TABLE OF CONTENTS

Technical Report

Collection of NetApp Core Dump Files and Uploading of Core Files to NetApp

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1 origin of core files 3

1.1 Triggers for core file creation 3

1.2 Core file creation process 3

2 Storage location of Core files 3

3 Overview of core file upload process 3

4 Core file upload process details 4

4.1 Access core file storage location 4

4.2 Verify completion of Core file creation 4

4.3 Copy Core file to managing DFM/OM Server 4

4.4 Split Core file into sub-parts of a practical size to upload 5

4.5 Copy Core file sub-parts to PC/Laptop 5

4.6 Upload Core file sub-parts to NetApp 6

4.7 Clearly communicate file sub-part count and names, size and estimated time for delivery 6

5 References 6

# origin of core files

Core files are created by the dump of all physical memory to a file, at a specific moment. The maximum size of a core file equals the size of the physical memory of a given storage appliance. The effective size of a core file reflects the portion of the physical memory addressed at the time of the core file creation.

## Triggers for core file creation

### Automatic Core File Creation

Core files are automatically genereated by core dump operations on a storage appliance. A core dump operation most often follows a storage appliance “Panic.

In a clustered pair of storage appliances, a “Panic” on one appliance leads to the surviving cluster partner “Taking over” the functions of the failed node.

For stand-alone storage appliances, core files will be generated as part of a disruptive reboot process.

### Manual Core file creation

Core files can be created manually via command line, or via physical button on the storage appliance. Generating cores manually is most often related to a troubleshooting effort.

## Core file creation process

### Creation of “Mini” core files

Upon a panic event, or a manual core file trigger, as part of the node reboot, a “mini” core file is generated. The function of this file is to guide and catalogue the necessary data and disk locations to be used in saving the full core data. There little diagnostic value in a “mini” core.

### Core (Saving) files

Once the storage appliance has completed its reboot cycle, either as a stand alone appliance, or partially, as part of an HA cluster, the “mini” core will guide the creation and saving of the full core file. While the data is being compiled and saved, the core file name will be appended with a SAVING tag. Mounting the /etc/crash location, and executing repeated “LS” commands or windows “refresh” operations will reveal the increasing size of the saving core file.

### Final Core Files

Final core files will be coded with the system ID number, date and time of the core creation.

# Storage location of Core files

During all stages of core file creation, the files are stored in the /etc/crash folder on the storage appliance.

# Overview of core file upload process

1. Access Core file storage location
2. Verify completion of Core file creation
3. Copy Core file to managing DFM/OM Server
4. Split Core file into sub-parts of a practical size to upload
5. Copy Core file sub-parts to PC/Laptop
6. Upload Core file sub-parts to NetApp
7. Clearly communicate file sub-part count and names, size and estimated time for delivery

# Core file upload process details

## Access core file storage location

### Standard NFS access method

As part of the implementation standard for all storage appliances at ThomsonReuters, an NFS export is created for the /etc file system on each storage controller and vFiler.

### Using the DFM/OM servers to access /etc/crash directories

Each Linux-based DFM/OM server is configured with an “automounter” function which allows automatic access to the NFS export. The automounter can be accessed by changing directory to “/filers”. That directory may appear to be blank, or have a limited numbers of subdirectories. The content of this file system is dynamic and will not always be visible until its access.

To access the /etc file system of a given storage appliance or vFiler, manually change directory to “/filers/<appliance name>”, whether the subfolder is visible or not.

### Other access methods

Any protol access method can be used to access /etc, though those other methods are not configured by default in the Thomson Reuters environment. CIFS shares, FTP, sFTP are possible in special situations. Seek NetApp assistance on a case-by-case basis for specialized resolution if there are issues using the standard NFS access method.

## Verify completion of Core file creation

Mount and list the contents of the /etc/crash directory on the affected storage appliance. Idenfity the “Mini” core file and the presence of any “Saving” files. Verify that the primary core file exists, and is not growing in size. Verify that the date and time codes of the core file matches the known incident time, and is not the result of a previous incident.

## Copy Core file to managing DFM/OM Server

There is no direct network pathway from a storage appliance in the Thomson Reuters environment to the NetApp Global Support Center. There is also no direct pathway from an individual PC or laptop to the /etc/crash directory on a storage appliance. In order to facilitate the file upload, it must first be copied from the affected appliance to the managing DFM/OM Linux server.

### Storage location on DFM/OM servers

The standard practice the onsite NetApp team has used for storing core files on the DFM/OM servers has been to create a subdirectory inside the /dfm/netapp filesystem name “cores”. Within that /dfm/netapp/cores folder, create a sub-folder named for the NetApp case number associated with the incident.

## Split Core file into sub-parts of a practical size to upload

### Reasons for splitting a core file into sub parts

Most core files from the current generation of NetApp storage appliances are larger than 5GB. Based on the speed and reliability of the network resources available for use to upload the files to NetApp, there are risks that file upload failure, or slow speed of single file upload threads will lead to unacceptably slow delivery times, and delay the overall incident troubleshooting process.

By splitting the core file into smaller pieces, several benefits are realized:

* Uploading multiple files creates checkpoints in the process of uploading. Completing the upload of any one part, allows that progress to be realized. Any one failure can be repeated without starting from scratch
* Uploading multiple files can allow for multi-threaded uploads that can provide larger aggregate bandwidth. One file may upload from a laptop at 200mb/sec. Five separate files may each upload at 125mb/sec equaling 625mb/sec and drastically shortening the overall upload time.

### Best practice for splitting core files

The NetApp Data OnTap software has many features in common with Linux. The engineering group at NetApp uses Linux/Unix servers to accomplish the necessary analysis on core files. As such, using a UNIX/Linus based split tool, like the actual “split” command on Linux is the best practice.

Windows based tools like winZIP or winRAR tools that accomplish file splitting, are **not best practice.**

The typical file size used to split core files is 1GB.

Splitting a core file using an even size will lead to a small remainder file being created. Its important to maintain all the pieces, including any small remainders.

### Sample Split command line

“split” –b 1000000000 <prefix> <filename>

* -b 1000000000 – splits the file into 1000000000 byte (1GB) pieces
* <prefix> - The prefix of each file name. Use the Core file name as the prefix
* <filename> - Name of the core file.

### Typical output of a split command

core.118075450.2011-06-15.07\_52\_07.nzaa

core.118075450.2011-06-15.07\_52\_07.nzab

core.118075450.2011-06-15.07\_52\_07.nzac

core.118075450.2011-06-15.07\_52\_07.nzad

### Netapp split documentation

* NetApp INTERNAL - How [to](https://kb.netapp.com/support/index?page=content&id=1011520) split, [reassemble](https://kb.netapp.com/support/index?page=content&id=1011520) and validate a core file

## Copy Core file sub-parts to PC/Laptop

There is no direct network pathway from the DFM/OM servers in the Thomson Reuters environment, and NetApp support. In order to facilitate the upload process, all the core file sub-parts must be copied to a PC or laptop in order to have access to a network connection with the proper access to the internet, and NetApp.

### Toolset

There are several tools available to accomplish the copy from the DFM/OM servers to a PC or laptop. One common freeware utility is named WinSCP.

## Upload Core file sub-parts to NetApp

### Standard process for uploading core files from a typical customer

[How to Upload a core file for Analysis](https://kb.netapp.com/support/index?page=content&id=1010364)

### Restrictions in the Thomson Reuters environment that affect upload

* FTP connections are routinely reset at some point in the network. No successful method has yet been found that will allow a long running FTP operation
* Thomson Reuters proxy/firewall function causes file upload operations to race for a short period then stall.

### Best Practices for uploading files to NetApp

* Use the TOC-GUEST wireless network, where available. There are no proxies on this network that cause the race/crash copy behavior.
* If possible, use the NetApp VPN (netapp staff only). Observed maximum network upload speeds have been higher using the NetApp VPN, vs un-channeled wireless network.

## Clearly communicate file sub-part count and names, size and estimated time for delivery

A median customer of NetApp does not have the restrictions outlined in the above section. An engineer at the NetApp Global Support Center will not have an experience base that allows them to understand the difficulties inherent in uploading core files from the NetApp environment. There are instruction sets available to Support Engineers that describe the process of re-assembling a core file split with a UNIX/Linux based command. The key to success in the process is clear and through communication (preferable by email for clarity and elimination of language or accept barriers).

# References

* [How to Upload a core file for Analysis](https://kb.netapp.com/support/index?page=content&id=1010364)
* NetApp INTERNAL - How [to](https://kb.netapp.com/support/index?page=content&id=1011520) split, reassemble and validate a core file



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