When file preparation has finished, the physical file(s) to read from can be found from [TransferLocations\(\)](#).

Parameters

<i>timeout</i>	If non-zero, this method will block until either the file has been prepared successfully or the timeout has passed. A zero value means that the caller would like to call and poll for status.
<i>wait_time</i>	If timeout is zero (caller would like asynchronous operation) and ReadPrepareWait is returned, a hint for how long to wait before a subsequent call may be given in <i>wait_time</i> .
<i>transport_protocols</i>	A list of possible transport protocols for the physical file in order of preference.

Reimplemented in [Arc::DataPointIndex](#).

3.10.4.15 `virtual DataStatus Arc::DataPoint::PrepareWriting (unsigned int timeout, unsigned int & wait_time, const std::list< std::string > & transport_protocols)` `[virtual]`

Prepare [DataPoint](#) for writing.

This method should be implemented by protocols which require preparation of physical files for writing. It can act synchronously or asynchronously (if protocol supports it). In the first case the method will block until the file is prepared or the specified timeout has passed. In the second case the method can return with a WritePrepareWait status before the file is prepared. The caller should then wait some time (a hint from the remote service may be given in wait_time) and call [PrepareWriting\(\)](#) again to poll for the preparation status, until the file is prepared. In this case it is also up to the caller to decide when the request has taken too long and if so cancel or abort it by calling FinishWriting(true). When file preparation has finished, the physical file(s) to write to can be found from [TransferLocations\(\)](#).

Parameters

<i>timeout</i>	If non-zero, this method will block until either the file has been prepared successfully or the timeout has passed. A zero value means that the caller would like to call and poll for status.
<i>wait_time</i>	If timeout is zero (caller would like asynchronous operation) and WritePrepareWait is returned, a hint for how long to wait before a subsequent call may be given in wait_time.
<i>transport_ - protocols</i>	A list of possible transport protocols for the physical file in order of preference.

Reimplemented in [Arc::DataPointIndex](#).

3.10.4.16 `virtual DataStatus Arc::DataPoint::PreRegister (bool replication, bool force = false) [pure virtual]`

Index service preregistration.

This function registers the physical location of a file into an indexing service. It should be called *before* the actual transfer to that location happens.

Parameters

<i>replication</i>	if true, the file is being replicated between two locations registered in the indexing service under same name.
<i>force</i>	if true, perform registration of a new file even if it already exists. Should be used to fix failures in Indexing Service.

Implemented in [Arc::DataPointDirect](#).

3.10.4.17 `virtual DataStatus Arc::DataPoint::PreUnregister (bool replication) [pure virtual]`

Index Service preunregistration.

Should be called if file transfer failed. It removes changes made by PreRegister.

Parameters

<i>replication</i>	if true, the file is being replicated between two locations registered in Indexing Service under same name.
--------------------	---

Implemented in [Arc::DataPointDirect](#).

3.10.4.18 `virtual bool Arc::DataPoint::ProvidesMeta () const [pure virtual]`

If endpoint can provide at least some meta information directly.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.19 `virtual void Arc::DataPoint::Range (unsigned long long int start = 0, unsigned long long int end = 0) [pure virtual]`

Set range of bytes to retrieve.

Default values correspond to whole file.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.20 `virtual void Arc::DataPoint::ReadOutOfOrder (bool v) [pure virtual]`

Allow/disallow [DataPoint](#) to produce scattered data during reading* operation.

Parameters

<i>v</i>	true if allowed (default is false).
----------	-------------------------------------

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.21 `virtual bool Arc::DataPoint::Registered () const [pure virtual]`

Check if file is registered in Indexing Service.

Proper value is obtainable only after Resolve.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.22 `virtual DataStatus Arc::DataPoint::Resolve (bool source) [pure virtual]`

Resolves index service URL into list of ordinary URLs.

Also obtains meta information about the file.

Parameters

<i>source</i>	true if DataPoint object represents source of information.
---------------	--

Implemented in [Arc::DataPointDirect](#).

3.10.4.23 `virtual void Arc::DataPoint::SetAdditionalChecks (bool v) [pure virtual]`

Allow/disallow additional checks.

Check for existence of remote file (and probably other checks too) before initiating reading and writing operations.

Parameters

<code>v</code>	true if allowed (default is true).
----------------	------------------------------------

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.24 `virtual void Arc::DataPoint::SetMeta (const DataPoint & p) [virtual]`

Copy meta information from another object.

Already defined values are not overwritten.

Parameters

<code>p</code>	object from which information is taken.
----------------	---

Reimplemented in [Arc::DataPointIndex](#).

3.10.4.25 `virtual void Arc::DataPoint::SetSecure (bool v) [pure virtual]`

Allow/disallow heavy security during data transfer.

Parameters

<code>v</code>	true if allowed (default depends on protocol).
----------------	--

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.26 `virtual bool Arc::DataPoint::SetURL (const URL & url) [virtual]`

Assigns new URL. Main purpose of this method is to reuse existing connection for accessing different object at same server. Implementation does not have to implement this method. If supplied URL is not suitable or method is not implemented false is returned.

3.10.4.27 `virtual void Arc::DataPoint::SortLocations (const std::string & pattern, const URLMap & url_map) [pure virtual]`

Sort locations according to the specified pattern.

Parameters

<i>pattern</i>	a set of strings, separated by , to match against.
----------------	---

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.4.28 `virtual DataStatus Arc::DataPoint::StartReading (DataBuffer & buffer) [pure virtual]`

Start reading data from URL.

Separate thread to transfer data will be created. No other operation can be performed while reading is in progress.

Parameters

<i>buffer</i>	operation will use this buffer to put information into. Should not be destroyed before StopReading() was called and returned.
---------------	---

Implemented in [Arc::DataPointIndex](#).

3.10.4.29 `virtual DataStatus Arc::DataPoint::StartWriting (DataBuffer & buffer, DataCallback * space_cb = NULL) [pure virtual]`

Start writing data to URL.

Separate thread to transfer data will be created. No other operation can be performed while writing is in progress.

Parameters

<i>buffer</i>	operation will use this buffer to get information from. Should not be destroyed before stop_writing was called and returned.
<i>space_cb</i>	callback which is called if there is not enough space to store data. May not implemented for all protocols.

Implemented in [Arc::DataPointIndex](#).

3.10.4.30 `virtual DataStatus Arc::DataPoint::Stat (FileInfo & file, DataPointInfoType verb = INFO_TYPE_ALL) [pure virtual]`

Retrieve information about this object.

If the [DataPoint](#) represents a directory or something similar, information about the object itself and not its contents will be obtained.

Parameters

<i>file</i>	will contain object name and requested attributes. There may be more attributes than requested. There may be less if object can't provide particular information.
-------------	---

<i>verb</i>	defines attribute types which method must try to retrieve. It is not a failure if some attributes could not be retrieved due to limitation of protocol or access control.
-------------	---

3.10.4.31 `virtual DataStatus Arc::DataPoint::StopReading () [pure virtual]`

Stop reading.

Must be called after corresponding `start_reading` method, either after all data is transferred or to cancel transfer. Use buffer object to find out when data is transferred. Must return failure if any happened during transfer.

Implemented in [Arc::DataPointIndex](#).

3.10.4.32 `virtual DataStatus Arc::DataPoint::StopWriting () [pure virtual]`

Stop writing.

Must be called after corresponding `start_writing` method, either after all data is transferred or to cancel transfer. Use buffer object to find out when data is transferred. Must return failure if any happened during transfer.

Implemented in [Arc::DataPointIndex](#).

3.10.4.33 `virtual std::vector<URL> Arc::DataPoint::TransferLocations () const [virtual]`

Returns physical file(s) to read/write, if different from [CurrentLocation\(\)](#)

To be used with protocols which re-direct to different URLs such as Transport URLs (TURLs). The list is initially filled by `PrepareReading` and `PrepareWriting`. If this list is non-empty then real transfer should use a URL from this list. It is up to the caller to choose the best URL and instantiate new [DataPoint](#) for handling it. For consistency protocols which do not require redirections return original URL. For protocols which need redirection calling `StartReading` and `StartWriting` will use first URL in the list.

Reimplemented in [Arc::DataPointIndex](#).

3.10.4.34 `virtual DataStatus Arc::DataPoint::Unregister (bool all) [pure virtual]`

Index Service unregistration.

Remove information about file registered in Indexing Service.

Parameters

<i>all</i>	if true, information about file itself is (LFN) is removed. Otherwise only particular physical instance is unregistered.
------------	--

Implemented in [Arc::DataPointDirect](#).

3.10.4.35 `virtual bool Arc::DataPoint::WriteOutOfOrder () [pure virtual]`

Returns true if URL can accept scattered data for *writing* operation.

Implemented in [Arc::DataPointDirect](#), and [Arc::DataPointIndex](#).

3.10.5 Field Documentation

3.10.5.1 `std::list<std::string> Arc::DataPoint::valid_url_options [protected]`

Subclasses should add their own specific options to this list

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

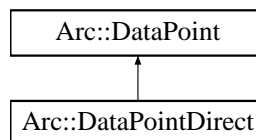
- [DataPoint.h](#)

3.11 Arc::DataPointDirect Class Reference

This is a kind of generalized file handle.

```
#include <DataPointDirect.h>
```

Inheritance diagram for Arc::DataPointDirect:



Public Member Functions

- virtual bool [IsIndex](#) () const
- virtual bool [IsStageable](#) () const
- virtual long long int [BufSize](#) () const
- virtual int [BufNum](#) () const
- virtual bool [Local](#) () const
- virtual void [ReadOutOfOrder](#) (bool v)
- virtual bool [WriteOutOfOrder](#) ()
- virtual void [SetAdditionalChecks](#) (bool v)
- virtual bool [GetAdditionalChecks](#) () const
- virtual void [SetSecure](#) (bool v)
- virtual bool [GetSecure](#) () const
- virtual void [Passive](#) (bool v)

- virtual void [Range](#) (unsigned long long int start=0, unsigned long long int end=0)
- virtual int [AddChecksumObject](#) ([Checksum](#) *cksum)
- virtual const [Checksum](#) * [GetChecksumObject](#) (int index) const
- virtual [DataStatus](#) [Resolve](#) (bool source)
- virtual bool [Registered](#) () const
- virtual [DataStatus](#) [PreRegister](#) (bool replication, bool force=false)
- virtual [DataStatus](#) [PostRegister](#) (bool replication)
- virtual [DataStatus](#) [PreUnregister](#) (bool replication)
- virtual [DataStatus](#) [Unregister](#) (bool all)
- virtual bool [AcceptsMeta](#) () const
- virtual bool [ProvidesMeta](#) () const
- virtual const URL & [CurrentLocation](#) () const
- virtual const std::string & [CurrentLocationMetadata](#) () const
- virtual [DataStatus](#) [CompareLocationMetadata](#) () const
- virtual bool [NextLocation](#) ()
- virtual bool [LocationValid](#) () const
- virtual bool [HaveLocations](#) () const
- virtual bool [LastLocation](#) ()
- virtual [DataStatus](#) [AddLocation](#) (const URL &url, const std::string &meta)
- virtual [DataStatus](#) [RemoveLocation](#) ()
- virtual [DataStatus](#) [RemoveLocations](#) (const [DataPoint](#) &p)
- virtual [DataStatus](#) [ClearLocations](#) ()
- virtual void [SortLocations](#) (const std::string &, const [URLMap](#) &)

3.11.1 Detailed Description

This is a kind of generalized file handle.

Differently from file handle it does not support operations `read()` and `write()`. Instead it initiates operation and uses object of class [DataBuffer](#) to pass actual data. It also provides other operations like querying parameters of remote object. It is used by higher-level classes `DataMove` and `DataMovePar` to provide data transfer service for application.

3.11.2 Member Function Documentation

3.11.2.1 `virtual int Arc::DataPointDirect::AddChecksumObject (Checksum * cksum)`
`[virtual]`

Add a checksum object which will compute checksum during transmission.

Parameters

<i>cksum</i>	object which will compute checksum. Should not be destroyed till <code>Data-Pointer</code> itself.
--------------	--

Returns

integer position in the list of checksum objects.

Implements [Arc::DataPoint](#).

3.11.2.2 `virtual DataStatus Arc::DataPointDirect::AddLocation (const URL & url, const std::string & meta) [virtual]`

Add URL to list.

Parameters

<i>url</i>	Location URL to add.
<i>meta</i>	Location meta information.

Implements [Arc::DataPoint](#).

3.11.2.3 `virtual DataStatus Arc::DataPointDirect::CompareLocationMetadata () const [virtual]`

Compare metadata of [DataPoint](#) and current location.

Returns inconsistency error or error encountered during operation, or success

Implements [Arc::DataPoint](#).

3.11.2.4 `virtual const std::string& Arc::DataPointDirect::CurrentLocationMetadata () const [virtual]`

Returns meta information used to create current URL.

Usage differs between different indexing services.

Implements [Arc::DataPoint](#).

3.11.2.5 `virtual bool Arc::DataPointDirect::NextLocation () [virtual]`

Switch to next location in list of URLs.

At last location switch to first if number of allowed retries is not exceeded. Returns false if no retries left.

Implements [Arc::DataPoint](#).

3.11.2.6 `virtual void Arc::DataPointDirect::Passive (bool v) [virtual]`

Request passive transfers for FTP-like protocols.

Parameters

<i>true</i>	to request.
-------------	-------------

Implements [Arc::DataPoint](#).

3.11.2.7 `virtual DataStatus Arc::DataPointDirect::PostRegister (bool replication)`
`[virtual]`

Index Service postregistration.

Used for same purpose as PreRegister. Should be called after actual transfer of file successfully finished.

Parameters

<i>replication</i>	if true, the file is being replicated between two locations registered in Indexing Service under same name.
--------------------	---

Implements [Arc::DataPoint](#).

3.11.2.8 `virtual DataStatus Arc::DataPointDirect::PreRegister (bool replication, bool force = false)`
`[virtual]`

Index service preregistration.

This function registers the physical location of a file into an indexing service. It should be called **before** the actual transfer to that location happens.

Parameters

<i>replication</i>	if true, the file is being replicated between two locations registered in the indexing service under same name.
<i>force</i>	if true, perform registration of a new file even if it already exists. Should be used to fix failures in Indexing Service.

Implements [Arc::DataPoint](#).

3.11.2.9 `virtual DataStatus Arc::DataPointDirect::PreUnregister (bool replication)`
`[virtual]`

Index Service preunregistration.

Should be called if file transfer failed. It removes changes made by PreRegister.

Parameters

<i>replication</i>	if true, the file is being replicated between two locations registered in Indexing Service under same name.
--------------------	---

Implements [Arc::DataPoint](#).

3.11.2.10 `virtual bool Arc::DataPointDirect::ProvidesMeta () const [virtual]`

If endpoint can provide at least some meta information directly.

Implements [Arc::DataPoint](#).

3.11.2.11 `virtual void Arc::DataPointDirect::Range (unsigned long long int start = 0, unsigned long long int end = 0) [virtual]`

Set range of bytes to retrieve.

Default values correspond to whole file.

Implements [Arc::DataPoint](#).

3.11.2.12 `virtual void Arc::DataPointDirect::ReadOutOfOrder (bool v) [virtual]`

Allow/disallow [DataPoint](#) to produce scattered data during reading* operation.

Parameters

<i>v</i>	true if allowed (default is false).
----------	-------------------------------------

Implements [Arc::DataPoint](#).

3.11.2.13 `virtual bool Arc::DataPointDirect::Registered () const [virtual]`

Check if file is registered in Indexing Service.

Proper value is obtainable only after Resolve.

Implements [Arc::DataPoint](#).

3.11.2.14 `virtual DataStatus Arc::DataPointDirect::Resolve (bool source) [virtual]`

Resolves index service URL into list of ordinary URLs.

Also obtains meta information about the file.

Parameters

<i>source</i>	true if DataPoint object represents source of information.
---------------	--

Implements [Arc::DataPoint](#).

3.11.2.15 `virtual void Arc::DataPointDirect::SetAdditionalChecks (bool v) [virtual]`

Allow/disallow additional checks.

Check for existence of remote file (and probably other checks too) before initiating reading and writing operations.

Parameters

<i>v</i>	true if allowed (default is true).
----------	------------------------------------

Implements [Arc::DataPoint](#).

3.11.2.16 `virtual void Arc::DataPointDirect::SetSecure (bool v)` `[virtual]`

Allow/disallow heavy security during data transfer.

Parameters

<i>v</i>	true if allowed (default depends on protocol).
----------	--

Implements [Arc::DataPoint](#).

3.11.2.17 `virtual void Arc::DataPointDirect::SortLocations (const std::string & pattern, const URLMap & url_map)` `[inline, virtual]`

Sort locations according to the specified pattern.

Parameters

<i>pattern</i>	a set of strings, separated by , to match against.
----------------	---

Implements [Arc::DataPoint](#).

3.11.2.18 `virtual DataStatus Arc::DataPointDirect::Unregister (bool all)` `[virtual]`

Index Service unregistration.

Remove information about file registered in Indexing Service.

Parameters

<i>all</i>	if true, information about file itself is (LFN) is removed. Otherwise only particular physical instance is unregistered.
------------	--

Implements [Arc::DataPoint](#).

3.11.2.19 `virtual bool Arc::DataPointDirect::WriteOutOfOrder ()` `[virtual]`

Returns true if URL can accept scattered data for *writing* operation.

Implements [Arc::DataPoint](#).

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

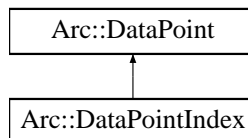
- DataPointDirect.h

3.12 Arc::DataPointIndex Class Reference

Complements [DataPoint](#) with attributes common for Indexing Service URLs.

```
#include <DataPointIndex.h>
```

Inheritance diagram for Arc::DataPointIndex:



Public Member Functions

- virtual const URL & [CurrentLocation](#) () const
- virtual const std::string & [CurrentLocationMetadata](#) () const
- virtual [DataStatus CompareLocationMetadata](#) () const
- virtual bool [NextLocation](#) ()
- virtual bool [LocationValid](#) () const
- virtual bool [HaveLocations](#) () const
- virtual bool [LastLocation](#) ()
- virtual [DataStatus RemoveLocation](#) ()
- virtual [DataStatus RemoveLocations](#) (const [DataPoint](#) &p)
- virtual [DataStatus ClearLocations](#) ()
- virtual [DataStatus AddLocation](#) (const URL &url, const std::string &meta)
- virtual void [SortLocations](#) (const std::string &pattern, const [URLMap](#) &url_map)
- virtual bool [IsIndex](#) () const
- virtual bool [IsStageable](#) () const
- virtual bool [AcceptsMeta](#) () const
- virtual bool [ProvidesMeta](#) () const
- virtual void [SetMeta](#) (const [DataPoint](#) &p)
- virtual void [SetChecksum](#) (const std::string &val)
- virtual void [SetSize](#) (const unsigned long long int val)
- virtual bool [Registered](#) () const
- virtual void [SetTries](#) (const int n)
- virtual long long int [BufSize](#) () const
- virtual int [BufNum](#) () const
- virtual bool [Local](#) () const
- virtual [DataStatus PrepareReading](#) (unsigned int timeout, unsigned int &wait_time, const std::list< std::string > &transport_protocols)
- virtual [DataStatus PrepareWriting](#) (unsigned int timeout, unsigned int &wait_time, const std::list< std::string > &transport_protocols)
- virtual [DataStatus StartReading](#) ([DataBuffer](#) &buffer)
- virtual [DataStatus StartWriting](#) ([DataBuffer](#) &buffer, [DataCallback](#) *space_cb=NULL)
- virtual [DataStatus StopReading](#) ()

- virtual [DataStatus StopWriting](#) ()
- virtual [DataStatus FinishReading](#) (bool error=false)
- virtual [DataStatus FinishWriting](#) (bool error=false)
- virtual std::vector< URL > [TransferLocations](#) () const
- virtual [DataStatus Check](#) ()
- virtual [DataStatus Remove](#) ()
- virtual void [ReadOutOfOrder](#) (bool v)
- virtual bool [WriteOutOfOrder](#) ()
- virtual void [SetAdditionalChecks](#) (bool v)
- virtual bool [GetAdditionalChecks](#) () const
- virtual void [SetSecure](#) (bool v)
- virtual bool [GetSecure](#) () const
- virtual [DataPointAccessLatency GetAccessLatency](#) () const
- virtual void [Passive](#) (bool v)
- virtual void [Range](#) (unsigned long long int start=0, unsigned long long int end=0)
- virtual int [AddChecksumObject](#) ([Checksum](#) *cksum)
- virtual const [Checksum](#) * [GetChecksumObject](#) (int index) const

3.12.1 Detailed Description

Complements [DataPoint](#) with attributes common for Indexing Service URLs.

It should never be used directly. Instead inherit from it to provide a class for specific a Indexing Service.

3.12.2 Member Function Documentation

3.12.2.1 virtual int [Arc::DataPointIndex::AddChecksumObject](#) ([Checksum](#) * *cksum*)
[virtual]

Add a checksum object which will compute checksum during transmission.

Parameters

<i>cksum</i>	object which will compute checksum. Should not be destroyed till Data-Pointer itself.
--------------	---

Returns

integer position in the list of checksum objects.

Implements [Arc::DataPoint](#).

3.12.2.2 virtual [DataStatus](#) [Arc::DataPointIndex::AddLocation](#) (const URL & *url*, const std::string & *meta*) [virtual]

Add URL to list.

Parameters

<i>url</i>	Location URL to add.
<i>meta</i>	Location meta information.

Implements [Arc::DataPoint](#).

3.12.2.3 virtual **DataStatus** Arc::DataPointIndex::Check () [virtual]

Query the [DataPoint](#) to check if object is accessible.

If possible this method will also try to provide meta information about the object. It returns positive response if object's content can be retrieved.

Implements [Arc::DataPoint](#).

3.12.2.4 virtual **DataStatus** Arc::DataPointIndex::CompareLocationMetadata () const [virtual]

Compare metadata of [DataPoint](#) and current location.

Returns inconsistency error or error encountered during operation, or success

Implements [Arc::DataPoint](#).

3.12.2.5 virtual const std::string& Arc::DataPointIndex::CurrentLocationMetadata () const [virtual]

Returns meta information used to create current URL.

Usage differs between different indexing services.

Implements [Arc::DataPoint](#).

3.12.2.6 virtual **DataStatus** Arc::DataPointIndex::FinishReading (bool *error* = false) [virtual]

Finish reading from the URL.

Must be called after transfer of physical file has completed and if [PrepareReading\(\)](#) was called, to free resources, release requests that were made during preparation etc.

Parameters

<i>error</i>	If true then action is taken depending on the error.
--------------	--

Reimplemented from [Arc::DataPoint](#).

3.12.2.7 `virtual DataStatus Arc::DataPointIndex::FinishWriting (bool error = false)`
`[virtual]`

Finish writing to the URL.

Must be called after transfer of physical file has completed and if [PrepareWriting\(\)](#) was called, to free resources, release requests that were made during preparation etc.

Parameters

<i>error</i>	If true then action is taken depending on the error.
--------------	--

Reimplemented from [Arc::DataPoint](#).

3.12.2.8 `virtual bool Arc::DataPointIndex::NextLocation ()` `[virtual]`

Switch to next location in list of URLs.

At last location switch to first if number of allowed retries is not exceeded. Returns false if no retries left.

Implements [Arc::DataPoint](#).

3.12.2.9 `virtual void Arc::DataPointIndex::Passive (bool v)` `[virtual]`

Request passive transfers for FTP-like protocols.

Parameters

<i>true</i>	to request.
-------------	-------------

Implements [Arc::DataPoint](#).

3.12.2.10 `virtual DataStatus Arc::DataPointIndex::PrepareReading (unsigned int timeout, unsigned int & wait_time, const std::list< std::string > & transport_protocols)`
`[virtual]`

Prepare [DataPoint](#) for reading.

This method should be implemented by protocols which require preparation or staging of physical files for reading. It can act synchronously or asynchronously (if protocol supports it). In the first case the method will block until the file is prepared or the specified timeout has passed. In the second case the method can return with a ReadPrepareWait status before the file is prepared. The caller should then wait some time (a hint from the remote service may be given in *wait_time*) and call [PrepareReading\(\)](#) again to poll for the preparation status, until the file is prepared. In this case it is also up to the caller to decide when the request has taken too long and if so cancel it by calling [FinishReading\(\)](#). When file preparation has finished, the physical file(s) to read from can be found from [TransferLocations\(\)](#).

Parameters

<i>timeout</i>	If non-zero, this method will block until either the file has been prepared successfully or the timeout has passed. A zero value means that the caller would like to call and poll for status.
<i>wait_time</i>	If timeout is zero (caller would like asynchronous operation) and ReadPrepareWait is returned, a hint for how long to wait before a subsequent call may be given in wait_time.
<i>transport_protocols</i>	A list of possible transport protocols for the physical file in order of preference.

Reimplemented from [Arc::DataPoint](#).

3.12.2.11 `virtual DataStatus Arc::DataPointIndex::PrepareWriting (unsigned int timeout, unsigned int & wait_time, const std::list< std::string > & transport_protocols)`
`[virtual]`

Prepare [DataPoint](#) for writing.

This method should be implemented by protocols which require preparation of physical files for writing. It can act synchronously or asynchronously (if protocol supports it). In the first case the method will block until the file is prepared or the specified timeout has passed. In the second case the method can return with a WritePrepareWait status before the file is prepared. The caller should then wait some time (a hint from the remote service may be given in wait_time) and call [PrepareWriting\(\)](#) again to poll for the preparation status, until the file is prepared. In this case it is also up to the caller to decide when the request has taken too long and if so cancel or abort it by calling [FinishWriting\(true\)](#). When file preparation has finished, the physical file(s) to write to can be found from [TransferLocations\(\)](#).

Parameters

<i>timeout</i>	If non-zero, this method will block until either the file has been prepared successfully or the timeout has passed. A zero value means that the caller would like to call and poll for status.
<i>wait_time</i>	If timeout is zero (caller would like asynchronous operation) and WritePrepareWait is returned, a hint for how long to wait before a subsequent call may be given in wait_time.
<i>transport_protocols</i>	A list of possible transport protocols for the physical file in order of preference.

Reimplemented from [Arc::DataPoint](#).

3.12.2.12 `virtual bool Arc::DataPointIndex::ProvidesMeta () const` `[virtual]`

If endpoint can provide at least some meta information directly.

Implements [Arc::DataPoint](#).

3.12.2.13 `virtual void Arc::DataPointIndex::Range (unsigned long long int start = 0, unsigned long long int end = 0) [virtual]`

Set range of bytes to retrieve.

Default values correspond to whole file.

Implements [Arc::DataPoint](#).

3.12.2.14 `virtual void Arc::DataPointIndex::ReadOutOfOrder (bool v) [virtual]`

Allow/disallow [DataPoint](#) to produce scattered data during reading* operation.

Parameters

<i>v</i>	true if allowed (default is false).
----------	-------------------------------------

Implements [Arc::DataPoint](#).

3.12.2.15 `virtual bool Arc::DataPointIndex::Registered () const [virtual]`

Check if file is registered in Indexing Service.

Proper value is obtainable only after Resolve.

Implements [Arc::DataPoint](#).

3.12.2.16 `virtual void Arc::DataPointIndex::SetAdditionalChecks (bool v) [virtual]`

Allow/disallow additional checks.

Check for existence of remote file (and probably other checks too) before initiating reading and writing operations.

Parameters

<i>v</i>	true if allowed (default is true).
----------	------------------------------------

Implements [Arc::DataPoint](#).

3.12.2.17 `virtual void Arc::DataPointIndex::SetMeta (const DataPoint & p) [virtual]`

Copy meta information from another object.

Already defined values are not overwritten.

Parameters

<i>p</i>	object from which information is taken.
----------	---

Reimplemented from [Arc::DataPoint](#).

3.12.2.18 `virtual void Arc::DataPointIndex::SetSecure (bool v) [virtual]`

Allow/disallow heavy security during data transfer.

Parameters

<i>v</i>	true if allowed (default depends on protocol).
----------	--

Implements [Arc::DataPoint](#).

3.12.2.19 `virtual void Arc::DataPointIndex::SortLocations (const std::string & pattern, const URLMap & url.map) [virtual]`

Sort locations according to the specified pattern.

Parameters

<i>pattern</i>	a set of strings, separated by , to match against.
----------------	---

Implements [Arc::DataPoint](#).

3.12.2.20 `virtual DataStatus Arc::DataPointIndex::StartReading (DataBuffer & buffer) [virtual]`

Start reading data from URL.

Separate thread to transfer data will be created. No other operation can be performed while reading is in progress.

Parameters

<i>buffer</i>	operation will use this buffer to put information into. Should not be destroyed before StopReading() was called and returned.
---------------	---

Implements [Arc::DataPoint](#).

3.12.2.21 `virtual DataStatus Arc::DataPointIndex::StartWriting (DataBuffer & buffer, DataCallback * space.cb = NULL) [virtual]`

Start writing data to URL.

Separate thread to transfer data will be created. No other operation can be performed while writing is in progress.

Parameters

<i>buffer</i>	operation will use this buffer to get information from. Should not be destroyed before stop_writing was called and returned.
<i>space.cb</i>	callback which is called if there is not enough space to store data. May not implemented for all protocols.

Implements [Arc::DataPoint](#).

3.12.2.22 `virtual DataStatus Arc::DataPointIndex::StopReading () [virtual]`

Stop reading.

Must be called after corresponding start_reading method, either after all data is transferred or to cancel transfer. Use buffer object to find out when data is transferred. Must return failure if any happened during transfer.

Implements [Arc::DataPoint](#).

3.12.2.23 `virtual DataStatus Arc::DataPointIndex::StopWriting () [virtual]`

Stop writing.

Must be called after corresponding start_writing method, either after all data is transferred or to cancel transfer. Use buffer object to find out when data is transferred. Must return failure if any happened during transfer.

Implements [Arc::DataPoint](#).

3.12.2.24 `virtual std::vector<URL> Arc::DataPointIndex::TransferLocations () const [virtual]`

Returns physical file(s) to read/write, if different from [CurrentLocation\(\)](#)

To be used with protocols which re-direct to different URLs such as Transport URLs (TURLs). The list is initially filled by PrepareReading and PrepareWriting. If this list is non-empty then real transfer should use a URL from this list. It is up to the caller to choose the best URL and instantiate new [DataPoint](#) for handling it. For consistency protocols which do not require redirections return original URL. For protocols which need redirection calling StartReading and StartWriting will use first URL in the list.

Reimplemented from [Arc::DataPoint](#).

3.12.2.25 `virtual bool Arc::DataPointIndex::WriteOutOfOrder () [virtual]`

Returns true if URL can accept scattered data for *writing* operation.

Implements [Arc::DataPoint](#).

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

- DataPointIndex.h

3.13 Arc::DataPointLoader Class Reference

Class used by [DataHandle](#) to load the required DMC.

```
#include <DataPoint.h>
```

3.13.1 Detailed Description

Class used by [DataHandle](#) to load the required DMC.

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

- DataPoint.h

3.14 Arc::DataPointPluginArgument Class Reference

Class representing the arguments passed to DMC plugins.

```
#include <DataPoint.h>
```

3.14.1 Detailed Description

Class representing the arguments passed to DMC plugins.

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

- DataPoint.h

3.15 Arc::DataSpeed Class Reference

Keeps track of average and instantaneous transfer speed.

```
#include <DataSpeed.h>
```

Public Member Functions

- [DataSpeed](#) (time_t base=DATASPEED_AVERAGING_PERIOD)
- [DataSpeed](#) (unsigned long long int min_speed, time_t min_speed_time, unsigned long long int min_average_speed, time_t max_inactivity_time, time_t base=DATASPEED_AVERAGING_PERIOD)
- [~DataSpeed](#) (void)
- void [verbose](#) (bool val)
- void [verbose](#) (const std::string &prefix)
- bool [verbose](#) (void)
- void [set_min_speed](#) (unsigned long long int min_speed, time_t min_speed_time)
- void [set_min_average_speed](#) (unsigned long long int min_average_speed)
- void [set_max_inactivity_time](#) (time_t max_inactivity_time)
- time_t [get_max_inactivity_time](#) ()
- void [set_base](#) (time_t base_=DATASPEED_AVERAGING_PERIOD)

- void [set_max_data](#) (unsigned long long int max=0)
- void [set_progress_indicator](#) (show_progress_t func=NULL)
- void [reset](#) (void)
- bool [transfer](#) (unsigned long long int n=0)
- void [hold](#) (bool disable)
- bool [min_speed_failure](#) ()
- bool [min_average_speed_failure](#) ()
- bool [max_inactivity_time_failure](#) ()
- unsigned long long int [transferred_size](#) (void)

3.15.1 Detailed Description

Keeps track of average and instantaneous transfer speed.

Also detects data transfer inactivity and other transfer timeouts.

3.15.2 Constructor & Destructor Documentation

3.15.2.1 `Arc::DataSpeed::DataSpeed (time_t base = DATASPEED_AVERAGING_PERIOD)`

Constructor

Parameters

<i>base</i>	time period used to average values (default 1 minute).
-------------	--

3.15.2.2 `Arc::DataSpeed::DataSpeed (unsigned long long int min_speed, time_t min_speed_time, unsigned long long int min_average_speed, time_t max_inactivity_time, time_t base = DATASPEED_AVERAGING_PERIOD)`

Constructor

Parameters

<i>base</i>	time period used to average values (default 1 minute).
<i>min_speed</i>	minimal allowed speed (Bytes per second). If speed drops and holds below threshold for <i>min_speed_time</i> seconds error is triggered.
<i>min_speed_time</i>	
<i>min_average_speed</i>	minimal average speed (Bytes per second) to trigger error. Averaged over whole current transfer time.
<i>max_inactivity_time</i>	- if no data is passing for specified amount of time (seconds), error is triggered.

3.15.3 Member Function Documentation

3.15.3.1 void Arc::DataSpeed::hold (bool *disable*)

Turn off speed control.

Parameters

<i>disable</i>	true to turn off.
----------------	-------------------

3.15.3.2 void Arc::DataSpeed::set_base (time_t *base* = DATASPEED_AVERAGING_PERIOD)

Set averaging time period.

Parameters

<i>base</i>	time period used to average values (default 1 minute).
-------------	--

3.15.3.3 void Arc::DataSpeed::set_max_data (unsigned long long int *max* = 0)

Set amount of data to be transferred. Used in verbose messages.

Parameters

<i>max</i>	amount of data in bytes.
------------	--------------------------

3.15.3.4 void Arc::DataSpeed::set_max_inactivity_time (time_t *max_inactivity_time*)

Set inactivity timeout.

Parameters

<i>max_inactivity_time</i>	- if no data is passing for specified amount of time (seconds), error is triggered.
----------------------------	---

3.15.3.5 void Arc::DataSpeed::set_min_average_speed (unsigned long long int *min_average_speed*)

Set minimal average speed.

Parameters

<i>min_average_speed</i>	minimal average speed (Bytes per second) to trigger error. Averaged over whole current transfer time.
--------------------------	---

3.15.3.6 `void Arc::DataSpeed::set_min_speed (unsigned long long int min_speed, time_t min_speed_time)`

Set minimal allowed speed.

Parameters

<i>min_speed</i>	minimal allowed speed (Butes per second). If speed drops and holds below threshold for <i>min_speed_time</i> seconds error is triggered.
<i>min_speed_time</i>	

3.15.3.7 `void Arc::DataSpeed::set_progress_indicator (show_progress.t func = NULL)`

Specify which external function will print verbose messages. If not specified internal one is used.

Parameters

<i>pointer</i>	to function which prints information.
----------------	---------------------------------------

3.15.3.8 `bool Arc::DataSpeed::transfer (unsigned long long int n = 0)`

Inform object, about amount of data has been transferred. All errors are triggered by this method. To make them work application must call this method periodically even with zero value.

Parameters

<i>n</i>	amount of data transferred (bytes).
----------	-------------------------------------

3.15.3.9 `void Arc::DataSpeed::verbose (bool val)`

Activate printing information about current time speeds, amount of transferred data.

3.15.3.10 `void Arc::DataSpeed::verbose (const std::string & prefix)`

Print information about current speed and amout of data.

Parameters

<i>'prefix'</i>	add this string at the beginning of every string.
-----------------	---

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

- DataSpeed.h

3.16 Arc::DataStatus Class Reference

Status code returned by many [DataPoint](#) methods.

```
#include <DataStatus.h>
```

Public Types

- enum [DataStatusType](#) {
[Success](#) = 0, [ReadAcquireError](#) = 1 , [WriteAcquireError](#) = 2 , [ReadResolveError](#) = 3 ,
[WriteResolveError](#) = 4 , [ReadStartError](#) = 5 , [WriteStartError](#) = 6 , [ReadError](#) = 7
,
[WriteError](#) = 8 , [TransferError](#) = 9 , [ReadStopError](#) = 10 , [WriteStopError](#) = 11 ,
[PreRegisterError](#) = 12 , [PostRegisterError](#) = 13 , [UnregisterError](#) = 14 , [CacheError](#) = 15 ,
[CredentialsExpiredError](#) = 16, [DeleteError](#) = 17 , [NoLocationError](#) = 18, [LocationAlreadyExistsError](#) = 19,
[NotSupportedForDirectDataPointsError](#) = 20, [UnimplementedError](#) = 21, [IsReadingError](#) = 22, [IsWritingError](#) = 23,
[CheckError](#) = 24 , [ListError](#) = 25 , [StatError](#) = 27 , [NotInitializedError](#) = 29,
[SystemError](#) = 30, [StageError](#) = 31 , [InconsistentMetadataError](#) = 32, [ReadPrepareError](#) = 32 ,
[ReadPrepareWait](#) = 33, [WritePrepareError](#) = 34 , [WritePrepareWait](#) = 35, [ReadFinishError](#) = 36 ,
[WriteFinishError](#) = 37 , [SuccessCached](#) = 38, [UnknownError](#) = 39 }

Public Member Functions

- bool [Passed](#) () const
- bool [Retryable](#) () const
- void [SetDesc](#) (const std::string &d)
- std::string [GetDesc](#) () const

3.16.1 Detailed Description

Status code returned by many [DataPoint](#) methods.

A class to be used for return types of all major data handling methods. It describes the outcome of the method.

3.16.2 Member Enumeration Documentation

3.16.2.1 enum Arc::DataStatus::DataStatusType

Status codes.

Enumerator:

- Success** Operation completed successfully.
- ReadAcquireError** Source is bad URL or can't be used due to some reason.
- WriteAcquireError** Destination is bad URL or can't be used due to some reason.

- ReadResolveError** Resolving of index service URL for source failed.
- WriteResolveError** Resolving of index service URL for destination failed.
- ReadStartError** Can't read from source.
- WriteStartError** Can't write to destination.
- ReadError** Failed while reading from source.
- WriteError** Failed while writing to destination.
- TransferError** Failed while transferring data (mostly timeout)
- ReadStopError** Failed while finishing reading from source.
- WriteStopError** Failed while finishing writing to destination.
- PreRegisterError** First stage of registration of index service URL failed.
- PostRegisterError** Last stage of registration of index service URL failed.
- UnregisterError** Unregistration of index service URL failed.
- CacheError** Error in caching procedure.
- CredentialsExpiredError** Error due to provided credentials are expired.
- DeleteError** Error deleting location or URL.
- NoLocationError** No valid location available.
- LocationAlreadyExistsError** No valid location available.
- NotSupportedForDirectDataPointsError** Operation has no sense for this kind of URL.
- UnimplementedError** Feature is unimplemented.
- IsReadingError** [DataPoint](#) is already reading.
- IsWritingError** [DataPoint](#) is already writing.
- CheckError** Access check failed.
- ListError** File listing failed.
- StatError** File/dir stating failed.
- NotInitializedError** Object initialization failed.
- SystemError** Error in OS.
- StageError** Staging error.
- InconsistentMetadataError** Inconsistent metadata.

- ReadPrepareError*** Can't prepare source.
- ReadPrepareWait*** Wait for source to be prepared.
- WritePrepareError*** Can't prepare destination.
- WritePrepareWait*** Wait for destination to be prepared.
- ReadFinishError*** Can't finish source.
- WriteFinishError*** Can't finish destination.
- SuccessCached*** Data was already cached.
- UnknownError*** Undefined.

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

- `DataStatus.h`

3.17 Arc::FileCache Class Reference

[FileCache](#) provides an interface to all cache operations.

```
#include <FileCache.h>
```

Public Member Functions

- [FileCache](#) (const std::string &cache_path, const std::string &id, uid_t job_uid, gid_t job_gid)
- [FileCache](#) (const std::vector< std::string > &caches, const std::string &id, uid_t job_uid, gid_t job_gid)
- [FileCache](#) (const std::vector< std::string > &caches, const std::vector< std::string > &remote_caches, const std::vector< std::string > &draining_caches, const std::string &id, uid_t job_uid, gid_t job_gid, int cache_max=100, int cache_min=100)
- [FileCache](#) ()
- bool [Start](#) (const std::string &url, bool &available, bool &is_locked, bool use_remote=true)
- bool [Stop](#) (const std::string &url)
- bool [StopAndDelete](#) (const std::string &url)
- std::string [File](#) (const std::string &url)
- bool [Link](#) (const std::string &link_path, const std::string &url, bool copy, bool executable)
- bool [Copy](#) (const std::string &dest_path, const std::string &url, bool executable=false)
- bool [Release](#) () const
- bool [AddDN](#) (const std::string &url, const std::string &DN, const Time &expiry_time)
- bool [CheckDN](#) (const std::string &url, const std::string &DN)
- bool [CheckCreated](#) (const std::string &url)
- Time [GetCreated](#) (const std::string &url)
- bool [CheckValid](#) (const std::string &url)

- Time [GetValid](#) (const std::string &url)
- bool [SetValid](#) (const std::string &url, const Time &val)
- [operator bool](#) ()
- bool [operator==](#) (const [FileCache](#) &a)

3.17.1 Detailed Description

[FileCache](#) provides an interface to all cache operations.

An instance of [FileCache](#) should be created per job, and all files within the job are managed by that instance. When it is decided a file should be downloaded to the cache, [Start\(\)](#) should be called, so that the cache file can be prepared and locked. When a transfer has finished successfully, [Link\(\)](#) should be called to create a hard link to a per-job directory in the cache and then soft link, or copy the file directly to the session directory so it can be accessed from the user's job. [Stop\(\)](#) must then be called to release any locks on the cache file. After the job has finished, [Release\(\)](#) should be called to remove the hard links.

The cache directory(ies) and the optional directory to link to when the soft-links are made are set in the global configuration file. The names of cache files are formed from a hash of the URL specified as input to the job. To ease the load on the file system, the cache files are split into subdirectories based on the first two characters in the hash. For example the file with hash 76f11edda169848038efbd9fa3df5693 is stored in 76/f11edda169848038efbd9fa3df5693. A cache filename can be found by passing the URL to [Find\(\)](#). For more information on the structure of the cache, see the A-REX Administration Guide (NORDUGRID-TECH-14).

A metadata file with the '.meta' suffix is stored next to each cache file. This contains the URL corresponding to the cache file and the expiry time, if it is available.

While cache files are downloaded, they are locked using the [FileLock](#) class, which creates a lock file with the '.lock' suffix next to the cache file. Calling [Start\(\)](#) creates this lock and [Stop\(\)](#) releases it. All processes calling [Start\(\)](#) must wait until they successfully obtain the lock before downloading can begin or an existing cache file can be used. Once a process obtains a lock it must later release it by calling [Stop\(\)](#) or [StopAndDelete\(\)](#). Once a cache file is successfully linked to the per-job directory in [Link\(\)](#), it is also unlocked, but [Stop\(\)](#) should still be called after.

3.17.2 Constructor & Destructor Documentation

3.17.2.1 `Arc::FileCache::FileCache (const std::string & cache_path, const std::string & id, uid_t job_uid, gid_t job_gid)`

Create a new [FileCache](#) instance.

Parameters

<i>cache_path</i>	The format is "cache_dir[link_path]". path is the path to the cache directory and the optional link_path is used to create a link in case the cache directory is visible under a different name during actual usage. When linking from the session dir this path is used instead of cache_path.
-------------------	--

<i>id</i>	the job id. This is used to create the per-job dir which the job's cache files will be hard linked from
<i>job_uid</i>	owner of job. The per-job dir will only be readable by this user
<i>job_gid</i>	owner group of job

3.17.2.2 `Arc::FileCache::FileCache (const std::vector< std::string > & caches, const std::string & id, uid_t job_uid, gid_t job_gid)`

Create a new [FileCache](#) instance with multiple cache dirs

Parameters

<i>caches</i>	a vector of strings describing caches. The format of each string is "cache_dir[link_path]".
<i>id</i>	the job id. This is used to create the per-job dir which the job's cache files will be hard linked from
<i>job_uid</i>	owner of job. The per-job dir will only be readable by this user
<i>job_gid</i>	owner group of job

3.17.2.3 `Arc::FileCache::FileCache (const std::vector< std::string > & caches, const std::vector< std::string > & remote_caches, const std::vector< std::string > & draining_caches, const std::string & id, uid_t job_uid, gid_t job_gid, int cache_max = 100, int cache_min = 100)`

Create a new [FileCache](#) instance with multiple cache dirs, remote caches and draining cache directories.

Parameters

<i>caches</i>	a vector of strings describing caches. The format of each string is "cache_dir[link_path]".
<i>remote_caches</i>	Same format as caches. These are the paths to caches which are under the control of other Grid Managers and are read-only for this process.
<i>draining_caches</i>	Same format as caches. These are the paths to caches which are to be drained.
<i>id</i>	the job id. This is used to create the per-job dir which the job's cache files will be hard linked from
<i>job_uid</i>	owner of job. The per-job dir will only be readable by this user
<i>job_gid</i>	owner group of job
<i>cache_max</i>	maximum used space by cache, as percentage of the file system
<i>cache_min</i>	minimum used space by cache, as percentage of the file system

3.17.2.4 `Arc::FileCache::FileCache () [inline]`

Default constructor. Invalid cache.

3.17.3 Member Function Documentation

3.17.3.1 `bool Arc::FileCache::AddDN (const std::string & url, const std::string & DN, const Time & expiry_time)`

Add the given DN to the list of cached DNs with the given expiry time

Parameters

<i>url</i>	the url corresponding to the cache file to which we want to add a cached DN
<i>DN</i>	the DN of the user
<i>expiry_time</i>	the expiry time of this DN in the DN cache

3.17.3.2 `bool Arc::FileCache::CheckCreated (const std::string & url)`

Check if there is an information about creation time. Returns true if the file exists in the cache, since the creation time is the creation time of the cache file.

Parameters

<i>url</i>	the url corresponding to the cache file for which we want to know if the creation date exists
------------	---

3.17.3.3 `bool Arc::FileCache::CheckDN (const std::string & url, const std::string & DN)`

Check if the given DN is cached for authorisation.

Parameters

<i>url</i>	the url corresponding to the cache file for which we want to check the cached DN
<i>DN</i>	the DN of the user

3.17.3.4 `bool Arc::FileCache::CheckValid (const std::string & url)`

Check if there is an information about expiry time.

Parameters

<i>url</i>	the url corresponding to the cache file for which we want to know if the expiration time exists
------------	---

3.17.3.5 `bool Arc::FileCache::Copy (const std::string & dest_path, const std::string & url, bool executable = false)`

Copy the cache file corresponding to url to the dest_path. The session directory is accessed under the uid passed in the constructor, and switching uid involves holding a global lock. Therefore care must be taken in a multi-threaded environment.

This method is deprecated - [Link\(\)](#) should be used instead with copy set to true.

3.17.3.6 `std::string Arc::FileCache::File (const std::string & url)`

Returns the full pathname of the file in the cache which corresponds to the given url.

Parameters

<code>url</code>	the URL to look for in the cache
------------------	----------------------------------

3.17.3.7 `Time Arc::FileCache::GetCreated (const std::string & url)`

Get the creation time of a cached file. If the cache file does not exist, 0 is returned.

Parameters

<code>url</code>	the url corresponding to the cache file for which we want to know the creation date
------------------	---

3.17.3.8 `Time Arc::FileCache::GetValid (const std::string & url)`

Get expiry time of a cached file. If the time is not available, a time equivalent to 0 is returned.

Parameters

<code>url</code>	the url corresponding to the cache file for which we want to know the expiry time
------------------	---

3.17.3.9 `bool Arc::FileCache::Link (const std::string & link_path, const std::string & url, bool copy, bool executable)`

Create a hard-link to the per-job dir from the cache dir, and then a soft-link from here to the session directory. This is effectively 'claiming' the file for the job, so even if the original cache file is deleted, eg by some external process, the hard link still exists until it is explicitly released by calling [Release\(\)](#).

If cache_link_path is set to "." then files will be copied directly to the session directory rather than via the hard link.

The session directory is accessed under the uid and gid passed in the constructor.

Parameters

<i>link_path</i>	path to the session dir for soft-link or new file
<i>url</i>	url of file to link to or copy
<i>copy</i>	If true the file is copied rather than soft-linked to the session dir
<i>executable</i>	If true then file is copied and given execute permissions in the session dir

3.17.3.10 Arc::FileCache::operator bool (void) [inline]

Returns true if object is useable.

3.17.3.11 bool Arc::FileCache::operator== (const FileCache & a)

Return true if all attributes are equal

3.17.3.12 bool Arc::FileCache::Release () const

Release claims on input files for the job specified by id. For each cache directory the per-job directory with the hard-links will be deleted.

3.17.3.13 bool Arc::FileCache::SetValid (const std::string & url, const Time & val)

Set expiry time.

Parameters

<i>url</i>	the url corresponding to the cache file for which we want to set the expiry time
<i>val</i>	expiry time

3.17.3.14 bool Arc::FileCache::Start (const std::string & url, bool & available, bool & is_locked, bool use_remote = true)

Prepare cache for downloading file, and lock the cached file. On success returns true. If there is another process downloading the same url, false is returned and is_locked is set to true. In this case the client should wait and retry later. If the lock has expired this process will take over the lock and the method will return as if no lock was present, ie available and is_locked are false.

Parameters

<i>url</i>	url that is being downloaded
<i>available</i>	true on exit if the file is already in cache
<i>is_locked</i>	true on exit if the file is already locked, ie cannot be used by this process
<i>use_remote</i>	Whether to look to see if the file exists in a remote cache. Can be set to false if for example a forced download to cache is desired.

3.17.3.15 `bool Arc::FileCache::Stop (const std::string & url)`

This method (or `stopAndDelete`) must be called after file was downloaded or download failed, to release the lock on the cache file. `Stop()` does not delete the cache file. It returns false if the lock file does not exist, or another pid was found inside the lock file (this means another process took over the lock so this process must go back to `Start()`), or if it fails to delete the lock file.

Parameters

<code>url</code>	the url of the file that was downloaded
------------------	---

3.17.3.16 `bool Arc::FileCache::StopAndDelete (const std::string & url)`

Release the cache file and delete it, because for example a failed download left an incomplete copy, or it has expired. This method also deletes the meta file which contains the url corresponding to the cache file. The logic of the return value is the same as `Stop()`.

Parameters

<code>url</code>	the url corresponding to the cache file that has to be released and deleted
------------------	---

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

- FileCache.h

3.18 Arc::FileCacheHash Class Reference

`FileCacheHash` provides methods to make hashes from strings.

```
#include <FileCacheHash.h>
```

Static Public Member Functions

- static std::string `getHash` (std::string url)
- static int `maxLength` ()

3.18.1 Detailed Description

`FileCacheHash` provides methods to make hashes from strings.

Currently the SHA-1 hash from the openssl library is used.

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

- FileCacheHash.h

3.19 Arc::FileInfo Class Reference

[FileInfo](#) stores information about files (metadata).

```
#include <FileInfo.h>
```

3.19.1 Detailed Description

[FileInfo](#) stores information about files (metadata).

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

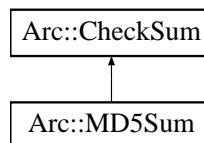
- FileInfo.h

3.20 Arc::MD5Sum Class Reference

Implementation of MD5 checksum.

```
#include <CheckSum.h>
```

Inheritance diagram for Arc::MD5Sum:



3.20.1 Detailed Description

Implementation of MD5 checksum.

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

- CheckSum.h

3.21 Arc::URLMap Class Reference

Data Structures

- class **map_entry**

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

- URLMap.h

Index

ACCESS_LATENCY_LARGE

Arc::DataPoint, [21](#)

ACCESS_LATENCY_SMALL

Arc::DataPoint, [21](#)

ACCESS_LATENCY_ZERO

Arc::DataPoint, [21](#)

add

Arc::DataBuffer, [9](#)

AddChecksumObject

Arc::DataPoint, [22](#)

Arc::DataPointDirect, [32](#)

Arc::DataPointIndex, [38](#)

AddDN

Arc::FileCache, [54](#)

AddLocation

Arc::DataPoint, [22](#)

Arc::DataPointDirect, [33](#)

Arc::DataPointIndex, [38](#)

Arc::Adler32Sum, [5](#)

Arc::CacheParameters, [5](#)

Arc::Checksum, [6](#)

Arc::ChecksumAny, [6](#)

Arc::CRC32Sum, [7](#)

Arc::DataBuffer, [7](#)

add, [9](#)

buffer_size, [9](#)

checksum_object, [9](#)

checksum_valid, [10](#)

DataBuffer, [9](#)

eof_read, [10](#)

eof_write, [10](#)

error, [10](#)

error_read, [10](#)

error_write, [10](#)

for_read, [11](#)

for_write, [11](#)

is_notwritten, [11](#), [12](#)

is_read, [12](#)

is_written, [12](#)

set, [13](#)

wait_any, [13](#)

Arc::DataCallback, [13](#)

Arc::DataHandle, [13](#)

Arc::DataMover, [14](#)

checks, [15](#)

force_to_meta, [15](#)

secure, [15](#)

set_default_max_inactivity_time, [15](#)

set_default_min_average_speed, [16](#)

set_default_min_speed, [16](#)

Transfer, [16](#)

verbose, [17](#)

Arc::DataPoint, [17](#)

ACCESS_LATENCY_LARGE, [21](#)

ACCESS_LATENCY_SMALL, [21](#)

ACCESS_LATENCY_ZERO, [21](#)

AddChecksumObject, [22](#)

AddLocation, [22](#)

Check, [22](#)

CompareLocationMetadata, [22](#)

CompareMeta, [23](#)

CurrentLocationMetadata, [23](#)

DataPoint, [21](#)

DataPointAccessLatency, [21](#)

DataPointInfoType, [21](#)

FinishReading, [23](#)

FinishWriting, [23](#)

GetFailureReason, [24](#)

INFO_TYPE_ACCESS, [21](#)

INFO_TYPE_ALL, [21](#)

INFO_TYPE_CONTENT, [21](#)

INFO_TYPE_MINIMAL, [21](#)

INFO_TYPE_NAME, [21](#)

INFO_TYPE_REST, [21](#)

INFO_TYPE_STRUCT, [21](#)

INFO_TYPE_TIMES, [21](#)

INFO_TYPE_TYPE, [21](#)

List, [24](#)

NextLocation, [24](#)

Passive, [24](#)

PostRegister, [24](#)

PrepareReading, [25](#)

- PrepareWriting, [25](#)
- PreRegister, [26](#)
- PreUnregister, [26](#)
- ProvidesMeta, [27](#)
- Range, [27](#)
- ReadOutOfOrder, [27](#)
- Registered, [27](#)
- Resolve, [27](#)
- SetAdditionalChecks, [28](#)
- SetMeta, [28](#)
- SetSecure, [28](#)
- SetURL, [28](#)
- SortLocations, [28](#)
- StartReading, [29](#)
- StartWriting, [29](#)
- Stat, [29](#)
- StopReading, [30](#)
- StopWriting, [30](#)
- TransferLocations, [30](#)
- Unregister, [30](#)
- valid_url_options, [31](#)
- WriteOutOfOrder, [31](#)
- Arc::DataPointDirect, [31](#)
 - AddChecksumObject, [32](#)
 - AddLocation, [33](#)
 - CompareLocationMetadata, [33](#)
 - CurrentLocationMetadata, [33](#)
 - NextLocation, [33](#)
 - Passive, [33](#)
 - PostRegister, [34](#)
 - PreRegister, [34](#)
 - PreUnregister, [34](#)
 - ProvidesMeta, [34](#)
 - Range, [35](#)
 - ReadOutOfOrder, [35](#)
 - Registered, [35](#)
 - Resolve, [35](#)
 - SetAdditionalChecks, [35](#)
 - SetSecure, [36](#)
 - SortLocations, [36](#)
 - Unregister, [36](#)
 - WriteOutOfOrder, [36](#)
- Arc::DataPointIndex, [37](#)
 - AddChecksumObject, [38](#)
 - AddLocation, [38](#)
 - Check, [39](#)
 - CompareLocationMetadata, [39](#)
 - CurrentLocationMetadata, [39](#)
 - FinishReading, [39](#)
 - FinishWriting, [39](#)
 - NextLocation, [40](#)
 - Passive, [40](#)
 - PrepareReading, [40](#)
 - PrepareWriting, [41](#)
 - ProvidesMeta, [41](#)
 - Range, [41](#)
 - ReadOutOfOrder, [42](#)
 - Registered, [42](#)
 - SetAdditionalChecks, [42](#)
 - SetMeta, [42](#)
 - SetSecure, [42](#)
 - SortLocations, [43](#)
 - StartReading, [43](#)
 - StartWriting, [43](#)
 - StopReading, [44](#)
 - StopWriting, [44](#)
 - TransferLocations, [44](#)
 - WriteOutOfOrder, [44](#)
- Arc::DataPointLoader, [44](#)
- Arc::DataPointPluginArgument, [45](#)
- Arc::DataSpeed, [45](#)
 - DataSpeed, [46](#)
 - hold, [47](#)
 - set_base, [47](#)
 - set_max_data, [47](#)
 - set_max_inactivity_time, [47](#)
 - set_min_average_speed, [47](#)
 - set_min_speed, [48](#)
 - set_progress_indicator, [48](#)
 - transfer, [48](#)
 - verbose, [48](#)
- Arc::DataStatus, [49](#)
 - CacheError, [50](#)
 - CheckError, [50](#)
 - CredentialsExpiredError, [50](#)
 - DataStatusType, [50](#)
 - DeleteError, [50](#)
 - InconsistentMetadataError, [50](#)
 - IsReadingError, [50](#)
 - IsWritingError, [50](#)
 - ListError, [50](#)
 - LocationAlreadyExistsError, [50](#)
 - NoLocationError, [50](#)
 - NotInitializedError, [50](#)
 - NotSupportedForDirectDataPointsError, [50](#)
 - PostRegisterError, [50](#)
 - PreRegisterError, [50](#)
 - ReadAcquireError, [50](#)
 - ReadError, [50](#)

- ReadFinishError, 51
- ReadPrepareError, 50
- ReadPrepareWait, 51
- ReadResolveError, 50
- ReadStartError, 50
- ReadStopError, 50
- StageError, 50
- StatError, 50
- Success, 50
- SuccessCached, 51
- SystemError, 50
- TransferError, 50
- UnimplementedError, 50
- UnknownError, 51
- UnregisterError, 50
- WriteAcquireError, 50
- WriteError, 50
- WriteFinishError, 51
- WritePrepareError, 51
- WritePrepareWait, 51
- WriteResolveError, 50
- WriteStartError, 50
- WriteStopError, 50
- Arc::FileCache, 51
 - AddDN, 54
 - CheckCreated, 54
 - CheckDN, 54
 - CheckValid, 54
 - Copy, 54
 - File, 55
 - FileCache, 52, 53
 - GetCreated, 55
 - GetValid, 55
 - Link, 55
 - operator bool, 56
 - operator==, 56
 - Release, 56
 - SetValid, 56
 - Start, 56
 - Stop, 57
 - StopAndDelete, 57
- Arc::FileCacheHash, 57
- Arc::FileInfo, 58
- Arc::MD5Sum, 58
- Arc::URLMap, 58
- buffer_size
 - Arc::DataBuffer, 9
- CacheError
 - Arc::DataStatus, 50
- Check
 - Arc::DataPoint, 22
 - Arc::DataPointIndex, 39
- CheckCreated
 - Arc::FileCache, 54
- CheckDN
 - Arc::FileCache, 54
- CheckError
 - Arc::DataStatus, 50
- checks
 - Arc::DataMover, 15
- checksum_object
 - Arc::DataBuffer, 9
- checksum_valid
 - Arc::DataBuffer, 10
- CheckValid
 - Arc::FileCache, 54
- CompareLocationMetadata
 - Arc::DataPoint, 22
 - Arc::DataPointDirect, 33
 - Arc::DataPointIndex, 39
- CompareMeta
 - Arc::DataPoint, 23
- Copy
 - Arc::FileCache, 54
- CredentialsExpiredError
 - Arc::DataStatus, 50
- CurrentLocationMetadata
 - Arc::DataPoint, 23
 - Arc::DataPointDirect, 33
 - Arc::DataPointIndex, 39
- DataBuffer
 - Arc::DataBuffer, 9
- DataPoint
 - Arc::DataPoint, 21
- DataPointAccessLatency
 - Arc::DataPoint, 21
- DataPointInfoType
 - Arc::DataPoint, 21
- DataSpeed
 - Arc::DataSpeed, 46
- DataStatusType
 - Arc::DataStatus, 50
- DeleteError
 - Arc::DataStatus, 50
- eof_read
 - Arc::DataBuffer, 10

- eof_write
 - Arc::DataBuffer, [10](#)
- error
 - Arc::DataBuffer, [10](#)
- error_read
 - Arc::DataBuffer, [10](#)
- error_write
 - Arc::DataBuffer, [10](#)
- File
 - Arc::FileCache, [55](#)
- FileCache
 - Arc::FileCache, [52](#), [53](#)
- FinishReading
 - Arc::DataPoint, [23](#)
 - Arc::DataPointIndex, [39](#)
- FinishWriting
 - Arc::DataPoint, [23](#)
 - Arc::DataPointIndex, [39](#)
- for_read
 - Arc::DataBuffer, [11](#)
- for_write
 - Arc::DataBuffer, [11](#)
- force_to_meta
 - Arc::DataMover, [15](#)
- GetCreated
 - Arc::FileCache, [55](#)
- GetFailureReason
 - Arc::DataPoint, [24](#)
- GetValid
 - Arc::FileCache, [55](#)
- hold
 - Arc::DataSpeed, [47](#)
- InconsistentMetadataError
 - Arc::DataStatus, [50](#)
- INFO_TYPE_ACCESS
 - Arc::DataPoint, [21](#)
- INFO_TYPE_ALL
 - Arc::DataPoint, [21](#)
- INFO_TYPE_CONTENT
 - Arc::DataPoint, [21](#)
- INFO_TYPE_MINIMAL
 - Arc::DataPoint, [21](#)
- INFO_TYPE_NAME
 - Arc::DataPoint, [21](#)
- INFO_TYPE_REST
 - Arc::DataPoint, [21](#)
- INFO_TYPE_STRUCT
 - Arc::DataPoint, [21](#)
- INFO_TYPE_TIMES
 - Arc::DataPoint, [21](#)
- INFO_TYPE_TYPE
 - Arc::DataPoint, [21](#)
- is_notwritten
 - Arc::DataBuffer, [11](#), [12](#)
- is_read
 - Arc::DataBuffer, [12](#)
- is_written
 - Arc::DataBuffer, [12](#)
- IsReadingError
 - Arc::DataStatus, [50](#)
- IsWritingError
 - Arc::DataStatus, [50](#)
- Link
 - Arc::FileCache, [55](#)
- List
 - Arc::DataPoint, [24](#)
- ListError
 - Arc::DataStatus, [50](#)
- LocationAlreadyExistsError
 - Arc::DataStatus, [50](#)
- NextLocation
 - Arc::DataPoint, [24](#)
 - Arc::DataPointDirect, [33](#)
 - Arc::DataPointIndex, [40](#)
- NoLocationError
 - Arc::DataStatus, [50](#)
- NotInitializedError
 - Arc::DataStatus, [50](#)
- NotSupportedForDirectDataPointsError
 - Arc::DataStatus, [50](#)
- operator bool
 - Arc::FileCache, [56](#)
- operator==
 - Arc::FileCache, [56](#)
- Passive
 - Arc::DataPoint, [24](#)
 - Arc::DataPointDirect, [33](#)
 - Arc::DataPointIndex, [40](#)
- PostRegister
 - Arc::DataPoint, [24](#)
 - Arc::DataPointDirect, [34](#)
- PostRegisterError

- Arc::DataStatus, 50
- PrepareReading
 - Arc::DataPoint, 25
 - Arc::DataPointIndex, 40
- PrepareWriting
 - Arc::DataPoint, 25
 - Arc::DataPointIndex, 41
- PreRegister
 - Arc::DataPoint, 26
 - Arc::DataPointDirect, 34
- PreRegisterError
 - Arc::DataStatus, 50
- PreUnregister
 - Arc::DataPoint, 26
 - Arc::DataPointDirect, 34
- ProvidesMeta
 - Arc::DataPoint, 27
 - Arc::DataPointDirect, 34
 - Arc::DataPointIndex, 41
- Range
 - Arc::DataPoint, 27
 - Arc::DataPointDirect, 35
 - Arc::DataPointIndex, 41
- ReadAcquireError
 - Arc::DataStatus, 50
- ReadError
 - Arc::DataStatus, 50
- ReadFinishError
 - Arc::DataStatus, 51
- ReadOutOfOrder
 - Arc::DataPoint, 27
 - Arc::DataPointDirect, 35
 - Arc::DataPointIndex, 42
- ReadPrepareError
 - Arc::DataStatus, 50
- ReadPrepareWait
 - Arc::DataStatus, 51
- ReadResolveError
 - Arc::DataStatus, 50
- ReadStartError
 - Arc::DataStatus, 50
- ReadStopError
 - Arc::DataStatus, 50
- Registered
 - Arc::DataPoint, 27
 - Arc::DataPointDirect, 35
 - Arc::DataPointIndex, 42
- Release
 - Arc::FileCache, 56
- Resolve
 - Arc::DataPoint, 27
 - Arc::DataPointDirect, 35
- secure
 - Arc::DataMover, 15
- set
 - Arc::DataBuffer, 13
- set_base
 - Arc::DataSpeed, 47
- set_default_max_inactivity_time
 - Arc::DataMover, 15
- set_default_min_average_speed
 - Arc::DataMover, 16
- set_default_min_speed
 - Arc::DataMover, 16
- set_max_data
 - Arc::DataSpeed, 47
- set_max_inactivity_time
 - Arc::DataSpeed, 47
- set_min_average_speed
 - Arc::DataSpeed, 47
- set_min_speed
 - Arc::DataSpeed, 48
- set_progress_indicator
 - Arc::DataSpeed, 48
- SetAdditionalChecks
 - Arc::DataPoint, 28
 - Arc::DataPointDirect, 35
 - Arc::DataPointIndex, 42
- SetMeta
 - Arc::DataPoint, 28
 - Arc::DataPointIndex, 42
- SetSecure
 - Arc::DataPoint, 28
 - Arc::DataPointDirect, 36
 - Arc::DataPointIndex, 42
- SetURL
 - Arc::DataPoint, 28
- SetValid
 - Arc::FileCache, 56
- SortLocations
 - Arc::DataPoint, 28
 - Arc::DataPointDirect, 36
 - Arc::DataPointIndex, 43
- StageError
 - Arc::DataStatus, 50
- Start
 - Arc::FileCache, 56
- StartReading

Arc::DataPoint, 29
 Arc::DataPointIndex, 43
 StartWriting
 Arc::DataPoint, 29
 Arc::DataPointIndex, 43
 Stat
 Arc::DataPoint, 29
 StatError
 Arc::DataStatus, 50
 Stop
 Arc::FileCache, 57
 StopAndDelete
 Arc::FileCache, 57
 StopReading
 Arc::DataPoint, 30
 Arc::DataPointIndex, 44
 StopWriting
 Arc::DataPoint, 30
 Arc::DataPointIndex, 44
 Success
 Arc::DataStatus, 50
 SuccessCached
 Arc::DataStatus, 51
 SystemError
 Arc::DataStatus, 50

 Transfer
 Arc::DataMover, 16
 transfer
 Arc::DataSpeed, 48
 TransferError
 Arc::DataStatus, 50
 TransferLocations
 Arc::DataPoint, 30
 Arc::DataPointIndex, 44

 UnimplementedError
 Arc::DataStatus, 50
 UnknownError
 Arc::DataStatus, 51
 Unregister
 Arc::DataPoint, 30
 Arc::DataPointDirect, 36
 UnregisterError
 Arc::DataStatus, 50

 valid_url_options
 Arc::DataPoint, 31
 verbose
 Arc::DataMover, 17

 Arc::DataSpeed, 48
 wait_any
 Arc::DataBuffer, 13
 WriteAcquireError
 Arc::DataStatus, 50
 WriteError
 Arc::DataStatus, 50
 WriteFinishError
 Arc::DataStatus, 51
 WriteOutOfOrder
 Arc::DataPoint, 31
 Arc::DataPointDirect, 36
 Arc::DataPointIndex, 44
 WritePrepareError
 Arc::DataStatus, 51
 WritePrepareWait
 Arc::DataStatus, 51
 WriteResolveError
 Arc::DataStatus, 50
 WriteStartError
 Arc::DataStatus, 50
 WriteStopError
 Arc::DataStatus, 50