

CIFS/clustered ONTAP/Off-box AV/Functional spec

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< CIFS | clustered ONTAP/Off-box AV

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Overview

C-Mode Offbox-Vscan feature provides anti-virus scanning support to clustered ONTAP, wherein the virus-scanning is performed by non-ONTAP machines hosting virus-scanners from various vendors. This feature fills the gap which surfaced when Onboard AV solution was disabled. The feature is similar to 7-Mode vscan feature (http://web.netapp.com/engineering/projects/conga/virusscan_dl.html). As laid out in the Overview section of the Architecture spec, this feature solves many issues which were encountered in Onboard AV and 7-mode vscan feature. The intent of this development is to allow 7-mode virus-scanner vendors to operate with clustered ONTAP, in a similar fashion to their operation with 7-mode filers, with as little modification to virus-scanner software as possible.

Offbox-Vscan feature provides virus-scanning support by triggering in-band notifications to external vscan servers on various file-operations like open, close, rename; applicable as per the fileop profile configuration. Due to in-band nature of these notifications, the said file-operation will be suspended till the scan-status is reported back by the external vscan server. The vscan servers, on receiving these notification, will read the file under question over a privileged CIFS share, scan the file contents and may attempt to perform remedial operations on an infected file as per the configuration done on the vscan servers. After completing all necessary operations, vscan server will respond with the scan status to Offbox-Vscan module, which will allow or deny the suspended file operation, if the file is found clean or infected, respectively. In SN.1, this feature supports vscan only for CIFS traffic. But in future we plan to support NFS as well. On-demand scans will also be supported to enable bulk scanning during off-peak hours.

This feature communicates with external vscan servers using a binary-protocol over a SMB named-pipe connection, unlike MS-RPC communication over named-pipes in 7-mode vscan feature. This is done, so as to have a simplified, light-weight communication between clustered ONTAP and vscan servers. The existing vscan servers will be able to migrate to this new interface by using an intermediate module, running on the same machine as the vscan server. This intermediate module, called 'avshim', communicates with vscan engines using MS-RPC over local named-pipes and with clustered ONTAP using the new vscanner-notification-protocol over SMB named-pipe. This new protocol will allow clustered ONTAP nodes to send scan-requests and to query information like virus-scan-engine version, run-time-statistics like CPU/memory/network utilization, pending request-queue lengths etc from external vscan servers.

Related Documents

- Offbox AV Page
- 7-Mode vscan feature spec (http://web.netapp.com/engineering/projects/conga/virusscan_dl.html)
- On-board AV functional-spec
- NBlade Packet & Connection Processing API
- Super locker functionality in 7G/7-mode

Terminology

- vserver
 - A vserver is a logical abstraction of storage in a cluster. There can be multiple LIFs present on a node for a given vserver. Also, LIFs for a given vserver can spread across different nodes.
- scan-engine/vscan engine/virus-scan-engine
 - software module that can detect software-virus
- (external) virus-scanning server/vscanner/vscan server
 - this refers to an off-box server machine running a virus-scan-engine, along with any other module(s) required to scan requests over network.
- vscan-notification-protocol
 - the binary protocol used by clustered ONTAP to send scan-requests to off-box vscanner.
- avshim
 - a software-module that acts as an intermediary between clustered ONTAP and virus-scan-engines. It translates vscan-notification-protocol messages into MS-RPC messages and vice-versa, to provide an effective communication-channel between clustered-ONTAP and virus-scan-engines.
- on-access policy
 - A vserverized configuration-entry that defines the scope of file-objects (in terms of file-paths, file-extensions and file-size) for which scan is triggered.
- Connection-Manager
 - The Offbox-Vscan software sub-module that manages connections between a clustered ONTAP node and external vscan servers.
- vendor
 - provider of virus-scan-engines
- vscanner-version
 - vscan-engine's version information, in form <uint32_t>.<uint32_t>
- version-ID/vscanner-version-ID
 - 16-bit representation of vendor-name & vscanner-version, internal to clustered ONTAP.

Requirements

Mentioned here. The ERRD is here

Dependencies

There is no specific dependency on the other teams apart from code review and consultation.

Others who are depending on this functionality:

None

This functionality needs the following from others:

Item	Description of Dependency or Issue	Affected Group	Contact	Tracking ID
1	Code review and consultation	SCON	Mike Accetta	
2	Code review and consultation	WAFL	Bill Zumach	
3	The lock manager needs to support AV scans for SMB 3 locks.	WAFL	Bill Zumach	burt691131 (http://burtweb-prd.eng.netapp.com/burt/burt-bin/start?burt-id=691131)

Detailed Use Cases and Flow Diagrams

Administrators and external vscanners are the primary parties that interacts with of Offbox-Vscan. External vscanners and Offbox-Vscan module interacts for the purposes of performing On-Access virus-scans and related operations. These may also involve in some diagnostic/statistics-gathering interactions The details will be captured in design spec.

Administrators will interact with user-interface and ONTAPI-APIs of this feature to operate upon configuration-setting or to obtain runtime-status/statistical-information. The latter category will be described directly as various status-display or diagnostic-display interfaces under User-Interfaces section.

Configuration

There are 2 major configuration-elements for Offbox-Vscan feature, namely On-Access policies and Scanner pools.

- On-Access Policies: This configuration defines the scope of On-Access scanning on file-objects. The scope parameter may be different for different Protocols. So, this is again categorized based on the Protocol. For SN.I, only CIFS is to be supported. The basic scoping parameters for CIFS are file-path, file-extension and max-file size. Apart from these, filters are also included that may be used to define the scope more precisely.
- Scanner pools: This configuration allows the administrator to provide the set of objects which are used for validating the vscanner connection (like allowed list of vscanner IPs, allowed list of authentication-parameters etc...) and other parameters like various timeouts for scan-notifications, responses (available in advanced mode).

Both these configuration-elements are vserverized, i.e. to create a configuration-entry, a vserver must be specified. Configuration may be created with Cluster-Server-ID (CSID) as the vserver. Such configuration-entries will be available for all vservers. However, to activate such configuration for a vserver, specific action will be required, where the vserver-to-apply-to must be specified.

Following are the steps needed to enable On-Access virus-scanning on a vserver:

- Ensure that vserver-of-interest has LIFs on atleast one clustered ONTAP node, and that vscanners are accessible for this/these LIF(s).
- Provide a Scanner pool configuration, mentioning:

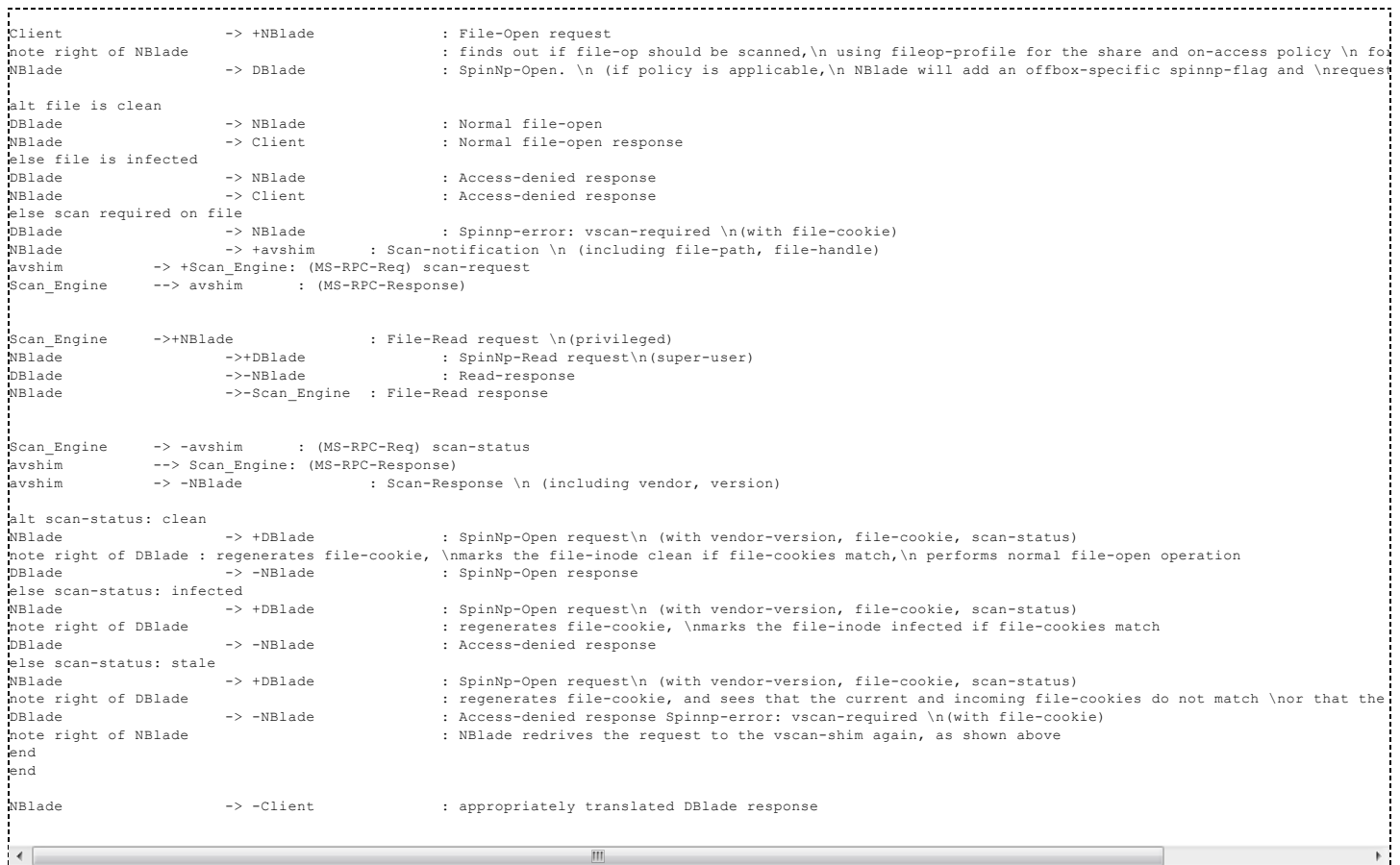
- list of vscanners IPs
- list of privileged-users, using which the virus-scan-engine accesses the files to be scanned
- scan-request and connection-setup related parameters (timeouts and retry counts)
- Apply appropriate scanner policy to Scanner pools for a vserver.
- Check the connection-status user-interface and ensure that vscanners are successfully connected to clustered ONTAP node(s).
- Create an On-Access policy for the vserver and specify an appropriate scope (file-paths and file-extensions to exclude)
- Enable the policy.

If a CSID-keyed scanner-configuration and On-Access policy configuration exists, following steps may be undertaken to apply this configuration to a vserver:

- Ensure that vserver-of-interest has LIFs on at-least one clustered ONTAP node, and that vscanners, provided in cluster-wide Scanner pool, are accessible for this/these LIF(s).
- Ensure that scope of CSID-keyed Scanner pool-configuration is valid in context of vserver-of-interest.
- Apply appropriate scanner policy to the scanner pool.
- Check the connection-status user-interface and ensure that vscanners are successfully connected to clustered ONTAP node(s).
- Enable the policy.

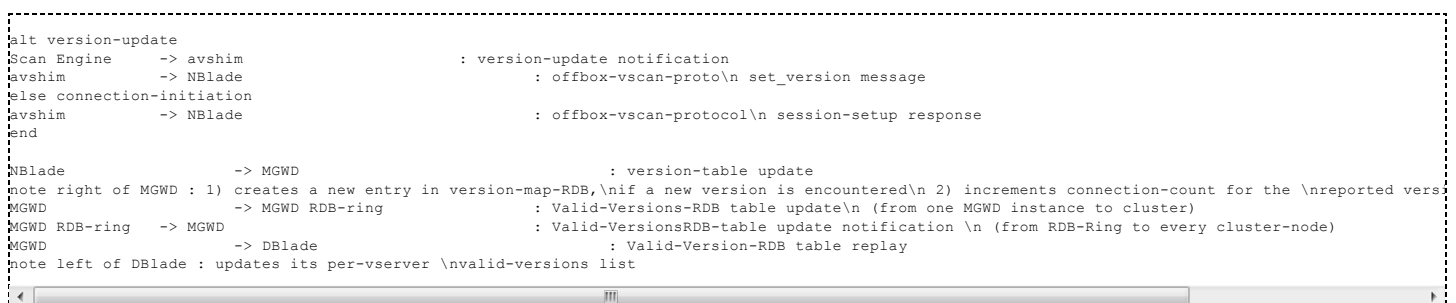
On-Access Scan operation

Following sequence diagram describes the operation-sequence, with important data-elements, for an On-Access scan.



Scan-Engine version update

Following sequence-diagrams provides an overview of operations carried out during a scan-engine version update. Similar operations are also takes place once connection is established between vscanner and clustered ONTAP.



Deployment

Packaging

This feature is a module part of the Clustered ONTAP release. It will be part of the standard Clustered ONTAP packaging and distribution.

Branding

The commands over CLI and GUI and the modules developed as part of this feature are vendor-neutral.

Installation

- Offbox-Vscan feature is part of clustered ONTAP and is available for use, post installation of ONTAP.
- All the participating nodes need to be at least at SierraNevada.1 or above for the feature to be enabled.
- CIFS is the supported protocol for data channel between vscanners and clustered ONTAP. So CIFS license needs to be added.
- Vscanners, with all appropriate software-components, must be made accessible from the data LIFs of the target-vserver.

Once the above-listed components are installed, valid configuration has to be setup to make Offbox-Vscan feature operational:

- On-access policy for a protocol must be configured and enabled. The file access using that protocol will be checked against the scope and filters configured in the policy to determine whether scan is needed or not.

Note: There is a provision of CSID-based default On-Access policies for all supported protocols, which is enabled on all vservers by default. Admin may choose to use the same instead of configuring a new one.
- Scanner pool must be configured and appropriate scanner policy must be applied. This is defined by the set of objects which are used for validating incoming vscanner connection request (allowed list of vscanner IPs, and allowed list of privileged users) and other parameters, such as various timeouts for scan-notifications, responses (available in advanced mode).
- Vscan must be enabled for the vserver.

Upgrading and Reverting

Offbox-Vscan feature will be introduced in SN.1 and will work only when all the nodes in the clustered ONTAP are at SN.1 or higher. This is taken care by leveraging the capability manager framework. For successful upgrade and revert, different aspects of the system has to be handled:

Configuration

- The feature needs to be turned-off before any revert operation on any of the nodes of the cluster. Capability manager ensures that:
 - for the feature to be enabled, all nodes must be at SN.1 or above.
 - if the feature is enabled, no node running a release without this feature can join the cluster.

Waf

- Offbox-Vscan stores AV state and vscanner-version on the in-core inode, not on-disk inode. Fields for storing these are same as the ones used by Onboard AV. While loading the on-disk inode of a file to the memory, AV state and scanner-version is masked. This is done to nullify the information which has been written by Onboard AV in previous releases.

SpinNP versioning

SpinNP version differences can show up during both the upgrade and the revert process where at least one of the nodes in the cluster does not understand the version with support for Offbox-Vscan (the Data ONTAP version is below SN.1). Offbox-Vscan feature requires new fields and flags to be added to the SpinNP protocol. Those have already been added in the SN code. These are marked within `SPINNP_FILEOP_VERSION_4_0` for SierraNevada. It is the responsibility of the sender node to not send data beyond the negotiated session version. Anyways capability manager ensures that this feature cannot be enabled in a cluster which has a node at below SN.1, So the sender node will not send data pertaining to Offbox-Vscan. This is true for both the N-blade being the higher version (SpinNP request case) or the D-blade being the higher version (SpinNP response case).

Licensing

- No additional license is required to enable Offbox-Vscan feature on Clustered ONTAP.
- For data access by virus-scan-engine over CIFS (data channel), CIFS license will be required.
- Appropriate vendor-licenses may be required for installing these on external vscanner.

Versioning

Offbox-Vscan feature cannot be enabled until all the nodes in the clustered ONTAP are at SN.1 or higher. This constraint is forced by leveraging the capability manager framework.

Documentation

Based on the target audience all the related documentation of this feature can be categorized as:

Documentation for storage administrators

- Offbox-Vscan Management Guide for managing clustered ONTAP and avshim. This will be provided by IE.
- Man pages and ZAPI docs for user interface for the feature
- Release note
- Best practice guide having recommendation on the deployments

Documentation for antivirus administrators

- AV Vendor Deployment Guide (Provided by the AV vendor)

Documentation for AV Vendors

- Vscan API documentation for integration of vscanners with NetApp provided avshim
- Document defining the wire protocol between avshim and clustered ONTAP. For the first release we will not be exposing this interface, but in future we might consider that, so that AV vendors may write their own avshim and package that with vscanner.

Feature Overview

Offbox-Vscan feature consists of various components. Those can be categorized on the basis of where they belong to.

M-Host

The major components residing here are:

Configuration Management

This provides the functionality of storing and retrieving the configuration elements using external interfaces (UI and Zapi). This is done by leveraging the SMF infrastructure.

The major configuration elements are:

- **Vscan-status of a vsriver:** Indicates whether vscan is enabled on the vsriver or not.
- **On-Access policy and its status:** Defines the scope of scanning on a files when access by a client.
- **fileop-profile:** Defines the vscan-fileop profile per share basis. This is maintained with cifs share.
- **Scanner pool and applied scanner policy:** Defines the set of objects which are used for validating the vscanner connection.
- **Connection-status:** Maintains vscanner connection-status. This information is retrieved from nblade.
- **Version-map table:** This table contains the versions of all the active vscanners. The workflow to maintain this table is as follows:
 - Once a vscanner is connected to clustered ONTAP or vscanner software is updated, vscanner-version is known to the nblade using vscanner-notification-protocol.
 - This information is received by MGWD through notification on the action-table.
 - If the version-map table already has an entry for the vendor and vscanner-version for the applicable vsriver, then it increases the ref-count for that version else it allocates a new 16-bit number which is used as an internal version. Incore-inode are stamped with the internal version for the files which are scanned are stamped with this internal version.
 - When a vscanner gets disconnected (any reason) to the clustered ONTAP, then again this information is received by MGWD through notification on the action-table.
 - The ref-count of the entry which represented the version with which the vscanner was running is reduced.
 - More details on allocating new version and purging the versions with ref-count 0 will be captured in design spec.

Refer to the details of configuration management at Configuration_Guide.

This module also provides the mechanism to replay selected configuration to n-blade and d-blade using KSMF and replay infrastructure.

Capability Manager Integration

Offbox-Vscan feature will be introduced in SN.1. Capability manager integration ensures that:

- This feature can be enabled only when all the nodes in the cluster are at SN.1 or higher.
- New node running a release prior to SN.1 cannot join the cluster.
- No node can be reverted to a release prior to SN.1 if this feature is enabled.

N-Blade

The major components residing here are:

Configuration Management

Most of the Offbox-Vscan configuration is replayed to nblade for various purposes using replay infrastructure and managed using KSMF. Tables which gets replayed to nblade are:

- **Vscan-status:** This table contains the vscan status on a vsriver. This information is maintained in nblade internal data-structure.
- **On-Access policy & status table:** These tables contain On-Access policy configuration and their status. Data in these tables are maintained in the internal data-structures which are used for decision making whether scan is required for a request or not. More details on this is available in On-Access Fileop-profile/Policy Check section.
- **Active scanner pool table:** This table contains the merged configuration of all the active scanner pools on a vsriver. That includes:
 - List of IP of the vscanners which are allowed to connect to the clustered ONTAP.
 - List of users which are allowed privileged access using which vscanner scans the file.
 - Various timeouts.

Again all of these are maintained in the internal data-structures which are used for validating and managing communication channel between "avshim - clustered ONTAP" and "vscanner - clustered ONTAP".

- **Version-map table:** This table contains the versions of all the active vscanners. This is used for mapping the vendor and version info to internal 16-bit version-ID
- **Connection-Status:** This table contains the connection-status of the vscanners which are allowed to get connected to this node. This is the only KSMF table in nblade which is not replayed from M-Host, instead this table is used by MGWD.

On-Access Fileop-profile/Policy Check

This component first checks the fileop-profile for the share through which file is accessed. This configuration is maintained per share basis as an enum with following values:

- no_scan: No scan is triggered for any fileop.
- standard: Scan is triggered for open, close and rename. This provides fairly safe system without degrading the performance too much.
- strict: Scan is triggered for open, read, close, and rename. Since this triggers vscan for many fileops, it should be used only after understanding the performance hit.

- **writes_only:** Scan is triggered for close fileop only if the file is newly created or modified.

If the fileop qualifies for scan then it checks whether the fileop falls into the scope of the applicable On-Access policy. It makes that decision based on below parameters of On-Access policy:

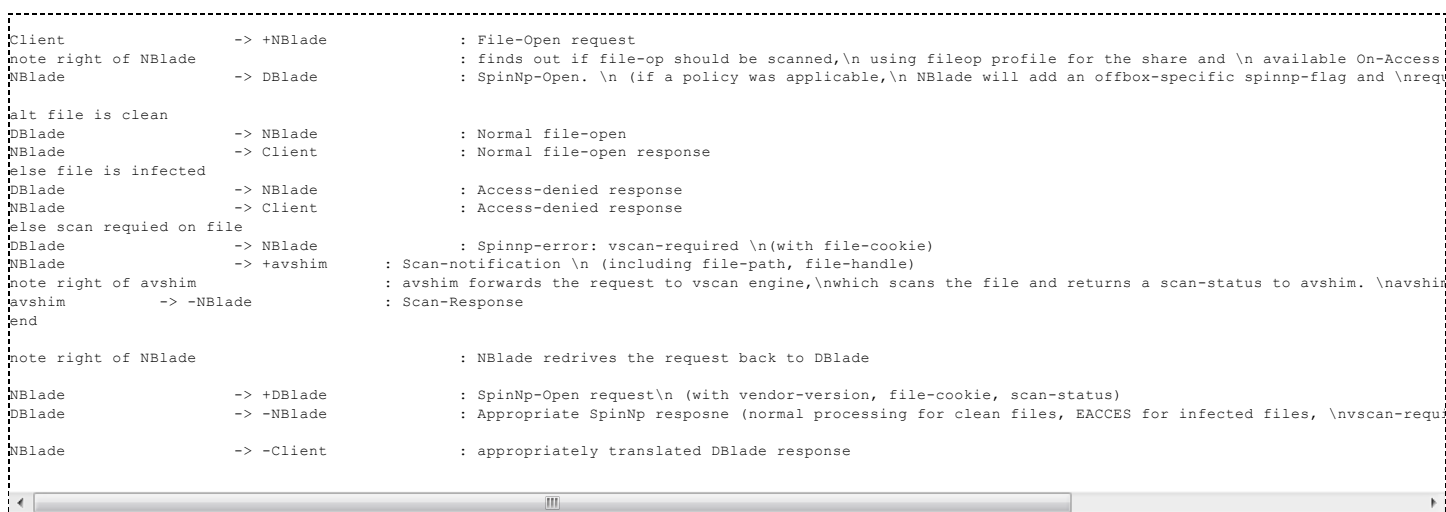
- **Protocol:** Protocol that the fileop belongs to. Currently only CIFS is supported. In later release different versions of NFS will also be supported.
- **paths-to-exclude:** This is the list of file-paths wrt to vserver namespace. Fileop on a file which resides in any of those paths must not trigger vscan.
- **file-ext-to-exclude:** This is the list of file-extensions. Fileop on a file that matches any of those extensions must not trigger scan.

If all the above checks are passed then only fileop is considered for vscan. In that case nblade send the requests to dblade for further processing. Details on how dblade handles that request is at Protocol_Message_Handling.

Protocol Handling

The following sequence-diagram shows the interactions between NBlade and DBlade for a protocol-operation, for which virus-scanning is found to be applicable using On-Access policy rules. The key-point to note here is that the protocol-operation takes a minimum of two forward-path trips from NBlade to DBlade to complete.

- The first forward-path trip is required for performing the following operations:
 - checking whether the file has a valid scan-status, on the basis of which the protocol-op may be appropriately handled
 - perform file-size checks for the file-under-question in DBlade
 - obtaining file-handle and file-signature from DBlade. The file-handles are used by the vscan engine to read the file over a privileged CIFS-share for scanning and perform remedial or quarantining operations on the file. The file-signature represents the current state of file, which is deemed to change if the file is modified in any manner. This signature is used to determine if the file was modified while it was being scanned. If file was indeed modified in this duration, then the scan-status is untrustworthy and file shall be scanned again in the context of the current protocol-operation
- The second forward-path trip is required for setting the scan-status on the in-core inode.



Avshim Connection Management

The vscan-notifications and their responses are transported over SMB named-pipe `\\pipe\vscan`. ONTAP operates in a server mode in this model and each avshim is responsible for creating named-pipe files as a client. The scope of an avshim may be

- **cluster-wide:**

where the avshim shall serve all vservers on the cluster, through all available NBlades. In this mode, the avshim shall be configured with cluster-mgmt LIF-IP, which is uses to poll the network-interface, using ZAPI, to determine the vserver-data-LIF IPs to which it must send SMB named-pipe creation requests. In this mode, the avshim must create one named-pipe connections per vserver per node, wherever a LIF can be found for any vservers.

- **vserver-wide:**

where the avshim shall serve only a single vserver, through all available NBlades. In this mode, the avshim shall be configured with one of the vserver-data-LIF-IP, which is uses to poll the network-interface, using ZAPI, to determine the vserver-data-LIF IPs to which it must send SMB named-pipe creation requests. In this mode, the avshim must create one named-pipe connections per node, where there exists a LIF for this vserver.

The above model enables an avshim for each node, which is capable of serving data through its N-Blade. This is necessary because vscan-notifications are generated from N-Blade in the current operation-model, as shown in the section above.

Offbox-Vscan Connection-Manager shall use the scanner pool configuration provided by the administrator through the feature-UI to determine if a named-pipe connection may be allowed from an avshim with a particular connection-user credentials. It shall utilize the SMB infrastructure, namely the SMB-session created by avshim before it can request a named-pipe file creation to obtain user-credentials and client-IP.

Privileged access for Virus-Scan-Engine

Virus-Scan-Engines shall be allowed to access files-to-be-scanned over a privileged CIFS-share in the current release.

- CIFS must be licensed on the storage appliance to allow for this privileged-access.
- The credentials that will be used by the Virus-Scan-Engine to access data over data channel must be specified in any of the active scanner pools for the vserver.
- The Virus-Scan-Engine details like IP address/hostname must be added in the policy configuration.

- The combination of the IP address and the user credential grants the Virus-Scan-Engine "Super user" credentials.
- "Super user" status grants the data channel these major privileges over other data accesses:
 - Avoid permission checks on files and directories.
 - Special locking privilege to allow read access to any files regardless of existing locks, and allow modify access to any files with immediate removal of existing locks.
 - By-pass any antivirus checks.
 - By-pass any FPolicy checks.

Avoiding all permission checks

- Virus-Scan-Engine will require unhindered access to files over the data channel. It may open/read the file to perform scan, remedy and/or quarantine operations.
- Once the session from the Virus-Scan-Engine is identified, any file access request from this client, when translated to a SpinNP request will have `SPINNP_FLAG_DONT_CHECK_PERMISSIONS + SPINNP_FLAG_DONT_CHECK_LOCKS` flag set on it, which shall cause suppression of checks for permission and auditing and allows the op to ignore any other locks held on the file
 - This flag is checked by `waf1_access_check`, `waf1_access_get_access`, `waf1_access_check_delete`, `waf1_setattr_access_check`

Lock privilege

In 7G/7-mode, all access from the Virus-Scan-Engine are granted a special lock. This special lock allows the Virus-Scan-Engine to access (read and write) any file at any time regardless of the locks already taken by other clients.

This presents an opportunity for data corruption. When holding a deny-write lock, clients are rightfully assuming that the file cannot change so the filer cannot let anybody modifying a file without at least telling the clients about it.

So the locking requirements for Offbox-Vscan in C-mode are as follow:

1. The Virus-Scan-Engine must be able to read any file (incl. its attributes) at any time, independently of any locks already taken by other clients. The Virus-Scan-Engine is able to deal with files being modified while it reading them (same behavior as in 7G/7mode Vscan).
2. The Virus-Scan-Engine must be able to write any file (incl. its attributes) at any time, without causing data corruption to clients already holding locks (different behavior from 7G/7-mode Vscan).

In C-mode, the lock manager provides a super access and a super lock, which fulfill the above requirements. These were added to support the integrated AV server, which has very similar locking needs.

Super Access

The lock manager in C-mode offers a way to bypass all file lock checks when reading a file by letting the sender setting the `SPINNP_FLAG_DONT_CHECK_LOCKS` flag in the `spinnp_fileop` request. If there is a super lock on the file, then access is granted only if the sender is the owner of the super lock (same `spinnp_lock_scope_info_t`).

The following changes will be made in the N-Blade for Offbox-Vscan:

- For all read access from the Virus-Scan-Engine, the N-Blade will set the `SPINNP_FLAG_DONT_CHECK_LOCKS` flag in all `spinnp_fileops` (read, `getattr...`).
- For opens from the Virus-Scan-Engine, the N-Blade will not only set the `SPINNP_FLAG_DONT_CHECK_LOCKS` flag in the open `spinnp_fileops` but will also:
 - reset the deny bits (`SPINNP_LOCK_MODE_OPEN_DENY_READ/WRITE/DELETE`) of the share locks if any is set, so the Virus-Scan-Engine doesn't conflict with existing lock
 - always set `SPINNP_LOCK_MODE_OPLOCK_NULL` to disable caching on the Virus-Scan-Engine

Super Lock

The lock manager in C-mode provides a way to take a special lock (aka super lock) that removes all existing locks. To request such a lock, one needs to send a `spinnp_lock` request for a byte range lock with special modes like `SPINNP_LOCK_MODE_SUPER`.

In a nutshell, here is what happen when a super lock is taken on a file:

- all existing oplocks of the file are expunged without any notifications to the client.
- all sharelocks are immediately removed ; there is no way to notify the clients about that, this is only when the client comes later that the filer fails the fileop request (with an invalid filehandle or no lock error) which forces the client to close the file, reopen it, and reacquire the locks.

The super lock is exclusive. Only one super lock can be taken at a time on a file.

The following changes will be made in the N-Blade for Offbox-Vscan:

- The N-Blade will take a super lock, the first time the Virus-Scan-Engine modifies the file (write, delete, `getattr...`), and release it when the file gets closed. This implies that the virus-scanner, for purposes of scanning the file, will not acquire a super-lock. It shall read the file with (`SPINNP_FLAG_DONT_CHECK_PERMISSIONS + SPINNP_FLAG_DONT_CHECK_LOCKS`). But if vscanner tries to remedy a virus in the file or quarantine the file, it shall acquire a super-lock, which will invalidate any existing file-opens and disallow any further opens on the file being acted upon.
- To request for a super lock, the N-blade must send a `spinnp_lock` request with the following parameters:
 - `type = SPINNP_TYPE_RANGE_LOCK`
 - `range = the whole file`
 - `mode = SPINNP_LOCK_MODE_SUPER | SPINNP_LOCK_MODE_EXCLUSIVE | SPINNP_LOCK_MODE_MANDATORY | SPINNP_LOCK_MODE_RELEASE_ON_SESSION_FAIL`

Path of file in notification

C-mode architecture allows multiple volumes to assigned to a single vserver. These volumes are accessible as normal directories under the volume's directory structure. The root of a vserver's namespace (aka global namespace of the vserver) always points to the vserver's root-volume, the volume which is mandatorily created at the time of vserver creation. Addition of a new volume under global namespace is similar to mounting the volume on a directory in global-namespace.

Hence, the absolute-path of a file is a concatenation of absolute-path of file's volume in global-namespace and path of the file, from its volume-root. This representation allows for effective leveraging of WAFL I2P support, which maintains file-name information as a per-volume database.

The Vscan-notification shall contain the absolute path of the file, that was used by the client which had opened the file. However, this path shall be used by scan-engines for purposes and renaming during quarantining only. For the purpose of scanning or remedying the file, the scan-engine shall be allowed to access the file using a special file-handle based path. File-accesses using such a file-handle based path shall only be allowed over privileged-CIFS-share.

Following are the semantics for file-names used by virus-scan-engines to access files over privileged-CIFS-share.

The file-handle based path shall be constructed by concatenating the following components, in the given order:

- CIFS-share-path of privileged-CIFS-share, or the drive-letter on which it is mounted on vscan-server
- file-handle, constructed from members of OffboxVScanReq_Scan message, in the following format:

<FEFF><volldRoot::dsid_major,8 chars><volldRoot::dsid_minor,8 chars><fh_file:flags (2 chars)><fh_file::file_id (8 chars)><fh_file::uniq (8 chars)>

- The path may be suffixed by the any further components, e.g the absolute-path of the file, but these shall ignored by clustered-ONTAP.

For illustration, assuming the following information are received in an OffBoxVScanReq_Scan message:

- volldRoot::dsid_major: 0x00000aaa
- volldRoot::dsid_minor: 0x00000bbb
- fh_file::file_id: 0x0000fdfd
- fh_file::uniq: 0x08070605
- fh_file::flags: 0x000000ee

and privileged-CIFS-share is accessible as 10.20.30.40:\PRIV_SHARE\$, 10.20.30.40 being one of the data-lif IPs of the corresponding vserver.

For these details, the file-path that vscan-engine shall use to access this file is:

\\10.20.30.40:\PRIV_SHARE\$\FEFF00000aa00000bbbee0000fdfd08070605

D-Blade

The major components residing here are:

Configuration Management

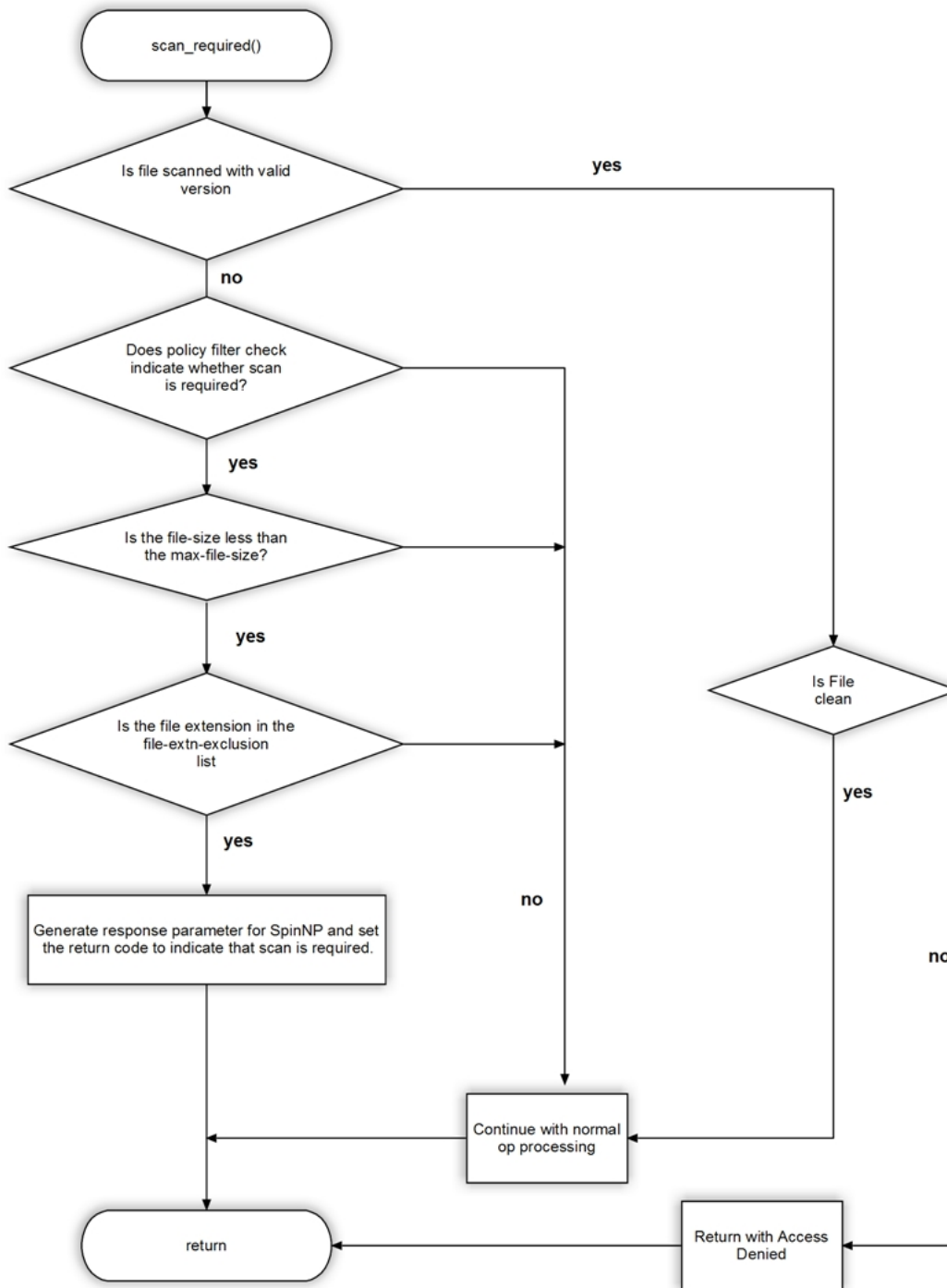
Configuration which are used in dblade for making decision is replayed using replay infrastructure and managed using KSMF. Tables which gets replayed to dblade are:

- **On-Access policy & status table:** These tables contain On-Access policy configuration and their status. Data from these tables are maintained in the internal data-structures which are used for decision making whether scan is required for a request or not.
- **Version_map table:** This table contains the versions of all the active Vscanners. This is used to maintain the list of valid versions. If a file has been scanned with a version that exists in the list of valid versions, then it is assumed that AV state is still valid and no new scan is required.

Protocol Message Handling

WRT Offbox-vscan, two kinds of SpinNP requests arrive in dblade. Those are:

- **SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_REQ:** nblade sends this request for fetching inode-parameters which is used for sending scan requests. Upon receiving this, avoa module in dblade checks if the file is already scanned with valid version or not. If yes then it returns the code indicating the scan status of the file and the fact that no scan is required. If not, and On-Access policy check suggests that it requires scan, then it prepares the response-structure and returns a specific error indicating that scan is required.



- **SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_STATUS:** After receiving successful response from vscanner, nblade sends this request to dblade. The request structure contains corresponding vsver-id, scan status, version of scan-engine that performed virus scanning and the cookie. Upon receiving this, avoa module sets the scan status and version to incore-inode if the file has not been modified while it was under scan-operation and the version of the server is correct. Otherwise it returns error indicating re-scan of the file. It should be noted that **scan status and version are set to the incore-inode not to disk inode, so this information persists only till the inode is in memory.**

SpinNP

To enable nblade-dblade communication wrt to offbox-vscan, this feature needs new flags, error-codes and data-structures in SpinNP module. These have already been added in SN.0 and marked within `SPINNP_FILEOP_VERSION_4_0`.

In summary, SpinNP request and response messages for *open*, *close*, *read*, *write*, *rename* operations have been modified. The op-specific SpinNP request message-components contain an additional offbox-vscan related parameter, used by N-Blade to inform DBlade of offbox-vscan applicability to the op, request for file-information or to set the scan-status information on the inode. The op-specific response components contain an additional offbox-vscan related parameter, used by DBlade provide information requested by NBlade in its corresponding request's offbox-vscan request-parameter.

Namely, the following request-message-components shall contain offbox-vscan related request-parameter:

- `struct spinnp_open_req_t`
- `struct spinnp_close_req_t`
- `struct spinnp_read_req_core_t`
- `struct spinnp_write_req_core_t`
- `struct spinnp_rename_req_t`

Correspondingly, the following response-message-components shall contain offbox-vscan related response-parameter:

- struct spinnp_open_resp_t
- struct spinnp_close_resp_t
- struct spinnp_read_resp_t
- struct spinnp_write_resp_t
- struct spinnp_rename_resp_t

Request Flags

- The following flags indicate the type of offbox-vscan-request to dblade:
 - **SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_REQ:** This flag indicates that the incoming vscan-parameter is a request for fetching inode-parameters for creating a vscan-notification. This parameter shall contain the corresponding vsrver-id, list of applicable policy-ids, filters for this request and flags to indicate the information that DBlade must sent back to NBlade. If dblade returns error type **SPINNP_ERR_OFFBOX_VSCAN_REQD**, it means that vscan is required for this op. So, nblade will send the scan-request to one of the available vscanner.
- - **SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_STATUS:** This flag indicates that the incoming vscan-parameter is a scan status, sent as a response from an external virus-scanner. As a part of this parameter, NBlade sends the corresponding vsrver-id, scan status, version of scan-engine that performed virus scanning and a cookie to help indicate if file underwent any modification while it was under scan-operation, apart from any modifications from virus-scanner.
- The following flags control the information returned by dblade for a SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_REQ type offbox-vscan-request on a offbox-vscan-enabled operation.
 - **SPINNP_OFFBOX_VSCAN_REQ_INFO_PATH:** This indicates the dblade must return the volume root file handle and path,from volume root, of the file to be scanned as a response
 - **SPINNP_OFFBOX_VSCAN_REQ_INFO_FH:** This indicates the dblade must return the volume root file handle and file handle of file to be scanned as a response
- The following flags provide information pertaining to applicability of virus scanning:
 - **SPINNP_OFFBOX_VSCAN_FILTER_SCAN_RO_VOL:** This indicates that files in read-only volumes should be scanned. The default behaviour is not to scan files in read-only volumes.
 - **SPINNP_OFFBOX_VSCAN_FILTER_SCAN_EXEC_ACCESS:** This indicates that the file under operation should be scanned only if the file is being/has been opened for execute-access. This applies to CIFS file accesses only.
 - **SPINNP_OFFBOX_VSCAN_FILTER_SCAN_EXEC_PERMS:** This indicates that the file under operation should be scanned only if file has execute permissions. This applies to NFS file accesses only.

Response Flags

The following set of flags are set on the SpinNP response when **SPINNP_ERR_OFFBOX_VSCAN_REQD** is returned. Each of these flags indicate whether certain data on the response is set:

- **SPINNP_OFFBOX_VSCAN_RESP_COOKIE:** A unique identifier on the file, which is assured to be changed if the file is changed.
- **SPINNP_OFFBOX_VSCAN_RESP_PATH_CIFS:** The CIFS client usable path of the file object is returned.
- **SPINNP_OFFBOX_VSCAN_RESP_PATH_NFS:** The NFS client usable path of the file object is returned.
- **SPINNP_OFFBOX_VSCAN_RESP_FH:** The spinnp-filehandle of file object to be scanned is returned.
- **SPINNP_OFFBOX_VSCAN_RESP_ROOT_FH:** The spinnp-filehandle of volume root of file object to be scanned is returned.

Error Codes

- **SPINNP_ERR_OFFBOX_VSCAN_REQD:** This indicates that the request needs to be scanned for viruses by an external server
- **SPINNP_ERR_OFFBOX_VSCAN_PENDING:** This indicate that scan is laready requested for this inode. In the current design we may not be using this.

```
spinnp_version supported_by(SPINNP_FILEOP, from(4,0));

typedef spinnp_content_signature_t spinnp_offbox_vscan_cookie_t;

typedef uint32_t spinnp_offbox_vscan_onaccess_policyid_t;

bitmap64_t spinnp_offbox_vscan_param_flags_t {
    SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_NONE = 0x0,
    SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_REQ = 0x1,
    SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_STATUS = 0x2
};

bitmap64_t spinnp_offbox_vscan_req_info_t {
    SPINNP_OFFBOX_VSCAN_REQ_INFO_NULL = 0x0,
    SPINNP_OFFBOX_VSCAN_REQ_INFO_PATH = 0x1,
    SPINNP_OFFBOX_VSCAN_REQ_INFO_FH = 0x2,
};

bitmap64_t spinnp_offbox_vscan_filter_t {
    SPINNP_OFFBOX_VSCAN_FILTER_NULL = 0x0,
    SPINNP_OFFBOX_VSCAN_FILTER_SCAN_RO_VOL = 0x1,
    SPINNP_OFFBOX_VSCAN_FILTER_SCAN_EXEC_ACCESS = 0x2,
    SPINNP_OFFBOX_VSCAN_FILTER_SCAN_EXEC_PERMS = 0x4
};

struct spinnp_offbox_vscan_param_t {
    spinnp_offbox_vscan_param_flags_t flags;
    collection [flags] {
```

```

case SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_REQ:
    struct {
        spinnp_virtual_server_id_t        vsid;
        spinnp_offbox_vscan_onaccess_policyid_t policies<>;
        spinnp_offbox_vscan_filter_t      filter;
        spinnp_offbox_vscan_req_info_t    req_info;
    } scan_req;
case SPINNP_OFFBOX_VSCAN_PARAM_FLAGS_SCAN_STATUS:
    struct {
        spinnp_virtual_server_id_t        vsid;
        spinnp_bool8_t                    is_scan_clean;
        uint16_t                          scan_version;
        spinnp_offbox_vscan_cookie_t      cookie;
    } scan_status;
default:
    void;
} data;
};

bitmap64_t spinnp_offbox_vscan_resp_flags_t {
    SPINNP_OFFBOX_VSCAN_RESP_NONE      = 0x0,
    SPINNP_OFFBOX_VSCAN_RESP_COOKIE    = 0x01,
    SPINNP_OFFBOX_VSCAN_RESP_PATH_CIFS = 0x02,
    SPINNP_OFFBOX_VSCAN_RESP_PATH_NFS  = 0x04,
    SPINNP_OFFBOX_VSCAN_RESP_FH        = 0x08,
    SPINNP_OFFBOX_VSCAN_RESP_ROOT_FH   = 0x10
};

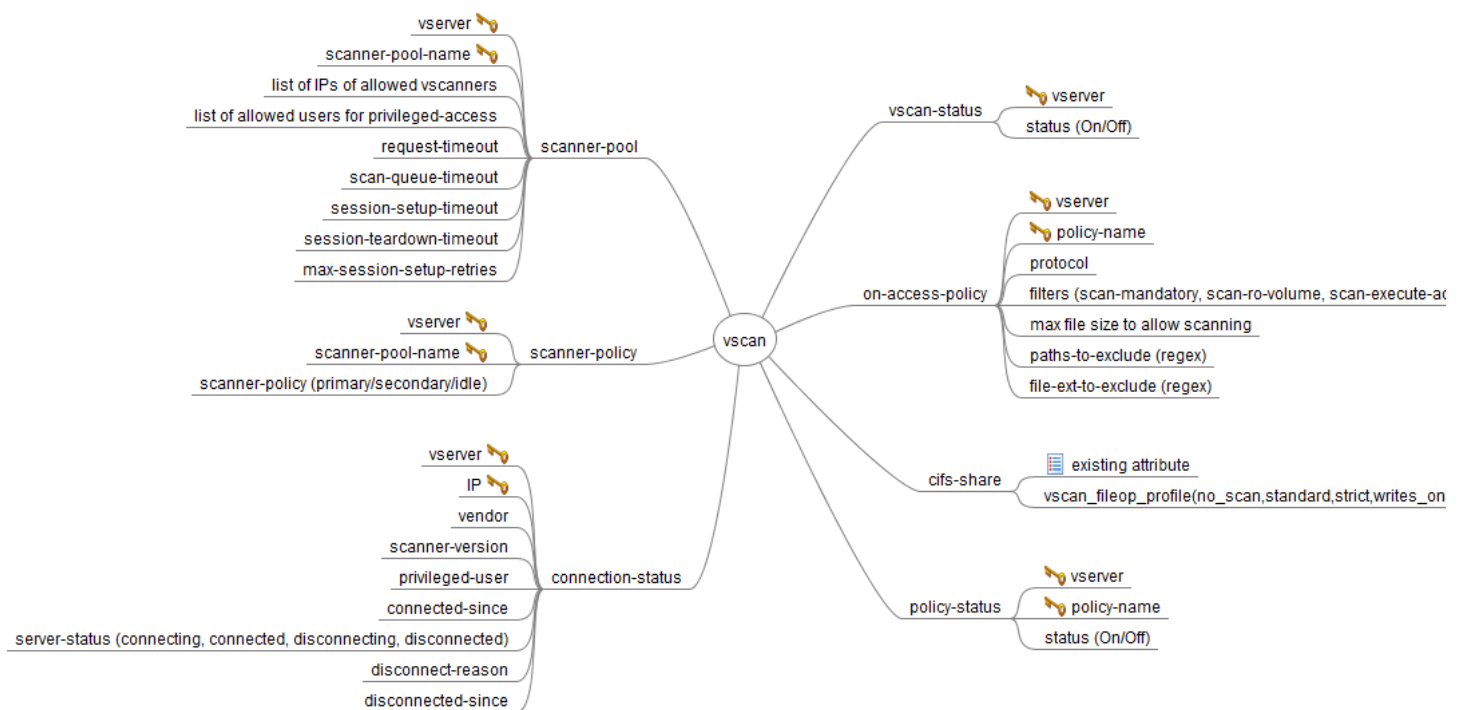
struct spinnp_offbox_vscan_resp_t {
    spinnp_offbox_vscan_resp_flags_t flags;
    collection [flags] {
        case SPINNP_OFFBOX_VSCAN_RESP_COOKIE:
            spinnp_offbox_vscan_cookie_t cookie;
        case SPINNP_OFFBOX_VSCAN_RESP_PATH_CIFS:
            spinnp_path_t path_cifs;
        case SPINNP_OFFBOX_VSCAN_RESP_PATH_NFS:
            spinnp_path_t path_nfs;
        case SPINNP_OFFBOX_VSCAN_RESP_FH:
            spinnp_filehandle_t fh;
        case SPINNP_OFFBOX_VSCAN_RESP_ROOT_FH:
            spinnp_filehandle_t root_fh;
        default:
            void;
    } data;
};
spinnp_version end;

enum16_t spinnp_fileop_errno_t {
...
    SPINNP_ERR_OFFBOX_VSCAN_REQD = 325, // The request needs to be scanned for viruses by an external server
    SPINNP_ERR_OFFBOX_VSCAN_PENDING = 326, // vscan-status pending for this inode
...
}

```

Object Model

Diagram



On-Access policy

This configuration defines the scope of On-Access scanning on file-objects. The scope parameter may be different for different Protocols. So, this is again categorized based on the Protocol. For SN.1, only CIFS is to be supported. The basic scoping parameters for CIFS are paths & file-extension exclusion list and max-file-size. Apart from these, filters are also included that may be used to define the scope more precisely.

This configuration element is represented by vserverized SMF object model (i.e. the internal SMF-representation includes separate user-interface, business-logic and storage units). Cluster-Server-Id (CSID) as a valid value for 'vserver' key. Such a CSID-keyed On-Access policy will be available to all vservers in the system, but need to be enabled separately for each vserver.

- **filters:** These are used to define the scope more precisely. Administrator can configure one or more filters to a policy.
 - *scan-mandatory:* This indicates whether a file-operation may be allowed in event of a virus-scanning failure or if it must be denied in such cases.
 - *scan-ro-volume:* Accesses on read-only volumes may be subjected to virus-scanning by setting this option to 'yes'.
 - *scan-execute-access:* Administrator may choose to scan only those files, which are opened with execute-access-enabled by setting this option to 'yes'.
- **max-file-size:** Refers to maximum file-size which is considered for scanning.
- **paths-to-exclude:** Refers to a comma separated list of paths which must be excluded from from scanning.
- **file-ext-to-exclude:** Refers to a comma separated list of file-extensions which must be excluded from from scanning. This can also contain regular expression such as "?" and "*".

On-Access-policy status

This interface provide means to enable/disable On-Access policies to vservers, and to observe the status of available On-Access policies. At one time only one policy of a particular protocol can be enabled at one time. Note that this table does not accept CSID as a valid value for vserver-key.

vscan-fileop-profile

This configuration provides a way to define vscan-fileop-profile at cifs share granularity. The fileop from a share is checked to determine whether this requires vscan or not. If it does not then vscan is not triggered on this fileop. If it does require vscan, then On-Access policy check is performed. This configuration is maintained per share basis as an enum with following values:

- **no_scan:** No scan is triggered for any fileop.
- **standard:** Scan is triggered for open, close and rename. This provides fairly safe system without degrading the performance too much.
- **strict:** Scan is triggered for open, read, close, and rename. Since this triggers vscan for many fileops, it should be used only after understanding the performance hit.
- **writes_only:** Scan is triggered for close fileop only if the file is newly created or modified.

Scanner pool

This configuration allows the administrator to provide the set of objects which are used for validating the vscanner connection (like allowed list of vscanner IPs, allowed list of authentication-parameters etc...) and other parameters like various timeouts for scan-notifications, responses (available in advanced mode). This configuration element is represented by vserverized SMF object model (i.e. the internal SMF-representation includes separate user-interface, business-logic and storage units). Cluster-Server-Id (CSID) as a valid value for 'vserver' key. Such a scanner pool will be available to all vservers in the system, but need to be enabled separately for each vserver.

- **servers:** List of IP of the vscanners which are allowed to connect to the clustered ONTAP.
- **privileged-users:** List of users which are allowed privileged access using which vscanner scans the file.
- **request-timeout:** Refers to the max wait-time for response of a scan-request.
- **scan-queue-timeout:** Refers to the max time spent by a scan-request in scan-engine's queue, before it is serviced.
- **session-setup-timeout:** Refers to the max wait-time for a response for session-setup-message.
- **session-teardown-timeout:** Refers to the max wait-time for a response for a session-teardown-message, or for any message to be received for a session-id, after the underlying connection has been disconnected.
- **max-session-setup-retries:** Refers to the max times session-setup for a session-id may be retried; case of consecutive retry failures only.

Scanner policy

This interface provide means to associate a scanner policy to a scanner pool. For SN.1 the only system created scanner policies are available for the use. Those are:

- **primary:** If a scanner pool is marked primary, it means the configuration is always active.
- **secondary:** If a scanner pool is marked secondary, it means the configuration gets activated when no primary Vscan server is connected.
- **idle:** If a scanner pool is marked idle, it means the configuration is never active. This is the default scanner policy for a new scanner pool.

Note that this table does not accept CSID as a valid value for vserver-key.

SMF Tables

```
// #####
// #
// #          vscan SMF tables          #
// #                                     #
// #####
// =====
// Filename      : vscan.smf
//
// Copyright    : Copyright (c) 2013 NetApp, Inc.
//               All Rights Reserved
//
// Summary:     : Handles all C-Mode Vscan-related SMF-tables
//               and associated operations.
//
// Note:
//
//             Please don't change any type of any field,
//             That may introduce some unstable state.
//
//             - XxxSameNameFieldXxx Doesn't work when there
//               are different type in UI(view)and DB table
//               fields.(vscan.cc)
```

```

//
//      - Incase you want to change the type of any field
//      ,change it every where DB,UI,View and
//      corresponding mirror table in N-blade
// =====

include { smf/schemas/types.smf }
include { smf/schemas/smf_blades.smf }
include { tables/vserver.smf }
include { tables/net.smf }
include { tables/vserver.smf }
include { types/common_name.smf }

include { smf/schemas/vscan_protocol.smf }
include { smf/schemas/vscan_on_access_policy.smf }
include { smf/schemas/vscan_file_ext.smf }
include { smf/schemas/vscan_file_path.smf }
include { smf/schemas/vscan_priv_user.smf }
include { smf/schemas/vscan_scanner_pool.smf }
include { smf/schemas/vscan_scanner_policy.smf }
include { smf/schemas/vscan_server_status.smf }
include { smf/schemas/vscan_scanner_type.smf }
include { smf/schemas/vscan_disconnect_reason.smf }
include { smf/schemas/vscan_config_owner.smf }
include { smf/schemas/vscan_on_access_policy_filter.smf }

include { ksmf/schemas/vscan_config.smf }

// #####
// #
// #      Directories Structure      #
// #
// #####

directory "vserver vscan" {
    help "Manage Vscan"
}

directory "vserver vscan on-access-policy" {
    help "Manage Vscan On-Access policies"
}

directory "vserver vscan scanner-pool" {
    help "Manage Vscan scanner pools"
}

directory "vserver vscan scanner-pool privileged-users" {
    help "Manage list of privileged users of a scanner pool"
}

directory "vserver vscan scanner-pool servers" {
    help "Manage list of servers of a scanner pool"
}

directory "vserver vscan connection-status" {
    help "Display connection status of Vscan servers"
}

// vscan ZAPI
zephyr {
    category vscan "Vscan configuration and managment."
    {
        "This set of APIs allow configuring and managing Vscan on Data ONTAP Cluster-Mode environment. \
This includes the APIs to retrieve the connection-status and other diagnostic information of active Vscan servers."
    }
}

//#####
//
// Table Name      : vscan_status_db
// Description      : Storage (Db) for
//                   Vscan status.
//#####
table vscan_status_db "Vscan Status" { create replicated }
{
    fields
    {
        -vserver      "Vserver"      vserverid      key(1)
        vscan-status   "Vscan Status" OnOff          write(2)
    }
}

//#####
//
// Table Name      : vscan_status
// Description      : Business-logic for
//                   Vscan status.
//#####
table vscan_status "Vscan Status" { create vserver-enabled }
{
    fields
    {
        -vserver      "Vserver"      vserverid      key
        vscan-status   "Vscan Status" OnOff          write
    }
}

//#####
//
// Table Name      : vscan_global_db
// Description      : Storage (Db) for
//                   Vscan global data.
//#####
table vscan_global_db "Vscan Global" { create replicated }
{
    fields

```

```

{
    -vserver                "Vserver"                vserverid        key(1)
    version-ID              "Current Version ID"        unsigned         read(2)
    version-ID-reuse        "Is Version ID Being Reused" OnOff            read(3)
    unused-version-timeout  "Unused Version Timeout"    time_interval    write(4)
    max-on-access-policies  "Maximum Number of On-Access policies"              unsigned         write(5)
    max-scanner-pools       "Maximum Number of Scanner Pools" unsigned         write(6)
    max-paths-to-exclude    "Maximum Number of Paths to Exclude in an On-Access Policy" unsigned         write(7)
    max-file-ext-to-exclude "Maximum Number of File Extensions to Exclude in an On-Access policy" unsigned         write(8)
    max-servers             "Maximum Number of Servers in a Scanner Pool" unsigned         write(9)
    max-privileged-users    "Maximum Number of Privileged Users in a Scanner Pool" unsigned         write(10)
}

//#####
//
// View Name      : vscan_status_byname
// Description    : Accessor for
//                Vscan status.
//#####
//TODO: Create an interface to modify the unused_version_timeout field.
// (Take this up during zapi implementation rework)
view vscan_status_byname "Vscan Status" { inner vserver-enabled }

    keys from vserver_by_name

    keys for vscan_status {}
    {
        vserver_by_name      id
    }

    values
    {
        vscan_status         vscan-status
    }

    extend_interface

    methods
    {
        method enable "Enable Vscan on a Vserver" {}
        {
            args {}

            command "vserver vscan enable"
            {
                help "Enable Vscan on a Vserver"
            }
        }

        method disable "Disable Vscan on a Vserver" {}
        {
            args {}

            command "vserver vscan disable"
            {
                help "Disable Vscan on a Vserver"
            }
        }

        // Instead of having two zapis (enable/disable), only one status-modify
        // zapi is exposed using thie method. This is used only from zapi interface.
        method status_modify "Modify Vscan status" {}
        {
            args
            {
                vscan-status "Vscan status. When true, Vscan feature is enabled for the Vserver." OnOff in
            }
            zephyr vscan-status
            {
                category vscan
                api modify "Modify Vscan status."
                {
                    errors
                    {
                        EINVALIDINPUTERROR
                        EINTERNALERROR
                        EOPNOTSUPPORTED
                        E_VSERVER_TYPE_NOT_SUPPORTED
                        EVSERVERNOTFOUND
                        ECIFSERVERNOTFOUND
                        E_NO_SCANNER_POOL_ACTIVE
                        E_VSCAN_CAPABILITY_NOT_ENABLED
                        E_VSCAN_JOB_QUEUE_FAILED
                        E_VSCAN_JOB_DELETE_FAILED
                    }
                    args
                    {
                        vscan-status=is-vscan-enabled {} {in}
                    }

                    // This ensures that same rbac rule applies to this zapi is
                    // as the given CLI.
                    rbac "vserver vscan enable"
                }
            }
        }
    }
}
command "vserver vscan"
{
    help_show    "Display Vscan status"
    show {} { vserver vscan-status }
    {
        +Vserver      Vscan Status
        +-----
        %%<<<<<<<<<<  %%<<<<<<<<<<
    }
}
}
descriptions {
    vscan-status { default "Vscan status. When true, Vscan feature is enabled for the Vserver." }
}

```

```

%table { default
    "This table contains Vscan status."
}

%entry { default
    "Entry for a single Vserver."
}

}

asup "T_VSCAN_STATUS" { cluster-scope }
{
    vsriver      "Vserver"      {hash}
    vscan-status "VscanStatus" {noop}
}

zephyr vscan-status
{
    category vscan
    typedef vscan-status-info "Vscan status information." {}
    {
        vsriver      {native}
        vscan-status=is-vscan-enabled { }
    }
    apis
    {
        get-iter "Returns Vscan status information."
        {
            errors
            {
                EINVALINPUTERROR
                EINTERNALERROR
                EVSERVERNOTFOUND
            }
        }
    }
}
}

#####
//
// Table Name   : vscan_on_access_policy_db
// Description  : Storage (Db) for
//               Vscan On-Access Policy configuration.
//#####
table vscan_on_access_policy_db "Vscan On-Access Policy" { create replicated }
{
    fields
    {
        -vsriver      "Vserver"      vsriverid      key(1)
        policy-name    "Policy"      vscan_on_access_policy key(2)
        protocol       "File-Access Protocol" vscan_protocol create(3)
        !filters        "Filters"      list<vscan_on_access_policy_filter,BYTES,once> write(4)
        !max-file-size  "Max File Size Allowed for Scanning" size write(5)
        !paths-to-exclude "File-Paths Not to Scan" list<text,BYTES,once> write(6)
        !file-ext-to-exclude "File-Extensions Not to Scan" list<text,BYTES,once> write(7)
    }
}

#####
//
// Table Name   : vscan_on_access_policy
// Description  : Business-logic for
//               Vscan On-Access Policy configuration.
//#####
table vscan_on_access_policy "Vscan On-Access Policy" { create vsriver-enabled }
{
    fields
    {
        -vsriver      "Vserver"      vsriverid      key
        policy-name    "Policy"      vscan_on_access_policy key
        owner          "Policy Config Owner" vscan_config_owner read
        protocol       "File-Access Protocol" vscan_protocol create
        !filters        "Filters"      list<vscan_on_access_policy_filter,once> write
        !max-file-size  "Max File Size Allowed for Scanning" size write
        !paths-to-exclude "File-Paths Not to Scan" list<vscan_file_path,once> write
        !file-ext-to-exclude "File-Extensions Not to Scan" list<vscan_file_ext,once> write
    }
}

#####
//
// Table Name   : vscan_on_access_policy_status_db
// Description  : Storage (Db) for
//               Vscan On-Access Policy status.
//#####
table vscan_on_access_policy_status_db "Vscan On-Access Policy Status" { create replicated }
{
    fields
    {
        -vsriver      "Vserver"      vsriverid      key(1)
        policy-name    "Policy"      vscan_on_access_policy key(2)
        protocol       "File-Access Protocol" vscan_protocol create(3)
        policy-status  "Policy Status" OnOff write(4)
    }
}

#####
//
// Table Name   : vscan_on_access_policy
// Description  : Business-logic for
//               Vscan On-Access-Policy status.
//#####
table vscan_on_access_policy_status "Vscan On-Access Policy Status" { create vsriver-enabled }
{
    fields
    {

```

```

        -vserver          "Vserver"                vserverid          key
        policy-name       "Policy"                 vscan_on_access_policy key
        owner             "Policy Config Owner"     vscan_config_owner read
        protocol          "File-Access Protocol"     vscan_protocol     create
        policy-status     "Policy Status"           OnOff              write
    }
}

//#####
//
// View Name      : vscan_on_access_policy_byname
// Description    : Accessor for
//                  Vscan On-Access Policy configuration.
//#####
view vscan_on_access_policy_byname "Vscan On-Access Policy" { inner create modify vserver-enabled }
{
    keys from
    {
        vserver_by_name      -vserver
        vscan_on_access_policy policy-name
    }

    keys for vscan_on_access_policy { create modify }
    {
        vserver_by_name      id
    }

    keys for vscan_on_access_policy_status { }
    {
        vserver_by_name      id
        vscan_on_access_policy policy-name
    }

    values
    {
        vscan_on_access_policy_status policy-status
        vscan_on_access_policy        owner
        vscan_on_access_policy        protocol
        vscan_on_access_policy        filters
        vscan_on_access_policy        max-file-size
        vscan_on_access_policy        paths-to-exclude
        vscan_on_access_policy        file-ext-to-exclude
    }

    extend_interface

    methods
    {
        method enable "Enable an On-Access policy" {}
        {
            args {}

            command "vserver vscan on-access-policy enable"
            {
                help "Enable an On-Access policy"
            }
        }

        method disable "Disable an On-Access policy" {}
        {
            args {}

            command "vserver vscan on-access-policy disable"
            {
                help "Disable an On-Access policy"
            }
        }

        // Instead of having two zapis (enable/disable), only one status-modify
        // zapi is exposed using thie method. This is used only from zapi interface.
        method status_modify "Modify On-Access policy status" {}
        {
            args
            {
                policy-status "Policy Status" OnOff in
            }
            zephyr vscan-on-access-policy
            {
                category vscan
                api status-modify "Modify On-Access policy status."
                {
                    errors
                    {
                        EINVALINPUTERROR
                        EINTERNALERROR
                        EOPNOTSUPPORTED
                        E_VSERVER_TYPE_NOT_SUPPORTED
                        EVSERVERNOTFOUND
                        E_OA_POLICY_NOT_FOUND
                        ERESOURCEINUSE
                    }
                    args
                    {
                        policy-name {} {in}
                        policy-status {} {in}
                    }

                    // This ensures that same rbac rule applies to this zapi is
                    // as the given CLI.
                    rbac "vserver vscan on-access-policy enable"
                }
            }
        }
    }

    command "vserver vscan on-access-policy"
    {
        help_new      "Create an On-Access policy"
        help_modify   "Modify an On-Access policy"
        help_delete   "Delete an On-Access policy"
    }
}

```

```

help_show "Display On-Access policies"
show {} { vserver policy-name owner protocol paths-to-exclude file-ext-to-exclude policy-status
          policy-name           paths-to-exclude file-ext-to-exclude }

{
+      +      Policy      Policy      File-Ext      Policy
+Vserver Name Owner Protocol Paths Excluded Excluded Status
+-----+-----+-----+-----+-----+-----+-----+
%%<<<<<<< %%<<<<<< %%<<<<< %<<<<<< %<<<<<<<<<<<< %<<<<<<<< %<<<<<
~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~
}

}
descriptions {
policy-name { default "Name of the policy." }
policy-status { default "Policy status." }
owner { default "Owner of the policy." }
protocol { default "File-Access protocol to monitor for On-Access scanning." }
filters { default "Filters." }
max-file-size { default "Max file-size (in bytes) allowed for scanning. The default value of 2147483648 (2GB) is taken if not provided at th
paths-to-exclude { default "File-paths for which On-Access scanning must not be performed." }
file-ext-to-exclude { default "File-Extensions for which On-Access scanning must not be performed." }

%table { default
"This table contains On-Access policy information."
}

%entry { default
"Entry for a single On-Access policy."
}
}

asup "T_VSCAN_ON_ACCESS_POLICY" { cluster-scope }
{
vserver "Vserver" (hash)
policy-name "PolicyName" (hash)
policy-status "PolicyStatus" (noop)
owner "PolicyOwner" (hash)
protocol "FileAccessProtocol" (noop)
filters "Filters" (hash)
max-file-size "MaxFileSize" (hash)
paths-to-exclude "PathsToExclude" (hash)
file-ext-to-exclude "FileExtensionsToExclude" (hash)
}

zephyr vsan-on-access-policy
{
category vsan
typedef vsan-on-access-policy-info "Vscan On-Access policy information." {}
{
vserver (native)
policy-name { }
policy-status=is-policy-enabled { }
owner=admin-owner { }
protocol { }
filters { }
max-file-size { }
paths-to-exclude { }
file-ext-to-exclude { }
}
apis
{
get-iter "Returns list of On-Access policies."
{
errors
{
EINVALINPUTERROR
EINTERNALERROR
EVSERVERNOTFOUND
E_OA_POLICY_NOT_FOUND
}
}
create "Create an On-Access policy."
{
errors
{
EINVALINPUTERROR
EINTERNALERROR
EOPNOTSUPPORTED
E_VSERVER_TYPE_NOT_SUPPORTED
EVSERVERNOTFOUND
E_OA_POLICY_EXISTS
E_OA_POLICY_CANNOT_CREATE_MAX_LIMIT
}
}
modify "Modify an On-Access policy."
{
errors
{
EINVALINPUTERROR
EINTERNALERROR
EVSERVERNOTFOUND
E_OA_POLICY_NOT_FOUND
EAPIPRIVILEGE
}
}
destroy=vsan-on-access-policy-delete "Delete an On-Access policy."
{
errors
{
EINVALINPUTERROR
EINTERNALERROR
EVSERVERNOTFOUND
E_OA_POLICY_NOT_FOUND
EAPIPRIVILEGE
ERESOURCEINUSE
}
}
}
}

```

```

#####
//
// Table Name : vscan_scanner_pool_db
// Description : Storage (Db) for Vscan Scanner Pool.
#####
table vscan_scanner_pool_db "Vscan Scanner Pool" { create replicated }
{
    fields
    {
        -vserver                "Vserver"                vserverid                key(1)
        scanner-pool            "Scanner Pool"            vscan_scanner_pool        key(2)
        servers                  "List of IPs of Allowed Vscan Servers" list<IpAddress,BYTES,once> write(3)
        privileged-users         "List of Privileged Users"         list<text_no_case,BYTES,once> write(4)

        !request-timeout        "Request Service Timeout"        time_interval            write(5)
        !scan-queue-timeout      "Scan Queue Timeout"            time_interval            write(6)
        !session-setup-timeout    "Session Setup Timeout"          time_interval            write(7)
        !session-teardown-timeout "Session Teardown Timeout"        time_interval            write(8)
        !max-session-setup-retries "Max Number of Consecutive Session Setup Attempts" unsigned                write(9)
    }
    privilege advanced
    {
        request-timeout
        scan-queue-timeout
        session-setup-timeout
        session-teardown-timeout
        max-session-setup-retries
    }
}

#####
//
// Table Name : vscan_scanner_pool
// Description : Business-logic for Vscan Scanner Pool
#####
table vscan_scanner_pool "Vscan Scanner Pool" { create vserver-enabled }
{
    fields
    {
        -vserver                "Vserver"                vserverid                key
        scanner-pool            "Scanner Pool"            vscan_scanner_pool        key
        owner                    "Scanner Pool Config Owner" vscan_config_owner        read
        servers                  "List of IPs of Allowed Vscan Servers" list<IpAddress,BYTES,once> write
        privileged-users         "List of Privileged Users"         list<vscan_priv_user,once> write

        !request-timeout        "Request Service Timeout"        time_interval            write
        !scan-queue-timeout      "Scan Queue Timeout"            time_interval            write
        !session-setup-timeout    "Session Setup Timeout"          time_interval            write
        !session-teardown-timeout "Session Teardown Timeout"        time_interval            write
        !max-session-setup-retries "Max Number of Consecutive Session Setup Attempts" unsigned                write
    }
    privilege advanced
    {
        request-timeout
        scan-queue-timeout
        session-setup-timeout
        session-teardown-timeout
        max-session-setup-retries
    }
}

#####
//
// Table Name : vscan_active_scanner_pool_db
// Description : Storage (Db) for Active set of Vscan Scanner Pool.
#####
table vscan_active_scanner_pool_db "Vscan Active Scanner Pool" { create replicated }
{
    fields
    {
        -vserver                "Vserver"                vserverid                key(1)
        scanner-pools            "List of Active Scanner Pools" list<vscan_scanner_pool,BYTES,once> read(2)
        primary-servers          "List of IPs of Primary Vscan Servers" list<IpAddress,BYTES,once> read(3)
        backup-servers           "List of IPs of Backup Vscan Servers" list<IpAddress,BYTES,once> read(4)
        privileged-users         "List of Privileged Users"         list<text_no_case,BYTES,once> read(5)

        !request-timeout        "Request Service Timeout"        time_interval            read(6)
        !scan-queue-timeout      "Scan Queue Timeout"            time_interval            read(7)
        !session-setup-timeout    "Session Setup Timeout"          time_interval            read(8)
        !session-teardown-timeout "Session Teardown Timeout"        time_interval            read(9)
        !max-session-setup-retries "Max Number of Consecutive Session Setup Attempts" unsigned                read(10)
    }
    privilege advanced
    {
        request-timeout
        scan-queue-timeout
        session-setup-timeout
        session-teardown-timeout
        max-session-setup-retries
    }
}

#####
//
// Table Name : vscan_active_scanner_pool
// Description : Business-logic for Active set of Vscan Scanner Pool.
// Marked all the fields (except key) as optional.
// This makes the get_imp() and next_imp() simple.
#####
table vscan_active_scanner_pool "Vscan Active Scanner Pool" { create vserver-enabled }
{
    fields
    {
        -vserver                "Vserver"                vserverid                key
        !scanner-pools           "List of Enabled Scanner Pools" list<vscan_scanner_pool,once> read
    }
}

```

```

//TODO: Consider maintaing list of some smf type which maintains content and its ref count to optimize
!servers                "Merged List of IPs of Allowed Vscan Servers"          list<IpAddress,BYTES,once>      read
!privileged-users       "Merged List of Privileged Users"                     list<vscan_priv_user,once>      read

!request-timeout        "Request Service Timeout"                             time_interval                   read
!scan-queue-timeout     "Scan Queue Timeout"                                  time_interval                   read
!session-setup-timeout  "Session Setup Timeout"                              time_interval                   read
!session-teardown-timeout "Session Teardown Timeout"                          time_interval                   read
!max-session-setup-retries "Max Number of Consecutive Session Setup Attempts"      unsigned                        read
}
privilege advanced
{
    request-timeout
    scan-queue-timeout
    session-setup-timeout
    session-teardown-timeout
    max-session-setup-retries
}
}

#####
//
// Table Name      : vscan_scanner_pool_status_db
// Description     : Storage (Db) for
//                  Vscan scanner-pool status.
//#####
table vscan_scanner_pool_status_db "Vscan Scanner Pool Status" { create replicated }
{
    fields
    {
        -vserver        "Vserver"                vserverid                key(1)
        scanner-pool     "Scanner Pool"            vscan_scanner_pool       key(2)
        scanner-policy   "Applied Policy"          vscan_scanner_policy     read(3)
        policy-type      "Applied Policy Type"      vscan_scanner_type       read(4)
        current-status   "Current Status"          OnOff                    read(5)
    }
}

#####
//
// Table Name      : vscan_scanner_pool_status
// Command         : None.
// Description     : Business-logic for
//                  Vscan scanner-pool status.
//#####
table vscan_scanner_pool_status "Vscan Scanner Pool Status" { create vserver-enabled }
{
    fields
    {
        -vserver        "Vserver"                vserverid                key
        scanner-pool     "Scanner Pool"            vscan_scanner_pool       key
        owner            "Scanner Pool Config Owner" vscan_config_owner       read
        scanner-policy   "Applied Policy"          vscan_scanner_policy     read
        policy-type      "Applied Policy Type"      vscan_scanner_type       read
        current-status   "Current Status"          OnOff                    read
    }
}

#####
//
// View Name       : vscan_scanner_pool_byname
// Command         : None.
// Description     : Accessor for Vscan Scanner Pool
//#####
view vscan_scanner_pool_byname "Vscan Scanner Pool" { inner create modify vserver-enabled }
{
    keys from
    {
        vserver_by_name    -vserver
        vscan_scanner_pool scanner-pool
    }

    keys for vscan_scanner_pool { create modify }
    {
        vserver_by_name    id
    }

    keys for vscan_scanner_pool_status { }
    {
        vserver_by_name    id
        vscan_scanner_pool scanner-pool
    }

    values
    {
        vscan_scanner_pool_status scanner-policy
        vscan_scanner_pool_status current-status
        vscan_scanner_pool        owner
        vscan_scanner_pool        servers
        vscan_scanner_pool        privileged-users
        vscan_scanner_pool        request-timeout
        vscan_scanner_pool        scan-queue-timeout
        vscan_scanner_pool        session-setup-timeout
        vscan_scanner_pool        session-teardown-timeout
        vscan_scanner_pool        max-session-setup-retries
    }
}
privilege advanced
{
    request-timeout
    scan-queue-timeout
    session-setup-timeout
    session-teardown-timeout
    max-session-setup-retries
}

extend_interface

methods

```

```

{
    method apply_policy "Apply scanner-policy to a scanner pool" {}
    {
        args
        {
            scanner-policy "Scanner Policy" vscan_scanner_policy in
        }

        command "vserver vscan scanner-pool apply-policy"
        {
            help "Apply scanner-policy to a scanner pool"
        }

        zephyr vscan-scanner-pool
        {
            category vscan
            api apply-policy "Apply scanner-policy to a scanner pool."
            {
                errors
                {
                    EINVALINPUTERROR
                    EINTERNALERROR
                    EOPNOTSUPPORTED
                    E_VSERVER_TYPE_NOT_SUPPORTED
                    EVSERVERNOTFOUND
                    E_SCANNER_POOL_NOT_FOUND
                    E_ONLY_SCANNER_POOL_ACTIVE
                }
                args
                {
                    scanner-pool {} {in}
                    scanner-policy {} {in}
                }
            }
        }
    }
}

command "vserver vscan scanner-pool"
{
    help_new "Create a scanner pool"
    help_modify "Modify a scanner pool"
    help_delete "Delete a scanner pool"
    help_show "Display scanner pools"
    show {} { vserver scanner-pool owner servers privileged-users scanner-policy
              scanner-pool servers privileged-users }
    {
        +      Scanner  Pool      Privileged  Scanner
        +Vserver Pool      Owner      Users      Policy
        +-----+-----+-----+-----+-----+
        %<<<<<<<<<< %<<<<<<< %<<<<<<<<<<<<<<< %<<<<<<<<<< %<<<<<<<<<
        ~~~~~~
    }
}

asup "T_VSCAN_SCANNER_POOL" { cluster-scope }
{
    vserver "Vserver" {hash}
    scanner-pool "ScannerPoolName" {hash}
    scanner-policy "ScannerPolicy" {hash}
    current-status "CurrentStatus" {noop}
    owner "ScannerPoolOwner" {hash}
    servers "Servers" {hash}
    privileged-users "PrivilegedUsers" {hash}
    request-timeout "RequestTimeout" {noop}
    scan-queue-timeout "ScanQueueTimeout" {noop}
    session-setup-timeout "SessionSetupTimeout" {noop}
    session-teardown-timeout "SessionTeardownTimeout" {noop}
    max-session-setup-retries "MaxSessionSetupRetry" {noop}
}

zephyr vscan-scanner-pool
{
    category vscan
    typedef vscan-scanner-pool-info "Vscan scanner pool information." {}
    {
        vserver {native}
        scanner-pool "Scanner pool is a set of attributes which are used to validate and manage connections between clustered Data ONTAP and Vscan se
        scanner-policy { }
        current-status=is-currently-active { }
        owner=admin-owner { }
        servers { }
        privileged-users { }
        request-timeout {native}
        scan-queue-timeout {native}
        session-setup-timeout {native}
        session-teardown-timeout {native}
        max-session-setup-retries { }
    }
}

apis
{
    get-iter "Returns list of scanner pools. Scanner pool is a set of attributes which are used to validate and manage connections between cluster
    {
        errors
        {
            EINVALINPUTERROR
            EINTERNALERROR
            EVSERVERNOTFOUND
            E_SCANNER_POOL_NOT_FOUND
        }
    }
    modify "Modify a scanner pool."
    {
        errors
        {
            EINVALINPUTERROR
            EINTERNALERROR
            EVSERVERNOTFOUND
            E_SCANNER_POOL_NOT_FOUND
            EAPIPRIVILEGE
        }
    }
}

```

```

    }
    create "Create a virus scanner pool, which is used for validating and managing connections between clustered Data ONTAP and Vscan servers."
    {
        errors
        {
            EINVALINPUTERROR
            INTERNALERROR
            EOPNOTSUPPORTED
            E_VSERVER_TYPE_NOT_SUPPORTED
            EVSERVERNOTFOUND
            E_SCANNER_POOL_EXISTS
            E_SCANNER_POOL_CANNOT_CREATE_MAX_LIMIT
        }
    }
    destroy=vscan-scanner-pool-delete "Delete a scanner pool."
    {
        errors
        {
            EINVALINPUTERROR
            INTERNALERROR
            EVSERVERNOTFOUND
            E_SCANNER_POOL_NOT_FOUND
            EAPIPRIVILEGE
            E_ONLY_SCANNER_POOL_ACTIVE
            ERESOURCEINUSE
        }
    }
}
}
descriptions {
    scanner-pool          { default "Name of the virus scanner pool." }
    scanner-policy        { default "Scanner policy. Currently only system policies are supported."
}

```

<p>Possible values:

```

<ul>
    <li> 'primary' - Makes it active always,
    <li> 'secondary' - Makes it active only when no primary Vscan server is connected,
    <li> 'idle' - Makes it inactive always
</ul>" }
    current-status        { default "Current status of a scanner pool." }
    owner                 { default "Owner of the scanner pool." }
    servers               { default "List of IP addresses of Vscan servers which are allowed to connect to clustered Data ONTAP." }
    privileged-users       { default "List of privileged users." }
    request-timeout        { default "Total request-service time-limit in seconds. The default value of 30 is taken if not provided while creating a scanner pool." }
    scan-queue-timeout     { default "Scan-queue wait-time-limit in seconds. The default value of 20 is taken if not provided while creating a scanner pool." }
    session-setup-timeout  { default "Total session-setup time-limit in seconds. The default value of 10 is taken if not provided while creating a scanner pool." }
    session-teardown-timeout { default "Total session-teardown time-limit in seconds. The default value of 10 is taken if not provided while creating a scanner pool." }
    max-session-setup-retries { default "Maximum number of consecutive session-setup attempts. The default value of 5 is taken if not provided while creating a scanner pool." }

    %table { default
        "This table contains Vscan scanner pool configuration information."
    }

    %entry { default
        "Entry for a single scanner pool configuration."
    }
}
}
}

#####
//
// View Name      : vscan_scanner_pool_server_byname
// Description    : Accessor for Vscan Scanner Pool Servers
//#####
view vscan_scanner_pool_servers_byname "Vscan Scanner Pool Servers" { inner vserver-enabled }
{
    keys from
    {
        vserver_by_name      -vserver
        vscan_scanner_pool    scanner-pool
    }

    keys for vscan_scanner_pool { }
    {
        vserver_by_name      id
    }

    values
    {
        vscan_scanner_pool    servers
    }

    extend_interface

    methods
    {
        method add "Add to the list of servers" {}
        {
            args
            {
                servers "List of IPs for Vscan Servers" list<IpAddress,BYTES,once> in
            }

            command "vserver vscan scanner-pool servers add"
            {
                help "Add to the list of servers"
            }
        }

        method remove "Remove from the list of servers" {}
        {
            args
            {
                servers "List of IPs for Vscan Servers" list<IpAddress,BYTES,once> in
            }

            command "vserver vscan scanner-pool servers remove"
            {
                help "Remove from the list of servers"
            }
        }
    }
}

```

[illegible]

```
// #####  
// View Name      : vscan_active_scanner_pool_byname  
// Description    : Accessor for Active Scanner Pool  
// #####  
view vscan_active_scanner_pool_byname "Vscan Scanner Pool Show-Active" { inner vsrver-enabled }  
  
keys from vsrver_by_name  
  
keys for vscan_active_scanner_pool { }  
{  
  vsrver_by_name          id  
}  
  
keys for vscan_status { }  
{  
  vsrver_by_name          id  
}  
  
values  
{  
  vscan_active_scanner_pool scanner-pools  
  vscan_active_scanner_pool servers  
  vscan_active_scanner_pool privileged-users  
  vscan_active_scanner_pool request-timeout  
  vscan_active_scanner_pool scan-queue-timeout  
  vscan_active_scanner_pool session-setup-timeout  
  vscan_active_scanner_pool session-teardown-timeout  
  vscan_active_scanner_pool max-session-setup-retries  
}  
  
privilege advanced  
{  
  request-timeout  
  scan-queue-timeout  
  session-setup-timeout  
  session-teardown-timeout  
  max-session-setup-retries  
}  
  
extend_interface  
  
command "vserver vscan scanner-pool show-active"  
{  
  collapse  
  help_show   "Display active scanner pools"  
  show {} { vserver scanner-pools servers privileged-users  
            scanner-pools servers privileged-users }  
  
  {  
+-----+-----+-----+-----+ Privileged  
+Vserver  Scanner Pools Servers        Users  
+-----+-----+-----+-----+  
%%<<<<< ><<<<<< %<<<<<<<<<<<<<< %<<<<<<<<<<<<  
~         ~<<<<<<< ~<<<<<<<<<<<<<< ~<<<<<<<<<<<<  
  }  
}  
  
asup "T_VSCAN_ACTIVE_SCANNER_POOL" { cluster-scope }  
{  
  vserver           "Vserver"              {hash}  
  scanner-pools     "ScannerPools"          {hash}  
  servers           "Servers"               {hash}  
  privileged-users   "PrivilegedUsers"       {hash}  
  request-timeout    "RequestTimeout"        {noop}  
  scan-queue-timeout "ScanQueueTimeout"      {noop}  
  session-setup-timeout "SessionSetupTimeout" {noop}  
  session-teardown-timeout "SessionTeardownTimeout" {noop}  
  max-session-setup-retries "MaxSessionSetupRetry" {noop}  
}  
  
zephyr vscan-active-scanner-pool  
{  
  category vscan  
  typedef vscan-active-scanner-pool-info "Vscan active scanner pool information." {}  
  {  
    vserver             {native}  
    scanner-pools       { }  
    servers             { }  
    privileged-users     { }  
    request-timeout      {native}  
    scan-queue-timeout   {native}  
    session-setup-timeout {native}  
    session-teardown-timeout {native}  
    max-session-setup-retries { }  
  }  
  apis  
  {  
    get-iter "Returns active scanner pool configuration of a vserver."  
    {  
      errors  
      {  
        EINVALINPUTERROR  
        EINTERNALERROR  
        EVSERVERNOTFOUND  
      }  
    }  
  }  
}  
descriptions {  
  scanner-pools { default "List of active scanner pools on a vserver." }  
  servers       { default "List of allowed Vscan servers IP for a vserver. A Vscan server is allowed to connect to the clustered Data ONTA  
  privileged-users { default "List of privileged users for a vserver. Vscan server is given privileged access to the clustered Data ONTA  
  request-timeout { default "Total request-service time-limit in seconds. This is set to the max of the request-timeouts of all active s  
  scan-queue-timeout { default "Scan-queue wait-time-limit in seconds. This is set to the max of the scan-queue-timeouts of all active sca  
  session-setup-timeout { default "Total session-setup time-limit in seconds. This is set to the max of the session-setup-timeouts of all act  
  session-teardown-timeout { default "Total session-teardown time-limit in seconds. This is set to the max of the session-teardown-timeouts of al  
  max-session-setup-retries { default "Maximum number of consecutive session-setup attempts. This is set to the max of max-session-setup-retries o  
%table { default  
  "This table contains active scanner pool information."
```

```

    }

    %entry { default
        "Entry for a single Vserver."
    }
}
}

#####
//
// Table Name      : vscan_version_map_db
// Command         : None.
// Description      : Replicated-storage for all known virus-scanner
//                   vendors & versions, their IDs for internal use and
//                   number of active connections available for each
//                   vserver. A version-ID shall be invalidated for a
//                   vserver in event of no connections to a vscan server
//                   of corresponding vendor & version being available
//#####
//TODO: After testing change the type to read for non-key fields.
table vscan_version_map_db "Vscan Version-Map DB" { create replicated }
{
    fields
    {
        -vserver          "Vserver"                vserverid      key(1)
        vendor             "Vscan Server Vendor"      text           key(2)
        version            "Vscan Server Version"      text           key(3)
        version-id         "Version-ID"               unsigned       write(4)
        connection-count   "Number of Connection"      unsigned       write(5)
        !no-connection-since "Time Since No Connection" DateAndTime    write(6)
    }
}

#####
//
// Table Name      : vscan_version_map_ref
// Description      : Manual table for allocating, deallocating
//                   version-mapping entries, and managing connection-
//                   count for each version-map entry.
//#####
action vscan_add_version_map_ref "Vscan Add Version-Map-Ref" { postkmmod normal ksmf-client }
{
    fields
    {
        vserver          "Vserver"                vserverid      key[1]
        vendor            "Vscan Server Vendor"      text           write[2]
        version           "Vscan Server Version"      text           write[3]
    }
    dist_keys from mgwd_process
}

#####
//
// Table Name      : vscan_version_map_ref
// Description      : Manual table for decreasing the connection-count
//                   and deleting the version without any active
//                   connections.
//#####
action vscan_dec_version_map_ref "Vscan Dec Version-Map-Ref" { postkmmod normal ksmf-client }
{
    fields
    {
        vserver          "Vserver"                vserverid      key[1]
        vendor            "Vscan Server Vendor"      text           write[2]
        version           "Vscan Server Version"      text           write[3]
        server-type       "Server Type"             vscan_scanner_type write[4]
        previous-server-status "Previous Server Status" vscan_server_status write[5]
        current-server-status "Current Server Status" vscan_server_status write[6]
    }
    dist_keys from mgwd_process
}

#####
//
// Table Name      : vscan_reset
// Description      : Action table for exposing "vscan reset" command
//#####
action vscan_reset "Vscan Reset" { vserver-enabled }
{
    fields
    {
        -vserver          "Vserver"                vserver_name    key
    }

    command "vserver vscan reset"
    {
        help "Discard cached scan information"
    }

    zephyr vscan
    {
        category vscan
        api reset "Discard cached information of files that have been successfully scanned."
        {
            errors
            {
                EINTERNALERROR
                EOPNOTSUPPORTED
                E_VSERVER_TYPE_NOT_SUPPORTED
                EVSERVERNOTFOUND
            }
            args
            { }
        }
    }
}
}

```

```

#####
//
// Table Name   : vscan_connection_summary
// Description  : Business-logic for
//               accessing basic info about connection status
//#####
table vscan_connection_summary "Vscan Connection-Status" { vserver-enabled }
{
    fields
    {
        -node                "Node Name"                filename                key
        -vserver              "Vserver"                  vserverid              key
        connection-count      "Number of Connected Vscan Servers Serving the Vserver" unsigned              read
        !servers               "List of Connected Vscan Servers" list<IpAddress,BYTES,once> read
    }
}

#####
//
// Table Name   : vscan_connection_status_connected
// Description  : Business-logic for
//               accessing status only for connected servers
//#####
table vscan_connection_status_connected "Vscan Connection-Status Connected" { vserver-enabled }
{
    fields
    {
        -node                "Node Name"                filename                key
        -vserver              "Vserver"                  vserverid              key
        server                "Server"                  IpAddress              key
        server-type           "Server Type"              vscan_scanner_type     read
        !vendor               "Vscan Server Vendor"       text                   read
        !version              "Vscan Server Version"      text                   read
        !privileged-user      "Privileged User Used for Connection" text                   read
        !connected-since      "Time When Vscan Server Was Connected" DateTime              read
    }
}

#####
//
// Table Name   : vscan_connection_status_not_connected
// Description  : Business-logic for
//               accessing status only for connections which are ready
//               to accept connections but are not yet connected
//#####
table vscan_connection_status_not_connected "Vscan Connection-Status Not-Connected" { vserver-enabled }
{
    fields
    {
        -node                "Node Name"                filename                key
        -vserver              "Vserver"                  vserverid              key
        server                "Server"                  IpAddress              key
        !server-status        "Server Status"            vscan_server_status    read
        server-type           "Server Type"              vscan_scanner_type     read
        !disconnect-reason    "Server Disconnect Reason" vscan_disconnect_reason read
        !disconnected-since   "Time When Vscan Server Was Disconnected" DateTime              read
    }
}

#####
//
// Table Name   : vscan_connection_status_all
// Description  : Business-logic for
//               accessing status only for connected servers
//#####
table vscan_connection_status_all "Vscan Connection-Status All" { vserver-enabled }
{
    fields
    {
        -node                "Node Name"                filename                key
        -vserver              "Vserver"                  vserverid              key
        server                "Server"                  IpAddress              key
        !server-status        "Server Status"            vscan_server_status    read
        server-type           "Server Type"              vscan_scanner_type     read
        !vendor               "Vscanner Vendor"          text                   read
        !version              "Vscanner Version"          text                   read
        !privileged-user      "Privileged User Used for Connection" text                   read
        !connected-since      "Time When Vscanner Was Connected" DateTime              read
        !disconnect-reason    "Server Disconnect Reason" vscan_disconnect_reason read
        !disconnected-since   "Time When Vscanner Was Disconnected" DateTime              read
        !extended-stats       "Extended-statistics from Vscanner" list<text,BYTES>       read
    }
}

#####
//
// View Name    : vscan_connection_status_summary_byname
// Description  : Accessor for Vscan Scanner Pool Connection-Status Summary
//#####
view vscan_connection_status_summary_byname "Vscan Connection-Status Show" { inner vserver-enabled }
{
    keys from
    {
        mgwd_byname          node[1]
        vserver_by_name      -vserver[2]
    }
    dist_keys from mgwd_byname

    keys for vscan_connection_summary { }
    {
        mgwd_byname          node
        vserver_by_name      id
    }

    values

```

[illegible]

```
//#####  
view vscan_connection_extended_stats_byname "Vscan Connection Extended-Stats" { inner vsrver-enabled diagnostic }  
  
keys from  
{  
    mgwd_byname                node[1]  
    vsrver_by_name              -vsrver[2]  
    vscan_connection_status_all server[3]  
}  
dist_keys from mgwd_byname  
  
keys for vscan_connection_status_all { }  
{  
    mgwd_byname            node  
    vsrver_by_name         id  
}  
  
values  
{  
    vscan_connection_status_all     server-status[4]  
    vscan_connection_status_all     server-type[5]  
    vscan_connection_status_all     vendor[6]  
    vscan_connection_status_all     version[7]  
    vscan_connection_status_all     extended-stats[9]  
}  
  
extend_interface  
  
command "vserver vscan connection-status show-extended-stats"  
{  
    collapse  
    help_show      "Display Vscan servers' extended statistics"  
    show {} { vserver node server server-status extended-stats  
               node server                        extended-stats }  
  
    {  
        +  
        +Vserver      Node          Server          Connection  
        +-----+-----+-----+-----+-----+  
        %<<<<<<<< <<<<<<<<<<<< %<<<<<<<<< %<<<<<<<<< %<<<<<<<<<<<<  
        ~~~~~~  
        ~<<<<<<<<<<< ~<<<<<<<<<<< ~<<<<<<<<<< ~<<<<<<<<<<<<  
    }  
}  
  
asup "T_VSCAN_CONNECTION_EXTENDED_STATS" { node-scope localize node }  
{  
    node           "Node"             {hash}  
    vsrver         "Vserver"           {hash}  
    server         "Server"            {hash}  
    server-status  "ServerStatus"       {noop}  
    server-type    "ServerType"         {noop}  
    vendor         "VscanServerVendor"  {noop}  
    version        "VscanServerVersion" {noop}  
    extended-stats "ExtendedStatistics" {noop}  
}  
  
zephyr vscan-connection-extended-stats  
{  
    category vscan  
    typedef vscan-connection-extended-stats-info "Vscan connection extended statistics." { }  
    {  
        node           { }  
        vsrver         {native}  
        server         { }  
        server-status   { }  
        server-type     { }  
        vendor          { }  
        version         { }  
        extended-stats  { }  
    }  
    apis  
    {  
        get-iter "Returns connection status."  
        {  
            errors  
            {  
                EINVALIDINPERROR  
                EINTERNALERROR  
                EVSERVERNOTFOUND  
                ENODENOTFOUND  
                E_SCANNER_POOL_NOT_FOUND  
            }  
        }  
    }  
}  
  
descriptions {  
    node           { default "Cluster node to which this connection is applicable." }  
    server         { default "IP of the Vscan server." }  
    server-status  { default "Status of the connection." }  
    server-type    { default "Server type." }  
    vendor         { default "Name of virus-scanner vendor." }  
    version        { default "Version of virus-scanner." }  
    extended-stats { default "Vscanner's extended statistics." }  
  
    %table { default  
        "This table contains connection's extended statistics."  
    }  
  
    %entry { default  
        "Entry for a single instance of connection."  
    }  
}  
}  
  
//#####  
//  
// View Name : vscan_connection_status_not_connected_byname  
// Description : Accessor for Vscan Connection-Status  
//              For Ready to Acceprt Connections but Not Yet Connected  
//              Servers  
//#####
```

```
view vscan_connection_status_not_connected_byname "Vscan Connection-Status Show-Not-Connected" { inner vserver-enabled }
{
    keys from
    {
        mgwd_byname                node[1]
        vserver_by_name            -vserver[2]
        vscan_connection_status_not_connected    server[3]
    }
    dist_keys from mgwd_byname

    keys for vscan_connection_status_not_connected { }
    {
        mgwd_byname                node
        vserver_by_name            id
    }

    values
    {
        vscan_connection_status_not_connected server-status[4]
        vscan_connection_status_not_connected disconnect-reason[5]
        vscan_connection_status_not_connected disconnected-since[6]
        vscan_connection_status_not_connected server-type[7]
    }

    extend_interface

    command "vserver vscan connection-status show-not-connected"
    {
        collapse
        help_show "Display connection status of Vscan servers which are allowed to connect but not yet connected"
        show {} { vserver node server server-status disconnect-reason
                    node server disconnect-reason }

        {
            +
            +Vserver      Node      Server      Connection      Disconnect
            +-----+-----+-----+-----+-----+
            %<<<<<<<<<<<< %<<<<<<<<<<<< %<<<<<<<<<<<< %<<<<<<<<<<<< %<<<<<<<<<<<<
            ~              ~<<<<<<<<<<<< ~<<<<<<<<<<<< ~<<<<<<<<<<<<
        }
    }

    descriptions {
        node          { default "Cluster node to which this connection is applicable." }
        server         { default "IP of the Vscan server." }
        server-status  { default "Status of the connection." }
        server-type    { default "Server type." }
        disconnect-reason { default "Reason for disconnection." }
        disconnected-since { default "Time when Vscan server was disconnected." }

        %table { default
            "This table contains connection status of Vscan servers which are allowed to connect but not yet connected."
        }

        %entry { default
            "Entry for a single instance of connection."
        }
    }
}

#####
//
// View Name      : vscan_connection_status_all_byname
// Description    : Accessor for Vscan Scanner Pool Connection-Status
//                  for show-advanced
//#####
view vscan_connection_status_all_byname "Vscan Connection-Status Show-All" { inner vserver-enabled }
{
    keys from
    {
        mgwd_byname                node[1]
        vserver_by_name            -vserver[2]
        vscan_connection_status_all    server[3]
    }
    dist_keys from mgwd_byname

    keys for vscan_connection_status_all { }
    {
        mgwd_byname                node
        vserver_by_name            id
    }

    values
    {
        vscan_connection_status_all    server-status[4]
        vscan_connection_status_all    server-type[5]
        vscan_connection_status_all    vendor[6]
        vscan_connection_status_all    version[7]
        vscan_connection_status_all    disconnect-reason[8]
        vscan_connection_status_all    disconnected-since[9]
        vscan_connection_status_all    privileged-user[10]
        vscan_connection_status_all    connected-since[11]
    }

    extend_interface

    command "vserver vscan connection-status show-all"
    {
        collapse
        help_show "Display Vscan servers connection status"
        show {} { vserver node server server-status disconnect-reason
                    node server disconnect-reason }

        {
            +
            +Vserver      Node      Server      Connection      Disconnect Reason
            +-----+-----+-----+-----+-----+
            %<<<<<<<<<<<< %<<<<<<<<<<<< %<<<<<<<<<<<< %<<<<<<<<<<<< %<<<<<<<<<<<<
            ~              ~<<<<<<<<<<<< ~<<<<<<<<<<<< ~<<<<<<<<<<<<
        }
    }
}
```

```

asup "T_VSCAN_CONNECTION_STATUS_ALL" { node-scope localize node }
{
    node                "Node"                {hash}
    vserver              "Vserver"              {hash}
    server               "Server"               {hash}
    server-status        "ServerStatus"         {noop}
    server-type          "ServerType"           {noop}
    disconnect-reason    "DisconnectionReason"  {noop}
    disconnected-since     "DisconnectedSince"     {noop}
    vendor               "VscanServerVendor"    {noop}
    version              "VscanServerVersion"   {noop}
    privileged-user      "PrivilegedUser"       {hash}
    connected-since      "ConnectedSince"       {noop}
}

zephyr vscan-connection-status-all
{
    category vscan
    typedef vscan-connection-status-all-info "Vscan connection status information." { }
    {
        node                { }
        vserver              {native}
        server               { }
        server-status        { }
        server-type          { }
        disconnect-reason    { }
        disconnected-since     { }
        vendor               { }
        version              { }
        privileged-user      { }
        connected-since      { }
    }
    apis
    {
        get-iter "Returns connection status."
        {
            errors
            {
                EINVALIDINPUTERROR
                EINTERNALERROR
                EVSERVERNOTFOUND
                ENODENOTFOUND
                E_SCANNER_POOL_NOT_FOUND
            }
        }
    }
}

descriptions {
    node                { default "Cluster node to which this connection is applicable." }
    server              { default "IP of the Vscan server." }
    server-status        { default "Status of the connection." }
    server-type          { default "Server type." }
    disconnect-reason    { default "Reason for disconnection." }
    disconnected-since     { default "Time when Vscan server was disconnected." }
    vendor              { default "Name of virus-scanner vendor." }
    version              { default "Version of virus-scanner." }
    privileged-user      { default "Privileged user, which is used for the connection between clustered Data ONTAP and the Vscan server." }
    connected-since      { default "Time when Vscan server was connected." }

    %table { default
        "This table contains connection status."
    }

    %entry { default
        "Entry for a single instance of connection."
    }
}
}

```

Multitenancy considerations

All Offbox-Vscan configuration is vserverized. Thus, multi-tenancy requirements are implicitly met.

User Interfaces

7mode Vscan UI compatibility is **not** a requirement for clustered ONTAP vscan . The subsequent UI section will mention ONLY clustered ONTAP CLIs.

Command Line Interface

This section defines all the commands for the Vscan feature in clustered ONTAP, as well as the SMF tables those will implement them.

Command Specification

All Vscan commands are rooted to the vserver directory.
The commands are grouped in the following sub-directories:

- vserver vscan : top level Vscan directory; enable/disable the feature for a vserver
- vserver vscan on-access-policy : Manage Vscan on-access-policies
- vserver vscan scanner-pool : Manage Vscan scanner pool
- vserver vscan scanner-pool privileged-users : Manage list of privileged-users of a scanner pool
- vserver vscan scanner-pool servers : Manage list of servers of a scanner pool
- vserver vscan connection-status : Display connection-status of external vscanners

Other than these, a new attribute "vscan-fileop-profile" is added to the vserver cifs share.

vscan

Syntax

```
jrajesh-SN-2::> vscan ?
(vserver vscan)
connection-status>      Display connection status of Vscan servers
disable                  Disable Vscan on a Vserver
enable                   Enable Vscan on a Vserver
on-access-policy>       Manage Vscan On-Access policies
reset                    Discard cached scan information
scanner-pool>           Manage Vscan scanner pools
show                     Display Vscan status

jrajesh-SN-2::> vscan enable ?
(vserver vscan enable)
[-vserver] <vserver name>  Vserver

jrajesh-SN-2::> vscan disable ?
(vserver vscan disable)
[-vserver] <vserver name>  Vserver

jrajesh-SN-2::> vscan reset ?
(vserver vscan reset)
[-vserver] <vserver name>  Vserver

jrajesh-SN-2::> vscan show ?
(vserver vscan show)
[ -instance | -fields <fieldname>, ... ]
[[-vserver] <vserver name>]  Vserver
[ -vscan-status {on|off} ]   Vscan Status

jrajesh-SN-2::> vscan show -instance ?
(vserver vscan show)
[[-vserver] <vserver name>]  Vserver
[ -vscan-status {on|off} ]   Vscan Status
```

Description

The "vserver vscan" is the root level directory for the Vscan feature in clustered ONTAP. It provides access to other command directories to configure and enable/disable policy and scanner pools. It also provides commands to display the connection-status of the vscanners.

Command Options

- **-vserver** refers to the vserver on which the scanning is enabled/disabled. On a secure multi-tenant environment, -vserver will implicitly point to the vserver on which vserver admin is working on. This attribute defines the scope of scanning.
- **-vscan-status** specifies whether scanning is on or off on the vserver.

Error Handling

Following errors conditions is handled :

1. vserver, on which scanning is being enabled/disabled, is not present.

Privileges Required

The admin (vserver/cluster) privilege is required for all commands.

Examples

```
jrajesh-SN-2::> vscan enable -vserver vserver_2
(vserver vscan enable)

jrajesh-SN-2::> vscan show
(vserver vscan show)
Vserver      Vscan Status
-----
vserver_1    on
vserver_2    on
2 entries were displayed.

jrajesh-SN-2::>
jrajesh-SN-2::> vscan disable -vserver vserver_1
(vserver vscan disable)

jrajesh-SN-2::> vscan show
(vserver vscan show)
Vserver      Vscan Status
-----
vserver_1    off
vserver_2    on
2 entries were displayed.

jrajesh-SN-2::> vscan reset -vserver vserver_1
(vserver vscan reset)

Warning: Running this command can cause performance degradation because files are scanned again when they are accessed.
Do you want to continue? {y/n}: y
```

Files

This command doesn't read/write to any administrative files.

See Also

N/A

vscan on-access-policy

Syntax

```
rajesh-SN-2::> vscan on-access-policy ?
(vserver vscan on-access-policy)
create          Create an On-Access policy
delete          Delete an On-Access policy
disable         Disable an On-Access policy
enable          Enable an On-Access policy
modify          Modify an On-Access policy
show            Display On-Access policies

rajesh-SN-2::> vscan on-access-policy create ?
(vserver vscan on-access-policy create)
-vserver <vserver name>          Vserver
[-policy-name] <policy name>    Policy
[[-protocol] <CIFS>]            File-Access Protocol (default: CIFS)
[[-filters] {scan-mandatory|scan-ro-volume|scan-execute-access}, ...] Filters (default: scan-mandatory)
[-max-file-size <integer>[KB|MB|GB|TB|PB]] Max File Size Allowed for Scanning (default: 2GB)
[-paths-to-exclude <file path>, ... ] File-Paths Not to Scan
[-file-ext-to-exclude <file extension>, ... ] File-Extensions Not to Scan

rajesh-SN-2::> vscan on-access-policy modify ?
(vserver vscan on-access-policy modify)
-vserver <vserver name>          Vserver
[-policy-name] <policy name>    Policy
[-filters {scan-mandatory|scan-ro-volume|scan-execute-access}, ... ] Filters
[-max-file-size <integer>[KB|MB|GB|TB|PB]] Max File Size Allowed for Scanning
[-paths-to-exclude <file path>, ... ] File-Paths Not to Scan
[-file-ext-to-exclude <file extension>, ... ] File-Extensions Not to Scan

rajesh-SN-2::> vscan on-access-policy show ?
(vserver vscan on-access-policy show)
[-instance | -fields <fieldname>, ... ]
[-vserver <vserver name> ]          Vserver
[[-policy-name] <policy name>]      Policy
[-policy-status {on|off} ]          Policy Status
[-owner <Configuration owner> ]     Policy Config Owner
[-protocol <CIFS> ]                  File-Access Protocol
[-filters {scan-mandatory|scan-ro-volume|scan-execute-access}, ... ] Filters
[-max-file-size <integer>[KB|MB|GB|TB|PB]] Max File Size Allowed for Scanning
[-paths-to-exclude <file path>, ... ] File-Paths Not to Scan
[-file-ext-to-exclude <file extension>, ... ] File-Extensions Not to Scan

rajesh-SN-2::> vscan on-access-policy delete ?
(vserver vscan on-access-policy delete)
-vserver <vserver name>          Vserver
[-policy-name] <policy name>    Policy

rajesh-SN-2::> vscan on-access-policy enable ?
(vserver vscan on-access-policy enable)
-vserver <vserver name>          Vserver
[-policy-name] <policy name>    Policy

rajesh-SN-2::> vscan on-access-policy disable ?
(vserver vscan on-access-policy disable)
-vserver <vserver name>          Vserver
[-policy-name] <policy name>    Policy
```

Description

The 'vscan on-access-policy' commands are used to manage On-Access policy. The commands in this directory are for creating new scanner pool and displaying/modifying/deleting/enabling/disabling existing scanner pools. Just creating a policy does not affect the vscan, it has to be enabled before it is used. Only one policy of a particular protocol can be enabled for a vserver at one time.

Command Options

- **-vserver** refers to the vserver on which policy is created. On a secure multi-tenant environment, -vserver will implicitly point to the vserver on which vserver admin is working on. This attribute defines the scope of the policy.
- **-policy-name** refers to the name of the policy.
- **-protocols** refers to the available protocols to be scanned.
- **-policy-status** specifies whether the policy is active or not.
- **-owner** specifies whether the cluster or vserver admin has created the policy. Only the owner is allowed to modify or delete the policy. However, cluster policies can be enabled for a vserver.
- **-filters** refers to the available filters, like "mandatory scan", "RO volume scan" etc.
- **-paths-to-exclude** is used to exclude a list of paths NOT to scan. With this option, administrator can provide a list of paths separated by comma.
- **-file-ext-to-exclude** is used to exclude a list of file-extensions NOT to scan. With this option, administrator can provide a list of file-extensions separated by comma. This can also contain regular expression such as "?" and "*".
- **-max-file-size** refers to maximum file-size which is considered for scanning.

Error Handling

The following errors will be handled :-

- When mandatory options are not mentioned, errors will be reported.
- When valid types (e.g. specifying alphabets for integer type) are not provided for command options, errors will be reported.

- When input doesn't fall under predefined range for a given option, error will be reported.
- When wrong combination is provided errors will be thrown.

Privileges Required

The admin(vserver/cluster) privilege is required for all commands.

Examples

```
jrajesh-SN-2::vserver vscan on-access-policy> show
Vserver      Policy      Policy      Owner      Protocol Paths Excluded      File-Ext      Policy
Name                                     Status
-----
jrajesh-SN-2      default_    cluster    CIFS      -          -          off
CIFS
vserver_1      default_    cluster    CIFS      -          -          off
CIFS
vserver_1      new         vserver    CIFS      \vol1\tmp\,  mp3        off
                  \vol2\abc
vserver_2      default_    cluster    CIFS      -          -          off
CIFS
4 entries were displayed.

jrajesh-SN-2::vserver vscan on-access-policy> show -instance

Vserver: jrajesh-SN-2
Policy: default_CIFS
Policy Status: off
Policy Config Owner: cluster
File-Access Protocol: CIFS
Filters: scan-mandatory
Max File Size Allowed for Scanning: 2GB
File-Paths Not to Scan: -
File-Extensions Not to Scan: -

Vserver: vserver_1
Policy: default_CIFS
Policy Status: off
Policy Config Owner: cluster
File-Access Protocol: CIFS
Filters: scan-mandatory
Max File Size Allowed for Scanning: 2GB
File-Paths Not to Scan: -
File-Extensions Not to Scan: -

Vserver: vserver_1
Policy: new
Policy Status: off
Policy Config Owner: vserver
File-Access Protocol: CIFS
Filters: scan-ro-volume
Max File Size Allowed for Scanning: 5GB
File-Paths Not to Scan: \vol1\tmp\, \vol2\abc
File-Extensions Not to Scan: mp3

Vserver: vserver_2
Policy: default_CIFS
Policy Status: off
Policy Config Owner: cluster
File-Access Protocol: CIFS
Filters: scan-mandatory
Max File Size Allowed for Scanning: 2GB
File-Paths Not to Scan: -
File-Extensions Not to Scan: -
4 entries were displayed.

jrajesh-SN-2::vserver vscan on-access-policy> create -vserver vserver_1 -policy-name test -protocol CIFS -filters scan-execute-access -paths-to-exclude \
jrajesh-SN-2::vserver vscan on-access-policy> show -instance -vserver vserver_1 -policy-name test

Vserver: vserver_1
Policy: test
Policy Status: off
Policy Config Owner: vserver
File-Access Protocol: CIFS
Filters: scan-execute-access
Max File Size Allowed for Scanning: 10GB
File-Paths Not to Scan: \vol2\
File-Extensions Not to Scan: txt

jrajesh-SN-2::vserver vscan on-access-policy> modify -vserver vserver_1 -policy-name test -filters scan-ro-volume -paths-to-exclude "" -file-ext-to-exclud
jrajesh-SN-2::vserver vscan on-access-policy> show -instance -vserver vserver_1 -policy-name test

Vserver: vserver_1
Policy: test
Policy Status: off
Policy Config Owner: vserver
File-Access Protocol: CIFS
Filters: scan-ro-volume
Max File Size Allowed for Scanning: 10GB
File-Paths Not to Scan: -
File-Extensions Not to Scan: mp*

jrajesh-SN-2::vserver vscan on-access-policy> enable -vserver vserver_1 -policy-name test
jrajesh-SN-2::vserver vscan on-access-policy> show -instance -vserver vserver_1 -policy-name test

Vserver: vserver_1
Policy: test
Policy Status: on
Policy Config Owner: vserver
File-Access Protocol: CIFS
Filters: scan-ro-volume
Max File Size Allowed for Scanning: 10GB
File-Paths Not to Scan: -
```

```

File-Extensions Not to Scan: mp*
jrajesh-SN-2::vserver vscan on-access-policy> enable -vserver vserver_1 -policy-name new
Error: command failed: Cannot enable policy. Reason: Another policy ("test") for the "CIFS" protocol is currently enabled. Disable the policy and try the
jrajesh-SN-2::vserver vscan on-access-policy> disable -vserver vserver_1 -policy-name test
jrajesh-SN-2::vserver vscan on-access-policy> show -instance -vserver vserver_1 -policy-name test

Vserver: vserver_1
Policy: test
Policy Status: off
Policy Config Owner: vserver
File-Access Protocol: CIFS
Filters: scan-ro-volume
Max File Size Allowed for Scanning: 10GB
File-Paths Not to Scan: -
File-Extensions Not to Scan: mp*
jrajesh-SN-2::vserver vscan on-access-policy> delete -vserver vserver_1 -policy-name test

```

Files

This command doesn't read/write to any administrative files.

See Also

N/A

vscan scanner-pool

Syntax

```

jrajesh-SN-2::> vscan scanner-pool ?
(vserver vscan scanner-pool)
apply-policy      Apply scanner-policy to a scanner pool
create            Create a scanner pool
delete            Delete a scanner pool
modify            Modify a scanner pool
privileged-users> Manage list of privileged users of a scanner pool
servers>          Manage list of servers of a scanner pool
show              Display scanner pools
show-active       Display active scanner pools

jrajesh-SN-2::> vscan scanner-pool create ?
(vserver vscan scanner-pool create)
-vserver <vserver name>          Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[-servers] <IpAddress>, ...      List of IPs of Allowed Vscan Servers
[-privileged-users] <Privileged user>, ... List of Privileged Users

jrajesh-SN-2::> vscan scanner-pool modify ?
(vserver vscan scanner-pool modify)
-vserver <vserver name>          Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[-servers <IpAddress>, ... ]     List of IPs of Allowed Vscan Servers
[-privileged-users <Privileged user>, ... ] List of Privileged Users

jrajesh-SN-2::> vscan scanner-pool delete ?
(vserver vscan scanner-pool delete)
-vserver <vserver name>          Vserver
[-scanner-pool] <scanner pool>   Scanner Pool

jrajesh-SN-2::> vscan scanner-pool en
Error: "en" is not a recognized command
jrajesh-SN-2::> vscan scanner-pool apply-policy ?
(vserver vscan scanner-pool apply-policy)
-vserver <vserver name>          Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[-scanner-policy] <vscan scanner policy> Scanner Policy

jrajesh-SN-2::> vscan scanner-pool show ?
(vserver vscan scanner-pool show)
[-instance | -fields <fieldname>, ... ]
[ -vserver <vserver name> ]          Vserver
[[-scanner-pool] <scanner pool>]     Scanner Pool
[ -scanner-policy <vscan scanner policy> ] Applied Policy
[ -current-status {on|off} ]         Current Status
[ -owner <Configuration owner> ]     Scanner Pool Config Owner
[ -servers <IpAddress>, ... ]         List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] List of Privileged Users

jrajesh-SN-2::> vscan scanner-pool show -instance ?
(vserver vscan scanner-pool show)
[ -vserver <vserver name> ]          Vserver
[[-scanner-pool] <scanner pool>]     Scanner Pool
[ -scanner-policy <vscan scanner policy> ] Applied Policy
[ -current-status {on|off} ]         Current Status
[ -owner <Configuration owner> ]     Scanner Pool Config Owner
[ -servers <IpAddress>, ... ]         List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] List of Privileged Users

jrajesh-SN-2::> vscan scanner-pool show-active ?
(vserver vscan scanner-pool show-active)
[-instance | -fields <fieldname>, ... ]
[[-vserver] <vserver name>]          Vserver
[ -scanner-pools <scanner pool>, ... ] List of Enabled Scanner Pools
[ -servers <IpAddress>, ... ]         Merged List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] Merged List of Privileged Users

```

```

rajesh-SN-2::> vscan scanner-pool show-active -instance ?
(vserver vscan scanner-pool show-active)
[[-vserver] <vserver name>]           Vserver
[ -scanner-pools <scanner pool>, ... ] List of Enabled Scanner Pools
[ -servers <IpAddress>, ... ]         Merged List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] Merged List of Privileged Users

rajesh-SN-2::> set advanced

Warning: These advanced commands are potentially dangerous; use them only when directed to do so by NetApp personnel.
Do you want to continue? {y/n}: y

rajesh-SN-2::~*> vscan scanner-pool ?
(vserver vscan scanner-pool)
apply-policy      Apply scanner-policy to a scanner pool
create            Create a scanner pool
delete            Delete a scanner pool
modify            Modify a scanner pool
privileged-users> Manage list of privileged users of a scanner pool
servers>          Manage list of servers of a scanner pool
show              Display scanner pools
show-active       Display active scanner pools

rajesh-SN-2::~*> vscan scanner-pool create ?
(vserver vscan scanner-pool create)
-vserver <vserver name>           Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[-servers] <IpAddress>, ...       List of IPs of Allowed Vscan Servers
[-privileged-users] <Privileged user>, ... List of Privileged Users
[[-request-timeout] <[<integer>h][<integer>m][<integer>s]>] *Request Service Timeout (default: 30s)
[ -scan-queue-timeout <[<integer>h][<integer>m][<integer>s]> ] *Scan Queue Timeout (default: 20s)
[ -session-setup-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Setup Timeout (default: 10s)
[ -session-teardown-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Teardown Timeout (default: 10s)
[ -max-session-setup-retries <integer> ] *Max Number of Consecutive Session Setup Attempts (default: 5)

rajesh-SN-2::~*> vscan scanner-pool modify ?
(vserver vscan scanner-pool modify)
-vserver <vserver name>           Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[ -servers <IpAddress>, ... ]     List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] List of Privileged Users
[ -request-timeout <[<integer>h][<integer>m][<integer>s]> ] *Request Service Timeout
[ -scan-queue-timeout <[<integer>h][<integer>m][<integer>s]> ] *Scan Queue Timeout
[ -session-setup-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Setup Timeout
[ -session-teardown-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Teardown Timeout
[ -max-session-setup-retries <integer> ] *Max Number of Consecutive Session Setup Attempts

rajesh-SN-2::~*> vscan scanner-pool delete ?
(vserver vscan scanner-pool delete)
-vserver <vserver name>           Vserver
[-scanner-pool] <scanner pool>   Scanner Pool

rajesh-SN-2::~*> vscan scanner-pool show ?
(vserver vscan scanner-pool show)
[ -instance | -fields <fieldname>, ... ]
[-vserver <vserver name> ]           Vserver
[[-scanner-pool] <scanner pool>]     Scanner Pool
[ -scanner-policy <vscan scanner policy> ] Applied Policy
[ -current-status {on|off} ]         Current Status
[ -owner <Configuration owner> ]     Scanner Pool Config Owner
[ -servers <IpAddress>, ... ]         List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] List of Privileged Users
[ -request-timeout <[<integer>h][<integer>m][<integer>s]> ] *Request Service Timeout
[ -scan-queue-timeout <[<integer>h][<integer>m][<integer>s]> ] *Scan Queue Timeout
[ -session-setup-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Setup Timeout
[ -session-teardown-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Teardown Timeout
[ -max-session-setup-retries <integer> ] *Max Number of Consecutive Session Setup Attempts

rajesh-SN-2::~*> vscan scanner-pool show -instance ?
(vserver vscan scanner-pool show)
[ -vserver <vserver name> ]           Vserver
[[-scanner-pool] <scanner pool>]     Scanner Pool
[ -scanner-policy <vscan scanner policy> ] Applied Policy
[ -current-status {on|off} ]         Current Status
[ -owner <Configuration owner> ]     Scanner Pool Config Owner
[ -servers <IpAddress>, ... ]         List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] List of Privileged Users
[ -request-timeout <[<integer>h][<integer>m][<integer>s]> ] *Request Service Timeout
[ -scan-queue-timeout <[<integer>h][<integer>m][<integer>s]> ] *Scan Queue Timeout
[ -session-setup-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Setup Timeout
[ -session-teardown-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Teardown Timeout
[ -max-session-setup-retries <integer> ] *Max Number of Consecutive Session Setup Attempts

rajesh-SN-2::~*> vscan scanner-pool show-active ?
(vserver vscan scanner-pool show-active)
[ -instance | -fields <fieldname>, ... ]
[[-vserver] <vserver name>]           Vserver
[ -scanner-pools <scanner pool>, ... ] List of Enabled Scanner Pools
[ -servers <IpAddress>, ... ]         Merged List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] Merged List of Privileged Users
[ -request-timeout <[<integer>h][<integer>m][<integer>s]> ] *Request Service Timeout
[ -scan-queue-timeout <[<integer>h][<integer>m][<integer>s]> ] *Scan Queue Timeout
[ -session-setup-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Setup Timeout
[ -session-teardown-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Teardown Timeout
[ -max-session-setup-retries <integer> ] *Max Number of Consecutive Session Setup Attempts

rajesh-SN-2::~*> vscan scanner-pool show-active -instance ?
(vserver vscan scanner-pool show-active)
[[-vserver] <vserver name>]           Vserver
[ -scanner-pools <scanner pool>, ... ] List of Enabled Scanner Pools
[ -servers <IpAddress>, ... ]         Merged List of IPs of Allowed Vscan Servers
[ -privileged-users <Privileged user>, ... ] Merged List of Privileged Users
[ -request-timeout <[<integer>h][<integer>m][<integer>s]> ] *Request Service Timeout
[ -scan-queue-timeout <[<integer>h][<integer>m][<integer>s]> ] *Scan Queue Timeout
[ -session-setup-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Setup Timeout
[ -session-teardown-timeout <[<integer>h][<integer>m][<integer>s]> ] *Session Teardown Timeout
[ -max-session-setup-retries <integer> ] *Max Number of Consecutive Session Setup Attempts

```

Description

The 'vscan scanner-pool' commands are used to manage configuration to control external vscanner connection to clustered-ONTAP. A scanner pool contains fields which are either allowed set of vscanner and their authentication parameters or various timeouts for scan-notifications, responses (available in advanced mode). The commands in this directory are for creating new scanner pool and displaying/modifying/deleting/enabling/disabling existing scanner pools. After creating a scanner pool, one of the scanner policies must be applied to it to specify when it gets activated. The default scanner policy is "idle", which means it is never aactive.

Configuration of all active scanner pools on a Vserver is merged to make a aggregated set which can be displayed using "show-active" command.

Command Options

- **-vserver** refers to the name of the vserver for which scanner pool is configured.
- **-scanner-pool** refers to the name of the scanner pool.
- **-scanner-pools** refers to the list of scanner pools which are active on this vserver. Applicable only for "vscan scanner-pool show-active" command.
- **-scanner-policy** specifies the scanner policy which is applied to the scanner pool.
- **-owner** specifies whether the cluster or vserver admin has created the scanner pool. Only the owner is allowed to modify or delete the pool. However, vserver admin can apply any scanner policy to a cluster pool for the Vserver.
- **-servers** refers to the list of IPs of allowed vscanners. (Incase of command "vscan scanner-pool show-active" it refers to the merged list of IPs of allowed vscanners of all the active scanner pools.)
- **-privileged-users** refers to the list of allowed users for vscanner's privileged-access. (Incase of command "vscan scanner-pool show-active" it refers to the merged list of allowed privileged-users of all the active scanner pools.)
- **-request-timeout** refers to the total request-service time-limit in seconds.
- **-scan-queue-timeout** refers to the max time spent by a scan-request in scanner's queue, before it is serviced.
- **-session-setup-timeout** refers to the max wait-time for a response for session-setup-message.
- **-session-teardown-timeout** refers to the max wait-time for a response for a session-tear-down-message, or for any message to be received for a session-id, after the underlying connection has been disconnected.
- **-max-session-setup-retries** refers to the max number of times session-setup for a session-id may be retried; case of consecutive retry failures only.

Error Handling

The following errors will be handled :-

- When mandatory options are not mentioned, errors will be reported.
- When valid types (e.g. specifying alphabets for integer type) are not provided for command options, errors will be reported.
- When input doesn't fall under predefined range for a given option, error will be reported.
- When wrong combination of options (for delete, modify and show command) is provided, error will be reported.

Privileges Required

The admin(vserver/cluster) privilege is required for all the commands. The following options are exposed through advanced privilege only :

1. request-timeout
2. scan-queue-timeout
3. session-setup-timeout
4. session-teardown-timeout
5. max-session-setup-retries

For details on above fields, refer to description section.

Examples

```
jrajesh-SN-2::vserver vscan scanner-pool> create -vserver jrajesh-SN-2 -scanner-pool test -servers 10.72.204.1 -privileged-users fsct\test

jrajesh-SN-2::vserver vscan scanner-pool> show
Vserver      Scanner Pool      Owner      Servers      Privileged Scanner
Vserver      Pool      Owner      Servers      Users      Policy
-----
jrajesh-SN-2 test      cluster 10.72.204.1 fsct\test    idle
vserver_1    new      vserver 10.72.204.27 fsct\administrator idle
vserver_1    test     cluster 10.72.204.1 fsct\test    idle
vserver_2    test     cluster 10.72.204.1 fsct\test    idle
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool> show -instance

Vserver: jrajesh-SN-2
Scanner Pool: test
Applied Policy: idle
Current Status: off
Scanner Pool Config Owner: cluster
List of IPs of Allowed Vscan Servers: 10.72.204.1
List of Privileged Users: fsct\test

Vserver: vserver_1
Scanner Pool: new
Applied Policy: idle
Current Status: off
Scanner Pool Config Owner: vserver
List of IPs of Allowed Vscan Servers: 10.72.204.27
List of Privileged Users: fsct\administrator

Vserver: vserver_1
Scanner Pool: test
Applied Policy: idle
Current Status: off
Scanner Pool Config Owner: cluster
List of IPs of Allowed Vscan Servers: 10.72.204.1
List of Privileged Users: fsct\test
```

```

Vserver: vserver_2
Scanner Pool: test
Applied Policy: idle
Current Status: off
Scanner Pool Config Owner: cluster
List of IPs of Allowed Vscan Servers: 10.72.204.1
List of Privileged Users: fsct\test
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool> modify -vserver vserver_1 -scanner-pool new -servers 10.72.204.29 -privileged-users fsct\administrator,fsct\jra

jrajesh-SN-2::vserver vscan scanner-pool> show
Vserver      Scanner Pool      Owner      Servers      Privileged Scanner
Pool      Users      Policy
-----
jrajesh-SN-2      test      cluster 10.72.204.1      fsct\test      idle
vserver_1      new      vserver 10.72.204.29      fsct\
administrator,      idle
fsct\jrajesh
vserver_1      test      cluster 10.72.204.1      fsct\test      idle
vserver_2      test      cluster 10.72.204.1      fsct\test      idle
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool> apply-policy -vserver vserver_1 -scanner-pool new -scanner-policy primary

jrajesh-SN-2::vserver vscan scanner-pool> apply-policy -vserver vserver_1 -scanner-pool test -scanner-policy secondary

jrajesh-SN-2::vserver vscan scanner-pool> apply-policy -vserver vserver_2 -scanner-pool test -scanner-policy primary

jrajesh-SN-2::vserver vscan scanner-pool> show
Vserver      Scanner Pool      Owner      Servers      Privileged Scanner
Pool      Users      Policy
-----
jrajesh-SN-2      test      cluster 10.72.204.1      fsct\test      idle
vserver_1      new      vserver 10.72.204.29      fsct\
administrator,      primary
fsct\jrajesh
vserver_1      test      cluster 10.72.204.1      fsct\test      secondary
vserver_2      test      cluster 10.72.204.1      fsct\test      primary
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool> show-ef
Error: "show-ef" is not a recognized command
jrajesh-SN-2::vserver vscan scanner-pool> show-active
Vserver      Scanner Pools Servers      Privileged
Users
-----
vserver_1      new      10.72.204.29      fsct\administrator,
fsct\jrajesh
vserver_2      test      10.72.204.1      fsct\test
2 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool> delete -vserver vserver_2 -scanner-pool
jrajesh-SN-2::vserver vscan scanner-pool> create -vserver jrajesh-SN-2 -scanner-pool test1 -servers 10.72.204.1 -privileged-users fsct\test

jrajesh-SN-2::vserver vscan scanner-pool> show
Vserver      Scanner Pool      Owner      Servers      Privileged Scanner
Pool      Users      Policy
-----
jrajesh-SN-2      test      cluster 10.72.204.1      fsct\test      idle
jrajesh-SN-2      test1     cluster 10.72.204.1      fsct\test      idle
vserver_1      new      vserver 10.72.204.29      fsct\
administrator,      primary
fsct\jrajesh
vserver_1      test      cluster 10.72.204.1      fsct\test      secondary
vserver_1      test1     cluster 10.72.204.1      fsct\test      idle
vserver_2      test      cluster 10.72.204.1      fsct\test      primary
vserver_2      test1     cluster 10.72.204.1      fsct\test      idle
7 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool> delete -vserver jrajesh-SN-2 -scanner-pool test1

jrajesh-SN-2::vserver vscan scanner-pool> set advanced
Warning: These advanced commands are potentially dangerous; use them only when directed to do so by NetApp personnel.
Do you want to continue? {y/n}: y

jrajesh-SN-2::vserver vscan scanner-pool*> show -instance -vserver vserver_1 -scanner-pool new

Vserver: vserver_1
Scanner Pool: new
Applied Policy: primary
Current Status: on
Scanner Pool Config Owner: vserver
List of IPs of Allowed Vscan Servers: 10.72.204.29, 1.1.1.1
List of Privileged Users: fsct\administrator, fsct\new
Request Service Timeout: 30s
Scan Queue Timeout: 20s
Session Setup Timeout: 10s
Session Teardown Timeout: 10s
Max Number of Consecutive Session Setup Attempts: 5

jrajesh-SN-2::vserver vscan scanner-pool*> modify -vserver vserver_1 -scanner-pool new -servers 10.72.204.29,1.1.1.1 -privileged-users fsct\administrator

jrajesh-SN-2::vserver vscan scanner-pool*> show -instance -vserver vserver_1 -scanner-pool new
Vserver: vserver_1
Scanner Pool: new
Applied Policy: primary
Current Status: on
Scanner Pool Config Owner: vserver
List of IPs of Allowed Vscan Servers: 10.72.204.29, 1.1.1.1
List of Privileged Users: fsct\administrator, fsct\new
Request Service Timeout: 20s
Scan Queue Timeout: 12s

```

```
Session Setup Timeout: 8s
Session Teardown Timeout: 9s
Max Number of Consecutive Session Setup Attempts: 3
```

Files

This command doesn't read/write to any administrative files.

See Also

N/A

vscan scanner-pool privileged-users

Syntax

```
rajesh-SN-2::> vscan scanner-pool privileged-users ?
(vserver vscan scanner-pool privileged-users)
add          Add to the list of privileged users
remove       Remove from the list of privileged users
show         Display list of privileged users

rajesh-SN-2::> vscan scanner-pool privileged-users add ?
(vserver vscan scanner-pool privileged-users add)
-vserver <vserver name>          Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[-privileged-users] <Privileged user>, ... List of Privileged Users

rajesh-SN-2::> vscan scanner-pool privileged-users remove ?
(vserver vscan scanner-pool privileged-users remove)
-vserver <vserver name>          Vserver
[-scanner-pool] <scanner pool>   Scanner Pool
[-privileged-users] <Privileged user>, ... List of Privileged Users

rajesh-SN-2::> vscan scanner-pool privileged-users show ?
(vserver vscan scanner-pool privileged-users show)
[ -instance | -fields <fieldname>, ... ]
[ -vserver <vserver name> ]          Vserver
[[-scanner-pool] <scanner pool>]     Scanner Pool
[ -privileged-users <Privileged user>, ... ] List of Privileged Users

rajesh-SN-2::> vscan scanner-pool privileged-users show -instance ?
(vserver vscan scanner-pool privileged-users show)
[ -vserver <vserver name> ]          Vserver
[[-scanner-pool] <scanner pool>]     Scanner Pool
[ -privileged-users <Privileged user>, ... ] List of Privileged Users
```

Description

The 'vscan scanner-pool privileged-users' directory contains command to manage list of privileged-users associated with a scanner pool. This set of commands (add/remove/show) is provided to empower admin with easy way to add/remove new user to the existing list.

Command Options

The following options are supported :-

- **-vserver** refers to the name of the Vserver for which scanner pool is configured.
- **-scanner-pool** refers to the name of the scanner pool.
- **-privileged-users** refers to the list of allowed users for vscanner's privileged-access (to be added to or removed from the existing list).

Error Handling

The following errors will be handled :-

- When mandatory options are not mentioned, errors will be reported.
- When valid types (e.g. specifying alphabets for integer type) are not provided for command options, errors will be reported.
- When input doesn't fall under predefined range for a given option, error will be reported.
- When wrong combination of input is provided, errors will be thrown.

Privileges Required

Vserver admin privilege is required to run these commands.

Examples

```
rajesh-SN-2::vserver vscan scanner-pool privileged-users> show
vserver      Scanner Pool      Privileged Users
-----
rajesh-SN-2   test              fsct\test
vserver_1     new                fsct\administrator, fsct\nw
vserver_1     test              fsct\test
vserver_2     test              fsct\test
4 entries were displayed.

rajesh-SN-2::vserver vscan scanner-pool privileged-users> add -vserver vserver_
vserver_1 vserver_2
rajesh-SN-2::vserver vscan scanner-pool privileged-users> add -vserver vserver_1 -scanner-pool new -privileged-users fsct\u1,fsct\u2
```

```

jrajesh-SN-2::vserver vscan scanner-pool privileged-users> show
Vserver          Scanner Pool      Privileged Users
-----
jrajesh-SN-2      test              fsct\test
vserver_1         new              fsct\administrator, fsct\new, fsct\ul,
vserver_1         test              fsct\test
vserver_2         test              fsct\test
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool privileged-users> remove -vserver vserver_1 -scanner-pool new -privileged-users fsct\new,fsct\ul

jrajesh-SN-2::vserver vscan scanner-pool privileged-users> show
Vserver          Scanner Pool      Privileged Users
-----
jrajesh-SN-2      test              fsct\test
vserver_1         new              fsct\administrator, fsct\ul2
vserver_1         test              fsct\test
vserver_2         test              fsct\test
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool privileged-users> show -instance

          Vserver: jrajesh-SN-2
          Scanner Pool: test
List of Privileged Users: fsct\test

          Vserver: vserver_1
          Scanner Pool: new
List of Privileged Users: fsct\administrator, fsct\ul2

          Vserver: vserver_1
          Scanner Pool: test
List of Privileged Users: fsct\test

          Vserver: vserver_2
          Scanner Pool: test
List of Privileged Users: fsct\test
4 entries were displayed.

```

Files

This command doesn't read/write to any administrative files.

See Also

N/A

vscan scanner-pool servers

Syntax

```

jrajesh-SN-2::> vscan scanner-pool servers ?
(vserver vscan scanner-pool servers)
add          Add to the list of servers
remove       Remove from the list of servers
show         Display list of servers

jrajesh-SN-2::> vscan scanner-pool servers add ?
(vserver vscan scanner-pool servers add)
-vserver <vserver name>      Vserver
[-scanner-pool] <scanner pool> Scanner Pool
[-servers] <IpAddress>, ...  List of IPs for Vscan Servers

jrajesh-SN-2::> vscan scanner-pool servers remove ?
(vserver vscan scanner-pool servers remove)
-vserver <vserver name>      Vserver
[-scanner-pool] <scanner pool> Scanner Pool
[-servers] <IpAddress>, ...  List of IPs for Vscan Servers

jrajesh-SN-2::> vscan scanner-pool servers show ?
(vserver vscan scanner-pool servers show)
[ -instance | -fields <fieldname>, ... ]
[ -vserver <vserver name> ]      Vserver
[[-scanner-pool] <scanner pool>] Scanner Pool
[ -servers <IpAddress>, ... ]    List of IPs of Allowed Vscan Servers

jrajesh-SN-2::> vscan scanner-pool servers show -instance ?
(vserver vscan scanner-pool servers show)
[ -vserver <vserver name> ]      Vserver
[[-scanner-pool] <scanner pool>] Scanner Pool
[ -servers <IpAddress>, ... ]    List of IPs of Allowed Vscan Servers

```

Description

The 'vscan scanner-pool servers' directory contains command to manage list of IPs of vscanners. This set of commands (add/remove/show) is provided to empower admin with easy way to add/remove new IP to the existing list.

Command Options

The following options are supported :-

- **-vserver** refers to the name of the Vserver for which scanner pool is configured.
- **-scanner-pool** refers to the name of the scanner pool.
- **-server** refers to the list of IPs of allowed vscanners (to be added to or removed from the existing list).

Error Handling

The following errors will be handled :-

- When mandatory options are not mentioned, errors will be reported.
- When valid types (e.g. specifying alphabets for integer type) are not provided for command options, errors will be reported.
- When input doesn't fall under predefined range for a given option, error will be reported.
- When wrong combination of input is provided, errors will be thrown.

Privileges Required

Vserver admin privilege is required to run these commands.

Examples

```
jrajesh-SN-2::vserver vscan scanner-pool servers> show
Vserver          Scanner Pool      Servers
-----
jrajesh-SN-2      test              10.72.204.1
vserver_1         new              10.72.204.29, 1.1.1.1
vserver_1         test             10.72.204.1
vserver_2         test             10.72.204.1
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool servers> add -vserver vserver_
vserver_1 vserver_2
jrajesh-SN-2::vserver vscan scanner-pool servers> add -vserver vserver_1 -scanner-pool new 2.2.2.2,3.3.3.3

jrajesh-SN-2::vserver vscan scanner-pool servers> show
Vserver          Scanner Pool      Servers
-----
jrajesh-SN-2      test              10.72.204.1
vserver_1         new              1.1.1.1, 2.2.2.2, 3.3.3.3, 10.72.204.29
vserver_1         test             10.72.204.1
vserver_2         test             10.72.204.1
4 entries were displayed.

jrajesh-SN-2::vserver vscan scanner-pool servers> remove -vserver vserver_1 -scanner-pool new 2.2.2.2,3.3.3.3,1.1.1.1

jrajesh-SN-2::vserver vscan scanner-pool servers> show -instance

                Vserver: jrajesh-SN-2
                Scanner Pool: test
List of IPs of Allowed Vscan Servers: 10.72.204.1

                Vserver: vserver_1
                Scanner Pool: new
List of IPs of Allowed Vscan Servers: 10.72.204.29

                Vserver: vserver_1
                Scanner Pool: test
List of IPs of Allowed Vscan Servers: 10.72.204.1

                Vserver: vserver_2
                Scanner Pool: test
List of IPs of Allowed Vscan Servers: 10.72.204.1
4 entries were displayed.
```

Files

This command doesn't read/write to any administrative files.

See Also

N/A

vscan connection-status

Syntax

```
jrajesh-SN-2::> vscan connection-status ?
(vserver vscan connection-status)
show                Display Vscan servers connection status summary
show-all           Display Vscan servers connection status
show-connected      Display connection status of connected Vscan servers
show-not-connected  Display connection status of Vscan servers which are allowed to connect but not yet connected

jrajesh-SN-2::> vscan connection-status show ?
(vserver vscan connection-status show)
[ -instance | -fields <fieldname>, ... ]
[[-node] <nodename>]      Node
[ -vserver <vserver name> ] Vserver
[ -servers <IpAddress>, ... ] List of Connected Vscan Servers
[ -connection-count <integer> ] Number of Connected Vscan Servers Serving the Vserver

jrajesh-SN-2::> vscan connection-status show -instance ?
(vserver vscan connection-status show)
[[-node] <nodename>]      Node
[ -vserver <vserver name> ] Vserver
[ -servers <IpAddress>, ... ] List of Connected Vscan Servers
[ -connection-count <integer> ] Number of Connected Vscan Servers Serving the Vserver

jrajesh-SN-2::> vscan connection-status show-connected ?
(vserver vscan connection-status show-connected)
[ -instance | -fields <fieldname>, ... ]
[[-node] <nodename>]      Node
```

```

[ -vserver <vserver name> ]           Vserver
[[-server] <IpAddress>]               Server
[ -vendor <text> ]                     Vscan Server Vendor
[ -version <text> ]                     Vscan Server Version
[ -privileged-user <text> ]             Privileged User Used for Connection
[ -connected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscan Server Was Connected
[ -server-type <Type> ]                 Server Type

rajesh-SN-2::> vscan connection-status show-connected -instance ?
(vserver vscan connection-status show-connected)
[[-node] <nodename>]                   Node
[ -vserver <vserver name> ]           Vserver
[[-server] <IpAddress>]               Server
[ -vendor <text> ]                     Vscan Server Vendor
[ -version <text> ]                     Vscan Server Version
[ -privileged-user <text> ]             Privileged User Used for Connection
[ -connected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscan Server Was Connected
[ -server-type <Type> ]                 Server Type

rajesh-SN-2::> vscan connection-status show-not-connected ?
(vserver vscan connection-status show-not-connected)
[ -instance | -fields <fieldname>, ... ]
[[-node] <nodename>]                   Node
[ -vserver <vserver name> ]           Vserver
[[-server] <IpAddress>]               Server
[ -server-status <Status> ]           Server Status
[ -disconnect-reason <reason> ]       Server Disconnect Reason
[ -disconnected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscan Server Was Disconnected
[ -server-type <Type> ]                 Server Type

rajesh-SN-2::> vscan connection-status show-not-connected -instance ?
(vserver vscan connection-status show-not-connected)
[[-node] <nodename>]                   Node
[ -vserver <vserver name> ]           Vserver
[[-server] <IpAddress>]               Server
[ -server-status <Status> ]           Server Status
[ -disconnect-reason <reason> ]       Server Disconnect Reason
[ -disconnected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscan Server Was Disconnected
[ -server-type <Type> ]                 Server Type

rajesh-SN-2::> vscan connection-status show-all ?
(vserver vscan connection-status show-all)
[ -instance | -fields <fieldname>, ... ]
[[-node] <nodename>]                   Node
[ -vserver <vserver name> ]           Vserver
[[-server] <IpAddress>]               Server
[ -server-status <Status> ]           Server Status
[ -server-type <Type> ]                 Server Type
[ -vendor <text> ]                     Vscanner Vendor
[ -version <text> ]                     Vscanner Version
[ -disconnect-reason <reason> ]       Server Disconnect Reason
[ -disconnected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscanner Was Disconnected
[ -privileged-user <text> ]             Privileged User Used for Connection
[ -connected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscanner Was Connected

rajesh-SN-2::> vscan connection-status show-all -instance ?
(vserver vscan connection-status show-all)
[[-node] <nodename>]                   Node
[ -vserver <vserver name> ]           Vserver
[[-server] <IpAddress>]               Server
[ -server-status <Status> ]           Server Status
[ -server-type <Type> ]                 Server Type
[ -vendor <text> ]                     Vscanner Vendor
[ -version <text> ]                     Vscanner Version
[ -disconnect-reason <reason> ]       Server Disconnect Reason
[ -disconnected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscanner Was Disconnected
[ -privileged-user <text> ]             Privileged User Used for Connection
[ -connected-since <"MM/DD/YYYY HH:MM:SS"> ] Time When Vscanner Was Connected

rajesh-SN-2::> set diag
Warning: These diagnostic commands are for use by NetApp personnel only.
Do you want to continue? {y|n}: y

rajesh-SN-2::*> vscan connection-status ?
(vserver vscan connection-status)
show                Display Vscan servers connection status summary
show-all            Display Vscan servers connection status
show-connected       Display connection status of connected Vscan servers
show-extended-stats *Display Vscan servers' extended statistics
show-not-connected   Display connection status of Vscan servers which are allowed to connect but not yet connected

rajesh-SN-2::*> vscan connection-status show-extended-stats ?
(vserver vscan connection-status show-extended-stats)
[ -instance | -fields <fieldname>, ... ]
[[-node] <nodename>]                   *Node
[ -vserver <vserver name> ]           *Vserver
[[-server] <IpAddress>]               *Server
[ -server-status <Status> ]           *Server Status
[ -server-type <Server type> ]         *Server Type
[ -vendor <text> ]                     *Vscanner Vendor
[ -version <text> ]                     *Vscanner Version
[ -extended-stats <text>, ... ]       *Extended-statistics from VScanner

rajesh-SN-2::*> vscan connection-status show-extended-stats -instance ?
(vserver vscan connection-status show-extended-stats)
[[-node] <nodename>]                   *Node
[ -vserver <vserver name> ]           *Vserver
[[-server] <IpAddress>]               *Server
[ -server-status <Status> ]           *Server Status
[ -server-type <Server type> ]         *Server Type
[ -vendor <text> ]                     *Vscanner Vendor
[ -version <text> ]                     *Vscanner Version
[ -extended-stats <text>, ... ]       *Extended-statistics from VScanner

```

Description

Command Options

- **-vserver** refers to the name of the Vserver for which scanner is configured.
- **-node** refers to the name of the node in the cluster.
- **-connection-count** specifies number of connected vscanners to a node for a vservers.
- **-server** is the IP of the vscanner.
- **-servers** refers to the list of IP of the vscanners which are connected on a node for a vservers. Applicable only to "vscan connection-status show" command.
- **-privileged-user** refers to the user which has been used as authentication parameter for named-pipe connection.
- **-server-status** refers to the current status of the connection to the vscanner.
- **-vendor** refers to the name of the vendor on the vscanner. This is retrieved from the scanner once connection is established.
- **-version** refers to the string-format version-information of a virus-scan-engine.. This is retrieved from the scanner once connection is established.
- **-connect-since** specifies the time when this connection was established.
- **-disconnect-reason** refers to the reason of disconnection to the external scanners.
- **-disconnect-since** specifies the time when this connection was broken.

- When mandatory options are not mentioned, errors will be reported.
- When valid types (e.g. specifying alphabets for integer type) are not provided for command options, errors will be reported.
- When input doesn't fall under predefined range for a given option, error will be reported.
- When wrong combination of input is provided, errors will be thrown.

Examples

```

jrajesh-SN-2::vserver vscan connection-status> show
                Connected Connected
Vserver         Node         Server-Count Servers
-----
vserver_1       jrajesh-SN-2-01           2 2.2.2.2, 3.3.3.3
vserver_2       jrajesh-SN-2-01           3 3.4.2.3, 10.72.204.1,
                                10.72.238.1
2 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show -instance
                Node: jrajesh-SN-2-01
                Vserver: vserver_1
                List of Connected Vscanners: 2.2.2.2, 3.3.3.3
Number of Connected Vscanners Serving the Vserver: 2

                Node: jrajesh-SN-2-01
                Vserver: vserver_2
                List of Connected Vscanners: 3.4.2.3, 10.72.204.1,
                                10.72.238.1
Number of Connected Vscanners Serving the Vserver: 3
2 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show-connected
Vserver         Node         Server         Vendor         Privileged
-----
vserver_1       jrajesh-SN-2-01     2.2.2.2        McAfee          fsct\ul
vserver_1       jrajesh-SN-2-01     3.3.3.3        McAfee          fsct\ul
vserver_2       jrajesh-SN-2-01     3.4.2.3        Symantec        fsct\ul2
vserver_2       jrajesh-SN-2-01     10.72.204.1    Symantec        fsct\ul
vserver_2       jrajesh-SN-2-01     10.72.238.1    Symantec        fsct\ul
5 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show-connected -instance
                Node: jrajesh-SN-2-01
                Vserver: vserver_1
                Server: 2.2.2.2
                Vscanner Vendor: McAfee
                Vscanner Version: 1.2.22.1
Privileged User Used for Connection: fsct\ul
Time When Vscanner Was Connected: 3/14/2013 16:10:11

                Node: jrajesh-SN-2-01
                Vserver: vserver_1
                Server: 3.3.3.3
                Vscanner Vendor: McAfee
                Vscanner Version: 1.2.22.1
Privileged User Used for Connection: fsct\ul
Time When Vscanner Was Connected: 3/11/2013 05:10:11

                Node: jrajesh-SN-2-01
                Vserver: vserver_2
                Server: 3.4.2.3
                Vscanner Vendor: Symantec
                Vscanner Version: 5.1.43
Privileged User Used for Connection: fsct\ul2
Time When Vscanner Was Connected: 3/10/2013 05:39:11

                Node: jrajesh-SN-2-01

```

Vserver: vserver_2
Server: 10.72.204.1
Vscanner Vendor: Symantec
Vscanner Version: 5.1.43
Privileged User Used for Connection: fsct\ul
Time When Vscanner Was Connected: 3/15/2013 05:09:11

Node: jrajesh-SN-2-01
Vserver: vserver_2
Server: 10.72.238.1
Vscanner Vendor: Symantec
Vscanner Version: 5.1.43
Privileged User Used for Connection: fsct\ul
Time When Vscanner Was Connected: 2/10/2013 05:39:11
5 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show-not-connected

Vserver	Node	Server	Connection Status	Disconnect Reason
vserver_1	jrajesh-SN-2-01	1.1.1.1	disconnected	manual-disconnect
vserver_2	jrajesh-SN-2-01	10.12.2.2	disconnected	manual-disconnect

2 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show-not-connected -instance

Node: jrajesh-SN-2-01
Vserver: vserver_1
Server: 1.1.1.1
Server Status: disconnected
Server Disconnect Reason: manual-disconnect
Time When Vscanner Was Disconnected: 3/12/2013 05:09:11

Node: jrajesh-SN-2-01
Vserver: vserver_2
Server: 10.12.2.2
Server Status: disconnected
Server Disconnect Reason: manual-disconnect
Time When Vscanner Was Disconnected: 3/14/2013 05:09:11
2 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show-all

Vserver	Node	Server	Connection Status	Disconnect Reason
vserver_1	jrajesh-SN-2-01	1.1.1.1	disconnected	manual-disconnect
vserver_1	jrajesh-SN-2-01	2.2.2.2	connected	-
vserver_1	jrajesh-SN-2-01	3.3.3.3	connected	-
vserver_2	jrajesh-SN-2-01	3.4.2.3	connected	-
vserver_2	jrajesh-SN-2-01	10.12.2.2	disconnected	manual-disconnect
vserver_2	jrajesh-SN-2-01	10.72.204.1	connected	-
vserver_2	jrajesh-SN-2-01	10.72.238.1	connected	-

7 entries were displayed.

jrajesh-SN-2::vserver vscan connection-status> show-all -instance

Node: jrajesh-SN-2-01
Vserver: vserver_1
Server: 1.1.1.1
Server Status: disconnected
Vscanner Vendor: vendor
Vscanner Version: 1234
Server Disconnect Reason: manual-disconnect
Time When Server Was Disconnected: 3/12/2013 05:09:11

Node: jrajesh-SN-2-01
Vserver: vserver_1
Server: 2.2.2.2
Server Status: connected
Vscanner Vendor: McAfee
Vscanner Version: 1.2.22.1
Server Disconnect Reason: -
Time When Server Was Disconnected: -

Node: jrajesh-SN-2-01
Vserver: vserver_1
Server: 3.3.3.3
Server Status: connected
Vscanner Vendor: McAfee
Vscanner Version: 1.2.22.1
Server Disconnect Reason: -
Time When Server Was Disconnected: -

Node: jrajesh-SN-2-01
Vserver: vserver_2
Server: 3.4.2.3
Server Status: connected
Vscanner Vendor: Symantec
Vscanner Version: 5.1.43
Server Disconnect Reason: -
Time When Server Was Disconnected: -

Node: jrajesh-SN-2-01
Vserver: vserver_2
Server: 10.12.2.2
Server Status: disconnected
Vscanner Vendor: vendor
Vscanner Version: 1234
Server Disconnect Reason: manual-disconnect
Time When Server Was Disconnected: 3/14/2013 05:09:11

Node: jrajesh-SN-2-01
Vserver: vserver_2
Server: 10.72.204.1
Server Status: connected
Vscanner Vendor: Symantec
Vscanner Version: 5.1.43
Server Disconnect Reason: -
Time When Server Was Disconnected: -

```

Node: jrajesh-SN-2-01
Vserver: vserver_2
Server: 10.72.238.1
Server Status: connected
Vscanner Vendor: Symantec
Vscanner Version: 5.1.43
Server Disconnect Reason: -
Time When Server Was Disconnected: -
7 entries were displayed.

jrajesh-SN-2::> set diag

Warning: These diagnostic commands are for use by NetApp personnel only.
Do you want to continue? {y|n}: y

jrajesh-SN-2::vserver vscan connection-status*> show-extended-stats -vserver vserver_1 -server 2.2.2.2

```

Vserver	Node	Server	Connection Status	Extended Stats
vserver_1	jrajesh-SN-2-01	2.2.2.2	connected	ts=3:37:36 AM Aug 13,2013 scans=sent:6534,compok:6534,comperr:0,compnotfnd:0,ms/comp:7 mempage/s=29, procs=58, threads=741, %cpu=13.95, procqlen=0, diskio/s=0, smbbytes/s=0, ifmac=00:14:5E:16:35:7E, tcpstat=retrans:683,connfail:293,connreset:4785,inerr:0 cfg=Host Name:WIN209-199 OS Name:Microsoft Windows Server 2008 R2 Standard OS Version:6.1.7600 N/A Build 7600 System Boot Time:8/8/2013, 9:44:56 PM System Manufacturer:IBM System Model:IBM System x3550 -[797842A]- System Type:x64-based PC Processor(s):2 Processor(s) Installed. [01]:Intel64 Family 6 Model 15 Stepping 6 GenuineIntel ~2000 Mhz

Files

This command doesn't read/write to any administrative files.

See Also

N/A

cifs share

Syntax

```

jrajesh-SN-2::> cifs share create ?
  -vserver <vserver name>                                Vserver
  [-share-name] <Share>                                    Share
  [-path] <text (size 1..256)>                               Path
  [[-share-properties] <share properties>, ...]           Share Properties (default: oplocks,browsable,changesnotify)
  [-symlink-properties {enable|hide|read_only}, ...]      Symlink Properties (default: enable)
  [-file-umask <Octal Permission>]                       File Mode Creation Mask
  [-dir-umask <Octal Permission>]                         Directory Mode Creation Mask
  [-comment <text (size 1..256)>]                          Share Comment
  [-attribute-cache-ttl <[[<integer>h][<integer>m][<integer>s]]>] File Attribute Cache Lifetime
  [-offline-files {none|manual|documents|programs}]       Offline Files (default: manual)
  [-vscan-fileop-profile {no_scan|standard|strict|writes_only}] Vscan File-Operations Profile (default: standard)

jrajesh-SN-2::> cifs share modify ?
  -vserver <vserver name>                                Vserver
  [-share-name] <Share>                                    Share
  [-path <text (size 1..256)>]                               Path
  [-symlink-properties {enable|hide|read_only}, ...]       Symlink Properties
  [-file-umask <Octal Permission>]                         File Mode Creation Mask
  [-dir-umask <Octal Permission>]                         Directory Mode Creation Mask
  [-comment <text (size 1..256)>]                          Share Comment
  [-attribute-cache-ttl <[[<integer>h][<integer>m][<integer>s]]>] File Attribute Cache Lifetime
  [-offline-files {none|manual|documents|programs}]       Offline Files
  [-vscan-fileop-profile {no_scan|standard|strict|writes_only}] Vscan File-Operations Profile

jrajesh-SN-2::> cifs share show ?
  [-fileopProfile | -instance | -shadowcopy | -umask | -fields <fieldname>, ...]
  [-vserver <vserver name>]                                Vserver
  [[-share-name] <Share>]                                    Share
  [-cifs-server <NetBIOS>]                                  CIFS Server NetBIOS Name
  [-path <text (size 1..256)>]                               Path
  [-share-properties <share properties>, ...]             Share Properties
  [-symlink-properties {enable|hide|read_only}, ...]       Symlink Properties
  [-file-umask <Octal Permission>]                         File Mode Creation Mask
  [-dir-umask <Octal Permission>]                         Directory Mode Creation Mask
  [-comment <text (size 1..256)>]                          Share Comment
  [-acl <text>, ...]                                        Share ACL
  [-attribute-cache-ttl <[[<integer>h][<integer>m][<integer>s]]>] File Attribute Cache Lifetime
  [-volume <volume name>]                                  Volume Name
  [-offline-files {none|manual|documents|programs}]       Offline Files
  [-vscan-fileop-profile {no_scan|standard|strict|writes_only}] Vscan File-Operations Profile

```

Description

The 'cifs share' directory contains commands to manage cifs shares. A new attribute "-vscan-fileop-profile" is added to the share as part of this feature. It is used to make decision on what fileop should trigger scan. If this attribute is not set, then standard profile will be set.

Command Options

The following options is added :-

- **-vscan-fileop-profile** refers to the fileop profile applicable on this share. For file access through this share, vscan will be applicable as per the configuration.

Error Handling

No special error handling for the new field.

Privileges Required

No special privilege required.

Examples

```
jrajesh-SN-2::vserver cifs share> create -vserver vserver_1 -share-name sh_new -path / -vscan-fileop-profile strict

jrajesh-SN-2::vserver cifs share> show -instance -vserver vserver_1 -share-name sh_new

          Vserver: vserver_1
          Share: sh_new
CIFS Server NetBIOS Name: JRAJESH-SN-2
          Path: /
Share Properties: oplocks
                  browsable
                  changenotify
Symlink Properties: enable
File Mode Creation Mask: -
Directory Mode Creation Mask: -
Share Comment: -
Share ACL: Everyone / Full Control
File Attribute Cache Lifetime: -
Volume Name: root_vol_1
Offline Files: manual
Vscan File-Operations Profile: strict

jrajesh-SN-2::vserver cifs share> modify -vserver vserver_1 -share-name sh_new -vscan-fileop-profile writes_only

jrajesh-SN-2::vserver cifs share> show -instance -vserver vserver_1 -share-name sh_new

          Vserver: vserver_1
          Share: sh_new
CIFS Server NetBIOS Name: JRAJESH-SN-2
          Path: /
Share Properties: oplocks
                  browsable
                  changenotify
Symlink Properties: enable
File Mode Creation Mask: -
Directory Mode Creation Mask: -
Share Comment: -
Share ACL: Everyone / Full Control
File Attribute Cache Lifetime: -
Volume Name: root_vol_1
Offline Files: manual
Vscan File-Operations Profile: writes_only
```

Files

This command doesn't read/write to any administrative files.

See Also

N/A

Options

N/A.

Hidden Commands

N/A.

Graphical Interface

N/A.

Programmatic Interfaces

APIs

```
/******
 *
 * @category   vscan
 * @synopsis   Vscan configuration and managment.
 * @discussion This set of APIs allow configuring and managing Vscan on Data
 *             ONTAP Cluster-Mode environment. This includes the APIs to
 *             retrieve the connection-status and other diagnostic information
 *             of active Vscan servers.
 *             *****/
```

vscan-status-get-iter-key-td

```
/******
```

```

*
* @typedef      vscan-status-get-iter-key-td
* @namespace    filer
* @desc         Key typedef for table vscan_status_byname
*
*
* @element      key-0
* @type         string, optional
* @desc         Field vserver
*
*
*
*
*****/

```

vscan-status-get-iter

```

/*****
*
* @api          vscan-status-get-iter
* @desc         Returns Vscan status information.
* @status       supported
*
*
* @readonly     true
* @errno        EINVALINPUTERROR
* @errno        EINTERNALERROR
* @errno        EVSERVERNOTFOUND
*
*
* @namespace    filer
* @family       ontap-cluster,ontap-vserver
*
*
* @input        max-records
* @type         integer, optional
* @range        [1..2^32-1]
* @desc         The maximum number of records to return in this call.
*               Default: 20
*
*
* @input        tag
* @type         string, optional
* @desc         Specify the tag from the last call.
*               It is usually not specified for the first call. For subsequent
*               calls, copy values from the 'next-tag' obtained from the previous
*               call.
*
*
* @input        query
* @type         vscan-status-info, optional
* @desc         A query that specifies which objects to return.
*               A query could be specified on any number of attributes in the
*               vscan-status object.
*               All vscan-status objects matching this query up to 'max-records'
*               will be returned.
*
*
* @input        desired-attributes
* @type         vscan-status-info, optional
* @desc         Specify the attributes that should be returned.
*               If not present, all attributes for which information is available
*               will be returned.
*               If present, only the desired attributes for which information is
*               available will be returned.
*
*
* @output        num-records
* @type         integer
* @range        [0..2^32-1]
* @desc         The number of records returned in this call.
*
*
* @output        attributes-list
* @desc         The list of attributes of vscan-status objects.
* @type         vscan-status-info[], optional
*
*
* @output        next-tag
* @type         string, optional
* @desc         Tag for the next call.
*               Not present when there are no more vscan-status objects to
*               return.
*
*
* @typedef      vscan-status-info
* @desc         Vscan status information.
*
*
*               When returned as part of the output, all elements of this typedef
*               are reported, unless limited by a set of desired attributes
*               specified by the caller.
*
*
*               <p>
*               When used as input to specify desired attributes to return,
*               omitting a given element indicates that it shall not be returned
*               in the output. In contrast, by providing an element (even with
*               no value) the caller ensures that a value for that element will
*               be returned, given that the value can be retrieved.
*
*
*               <p>
*               When used as input to specify queries, any element can be omitted
*               in which case the resulting set of objects is not constrained by
*               any specific value of that attribute.
*
*
*
* @element      vserver
* @type         string, optional
* @desc         Vserver
*               Attributes: key, non-creatable, non-modifiable
*
*
* @element      is-vscan-enabled
* @type         boolean, optional
* @desc         Vscan status. When true, Vscan feature is enabled for the
*               Vserver.
*               Attributes: non-creatable, non-modifiable
*
*
*
*****/

```

vscan-status-status-modify

```

/*****
 *
 * @api      vscan-status-modify
 * @desc     Modify Vscan status.
 *
 * @status   supported
 *
 * @readonly  false
 * @errno    EINVALINPUTERROR
 * @errno    EINTERNALERROR
 * @errno    EOPNOTSUPPORTED
 * @errno    E_VSERVER_TYPE_NOT_SUPPORTED
 * @errno    EVSERVERNOTFOUND
 * @errno    ECIFSERVERNOTFOUND
 * @errno    E_NO_SCANNER_POOL_ACTIVE
 * @errno    E_VSCAN_CAPABILITY_NOT_ENABLED
 * @errno    E_VSCAN_JOB_QUEUE_FAILED
 * @errno    E_VSCAN_JOB_DELETE_FAILED
 *
 * @namespace filer
 * @family   ontap-vserver
 *
 * @input     is-vscan-enabled
 * @type      boolean
 * @desc      Vscan status. When true, Vscan feature is enabled for the
 *            Vserver.
 *
 *****/

```

vscan-on-access-policy-get-iter-key-td

```

/*****
 *
 * @typedef   vscan-on-access-policy-get-iter-key-td
 * @namespace filer
 * @desc      Key typedef for table vscan_on_access_policy_byname
 *
 *           @element   key-0
 *           @type       string, optional
 *           @desc       Field vserver
 *
 *           @element   key-1
 *           @type       string, optional
 *           @desc       Field policy_name
 *
 * @typedef   file-extension
 * @namespace filer
 * @type      string
 * @desc      File extension
 *
 *
 * @typedef   file-path
 * @namespace filer
 * @type      string
 * @desc      File path
 *
 *
 * @typedef   policy-name
 * @namespace filer
 * @type      string
 * @desc      Policy name
 *
 *
 * @typedef   size
 * @namespace filer
 * @type      integer
 * @desc      Size in bytes
 *
 *           Range : [0..2^63-1].
 *
 * @typedef   vscan-config-owner
 * @namespace filer
 * @type      string
 * @desc      Configuration owner
 *
 *           Possible values:
 *           <ul>
 *           <li> "vserver" - Vserver Admin,
 *           <li> "cluster" - Cluter Admin
 *           </ul>
 *
 * @typedef   vscan-on-access-policy-filter
 * @namespace filer
 * @type      string
 * @desc      Filters to to define the scope of On-Access scanning more
 *            precisely.
 *
 *           Possible values:
 *           <ul>
 *           <li> "scan_mandatory" - Enable mandatory scan,
 *           <li> "scan_ro_volume" - Enable scans for read-only
 *           volume,
 *           <li> "scan_execute_access" - Scan only files opened with
 *           execute-access (CIFS only)
 *           </ul>
 *
 * @typedef   vscan-protocol
 * @namespace filer
 * @type      string
 * @desc      CIFS
 *
 *           Possible values:
 *           <ul>
 *           <li> "cifs" - CIFS Protocol
 *           </ul>
 *
 *****/

```

vscan-on-access-policy-get-iter

```
*****
*
* @api          vscan-on-access-policy-get-iter
* @desc         Returns list of On-Access policies.
* @status       supported
*
* @readonly     true
* @errno        EINVALINPUTERROR
* @errno        EINTERNALERROR
* @errno        EVSERVERNOTFOUND
* @errno        E_OA_POLICY_NOT_FOUND
*
* @namespace    filer
* @family       ontap-cluster,ontap-vserver
*
* @input        max-records
* @type         integer, optional
* @range        [1..2^32-1]
* @desc         The maximum number of records to return in this call.
*               Default: 20
*
* @input        tag
* @type         string, optional
* @desc         Specify the tag from the last call.
*               It is usually not specified for the first call. For subsequent
*               calls, copy values from the 'next-tag' obtained from the previous
*               call.
*
* @input        query
* @type         vscan-on-access-policy-info, optional
* @desc         A query that specifies which objects to return.
*               A query could be specified on any number of attributes in the
*               vscan-on-access-policy object.
*               All vscan-on-access-policy objects matching this query up to
*               'max-records' will be returned.
*
* @input        desired-attributes
* @type         vscan-on-access-policy-info, optional
* @desc         Specify the attributes that should be returned.
*               If not present, all attributes for which information is available
*               will be returned.
*               If present, only the desired attributes for which information is
*               available will be returned.
*
* @output        num-records
* @type         integer
* @range        [0..2^32-1]
* @desc         The number of records returned in this call.
*
* @output        attributes-list
* @desc         The list of attributes of vscan-on-access-policy objects.
* @type         vscan-on-access-policy-info[], optional
*
* @output        next-tag
* @type         string, optional
* @desc         Tag for the next call.
*               Not present when there are no more vscan-on-access-policy objects
*               to return.
*
* @typedef       vscan-on-access-policy-info
* @desc         Vscan On-Access policy information.
*
*
*               When returned as part of the output, all elements of this typedef
*               are reported, unless limited by a set of desired attributes
*               specified by the caller.
*
*               <p>
*               When used as input to specify desired attributes to return,
*               omitting a given element indicates that it shall not be returned
*               in the output. In contrast, by providing an element (even with
*               no value) the caller ensures that a value for that element will
*               be returned, given that the value can be retrieved.
*
*               <p>
*               When used as input to specify queries, any element can be omitted
*               in which case the resulting set of objects is not constrained by
*               any specific value of that attribute.
*
* @element       vserver
* @type          string, optional
* @desc          Vserver
*               Attributes: key, non-creatable, non-modifiable
*
* @element       policy-name
* @type          policy-name, optional
* @desc          Name of the policy.
*               Attributes: key, required-for-create, non-modifiable
*
* @element       is-policy-enabled
* @type          boolean, optional
* @desc          Policy status.
*               Attributes: non-creatable, non-modifiable
*
* @element       admin-owner
* @type          vscan-config-owner, optional
* @desc          Owner of the policy.
*               Attributes: non-creatable, non-modifiable
*               Possible values:
*               <ul>
*               <li> "vserver"    - Vserver Admin,
*               <li> "cluster"   - Cluter Admin
*               </ul>
*
* @element       protocol
* @type          vscan-protocol, optional
* @desc          File-Access protocol to monitor for On-Access scanning.
*               Attributes: required-for-create, non-modifiable
```

```

*
* Possible values:
* <ul>
* <li> "cifs" - CIFS Protocol
* </ul>
*
*
* @element filters
* @type vscan-on-access-policy-filter[], optional
* @desc Filters.
* Attributes: optional-for-create, modifiable
* Possible values:
* <ul>
* <li> "scan_mandatory" - Enable mandatory scan,
* <li> "scan_ro_volume" - Enable scans for read-only
* volume,
* <li> "scan_execute_access" - Scan only files opened
* with execute-access (CIFS only)
* </ul>
*
*
* @element max-file-size
* @type size, optional
* @desc Max file-size (in bytes) allowed for scanning. The
* default value of 2147483648 (2GB) is taken if not
* provided at the time of creating a policy.
* Attributes: optional-for-create, modifiable
*
* @element paths-to-exclude
* @type file-path[], optional
* @desc File-paths for which On-Access scanning must not be
* performed.
* Attributes: optional-for-create, modifiable
*
* @element file-ext-to-exclude
* @type file-extension[], optional
* @desc File-Extensions for which On-Access scanning must not be
* performed.
* Attributes: optional-for-create, modifiable
*
*
* *****/

```

vscan-on-access-policy-create

```

/*****
*
* @api vscan-on-access-policy-create
* @desc Create an On-Access policy.
*
* @status supported
*
* @readonly false
* @errno EINVALINPUTERROR
* @errno EINTERNALERROR
* @errno EOPNOTSUPPORTED
* @errno E_VSERVER_TYPE_NOT_SUPPORTED
* @errno EVSERVERNOTFOUND
* @errno E_OA_POLICY_EXISTS
* @errno E_OA_POLICY_CANNOT_CREATE_MAX_LIMIT
*
* @namespace filer
* @family ontap-vserver
*
* @input policy-name
* @type policy-name
* @desc Name of the policy.
*
* @input protocol
* @type vscan-protocol
* @desc File-Access protocol to monitor for On-Access scanning.
* Possible values:
* <ul>
* <li> "cifs" - CIFS Protocol
* </ul>
*
* @input filters
* @type vscan-on-access-policy-filter[], optional
* @desc Filters.
* Possible values:
* <ul>
* <li> "scan_mandatory" - Enable mandatory scan,
* <li> "scan_ro_volume" - Enable scans for read-only
* volume,
* <li> "scan_execute_access" - Scan only files opened with
* execute-access (CIFS only)
* </ul>
*
* @input max-file-size
* @type size, optional
* @desc Max file-size (in bytes) allowed for scanning. The default value
* of 2147483648 (2GB) is taken if not provided at the time of
* creating a policy.
*
* @input paths-to-exclude
* @type file-path[], optional
* @desc File-paths for which On-Access scanning must not be performed.
*
* @input file-ext-to-exclude
* @type file-extension[], optional
* @desc File-Extensions for which On-Access scanning must not be
* performed.
*
* @input return-record
* @type boolean, optional
* @desc If set to true, returns the vscan-on-access-policy on successful
* creation.
* Default: false
*
* @output result

```

```

* @type      vscan-on-access-policy-info, optional
* @desc      The vscan-on-access-policy created (keys or the entire object if
*             requested)
*
*****/

```

vscan-on-access-policy-delete

```

/*****
*
* @api      vscan-on-access-policy-delete
* @desc      Delete an On-Access policy.
* @status    supported
*
* @readonly  false
* @errno     EINVALIDINPUTERROR
* @errno     EINTERNALERROR
* @errno     EVSERVERNOTFOUND
* @errno     E_OA_POLICY_NOT_FOUND
* @errno     EAPIPRIVILEGE
* @errno     E_OA_POLICY_CANNOT_DELETE
* @errno     ERESOURCEINUSE
*
* @namespace filer
* @family    ontap-vserver
*
* @input     policy-name
* @type      policy-name
* @desc      Name of the policy.
*
*****/

```

vscan-on-access-policy-modify

```

/*****
*
* @api      vscan-on-access-policy-modify
* @desc      Modify an On-Access policy.
* @status    supported
*
* @readonly  false
* @errno     EINVALIDINPUTERROR
* @errno     EINTERNALERROR
* @errno     EVSERVERNOTFOUND
* @errno     E_OA_POLICY_NOT_FOUND
* @errno     EAPIPRIVILEGE
*
* @namespace filer
* @family    ontap-vserver
*
* @input     policy-name
* @type      policy-name
* @desc      Name of the policy.
*
* @input     filters
* @type      vscan-on-access-policy-filter[], optional
* @desc      Filters.
*             Possible values:
*             <ul>
*             <li> "scan_mandatory"      - Enable mandatory scan,
*             <li> "scan_ro_volume"     - Enable scans for read-only
*             volume,
*             <li> "scan_execute_access" - Scan only files opened with
*             execute-access (CIFS only)
*             </ul>
*
* @input     max-file-size
* @type      size, optional
* @desc      Max file-size (in bytes) allowed for scanning. The default value
*             of 2147483648 (2GB) is taken if not provided at the time of
*             creating a policy.
*
* @input     paths-to-exclude
* @type      file-path[], optional
* @desc      File-paths for which On-Access scanning must not be performed.
*
* @input     file-ext-to-exclude
* @type      file-extension[], optional
* @desc      File-Extensions for which On-Access scanning must not be
*             performed.
*
*****/

```

vscan-on-access-policy-status-modify

```

/*****
*
* @api      vscan-on-access-policy-status-modify
* @desc      Modify On-Access policy status.
*
* @status    supported
*
* @readonly  false
* @errno     EINVALIDINPUTERROR
* @errno     EINTERNALERROR
* @errno     EOPNOTSUPPORTED
* @errno     E_VSERVER_TYPE_NOT_SUPPORTED
* @errno     EVSERVERNOTFOUND
* @errno     E_OA_POLICY_NOT_FOUND
* @errno     ERESOURCEINUSE
*
* @namespace filer

```

```

* @family      ontap-vserver
*
* @input       policy-name
* @type        policy-name
* @desc        Name of the policy.
*
* @input       policy-status
* @type        boolean
* @desc        Policy Status
*
*****/

```

vsan-scanner-pool-get-iter-key-td

```

/*****
*
* @typedef      vsan-scanner-pool-get-iter-key-td
* @namespace    filer
* @desc         Key typedef for table vsan_scanner_pool_byname
*
* @element      key-0
* @type         string, optional
* @desc         Field vserver
*
* @element      key-1
* @type         string, optional
* @desc         Field scanner_pool
*
* @typedef      ip-address
* @namespace    filer
* @type         string
* @desc         IPv4 and IPv6 address
*
* @typedef      privileged-user
* @namespace    filer
* @type         string
* @desc         Privileged user
*
* @typedef      scanner-policy
* @namespace    filer
* @type         string
* @desc         Policy applied to a Vscan scanner pool
*
* @typedef      scanner-pool
* @namespace    filer
* @type         string
* @desc         Scanner pool is a set of attributes which are used to validate
*               and manage connections between clustered ONTAP and Vscan servers
*               (virus scanners).
*
*****/

```

vsan-scanner-pool-get-iter

```

/*****
*
* @api          vsan-scanner-pool-get-iter
* @desc         Returns list of scanner pools. Scanner pool is a set of
*               attributes which are used to validate and manage connections
*               between clustered Data ONTAP and Vscan servers (virus scanners).
* @status       supported
*
* @readonly     true
* @errno        EINVALIDINPUTERROR
* @errno        EINTERNALERROR
* @errno        EVSERVERNOTFOUND
* @errno        E_SCANNER_POOL_NOT_FOUND
*
* @namespace    filer
* @family       ontap-cluster,ontap-vserver
*
* @input        max-records
* @type         integer, optional
* @range        [1..2^32-1]
* @desc         The maximum number of records to return in this call.
*               Default: 20
*
* @input        tag
* @type         string, optional
* @desc         Specify the tag from the last call.
*               It is usually not specified for the first call. For subsequent
*               calls, copy values from the 'next-tag' obtained from the previous
*               call.
*
* @input        query
* @type         vsan-scanner-pool-info, optional
* @desc         A query that specifies which objects to return.
*               A query could be specified on any number of attributes in the
*               vsan-scanner-pool object.
*               All vsan-scanner-pool objects matching this query up to
*               'max-records' will be returned.
*
* @input        desired-attributes
* @type         vsan-scanner-pool-info, optional
* @desc         Specify the attributes that should be returned.
*               If not present, all attributes for which information is available
*               will be returned.
*               If present, only the desired attributes for which information is
*               available will be returned.
*
* @output       num-records

```

```

* @type      integer
* @range     [0..2^32-1]
* @desc      The number of records returned in this call.
*
* @output    attributes-list
* @desc      The list of attributes of vscan-scanner-pool objects.
* @type      vscan-scanner-pool-info[], optional
*
* @output    next-tag
* @type      string, optional
* @desc      Tag for the next call.
*
*            Not present when there are no more vscan-scanner-pool objects to
*            return.
*
* @typedef   vscan-scanner-pool-info
* @desc      Vscan scanner pool information.
*
*            When returned as part of the output, all elements of this typedef
*            are reported, unless limited by a set of desired attributes
*            specified by the caller.
*
*            <p>
*            When used as input to specify desired attributes to return,
*            omitting a given element indicates that it shall not be returned
*            in the output. In contrast, by providing an element (even with
*            no value) the caller ensures that a value for that element will
*            be returned, given that the value can be retrieved.
*
*            <p>
*            When used as input to specify queries, any element can be omitted
*            in which case the resulting set of objects is not constrained by
*            any specific value of that attribute.
*
* @element   vserver
* @type      string, optional
* @desc      Vserver
*            Attributes: key, non-creatable, non-modifiable
*
* @element   scanner-pool
* @type      scanner-pool, optional
* @desc      Scanner pool is a set of attributes which are used to
*            validate and manage connections between clustered Data
*            ONTAP and Vscan servers (virus scanners).
*            Attributes: key, required-for-create, non-modifiable
*
* @element   scanner-policy
* @type      scanner-policy, optional
* @desc      Scanner policy. Currently only system policies are
*            supported.
*            <p>
*            Possible values:
*            <ul>
*            <li> 'primary' - Makes it active always,
*            <li> 'secondary' - Makes it active only when no
*            primary Vscan server is connected,
*            <li> 'idle' - Makes it inactive always
*            </ul>
*            Attributes: non-creatable, non-modifiable
*
* @element   is-currently-active
* @type      boolean, optional
* @desc      Current status of a scanner pool.
*            Attributes: non-creatable, non-modifiable
*
* @element   admin-owner
* @type      vscan-config-owner, optional
* @desc      Owner of the scanner pool.
*            Attributes: non-creatable, non-modifiable
*            Possible values:
*            <ul>
*            <li> "vserver" - Vserver Admin,
*            <li> "cluster" - Cluter Admin
*            </ul>
*
* @element   servers
* @type      ip-address[], optional
* @desc      List of IP addresses of Vscan servers which are allowed
*            to connect to clustered Data ONTAP.
*            Attributes: required-for-create, modifiable
*
* @element   privileged-users
* @type      privileged-user[], optional
* @desc      List of privileged users.
*            Attributes: required-for-create, modifiable
*
* @element   request-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Total request-service time-limit in seconds. The default
*            value of 30 is taken if not provided while creating a
*            scanner pool.
*            Attributes: optional-for-create, modifiable
*
* @element   scan-queue-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Scan-queue wait-time-limit in seconds. The default value
*            of 20 is taken if not provided while creating a scanner
*            pool.
*            Attributes: optional-for-create, modifiable
*
* @element   session-setup-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Total session-setup time-limit in seconds. The default
*            value of 10 is taken if not provided while creating a
*            scanner pool.
*            Attributes: optional-for-create, modifiable
*
* @element   session-teardown-timeout

```

```

*      @type      integer, optional
*      @range     [0..2^32-1]
*      @desc      Total session-teardown time-limit in seconds. The default
*                  value of 10 is taken if not provided while creating a
*                  scanner pool.
*                  Attributes: optional-for-create, modifiable
*
*      @element   max-session-setup-retries
*      @type      integer, optional
*      @range     [0..2^32-1]
*      @desc      Maximum number of consecutive session-setup attempts. The
*                  default value of 5 is taken if not provided while
*                  creating a scanner pool.
*                  Attributes: optional-for-create, modifiable
*
*****/

```

vscan-scanner-pool-create

```

/*****
*
* @api      vscan-scanner-pool-create
* @desc     Create a virus scanner pool, which is used for validating and
*            managing connections between clustered Data ONTAP and Vscan
*            servers.
*
* @status   supported
*
* @readonly false
* @errno    EINVALIDINPUTERROR
* @errno    EINTERNALERROR
* @errno    EOPNOTSUPPORTED
* @errno    E_VSERVER_TYPE_NOT_SUPPORTED
* @errno    EVSERVERNOTFOUND
* @errno    E_SCANNER_POOL_EXISTS
* @errno    E_SCANNER_POOL_CANNOT_CREATE_MAX_LIMIT
*
* @namespace filer
* @family    ontap-vserver
*
* @input     scanner-pool
* @type      scanner-pool
* @desc      Name of the virus scanner pool.
*
* @input     servers
* @type      ip-address[]
* @desc      List of IP addresses of Vscan servers which are allowed to
*            connect to clustered Data ONTAP.
*
* @input     privileged-users
* @type      privileged-user[]
* @desc      List of privileged users.
*
* @input     request-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Total request-service time-limit in seconds. The default value of
*            30 is taken if not provided while creating a scanner pool.
*
* @input     scan-queue-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Scan-queue wait-time-limit in seconds. The default value of 20 is
*            taken if not provided while creating a scanner pool.
*
* @input     session-setup-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Total session-setup time-limit in seconds. The default value of
*            10 is taken if not provided while creating a scanner pool.
*
* @input     session-teardown-timeout
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Total session-teardown time-limit in seconds. The default value
*            of 10 is taken if not provided while creating a scanner pool.
*
* @input     max-session-setup-retries
* @type      integer, optional
* @range     [0..2^32-1]
* @desc      Maximum number of consecutive session-setup attempts. The default
*            value of 5 is taken if not provided while creating a scanner
*            pool.
*
* @input     return-record
* @type      boolean, optional
* @desc      If set to true, returns the vscan-scanner-pool on successful
*            creation.
*            Default: false
*
* @output    result
* @type      vscan-scanner-pool-info, optional
* @desc      The vscan-scanner-pool created (keys or the entire object if
*            requested)
*
*****/

```

vscan-scanner-pool-delete

```

/*****
*
* @api      vscan-scanner-pool-delete
* @desc     Delete a scanner pool.
* @status   supported
*

```

```

* @readonly    false
* @errno       EINVALINPUTERROR
* @errno       EINTERNALERROR
* @errno       EVSERVERNOTFOUND
* @errno       E_SCANNER_POOL_NOT_FOUND
* @errno       EAPIPRIVILEGE
* @errno       E_ONLY_SCANNER_POOL_ACTIVE
* @errno       ERESOURCEINUSE
*
* @namespace   filer
* @family      ontap-vserver
*
* @input       scanner-pool
* @type        scanner-pool
* @desc        Name of the virus scanner pool.
*
*****/

```

vscan-scanner-pool-modify

```

/*****
*
* @api         vscan-scanner-pool-modify
* @desc        Modify a scanner pool.
* @status      supported
*
* @readonly    false
* @errno       EINVALINPUTERROR
* @errno       EINTERNALERROR
* @errno       EVSERVERNOTFOUND
* @errno       E_SCANNER_POOL_NOT_FOUND
* @errno       EAPIPRIVILEGE
*
* @namespace   filer
* @family      ontap-vserver
*
* @input       scanner-pool
* @type        scanner-pool
* @desc        Name of the virus scanner pool.
*
* @input       servers
* @type        ip-address[], optional
* @desc        List of IP addresses of Vscan servers which are allowed to
                connect to clustered Data ONTAP.
*
* @input       privileged-users
* @type        privileged-user[], optional
* @desc        List of privileged users.
*
* @input       request-timeout
* @type        integer, optional
* @range       [0..2^32-1]
* @desc        Total request-service time-limit in seconds. The default value of
                30 is taken if not provided while creating a scanner pool.
*
* @input       scan-queue-timeout
* @type        integer, optional
* @range       [0..2^32-1]
* @desc        Scan-queue wait-time-limit in seconds. The default value of 20 is
                taken if not provided while creating a scanner pool.
*
* @input       session-setup-timeout
* @type        integer, optional
* @range       [0..2^32-1]
* @desc        Total session-setup time-limit in seconds. The default value of
                10 is taken if not provided while creating a scanner pool.
*
* @input       session-teardown-timeout
* @type        integer, optional
* @range       [0..2^32-1]
* @desc        Total session-teardown time-limit in seconds. The default value
                of 10 is taken if not provided while creating a scanner pool.
*
* @input       max-session-setup-retries
* @type        integer, optional
* @range       [0..2^32-1]
* @desc        Maximum number of consecutive session-setup attempts. The default
                value of 5 is taken if not provided while creating a scanner
                pool.
*
*****/

```

vscan-scanner-pool-apply-policy

```

/*****
*
* @api         vscan-scanner-pool-apply-policy
* @desc        Apply scanner-policy to a scanner pool.
*
* @status      supported
*
* @readonly    false
* @errno       EINVALINPUTERROR
* @errno       EINTERNALERROR
* @errno       EOPNOTSUPPORTED
* @errno       E_VSERVER_TYPE_NOT_SUPPORTED
* @errno       EVSERVERNOTFOUND
* @errno       E_SCANNER_POOL_NOT_FOUND
* @errno       E_ONLY_SCANNER_POOL_ACTIVE
*
* @namespace   filer
* @family      ontap-vserver
*
* @input       scanner-pool
* @type        scanner-pool

```

```

* @desc      Name of the virus scanner pool.
*
* @input     scanner-policy
* @type      scanner-policy
* @desc      Scanner Policy
*
*****/

```

vscan-active-scanner-pool-get-iter-key-td

```

*****
*
* @typedef    vscan-active-scanner-pool-get-iter-key-td
* @namespace  filer
* @desc      Key typedef for table vscan_active_scanner_pool_byname
*
*           @element    key-0
*           @type        string, optional
*           @desc        Field vserver
*
*
*****/

```

vscan-active-scanner-pool-get-iter

```

*****
*
* @api        vscan-active-scanner-pool-get-iter
* @desc      Returns active scanner pool configuration of a vserver.
* @status     supported
*
* @readonly   true
* @errno      EINVALINPUTERROR
* @errno      EINTERNALERROR
* @errno      EVSERVERNOTFOUND
*
* @namespace  filer
* @family     ontap-cluster,ontap-vserver
*
* @input      max-records
* @type       integer, optional
* @range      [1..2^32-1]
* @desc      The maximum number of records to return in this call.
*            Default: 20
*
* @input      tag
* @type       string, optional
* @desc      Specify the tag from the last call.
*            It is usually not specified for the first call. For subsequent
*            calls, copy values from the 'next-tag' obtained from the previous
*            call.
*
* @input      query
* @type       vscan-active-scanner-pool-info, optional
* @desc      A query that specifies which objects to return.
*            A query could be specified on any number of attributes in the
*            vscan-active-scanner-pool object.
*            All vscan-active-scanner-pool objects matching this query up to
*            'max-records' will be returned.
*
* @input      desired-attributes
* @type       vscan-active-scanner-pool-info, optional
* @desc      Specify the attributes that should be returned.
*            If not present, all attributes for which information is available
*            will be returned.
*            If present, only the desired attributes for which information is
*            available will be returned.
*
* @output     num-records
* @type       integer
* @range      [0..2^32-1]
* @desc      The number of records returned in this call.
*
* @output     attributes-list
* @desc      The list of attributes of vscan-active-scanner-pool objects.
* @type       vscan-active-scanner-pool-info[], optional
*
* @output     next-tag
* @type       string, optional
* @desc      Tag for the next call.
*            Not present when there are no more vscan-active-scanner-pool
*            objects to return.
*
* @typedef    vscan-active-scanner-pool-info
* @desc      Vscan active scanner pool information.
*
*
*            When returned as part of the output, all elements of this typedef
*            are reported, unless limited by a set of desired attributes
*            specified by the caller.
*
*            <p>
*            When used as input to specify desired attributes to return,
*            omitting a given element indicates that it shall not be returned
*            in the output. In contrast, by providing an element (even with
*            no value) the caller ensures that a value for that element will
*            be returned, given that the value can be retrieved.
*
*            <p>
*            When used as input to specify queries, any element can be omitted
*            in which case the resulting set of objects is not constrained by
*            any specific value of that attribute.
*
*           @element    vserver
*           @type        string, optional
*           @desc        Vserver

```

```

*
*                               Attributes: key, non-creatable, non-modifiable
*
* @element      scanner-pools
* @type         scanner-pool[], optional
* @desc        List of active scanner pools on a vserver.
*              Attributes: non-creatable, non-modifiable
*
* @element      servers
* @type         ip-address[], optional
* @desc        List of allowed Vscan servers IP for a vserver. A Vscan
*              server is allowed to connect to the clustered Data ONTAP
*              only if its IP is part of this list.
*              Attributes: non-creatable, non-modifiable
*
* @element      privileged-users
* @type         privileged-user[], optional
* @desc        List of privileged users for a vserver. Vscan server is
*              given privileged access to the clustered Data ONTAP only
*              if it uses one of these users.
*              Attributes: non-creatable, non-modifiable
*
* @element      request-timeout
* @type         integer, optional
* @range        [0..2^32-1]
* @desc        Total request-service time-limit in seconds. This is set
*              to the max of the request-timeouts of all active scanner
*              pools on a vserver.
*              Attributes: non-creatable, non-modifiable
*
* @element      scan-queue-timeout
* @type         integer, optional
* @range        [0..2^32-1]
* @desc        Scan-queue wait-time-limit in seconds. This is set to the
*              max of the scan-queue-timeouts of all active scanner
*              pools on a vserver.
*              Attributes: non-creatable, non-modifiable
*
* @element      session-setup-timeout
* @type         integer, optional
* @range        [0..2^32-1]
* @desc        Total session-setup time-limit in seconds. This is set to
*              the max of the session-setup-timeouts of all active
*              scanner pools on a vserver.
*              Attributes: non-creatable, non-modifiable
*
* @element      session-teardown-timeout
* @type         integer, optional
* @range        [0..2^32-1]
* @desc        Total session-teardown time-limit in seconds. This is set
*              to the max of the session-teardown-timeouts of all active
*              scanner pools on a vserver.
*              Attributes: non-creatable, non-modifiable
*
* @element      max-session-setup-retries
* @type         integer, optional
* @range        [0..2^32-1]
* @desc        Maximum number of consecutive session-setup attempts.
*              This is set to the max of max-session-setup-retries of
*              all active scanner pools on a vserver.
*              Attributes: non-creatable, non-modifiable
*
* *****/

```

vscan-reset

```

/*****
*
* @api      vscan-reset
* @desc     Discard cached information of files that have been successfully
*           scanned.
*
* @status   supported
*
* @readonly false
* @errno    EINTERNALERROR
* @errno    EOPNOTSUPPORTED
* @errno    E_VSERVER_TYPE_NOT_SUPPORTED
* @errno    EVSERVERNOTFOUND
*
* @namespace filer
* @family   ontap-vserver
*
* *****/

```

vscan-connection-extended-stats-get-iter-key-td

```

/*****
*
* @typedef   vscan-connection-extended-stats-get-iter-key-td
* @namespace filer
* @desc     Key typedef for table vscan_connection_extended_stats_byname
*
* @element  key-0
* @type     string, optional
* @desc     Field node
*
* @element  key-1
* @type     string, optional
* @desc     Field vserver
*
* @element  key-2
* @type     string, optional
* @desc     Field server
*
* @typedef  node-name

```

```

* @namespace filer
* @type string
* @desc The node's name
*
*
* @typedef vscan-scanner-type
* @namespace filer
* @type string
* @desc Server type
*
*
* Possible values:
* <ul>
* <li> "primary" - Primary,
* <li> "backup" - Backup
* </ul>
*
* @typedef vscan-server-status
* @namespace filer
* @type string
* @desc Status
*
*
* Possible values:
* <ul>
* <li> "disconnected" - Disconnected,
* <li> "disconnecting" - Disconnecting,
* <li> "connecting" - Connecting,
* <li> "connected" - Connected
* </ul>
*
*
*****/

```

vscan-connection-extended-stats-get-iter

```

/*****
*
* @api vscan-connection-extended-stats-get-iter
* @desc Returns connection status.
* @status supported
*
* @readonly true
* @errno EINVALINPUTERROR
* @errno EINTERNALERROR
* @errno EVSERVERNOTFOUND
* @errno ENODENOTFOUND
* @errno E_SCANNER_POOL_NOT_FOUND
*
* @namespace filer
* @family ontap-cluster,ontap-vserver
*
* @input max-records
* @type integer, optional
* @range [1..2^32-1]
* @desc The maximum number of records to return in this call.
* Default: 20
*
* @input tag
* @type string, optional
* @desc Specify the tag from the last call.
* It is usually not specified for the first call. For subsequent
* calls, copy values from the 'next-tag' obtained from the previous
* call.
*
* @input query
* @type vscan-connection-extended-stats-info, optional
* @desc A query that specifies which objects to return.
* A query could be specified on any number of attributes in the
* vscan-connection-extended-stats object.
* All vscan-connection-extended-stats objects matching this query
* up to 'max-records' will be returned.
*
* @input desired-attributes
* @type vscan-connection-extended-stats-info, optional
* @desc Specify the attributes that should be returned.
* If not present, all attributes for which information is available
* will be returned.
* If present, only the desired attributes for which information is
* available will be returned.
*
* @output num-records
* @type integer
* @range [0..2^32-1]
* @desc The number of records returned in this call.
*
* @output attributes-list
* @desc The list of attributes of vscan-connection-extended-stats
* objects.
* @type vscan-connection-extended-stats-info[], optional
*
* @output next-tag
* @type string, optional
* @desc Tag for the next call.
* Not present when there are no more
* vscan-connection-extended-stats objects to return.
*
* @typedef vscan-connection-extended-stats-info
* @desc Vscan connection extended statistics.
*
*
* When returned as part of the output, all elements of this typedef
* are reported, unless limited by a set of desired attributes
* specified by the caller.
*
*
* <p>
* When used as input to specify desired attributes to return,
* omitting a given element indicates that it shall not be returned
* in the output. In contrast, by providing an element (even with
* no value) the caller ensures that a value for that element will
* be returned, given that the value can be retrieved.
*
*

```

```

*
*      <p>
*      When used as input to specify queries, any element can be omitted
*      in which case the resulting set of objects is not constrained by
*      any specific value of that attribute.
*
*      @element      node
*      @type          node-name, optional
*      @desc          Cluster node to which this connection is applicable.
*                    Attributes: key, non-creatable, non-modifiable
*
*      @element      vserver
*      @type          string, optional
*      @desc          Vserver
*                    Attributes: key, non-creatable, non-modifiable
*
*      @element      server
*      @type          ip-address, optional
*      @desc          IP of the Vscan server.
*                    Attributes: key, non-creatable, non-modifiable
*
*      @element      server-status
*      @type          vscan-server-status, optional
*      @desc          Status of the connection.
*                    Attributes: non-creatable, non-modifiable
*                    Possible values:
*
*      <ul>
*      <li> "disconnected"    - Disconnected,
*      <li> "disconnecting"   - Disconnecting,
*      <li> "connecting"      - Connecting,
*      <li> "connected"       - Connected
*      </ul>
*
*      @element      server-type
*      @type          vscan-scanner-type, optional
*      @desc          Server type.
*                    Attributes: non-creatable, non-modifiable
*                    Possible values:
*
*      <ul>
*      <li> "primary"         - Primary,
*      <li> "backup"          - Backup
*      </ul>
*
*      @element      vendor
*      @type          string, optional
*      @desc          Name of virus-scanner vendor.
*                    Attributes: non-creatable, non-modifiable
*
*      @element      version
*      @type          string, optional
*      @desc          Version of virus-scanner.
*                    Attributes: non-creatable, non-modifiable
*
*      @element      extended-stats
*      @type          string[], optional
*      @desc          Vscanner's extended statistics.
*                    Attributes: non-creatable, non-modifiable
*
*      *****/

```

vscan-connection-status-all-get-iter-key-td

```

/*****
*
* @typedef      vscan-connection-status-all-get-iter-key-td
* @namespace    filer
* @desc        Key typedef for table vscan_connection_status_all_byname
*
*      @element      key-0
*      @type          string, optional
*      @desc          Field node
*
*      @element      key-1
*      @type          string, optional
*      @desc          Field vserver
*
*      @element      key-2
*      @type          string, optional
*      @desc          Field server
*
* @typedef      datetime
* @namespace    filer
* @type          integer
* @desc        The number of seconds since January 1, 1970.
*
*      Range : [0..2^31-1].
*
* @typedef      node-name
* @namespace    filer
* @type          string
* @desc        The node's name
*
* @typedef      vscan-disconnect-reason
* @namespace    filer
* @type          string
* @desc        reason
*
*      Possible values:
*
*      <ul>
*      <li> "na"                - Not applicable,
*      <li> "vscan_disabled"   - Vscan disabled on the
*      vserver,
*      <li> "no_data_lif"      - Vserver does not have data
*      lif on the node,
*      <li> "session_uninitialized" - Session not initialized,
*      <li> "remote_closed"    - Closure from Server,

```

```

*         <li> "invalid_protocol_msg"      - Invalid protocol-message
*     received,
*         <li> "invalid_session_id"        - Invalid session-id received,
*         <li> "inactive_connection"       - No activity on connection
*     </ul>
*
* @typedef   vscan-scanner-type
* @namespace filer
* @type      string
* @desc      Type
*
*           Possible values:
*           <ul>
*           <li> "primary"    - Primary,
*           <li> "backup"     - Backup
*           </ul>
*
* @typedef   vscan-server-status
* @namespace filer
* @type      string
* @desc      Status
*
*           Possible values:
*           <ul>
*           <li> "disconnected" - Disconnected,
*           <li> "disconnecting" - Disconnecting,
*           <li> "connecting"   - Connecting,
*           <li> "connected"    - Connected
*           </ul>
*
* *****/

```

vscan-connection-status-all-get-iter

```

/*****
*
* @api       vscan-connection-status-all-get-iter
* @desc      Returns connection status.
* @status    supported
*
* @readonly  true
* @errno     EINVALIDINPUTERROR
* @errno     EINTERNALERROR
* @errno     EVSERVERNOTFOUND
* @errno     ENODENOTFOUND
* @errno     E_SCANNER_POOL_NOT_FOUND
*
* @namespace filer
* @family    ontap-cluster,ontap-vserver
*
* @input     max-records
* @type      integer, optional
* @range     [1..2^32-1]
* @desc      The maximum number of records to return in this call.
*           Default: 20
*
* @input     tag
* @type      string, optional
* @desc      Specify the tag from the last call.
*           It is usually not specified for the first call. For subsequent
*           calls, copy values from the 'next-tag' obtained from the previous
*           call.
*
* @input     query
* @type      vscan-connection-status-all-info, optional
* @desc      A query that specifies which objects to return.
*           A query could be specified on any number of attributes in the
*           vscan-connection-status-all object.
*           All vscan-connection-status-all objects matching this query up to
*           'max-records' will be returned.
*
* @input     desired-attributes
* @type      vscan-connection-status-all-info, optional
* @desc      Specify the attributes that should be returned.
*           If not present, all attributes for which information is available
*           will be returned.
*           If present, only the desired attributes for which information is
*           available will be returned.
*
* @output     num-records
* @type      integer
* @range     [0..2^32-1]
* @desc      The number of records returned in this call.
*
* @output     attributes-list
* @desc      The list of attributes of vscan-connection-status-all objects.
* @type      vscan-connection-status-all-info[], optional
*
* @output     next-tag
* @type      string, optional
* @desc      Tag for the next call.
*           Not present when there are no more vscan-connection-status-all
*           objects to return.
*
* @typedef   vscan-connection-status-all-info
* @desc      Vscan connection status information.
*
*           When returned as part of the output, all elements of this typedef
*           are reported, unless limited by a set of desired attributes
*           specified by the caller.
*
*           <p>
*           When used as input to specify desired attributes to return,
*           omitting a given element indicates that it shall not be returned
*           in the output. In contrast, by providing an element (even with
*           no value) the caller ensures that a value for that element will
*           be returned, given that the value can be retrieved.
*
* *****/

```

```

*      <p>
*      When used as input to specify queries, any element can be omitted
*      in which case the resulting set of objects is not constrained by
*      any specific value of that attribute.
*
*      @element      node
*      @type          node-name, optional
*      @desc          Cluster node to which this connection is applicable.
*                    Attributes: key, non-creatable, non-modifiable
*
*      @element      vserver
*      @type          string, optional
*      @desc          Vserver
*                    Attributes: key, non-creatable, non-modifiable
*
*      @element      server
*      @type          ip-address, optional
*      @desc          IP of the Vscan server.
*                    Attributes: key, non-creatable, non-modifiable
*
*      @element      server-status
*      @type          vscan-server-status, optional
*      @desc          Status of the connection.
*                    Attributes: non-creatable, non-modifiable
*                    Possible values:
*      <ul>
*      <li> "disconnected" - Disconnected,
*      <li> "disconnecting" - Disconnecting,
*      <li> "connecting" - Connecting,
*      <li> "connected" - Connected
*      </ul>
*
*      @element      server-type
*      @type          vscan-scanner-type, optional
*      @desc          Server type.
*                    Attributes: non-creatable, non-modifiable
*                    Possible values:
*      <ul>
*      <li> "primary" - Primary,
*      <li> "backup" - Backup
*      </ul>
*
*      @element      disconnect-reason
*      @type          vscan-disconnect-reason, optional
*      @desc          Reason for disconnection.
*                    Attributes: non-creatable, non-modifiable
*                    Possible values:
*      <ul>
*      <li> "na" - Not applicable,
*      <li> "vscan_disabled" - Vscan disabled on the
*      vserver,
*      <li> "no_data_lif" - Vserver does not have
*      data lif on the node,
*      <li> "session_uninitialized" - Session not
*      initialized,
*      <li> "remote_closed" - Closure from Server,
*      <li> "invalid_protocol_msg" - Invalid
*      protocol-message received,
*      <li> "invalid_session_id" - Invalid session-id
*      received,
*      <li> "inactive_connection" - No activity on
*      connection
*      </ul>
*
*      @element      disconnected-since
*      @type          datetime, optional
*      @desc          Time when Vscan server was disconnected.
*                    Attributes: non-creatable, non-modifiable
*
*      @element      vendor
*      @type          string, optional
*      @desc          Name of virus-scanner vendor.
*                    Attributes: non-creatable, non-modifiable
*
*      @element      version
*      @type          string, optional
*      @desc          Version of virus-scanner.
*                    Attributes: non-creatable, non-modifiable
*
*      @element      privileged-user
*      @type          string, optional
*      @desc          Privileged user, which is used for the connection between
*      clustered Data ONTAP and the Vscan server.
*                    Attributes: non-creatable, non-modifiable
*
*      @element      connected-since
*      @type          datetime, optional
*      @desc          Time when Vscan server was connected.
*                    Attributes: non-creatable, non-modifiable
*
*      *****/

```

cifs-share-get-iter (Modified)

```

/*****
*
* @api      cifs-share-get-iter
* @desc     Gives information about one or more CIFS shares.
* @status   supported
*
* @readonly true
* @errno    EINTERNALERROR
*
* @namespace filer
* @family   ontap-cluster,ontap-vserver

```

```

*
* @input      max-records
* @type       integer, optional
* @range      [1..2^32-1]
* @desc       The maximum number of records to return in this call.
*             Default: 20
*
* @input      tag
* @type       string, optional
* @desc       Specify the tag from the last call.
*             It is usually not specified for the first call. For subsequent
*             calls, copy values from the 'next-tag' obtained from the previous
*             call.
*
* @input      query
* @type       cifs-share, optional
* @desc       A query that specifies which objects to return.
*             A query could be specified on any number of attributes in the
*             cifs-share object.
*             All cifs-share objects matching this query up to 'max-records'
*             will be returned.
*
* @input      desired-attributes
* @type       cifs-share, optional
* @desc       Specify the attributes that should be returned.
*             If not present, all attributes for which information is available
*             will be returned.
*             If present, only the desired attributes for which information is
*             available will be returned.
*
* @output     num-records
* @type       integer
* @range      [0..2^32-1]
* @desc       The number of records returned in this call.
*
* @output     attributes-list
* @desc       The list of attributes of cifs-share objects.
* @type       cifs-share[], optional
*
* @output     next-tag
* @type       string, optional
* @desc       Tag for the next call.
*             Not present when there are no more cifs-share objects to return.
*
* @typedef    cifs-share
* @desc       CIFS share configuration.
*
*
*             When returned as part of the output, all elements of this typedef
*             are reported, unless limited by a set of desired attributes
*             specified by the caller.
*
*
* <p>
*             When used as input to specify desired attributes to return,
*             omitting a given element indicates that it shall not be returned
*             in the output. In contrast, by providing an element (even with
*             no value) the caller ensures that a value for that element will
*             be returned, given that the value can be retrieved.
*
*
* <p>
*             When used as input to specify queries, any element can be omitted
*             in which case the resulting set of objects is not constrained by
*             any specific value of that attribute.
*
*
* @element    vserver
* @type       string, optional
* @desc       The name of the Vserver.
*             Attributes: key, required-for-create, non-modifiable
*
*
* @element    share-name
* @type       string, optional
* @desc       The name of the CIFS share. The CIFS share name is a
*             UTF-8 string with the following characters being illegal:
*             control characters from 0x00 to 0x1F, both inclusive,
*             0x22 (double quotes) and the characters \/[|:<>+;,?"*
*             Attributes: key, required-for-create, non-modifiable
*
*
* @element    cifs-server
* @type       string, optional
* @desc       The NetBIOS name of the CIFS server that owns this
*             share.
*             Attributes: non-creatable, non-modifiable
*
*
* @element    path
* @type       string, optional
* @desc       The file system path that is shared through this CIFS
*             share. The path is the full, user visible path relative
*             to the vserver root, and it might be crossing junction
*             mount points. The path is in UTF8 and uses forward slash
*             as directory separator.
*             Attributes: required-for-create, modifiable
*
*
* @element    share-properties
* @type       cifs-share-properties[], optional
* @desc       The list of properties for this CIFS share.
*             Attributes: optional-for-create, modifiable
*             Possible values:
*             <ul>
*             <li> "oplocks" - This specifies that
*             opportunistic locks (client-side caching) are enabled on
*             this share.,
*             <li> "browsable" - This specifies that the share
*             can be browsed by Windows clients.,
*             <li> "showsnapshot" - This specifies that Snapshots
*             can be viewed and traversed by clients.,
*             <li> "changenotify" - This specifies that CIFS
*             clients can request for change notifications for
*             directories on this share.,
*             <li> "homedirectory" - This specifies that the share
*             is added and enabled as part of the CIFS home directory
*             feature. The configuration of this share should be done
*             using CIFS home directory feature interface.,

```

- "attributecache" - This specifies that connections through this share are caching attributes for a short time to improve performance.
- "branchcache" - This specifies that clients connecting to this share can make requests using BranchCache technology that allows them to cache the content in an attempt to reduce WAN utilization from a remote office.
- "continuously_available" - This specifies that clients connecting to this share can open files in a persistent manner. Files opened this way are protected from disruptive events, such as failover and giveback.
- "shadowcopy" - This specifies that the share is pointing to a shadow copy. This attribute cannot be added nor removed from a share.
- "access_based_enumeration" - This specifies that Access Based Enumeration is enabled on this share. ABE-filtered shared folders are visible to a user based on that individual user's access rights, preventing the display of folders or other shared resources that the user does not have rights to access.

```
@element symlink-properties
@type cifs-share-symlink-properties[], optional
@desc This flag controls whether the symlinks under this shared
directory are hidden (option 'hide'), accessible (option
'enable') or are accessible as read-only (option
'read-only' along with option 'enable').
Attributes: optional-for-create, modifiable
Possible values:
<ul>
<li> "enable" ,
<li> "hide" ,
<li> "read_only"
</ul>
```

```
@element file-umask
@type integer, optional
@range [0..777]
@desc The value of this field controls the file mode creation
mask for the CIFS share in qtrees with UNIX or Mixed
security styles. The mask restricts the initial
permissions setting of a newly created file. The input
value is a numeric mode comprising of one to three octal
digits (0-7), derived by adding up the bits with values
4, 2, and 1. The first digit selects permissions for the
user who owns the file: read (4), write (2), and execute
(1); the second selects permissions for other users in
the file's group, with the same values; and the third for
other users not in the file's group, with the same
values.
Attributes: optional-for-create, modifiable
```

```
@element dir-umask
@type integer, optional
@range [0..777]
@desc The value of this field controls the file mode creation
mask for the CIFS share in qtrees with UNIX or Mixed
security styles. The mask restricts the initial
permissions setting of a newly created directory. The
input value is a numeric mode comprising of one to three
octal digits (0-7), derived by adding up the bits with
values 4, 2, and 1. The first digit selects permissions
for the user who owns the file: read (4), write (2), and
execute (1); the second selects permissions for other
users in the file's group, with the same values; and the
third for other users not in the file's group, with the
same values.
Attributes: optional-for-create, modifiable
```

```
@element comment
@type string, optional
@desc This string gives a description of the CIFS share. CIFS
clients see this description when browsing the Vserver's
CIFS shares.
Attributes: optional-for-create, modifiable
```

```
@element acl
@type string[], optional
@desc This string list gives the applicable Access Control list
for the CIFS share. Each list entry is a '/' separated
pair of the User or Group name and the effective
permissions. The permission could be 'Full Control',
'Change', 'Read' or 'No access'. e.g.: If the group is
'Everyone' and the effective permission for this group is
'Change', the entry would be 'Everyone / Change'.
Attributes: non-creatable, non-modifiable
```

```
@element attribute-cache-ttl
@type integer, optional
@range [0..2^32-1]
@desc The lifetime of an entry in the file attribute cache, in
seconds. This value is used if the share has the
'attributecache' property set, which improves the
performance of certain metadata operations in common
workloads. The default is 10 seconds. Raising this value
may improve performance, but the likelihood that stale
metadata will be served increases as well. The value of
this field must be in the range of 1 to 86400.
Attributes: optional-for-create, modifiable
```

```
@element volume
@type string, optional
@desc The name of the volume where the root of the CIFS share
resides.
```

```
@element offline-files-mode
@type string, optional
@desc Mode of the offline file for the CIFS share.
```

```

*
* The default value is manual.
* Possible values:
* <ul>
* <li> "none" - Clients are not permitted to cache
* files for offline access.,
* <li> "manual" - Clients may cache files that are
* explicitly selected by the user for offline use.,
* <li> "documents" - Clients may automatically cache
* files that are used by the user for offline access.,
* <li> "programs" - Clients may automatically cache
* files that are used by the user for offline access and
* may use those files in an offline mode even if the share
* is available.
* </ul>
*
*
* @element vscan-fileop-profile
* @type string, optional
* @desc Profile-set of file-ops to which Vscan On-Access scanning
* will be applicable. The default value is standard, in
* which Vscan is applicable for open, close and rename
* fileops.
* Possible values:
* <ul>
* <li> "no_scan" - Scan is not applicable for any fileop,
* <li> "standard" - Scan is applicable for open, close
* and rename fileops,
* <li> "strict" - Scan is applicable for open, read,
* close and rename fileops,
* <li> "writes_only" - Scan is applicable for close
* fileop only when file is created or modified
* </ul>
*
*
*****/

```

cifs-share-create (Modified)

```

/*****
*
* @api cifs-share-create
* @desc Creates a new CIFS share rooted at the specified path.
*
* @status supported
*
* @readonly false
* @errno EINTERNALERROR
*
* @namespace filer
* @family ontap-vserver
*
* @input share-name
* @type string
* @desc The name of the CIFS share. The CIFS share name is a UTF-8 string
* with the following characters being illegal: control characters
* from 0x00 to 0x1F, both inclusive, 0x22 (double quotes) and the
* characters \[:|<>+;,?*"
*
* @input path
* @type string
* @desc The file system path that is shared through this CIFS share.
*
* @input share-properties
* @type cifs-share-properties[], optional
* @desc The list of properties for this CIFS share.
* Possible values:
* <ul>
* <li> "oplocks" - This specifies that opportunistic locks
* (client-side caching) are enabled on this share.,
* <li> "browsable" - This specifies that the share can be
* browsed by Windows clients.,
* <li> "showsnapshot" - This specifies that Snapshots can be
* viewed and traversed by clients.,
* <li> "changenotify" - This specifies that CIFS clients can
* request for change notifications for directories on this share.,
* <li> "homedirectory" - This specifies that the share is added
* and enabled as part of the CIFS home directory feature. The
* configuration of this share should be done using CIFS home
* directory feature interface. This property can only be set
* during the create process and cannot be altered later.
* <li> "attributecache" - This specifies that connections through
* this share are caching attributes for a short time to improve
* performance.
* <li> "branchcache" - This specifies that clients connecting to
* this share can make requests using BranchCache technology that
* allows them to cache the content in an attempt to reduce WAN
* utilization from a remote office.
* <li> "continuously_available" - This specifies that clients
* connecting to this share can open files in a persistent manner.
* Files opened this way are protected from disruptive events, such
* as failover and giveback.
* <li> "shadowcopy" - This specifies that the share is pointing
* to a shadow copy. This attribute cannot be added nor removed from
* a share.
* <li> "access_based_enumeration" - This specifies that Access
* Based Enumeration is enabled on this share. ABE-filtered shared
* folders are visible to a user based on that individual user's
* access rights, preventing the display of folders or other shared
* resources that the user does not have rights to access.
* </ul>
*
* @input symlink-properties
* @type cifs-share-symlink-properties[], optional
* @desc This flag controls whether the symlinks under this shared
* directory are hidden (option 'hide'), accessible (option
* 'enable') or are accessible as read-only (option 'read-only')
* along with option 'enable').
* Possible values:
* <ul>

```

```

*         <li> "enable"      ,
*         <li> "hide"        ,
*         <li> "read_only"
*     </ul>
*
* @input    file-umask
* @type     integer, optional
* @range    [0..777]
* @desc     The value of this field controls the file mode creation mask for
*           the CIFS share in qtrees with UNIX or Mixed security styles. The
*           mask restricts the initial permissions setting of a newly created
*           file. The input value is a numeric mode comprising of one to
*           three octal digits (0-7), derived by adding up the bits with
*           values 4, 2, and 1. The first digit selects permissions for the
*           user who owns the file: read (4), write (2), and execute (1); the
*           second selects permissions for other users in the file's group,
*           with the same values; and the third for other users not in the
*           file's group, with the same values.
*
* @input    dir-umask
* @type     integer, optional
* @range    [0..777]
* @desc     The value of this field controls the file mode creation mask for
*           the CIFS share in qtrees with UNIX or Mixed security styles. The
*           mask restricts the initial permissions setting of a newly created
*           directory. The input value is a numeric mode comprising of one to
*           three octal digits (0-7), derived by adding up the bits with
*           values 4, 2, and 1. The first digit selects permissions for the
*           user who owns the file: read (4), write (2), and execute (1); the
*           second selects permissions for other users in the file's group,
*           with the same values; and the third for other users not in the
*           file's group, with the same values.
*
* @input    comment
* @type     string, optional
* @desc     This string gives a description of the CIFS share. CIFS clients
*           see this description when browsing the Vserver's CIFS shares.
*
* @input    attribute-cache-ttl
* @type     integer, optional
* @range    [0..2^32-1]
* @desc     The lifetime of an entry in the file attribute cache, in seconds.
*           This value is used if the share has the 'attributecache' property
*           set, which improves the performance of certain metadata
*           operations in common workloads. The default is 10 seconds.
*           Raising this value may improve performance, but the likelihood
*           that stale metadata will be served increases as well. The value
*           of this field must be in the range of 1 to 86400.
*
* @input    offline-files-mode
* @type     string, optional
* @desc     Mode of the offline file for the CIFS share. The default value
*           is manual.
*           Possible values:
*           <ul>
*           <li> "none"        - Clients are not permitted to cache files for
*           offline access.,
*           <li> "manual"     - Clients may cache files that are explicitly
*           selected by the user for offline use.,
*           <li> "documents" - Clients may automatically cache files that
*           are used by the user for offline access.,
*           <li> "programs"  - Clients may automatically cache files that
*           are used by the user for offline access and may use those files
*           in an offline mode even if the share is available.
*           </ul>
*
* @input    vscan-fileop-profile
* @type     string, optional
* @desc     Profile-set of file-ops to which Vscan On-Access scanning will be
*           applicable. The default value is standard, in which Vscan is
*           applicable for open, close and rename fileops.
*           Possible values:
*           <ul>
*           <li> "no_scan"    - Scan is not applicable for any fileop,
*           <li> "standard"   - Scan is applicable for open, close and
*           rename fileops,
*           <li> "strict"     - Scan is applicable for open, read, close
*           and rename fileops,
*           <li> "writes_only" - Scan is applicable for close fileop only
*           when file is created or modified
*           </ul>
*
* @input    return-record
* @type     boolean, optional
* @desc     If set to true, returns the cifs-share on successful creation.
*           Default: false
*
* @output    result
* @type     cifs-share, optional
* @desc     The cifs-share created (keys or the entire object if requested)
*
* *****/

```

cifs-share-modify (Modified)

```

/*****
*
* @api      cifs-share-modify
* @desc     Modifies settings of a CIFS share, even if the shares are in
*           use.
* @status   supported
*
* @readonly false
* @errno    EOBJECTNOTFOUND
* @errno    EINTERNALERROR
*
* @namespace filer

```

```

* @family      ontap-vserver
*
* @input       share-name
* @type        string
* @desc        The name of the CIFS share. The CIFS share name is a UTF-8 string
*              with the following characters being illegal: control characters
*              from 0x00 to 0x1F, both inclusive, 0x22 (double quotes) and the
*              characters \[|:|<>+;,?*"
*
* @input       path
* @type        string, optional
* @desc        The file system path that is shared through this CIFS share.
*
* @input       share-properties
* @type        cifs-share-properties[], optional
* @desc        The list of properties for this CIFS share.
*              Possible values:
*              <ul>
*              <li> "oplocks" - This specifies that opportunistic locks
*              (client-side caching) are enabled on this share.,
*              <li> "browsable" - This specifies that the share can be
*              browsed by Windows clients.,
*              <li> "showsnapshot" - This specifies that Snapshots can be
*              viewed and traversed by clients.,
*              <li> "changenotify" - This specifies that CIFS clients can
*              request for change notifications for directories on this share.,
*              <li> "homedirectory" - This specifies that the share is added
*              and enabled as part of the CIFS home directory feature. The
*              configuration of this share should be done using CIFS home
*              directory feature interface. This property cannot be added or
*              removed from existing share.
*              <li> "attributecache" - This specifies that connections through
*              this share are caching attributes for a short time to improve
*              performance.
*              <li> "branchcache" - This specifies that clients connecting to
*              this share can make requests using BranchCache technology that
*              allows them to cache the content in an attempt to reduce WAN
*              utilization from a remote office.
*              <li> "continuously_available" - This specifies that clients
*              connecting to this share can open files in a persistent manner.
*              Files opened this way are protected from disruptive events, such
*              as failover and giveback.
*              <li> "shadowcopy" - This specifies that the share is pointing
*              to a shadow copy. This attribute cannot be added nor removed from
*              a share.
*              <li> "access_based_enumeration" - This specifies that Access
*              Based Enumeration is enabled on this share. ABE-filtered shared
*              folders are visible to a user based on that individual user's
*              access rights, preventing the display of folders or other shared
*              resources that the user does not have rights to access.
*              </ul>
*
* @input       symlink-properties
* @type        cifs-share-symlink-properties[], optional
* @desc        This flag controls whether the symlinks under this shared
*              directory are hidden (option 'hide'), accessible (option
*              'enable') or are accessible as read-only (option 'read-only')
*              along with option 'enable').
*              Possible values:
*              <ul>
*              <li> "enable" ,
*              <li> "hide" ,
*              <li> "read_only"
*              </ul>
*
* @input       file-umask
* @type        integer, optional
* @range       [0..777]
* @desc        The value of this field controls the file mode creation mask for
*              the CIFS share in qtrees with UNIX or Mixed security styles. The
*              mask restricts the initial permissions setting of a newly created
*              file. The input value is a numeric mode comprising of one to
*              three octal digits (0-7), derived by adding up the bits with
*              values 4, 2, and 1. The first digit selects permissions for the
*              user who owns the file: read (4), write (2), and execute (1); the
*              second selects permissions for other users in the file's group,
*              with the same values; and the third for other users not in the
*              file's group, with the same values.
*
* @input       dir-umask
* @type        integer, optional
* @range       [0..777]
* @desc        The value of this field controls the file mode creation mask for
*              the CIFS share in qtrees with UNIX or Mixed security styles. The
*              mask restricts the initial permissions setting of a newly created
*              directory. The input value is a numeric mode comprising of one to
*              three octal digits (0-7), derived by adding up the bits with
*              values 4, 2, and 1. The first digit selects permissions for the
*              user who owns the file: read (4), write (2), and execute (1); the
*              second selects permissions for other users in the file's group,
*              with the same values; and the third for other users not in the
*              file's group, with the same values.
*
* @input       comment
* @type        string, optional
* @desc        This string gives a description of the CIFS share. CIFS clients
*              see this description when browsing the Vserver's CIFS shares.
*
* @input       attribute-cache-ttl
* @type        integer, optional
* @range       [0..2^32-1]
* @desc        The lifetime of an entry in the file attribute cache, in seconds.
*              This value is used if the share has the 'attributecache' property
*              set, which improves the performance of certain metadata
*              operations in common workloads. The default is 10 seconds.
*              Raising this value may improve performance, but the likelihood
*              that stale metadata will be served increases as well. The value
*              of this field must be in the range of 1 to 86400.
*
* @input       offline-files-mode
* @type        string, optional

```

```
* @desc      Mode of the offline file for the CIFS share. The default value
*            is manual.
*            Possible values:
*            <ul>
*            <li> "none"      - Clients are not permitted to cache files for
*            offline access.,
*            <li> "manual"    - Clients may cache files that are explicitly
*            selected by the user for offline use.,
*            <li> "documents" - Clients may automatically cache files that
*            are used by the user for offline access.,
*            <li> "programs"  - Clients may automatically cache files that
*            are used by the user for offline access and may use those files
*            in an offline mode even if the share is available.
*            </ul>
*
* @input      vscan-fileop-profile
* @type       string, optional
* @desc       Profile-set of file-ops to which Vscan On-Access scanning will be
*            applicable. The default value is standard, in which Vscan is
*            applicable for open, close and rename fileops.
*            Possible values:
*            <ul>
*            <li> "no_scan"    - Scan is not applicable for any fileop,
*            <li> "standard"   - Scan is applicable for open, close and
*            rename fileops,
*            <li> "strict"     - Scan is applicable for open, read, close
*            and rename fileops,
*            <li> "writes_only" - Scan is applicable for close fileop only
*            when file is created or modified
*            </ul>
*
*            *****/
```

SNMP

This feature will provide SNMP traps for major events. List of those will be captured in design spec.

Host Interfaces

Offbox-Vscan requires avshim running on external windows server. The communication between this module and clustered-ONTAP is over a SMB named-pipe.

Hardware interfaces

Offbox-Vscan does not require any additional hardware interfaces

Wire protocols

The communication between avshim and clustered ONTAP is over a SMB named-pipe. For the first release we will not be exposing the interface, but in future we might consider that, so that AV vendors may write their own avshim and package that with vscanner.

More details of the protocol will be captured in design spec.

Reliability

Different aspects of the reliability of this feature are as followed:

- **Unavailability of vscanners:** Due to some misconfiguration or network issues, vscanners which are supposed to serve a vservers/cluster may not even get connected to clustered ONTAP. This directly affects the clients data-access which requires vscan. If the file could not be scanned then the data-access requiring mandatory scan will be denied. Since this feature does not make outbound connection to the vscanners, it has very little role in the active handling of this failure. But this feature does support some mechanisms to avoid or reduce the chances of the system being in this situation:
 - Various deployment models to increase redundancy in terms of number of vscanners serving a vservers.
 - The admin can configure scanner pools to get auto-activated and allow connections from the reserve pool of vscanners based on certain condition (like numbers of vscanners connected are less than configured). For SN.1 the only supported use-case is that secondary scanner pools gets auto-activated when there is no connection based on primary scanner pool.
 - EMS messages and SNMP traps to warn admin of this situation.
- **Overloaded vscanners:** During high traffic vscanners may be flooded with scan-requests. That may lead to high latency or even request-timeout. For handling this failure :
 - A mechanism is provided to favour the faster vscanner while requesting for file scan.
 - Latency statistics are maintained for each connected vscanner. So, admin can take come corrective action.
 - The avshim will report local vscanner conditions to clustered ONTAP which indicate that the vscanner is overloaded and is not keeping up with the arrival rate of new scan requests. This information will be fed to the counters and connection-status statistics.
- **Vscanner-disconnection:** This connection is SMB named-pipe, so standard failure handling is provided by protocol. In case of disconnection, the scan-requests that are queued to be sent to this vscanner are queued to other available vscanner.
- **Avshim-error:** If avshim returns error for any scan-request, then it is sent to other available vscanner.
- **Scan request timeout:** Data-access requiring mandatory scan will be denied.
- **LIF config changes:** Changes in the LIF config for a vservers is not known to the avshim which is responsible to connect to clustered ONTAP. So, the vscanner admin will have to feed this information to the avshim manually and restart the service. To fix this inconvenience, we will consider supporting some mechanism in the M-host which would allow it to contact the avshim and give it new LIF configuration information any time and avshim can take appropriate decision on the fly.
- *What are the failure modes of the product? What failures does the product handle, and what failures does it not.*

- *What effect do these failures have on feature availability?*
- *What effect do these failures have on other subsystems?*
- *What failures does the product not handle?*

Described above.

- *How can these failure modes be detected (e.g., by Diags)*

This feature will generate EMS logs and SNMP traps for various failures.

- *What happens when (not if!) various HW failures occur? What does the remainder of the HW do? What does the SW do? [Experience suggests that asking this question for each HW component is very important: consider these disk-related problems: cable, connector, LRC, shelf, power, grounding, adapter, disk]*

This feature does not provide any special handling of HW failures.

- *Is a failure of the product (or part of it) likely to cause other parts of the system to go down previously unknown failure paths, and become unstable?*

The feature directly affects the clients data-access which requires vscan. If the file could not be scanned then the data-access requiring mandatory scan will be denied.

- *Can a misbehaving product do damage (e.g., introduce errors on data paths to or from disks, to or from the network)? Can the damage be transferred to different systems (e.g., via CFO or SnapMirror).*

Not likely to happen.

- *What – if any – failure modes run the risk of corrupting data? Note that this includes:*
 - *Application believes data has been written, but it may be lost.*
 - *Data write ordering, when required, is not preserved (e.g. dependent writes to different DOT volumes (consistency groups)).*
 - *Testable goals.*

N/A

Availability

General:

- *Will the product require deliberate reboots (e.g., to be done after being licensed, before it starts to work)*

No

- *Will recovery from an error ever require the host to suspend I/O?*

No

- *Are there conditions in which the product will no longer function (e.g., if a configuration file is mysteriously trashed), or will it continue to run in some degraded state*

If all the configurations are in place but no vscanner is connected to the vserver, then files won't get scanned. In that case data access will be denied if requests are marked for mandatory scan.

- *Will it panic in such cases, panic M-host processes or will it complain and continue?*

No

- *Describe any cases where the subsystem must be stopped and restarted.*

None

- *What sorts of product failures are likely to require manual recovery?*

If vscanners are not available for scanning or loaded with too much then admin should configure new scanners. This is technically not an example of "product failure and manual recovery", but most common issue and the fix.

- *Will the product be able to be integrated with host clustering products?*

N/A

- *How will the product interact with host multipathing?*

N/A

Data ONTAP:

- *If the product includes FW, describe whether FW updates are manual or automatic, and require downtime or takeovers.*

This feature will be installed with Data ONTAP release.

- *For subsystem-initiated halts, discuss how these halts relate (or do not) to takeover by the partner.*

N/A

- *Describe any cases which a user reboot is required (e.g., to license it successfully).*

None

Host Software:

- *How will the host product behave during a filer cluster takeover? Are there timeouts, either hidden or explicit, that may cause failure of function if the takeover takes too long? Are they configurable? Under what conditions will this occur/be an issue?*

After the process of cluster takeover or giveback, the vscanner connections will be restored by avshim. All the client file access request which were queued before the takeover are denied.

Supportability

Product Behavior

General

Data ONTAP:

- *Does the product change the way a customer or SE would install HW or SW?*

No

- *Does it require any changes to Manufacturing or the way the product is tested prior to ship (usually applies only to HW products)?*

No

- *Does it require new Diagnostics?*

Counters, EMS and SNMP traps are provided to help in diagnosing any issue.

- *Describe how the product can be repaired.*

Removing the existing configuration and disabling the vscan for all vservers will reset the feature to its initial state.

- *What repair tools exist for the product?*

None

- *Is manual booting or booting from an alternate device ever required to repair problems?*

No

- *Are any cookies stored as environment variables? If so, what happens when they go away? (they will in various repair scenarios)*

No

- *Is waf-check or waf_iron ever required to repair problems?*

No

- *Is floppy booting ever required to repair problems?*

No

- *Is wack ever required to repair problems?*

No

- *Describe the behavior of the system in any of the unusual boot modes, especially...*

- *Maintenance mode*

Feature will not be available.

- *No-rc mode (typically, major subsystems must not start up in this boot mode). See the HHG for details.*

Feature will not be available.

- *While out of cluster quorum.*

Feature will continue to work.

- *Will this product affect host boot in any way?*

N/A

- *How will this host-side product be affected by filer boot modes?*

N/A

- *Describe how your functionality will work after a MetroCluster switchover and any limitations if used in a MetroCluster configuration.*

Once vservers DR is available in FS.0, we plan to support config replication as well as some intelligence in the scanner pool configuration to help the DR partner establish connection with new set of vscanners.

Host-side:

- *Is there a host-specific mechanism for supportability/serviceability that this product should integrate with to provide maximum supportability? Customer-support considerations – is there a host-specific mechanism that must be supported in order to integrate the product with the host*

Avshim is required to run on the windows server where vscanner runs. More details would be captured in avshim FS.

AutoSupport

Data ONTAP:

- *What new AutoSupport notifications does this feature generate? Explain the triggers of these notifications.*

This feature does not trigger Autosupport notification.

- *Are any AutoSupport notifications associated with a controller shutdown or failover? It can take many minutes to collect and send an AutoSupport, how much delay is there between the notification and the shutdown?*

No

- *What information does this feature add to the existing AutoSupport notifications? For example, internal statistics or state variables, internal logs, and any computed values that might be helpful in diagnosing problems.*

This feature will aid to existing Autosupport infrastructure by providing hooks to collect feature specific statistics, counters and configuration information.

- *Describe how someone could tell, from an AutoSupport notification, whether this feature or product is functioning correctly. This would typically be some collection of EMS messages, statistics in various other AutoSupport sections, etc. If you don't have such metrics, your product will fail the supportability tests. Please look into the HHG FAQ for more information on this topic.*

This feature generates EMS messages in failures and maintains different kind of counters. These along with the current configuration can give fair idea of overall feature health.

- *Be sure to review AutoSupport additions and changes with dl-autosupport-discuss and with the escalation engineering team within NetApp Global Services.*

Once the development and unit-testing is done, formal review process will be initiated.

- *Describe how much logging and tracing information will be generated and possibly collected by AutoSupport during the course of one week. Please include a description of the worse case situation that persists for days or how dump-on-first capture and counter usage minimizes logging collected.*

This feature does not generate any new log file. Logs will be dumped to sktlogd.log and mgwd.log (config related) and EMS logs.

Counters Collected and Exported

Data ONTAP:

- *Describe any statistics collected by this feature and how they are exported (through SMF and/or CM).*

All the counters will be exported through counter-manager.

- *All products must have Counter Manager counters for performance and limits. Describe yours here. Distinguish between counters that are primarily aimed at (1) high level health and capacity monitoring (2) diagnostics/tuning by customers or NGS (3) debugging by NGS or development.*

To capture the general state of the feature many counters will be collected. Complete list of counters will be captured in design spec. Generally they will fall into below categories:

- 1) Latency statistics of the vscanners
- 2) Connection statistics of the vscanners
- 3) Vscanner statistics (like num of scan-request, clean-files, infected-files, repaired-files, request-timeouts etc...)
- 4) On-Access policy statistics

- *Please provide a brief description of tools where the counters need to be visible in. Your options are CLI, Onboard tools, Operations Manager, Hourly AutoSupport and Weekly AutoSupport.*

Counters are visible in CLI.

- *If data is coming back through AutoSupport please provide a brief description of how you plan to use this data (or who would have use for this data).*

There are many audience for AutoSupport data. Product management and engineering teams can use it to get more insight on the usages of the feature. This can also be used by support/engineering teams to debug any field issue.

- *Are there plans to add these counters to the performance archive (used primarily for diagnostics)?*

No plans for this in SN.1. But we would like to do that in future release.

CLIs and ZAPIs

- *Please provide extra detail (if any) that pertains specifically to Supportability beyond what is described in 'User Interfaces' and 'Programmatic Interfaces' section earlier.*

One of the very important piece of info for admin or NGS folks could be the current-status of connection between clustered ONTAP and the vscanners. That is exposed in the CLI. More details are available here.

Apart from that "event log show" can be used by the admin to get EMS messages which may point to some error reported by this feature.

- *Describe any tools, diagnostic CLI commands, and verbose logging or reporting that can be enabled by NGS or by customers to help diagnose problems.*

NGS folks can enable verbose logging of different modules. More details will be captured in design spec.

- *Describe any options that can be set in the field to disable or enable specific functionality. NGS often uses this to help narrow down issues.*

Refer to this.

- *Describe any CLI commands that would be used to determine if one or more of the functional subsystems is working as expected? Can this also be used to determine that some other subsystem either inside the product or located in the customer's environment such as name services and authentication services are not working, slowly performing or not responding.*

We may come up with some method to determine the health of avshim or vscanner running in external windows server in future releases.

Special Features

- *Is Tracing Supported by this feature? If so, how are the trace points controlled and exported? Please look at http://wikid.netapp.com/w/Supportability/Dev_Guidelines for some tracing guidelines.*

This feature integrates into various existing subsystem, and will follow convention of those subsystem to generate tracing information

- 1) DBlade tracing will be consistent with WAFL fileops' SKTRACE.
- 2) NBlade CIFS we will be using CIFS diagnostic infrastructure which is based on SKTRACE.
- 3) Mhost implementation will be using mgmt_logger infrastructure for logging.

- *If the feature implements a live core facility to extract state non-disruptively please provide more details.*

No

- *What interactions does this component have with RLM/Service Processor?*

None

- *Is first-failure tracing (e.g., RASrtrace) supported by this feature?*

No

- *Does the component provide "side-door" access to diagnostic and analysis interfaces?*

No

- *Integration with System Health Monitor - Does this feature have plans to report its configuration and operational health status through an appropriate health monitor? If so, briefly describe the plans. If not, briefly describe how the subsystem health will be reported through System Manager*

No. Operational health can be determined via the counters and event logs, as explained above. But we might consider integrating with CIFS Health Monitor in future.

Error Reporting

General:

- *How and where are errors reported and logged? (For Data ONTAP, this includes at least EMS. Be sure to get approval from dl-error-review for EMS messages.)*
- *Does this feature send EMS messages for critical errors, log messages for serious errors, and collect tracing information for the rest?*

All major errors are reported via EMS. Tracing can be enabled at appropriate level.

- *For messages other than EMS, where does NGS find the messages? What do the messages look like (include examples)? Are there unique terms to search for to identify module-specific messages?*

N/A

- *How is debug logging turned on, and where are the results saved?*

N/A

- *Describe how logging avoids requiring field support and viewers of AutoSupport information to wade through 100s if not 1000s of lines of repetitive output collected in the logs during the week?*

N/A

- *Is logging and tracing information located under the root volume /etc/log directory so that remote support systems such as Remote Support Agent on the RLM or SP can see these files? Is customer configuration and other private information located outside of this directory?*

All trace logs are kept in /mroot/etc/log.

- *Does this feature support in-memory tracing (such as mtrace)?*

No

- *Does this feature record state transitions to the tracing?*
- *Does this feature support trace-dump on failure?*

We might consider doing that. Details will be captured in design spec.

- *Describe the interface that calling applications use to convert error codes (numeric or otherwise) into human readable messages and corrective actions. Include examples of these messages.*

N/A

Data ONTAP:

- *Use EMS (not syslog) for messages. If you think otherwise, provide reasoning here. (It will be questioned). Also be aware that the error messages need to be really meaningful to the right target audience. Please refer to http://wikid.netapp.com/w/Supportability/Dev_Guidelines for current guidelines.*

EMS will be used to log messages.

- *List the new EMS messages you'll be generating. Be sure to update this list with final names and descriptions after coding is complete and dl-error-review has approved.*

EMS messages will be generated for each event worth noting. That may include some information apart from errors. The list of supported EMS will be published to design spec.

- *Describe any dbg_printf usage (this is allowed only very early in boot or during panic. Remember that most customers do not have consoles attached to the console ports. See the HHG for details).*

N/A

- *Describe how/if the LCD is used in old platforms and how that information is presented in platforms that don't have an LCD.*

N/A

- *Describe how visual indicators will be used to help the service provider identify the element needing attention and possible replacement (e.g. Attention/Fault LEDs, any special LED modes, chassis/shelf ID displays to identify a particular chassis, etc).*

N/A

- *Describe how error messages will incorporate physical information to help the service provider identify the element needing attention and possible replacement (e.g. port, slot, bay, module, FRU part#, FRU serial number, chassis ID, chassis serial number, etc).*

N/A

Host-side products:

- *Where and how are host errors to be logged? Are they logged in the normal location for the host operating system (e.g. Windows Events), as well as in a NetApp-specific location? How will a user know that a particular error is from your product?*
- *For the host are there standard error messages and/or message numbers?*

If applicable, this information would be captured in avshim FS.

Supporting Tools and Scripts

- *What external programs (typically, Perl scripts) will be provided to allow the customer to check if configuration is correct (often across multiple systems).*

N/A

- *Does the feature introduce its own tracing, logging, or error handling mechanism?*

No

- *What tools or scripts are required for post-mortem analysis?*

- 1) GDB macros will be provided to retrieve internal data-structures of this feature. Details will be provided in design spec.
- 2) Dummy scan engine "NVSC" will be provided to help in simulating the scenarios which result in an issue.

- *For Data ONTAP, describe what data would be required from other nodes in a cluster for root cause analysis.*

The data path may go from node1-nblade to node2-dblade using SpinNP. If there are some issue in accessing the other dblade, then some debug information may be required.

Troubleshooting

- *Describe in detail how to troubleshoot common problems. Provide a list of expected failure scenarios with the commands and counters that can be used to debug these scenarios. If some of these have been detailed in earlier sections please point to those clearly here.*

Common issue and the troubleshooting:

- 1) If the vscanners are not able to connect to the clustered ONTAP, then it is quite possible that scanner pool configuration does not specify the vscanner IPs and/or users in the allowed list or scanner pool itself is not active or there has been some issue with the network.
- 2) If the clients are observing high latency, then probably it's time for the admin to add some more vscanners to the pool.
- 3) If too many scans are getting triggered, then vscan-fileop-profile for the shares may be adjusted as per the need.
- 4) If some files are not getting scanned, then On-Access policy should be checked. It might be possible that the file path has been added to the path-exclusion-list or file size exceeds the configured value.
- 5) "scan-mandatory" in policy configuration will deny the data access if no scanners are connected. So, this should be marked appropriately.
- 6) Vscan could become a bottleneck to the overall data traffic if vscanners bog down too much. In this case disabling vscan temporarily can help.

- *Does this feature currently have (or is expected to have) any external tool dependencies for troubleshooting*

This feature requires a component avshim to be running on the external windows server. The troubleshooting information from that component may come in handy to debug some issue. Details on that would be covered in avshim FS.

Scalability

One of the major advantage of this feature is the ability to scale (up/down) as per the requirement. The empirical results shows that performance of the system does scale when more vscanners are added to serve a vserver.

Kind of scalability this feature provides can be understood from below points :

- One vscanner can serve more than one vserver (or cluster).
- There is no limit on the number of vscanners serving scan-facility to a vserver. This enables the admin to add as many vscanner as required.
- The admin can configure scanner pools to get auto-activated and allow connections from the reserve pool of vscanners based on certain condition (like system is experiencing more than normal load). For SN.1 the only supported use-case is that secondary scanner pools gets auto-activated when there is no connection based on primary scanner pool.
- Theoretically it is possible to support 7-mode DATA ONTAP as well as clustered ONTAP on the same vscanner, but it will depend on the AV partners implementation.

Security

- The feature provides scanner pool configuration which takes the list of IPs and list of users. For a vserver, all the active scanner pools are merged to get the active-scanner-pool. Any incoming connection request (named-pipe-create) is validated against the effective list of allowed IPs and privileged-users. Only after passing this check notification protocol connection is established.
- When a scanner pool is modified to remove one or more IPs and/or users, all active connections from those IPs or using those users is torn down.
- For any active connection, the user used for establishing the connection is displayed in the UI.
- Vscanners access the file for scanning with privileged access over a normal SMB connection, typically authenticating using Kerberos and Active Directory. No client is permitted to connect to the `ontap_admin$` share unless its IP address and login account are in those lists.
- The avshim and the vscan engine communicate over a local, in-memory MSRPC connection. To protect this connection an explicit requirement will be made that any machine to be used as a vscanner will not have non-administrative users running on it, and that the only applications running there will be related to anti-virus.

Feature Interaction Dependencies and Impacts

FlexCache interactions

- There are no on-disk changes, including metadir files, hence no effect on data transfers or version matching.
- There are no lock manager changes. The privileged accesses through `ontap_admin$` are identical to those of `fpolicy`.
- The off-box vscan configuration on the cache vserver need not be identical to the origin vserver. Hence, there is no need to replicate this configuration information.

MetroCluster / Vserver DR interactions

- Off-box AV will have no interaction until FS.0. However, once vserver dr is available,
 - The major issue that arises is the question of what configuration to use when switchover has occurred. That is handled in this design by configuring vscanners in both environment, and allowing a scanner pool to detect which environment the vserver is in.
 - We will need to make sure the scanner pools are evaluated in a timely way, to ensure that clients are able to access the vserver quickly after switchover/switchback.
 - We plan for a future release to add the ability for an M-host to send a notification, over a secure channel, to the avshim of a standby vscanner so that it will attempt to register with a vserver. That would be ideal in this setting.

Snaplock interactions

- If a file is found to be infected, the vscanner will attempt to delete, disinfect, or quarantine the file. If that is disallowed by SnapLock, a message will be logged on the vscan engine, and the in-core inode will be updated to reflect that the file is infected, preventing further accesses or scans. However, the on-disk inode will never be modified by vscan operations.

HA

- The vscanner (avshim and vscan engine) have normal SMB connections with a node. If the node reboots, either for takeover or giveback, the vscanner will have to reconnect, which it will do. There are no special considerations for HA with this feature, beyond normal CIFS interactions.
- Any movement of data, disruptive or non-disruptive, will appear to the off-box vscan feature the same it would appear to any SMB client. No special considerations apply.
- There is no need to notify this facility of these data movement operations. The vscanner(s) will automatically disconnect/reconnect as needed.
- If there are slow pending AV scans, the normal CIFS shutdown logic will terminate the sessions for both avshim and vscan engine, without requiring the entire scan process to complete.
- When the CIFS server comes up on the partner, the configured vscanners should immediately connect, so this should not introduce any noticeable delay before CIFS client requests can be serviced. If there is a problem, and the vscanners do not connect right away, access would be granted or not, depending on the mandatory vscan setting. This is true any time, of course, not just after reboot in an HA situation.
- No new veto checks related to this feature.

NDU impact

- The external components (avshim, vscan engine) just connect and operate as CIFS clients, so the behavior during NDU is the same as what is seen by other CIFS connections.
- Off-box vscan cannot be enabled unless all nodes are running a version that supports it. This will be enforced using the capability manager.
- There are no on-disk changes, so there are no revert considerations, other than perhaps cleaning up the SMF tables.
 - For the first release, there is no plan to clean up these tables, as this would have to be done in SN.0, and at the time of this writing, a change like that would not be permitted under release guidelines.
- The avshim component can up updated at any time, but the vscanner will not be functional during that time. The same is true of a major update to the vscan engine that requires virus scanning to be disabled during the upgrade. For this reason, it will always be best practice to have more than one vscanner configured.

Performance

Performance is one of the key requirements for the feature as this directly impacts the data-access latency. More details can be found [here](#).

Even though this feature does not have much control over the latency introduced by vscanners (big chunk of overall latency), below mechanism are in place to help improve performance:

- The concept of scanner pools is devised to handle load scenarios. So, based on some stats (like latency or number of active connections etc) other scanner pools can get activated automatically which will result in addition of new set of vscanners. For SN.1 the only supported use-case is that secondary scanner pools gets auto-activated when there is no connection based on primary scanner pool.
- Faster vscanners are favoured instead of just round-robin. This means that if some vscanner is getting loaded, then new requests will be sent to other vscanners.

The following areas will have appropriate counters to give fair assesment of the performance of the feature: To assist the admin in monitoring the performance, below support is provided:

- Counters are provided to measure the overall
 - responsiveness of vscanners
 - connection health of vscanners
- SNMP traps and EMS notifications when performance degradation is observed.

Test Strategies

Functional testing:

- Configuration management.
- Scan functionality with all possible fileop profile setting.
- Scan functionality with all supported protocols (only CIFS for SN.1).
- Different permutations of scanner pool and applied scanner policy settings.
- Even though vscanner is completely owned by AV vendors, some amount of testing should be done. That should include scanning different file-types and file-sizes, different settings of quarantine actions etc.

Apart from the functional testing, following scenarios must be part of the testing:

- Load conditions.
- Flaky connection with vscanner.
- Vscanner is connected first time or AV software is updated (verify that vendor version is updated in the clustered ONTAP).
- Different deployment scenarios, like:
 - Multiple vscanners serving one vsriver
 - One vscanner serving more than one vsriver
- Test in pure IPV4, pure IPV6 and mix of both environments.
- LIF movements, especially the ones that being used for control and data connections.
- Node failures.
- Upgrade/revert.

Regression Candidate Test Delivery

Fpolicy test suits must be updated with new test cases to verify the functionality when clustered ONTAP has Offbox-Vscan operational.

Build Architecture Impact

There is no impact on the build architecture for implementing this feature.

However, separate branch and build infrastructure shall be created for maintaining avshim (OFFTAP component). Details for that would be captured in avshim FS.

Codeline Delivery Strategy

- For enabling parallel development, a shared branch (SB) based out of DOT:Rsierranevada is created.
- In different private branches (PDBs), individual pieces of feature development is going on.
- At regular interval:
 - SB is synced to get the latest content of the backing branches.
 - logically separate pieces of code chunks are integrated to the SB.

After completing the development and passing pre-merge criteria the code will be submitted to the backing branch.

Project Extensions

N/A

Open Issues

Item	Date	Name	Issue	Resolution	Date Resolved
1	20/03/2013	Daniel Holmes	Is there any possibility to combine enable/disable set of APIs to a single virus-scan-settings-modify API? Customers generally have issues about the sprawl of the number of APIs we have and generally having an enable/disable API per attribute setting is discouraged.	Need to find out a way to create new zapi which does not need a CLI mapping. There is a burt611847 (http://burtweb-prd.eng.netapp.com/burt/burt-bin/start?burt-id=611847) describing that it is not possible. But still we want to confirm with John DeGraaf. Have sent mail to him and waiting for the response. We have come up with the list of consolidated ZAPIs after discussing with Daniel. We will implement those if smf provides a way to do it.	[07/05/2013]: Done.

Revision History

Version	Date	Name	Change
0.1	25 Nov 2012	Mankawal deep Singh	Initial version adapted from ONTAP template.
0.2	06 March 2013	Rajesh Jaiswal	First draft complete.
0.5	13 March 2013	Rajesh Jaiswal	Review.
0.6	25 March 2013	Rajesh Jaiswal	Incorporated review comments.
1.0	30 March 2013	Rajesh Jaiswal	Approved in the spec tool. Updated the status here as well.

Approvals

These are in the official spec tracker (<http://engmetrics-web.eng.netapp.com/SpecTool/Specs.jsp?suiteId=1&docId=7145>)

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