## DARC

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# **Chapter 1**

# **Hierarchical Index**

## 1.1 Class Hierarchy

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# Chapter 2

# **Class Index**

## 2.1 Class List

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

darc.amber_clustering.AMBERClustering
darc.amber_clustering.AMBERClusteringException
darc.amber_listener.AMBERListener
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darc.amber_triggering.AMBERTriggering
darc.amber_triggering.AMBERTriggeringException
darc.dada_trigger.DADATrigger
darc.dada_trigger.DADATriggerException
darc.base.DARCBase
darc.darc_master.DARCMaster
darc.darc_master.DARCMasterException
darc.offline_processing.OfflineProcessing
darc.offline_processing.OfflineProcessingException
darc.processor.Processor
darc.processor.ProcessorException
darc.sb_generator.SBGenerator
darc.sb_generator.SBGeneratorException
darc.status_website.StatusWebsite
darc.status_website.StatusWebsiteException
darc.voevent_generator.VOEventGenerator
darc.voevent_generator.VOEventGeneratorException
darc voevent, generator VOEventQueueServer

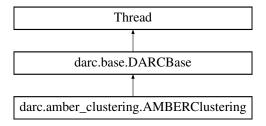
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## **Chapter 3**

## **Class Documentation**

## 3.1 darc.amber\_clustering.AMBERClustering Class Reference

Inheritance diagram for darc.amber\_clustering.AMBERClustering:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def process\_command (self, command)
- def start\_observation (self, obs\_config)
- def stop observation (self)
- def process\_triggers (self)

#### **Public Attributes**

- needs\_source\_queue
- needs\_target\_queue
- proc\_thread
- hdr\_mapping
- obs\_config
- observation\_running
- · amber\_triggers

### 3.1.1 Detailed Description

#### 3.1.2 Constructor & Destructor Documentation

Reimplemented from darc.base.DARCBase.

#### 3.1.3 Member Function Documentation

#### 3.1.3.1 process\_command()

#### 3.1.3.2 process\_triggers()

```
def darc.amber_clustering.AMBERClustering.process_triggers ( self \ ) Applies thresholding to clusters Puts approved clusters on queue
```

#### 3.1.3.3 start\_observation()

```
def darc.amber_clustering.AMBERClustering.start_observation ( self, \\ obs\_config \ )
```

Parse obs config and start listening for amber triggers on queue

#### 3.1.3.4 stop\_observation()

```
def darc.amber_clustering.AMBERClustering.stop_observation ( self \ ) Stop observation
```

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

• darc/amber\_clustering.py

## 3.2 darc.amber\_clustering.AMBERClusteringException Class Reference

Inheritance diagram for darc.amber\_clustering.AMBERClusteringException:

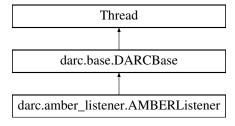


The documentation for this class was generated from the following file:

· darc/amber\_clustering.py

## 3.3 darc.amber\_listener.AMBERListener Class Reference

Inheritance diagram for darc.amber\_listener.AMBERListener:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def start\_observation (self, obs\_config)
- def stop\_observation (self)
- def process\_command (self)

#### **Public Attributes**

- · needs\_target\_queue
- · observation\_threads
- · observation\_events

#### **Private Member Functions**

```
• def _follow_file (self, fname, event)
```

#### 3.3.1 Detailed Description

```
Listens to AMBER triggers and puts them on a queue.
```

#### 3.3.2 Constructor & Destructor Documentation

Reimplemented from darc.base.DARCBase.

#### 3.3.3 Member Function Documentation

#### 3.3.3.1 \_follow\_file()

#### 3.3.3.2 start\_observation()

#### 3.3.3.3 stop\_observation()

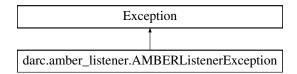
```
def darc.amber_listener.AMBERListener.stop_observation ( self \ ) Stop any running observation
```

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

· darc/amber\_listener.py

## 3.4 darc.amber\_listener.AMBERListenerException Class Reference

Inheritance diagram for darc.amber\_listener.AMBERListenerException:

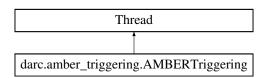


The documentation for this class was generated from the following file:

· darc/amber\_listener.py

## 3.5 darc.amber\_triggering.AMBERTriggering Class Reference

Inheritance diagram for darc.amber\_triggering.AMBERTriggering:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def stop (self)
- def set\_source\_queue (self, queue)
- def run (self)
- def process\_triggers (self, triggers)

#### **Public Attributes**

- · daemon
- · stop\_event
- · amber queue
- · cluster\_queue
- · hdr\_mapping
- start\_time
- vo\_config
- logger
- · voevent\_queue\_server

#### 3.5.1 Detailed Description

Process AMBER triggers and turn into trigger message

#### 3.5.2 Member Function Documentation

#### 3.5.2.1 process\_triggers()

#### 3.5.2.2 set\_source\_queue()

#### 3.5.2.3 stop()

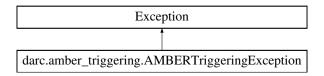
```
\operatorname{def\ darc.amber\_triggering.AMBERTriggering.stop} ( self\ ) Stop the service
```

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

· darc/amber\_triggering.py

## 3.6 darc.amber\_triggering.AMBERTriggeringException Class Reference

Inheritance diagram for darc.amber\_triggering.AMBERTriggeringException:

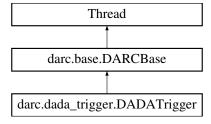


The documentation for this class was generated from the following file:

• darc/amber\_triggering.py

## 3.7 darc.dada\_trigger.DADATrigger Class Reference

Inheritance diagram for darc.dada\_trigger.DADATrigger:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def process\_command (self, command)
- def cleanup (self)
- def send\_event (self, triggers)

#### **Public Attributes**

thread

#### 3.7.1 Detailed Description

```
Generate and send dada_dbevent triggers
```

#### 3.7.2 Constructor & Destructor Documentation

Reimplemented from darc.base.DARCBase.

#### 3.7.3 Member Function Documentation

#### 3.7.3.1 cleanup()

```
\begin{tabular}{ll} $\operatorname{def darc.dada\_trigger.DADATrigger.cleanup} & ( & self \end{tabular} \label{eq:self} Remove any remaining threads
```

Reimplemented from darc.base.DARCBase.

#### 3.7.3.2 process\_command()

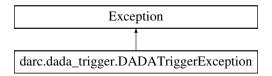
#### 3.7.3.3 send\_event()

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

· darc/dada\_trigger.py

## 3.8 darc.dada\_trigger.DADATriggerException Class Reference

Inheritance diagram for darc.dada\_trigger.DADATriggerException:



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

· darc/dada\_trigger.py

#### 3.9 darc.base.DARCBase Class Reference

Inheritance diagram for darc.base.DARCBase:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def stop (self)
- def set\_source\_queue (self, queue)
- def set\_target\_queue (self, queue)
- def run (self)
- def start\_observation (self, \*args, \*\*kwargs)
- def stop\_observation (self, \*args, \*\*kwargs)
- def cleanup (self)
- def process\_command (self, \*args, \*\*kwargs)

#### **Public Attributes**

- · daemon
- stop\_event
- · needs\_source\_queue
- needs\_target\_queue
- source\_queue
- · target\_queue
- log\_name
- logger

#### 3.9.1 Detailed Description

```
DARC Base class
Provides common methods
```

#### 3.9.2 Constructor & Destructor Documentation

Reimplemented in darc.amber\_clustering.AMBERClustering, darc.processor.Processor, darc.amber\_listener.AMBERListener, and darc.dada\_trigger.DADATrigger.

#### 3.9.3 Member Function Documentation

#### 3.9.3.2 set\_source\_queue()

#### 3.9.3.3 set\_target\_queue()

### 3.9.3.4 stop()

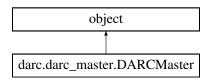
```
\operatorname{def} darc.base.DARCBase.stop ( \operatorname{\mathit{self}} ) Set the stop event
```

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

· darc/base.py

## 3.10 darc.darc\_master.DARCMaster Class Reference

Inheritance diagram for darc.darc\_master.DARCMaster:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def run (self)
- def parse\_message (self, raw\_message)
- def process\_message (self, service, command, payload)
- def check\_status (self, service)
- def start\_service (self, service)
- def stop service (self, service)
- def restart\_service (self, service)
- def create\_thread (self, service)
- def stop (self)
- def start\_observation (self, config\_file)
- def stop\_observation (self)

#### **Public Attributes**

- stop\_event
- hostname
- · amber\_listener\_queue
- · amber\_trigger\_queue
- · dadatrigger\_queue
- · processor\_queue
- all\_queues
- · services
- · service\_mapping
- logger
- · threads
- command\_socket

#### **Private Member Functions**

- def \_load\_config (self)
- def \_load\_yaml (self, config\_file)
- def \_load\_parset (self, config\_file)
- def \_reload (self, service)

#### 3.10.1 Constructor & Destructor Documentation

#### 3.10.2 Member Function Documentation

```
3.10.2.1 _load_config()
def darc.darc_master.DARCMaster._load_config (
             self ) [private]
Load configuration file
3.10.2.2 _load_parset()
def darc.darc_master.DARCMaster._load_parset (
              self,
              config_file ) [private]
Load parset file and convert to observation config
:param config_file: Path to parset file
:return: observation config dict
3.10.2.3 _load_yaml()
def darc.darc_master.DARCMaster._load_yaml (
             self,
              config_file ) [private]
Load yaml file and convert to observation config
:param config_file: Path to yaml file
:return: observation config dict
3.10.2.4 _reload()
def darc.darc_master.DARCMaster._reload (
             self,
              service ) [private]
Reimport service from .py file
:param service: which service to reload
:return:
```

#### 3.10.2.5 check\_status()

```
def darc.darc_master.DARCMaster.check_status (
              self.
              service )
:param service: Service to check status of
:return: status, reply
3.10.2.6 create_thread()
def darc.darc_master.DARCMaster.create_thread (
             self,
              service )
:param service: service to create a new thread for
3.10.2.7 parse_message()
def darc.darc_master.DARCMaster.parse_message (
              self,
              raw_message )
Parse raw received message
:param raw_message: message as single string
:return: status (str), reply (dict)
3.10.2.8 process_message()
def darc.darc_master.DARCMaster.process_message (
              self,
              service,
              command,
              payload )
:param service: service to interact with
:param command: command to run
\verb:param payload: payload for command \\
:return: status (str), reply (dict)
```

```
3.10.2.9 restart_service()
```

```
def darc.darc_master.DARCMaster.restart_service (
              self,
              service )
:param service: service to restart
3.10.2.10 run()
def darc.darc_master.DARCMaster.run (
             self )
Listen for message on the command socket
3.10.2.11 start_observation()
def darc.darc_master.DARCMaster.start_observation (
              self,
              config_file )
Start an observation
:param config_file: Path to observation config file
3.10.2.12 start_service()
def darc.darc_master.DARCMaster.start_service (
              service )
:param service: service to start
:return: status
3.10.2.13 stop()
def darc.darc_master.DARCMaster.stop (
              self )
Stop all services and exit
```

#### 3.10.2.14 stop\_observation()

```
def darc.darc_master.DARCMaster.stop_observation ( self \ ) Stop an observation :return: status, reply message
```

#### 3.10.2.15 stop\_service()

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

· darc/darc\_master.py

## 3.11 darc.darc\_master.DARCMasterException Class Reference

Inheritance diagram for darc.darc\_master.DARCMasterException:

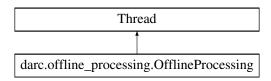


The documentation for this class was generated from the following file:

· darc/darc\_master.py

## 3.12 darc.offline\_processing.OfflineProcessing Class Reference

Inheritance diagram for darc.offline\_processing.OfflineProcessing:



#### **Public Member Functions**

```
def __init__ (self)
def set_source_queue (self, queue)
def stop (self)
def run (self)
```

#### **Public Attributes**

- daemon
- · stop event
- · observation\_queue
- · threads
- · config
- logger
- · host\_type

#### **Private Member Functions**

```
def _start_observation_master (self, obs_config)
def _start_observation_worker (self, obs_config)
def _merge_triggers (self, obs_config)
def _cluster (self, obs_config, filterbank_name, tab=None, ind=None, sbmin=None, sbmax=None, out=None)
def _merge_hdf5 (self, obs_config, output_file)
def _classify (self, obs_config, input_file)
def _merge_plots (self, obs_config)
def _gather_results (self, obs_config)
def _get_coordinates (self, obs_config)
def _get_overview (self, obs_config)
def _get_ymw16 (self, obs_config)
def _fold_pulsar (self, source, obs_config)
def _load_parset (self, obs_config)
```

#### 3.12.1 Member Function Documentation

3.12.1.1 \_classify()

#### 3.12.1.2 \_cluster()

```
{\tt def darc.offline\_processing.OfflineProcessing.\_cluster} \ (
              self,
              obs_config,
              filterbank_name,
              tab = None,
              ind = None,
              sbmin = None,
              sbmax = None,
              out = None ) [private]
Run triggers.py
:param obs_config: Observation config
:param filterbank_name: Full path to filterbank file (TAB/IAB) or prefix (SB) to use
:param tab: TAB number to process (0 for IAB, absent/None for SB)
:param ind: Index of out array where
:param sbmin: First SB to process (SB mode only)
:param sbmax: Last SB to process (SB mode only)
:param out: array where return value is put at index <ind> (optional)
3.12.1.3 _fold_pulsar()
def darc.offline_processing.OfflineProcessing._fold_pulsar (
              self,
              source,
              obs_config ) [private]
Fold pulsar with PRESTO
:param source: pulsar name including B or J
:param obs_config: Observation config
3.12.1.4 _gather_results()
{\tt def darc.offline\_processing.0fflineProcessing.\_gather\_results} \ \ (
              self,
              obs_config,
             ** kwargs ) [private]
Gather output results and put in central location
:param obs_config: Observation config
:param kwargs: number of candidates, output prefixes
```

#### 3.12.1.5 \_get\_coordinates()

```
{\tt def darc.offline\_processing.OfflineProcessing.\_get\_coordinates} \ \ (
              self,
              obs_config ) [private]
Generate the coordinates file from the pointing directions
:param obs_config: Observation config
#:return: dict with RA, Dec, gl, gb for each CB
3.12.1.6 _get_overview()
def darc.offline_processing.OfflineProcessing._get_overview (
              self,
              obs_config ) [private]
Generate observation overview file
:param obs_config: Observation config
3.12.1.7 _get_ymw16()
def darc.offline_processing.OfflineProcessing._get_ymw16 (
              self,
              obs_config ) [private]
Get YMW16 DM
:param obs_config: Observation config
:return: YMW16 DM
3.12.1.8 _load_parset()
def darc.offline_processing.OfflineProcessing._load_parset (
              self,
              obs_config ) [private]
Load the observation parset
:param obs_config: Observation config
:return: parset as dict
```

```
3.12.1.9 _merge_hdf5()
def darc.offline_processing.OfflineProcessing._merge_hdf5 (
              obs_config,
              output_file ) [private]
Merge HDF5 files generated by clustering
:param obs_config: Observation config
:param output_file: Filename of merged HDF5 data
3.12.1.10 _merge_plots()
def darc.offline_processing.OfflineProcessing._merge_plots (
              self,
              obs_config ) [private]
Merge classifier output plots
:param obs_config: Observation config
3.12.1.11 _merge_triggers()
def darc.offline_processing.OfflineProcessing._merge_triggers (
              obs_config ) [private]
Merge AMBER triggers into one file
:param obs_config: Observation config
3.12.1.12 _start_observation_master()
def darc.offline_processing.OfflineProcessing._start_observation_master (
              self,
              obs_config ) [private]
Start observation on master node
```

:param obs\_config: Observation config

#### 3.12.1.13 \_start\_observation\_worker()

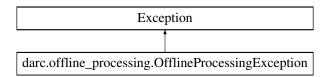
```
\tt def \ darc.offline\_processing.OfflineProcessing.\_start\_observation\_worker \ (
              self,
              obs_config ) [private]
Start observation on worker node
:param obs_config: Observation config
3.12.1.14 run()
def darc.offline_processing.OfflineProcessing.run (
              self )
Wait for start_observation command
3.12.1.15 set_source_queue()
def darc.offline_processing.OfflineProcessing.set_source_queue (
              self,
              queue )
:param queue: Source of start_observation commands
3.12.1.16 stop()
def darc.offline_processing.OfflineProcessing.stop (
              self )
Stop the service
```

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

darc/offline\_processing.py

## 3.13 darc.offline\_processing.OfflineProcessingException Class Reference

Inheritance diagram for darc.offline\_processing.OfflineProcessingException:

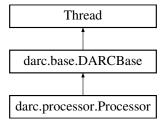


The documentation for this class was generated from the following file:

· darc/offline\_processing.py

## 3.14 darc.processor.Processor Class Reference

Inheritance diagram for darc.processor.Processor:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def process\_command (self, command)
- def start\_observation (self, obs\_config)
- def stop\_observation (self)
- def read\_and\_process\_data (self, obs\_config)
- def lofar\_trigger (self, trigger)
- def iquv\_trigger (self, trigger)

#### **Public Attributes**

- · needs\_target\_queue
- thread
- · observation\_running
- rtproc
- · model\_freqtime
- · model\_dmtime

#### 3.14.1 Detailed Description

Process dada events

#### 3.14.2 Constructor & Destructor Documentation

Reimplemented from darc.base.DARCBase.

#### 3.14.3 Member Function Documentation

#### 3.14.3.1 iquv\_trigger()

#### 3.14.3.2 lofar\_trigger()

```
def darc.processor.Processor.lofar_trigger ( self, \\ trigger \ ) Contact VOEvent server to send LOFAR trigger
```

#### 3.14.3.3 read\_and\_process\_data()

#### 3.14.3.4 start\_observation()

```
\begin{tabular}{ll} $\operatorname{def darc.processor.Processor.start\_observation} & ( & self, & \\ & obs\_config \end{tabular} ) \\ \\ $\operatorname{Start observation} & \begin{tabular}{ll} $\operatorname{Start observation} \end{tabular}
```

#### 3.14.3.5 stop\_observation()

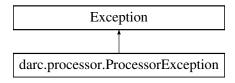
```
\label{eq:continuous} \mbox{def darc.processor.Processor.stop\_observation (} \\ self \mbox{)} Stop observation
```

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

· darc/processor.py

## 3.15 darc.processor.ProcessorException Class Reference

 $Inheritance\ diagram\ for\ darc.processor. Processor Exception:$ 

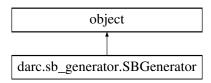


The documentation for this class was generated from the following file:

darc/processor.py

## 3.16 darc.sb\_generator.SBGenerator Class Reference

Inheritance diagram for darc.sb\_generator.SBGenerator:



#### **Public Member Functions**

- def \_\_init\_\_ (self, fname=None, science\_case=None)
- def reversed (self)
- def reversed (self, state)
- def from\_table (cls, fname)
- def from\_science\_case (cls, science\_case)
- def get\_map (self, sb)
- def synthesize\_beam (self, data, sb)

#### **Public Attributes**

- · sb\_table
- nsub
- numtab
- numsb
- · science\_case
- fname
- sb\_mapping

#### **Private Member Functions**

• def \_load\_table (self)

#### **Private Attributes**

· \_\_reversed

#### 3.16.1 Member Function Documentation

```
3.16.1.1 _load_table()
```

```
\begin{tabular}{ll} $\operatorname{def darc.sb\_generator.SBGenerator.\_load\_table} & ( & self ) & [private] \end{tabular}
```

Load the SB table

#### 3.16.1.2 from\_science\_case()

```
def darc.sb_generator.SBGenerator.from_science_case (
              cls,
              science_case )
Initalize default table for given science cases
:param science_case: science case (3 or 4)
:return: SBGenerator object
3.16.1.3 from_table()
def darc.sb_generator.SBGenerator.from_table (
              cls,
              fname )
Initalize with provided SB table
:param fname: Path to SB table
:return: SBGenerator object
3.16.1.4 get_map()
def darc.sb_generator.SBGenerator.get_map (
              self,
              sb)
Return mapping of requested SB
:param sb: beam to return mapping for
:return: SB mapping for requested beam
3.16.1.5 reversed() [1/2]
def darc.sb_generator.SBGenerator.reversed (
              self )
Whether or not the SB table is reversed for use on filterbank data
:return: reversed (bool)
```

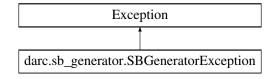
## 

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

· darc/sb generator.py

## 3.17 darc.sb\_generator.SBGeneratorException Class Reference

Inheritance diagram for darc.sb\_generator.SBGeneratorException:

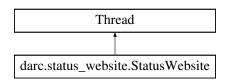


The documentation for this class was generated from the following file:

· darc/sb\_generator.py

#### 3.18 darc.status\_website.StatusWebsite Class Reference

Inheritance diagram for darc.status\_website.StatusWebsite:



#### **Public Member Functions**

```
• def __init__ (self)
```

- def run (self)
- def stop (self)
- def publish\_status (self, statuses)
- def get\_template (self)
- def make\_offline\_page (self)

#### **Public Attributes**

- stop\_event
- daemon
- · services\_master
- · services worker
- · all\_nodes
- logger

#### 3.18.1 Member Function Documentation

Publish status as simple html webpage

```
3.18.1.4 run()
```

```
\label{lem:def_def} \mbox{def darc.status\_website.StatusWebsite.run (} \\ self \mbox{)}
```

#### 3.18.1.5 stop()

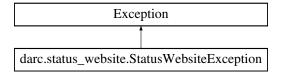
```
def darc.status_website.StatusWebsite.stop ( self \ ) Stop the service
```

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

· darc/status\_website.py

## 3.19 darc.status\_website.StatusWebsiteException Class Reference

 $Inheritance\ diagram\ for\ darc.status\_website. StatusWebsite Exception:$ 

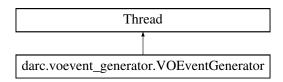


The documentation for this class was generated from the following file:

darc/status\_website.py

## 3.20 darc.voevent\_generator.VOEventGenerator Class Reference

Inheritance diagram for darc.voevent\_generator.VOEventGenerator:



#### **Public Member Functions**

- def \_\_init\_\_ (self)
- def stop (self)
- def run (self)
- def create\_and\_send (self, trigger)
- def **NewVOEvent** (self, dm, dm\_err, width, snr, flux, ra, dec, semiMaj, semiMin, ymw16, name, importance, utc, gl, gb)

#### **Public Attributes**

- stop\_event
- daemon
- · voevent\_server
- logger
- · voevent\_queue

#### 3.20.1 Detailed Description

Generate VOEvent from incoming trigger

#### 3.20.2 Member Function Documentation

#### 3.20.2.1 create\_and\_send()

```
def darc.voevent_generator.VOEventGenerator.create_and_send ( self, \\ trigger \ ) Creates VOEvent Sends if enabled in config :param trigger: Trigger event
```

#### 3.20.2.2 run()

```
def darc.voevent_generator.VOEventGenerator.run ( self \ ) Read triggers from queue and call processing for each trigger
```

#### 3.20.2.3 stop()

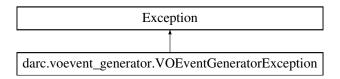
```
\label{lem:continuous} $\operatorname{def darc.voevent\_generator.VOEventGenerator.stop} \ ($\operatorname{\it self}$ ) Stop the service
```

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

darc/voevent\_generator.py

#### 3.21 darc.voevent\_generator.VOEventGeneratorException Class Reference

Inheritance diagram for darc.voevent\_generator.VOEventGeneratorException:

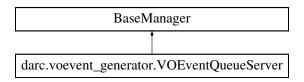


The documentation for this class was generated from the following file:

· darc/voevent\_generator.py

## 3.22 darc.voevent\_generator.VOEventQueueServer Class Reference

Inheritance diagram for darc.voevent\_generator.VOEventQueueServer:



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

darc/voevent\_generator.py

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