Process Memory Management

This module describes memory management processes.

In Cisco IOS XR routers, process memory management refers to the efficient allocation and isolation of memory for individual processes within the modular operating system. Each process runs in its own protected memory space to ensure stability and prevent interference.

IOS XR routers has dynamic memory allocation, leveraging segments like code, data, stack, heap, and shared memory for process execution.

Core dump folder limit

A core dump folder is a designated directory in the Cisco IOS XR file system that:

- stores diagnostic files, known as **core dumps**, which capture the state of the system's memory during a crash or failure,
- is typically located at `/misc/disk1/coredumps`, and
- provides critical information for troubleshooting and debugging system issues.

To manage storage effectively and ensure system reliability, Cisco IOS XR introduces mechanisms such as:

- configurable storage limits to control the amount of space used by core dumps,
- periodic cleanup to remove older files and free up disk space, and
- syslog alerts to notify administrators of storage issues, optimizing disk usage and preventing data loss during repeated crash scenarios.

Table 1: Feature History Table

Feature Name	Release	Description
Core dump folder limit	Release 25.2.1	Introduced in this release on: Fixed Systems (8200 [ASIC: Q200, P100], 8700 [ASIC: P100, K100]);Centralized Systems (8600 [ASIC: Q200]); Modular Systems (8800 [LC ASIC: Q100, Q200, P100, K100]) You can now set configurable disk storage limits between 20% and 50% of total space to prevent excessive core dumps during repeated crashes. This is complemented by a new core dump folder limit, which restricts the number of retained coreinfo files to a maximum of 50. Together, these features ensure better disk management by controlling storage consumption and preserving space for critical system operations. Additionally, periodic automatic cleanup every 15 minutes helps maintain optimal disk usage, enhancing overall system reliability and performance. **CLI**: • The **disk-usage-limit** keyword is added to the **exception** command. **YANG Data Model:** • `Cisco-IOS-XR-sysadmin-dumper.yang` (see GitHub, YANG Data Models Navigator)

Before Release 25.2.1, the core dump folder lacked a storage limit for core dump files,

- which could result in the allocated hard disk space being filled during continuous crash scenarios.
- This situation could prevent the Cisco IOS XR software from saving the latest core files, leading to data loss.

From Release 25.2.1:

- You can configure the following to effectively control the core dump folder storage:
  - **Throttling mechanism bypass**: Use the **exception filepath** to redirect core files to another directory, utilizing new storage space.
  - **Disk usage limit**: Use the **exception disk-usage-limit <usage limit percent>** command to set the storage limit between 20% and 50% of the total hard disk space.

Periodic cleanup

Before Release 25.2.1, the Cisco IOS XR software generate a syslog message when the disk was full without performing any cleanup.

From Release 25.2.1, The Cisco IOS XR software automatically performs a periodic check every 15 minutes and deletes older coreinfo files if the count in core dump folder exceeds 50.

This cleanup specifically targets coreinfo files such as files ending with core.txt.

During a cleanup scenario, the Cisco IOS XR software displays the following syslog message:

```
Router:Jan 20 20:15:02.014 UTC: dumper[69243]: %OS-SYSLOG-6-LOG_INFO : Coreinfo count is
currently 52, deleting
/misc/disk1/coredumps/sleep_11899.by.3.20250120-191744.xr-vm_node0_RP0_CPU0.34684.core.txt

RP/0/RP0/CPU0:Jan 20 20:15:02.056 UTC: dumper[69255]: %OS-SYSLOG-6-LOG_INFO : Coreinfo count
 is currently 51, deleting
/misc/disk1/coredumps/sleep_13995.by.3.20250120-193249.xr-vm_node0_RP0_CPU0.34684.core.txt
```

Restrictions of core dump folder limit

- **Core file saving abort scenarios:**

  The system displays syslog messages instead of saving host core dumps when it encounters the following storage constraints:

  - **Insufficient Disk Space less than 10 percent**:

    If the available disk space is less than threshold limit of 10 percent, the Cisco IOS XR software aborts the core file copy and deletes the file from the temporary directory.

    In this syslog example, the Cisco IOS XR software aborts the core file copy when the space in the hard disk is less than 10 percent.

    ```
    Router:Jan 31 10:18:42.000 UTC: dumper[1759]: %INFRA-CALVADOS_DUMPER-2-ABORT_COPY
    : Copy of sleep_16135.by.3.20250131-101800.ios.34684.core.lz4 to
    0/RP0:/misc/disk1/coredumps aborted for reason: Not enough available space in
    /misc/disk1 (less than 10%). Deleting core from /misc/scratch/core
    ```

  - **Exceeding Disk Usage Limit**:

    If the core dump folder storage size exceeds the configured disk usage threshold limit and the latest core file in the hard disk is within 10 minutes than the current crash time, the Cisco IOS XR software

    - aborts saving of the new core file and
    - deletes incoming core files.

    In this syslog example, the Cisco IOS XR software aborts the core file copy when the disk usage exceeds 20 percent of the hard disk's threshold value and the latest core file in the hard disk is within 10 minutes than the current crash time.

    ```
    Router :Mar 25 05:53:08.000 UTC: dumper[2715]: %INFRA-CALVADOS_DUMPER-2-ABORT_COPY
     : Copy of sleep_21216.by.3.20380325-055224.ios.34684.core.lz4 to
    0/RSP0:/misc/disk1/coredumps aborted for reason: Dumper disk usage exceeds 20%
    threshold of /misc/disk1. Deleting core from /misc/scratch/core
    ```

How core dump folder limit works

Summary

The process of managing core dump storage involves:

- Monitoring disk usage against a configured threshold.
- Deleting older core files when the disk usage exceeds the limit and conditions allow.
- Aborting saving of new core files if the disk usage is critically high or if conditions prevent older files from being deleted.

The key components that are involved in core dump folder limit are:

- **Cisco IOS XR Software**: Monitors disk usage and performs actions.
- **Core dump folder**: Stores the core files created during system crashes.

Workflow

After enabling the disk usage limit with the **exception disk-usage-limit <usage limit percent>** commad, IOS XR software perform these actions to control the core dump folder storage under various disk storage scenarios:

1. Cisco IOS XR software continuously monitors the disk usage of the core dump folder against the configured limit.
2. If the core dump folder storage size exceeds the configured disk usage limit value, Cisco IOS XR software perfoms the following actions:

When…	And…	Then Cisco IOS XR software…	And displays these syslog message…

the core dump folder storage size exceeds the configured disk usage limit value and	if the latest core file in the hard disk is more than 10 minutes older than the current crash time	deletes the older core files starting from oldest to newest until the core dump folder storage value is below the the default or configured disk usage limit value.	`Router:Jan 21 10:19:36.119 UTC: dumper[67458]: %OS-SYSLOG-3-LOG_ERR : sleep_14157 signature 4f24a3679e430a4a68d6096785d26548`
			
			`RP/0/RSP0/CPU0:Jan 21 10:19:36.251 UTC: dumper[399]: %OS-COREHELPER-6-DELETE_STALE_CORE : Deleting /misc/disk1/coredumps/sleep_10432.by.3.20250121-100007.xr-vm_node0_RSP0_CPU0.34684.core.lz4 on active RP for reason: Freeing up old core in /misc/disk1/coredumps, attempting to copy new core file`

When…	And…	Then Cisco IOS XR software…	And displays these syslog message…
the core dump folder storage size exceeds the configured disk usage limit value and	if the latest core file in the hard disk is within 10 minutes than the current crash time	will abort saving the core files and delete any incoming core files.	Router:/misc/disk1/coredumps] $RP/0/RSP0/CPU0: Jan 24 10:23:53.921 UTC: dumper[175]: %OS -COREHELPER-2-ABORT_COPY : Copy of sleep_19617.by.3. 20250124-102353.xr-vm_node 0_RSP0_CPU0.34684.core.lz4 to 0/RSP0/CPU0:/misc/disk1/ **coredumps aborted for reason: Dumper disk usage exceeds 20% threshold of /misc/disk1. Potential /misc/disk1/coredumps usage with new core: 100.0%, seconds since last core: 36.0s. Deleting core from /misc/scratch/core.**
the hard disk is filled more than 90 percent of the total hard disk space	-	will abort saving the core files and delete any incoming core files as it can't delete any old core files.	Router:Mar 25 04:25:06.252 UTC: dumper[329]: %OS -COREHELPER-2-ABORT_COPY : Copy of sleep_30731.by.3.20380325-042505. xr-vm_node0_RSP0_CPU0.34684.core.lz4 to 0/RSP0/CPU0:/misc/disk1/coredumps **aborted for reason: Not enough available space in /misc/disk1 (less than 10%). Current /misc/disk1 bytes in use: 23590813696B, size of core file: 1471276B. Deleting core from /misc/scratch/core.**

Configure core dump folder limit

You must perform these steps to control the core dump folder storage limit:

Procedure

Step 1 Set the core dump folder storage limit to prevent excessive core dumps on the hard disk.

Example:

```
Router# configuration
Router(config)# exception disk-usage-limit 29
Router(config)# commit
```

You can configure the core dump folder storage limit to range between 20 and 50 percent of the total hard disk space.

Step 2 Run **show exception** command to view the set core dump folder storage limit.

Example:

This example displays the core dump folder storage limit set to 29 percent of the total hard disk space.

```
Router# show exception
 Exception path for choice 1 is not configured or removed
 Exception path for choice 2 is not configured or removed
 Exception path for choice 3 is not configured or removed
 Default fallback/copy path = /misc/disk1/coredumps
 Core dump usage on disk limited to 29%
```

Example:

This example displays the core dump folder storage limit reset to 20 percent of the total hard disk space after disabling the **exception disk-usage-limit** command.

```
Router# show exception
 Exception path for choice 1 is not configured or removed
 Exception path for choice 2 is not configured or removed
 Exception path for choice 3 is not configured or removed
 Default fallback/copy path = /misc/disk1/coredumps
 Core dump usage on disk limited to 20%
```