

EaseFilter Filter Driver SDK Manual

Introduction

File system filter driver

A file system filter driver intercepts requests targeted at a file system or another file system filter driver. By intercepting the request before it reaches its intended target, the filter driver can extend or replace functionality provided by the original target of the request. It is developed primarily to allow the addition of new functionality beyond what is currently available.

File system monitor filter

File system monitor filter can monitor the file system activities on the fly. With file system monitor filter, you can monitor the file activities on file system level, capture file open/create/replace, read/write, query/set file attribute/size/time security information, rename/delete, directory browsing and file close request by which user and process name. You can develop the software for the following purposes:

- Continuous data protection (CDP).
- Auditing.
- Access log.
- Journaling.

File system control filter

File system control filter can control the file activities, which you can intercept the file system call, modify its content before or after the request goes down to the file system, allow/deny/cancel its execution based on the filter rule. You can fully control file open/create/replace, read/write, query/set file attribute/size/time security information, rename/delete, directory browsing these io requests. With file system control filter, you can develop these kinds of software:

- Data protection.
- File Screening
- Access Control.
- File Security.

File system encryption filter

File system encryption filter provides a comprehensive solution for transparent file level encryption. It allows developers to create transparent, on-access, per-file encryption products which it can encrypt or decrypt file on-the-fly. Our encryption engine uses a strong cryptographic algorithm called Rijndael (256-bit key), it is a high security algorithm created by Joan Daemen and Vincent Rijmen (Belgium). Rijndael is the new Advanced Encryption Standard (AES) chosen by the National Institute of Standards and Technology (NIST).

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Process filter driver

Process filter driver is a kernel-mode driver that tracks and controls the process and thread operations, it provides you an easy way to develop Windows application for the Windows process monitoring and protection. Prevent the untrusted executable binaries (malwares) from being launched, protect your data being damaged by the untrusted processes.

Registry filter driver

Registry filter driver is a kernel-mode driver that tracks and controls the registry access, it provides you an easy way to develop Windows application for registry monitoring and protection, it enables your application to prevent the Windows core registry keys and values from being damaged.

The rules to use of file system control filter

To use the file system control filter, you need to follow the following rules, or might cause the system deadlock.

1. Avoid the re-entrance issue, don't generate any new I/O request which will cause the request comes to the control filter handler again.
2. Avoid using any file operations in buffered mode, open any file in the control filter handler with `FILE_FLAG_NO_BUFFERING` flag set.
3. Avoid asynchronous procedure calls.
4. Avoid any GUI (user interface) operations.

Supported Platforms

- Windows 2016/Windows 2019/Windows 2022
- Windows 10/11 (32bit, 64bit)
- Windows 8 (32bit, 64bit)
- Windows 2012 Server R2
- Windows 2008 Server R2 (32bit, 64bit)
- Windows 7 (32bit,64bit)
- Windows 2008 Server (32bit, 64bit)
- Windows Vista (32bit,64bit)
- Windows 2003 Server(32bit,64bit)
- Windows XP (32bit,64bit)

Overview and Basic Concepts

The EaseFilter file system filter driver

A filter rule has only one unique include file mask, when a new filter rule was added to the filter driver, if a filter rule with the same include file filter mask exists, the new filter rule will replace the older one.

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I/O registration

Pre IO and Post IO

A pre IO is the I/O operation which is not going down to the file system. A post IO is the I/O operation which was returned from the file system after it was processed.

To get the notification of an I/O for a monitor filter driver you need to register the specific post IO callback class. To control the file I/O, you can register the pre IO or post IO callback class for the control filter driver, you can modify the I/O data in your callback function.

Symbol Reference

Structures, Enums

Typedef enum FilterType

```
{  
    FILE_SYSTEM_CONTROL           = 1,  
    FILE_SYSTEM_ENCRYPTION        = 2,  
    FILE_SYSTEM_MONITOR           = 4,  
    FILE_SYSTEM_REGISTRY          = 8,  
    FILE_SYSTEM_PROCESS           = 16,  
};
```

Comments

FILE_SYSTEM_CONTROL filter type is the file system filter driver which can control the file I/O request's behaviour before it goes down to the file system or after it is completed by the file system.

FILE_SYSTEM_ENCRYPTION filter type is the file system filter driver which can encrypt and decrypt the files on-the-fly.

FILE_SYSTEM_MONITOR filter type is the file system filter driver which only intercept the file I/O notification after it was completed.

FILE_SYSTEM_REGISTRY filter type is the filter driver which can track and control the registry access.

FILE_SYSTEM_PROCESS filter type is the filter driver which can track and control the process and thread operations.

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typedef enum IOCallbackClass

```
{  
    PRE_CREATE = 0x00000001,  
    POST_CREATE = 0x00000002,  
    PRE_NEW_FILE_CREATED = 0x0000000100000000,  
    POST_NEW_FILE_CREATED = 0x0000000200000000,  
    PRE_FASTIO_READ = 0x00000004,  
    POST_FASTIO_READ = 0x00000008,  
    PRE_CACHE_READ = 0x00000010,  
    POST_CACHE_READ = 0x00000020,  
    PRE_NOCACHE_READ = 0x00000040,  
    POST_NOCACHE_READ = 0x00000080,  
    PRE_PAGING_IO_READ = 0x00000100,  
    POST_PAGING_IO_READ = 0x00000200,  
    PRE_FASTIO_WRITE = 0x00000400,  
    POST_FASTIO_WRITE = 0x00000800,  
    PRE_CACHE_WRITE = 0x00001000,  
    POST_CACHE_WRITE = 0x00002000,  
    PRE_NOCACHE_WRITE = 0x00004000,  
    POST_NOCACHE_WRITE = 0x00008000,  
    PRE_PAGING_IO_WRITE = 0x00010000,  
    POST_PAGING_IO_WRITE = 0x00020000,  
    PRE_QUERY_INFORMATION = 0x00040000,  
    POST_QUERY_INFORMATION = 0x00080000,  
    PRE_QUERY_FILE_SIZE = 0x0000000400000000,  
    POST_QUERY_FILE_SIZE = 0x0000000800000000,  
    PRE_QUERY_FILE_BASIC_INFO = 0x0000001000000000,  
    POST_QUERY_FILE_BASIC_INFO = 0x0000002000000000,  
    PRE_QUERY_FILE_STANDARD_INFO = 0x0000004000000000,  
    POST_QUERY_FILE_STANDARD_INFO = 0x0000008000000000,  
    PRE_QUERY_FILE_NETWORK_INFO = 0x0000010000000000,  
    POST_QUERY_FILE_NETWORK_INFO = 0x0000020000000000,  
    PRE_QUERY_FILE_ID = 0x0000040000000000,  
    POST_QUERY_FILE_ID = 0x0000080000000000,  
    PRE_SET_INFORMATION = 0x00100000,  
    POST_SET_INFORMATION = 0x00200000,  
    PRE_SET_FILE_SIZE = 0x0000400000000000,  
    POST_SET_FILE_SIZE = 0x0000800000000000,  
    PRE_SET_FILE_BASIC_INFO = 0x0001000000000000,  
    POST_SET_FILE_BASIC_INFO = 0x0002000000000000,  
    PRE_SET_FILE_STANDARD_INFO = 0x0004000000000000,  
    POST_SET_FILE_STANDARD_INFO = 0x0008000000000000,  
    PRE_SET_FILE_NETWORK_INFO = 0x0010000000000000,  
    POST_SET_FILE_NETWORK_INFO = 0x0020000000000000,  
    PRE_RENAME_FILE = 0x0040000000000000,  
    POST_RENAME_FILE = 0x0080000000000000,  
}
```

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<i>PRE_DELETE_FILE</i>	<i>= 0x0100000000000000,</i>
<i>POST_DELETE_FILE</i>	<i>= 0x0200000000000000,</i>
<i>PRE_DIRECTORY</i>	<i>= 0x00400000,</i>
<i>POST_DIRECTORY</i>	<i>= 0x00800000,</i>
<i>PRE_QUERY_SECURITY</i>	<i>= 0x01000000,</i>
<i>POST_QUERY_SECURITY</i>	<i>= 0x02000000,</i>
<i>PRE_SET_SECURITY</i>	<i>= 0x04000000,</i>
<i>POST_SET_SECURITY</i>	<i>= 0x08000000,</i>
<i>PRE_CLEANUP</i>	<i>= 0x10000000,</i>
<i>POST_CLEANUP</i>	<i>= 0x20000000,</i>
<i>PRE_CLOSE</i>	<i>= 0x40000000,</i>
<i>POST_CLOSE</i>	<i>= 0x80000000,</i>

};

Members

PRE_CREATE

This is the IRP_MJ_CREATE request, the create I/O request before it goes down to the file system.

POST_CREATE

This is the IRP_MJ_CREATE request, the create I/O request after it is completed by file system.

PRE_NEW_FILE_CREATED

This is the IRP_MJ_CREATE request, if you want to filter the file going to be created operation only, you can register PRE_NEW_FILE_CREATED.

POST_NEW_FILE_CREATED

This is the IRP_MJ_CREATE request, if you want to filter the file being created operation only, you can register PRE_NEW_FILE_CREATED.

PRE_FASTIO_READ

This is the fast I/O pre read request if the data is in the cache.

POST_FASTIO_READ

This is the fast I/O post read request if the data is in the cache. If the data is already in the Cache Manager, it

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will return true, or it will return false and the I/O Manager will reissue a new IRP cache read request to the file system.

PRE_CACHE_READ

This is the IRP_MJ_READ cache read pre request, before the data was read from the cache manager.

POST_CACHE_READ

This is the IRP_MJ_READ cache read post request, after the data was read from the cache manager. If the data is not in the Cache Manager, it will trigger a paging I/O read request and load the data from the storage to the Cache Manager. Normally you will see the paging I/O read request follows the cache read request.

PRE_NOCACHE_READ

This is the IRP_MJ_READ no cache read pre request, read the data from the disk directly, bypass the cache manager.

POST_NOCACHE_READ

This is the IRP_MJ_READ no cache read post request, read the data from the disk directly, bypass the cache manager. You will see the noncache read request if you open a file with the flag `FILE_NO_INTERMEDIATE_BUFFERING`.

PRE_PAGING_IO_READ

This is the IRP_MJ_READ paging read pre request, read the data from the disk to the cache.

POST_PAGING_IO_READ

This is the IRP_MJ_READ paging read post request, read the data from the disk to the cache. It is initiated by the virtual memory system in order to satisfy the needs of the demand paging system.

PRE_FASTIO_WRITE

This is the fast I/O pre write request to the cache.

POST_FASTIO_WRITE

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This is the fast I/O pre write request to the cache. The data was written to the cache if the request is satisfied immediately, or a IRP cache write will be issued.

PRE_CACHE_WRITE

This is the IRP_MJ_WRITE cache write pre request, write the data to the cache manager.

POST_CACHE_WRITE

This is the IRP_MJ_WRITE cache write post request, write the data to the cache manager. The paging I/O write request will be issued after the cache write.

PRE_NOCACHE_WRITE

This is the IRP_MJ_WRITE no cache write pre request, write the data to the disk directly, bypass the cache manager.

POST_NOCACHE_WRITE

This is the IRP_MJ_WRITE no cache write pre request, write the data to the disk directly, bypass the cache manager. You will see the noncache write request if you open a file with flag FILE_NO_INTERMEDIATE_BUFFERING.

PRE_PAGING_IO_WRITE

This is the IRP_MJ_WRITE paging write pre request, write the data from cache to the disk.

POST_PAGING_IO_WRITE

This is the IRP_MJ_WRITE paging write post request, after the data was written from the cache to the disk.

PRE_QUERY_INFORMATION

This is the IRP_MJ_QUERY_INFORMATION pre request to retrieve the information for a given file before it goes down to the file system. The file information class tells the type of the information will be returned.

POST_QUERY_INFORMATION

This is the IRP_MJ_QUERY_INFORMATION post request to retrieve the information for a given file after it came back

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from the file system. The file information class tells the type of the information will be returned.

PRE_QUERY_FILE_SIZE

This is the IRP_MJ_QUERY_INFORMATION pre request with information class FileEndOfFileInformation, if you only want to get the callback for the file size query, you can register this class.

POST_QUERY_FILE_SIZE

This is the IRP_MJ_QUERY_INFORMATION post request with information class FileEndOfFileInformation.

PRE_QUERY_FILE_BASIC_INFO

This is the IRP_MJ_QUERY_INFORMATION pre request with information class FileBasicInformation, if you only want to get the callback for the file basic information query, you can register this class.

POST_QUERY_FILE_BASIC_INFO

This is the IRP_MJ_QUERY_INFORMATION post request with information class FileBasicInformation.

PRE_QUERY_FILE_STANDARD_INFO

This is the IRP_MJ_QUERY_INFORMATION pre request with information class FileStandardInformation, if you only want to get the callback for the file standard information query, you can register this class.

POST_QUERY_FILE_STANDARD_INFO

This is the IRP_MJ_QUERY_INFORMATION post request with information class FileStandardInformation.

PRE_QUERY_FILE_NETWORK_INFO

This is the IRP_MJ_QUERY_INFORMATION pre request with information class FileNetworkOpenInformation, if you only want to get the callback for the file network information query, you can register this class.

POST_QUERY_FILE_NETWORK_INFO

This is the IRP_MJ_QUERY_INFORMATION post request with information class FileNetworkOpenInformation.

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PRE_QUERY_FILE_ID

This is the IRP_MJ_QUERY_INFORMATION pre request with information class FileInternalInformation, if you only want to get the callback for the file Id information query, you can register this class.

POST_QUERY_FILE_ID

This is the IRP_MJ_QUERY_INFORMATION post request with information class FileInternalInformation.

PRE_SET_INFORMATION

This is the IRP_MJ_SET_INFORMATION pre request to set the information for a given file before it goes down to the file system. The file information class tells the type of the information will be set.

POST_SET_INFORMATION

This is the IRP_MJ_SET_INFORMATION post request to set the information for a given file after it came back from the file system. The file information class tells the type of the information will be set.

PRE_SET_FILE_SIZE

This is the IRP_MJ_SET_INFORMATION pre request to set the information with class FileEndOfFileInformation for a given file before it goes down to the file system. You can register this I/O class if you want to filter the file size change.

POST_SET_FILE_SIZE

This is the IRP_MJ_SET_INFORMATION post request to set the information with class FileEndOfFileInformation for a given file after the I/O completed and came back from the file system.

PRE_SET_FILE_BASIC_INFO

This is the IRP_MJ_SET_INFORMATION pre request to set the information with class FileBasicInformation for a given file before it goes down to the file system. You can

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register this I/O class if you want to filter the file basic information change.

POST_SET_FILE_BASIC_INFO

This is the IRP_MJ_SET_INFORMATION post request to set the information with class FileBasicInformation for a given file after the I/O completed and came back from the file system.

PRE_SET_FILE_STANDARD_INFO

This is the IRP_MJ_SET_INFORMATION pre request to set the information with class FileStandardInformation for a given file before it goes down to the file system. You can register this I/O class if you want to filter the file standard information change.

POST_SET_FILE_BASIC_INFO

This is the IRP_MJ_SET_INFORMATION post request to set the information with class FileStandardInformation for a given file after the I/O completed and came back from the file system.

PRE_SET_FILE_NETWORK_INFO

This is the IRP_MJ_SET_INFORMATION pre request to set the information with class FileNetworkOpenInformation for a given file before it goes down to the file system. You can register this I/O class if you want to filter the file network information change.

POST_SET_FILE_NETWORK_INFO

This is the IRP_MJ_SET_INFORMATION post request to set the information with class FileNetworkOpenInformation for a given file after the I/O completed and came back from the file system.

PRE_RENAME_FILE

This is the IRP_MJ_SET_INFORMATION pre request to set the information with class FileMoveOrRenameInformation for a given file before it goes down to the file system. You can register this I/O class if you want to filter the file move or rename operation.

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POST_RENAME_FILE

This is the IRP_MJ_SET_INFORMATION post request to set the information with class FileMoveOrRenameInformation for a given file after the I/O completed and came back from the file system.

PRE_DELETE_FILE

This is the IRP_MJ_SET_INFORMATION pre request to set the information with class FileDispositionInformation for a given file before it goes down to the file system. You can register this I/O class if you want to filter the file delete operation.

POST_DELETE_FILE

This is the IRP_MJ_SET_INFORMATION post request to set the information with class FileDispositionInformation for a given file after the I/O completed and came back from the file system.

PRE_DIRECTORY

This the IRP_MJ_DIRECTORY_CONTROL pre request for the folder browsing I/O request before it goes down to the file system. It retrieve various kinds of information about files in the given directory. The information class tells the type of information will be returned.

POST_DIRECTORY

This the IRP_MJ_DIRECTORY_CONTROL post request for the folder browsing I/O request after the data came back from the file system. It retrieve various kinds of information about files in the given directory. The information class tells the type of information will be returned.

PRE_QUERY_SECURITY

This is the IRP_MJ_QUERY_SECURITY pre request to query the security information before it goes down to the file system. It will retrieve the security descriptor for a given file. The security information tells the the type of the security descriptor.

POST_QUERY_SECURITY

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This is the `IRP_MJ_QUERY_SECURITY` post request to query the security information after the data came back from the file system. It will retrieve the security descriptor for a given file. The security information tells the the type of the security descriptor.

PRE_SET_SECURITY

This is the `IRP_MJ_SET_SECURITY` pre request to set the security information before it goes down to the file system. It will set the security state for a given file. The security information tells the the type of the security descriptor.

POST_SET_SECURITY

This is the `IRP_MJ_SET_SECURITY` post request to set the security information after the data was written to the file system. It will set the security state for a given file. The security information tells the the type of the security descriptor.

PRE_CLEANUP

This is the `IRP_MJ_CLEANUP` pre request before it goes down to the file system. It indicates that the handle reference count on a file object has reached zero. In other words, all handles to the file object have been closed. Often it is sent when a user-mode application has called the Microsoft Win32 `CloseHandle` function on the last outstanding handle to a file object.

POST_CLEANUP

This is the `IRP_MJ_CLEANUP` post request after the I/O completed and came back from the file system.

PRE_CLOSE

This is the `IRP_MJ_CLOSE` pre request before it goes down to the file system. It indicates that the reference count on a file object has reached zero, usually because a file system driver or other kernel-mode component has called `ObDereferenceObject` on the file object. This request normally follows a cleanup request. However, this does not

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necessarily mean that the close request will be received immediately after the cleanup request.

POST_CLOSE

This is the IRP_MJ_CLOSE post request after the I/O completed and came back from the file system.

Comments

Register the I/O request with the combination of the request type you want to monitor. For file system monitor filter, only post requests are affected.

typedef enum FilterCommand

```
{
FILTER_SEND_FILE_CHANGED_EVENT           = 0X00010001,
FILTER_REQUEST_USER_PERMIT               = 0X00010002,
FILTER_REQUEST_ENCRYPTION_KEY            = 0X00010003,
FILTER_REQUEST_ENCRYPTION_IV_AND_KEY     = 0X00010004,
FILTER_REQUEST_ENCRYPTION_IV_AND_KEY_ACCESSFLAG=0X00010005,
FILTER_REQUEST_ENCRYPTION_IV_AND_KEY_TAGDATA =0X00010006,
FILTER_SEND_REG_CALLBACK_INFO            = 0X00010007,
FILTER_SEND_PROCESS_CREATION_INFO        = 0X00010008,
FILTER_SEND_PROCESS_TERMINATION_INFO     = 0X00010009,
FILTER_SEND_THREAD_CREATION_INFO         = 0X0001000A,
FILTER_SEND_THREAD_TERMINATION_INFO      = 0X0001000B,
FILTER_SEND_PROCESS_HANDLE_INFO          = 0X0001000C,
FILTER_SEND_THREAD_HANDLE_INFO           = 0X0001000D,
FILTER_SEND_ATTACHED_VOLUME_INFO         = 0x0001000e,
FILTER_SEND_DETACHED_VOLUME_INFO         = 0x0001000f,
FILTER_SEND_DENIED_FILE_IO_EVENT         = 0x00010010,
FILTER_SEND_DENIED_VOLUME_DISMOUNT_EVENT = 0x00010011,
FILTER_SEND_DENIED_PROCESS_EVENT         = 0x00010012,
FILTER_SEND_DENIED_REGISTRY_ACCESS_EVENT = 0x00010013,
FILTER_SEND_DENIED_PROCESS_TERMINATED_EVENT = 0x00010014,
FILTER_SEND_DENIED_USB_READ_EVENT        = 0x00010015,
FILTER_SEND_DENIED_USB_WRITE_EVENT       = 0x00010016,
FILTER_SEND_PRE_TERMINATE_PROCESS_INFO   = 0x00010017,
}
```

FILTER_SEND_FILE_CHANGED_EVENT

If the monitor filter driver register the event type with API 'RegisterEventTypeToFilterRule', the notification will be sent when the file was changed.

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`FILTER_REQUEST_USER_PERMIT`

If the file has this control flag, the filter driver will request the permission to open this file.

`FILTER_REQUEST_ENCRYPTION_KEY`

For encryption filter driver, if this control flag was enable for this file, the filter driver will request the encryption key for this file.

`FILTER_REQUEST_ENCRYPTION_IV_AND_KEY`

For encryption filter driver, if this control flag was enable for this file, the filter driver will request the encryption key and IV for this file.

`FILTER_REQUEST_ENCRYPTION_IV_AND_KEY_AND_ACCESSFLAG`

For encryption filter driver, if this control flag was enable for this file, the filter driver will request the encryption key, IV and access flag for this file.

`FILTER_REQUEST_ENCRYPTION_IV_AND_KEY_AND_TAGDATA`

For encryption filter driver, if this control flag was enable for this file, the filter driver will request the encryption key, IV and tag data for this file.

`FILTER_SEND_REG_CALLBACK_INFO`

For registry filter driver, if the registry callback class was registered, the registry access notification will be sent whent the registry was accessed.

`FILTER_SEND_PROCESS_CREATION_INFO`

For process filter driver, if the `PROCESS_CREATION_NOTIFICATION` was registered, the process infomation will be sent when the new process was created.

`FILTER_SEND_PROCESS_TERMINATION_INFO`

For process filter driver, if the `PROCESS_TERMINATION_NOTIFICATION` was registered, the process infomation will be sent when the process was terminated.

`FILTER_SEND_THREAD_CREATION_INFO`

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For process filter driver, if the `THREAD_CREATION_NOTIFICATION` was registered, the process information will be sent when the new thread was created.

`FILTER_SEND_THREAD_TERMINATION_INFO`

For process filter driver, if the `THREAD_TERMINATION_NOTIFICATION` was registered, the process information will be sent when the thread was terminated.

`FILTER_SEND_PROCESS_HANDLE_INFO`

For process filter driver, if the `PROCESS_HANDLE_OP_NOTIFICATION` was registered, the process information will be sent when a handle for a process was created or duplicated.

`FILTER_SEND_THREAD_HANDLE_INFO`

For process filter driver, if the `THREAD_HANDLE_OP_NOTIFICATION` was registered, the process information will be sent when a handle for a thread was created or duplicated.

`FILTER_SEND_ATTACHED_VOLUME_INFO`

Send the volume information if there a volume was attached to the filter driver if it was enabled in volume control flag.

`FILTER_SEND_DETACHED_VOLUME_INFO`

Send the volume information if there a volume was detached from the filter driver if it was enabled in volume control flag.

`FILTER_SEND_FILE_IO_DENIED_EVENT`

Send file I/O information if the I/O was blocked by the filter driver with access flag setting if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_FILE_IO_DENIED_EVENT`

Send file I/O information if the I/O was blocked by the filter driver with access flag setting if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_DENIED_VOLUME_DISMOUNT_EVENT`

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Send volume information if the volume dismount operation was blocked by the filter driver with the flag `BLOCK_VOLUME_DISMOUNT` enabled in the volume control flag if the `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_DENIED_PROCESS_EVENT`

Send the new process information if new process creation was blocked by the filter driver with flag `DENY_NEW_PROCESS_CREATION` was enabled in the process control flag if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_DENIED_REGISTRY_ACCESS_EVENT`

Send registry access information if the operation was blocked by the filter driver in registry control flag setting if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_DENIED_PROCESS_TERMINATION_EVENT`

Send the process information if the protected process termination was blocked by the filter driver if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_DENIED_USB_READ_EVENT`

Send file I/O information if the USB read was block by the filter driver with flag `BLOCK_USB_READ` enabled if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_DENIED_USB_WRITE_EVENT`

Send file I/O information if the USB write was block by the filter driver with flag `BLOCK_USB_WRITE` enabled if the flag `ENABLE_SEND_DENIED_EVENT` was enabled in global boolean setting.

`FILTER_SEND_PRE_TEMINIATE_PROCESS_INFO`

Send the process information before it was going to be terminated if the flag `PROCESS_PRE_TERMINATION_REQUEST` was enabled in process control setting.

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Comments

This is the command which was sent from the filter driver with the information associated to the specific command in structure 'MESSAGE_SEND_DATA'.

typedef enum VolumeControlFlag

```
{
    GET_ATTACHED_VOLUME_INFORMATION          = 0X00000001,
    VOLUME_ATTACHED_NOTIFICATION             = 0X00000002,
    VOLUME_DETACHED_NOTIFICATION             = 0X00000004,
    BLOCK_VOLUME_DISMOUNT                    = 0X00000008,
    BLOCK_USB_READ                            = 0x00000010,
    BLOCK_USB_WRITE                          = 0x00000020,
}
```

GET_ATTACHED_VOLUME_INFORMATION

If this flag is enabled, the filter driver will send all the attached volume information to the user mode service.

VOLUME_ATTACHED_NOTIFICATION

If this flag is enabled, you will get the notification when the filter driver attached to a volume.

VOLUME_DETACHED_NOTIFICATION

If this flag is enabled, you will get the notification when the filter driver detached from a volume.

BLOCK_VOLUME_DISMOUNT

If this flag is enabled, it will prevent the attached volumes from being formatted or dismounted.

BLOCK_USB_READ

If this flag is enabled, it will prevent USB volume from being read.

BLOCK_USB_WRITE

If this flag is enabled, it will prevent USB volume from being written.

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Comments

This is the control flag for volume information with API "SetVolumeControlFlag", enable you to get the notification when the filter driver attached to a volume or detached a volume, or prevent the attached volumes from being formatted or dismounted.

typedef struct _VOLUME_INFO

```
{  
    ULONG        VolumeNameLength;  
    WCHAR        VolumeName[MAX_FILE_NAME_LENGTH];  
    ULONG        VolumeDosNameLength;  
    WCHAR        VolumeDosName[MAX_FILE_NAME_LENGTH];  
    ULONG        VolumeFileSystemType;  
    ULONG        DeviceCharacteristics;  
  
} VOLUME_INFO, *PVOLUME_INFO;
```

Members

VolumeNameLength

This is the length of the volume name.

VolumeName

The volume name buffer.

VolumeDosNameLength

The length of the volume dos name.

VolumeDosName

The volume dos name buffer.

VolumeFileSystemType

The file system type of the attached volume.

DeviceCharacteristics

The volume attached device's characteristics.

Comments

This is the structure of the volume's information when the filter driver attached to a volume or detached a volume.

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typedef enum ProcessControlFlag

```
{
    DENY_NEW_PROCESS_CREATION           = 0X00000001,
    ENABLE_SEND_DENIED_PROCESS_EVENT     = 0X00000002,
    PROCESS_PRE_TERMINATION_REQUEST      = 0X00000004,
    PROCESS_CREATION_NOTIFICATION        = 0X00000100,
    PROCESS_TERMINATION_NOTIFICATION     = 0X00000200,
    PROCESS_HANDLE_OP_NOTIFICATION       = 0X00000400,
    THREAD_CREATION_NOTIFICATION         = 0X00000800,
    THREAD_TERMINATION_NOTIFICATION      = 0X00001000,
    THREAD_HANDLE_OP_NOTIFICATION        = 0X00002000,
}
```

DENY_NEW_PROCESS_CREATION

If this flag is enabled, it will block the new process creation when the process name matches the process name filter mask. It is especially good to prevent the untrusted process from being launched.

ENABLE_SEND_DENIED_PROCESS_EVENT

If this flag is enabled, a notification will be sent when a new process creation was blocked by the filter driver.

PROCESS_PRE_TERMINATION_REQUEST

If this flag is enabled, a callback request will be sent before the process is going to be terminated ungratefully, you can block the termination in your callback function.

PROCESS_CREATION_NOTIFICATION

If this flag is enabled and was registered to the process filter rule, the process creation notification will be sent when the creating new process name matches the process name filter mask.

PROCESS_TERMINATION_NOTIFICATION

If this flag is enabled and was registered to the process filter rule, the process termination notification will be sent when the terminating process name matches the process name filter mask.

PROCESS_HANDLE_OP_NOTIFICATION

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If this flag is enabled and was registered to the process filter rule, the process operation information notification will be sent when a handle for a process is being created or duplicated.

THREAD_CREATION_NOTIFICATION

If this flag is enabled and was registered to the process filter rule, the thread creation notification will be sent when the creating new thread's process name matches the process name filter mask.

THREAD_TERMINATION_NOTIFICATION

If this flag is enabled and was registered to the process filter rule, the thread termination notification will be sent when the terminating thread's process name matches the process name filter mask.

THREAD_HANDLE_OP_NOTIFICATION

If this flag is enabled and was registered to the process filter rule, the thread operation information notification will be sent when a handle for a thread is being created or duplicated.

Comments

This is the control flag for process filter rule, to prevent untrusted process from being launched or track the process operations.

typedef enum RegCallbackClass

```
{
    Reg_Pre_Delete_Key = 0x00000001,
    Reg_Pre_Set_Value_Key = 0x00000002,
    Reg_Pre_Delete_Value_Key = 0x00000004,
    Reg_Pre_SetInformation_Key = 0x00000008,
    Reg_Pre_Rename_Key = 0x00000010,
    Reg_Pre_Enumerate_Key = 0x00000020,
    Reg_Pre_Enumerate_Value_Key = 0x00000040,
    Reg_Pre_Query_Key = 0x00000080,
    Reg_Pre_Query_Value_Key = 0x00000100,
    Reg_Pre_Query_Multiple_Value_Key = 0x00000200,
    Reg_Pre_Create_Key = 0x00000400,
    Reg_Post_Create_Key = 0x00000800,
```

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```
Reg_Pre_Open_Key = 0x00001000,  
Reg_Post_Open_Key = 0x00002000,  
Reg_Pre_Key_Handle_Close = 0x00004000,  
//  
// .Net only  
//  
Reg_Post_Delete_Key = 0x00008000,  
Reg_Post_Set_Value_Key = 0x00010000,  
Reg_Post_Delete_Value_Key = 0x00020000,  
Reg_Post_SetInformation_Key = 0x00040000,  
Reg_Post_Rename_Key = 0x00080000,  
Reg_Post_Enumerate_Key = 0x00100000,  
Reg_Post_Enumerate_Value_Key = 0x00200000,  
Reg_Post_Query_Key = 0x00400000,  
Reg_Post_Query_Value_Key = 0x00800000,  
Reg_Post_Query_Multiple_Value_Key = 0x01000000,  
Reg_Post_Key_Handle_Close = 0x02000000,  
Reg_Pre_Create_KeyEx = 0x04000000,  
Reg_Post_Create_KeyEx = 0x08000000,  
Reg_Pre_Open_KeyEx = 0x10000000,  
Reg_Post_Open_KeyEx = 0x20000000,  
//  
// new to Windows Vista  
//  
Reg_Pre_Flush_Key = 0x40000000,  
Reg_Post_Flush_Key = 0x80000000,  
Reg_Pre_Load_Key = 0x100000000,  
Reg_Post_Load_Key = 0x200000000,  
Reg_Pre_UnLoad_Key = 0x400000000,  
Reg_Post_UnLoad_Key = 0x800000000,  
Reg_Pre_Query_Key_Security = 0x1000000000,  
Reg_Post_Query_Key_Security = 0x2000000000,  
Reg_Pre_Set_Key_Security = 0x4000000000,  
Reg_Post_Set_Key_Security = 0x8000000000,  
//  
// per-object context cleanup  
//  
Reg_Callback_Object_Context_Cleanup = 0x10000000000,  
//  
// new in Vista SP2  
//  
Reg_Pre_Restore_Key = 0x200000000000,  
Reg_Post_Restore_Key = 0x400000000000,  
Reg_Pre_Save_Key = 0x800000000000,  
Reg_Post_Save_Key = 0x1000000000000,  
Reg_Pre_Replace_Key = 0x2000000000000,
```

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```
Reg_Post_Replace_Key = 0x4000000000000000,  
//  
// new in Windows 10  
//  
Reg_Pre_Query_KeyName = 0x8000000000000000,  
Reg_Post_Query_KeyName = 0x1000000000000000,  
MAX_REG_CALLBACK_CLASE = 0xfffffffffffffffff,  
}
```

REG_PRE_DELETE_KEY

Specifies that a thread is attempting to delete a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_SET_VALUE_KEY

Specifies that a thread is attempting to set a value entry for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_DELETE_VALUE_KEY

Specifies that a thread is attempting to delete a value entry for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_SETINFORMATION_KEY

Specifies that a thread is attempting to set the metadata for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_RENAME_KEY

Specifies that a thread is attempting to rename a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_ENUMERATE_KEY

Specifies that a thread is attempting to enumerate a value entry for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_ENUMERATE_KEY

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Specifies that a thread is attempting to enumerate a value entry for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_QUERY_KEY

Specifies that a thread is attempting to read the metadata for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_QUERY_VALUE_KEY

Specifies that a thread is attempting to read a value entry for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_QUERY_MULTIPLE_VALUE_KEY

Specifies that a thread is attempting to query multiple value entries for a key. This value indicates a pre-notification call to RegistryCallback.

REG_PRE_CREATE_KEY

Specifies that a thread is attempting to create a key. This value indicates a pre-notification call to RegistryCallback.

REG_POST_CREATE_KEY

Specifies that a thread has successfully created a key. This value indicates a post-notification call to RegistryCallback.

REG_PRE_OPEN_KEY

Specifies that a thread is attempting to open an existing key. This value indicates a pre-notification call to RegistryCallback.

REG_POST_OPEN_KEY

Specifies that a thread has successfully opened an existing key. This value indicates a post-notification call to RegistryCallback.

REG_PRE_KEY_HANDLE_CLOSE

Specifies that a thread is attempting to close a key handle. This value indicates a pre-notification call to RegistryCallback.

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REG_POST_DELETE_KEY

Specifies that the system has attempted to delete the key. This value indicates a post-notification call to RegistryCallback.

REG_POST_SET_VALUE_KEY

Specifies that the system has attempted to set a value entry for a key. This value indicates a post-notification call to RegistryCallback.

REG_POST_DELETE_VALUE_KEY

Specifies that the system has attempted to delete a value entry for a key. This value indicates a post-notification call to RegistryCallback.

REG_POST_SETINFORMATION_KEY

Specifies that the system has attempted to set the key's metadata. This value indicates a post-notification call to RegistryCallback.

REG_POST_RENAME_KEY

Specifies that the system has attempted to rename the key. This value indicates a post-notification call to RegistryCallback.

REG_POST_ENUMERATE_KEY

Specifies that the system has attempted to enumerate the subkey of a key. This value indicates a post-notification call to RegistryCallback.

REG_POST_ENUMERATE_VALUE_KEY

Specifies that the system has attempted to enumerate the value entry of a key. This value indicates a post-notification call to RegistryCallback.

REG_POST_QUERY_KEY

Specifies that the system has attempted to query the metadata for a key. This value indicates a post-notification call to RegistryCallback.

REG_POST_QUERY_VALUE_KEY

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Specifies that the system has attempted to query a value entry for the key. This value indicates a post-notification call to RegistryCallback.

REG_POST_QUERY_MULTIPLE_VALUE_KEY

Specifies that the system has attempted to query multiple value entries for the key. This value indicates a post-notification call to RegistryCallback.

REG_POST_KEY_HANDLE_CLOSE

Specifies that the system has attempted to close a key handle. This value indicates a post-notification call to RegistryCallback.

REG_PRE_CREATE_KEYEX

Specifies that a thread is attempting to create a key. This value indicates a pre-notification call to RegistryCallback.

REG_POST_CREATE_KEYEX

Specifies that the system has attempted to create a key. This value indicates a post-notification call to RegistryCallback.

REG_PRE_OPEN_KEYEX

Specifies that a thread is attempting to open an existing key. This value indicates a pre-notification call to RegistryCallback.

REG_POST_OPEN_KEYEX

Specifies that the system has attempted to open an existing key. This value indicates a post-notification call to RegistryCallback.

REG_PRE_FLUSH_KEY

Specifies that a thread is attempting to write a key to disk. This value indicates a pre-notification call to RegistryCallback.

REG_POST_FLUSH_KEY

Specifies that the system has attempted to write a key to disk. This value indicates a post-notification call to RegistryCallback.

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REG_PRE_LOAD_KEY

Specifies that a thread is attempting to load a registry hive from a file. This value indicates a pre-notification call to RegistryCallback.

REG_POST_LOAD_KEY

Specifies that the system has attempted to load a registry hive from a file. This value indicates a post-notification call to RegistryCallback.

REG_PRE_UNLOAD_KEY

Specifies that a thread is attempting to unload a registry hive. This value indicates a pre-notification call to RegistryCallback.

REG_POST_UNLOAD_KEY

Specifies that the system has attempted to unload a registry hive. This value indicates a post-notification call to RegistryCallback.

REG_PRE_QUERY_KEY_SECURITY

Specifies that a thread is attempting to obtain a registry key's security information. This value indicates a pre-notification call to RegistryCallback.

REG_POST_QUERY_KEY_SECURITY

Specifies that a thread has attempted to obtain a registry key's security information. This value indicates a post-notification call to RegistryCallback.

REG_PRE_SET_KEY_SECURITY

Specifies that a thread is attempting to set a registry key's security information. This value indicates a pre-notification call to RegistryCallback.

REG_POST_SET_KEY_SECURITY

Specifies that a thread has attempted to set a registry key's security information. This value indicates a post-notification call to RegistryCallback.

REG_CALLBACK_OBJECT_CONTEXT_CLEANUP

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Specifies that the driver has called CmUnRegisterCallback or the driver's RegistryCallback routine has just finished processing a RegNtPreKeyHandleClose class value.

REG_PRE_RESTORE_KEY

Specifies that a thread is attempting to restore a registry key's information. This value indicates a pre-notification call to RegistryCallback.

REG_POST_RESTORE_KEY

Specifies that a thread has attempted to restore a registry key's information. This value indicates a post-notification call to RegistryCallback.

REG_PRE_SAVE_KEY

Specifies that a thread is attempting to save a registry key's information. This value indicates a pre-notification call to RegistryCallback.

REG_POST_SAVE_KEY

Specifies that a thread has attempted to save a registry key's information. This value indicates a post-notification call to RegistryCallback.

REG_PRE_REPLACE_KEY

Specifies that a thread is attempting to replace a registry key's information. This value indicates a pre-notification call to RegistryCallback.

REG_POST_REPLACE_KEY

Specifies that a thread has attempted to replace a registry key's information. This value indicates a post-notification call to RegistryCallback.

REG_PRE_QUERY_KEYNAME

Specifies that a thread is attempting to obtain the full path of a registry key. Use this value on Windows 10 and later versions of the Windows operating system.

REG_POST_QUERY_KEYNAME

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Specifies that a thread has attempted to obtain the full path of a registry key. Use this value on Windows 10 and later versions of the Windows operating system.

MAX_REG_CALLBACK_CLASS

Specifies the maximum value in this enumeration type.

Comments

This is registry callback class, to get the notification of the registry operations.

typedef enum RegControlFlag

```
{
    REG_ALLOW_OPEN_KEY                = 0X00000001,
    REG_ALLOW_CREATE_KEY               = 0X00000002,
    REG_ALLOW_QUERY_KEY                = 0X00000004,
    REG_ALLOW_RENAME_KEY               = 0X00000008,
    REG_ALLOW_DELETE_KEY               = 0X00000010,
    REG_ALLOW_SET_VALUE_KEY_INFORMATION = 0X00000020,
    REG_ALLOW_SET_INFORMATION_KEY      = 0X00000040,
    REG_ALLOW_ENUMERATE_KEY            = 0X00000080,
    REG_ALLOW_QUERY_VALUE_KEY           = 0X00000100,
    REG_ALLOW_ENUMERATE_VALUE_KEY       = 0X00000200,
    REG_ALLOW_QUERY_MULTIPLE_VALUE_KEY = 0X00000400,
    REG_ALLOW_DELETE_VALUE_KEY          = 0X00000800,
    REG_ALLOW_QUERY_KEY_SECURITY        = 0X00001000,
    REG_ALLOW_SET_KEY_SECURITY          = 0X00002000,
    REG_ALLOW_RESTORE_KEY               = 0X00004000,
    REG_ALLOW_SAVE_KEY                  = 0X00010000,
    REG_ALLOW_FLUSH_KEY                 = 0X00020000,
    REG_ALLOW_LOAD_KEY                  = 0X00040000,
    REG_ALLOW_UNLOAD_KEY                = 0X00080000,
    REG_ALLOW_KEY_CLOSE                 = 0X00100000,
    REG_ALLOW_KEY_RENAME                = 0X00200000,
    REG_MAX_ACCESS_FLAG                 = 0XFFFFFFFF,
}
```

REG_ALLOW_OPEN_KEY

If this flag is disabled, it will block the registry key open if the process name matches the filter rule.

REG_ALLOW_CREATE_KEY

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If this flag is disabled, it will block the registry key being created if the process name matches the filter rule.

REG_ALLOW_QUERY_KEY

If this flag is disabled, it will block the registry key being queried if the process name matches the filter rule.

REG_ALLOW_RENAME_KEY

If this flag is disabled, it will block the registry key being renamed if the process name matches the filter rule.

REG_ALLOW_DELETE_KEY

If this flag is disabled, it will block the registry key being deleted if the process name matches the filter rule.

REG_ALLOW_SET_VALUE_KEY_INFORMATION

If this flag is disabled, it will block the setting the value of the registry key if the process name matches the filter rule.

REG_ALLOW_SET_INFORMATION_KEY

If this flag is disabled, it will block the setting the registry key if the process name matches the filter rule.

REG_ALLOW_ENUMERATE_KEY

If this flag is disabled, it will block the registry key being enumerated if the process name matches the filter rule.

REG_ALLOW_QUERY_VALUE_KEY

If this flag is disabled, it will block the value of the registry key being queried if the process name matches the filter rule.

REG_ALLOW_ENUMERATE_VALUE_KEY

If this flag is disabled, it will block the value of the registry key being enumerated if the process name matches the filter rule.

REG_ALLOW_QUERY_MULTIPLE_VALUE_KEY

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If this flag is disabled, it will block the querying of multiple values of the registry key if the process name matches the filter rule.

REG_ALLOW_DELETE_VALUE_KEY

If this flag is disabled, it will block the value of the registry key being deleted if the process name matches the filter rule.

REG_ALLOW_QUERY_KEY_SECURITY

If this flag is disabled, it will block the registry key security being queried if the process name matches the filter rule.

REG_ALLOW_SET_KEY_SECURITY

If this flag is disabled, it will block the registry key security being setted if the process name matches the filter rule.

REG_ALLOW_RESTORE_KEY

If this flag is disabled, it will block the registry key being restored if the process name matches the filter rule.

REG_ALLOW_SAVE_KEY

If this flag is disabled, it will block the registry key being saved if the process name matches the filter rule.

REG_ALLOW_FLUSH_KEY

If this flag is disabled, it will block the registry key security being flushed if the process name matches the filter rule.

REG_ALLOW_LOAD_KEY

If this flag is disabled, it will block the registry key being loaded if the process name matches the filter rule.

REG_ALLOW_UNLOAD_KEY

If this flag is disabled, it will block the registry key being unloaded if the process name matches the filter rule.

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REG_ALLOW_KEY_CLOSE

If this flag is disabled, it will block the registry key being closed if the process name matches the filter rule.

REG_ALLOW_KEY_RENAME

If this flag is disabled, it will block the registry key being renamed if the process name matches the filter rule.

REG_MAX_ACCESS_FLAG

Enable the maximum access right for the registry access.

Comments

This is the control flag for registry filter rule, to track or control the registry operations.

typedef enum FileEventType

```
{  
    FILE_WAS_CREATED           = 0x00000020,  
    FILE_WAS_WRITTEN           = 0x00000040,  
    FILE_WAS_RENAMED           = 0x00000080,  
    FILE_WAS_DELETED           = 0x00000100,  
    FILE_SECURITY_CHANGED       = 0x00000200,  
    FILE_INFO_CHANGED          = 0x00000400,  
    FILE_WAS_READ              = 0x00000800,  
};
```

Members

FILE_WAS_CREATED

The new file was created event.

FILE_WAS_WRITTEN

The file was written with data event.

FILE_WAS_RENAMED

The file was renamed event.

FILE_SECURITY_CHANGED

The file security was changed event.

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FILE_INFO_CHANGED

The file information was changed event.

FILE_WAS_READ

The file data was read event.

Comments

This is the file change event, you can get the notification when the file was changed by registering the specific events.

typedef enum AccessFlag

```
{
    EXCLUDE_FILTER_RULE                = 0X00000000,
    EXCLUDE_FILE_ACCESS                = 0x00000001,
    REPARSE_FILE_OPEN                  = 0x00000002,
    HIDE_FILES_IN_DIRECTORY_BROWSING   = 0x00000004,
    FILE_ENCRYPTION_RULE                = 0x00000008,
    ALLOW_OPEN_WITH_ACCESS_SYSTEM_SECURITY = 0x00000010,
    ALLOW_OPEN_WITH_READ_ACCESS        = 0x00000020,
    ALLOW_OPEN_WITH_WRITE_ACCESS       = 0x00000040,
    ALLOW_OPEN_WITH_CREATE_OR_OVERWRITE_ACCESS = 0x00000080,
    ALLOW_OPEN_WITH_DELETE_ACCESS      = 0x00000100,
    ALLOW_READ_ACCESS                  = 0x00000200,
    ALLOW_WRITE_ACCESS                 = 0x00000400,
    ALLOW_QUERY_INFORMATION_ACCESS      = 0x00000800,
    ALLOW_SET_INFORMATION               = 0x00001000,
    ALLOW_FILE_RENAME                  = 0x00002000,
    ALLOW_FILE_DELETE                  = 0x00004000,
    ALLOW_FILE_SIZE_CHANGE              = 0x00008000,
    ALLOW_QUERY_SECURITY_ACCESS         = 0x00010000,
    ALLOW_SET_SECURITY_ACCESS           = 0x00020000,
    ALLOW_DIRECTORY_LIST_ACCESS         = 0x00040000,
    ALLOW_FILE_ACCESS_FROM_NETWORK      = 0x00080000,
    ALLOW_NEW_FILE_ENCRYPTION           = 0x00100000,
    ALLOW_READ_ENCRYPTED_FILES          = 0x00200000,
    ALLOW_ALL_SAVE_AS                   = 0x00400000,
    ALLOW_COPY_PROTECTED_FILES_OUT     = 0x00800000,
    ALLOW_FILE_MEMORY_MAPPED           = 0x01000000,
    DISABLE_ENCRYPT_ON_READ              = 0x02000000,
    ALLOW_COPY_PROTECTED_FILES_TO_USB   = 0x04000000,
```

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```
    LEAST_ACCESS_FLAG                = 0xf0000000,  
    ALLOW_MAX_RIGHT_ACCESS           = 0xffffffff0,  
  
};
```

Members

EXCLUDE_FILTER_RULE

EXCLUDE_FILTER_RULE is the rule which bypass the files matched the FilterMask. It can't combine to use with the other access flags. If a file matches the exclude filter rule, the filter will bypass this file, you won't get any Io request notification or control. If a file matches both the exclude filter rule and monitor rule, the exclude filter rule will be applied.

EXCLUDE_FILE_ACCESS

EXCLUDE_FILE_ACCESS is the flag indicates the filter will deny the access to the files which match the FilterMask.

REPARSE_FILE_OPEN

REPARSE_FILE_OPEN is the rule which reparses the file matched the FilterMask open to the other files which match the ReparseMask.

Example:

Reparse the file open in folder c:\test to another folder c:\reparseFolder"

```
AddFileFilterRule(ALLOW_MAX_RIGHT_ACCESS|REPARSE_FILE_OPEN, L"c:\\test\\*", 1);
```

```
AddReparseFileMaskToFilterRule(L"c:\\test\\*", L"c:\\reparseFolder\\*");
```

HIDE_FILES_IN_DIRECTORY_BROWSING

HIDE_FILES_IN_DIRECTORY_BROWSING is the flag let you hide the files in the managed folder when it matches the mask.

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Example:

Hide the files in folder c:\test for process "explorer.exe"

```
AddFileFilterRule(ALLOW_MAX_RIGHT_ACCESS|HIDE_FILES_IN_DIRECTORY_BROWSI
NG, L"c:\\test\\*", FALSE, 1);

AddIncludeProcessNameToFilterRule(L"c:\\test\\*", L"explorer.exe");

AddHiddenFileMaskToFilterRule(L"c:\\test\\*", L"*.");
```

ENCRYPTION_FILTER_RULE

ENCRYPTION_FILTER_RULE is the flag indicates the filter will encrypt the new created files which match the FilterMask. If the other flag were set, this flag is automatically enabled.

ALLOW_OPEN_WITH_ACCESS_SYSTEM_SECURITY

ALLOW_OPEN_WITH_ACCESS_SYSTEM_SECURITY is the flag indicates if you can open the file with the desired access with the ACCESS_SYSTEM_SECURITY set.

ALLOW_OPEN_WITH_READ_ACCESS

ALLOW_OPEN_WITH_READ_ACCESS is the flag indicates if you can open the file with read access.

ALLOW_OPEN_WITH_WRITE_ACCESS

ALLOW_OPEN_WITH_WRITE_ACCESS is the flag indicates if you can open the file with write access.

ALLOW_OPEN_WITH_CREATE_OR_OVERWRITE_ACCESS

ALLOW_OPEN_WITH_CREATE_OR_OVERWRITE_ACCESS is the flag indicates if you can open with create a new file or overwrite the exist file.

ALLOW_OPEN_WITH_DELETE_ACCESS

ALLOW_OPEN_WITH_DELETE_ACCESS is the flag indicates if you can open the file for deletion or rename access.

ALLOW_READ_ACCESS

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`ALLOW_READ_ACCESS` is the flag indicates if you have the permission to read the file.

`ALLOW_WRITE_ACCESS`

`ALLOW_WRITE_ACCESS` is the flag indicates if you have the permission to write the file.

`ALLOW_QUERY_INFORMATION_ACCESS`

`ALLOW_QUERY_INFORMATION_ACCESS` is the flag indicates if you have the permission to query the file information.

`ALLOW_SET_INFORMATION`

`ALLOW_SET_INFORMATION` is the flag indicates if you have the permission to set the file information.

`ALLOW_FILE_RENAME`

`ALLOW_FILE_RENAME` is the flag indicates if you have the permission to rename the file. If the flag `ALLOW_SET_INFORMATION` is unset, the rename is blocked automatically.

`ALLOW_FILE_DELETE`

`ALLOW_FILE_DELETE` is the flag indicates if you have the permission to delete the file. If the flag `ALLOW_SET_INFORMATION` is unset, the deletion is blocked automatically.

`ALLOW_FILE_SIZE_CHANGE`

`ALLOW_FILE_SIZE_CHANGE` is the flag indicates if you have the permission to change the file size. If the flag `ALLOW_SET_INFORMATION` is unset, the file size change is blocked automatically.

`ALLOW_QUERY_SECURITY_ACCESS`

`ALLOW_QUERY_SECURITY_ACCESS` is the flag indicates if you have the permission to query the file security.

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ALLOW_SET_SECURITY_ACCESS

ALLOW_SET_SECURITY_ACCESS is the flag indicates if you have the permission to set the file security.

ALLOW_DIRECTORY_LIST_ACCESS

ALLOW_DIRECTORY_LIST_ACCESS is the flag indicates if you have the permission to browse the directory.

ALLOW_FILE_ACCESS_FROM_NETWORK

ALLOW_FILE_ACCESS_FROM_NETWORK is the flag indicates if you have the permission to access the files from the network server.

ALLOW_NEW_FILE_ENCRYPTION

ALLOW_NEW_FILE_ENCRYPTION is the flag indicates if you allow to encrypt the new created files by the filter driver.

ALLOW_READ_ENCRYPTED_FILES

ALLOW_READ_ENCRYPTED_FILES is the flag indicates if you allow to read encrypted files, if it is disabled, the encrypted data will return to the users.

ALLOW_ALL_SAVE_AS

ALLOW_ALL_SAVE_AS is the flag indicates if the process has the permission to create a new file.

ALLOW_COPY_PROTECTED_FILES_OUT

ALLOW_COPY_PROTECTED_FILES_OUT is the flag indicates if allow the protected files being copy out of the protected folder, if allow_all_save_as is true.

ALLOW_FILE_MEMORY_MAPPED

ALLOW_FILE_MEMORY_MAPPED indicates if the file can be opened with memory mapped, a file execution must be opened with memory mapped.

DISABLE_ENCRYPT_DATA_ON_READ

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DISABLE_ENCRYPT_DATA_ON_READ is false, and the encryption is enabled, it can encrypt the data when the application reads the file, it enables you to encrypt your files when you upload or copy out your files to other places.

LEAST_ACCESS_FLAG

LEAST_ACCESS_FLAG indicates the file has the least access right, it can't be set to 0, or it will be excluded by the filter driver.

ALLOW_COPY_PROTECTED_FILES_TO_USB

If this flag was disabled, the protected files can't be copied out to the USB drive.

ALLOW_MAX_RIGHT_ACCESS

ALLOW_MAX_RIGHT_ACCESS indicates if you have the maximum access right to the file.

Comments

An accessFlag is the control flag of a filter rule, you can control the file access by disabling the specific flags.

typedef enum AESFlags

```
{
    Flags_Enabled_Expire_Time           = 0x00000010,
    Flags_Enabled_Check_ProcessName     = 0x00000020,
    Flags_Enabled_Check_UserName       = 0x00000040,
    Flags_Enabled_Check_AccessFlags    = 0x00000080,
    Flags_Enabled_Check_User_Permit    = 0x00000100,
    Flags_AES_Key_Was_Embedded         = 0x00000200,
    Flags_Enabled_Request_IV_And_Key   = 0x00000400,
    Flags_Enabled_Revoke_Access_Control = 0x00000800,
    Flags_Enabled_Check_Computer_Id    = 0x00001000,
    Flags_Enabled_Check_User_Password  = 0x00002000,
};
```

Members

Flags_Enabled_Expire_Time

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`Flags_Enabled_Expire_Time` is the flag which indicates that the filter driver will check if the encrypted file was expired before it can be opened.

Flags_Enabled_Check_ProcessName

`Flags_Enabled_Check_ProcessName` is the flag which indicates that the filter driver will check if the process has the permission to open the encrypted file.

Flags_Enabled_Check_UserName

`Flags_Enabled_Check_UserName` is the flag which indicates that the filter driver will check if the user has the permission to open the encrypted file.

Flags_Enabled_Check_AccessFlags

`Flags_Enabled_Check_AccessFlags` is the flag which indicates that the filter driver will check the access flags if the encrypted file can be opened.

Flags_Enabled_Check_User_Permit

`Flags_Enabled_Check_User_Permit` is the flag which indicates that the filter driver will require the user permission before the encrypted file can be opened.

Flags_AES_KEY_WAS_EMBEDDED

`Flags_AES_KEY_WAS_EMBEDDED` is the flag which indicates that the filter driver will use the embedded AES key to decrypt the file.

Flags_Enabled_Request_IV_And_Key

`Flags_Enabled_Request_IV_And_Key` is the flag which indicates that the filter driver will require encryption key and IV from user mode service to decrypt the file.

Flags_Enabled_Revoke_Access_Control

`Flags_Enabled_Revoke_Access_Control` is the flag which indicates that the filter driver will require the

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permission from the control server and get the encryption key and IV to decrypt the file.

Flags_Enabled_Check_Computer_Id

Flags_Enabled_Check_Computer_Id is the flag which indicates that the filter driver will check if the computer can access the encrypted files.

Flags_Enabled_Check_User_Password

Flags_Enabled_Check_User_Password is the flag which indicates that the filter driver will require the user password before the encrypted file can be opened.

Comments

A AESFlags is a flag inside the metadata of the encrypted file.

typedef struct _AES_DATA

```
{
    ULONG           VerificationKey;
    ULONG           AESFlags;
    ULONG           Version;
    UCHAR           IV[16];
    ULONG           EncryptionKeyLength;
    UCHAR           EncryptionKey[32];
    LONGLONG        FileSize;
    ULONG           CryptoType;
    ULONG           PaddingSize;
    ULONG           AESDataSize;
    LONGLONG        FileSizeOnDisk;
    ULONG           AccessFlags;
    ULONG           Reserve1;
    ULONG           Reserve2;
    ULONG           TagDataLength;
    WCHAR           TagData[1];
}
```

Members

EaseTagKey

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The verification key of the AES data structure, the value is 0xccb76e80.

AESFlags

The Flags of the encrypted file's meta data, indicates the filter driver what action needs to do for the encrypted file opens.

Version

The version indicates the encryption engine OpenSSL library if it is 16, or use Microsoft CNG library if it is 32.

IV

The 16 bytes initialization vector, is an arbitrary number that can be used along with an encryption key for the file encryption.

EncryptionKeyLength

The length of the encryption key, it should be 16, 24 or 32.

EncryptionKey

The encryption key for the file encryption.

FileSize

The file size was present to the user for the encrypted file, this is file size doesn't include the padding size and the header size.

CryptoType

The crypto type for the encryption, default is 0 which is using AES CTR mode.

PaddingSize

The padding size of the last block if it needs the padding.

AESDataSize

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The total size of this structure, this is the size which will be appended to the encrypted file, by default is 1024.

FileSizeOnDisk

This is the actual physical file size of the encrypted file, includes the padding size and the header size.

AccessFlags

The file access control flag if the bit *Flags_Enabled_Check_AccessFlags* in the AESFlags flag was enabled.

Reserve1

The reserve data for future use.

Reserve2

The reserve data for future use.

TagDataLength

The length of the custom data.

TagData

The custom tag data which was added by the user from the encryption API.

Comments

AES_DATA structure is the metadata of the encrypted file which was appended to the end of the file.

Typedef enum FilterStatus

```
{  
    FILTER_MESSAGE_IS_DIRTY           = 0x00000001,  
    FILTER_COMPLETE_PRE_OPERATION     = 0x00000002,  
    FILTER_DATA_BUFFER_IS_UPDATED     = 0x00000004,  
};
```

Members

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`FILTER_MESSAGE_IS_DIRTY`

`FILTER_MESSAGE_IS_DIRTY` is the flag indicates the reply message was modified and needs to be processed in filter driver. Set this flag if you change the reply message.

`FILTER_COMPLETE_PRE_OPERATION`

`FILTER_COMPLETE_PRE_OPERATION` is the flag indicates the filter needs to complete this pre I/O request. Only set this flag with pre operation request when you don't want the request goes down to the file system.

`FILTER_DATA_BUFFER_IS_UPDATED`

`FILTER_DATA_BUFFER_IS_UPDATED` is the flag indicates the data buffer of the reply message was updated. The filter will process this data buffer.

Comments

`FilterStatus` is the status code which returns to the filter driver, it is for control filter driver. It instructs the filter driver what action needs to be done.

`typedef struct _MESSAGE_SEND_DATA`

```
{
    ULONG           VerificationNumber;
    ULONG           MessageId;
    ULONG           FilterRuleId;
    WCHAR           RemoteIP[INET_ADDR_STR_LEN];
    PVOID           FileObject;
    PVOID           FsContext;
    ULONG           MessageType;
    ULONG           ProcessId;
    ULONG           ThreadId;
    LONGLONG        Offset;
    ULONG           Length;
    LONGLONG        FileSize;
    LONGLONG        TransactionTime;
    LONGLONG        CreationTime;
    LONGLONG        LastAccessTime;
    LONGLONG        LastWriteTime;
    ULONG           FileAttributes;
```

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```
    ULONG        DesiredAccess;
    ULONG        Disposition;
    ULONG        ShareAccess;
    ULONG        CreateOptions;
    ULONG        CreateStatus;
    ULONG        InfoClass;
    ULONG        Status;
    ULONG        ReturnLength;
    ULONG        FileNameLength;
    WCHAR        FileName[MAX_FILE_NAME_LENGTH];
    ULONG        SidLength;
    UCHAR        Sid[MAX_SID_LENGTH];
    ULONG        DataBufferLength;
    UCHAR        DataBuffer[MAX_MESSAGE_SIZE];

} MESSAGE_SEND_DATA, *PMESSAGE_SEND_DATA;
```

Members

VerificationNumber

The verification number to verify the data structure integrity.

MessageId

This is the sequential number of the transaction.

FilterRuleId

This is the filter rule Id of the file I/O was managed.

RemoteIP

The remote IP address if the file I/O was accessed from the smb network computer.

FileObject

The FileObject is the pointer to the file object, it is a unique number to every file open.

FsContext

The FsContext is the pointer to the file context, it is unique number to the same file.

MessageType

MessageType is the I/O request type for this transaction.

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ProcessId

The ProcessId is the id of the process associated with the thread that originally requested the I/O operation.

ThreadId

The ThreadId is the id of thread which requested the I/O operation.

Offset

The Offset is the read or write offset.

Length

The Length is the length for read or write.

FileSize

The FileSize is the size of the file for this I/O request.

TransactionTime

The transaction time in UTC format of the request.

CreationTime

The creation time in UTC format of the file we are requesting.

LastAccessTime

The last access time in UTC format of the file we are requesting.

LastWriteTime

The last write time in UTC format of the file we are requesting.

FileAttributes

The file attributes of the file we are requesting.

DesiredAccess

The DesiredAccess is the request access to the file for the Create I/O request, which can be summarized as read, write, both or neither zero. For more information reference the Windows API CreateFile.

Disposition

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The disposition is the action to take on a file that exist or does not exist. For more information reference the Windows API CreateFile.

SharedAccess

The SharedAccess is the requested sharing mode of the file which can be read,write,both,delete,all of these,or none. For more information reference the Windows API CreateFile.

CreateOptions

The CreateOptions specifies the options to be applied when creating or opening the file. For more information reference the Windows API CreateFile.

CreateStatus

The CreateStatus is the status after the Create I/O request completed.It could be the one of the following values:

```
FILE_SUPERSEDED = 0x00000000,  
FILE_OPENED = 0x00000001,  
FILE_CREATED = 0x00000002,  
FILE_OVERWRITTEN = 0x00000003,  
FILE_EXISTS = 0x00000004,  
FILE_DOES_NOT_EXIST = 0x00000005,
```

InfoClass

The infoClass is the information class for query/set information I/O request, or directory browsing request. For query/set security request, it is the security information.For more information reference the windows Filter API FltQueryInformationFile, FltQueryDirectoryFile,FltQuerySecurityObject.

Status

The Status is the I/O status which returns from the file system,indicates if the I/O request succeeded.It is only meaningful to the post I/O requests.

ReturnLength

The return length of the I/O for read or write.

FileNameLength

The file name length in byte of the file we are requesting.

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FileName

The file name we are requesting.

SidLength

The length of the security identifier buffer in byte.

Sid

The buffer of the security identifier data.

DataBufferLength

The data buffer length for read, write, security, information, directory I/O requests.

DataBuffer

The The data buffer length for read, write, security, information, directory I/O requests.

Comments

The MESSAGE_SEND_DATA structure is used to transfer the data from kernel to the user mode application. It includes all the information needed for the user.

typedef struct _PROCESS_INFO

```
{
    ULONG           MessageId;
    PVOID           Reserve1;
    PVOID           Reserve2;
    ULONG           MessageType;
    LONGLONG        TransactionTime;
    ULONG           ProcessId;
    ULONG           ThreadId;
    ULONG           ParentProcessId;
    ULONG           CreatingProcessId;
    ULONG           CreatingThreadId;
    ULONG           DesiredAccess;
    ULONG           Operation;
    BOOL            FileOpenNameAvailable;
    ULONG           SidLength;
    UCHAR           Sid[MAX_SID_LENGTH];
    ULONG           FileNameLength;
    WCHAR           FileName[MAX_FILE_NAME_LENGTH];
    ULONG           CommandLineLength;
```

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<i>WCHAR</i>	<i>CommandLine[MAX_FILE_NAME_LENGTH];</i>
<i>ULONG</i>	<i>Status;</i>
<i>ULONG</i>	<i>VerificationNumber;</i>

} *PROCESS_INFO*, **PPROCESS_INFO*;

Members

MessageId

This is the sequential number of the transaction.

Reserve1

The reserve data field1.

Reserve2

The reserve data field2.

MessageType

MessageType is the process message type which is the filter command, reference filter command enumeration.

TransactionTime

The transaction time in UTC format of the request.

ProcessId

The ProcessId is the id of the current process associated with the thread that originally requested the process operation.

ThreadId

The thread Id of the current operation thread.

ParentProcessId

The process Id of the parent process for the new process. Note that the parent process is not necessarily the same process as the process that created the new process.

CreatingProcessId

The process Id of the process that created new process.

CreatingThreadId

The thread Id of the thread that created the new process.

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DesiredAccess

An ACCESS_MASK value that specifies the access rights to grant for the handle.

Operation

The type of handle operation, this member might be one of the following values: OB_OPERATION_HANDLE_CREATE, OB_OPERATION_HANDLE_DUPLICATE.

FileOpenNameAvailable

A boolean value that specifies whether the ImageFilename member contains the exact file name that is used to open the process executable file.

SidLength

The length of the security identifier buffer in byte.

Sid

The buffer of the security identifier data.

ImageFileNameLength

The image file name length in byte of the file name that is used to open the process executable file.

ImageFileName

The file name that is used to open the process executable file.

CommandLineLength

The length in byte of the command line.

CommandLine

The process executable file and command line.

Status

The Status is the I/O status which returns from the file system, indicates if the I/O request succeeded.

VerificationNumber

The verification number to verify the data structure integrity.

Comments

Replace MESSAGE_SEND_DATA structure with this one when process filter driver sends the process operation callback

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notification, is used to transfer the data from kernel to the user mode application.

typedef struct _MESSAGE_REPLY_DATA

```
{
    ULONG          MessageId;
    ULONG          MessageType;
    ULONG          ReturnStatus;
    ULONG          FilterStatus;
    union
    {
        Struct{
            ULONG          DataBufferLength;
            UCHAR          DataBuffer[MAX_MESSAGE_SIZE];
        }Data;

        Struct{
            ULONG          AESDataLength;
            UCHAR          IV[16];
            ULONG          EncryptionKeyLength;
            UCHAR          EncryptionKey[1];
        }AESData;

        Struct{
            ULONG          UserNameLength;
            UCHAR          UserName[1];
        }UserInfo;

        Struct{
            ULONG          FileNameLength;
            UCHAR          FileName[1];
        }FileInfo;

    }ReplyData
} MESSAGE_REPLY_DATA, *PMESSAGE_REPLY_DATA;
```

Members

MessageId

This is the sequential number of the transaction.

MessageType

MessageType is the I/O request type for this transaction. Reference MessageType enum type.

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ReturnStatus

The ReturnStatus is the I/O status which returns to filter driver, and filter will return this status to the user application for the request.

FilterStatus

The FilterStatus is the status code which returns to the filter driver, it instructs the filter what process needs to be done. For more information reference the FilterStatus enum.

DataBufferLength

The data buffer length which returns to the filter driver.

DataBuffer

The data buffer which returns to the filter driver.

AESDataLength

The total length of the AESData.

IV

The 16 bytes initialization vector returns to filter driver.

EncryptionKeyLength

The length of the encryption key.

EncryptionKey

The encryption key returns to the filter driver.

UserNameLength

The length of the user name.

UserName

The user name buffer.

FileNameLength

The length of the file name.

FileName

The file name buffer.

Comments

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MESSAGE_REPLY_DATA is only for control filter, when it needs to change the data or status of the I/O request. To update the reply data buffer, you must understand the format of the buffer, incorrect data could cause your system unfunctional, even crash.

Types

```
typedef BOOL (_stdcall *Proto_Message_Callback)(  
    IN      PMESSAGE_SEND_DATA  pSendMessage,  
    IN OUT PMESSAGE_REPLY_DATA  pReplyMessage)
```

Comments

This is the proto type of the message callback function. The function will be called when the registered I/O requests match the filter rule. The second parameter "pReplyMessage" is always NULL for the file system monitor filter.

```
typedef VOID (_stdcall *Proto_Disconnect_Callback)()
```

Comments

This is the proto type of disconnect function. The function will be called when the connection to the filter is disconnected.

Exported API

BOOL

InstallDriver()

Return Value

Return true if it succeeds, else return false.

Comments

Install the EaseFilter driver to the system. To install the driver you need the administrator permission.

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BOOL

UnInstallDriver()

Return Value

Return true if it succeeds, else return false.

Comments

UnInstall the EaseFilter driver from the system. To UnInstall the driver you need the administrator permission.

BOOL

SetRegistrationKey()

IN WCHAR RegisterKey)*

Parameters

RegisterKey

Your register key.

Return Value

Return true if it succeeds, else return false.

Comments

You have to set the registration key before you can start the filter.

BOOL

RegisterMessageCallback()

*ULONG ThreadCount,
Proto_Message_Callback MessageCallback,
Proto_Disconnect_Callback DisconnectCallback)*

Parameters

ThreadCount

The number of threads used for connection to the filter.

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MessageCallback

The message callback function for the registered I/O requests.

DisconnectCallback

The disconnect callback function when the connection is disconnected.

Return Value

Return true if it succeeds, else return false.

Comments

RegisterMessageCallback is the first API you need to call, it is the API start the filter and create the connection to the filter.

VOID

Disconnect()

Comments

Disconnect is the API when you want to stop filter and filter connection.

BOOL

GetLastErrorMessage(WCHAR* Buffer, PULONG BufferLength)

Parameters

Buffer

This the pointer of the buffer to receive the last error message.

BufferLength

The length of the buffer.

Return Value

Return true if it succeeds, else return false if the buffer length is not big enough to contain the message, and the BufferLength is set with the right size needed.

Comments

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This API is called right after if the other API is failed. It will return the error message.

BOOL

ResetConfigData();

Return Value

Return true if it succeeds, else return false.

Comments

ResetConfigData is the API reset all the configuration of the filter, it will clear up all the setting includes the filter rules.

BOOL

SetFilterType(ULONG FilterType)

Parameters

FilterType

The type of the filter you want to set. There are FILE_SYSTEM_MONITOR filter and FILE_SYSTEM_CONTROL filter.

Return Value

Return true if it succeeds, else return false.

Comments

The default filter type is file system monitor filter.

BOOL

SetConnectionTimeout(ULONG TimeOutInSeconds)

Parameters

TimeOutInSeconds

The value of the filter wait time out.

Return Value

Return true if it succeeds, else return false.

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Comments

This is the maximum time for the filter driver wait for the response from user mode, the user mode application should return as fast as possible, or it will block the system requests. Set it bigger if your application needs to process with more time.

BOOL

SetVolumeControlFlag(ULONG VolumeControlFlag)

Parameters

VolumeControlFlag

The value of the volume control flag.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to register the notification when the filter driver attached the volume or detached the volume. You also can prevent the attached volumes from being formatted or dismounted.

BOOL

AddFileFilterRule(

```
    IN    ULONG    AccessFlag,  
    IN    WCHAR*   FilterMask,  
    IN    BOOLEAN  IsResident,  
    IN    ULONG    FilterRuleId  
)
```

Parameters

AccessFlag

The AccessFlag of this filter rule.

FilterMask

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The FilterMask set the target folder or files. The mask is dos format, it can include wild character '*' or '?'. For example:

```
C:\test\*txt
```

The filter only monitor the files end with 'txt' in the folder c:\test.

IsResident

The flag indicates if the filter rule will be saved to the registry.

FilterRuleId

The Id of this filter rule, when you get the I/O callback or the notification, the filter rule Id in the data structure "MessageSend" can tell you which filter rule was applied to this I/O.

Return Value

Return true if it succeeds, else return false.

Comments

AddFileFilterRule is the API to setup the filter rule, You can set up multiple filter rules, the FilterMask must be different, if the FilterMask is the same, it will overwrite the previous one.

BOOL

RegisterFileChangeEventToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    ULONG  EventType  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule.

EventType

The event types were registered to the filter rule, to monitor the file events.

Comments

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If you want to monitor the file events for the filter rule, this is the API to register the event types.

BOOL

RegisterMonitorIOToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    ULONG  RegisterIO  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule.

RegisterIO

The IOs were registered to the filter rule, only post-IOs can be registered, it was used to monitor the file IOs, when it was triggered, filter driver will send the notification to the user.

Comments

If you want to get the notification of the file IOs for the filter rule, this is the API to register the IOs which you are interested.

BOOL

RegisterControlIOToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    ULONG  RegisterIO  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule.

RegisterIO

The IOs were registered to the filter rule, were used to control the file IOs, when it was triggered, filter driver will send the notification to the user, block and wait for the response, it can control the IOs data and status based on the return result.

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Comments

If you want to control the file requests, this is the API to register the IOs which you are interested.

BOOL

AddRegisterIOFilterToFilterRule(

```
    IN    WCHAR*  FilterMask,  
    IN    ULONG   FilterByDesiredAccess,  
    IN    ULONG   FilterByDisposition,  
    IN    ULONG   FilterByCreateOptions  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule.

FilterByDesiredAccess

Filter the register IO option with file opens DesiredAccess.

FilterByDisposition

Filter the register IO option with file opens Disposition.

FilterByCreateOptions

Filter the register IO option with file opens CreateOptions.

Comments

Filter the callback IOs by the file open options if the callback IOs were registered.

BOOL

AddEncryptionKeyToFilterRule(

```
    IN    WCHAR*  FilterMask,  
    IN    ULONG   EncryptionKeyLength,  
    IN    UCHAR*  EncryptionKey  
)
```

Parameters

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FilterMask

The FilterMask which was set in API AddFileFilterRule.

EncryptionKeyLength

The length of the encryption key.

EncryptionKey

The encryption key for the filter rule.

Return Value

Return true if it succeeds, else return false.

Comments

If the encryption was enabled in the access flag in the API AddFileFilterRule, this is the API to add the encryption key for the filter rule, every file will use an unique iv.

BOOL

AddEncryptionKeyAndIVToFilterRule(

```
    IN    WCHAR*  FilterMask,  
    IN    ULONG   EncryptionKeyLength,  
    IN    UCHAR*  EncryptionKey,  
    IN    ULONG   IVLength,  
    IN    UCHAR*  IV  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule.

EncryptionKeyLength

The length of the encryption key.

EncryptionKey

The encryption key for the filter rule.

IVLength

The length of the encryption iv.

IV

The encryption iv for the filter rule.

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Return Value

Return true if it succeeds, else return false.

Comments

If the encryption was enabled in the access flag in the API `AddFileFilterRule`, this is the API to add the encryption key and iv for the filter rule, all files in this filter rule will use the same key and iv.

BOOL

AddReparseFileMaskToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* ReparseFilterMask  
)
```

Parameters

FilterMask

The FilterMask which was set in API `AddFileFilterRule` .

ReparseFilterMask

The reparse folder mask, it can include the wild character, but it must match the wild character in FilterMask.

For example:

FilterMask = c:\test*txt

ReparseFilterMask = d:\reparse*doc

If you open file c:\test\MyTest.txt, it will reparse to the file d:\reparse\MyTest.doc.

Return Value

Return true if it succeeds, else return false.

Comments

If the `REPARSE_FILE_OPEN` was enabled in the access flag in the API `AddFileFilterRule` , this is the API to add the reparse filter mask for the filter rule.

BOOL

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AddHiddenFileMaskToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* HiddenFileFilterMask  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

HiddenFileFilterMask

The hidden file filter mask for the files to be
hidden.

For example:

```
FilterMask = c:\hideFilesTest\\*  
HiddenFileFilterMask = *.doc
```

If you open folder c:\hideFilesTest, all the files
with extension .doc won't show up in the folder.

Return Value

Return true if it succeeds, else return false.

Comments

If the `HIDE_FILES_IN_DIRECTORY_BROWSING` was enabled in the
access flag in the API `AddFileFilterRule` , this is the API
to add the hidden filter mask for the filter rule.

BOOL

AddExcludeFileMaskToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* ExcludeFileFilterMask  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

ExcludeFileFilterMask

The file filter mask to be excluded.

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For example:

```
FilterMask = *.txt
```

```
ExcludeFileFilterMask = c:\windows\*
```

The filter driver target file is all the files with extension .txt except the files in folder c:\windows and its subfolders.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the exclude file filter mask for the filter rule which was set in AddFileFilterRule .

BOOL

AddIncludeProcessIdToFilterRule(

IN WCHAR FilterMask,*

IN ULONG IncludeProcessId

)

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule .

IncludeProcessId

The process Id to be included by filter driver.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the include process Id for the filter rule which was set in AddFileFilterRule ,only the files opened by the processes in the included process Ids and process names will be monitored by the filter driver.

BOOL

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AddExcludeProcessIdToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    ULONG ExcludeProcessId  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

ExcludeProcessId

The process Id to be excluded by filter driver.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the exclude process Id for the filter rule which was set in AddFileFilterRule , all the files were opened by the processes in the excluded process Ids and process names won't be monitored by the filter driver.

BOOL

AddIncludeProcessNameToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* IncludeProcessName  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

IncludeProcessName

The process name to be included by filter driver.

Return Value

Return true if it succeeds, else return false.

Comments

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This is the API to add the include process name for the filter rule which was set in `AddFileFilterRule` , only the files opened by the processes in the included process Ids and process names will be monitored by the filter driver.

BOOL

AddExcludeProcessNameToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* ExcludeProcessName  
)
```

Parameters

FilterMask

The FilterMask which was set in API `AddFileFilterRule` .

ExcludeProcessName

The process name to be excluded by filter driver.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the exclude process name for the filter rule which was set in `AddFileFilterRule` , all the files were opened by the processes in the excluded process Ids and process names won't be monitored by the filter driver.

BOOL

AddIncludeUserNameToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* IncludeUserName  
)
```

Parameters

FilterMask

The FilterMask which was set in API `AddFileFilterRule` .

IncludeUserName

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The user name to be included by filter driver.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the include user name for the filter rule which was set in AddFileFilterRule ,only the files were opened by the users in the included user names will be monitored by the filter driver.

BOOL

AddExcludeUserNameToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* ExcludeUserName  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule .

ExcludeUserName

The process name to be excluded by filter driver.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the exclude user name for the filter rule which was set in AddFileFilterRule , all the files were opened by the users in the excluded user names won't be monitored by the filter driver.

BOOL

AddTrustedProcessToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    UCHAR* ImageSHA256,  
    IN    ULONG  HashLength,  
    IN    ULONG  AccessFlag  
)
```

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Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

ImageSHA256

The executable binary sha256.

HashLength

The length of the sha256.

AccessFlag

The access rights for the process.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the access flags to the specific process with the same sha256, when the process accesses the files, it needs to check permission from access flags first to allow or deny the file access.

BOOL

AddProcessRightsToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* ProcessName,  
    IN    ULONG  AccessFlag  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

ProcessName

The process name to be set access rights.

AccessFlag

EaseFilter Filter Driver SDK Manual

The access rights for the process.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the access flags to the specific process, when the process accesses the files, it needs to check permission from access flags first to allow or deny the file access.

BOOL

RemoveProcessRightsFromFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    WCHAR* ProcessName  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

ProcessName

The process name to be set access rights.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to remove the process access rights setting from the filter rule.

BOOL

AddProcessIdRightsToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    ULONG  ProcessId,  
    IN    ULONG  AccessFlag  
)
```

Parameters

EaseFilter Filter Driver SDK Manual

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

ProcessId

The process Id to be set access rights.

AccessFlag

The access rights for the process.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the access flags to the specific process with the process Id, when the process accesses the files, it needs to check permission from access flags first to allow or deny the file access.

BOOL

AddUserRightsToFilterRule(

```
    IN    WCHAR*  FilterMask,  
    IN    WCHAR*  UserName,  
    IN    ULONG   AccessFlag  
)
```

Parameters

FilterMask

The FilterMask which was set in API
AddFileFilterRule .

UserName

The user name to be set access rights.

AccessFlag

The access rights for the user.

Return Value

Return true if it succeeds, else return false.

Comments

EaseFilter Filter Driver SDK Manual

This is the API to add the access flags to the specific user, when the user accesses the files, it needs to check permission from access flags first to allow or deny the file access.

BOOL

AddBooleanConfigToFilterRule(

```
    IN    WCHAR* FilterMask,  
    IN    ULONG BooleanConfig  
)
```

Parameters

FilterMask

The FilterMask which was set in API AddFileFilterRule .

Booleanconfig

The boolean config setting.

Return Value

Return true if it succeeds, else return false.

Comments

This is the API to add the boolean config setting for the filter rule which was set in AddFileFilterRule , please reference the BooleanConfig enumeration.

BOOL

RemoveFilterRule(WCHAR* FilterMask);

Parameters

FilterMask

The FilterMask associated to the filter rule.

Return Value

Return true if it succeeds, else return false.

Comments

EaseFilter Filter Driver SDK Manual

You can remove the filter rule which was set by AddFileFilterRule API.

BOOL

AddIncludedProcessId(ULONG ProcessId)

Parameters

ProcessId

The process Id you want to be included by filter.

Return Value

Return true if it succeeds, else return false.

Comments

This API let the filter driver only intercept the I/O for the included processes, discard all other I/O from other processes, you can add multiple process Id.

BOOL

RemoveExcludeProcessId(ULONG ProcessId)

Parameters

ProcessId

The process Id you want to remove which set by AddIncludedProcessId API.

Return Value

Return true if it succeeds, else return false.

Comments

This API removes the included process Id from filter.

BOOL

AddExcludedProcessId(ULONG ProcessId)

Parameters

ProcessId

EaseFilter Filter Driver SDK Manual

The process Id you want to be excluded by filter.

Return Value

Return true if it succeeds, else return false.

Comments

This API let you can bypass the filter for specific processes, you can add multiple process Id.

BOOL

RemoveExcludeProcessId(ULONG ProcessId)

Parameters

ProcessId

The process Id you want to remove which set by AddExcludedProcessId API.

Return Value

Return true if it succeeds, else return false.

Comments

This API removes the excluded process Id from filter.

BOOL

AddRegistryFilterRule(

```
    IN    ULONG    ProcessNameLength
    IN    WCHAR*    ProcessName,
    IN    ULONG    ProcessId,
    IN    ULONG    UserNameLength,
    IN    WCHAR*    UserNameFilterMask,
    IN    ULONG    KeyNameLength,
    IN    WCHAR*    KeyNameFilterMask,
    IN    ULONG    AccessFlag,
    IN    ULONGLONG RegCallbackClass,
    IN    BOOL     IsExcludeFilter,
    IN    ULONG    FilterRuleId
)
```

Parameters

ProcessNameLength

EaseFilter Filter Driver SDK Manual

The length of the process name string in bytes.

ProcessName

The process name to be filtered, use '*' to include all processes.

ProcessId

If the process Id is not 0, then filter with the process Id instead of the process name.

UserNameLength

The length of the user name string in bytes.

UserNameFilterMask

The user name to be filtered, use '*' to include all users.

KeyNameLength

The length of the process name string in bytes.

KeyNameFilterMask

The register key name to be filtered, use '*' to include all the keys.

AccessFlag

The access control flag for the registry filter rule.

RegCallbackClass

Register the callback class for the registry filter rule.

IsExcludeFilter

The flag indicates if the filter rule exclude filter rule, if it is true, the filter driver will skip all the registry operation for this filter rule.

FilterRuleId

The Id of this filter rule.

Comments

This is the API to add the registry filter rule, filter by process name.

BOOL

EaseFilter Filter Driver SDK Manual

AddRegistryFilterRuleByName(

```
    IN    ULONG      ProcessNameLength
    IN    WCHAR*     ProcessName,
    IN    ULONG      AccessFlag,
    IN    ULONGLONG   RegCallbackClass,
    IN    BOOL       IsExcludeFilter
)
```

Parameters

ProcessNameLength

The length of the process name string in bytes.

ProcessName

The process name to be filtered, use '*' to include all processes.

AccessFlag

The access control flag for the registry filter rule.

RegCallbackClass

Register the callback class for the registry filter rule.

IsExcludeFilter

The flag indicates if the filter rule exclude filter rule, if it is true, the filter driver will skip all the registry operation for this filter rule.

Comments

This is the API to add the registry filter rule, filter by process name.

BOOL

AddRegistryFilterRuleByProcessId(

```
    IN    ULONG      ProcessId
    IN    ULONG      AccessFlag,
    IN    ULONGLONG   RegCallbackClass,
    IN    BOOL       IsExcludeFilter
)
```

Parameters

EaseFilter Filter Driver SDK Manual

ProcessId

The process Id of the process which will be managed by registry filter driver.

AccessFlag

The access control flag for the registry filter rule.

RegCallbackClass

Register the callback class for the registry filter rule.

IsExcludeFilter

The flag indicates if the filter rule exclude filter rule, if it is true, the filter driver will skip all the registry operation for this filter rule.

Comments

This is the API to add the registry filter rule, filter by process Id.

BOOL

RemoveRegistryFilterRuleByProcessId(

IN ULONG ProcessId
)

Parameters

ProcessId

The process Id of the process which will be managed by registry filter driver.

Comments

This is the API to remove the registry filter rule, filter by process Id.

BOOL

RemoveRegistryFilterRuleByName(

IN ULONG ProcessNameLength
IN WCHAR ProcessName*
)

Parameters

EaseFilter Filter Driver SDK Manual

ProcessNameLength

The length of the process name string in bytes.

ProcessName

The process name to be filtered.

Comments

This is the API to remove the registry filter rule, filter by process name.

BOOL

AddProceeFilterRule(

```
    IN    ULONG    ProcessNameMaskLength,  
    IN    WCHAR*   ProcessNameMask,  
    IN    ULONG    ControlFlag,  
    IN    ULONG    FilterRuleId  
)
```

Parameters

ProcessNameLength

The length of the process name mask string in bytes.

ProcessName

The process name mask to be filtered.

ControlFlag

The control flag for the process, reference the ProcessControlFlag enumeration.

FilterRuleId

The Id of this process filter rule.

Comments

This is the API to add the process filter rule, to prevent the process from being launched, or register the callback notification of the process operation.

BOOL

EaseFilter Filter Driver SDK Manual

RemoveProceeFilterEntry(

```
    IN    ULONG      ProcessNameMaskLength,  
    IN    WCHAR*     ProcessNameMask  
)
```

Parameters

ProcessNameLength

The length of the process name mask string in bytes.

ProcessName

The process name mask to be filtered.

Comments

This is the API to remove the process filter rule.

BOOL

AddFileControlToProcessByName(

```
    IN    ULONG      ProcessNameMaskLength,  
    IN    WCHAR*     ProcessNameMask,  
    IN    ULONG      FileNameNameMaskLength,  
    IN    WCHAR*     FileNameMask,  
    IN    ULONG      AccessFlag  
)
```

Parameters

ProcessNameLength

The length of the process name mask string in bytes.

ProcessName

The process name mask to be filtered.

FileNameMaskLength

The length of the file name mask string in bytes.

FileNameMask

The file name mask to be filtered.

AccessFlag

The file access flag which control the process file access rights.

MonitorIO

EaseFilter Filter Driver SDK Manual

Register the callback notification of the monitor IO.

ControlIO

Register the callback notification of the control IO.

Comments

This is the API to add the file access rights of the specific files to the specific processes.

BOOL

AddFilterCallbackIOToProcessByName(

```
IN    ULONG    ProcessNameMaskLength,  
IN    WCHAR*   ProcessNameMask,  
IN    ULONG    FileNameNameMaskLength,  
IN    WCHAR*   FileNameMask,  
IN    ULONG    MonitorIO,  
IN    ULONG    ControlIO,  
IN    ULONG    FilterByDesiredAccess,  
IN    ULONG    FilterByDisposition,  
IN    ULONG    FilterByCreateOptions  
  
)
```

Parameters

ProcessNameLength

The length of the process name mask string in bytes.

ProcessName

The process name mask to be filtered.

FileNameMaskLength

The length of the file name mask string in bytes.

FileNameMask

The file name mask to be filtered.

MonitorIO

Register the callback notification of the monitor IO.

ControlIO

Register the callback notification of the control IO.

EaseFilter Filter Driver SDK Manual

FilterByDesiredAccess

Filter the register IO option with file opens
DesiredAccess.

FilterByDisposition

Filter the register IO option with file opens
Disposition.

FilterByCreateOptions

Filter the register IO option with file opens
CreateOptions.

Comments

Register the callback IOs for the process, filter the
callback IOs by the file open options if they are not zero.

BOOL

RemoveFileControlFromProcessByName(

```
    IN    ULONG    ProcessNameMaskLength,  
    IN    WCHAR*   ProcessNameMask,  
    IN    ULONG    FileNameNameMaskLength,  
    IN    WCHAR*   FileNameMask  
)
```

Parameters

ProcessNameLength

The length of the process name mask string in bytes.

ProcessName

The process name mask to be filtered.

FileNameMaskLength

The length of the file name mask string in bytes.

FileNameMask

The file name mask to be filtered.

Comments

This is the API to remove the file access rights of the
specific files to the specific processes if it was set.

BOOL

EaseFilter Filter Driver SDK Manual

AddFileControlToProcessById(

```
    IN    ULONG    ProcessId,  
    IN    ULONG    FileNameNameMaskLength,  
    IN    WCHAR*   FileNameMask,  
    IN    ULONG    AccessFlag  
)
```

Parameters

ProcessId

The process Id of the process which will be added file access rights.

ProcessName

The process name mask to be filtered.

FileNameMaskLength

The length of the file name mask string in bytes.

FileNameMask

The file name mask to be filtered.

AccessFlag

The file access flag which control the process file access rights.

Comments

This is the API to add the file access rights of the specific files to the specific process.

BOOL

RemoveFileControlFromProcessById(

```
    IN    ULONG    ProcessId,  
    IN    ULONG    FileNameNameMaskLength,  
    IN    WCHAR*   FileNameMask  
)
```

Parameters

ProcessId

The process Id of the process which will be removed file access rights.

FileNameMaskLength

EaseFilter Filter Driver SDK Manual

The length of the file name mask string in bytes.

FileNameMask

The file name mask to be filtered.

Comments

This is the API to remove the file access rights of the specific files to the specific process if it was set.

BOOL

AddProtectedProcessId(ULONG ProcessId)

Parameters

ProcessId

The process Id you want to be protected by filter.

Return Value

Return true if it succeeds, else return false.

Comments

This API can prevent the process being terminated, you can add multiple process Id, this API is supported in OS vista or later versions.

BOOL

RemoveProtectedProcessId(ULONG ProcessId)

Parameters

ProcessId

The process Id you want to remove which set by ***AddProtectedProcessId*** API.

Return Value

Return true if it succeeds, else return false.

Comments

This API removes the protected procss Id.

EaseFilter Filter Driver SDK Manual

BOOL

RegisterIoRequest(ULONG RequestRegistration)

Parameters

RequestRegistration

The RequestRegistration is the bit combination of the request type.

Return Value

Return true if it succeeds, else return false.

Comments

Register the I/O requests which you want to monitor. For File_SYSTEM_MONITOR filter, only post I/O requests registration are affected, since it only can get notification after the request was completed by file system.

For FILE_SYSTEM_CONTROL filter you can register both pre and post requests. If you want to deny, cancel or return with your own data instead of going down to the file system, you need to register the pre request.

For some post I/O requests, you can't cancel or deny it, for example Create, Set information, Set security, Write requests.

BOOL

GetFileHandleInFilter(WCHAR* FileName, ULONG DesiredAccess, Handle* FileHandle);

Parameters

FileName

The full path of the file which you want to open.

DesiredAccess

The requested access to the file or device, which can be summarized as read, write, both or neither zero).

FileHandle

EaseFilter Filter Driver SDK Manual

The pointer to the file handle which will receive the file handle after the file was opened.

Return Value

Return true if it succeeds, else return false.

Comments

Use this API to open the file, it will bypass the filter, avoid reentrant issue. It also will bypass the security check. Close the handle with CloseHandle win32 API.

BOOL

AESEncryptFile(

```
IN    WCHAR*  FileName,  
IN    ULONG   KeyLength,  
IN    UCHAR*  Key,  
IN    ULONG   IVLength,  
IN    UCHAR*  IV,  
IN    BOOL    AddAESData )
```

Parameters

FileName

The file name to be encrypted.

KeyLength

The encryption key length, it has to be 16(128bits), 24(192bits) or 32(256bits).

Key

The encryption key, it is an unsigned char array with KeyLength size.

IVLength

The initial vector length, if it is 0, the system will allocate a unique IV for the file.

IV

The initial vector, when IVLength is 0, it sets to NULL.

AddAESData

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If it is true, it will add the AESData structure to the encrypted file, then the encryption filter driver can recognize this encrypted file.

Return Value

Return true if it succeeds, else return false.

Comments

AESEncryptFile is the API to encrypt file with AES encryption cryptographic algorithm.

BOOL

AESEncryptFileWithTag(

```
IN    WCHAR*  FileName,
IN    ULONG   KeyLength,
IN    UCHAR*  Key,
IN    ULONG   IVLength,
IN    UCHAR*  IV,
IN    ULONG   TagDataLength,
IN    UCHAR*  TagData )
```

Parameters

FileName

The file name to be encrypted.

KeyLength

The encryption key length, it has to be 16(128bits), 24(192bits) or 32(256bits).

Key

The encryption key, it is an unsigned char array with KeyLength size.

IVLength

The initial vector length, if it is 0, the system will allocate a unique IV for the file.

IV

The initial vector, when IVLength is 0, it sets to NULL.

TagDataLength

The length of the tag data.

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TagData

The custom tag data which was added to the AESData structure in the encrypted file header, the user can get this custom data when the filter request the encryption iv and key.

Return Value

Return true if it succeeds, else return false.

Comments

AESEncryptFile is the API to encrypt file file with AES encryption cryptographic algorithm.

BOOL

AESEncryptFileToFile(

```
IN    WCHAR* SourceFileName,  
IN    WCHAR* DestFileName,  
IN    ULONG  KeyLength,  
IN    UCHAR* Key,  
IN    ULONG  IVLength,  
IN    UCHAR* IV,  
IN    BOOL   AddAESData )
```

Parameters

SourceFileName

The source file name to be encrypted.

DestFileName

The target file name was encrypted.

KeyLength

The encryption key length, it has to be 16(128bits), 24(192bits) or 32(256bits).

Key

The encryption key, it is an unsigned char array with KeyLength size.

IVLength

The initial vector length, if it is 0, the system will allocate an unique IV for the file.

EaseFilter Filter Driver SDK Manual

IV

The initial vector,when IVLenght is 0, it sets to NULL.

AddAESData

If it is true,it will add the AESData structure to the encrypted file,then the encryption filter driver can recognize this encrypted file.

Return Value

Return true if it succeeds, else return false.

Comments

AESEncryptFileToFile is the API to encrypt file file with AES encryption cryptographic algorithm.

BOOL

AESEncryptFileToFileWithTag(

```
IN    WCHAR* SourceFileName,
IN    WCHAR* DestFileName,
IN    ULONG  KeyLength,
IN    UCHAR* Key,
IN    ULONG  IVLength,
IN    UCHAR* IV,
IN    ULONG  TagDataLength,
IN    UCHAR* TagData )
```

Parameters

SourceFileName

The source file name to be encrypted.

DestFileName

The target file name was encrypted.

KeyLength

The encryption key length,it has to be 16(128bits),24(192bits) or 32(256bits).

Key

The encryption key,it is an unsigned char array with KeyLength size.

EaseFilter Filter Driver SDK Manual

IVLength

The initial vector length, if it is 0, the system will allocate an unique IV for the file.

IV

The initial vector, when IVLength is 0, it sets to NULL.

TagDataLength

The length of the tag data.

TagData

The custom tag data which was added to the AESData structure in the encrypted file header, the user can get this custom data when the filter request the encryption iv and key.

Return Value

Return true if it succeeds, else return false.

Comments

AESEncryptFileToFile is the API to encrypt file with AES encryption cryptographic algorithm.

BOOL

AESDecryptFile(

```
IN    WCHAR*  FileName,  
IN    ULONG   KeyLength,  
IN    UCHAR*  Key,  
IN    ULONG   IVLength,  
IN    UCHAR*  IV )
```

Parameters

FileName

The file name to be decrypted.

KeyLength

The encryption key length, it has to be 16(128bits), 24(192bits) or 32(256bits).

Key

The encryption key, it is an unsigned char array with KeyLength size.

EaseFilter Filter Driver SDK Manual

IVLength

The initial vector length,if the encrypted file already has IVTag,it will use the IV tag instead of the pass in IV, if the encrypted file doesn't set the IV tag,then the IVLength can't be 0, and IV can't be NULL.

IV

The initial vector,when the encrypted file doesn't set IV tag, the IV can't be NULL, or it can be NULL.

Return Value

Return true if it succeeds, else return false.

Comments

AESDecryptFile is the API to decrypt file file with AES encryption cryptographic algorithm.

BOOL

AESDecryptFileToFile(

```
IN    WCHAR* SourceFileName,
IN    WCHAR* DestFileName,
IN    ULONG  KeyLength,
IN    UCHAR* Key,
IN    ULONG  IVLength,
IN    UCHAR* IV )
```

Parameters

SourceFileName

The encrypted file name.

DestFileName

The target file name was decrypted.

KeyLength

The encryption key length,it has to be 16(128bits),24(192bits) or 32(256bits).

Key

The encryption key,it is an unsigned char array with KeyLength size.

IVLength

EaseFilter Filter Driver SDK Manual

The initial vector length,if the encrypted file already has IVTag,it will use the IV tag instead of the pass in IV, if the encrypted file doesn't set the IV tag,then the IVLength can't be 0, and IV can't be NULL.

IV

The initial vector,when the encrypted file doesn't set IV tag, the IV can't be NULL, or it can be NULL.

Return Value

Return true if it succeeds, else return false.

Comments

AESDecryptFileToFile is the API to decrypt file file with AES encryption cryptographic algorithm.

BOOL

GetAESHeader(

IN WCHAR FileName,*
IN PULONG HeaderSize,
IN UCHAR Header)*

Parameters

FileName

The file name was encrypted.

HeaderSize

The pointer of the header buffer size.

Header

The header buffer to store the header data.

Return Value

Return true if it succeeds, else return false.

Comments

GetAESHeader is the API to get encrypted file header, return true if it exists, or it will return false.

BOOL

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GetAESTagData(

```
IN    WCHAR*   FileName,  
IN    PULONG   TagDataSize,  
IN    UCHAR*   TagData )
```

Parameters

FileName

The file name was encrypted.

TagDataSize

The pointer of the Tag Data size.

TagData

The custom tag data which was added to the header of the encrypted file.

Return Value

Return true if it succeeds, else return false.

Comments

GetTagData is the API to get the custom tag data from the encrypted file header, return true if it exists, or it will return false.

How to use EaseFilter SDK

The components

The EaseFilter file system filter SDK includes two components (EaseFlt.sys and FilterAPI.dll), The EaseFlt.sys and FilterAPI.dll are different for 32bit and 64bit windows system. EaseFlt.sys is the file system filter driver which implements all the functionalities in the file system level. FilterAPI.dll is a wrapper DLL which exports the API to the user mode applications.

To check the binary is 32 bit or 64 bit you can right click file and go to the property, then go to the “Details” tag and check the “file description” section.

Set up the filter

Install the filter driver with [InstallDriver\(\)](#) method if the driver has not been installed yet. After filter driver was installed, the filter was loaded, if not you can load the filter with

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command “Fltmc load EaseFlt” in dos prompt. To remove the filter driver from the system, call [UninstallDriver\(\)](#) method.

Start the filter

1. Enable the filter with API [SetRegistrationKey\(\)](#). You can request the trial license key with the link: <http://www.easefilter.com/Order.htm> or email us info@easefilter.com
2. Start the filter driver by registering the callback function with API RegisterMessageCallback:

```
RegisterMessageCallback(FilterConnectionThreadsCount, MessageCallback,  
DisconnectCallback);
```

3. Setup global configuration setting for the filter driver:

*//To enable the monitor/control/encryption/process/registry filter driver by
setting the filter type with proper license key.*

```
SetFilterType(FILE_SYSTEM_MONITOR|FILE_SYSTEM_CONTROL);
```

*//Set up the connection timeout in seconds, this is the maximum time for the
filter driver waiting for the response of the callback function.*

```
SetConnectionTimeout(30);
```

*//Set up the global Boolean config setting to enable some features:
ENABLE_SEND_DENIED_EVENT|ENABLE_SEND_DATA_BUFFER*

```
SetBooleanConfig(booleanConfig);
```

*//Add or remove protected process Id to the filter driver to prevent it from being
terminated ungratefully:*

```
AddProtectedProcessId (processId);
```

```
RemoveProtectedProcessId (processId);
```

*//Set up the volume control flag to block the USB read write:
BLOCK_USB_READ|BLOCK_USB_WRITE*

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```
SetvolumeControlFlag(volumeControlFlag);
```

4. Setup the file filter rule for the filter driver:

```
//Setup the filter rule to monitor the file I/O in c:\\test folder
```

```
AddFileFilterRule(AccessFlags,L"C:\\test\\*", FALSE, FilterRuleId);
```

```
//Register the file change events to get the notification for below events:
```

```
FILE_WAS_CREATED|FILE_WAS_WRITTEN|FILE_WAS_RENAMED|FILE_WAS_DELETED|FILE_SECURITY_CHANGED|FILE_INFO_CHANGED
```

```
RegisterFileChangedEventsToFilterRule(L"C:\\test\\*", FileChangedEvents);
```

```
//Register the POST IO to get the notification when the IO was processed by the file system.
```

```
RegisterMonitorIOToFilterRule(L"c:\\test\\*",
```

```
POST_NEW_FILE_CREATED|POST_FILE_RENAMED|POST_FILE_DELETED);
```

```
//Setup the filter rule to control the file I/O in c:\\protected folder
```

```
configure the access control flag to protect the folder, not allow the file being renamed or deleted.
```

```
AccessFlags= ALLOW_MAX_RIGHT_ACCESS & (~ALLOW_FILE_RENAME) &
```

```
(~ALLOW_FILE_DELETE)
```

```
AddFileFilterRule(AccessFlags,L"C:\\protected\\*", FALSE, FilterRuleId);
```

```
//Register the PRE IO to get the callback before the IO was processed by the file system, you can allow or deny the file I/O in the callback function.
```

```
RegisterControlIOToFilterRule(L"c:\\protected\\*", PRE_CREATE);
```

```
//Add or remove the access rights for a specific process to the files in the protected folder. i.e., Set full access rights for process "wordpad.exe"
```

```
AddProcessRightsToFilterRule(L"c:\\protected\\*", L"wordpad.exe",
```

```
ALLOW_MAX_RIGHT_ACCESS);
```

```
//Hide your sensitive files from the protected folder by enabling the hide file access flag. i.e., hide the files with extension .prt in folder c:\\protected.
```

```
AccessFlags= ALLOW_MAX_RIGHT_ACCESS | ENABLE_HIDE_FILES_DIRECTORY_BROWSING
```

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```
AddFileFilterRule(AccessFlags,L"C:\\protected\\*", FALSE, FilterRuleId);
AddHiddenFileMaskToFilterRule(L"c:\\protected\\*", L "*.prt");

// Setup the filter rule for AUTO FILE ENCRYPTION in c:\\protected folder
AccessFlags= ALLOW_MAX_RIGHT_ACCESS | ENABLE_FILE_ENCRYPTION_RULE
AddFileFilterRule(AccessFlags,L"C:\\encrypt\\*", FALSE, FilterRuleId);

//Configure the processes to read the raw encrypted data for backup software or
other software needs to send raw encrypted files.
AccessFlags= ALLOW_MAX_RIGHT_ACCESS & (~ALLOW_READ_ENCRYPTED_FILES)
AddProcessRightsToFilterRule(L"c:\\encrypt\\*", L"explorer.exe", AccessFlags);

//Setup the registry filter rule to monitor or protect the registry access
You can block the registry access, for example you block the registry key change,
you also can get the notification for the registry access.
AddRegistryFilterRule(2,L"*",0,2,L"*",0,NULL,REG_MAX_ACCESS_FLAG,regC
allbackClass,FALSE, FilterRuleId);

//Setup the process filter rule to monitor or protect the process operation
You can block the new process launching, you can get the notification when the
process was created or terminated.
AddProcessFilterRule( (ULONG)wcslen(ProcessFilterMask)*sizeof(WCH
AR),ProcessFilterMask,ControlFlag);
```

We provide C++ example and C# example to demonstrate how to use the EaseFilter File System Monitor and Control Filter.

C++ Example

Copy the correct version (32bit or 64bit) EaseFilt.sys, FilterAPI.DLL,FilterAPI.h and FilterAPI.lib to your folder. FilterAPI.h file includes all the functions and structures used for connecting to the filter driver. WinDataStructures.h file is part of the structures of windows API which is used in the example, for more structures please reference Microsoft MSDN website.

For monitor filter, you can get the notification with file I/O messages which include process Id, Thread Id, file name, user name, file system I/O type, etc.

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For Control filter, the filter will block and wait for the response if that I/O was registered, so it is better handling this request as soon as possible, or it will block the system call.

C# Example

Copy the correct version (32bit or 64bit) Easeflt.sys, FilterAPI.DLL to your binary folder, then add the reference "FilterControl" project to your project.

```
FilterControl filterControl = new FilterControl();

if (!filterControl.StartFilter(filterType, serviceThreads, connectionTimeout,
licenseKey, ref lastError))
{
    Console.WriteLine("Start Filter Service failed with error:" + lastError);
    return;
}

//create a file monitor filter rule, every filter
//rule must have the unique watch path.
FileFilter fileMonitorFilter = new FileFilter(watchPath);

//Filter the file change event to monitor all file change events.
fileMonitorFilter.FileChangeEventFilter =
(FilterAPI.FileChangedEvents)FilterAPI.NotifyAllFileEvents;

//register the file change callback events.
fileMonitorFilter.NotifyFileWasChanged += NotifyFileChanged;

//Filter the monitor file IO events
fileMonitorFilter.MonitorFileIOEventFilter =
(ulong)(MonitorFileIOEvents.OnFileOpen | MonitorFileIOEvents.OnFileRead);

//fileMonitorFilter.OnFileOpen += OnFileOpen;
//fileMonitorFilter.OnFileRead += OnFileRead;

filterControl.AddFilter(fileMonitorFilter);

if (!filterControl.SendConfigSettingsToFilter(ref lastError))
{
    Console.WriteLine("SendConfigSettingsToFilter failed." + lastError);
    return;
}
```

For more programming reference, go to :

<https://www.easefilter.com/programming.htm>