# 14 Operation & Maintenance of Datacenter Storage Systems

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# Foreword

- This module mainly introduces:
  - Daily operations of Datacenter Storage Administrators.
  - The routine maintenance items for Datacenter Storage Systems.
  - The daily management items for Datacenter Storage Systems.
  - The common Operation & Maintenance (O&M) tools used on Datacenter Storage Systems.

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# Objectives

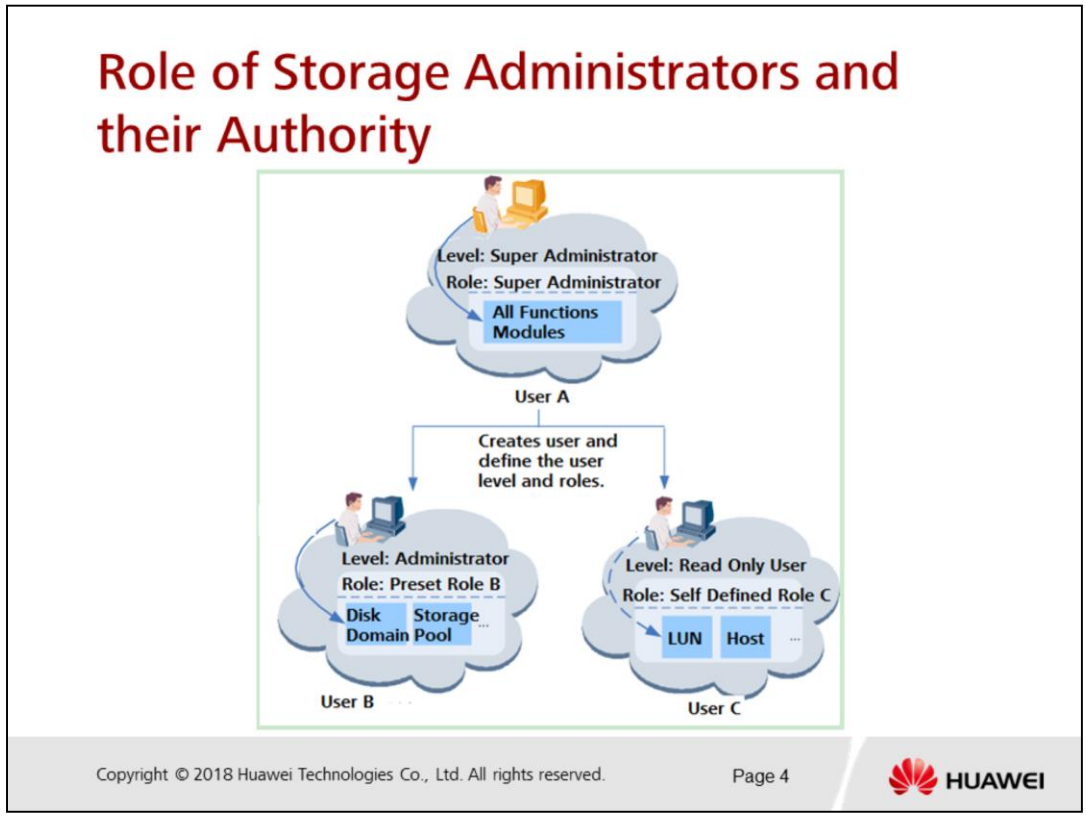
- Upon completion of this module, you will be able to:
  - Describe the work scope of Datacenter Storage Administrators.
  - Describe the routine maintenance items and the maintenance methods for Datacenter Storage Systems.
  - Describe the content of daily management items for Datacenter Storage Systems.
  - Describe the functions and application scenario of the common O&M tools used on Datacenter Storage Systems.

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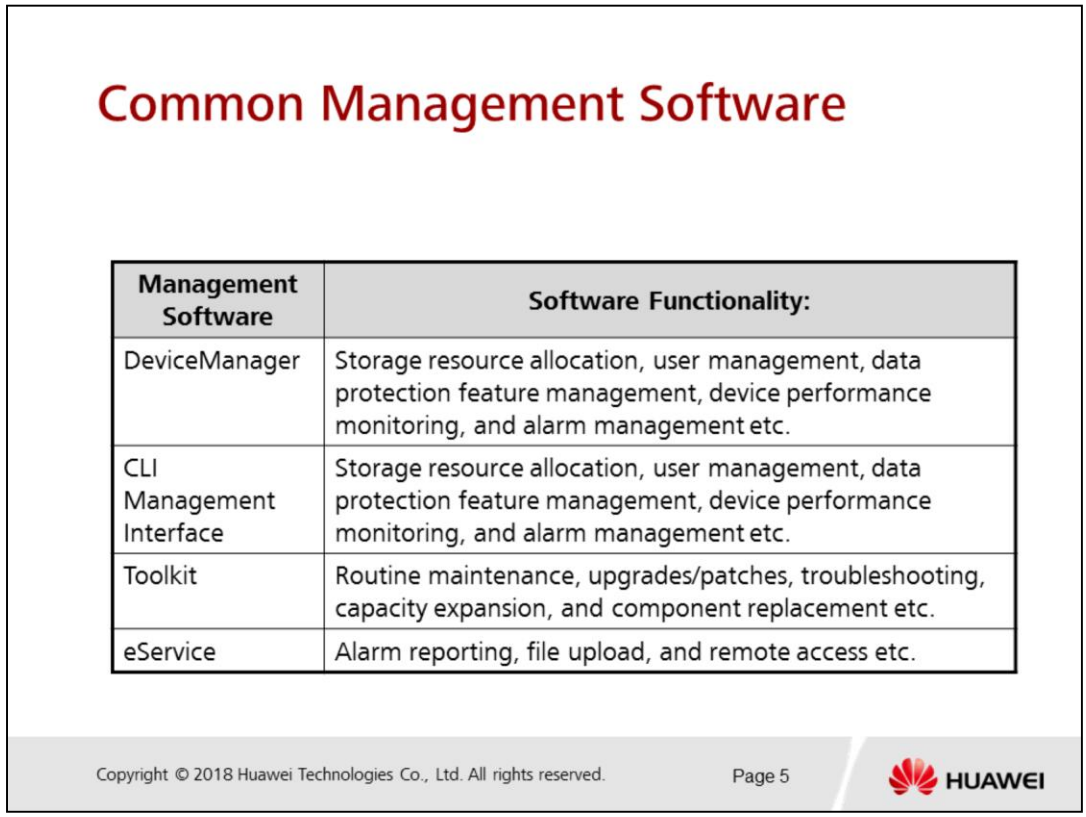
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2. Routine Maintenance.
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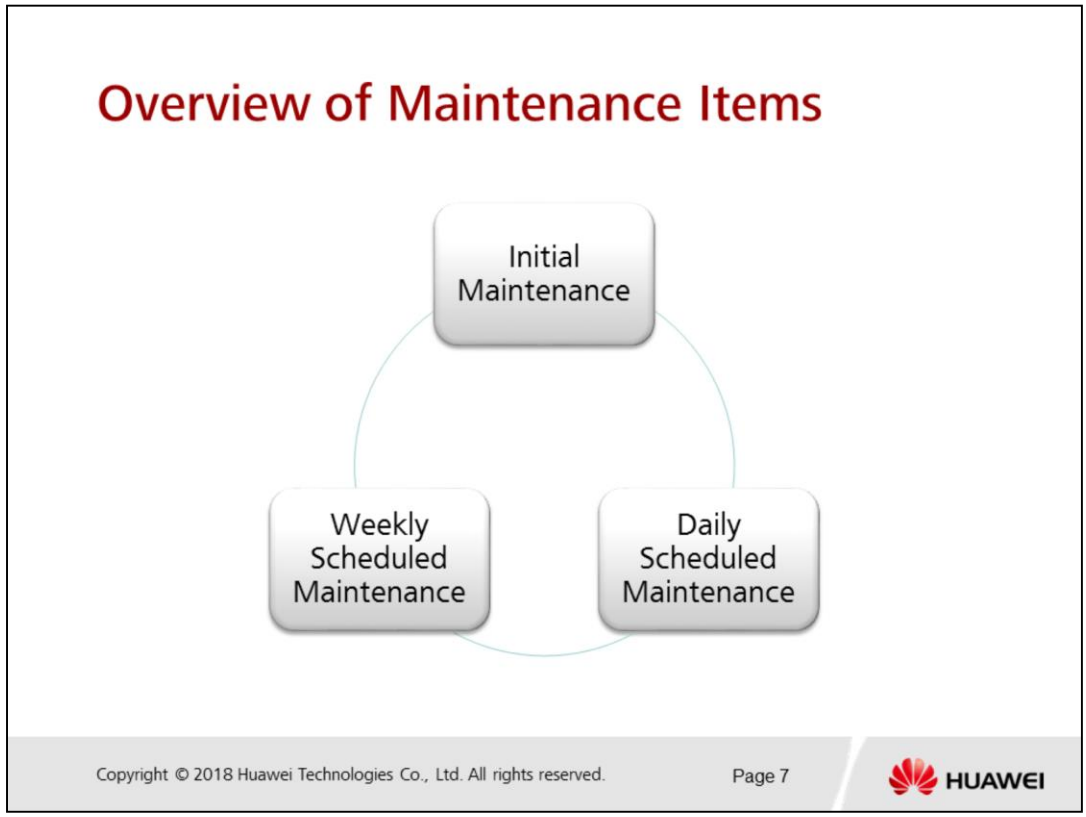



- In order to prevent wrong operations from affecting the stability of the business system and the security of business data, the system controls the user's operating authority and scope through levels and roles.
- Super administrator: has full control over the storage device and can create users at all levels.
- Administrator: Has a certain level of control over the storage device, but cannot perform operations such as user management, system upgrade, system modification, device power off, and device restart.
- Read-only user: Only has access to the storage device. After logging in to the storage device, read-only users can only perform query operations.

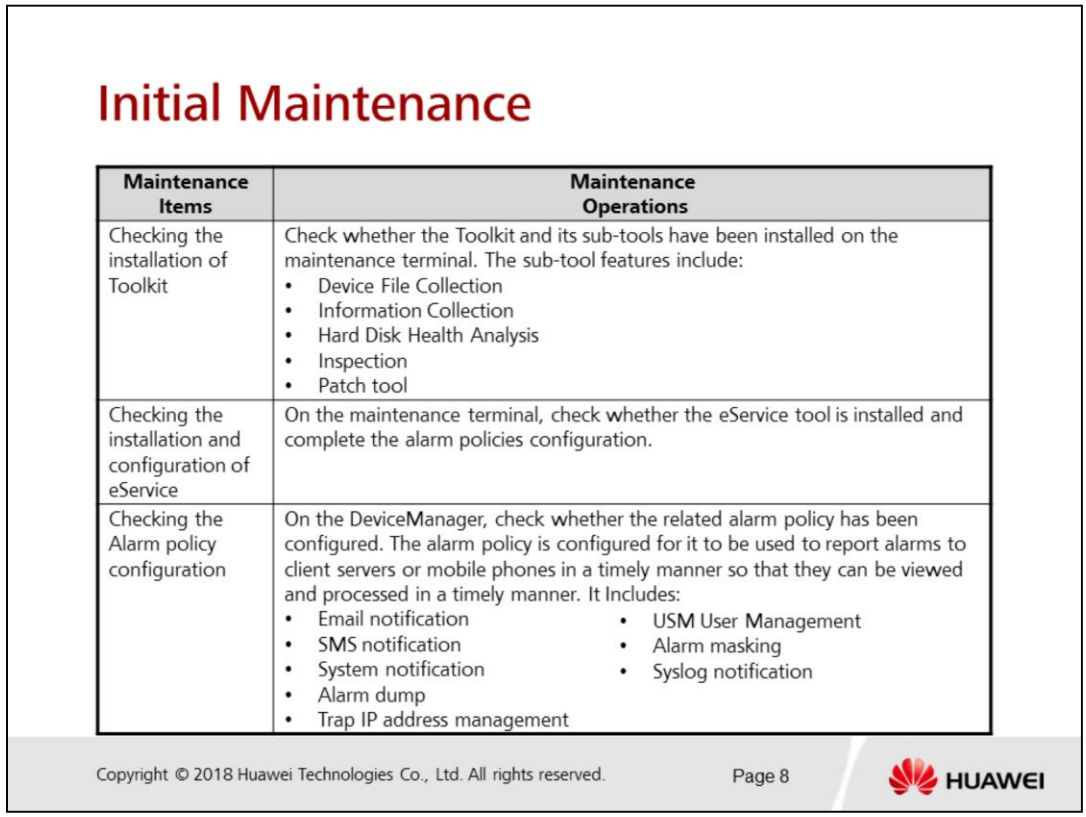



- Users can query, set, manage, and maintain the storage system through the DeviceManager and CLI management interfaces. Serviceability management tools such as Toolkit and eService can effectively improve the operation and maintenance efficiency. The operation and maintenance management software can help administrators manage and monitor the storage system. The commonly used software for managing storage systems is shown in the table.
- DeviceManager is a Huawei storage device management software that can easily configure, manage, and maintain storage devices.
- The CLI (Command Line Interface) provides command line management and maintenance of the storage system. Configuration commands are input through the keyboard and are compiled and executed by the program. The execution result is displayed in the CLI operation interface as text or graphics.

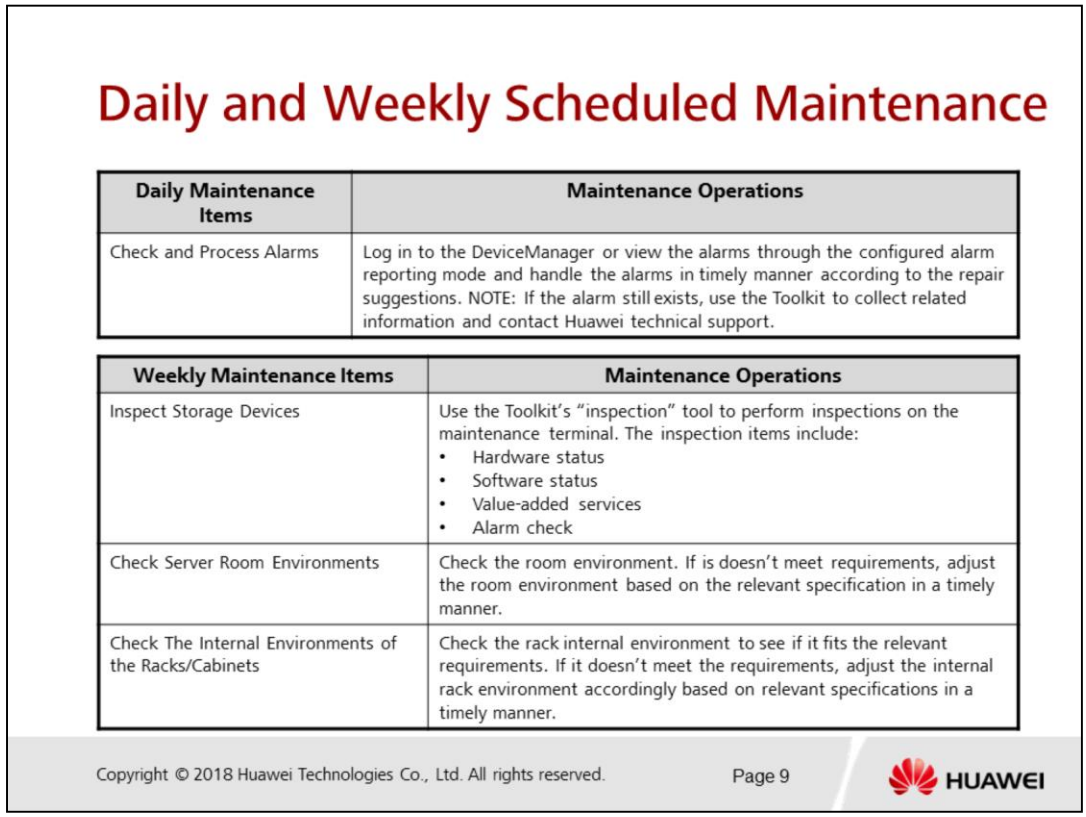
- Toolkit is a unified desktop-side management platform for all IT tools. It contains various tools required for deploying, maintaining, and upgrading IT equipment. It is mainly used for routine maintenance of storage systems.
- eService is a professional service tool with alarm reporting, file upload, and remote access. After the eService is installed, eService can automatically report storage device alarms connected to eService to the Huawei Service Support Center. Huawei maintenance personnel quickly formulate measures based on the severity of the alarm and the difficulty of alarm processing. This effectively improves the alarm processing efficiency and saves customer's time and manpower.




- The diagram above shows the three main elements in the maintenance process of storage systems in a datacenter. It consists of initial maintenance when all the systems are installed for the first time, then followed by daily and weekly scheduled maintenance to ensure optimal operation and to locate any faults in a timely manner.




- Through diligent maintenance and weekly reporting, the system administrator can ensure the optimal working environment and status of the equipment. If any abnormalities occur, then it can be processed and maintained in a timely manner, which ensures the continuous healthy operation of the storage system.
- Note: If you haven't installed the Toolkit or the eService tool, kindly login to Huawei Enterprise website (http://enterprise.huawei.com), to search and download the "OceanStor Toolkit" or "eService" software installers and the operational guide documents. You may install the tools based on the guide document provided.

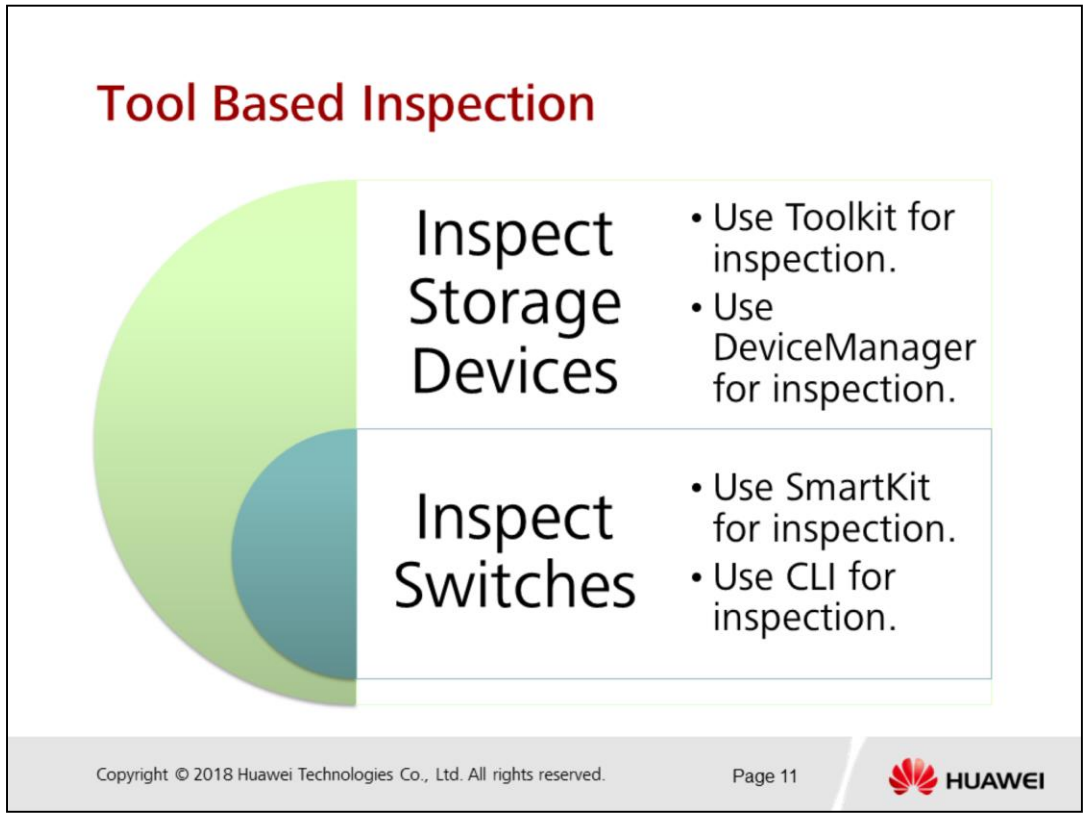



- The table above shows the list of items in the maintenance plans for daily and weekly maintenance process along with the maintenance operations conducted for each maintenance item.
- Daily maintenance involves checking and processing alarms found via the DeviceManager or other notification channels.
- Weekly maintenance involves maintenance checks for storage devices and its environments to ensure that each devices are operating normally in the working environment specified. If the environment of the equipment doesn't meet the requirements, action needs to be taken immediately to rectify the issue before any damage occurs to the equipment.

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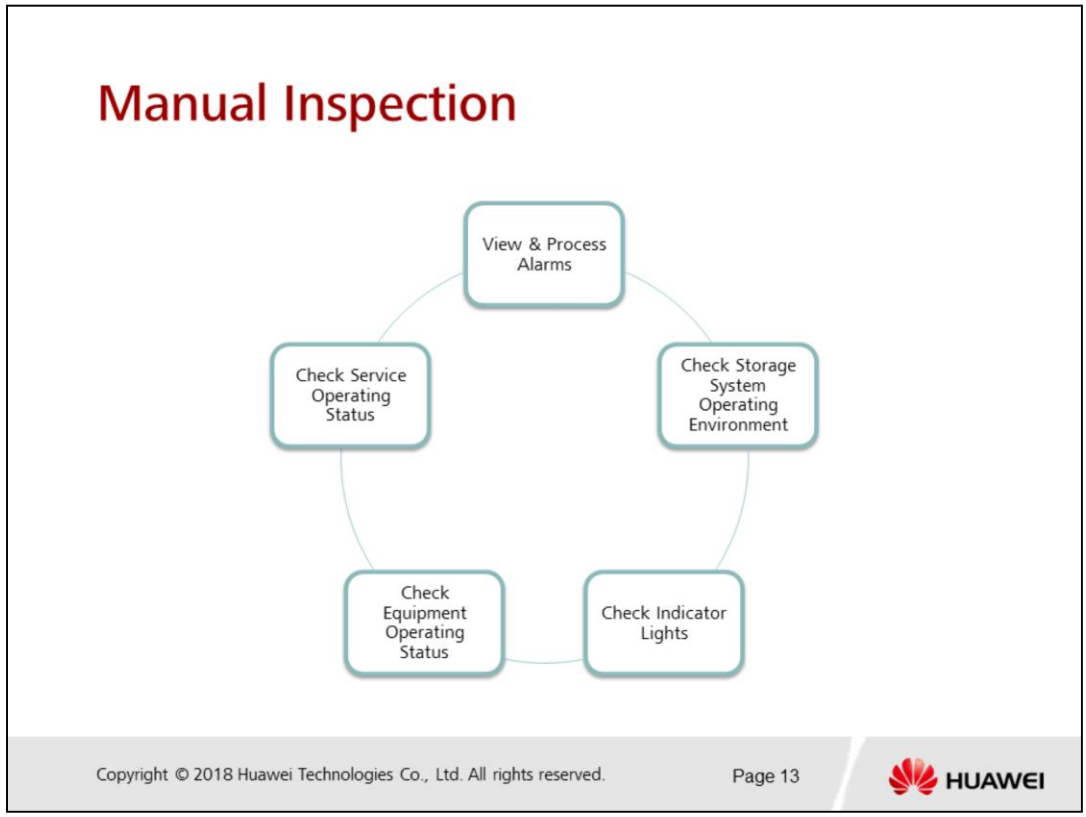
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- The O&M tool can inspect the current state of the equipment to know the running status of the equipment and the network in real time, understand the operational trends of the equipment and network, and improve the handling efficiency of maintenance personnel in the event of emergencies.
- Inspection of storage device: Inspection of storage device can be done via the Toolkit or the DeviceManager.
- Inspection of switches: You can use the SmartKit tool to inspect the switch or log in to the CLI through the serial port to check the health and running status of the switch.
- Using the Toolkit to perform inspection: When the OceanStor Toolkit inspection tool is installed on the storage system, you can use the inspection tool to formulate a corresponding inspection strategy and perform inspections on the equipment so that you can know the running status of the equipment in real time.

- Using the DeviceManager to perform inspections: By checking detailed alarm information and repair suggestions in the alarm list, it can help you repair storage system alarms and ensure normal operation of devices and services.
- Using SmartKit to inspect the switches: Fiber switches are used to control the interconnection between racks and nodes. You can use the SmartKit tool to check the switch to understand the current operating status of the switch. For SmartKit tool download, use the following link : http://support.huawei.com/carrier/navi#col=software.
- Using the CLI to inspect the switches: When the inspection tool is not installed, you can check the health and operation status of the switch through the CLI.




- View and process alarms: By checking detailed alarm information and repair suggestions in the alarm list, it can help you to repair and act upon the storage system alarms, and ensure normal operation of devices and services.
- Checking the operating environment of the storage system: The operating environment of the storage system that meets the business requirements is a necessary condition for the storage system to be able to operate in stable conditions for a long period time.
- Check indicator lights: The indicator lights can reflect the working status of the corresponding hardware device in real time. By checking the indicator lights, you can quickly and accurately determine whether each hardware device is in the normal working condition.
- Check the operating status of the device: By checking the operating status of the storage system on the storage system and DeviceManager, you can find faults in time and ensure the normal operation of the storage system.
- Check the service operating status: Check the service operating status on the DeviceManager management interface to detect faults in time and avoid data loss due to service interruption.

# Collecting Storage System Information (1)

| Types of Information | Names | Description: |
|---|---|---|
| Basic Information | Device Serial Number and Version | Provides the serial number and version info of the device. |
| | Customer Info | Provides actual contact and contact information. |
| Fault Information | Time of Fault | Records the accurate time when the faults occur. |
| | Fault Symptoms | Records in detail on the symptoms of the faults such as the content of the error dialog box, and the content of the notification received during fault. |
| | Operation Prior to Fault Occurrence | Recall and records the operation done on the system before the fault occurs. |
| | Operation After the Fault Occurred | Recall and records the operation done after the fault has occurred. |
| Storage Device Information | Configuration of Hardware Module | Records in detail the configuration information of the hardware module. |
| | Indicator Light Status | Record the indicator status of the storage device, especially the orange and red indicator light status information.<br>For the indicator status of each component of the storage device, see "Product Description" in the documentation of the corresponding product model. |
| | Storage System Data | Manually export the operating data and system logs of the storage device. |
| | Alarms and Logs | Manually export the alarm and logs information of the storage device. |

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- The maintenance information that needs to be collected includes basic information, fault information, storage device information, networking, and application server information.
- DeviceManager can be used to collect system data, alarms, and event information.
- Use the CLI to back up or import device configuration data.
- Use Toolkit to collect device system data, file information, host information, and more.

# Collecting Storage System Information (2)

| Types of Information | Names | Description: |
|---|---|---|
| Network Information | Connection Method | Describe the network connection between application servers and storage devices, such as FC networking and iSCSI networking. |
| | Switch Model | Records the model number of the existing switches in the network. |
| | Switch Diagnostics Information | Manually export diagnostic information of the currently running switch, including startup configuration, current configuration, interface information, time, and system version. |
| | Network Topology | Describes the network topology between application servers and storage devices or provide networking diagrams of the current environment. |
| | IP Address Information | If iSCSI networking is used between the application server and the storage device, it describes the principle of IP address allocation or provides an IP address allocation list of the current network. |
| Application Server Information | OS Version | Records the operating system type and its version number installed in the application server. |
| | Port Rate | Record the application server port rate connected to the storage device. For how to check the port rate, see the documentation for more information. |
| | OS Logs | View and exports the operating system logs information. |

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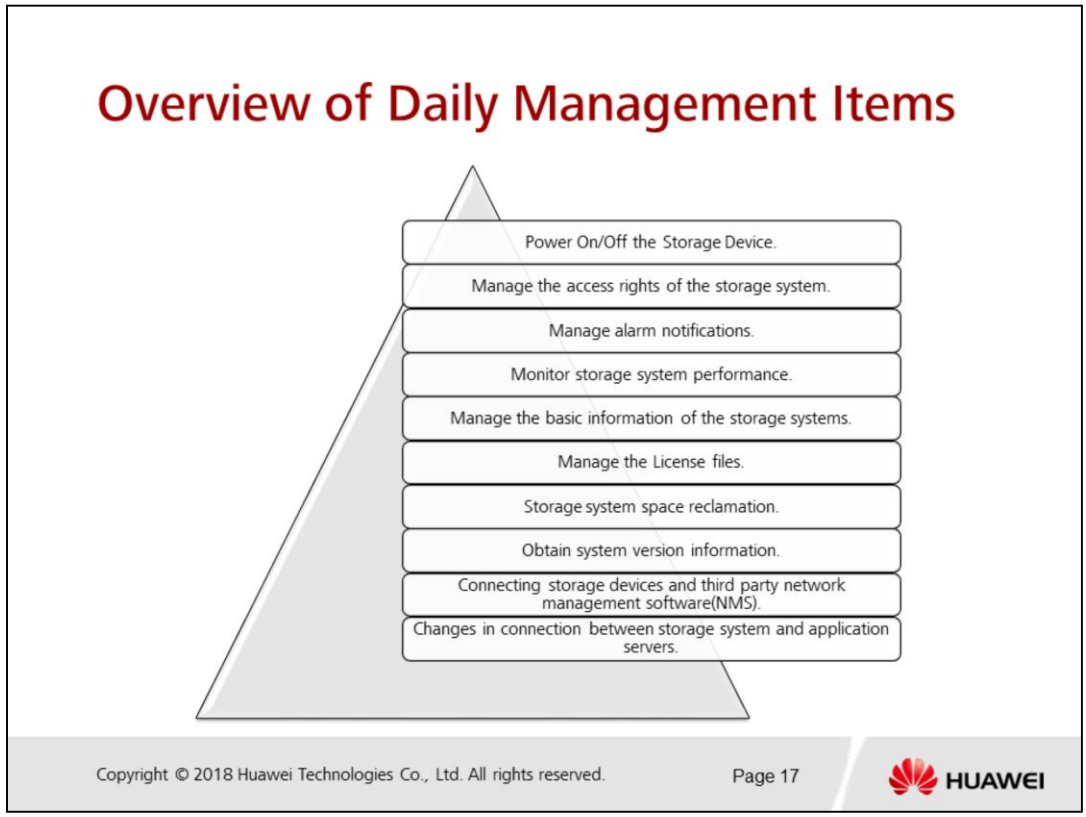
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- The table above shows the continuation of the information collected from the storage system as part of the maintenance process.
- Collection of these information allows O&M personnel to have better understanding of the current running status of the storage devices and their configurations, which helps in locating faults or bottlenecks in the performance of the storage systems.

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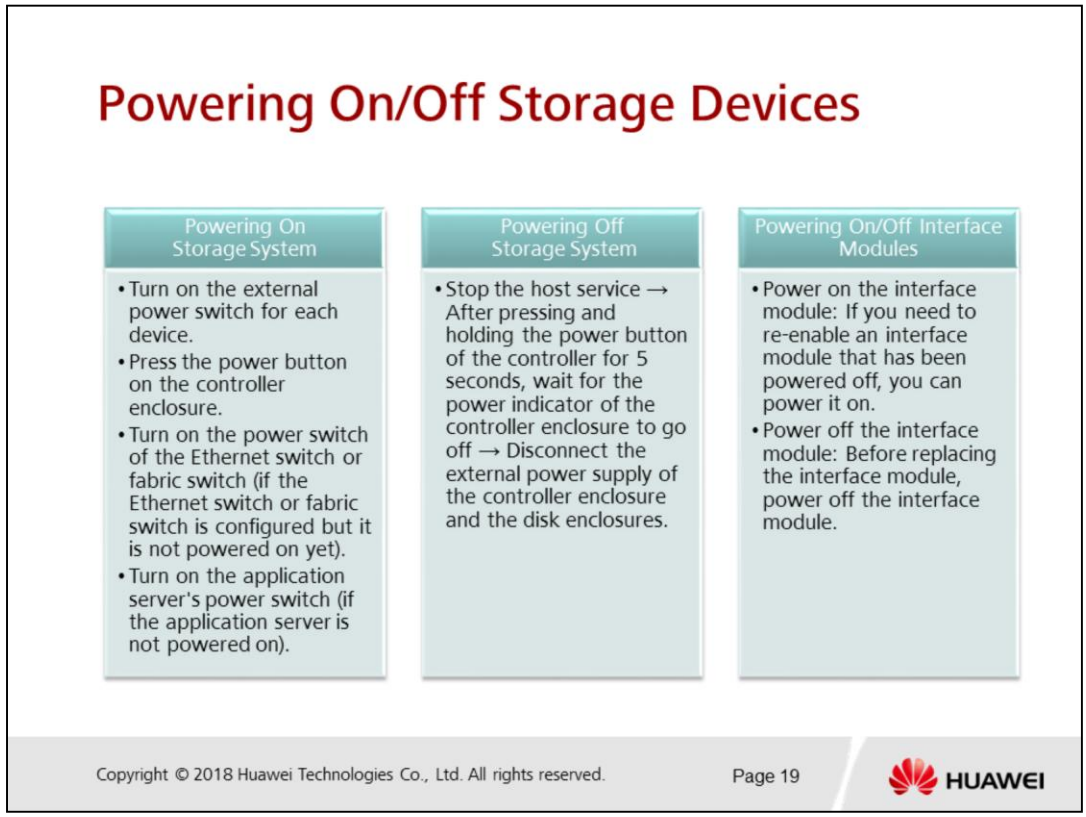
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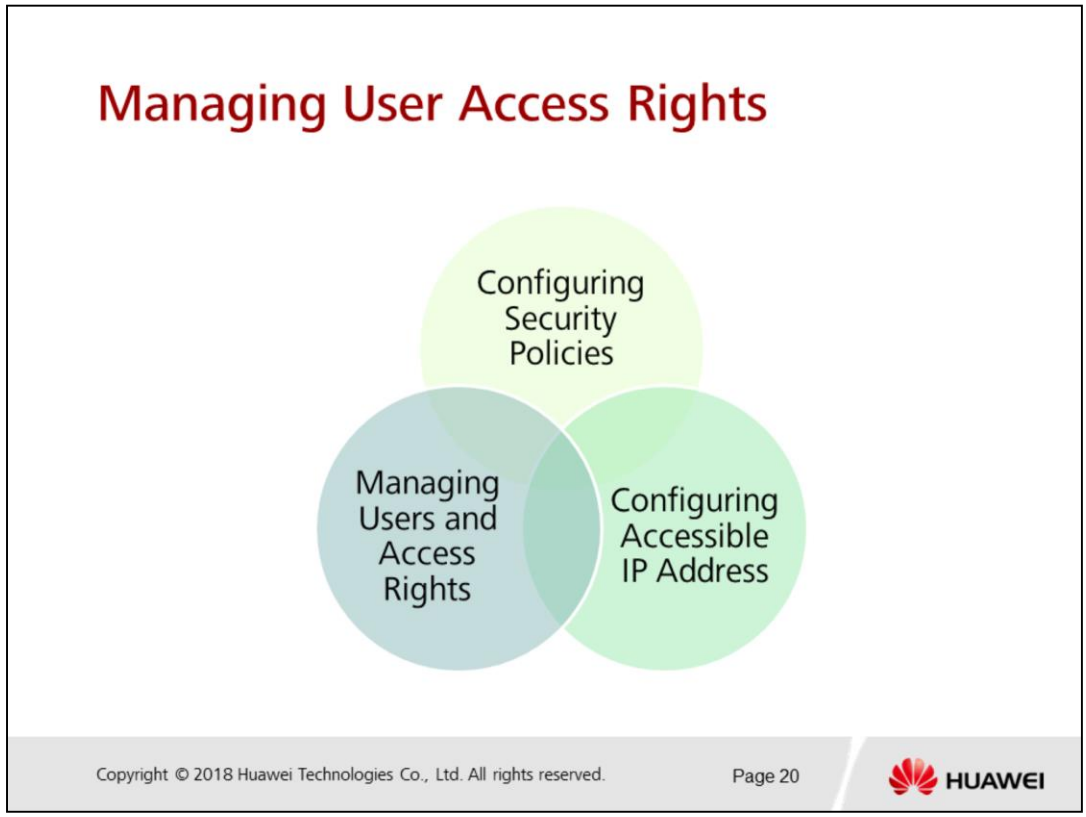



- Powering on and off the storage device: It includes powering on and off the storage system and powering on and off the interface module. Proper power-on and power-off prevents equipment damage due to improper operation.
- Managing access rights of the storage system: The storage system provides security policy adjustment such as access IP address management, and user management to ensure the security of storage devices and service data.
- Management of alarm and notifications: The storage system provides remote alarm notification. This chapter describes how to manage remote alarm notifications to ensure that administrators receive and process alarms in a timely manner.
- Monitor storage system performance: Monitor and view performance monitoring data to understand the system performance status and use related information for tuning the configurations to improve system performance.
- Manage basic information about the storage system: Basic information such as device name and system time can be modified according to service requirements.
- Management of License Files: A license file is a credential that allows the usage of various value-added features. During the daily management of the device, you need to pay attention to whether the license files is available and valid, to avoid the situation of unable to use certain value-added features because the license file is unavailable or invalid.

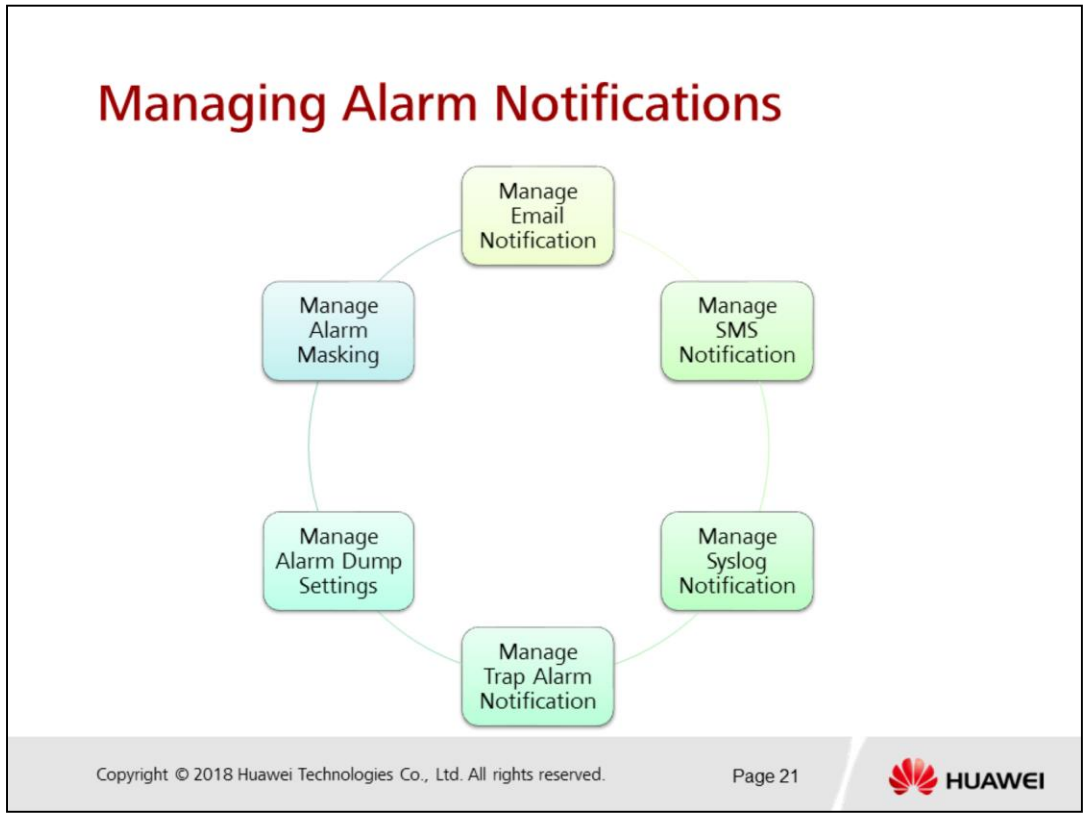
- Storage system space reclamation: When all or part of the storage system services do not need to be in operation, or the capacity allocated for capacity expansion is not actually used, this part of space can be reclaimed, and these storage spaces can be used to run new services to improve the utilization of storage space.
- Obtaining system version information: You can use DeviceManager and CLI to query and learn the version information of the current storage system so that the software version can be accurately determined according to the system version during maintenance. At the same time, the historical version information of the storage system can also be queried through the CLI.
- Connecting storage devices and third-party Network Management Systems (NMS): Huawei storage devices support interface protocols such as SNMP and SMI-S. Thus, users can manage storage devices through third-party NMS.
- Changes in connection between the storage system and the application server: After the connection between the storage system and the application server is changed, change the configuration on the storage system and the application server so that the application server can use the storage space of the storage system through the new connection channel. . This chapter will mainly describes the configuration steps after the HBA replacement in the following segments.



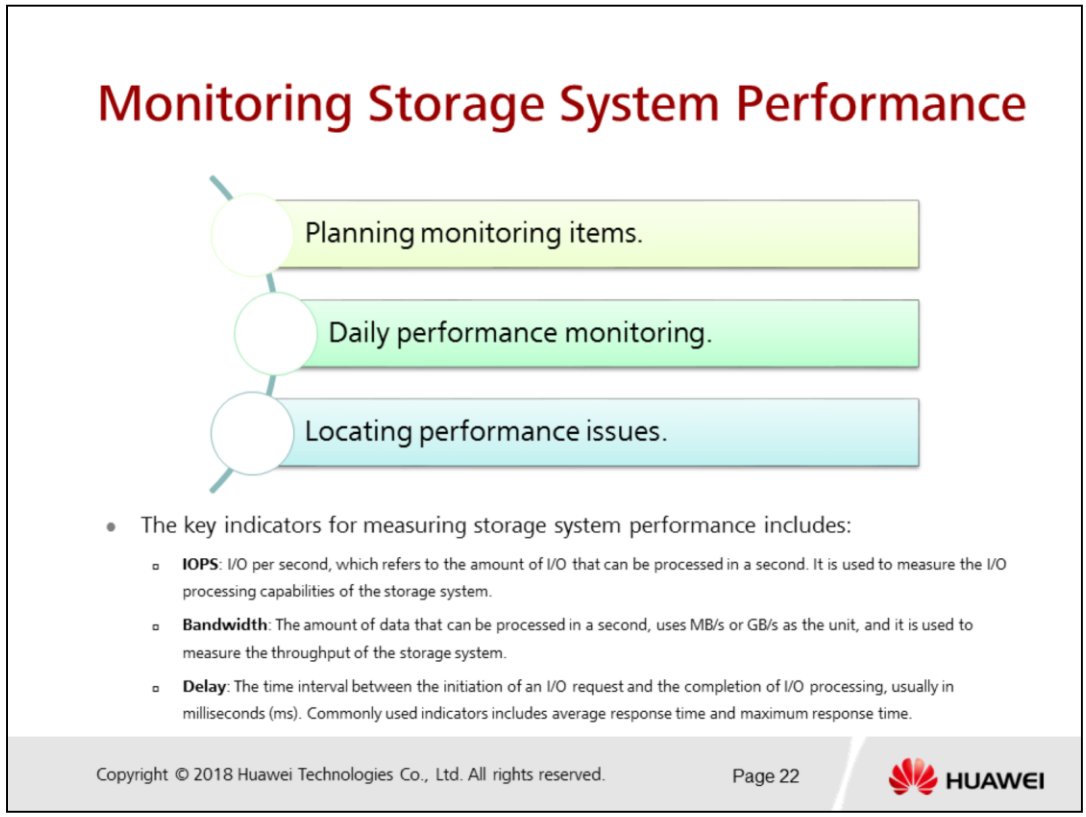

- Restarting the storage system causes service interruption on the storage system. Perform this operation with caution.
- When a fire, smoke, or flooding occurs in the equipment room, you need to do an emergency power-off to the storage system in order to ensure your personal safety or ensuring that the equipment is not damaged. For details on how to emergency power-off the storage system, please follow the user's server room safety guidelines for the power off process.
- The precondition for powering off the interface module is that all services involved in the interface module have already been stopped.




- The storage system provides security policies configuration such as access IP address management, and user management to ensure the security of storage devices and service data.
- Configure the security policy: You can control the complexity of the user name and password of the newly created account by setting the user name policy and password policy. Setting the login policy can lock the account that the system identifies as abnormal.
- Configure Accessible IP Addresses: After the IP address security limit is enabled, only the IP address or address segment in the list can access DeviceManager. Only super administrators can perform the operation of configuring accessible IP addresses.
- Managing users and access rights: In order to prevent incorrect operations from affecting the stability of business systems and the security of business data, the storage system defines three levels of users and restricts the operation rights of users at different levels.

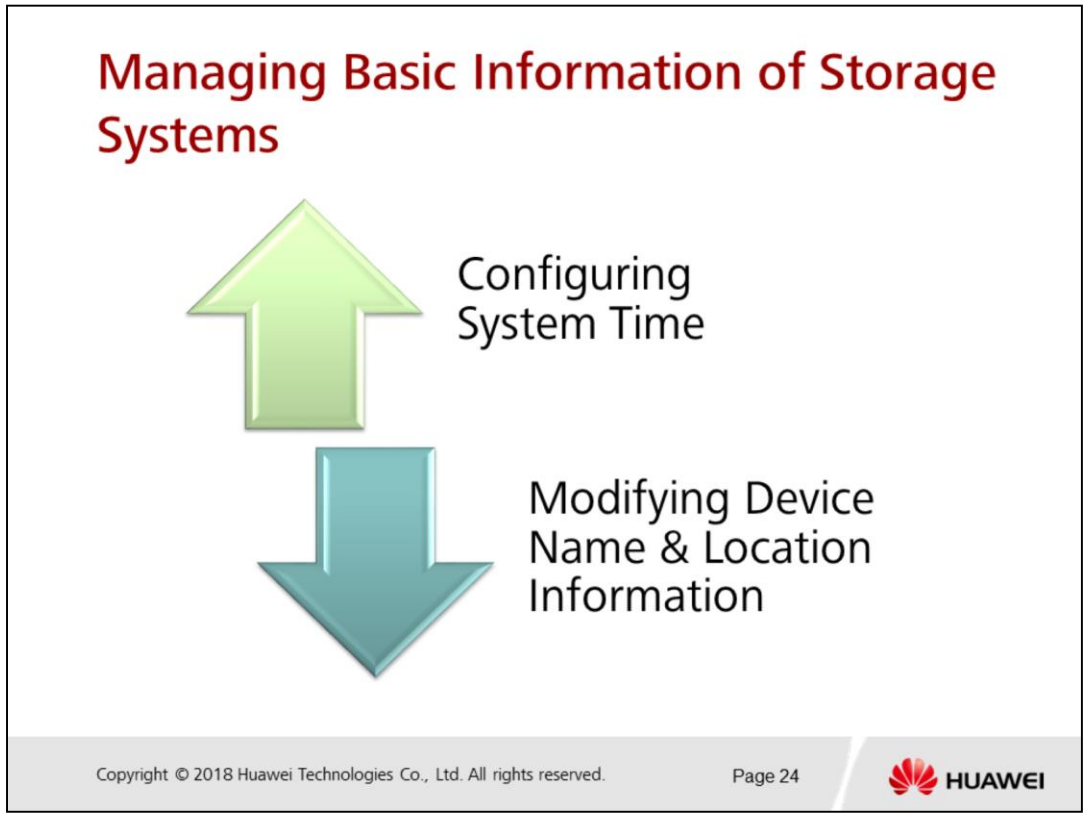



- Management of email notification: In the daily operation and maintenance process, changes in the business may require you to change the backup SMTP server and receive the alarm notification email address in time.
- Management of SMS notification: On the DeviceManager management interface, alarms can be set to be sent to the specified mobile phone as required by SMS to enable users to know and handle the storage system faults in a timely manner.
- Management of Syslog Notification: Users can adjust the server address for receiving syslog notifications and the level and type of notifications received according to the actual situation.
- Management of Trap alarm notification: Users can adjust the address of the Trap alarm notification according to the actual situation. The storage device alarm information will be sent to the network management system or storage device specified by the server.
- Management of alarm dump settings: After you set the alarm dump function, when the alarm information capacity reaches the system-defined threshold, it is automatically dumped to the specified FTP server or SFTP server.
- Management of alarm masking: After the alarm mask is set, you can enable/disable the alarm mask to manage the alarm information of the device without reporting or with reporting to the NMS.

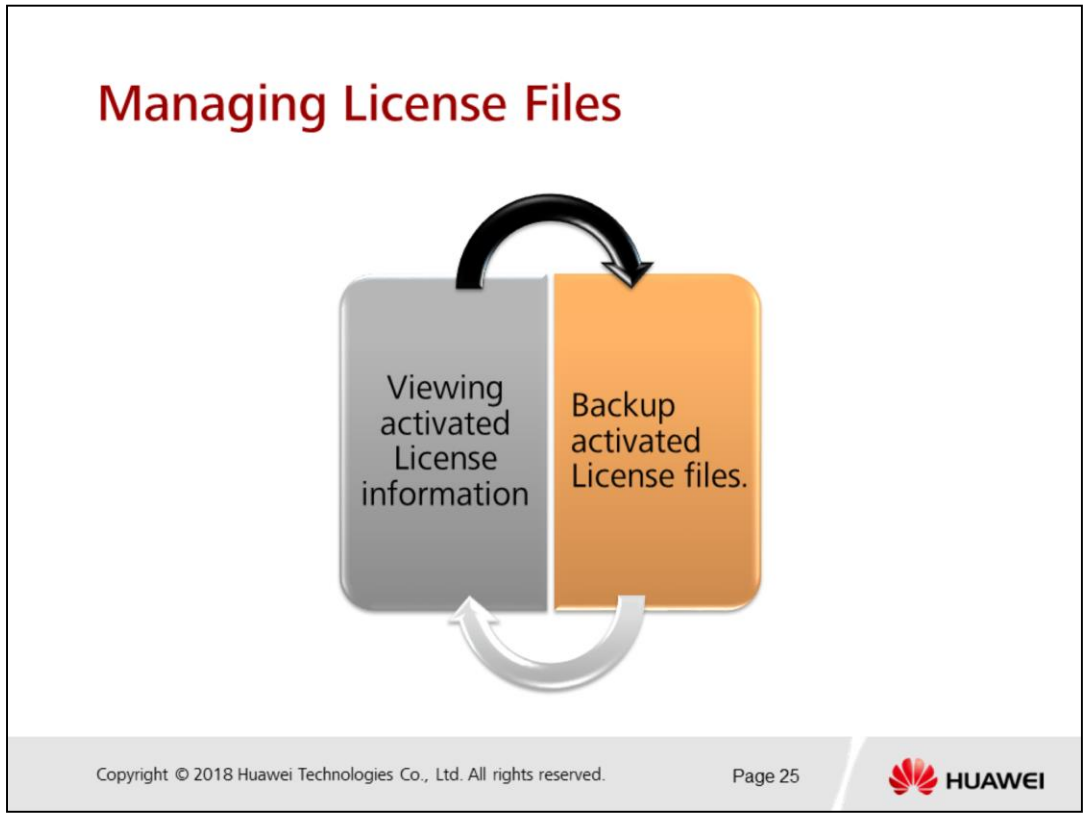



- Performance Monitoring Overview: Performance is a manifestation of the comprehensive capabilities of a storage system. In the service running phase, users can fully understand the performance of the storage system by performing real-time performance monitoring and performance trend analysis on the storage system. When performance problems occur, the analysis and locating of problems can be performed based on the performance monitoring data.
- Planning monitoring items: Under different service scenarios, different types of performance indicators need to be monitored by the users.
- Daily performance monitoring: On Huawei OceanStor V3 storage, daily performance monitoring of the storage system can be performed through the storage system management software DeviceManager and performance monitoring tool SystemReporter, enabling users to view and fully understand the operating status of the storage system.
- Locating performance issues: System performance issues is determined by the presence of a bottleneck in the system. When performing performance optimization and locating of performance issues, it is first necessary to clarify the service scenario currently carried by the system and the user's demand for performance. Followed by the usage of the system I/O path as a clue to determine the module where the performance problem lies. Finally, locate and optimize the performance problem of the storage system.

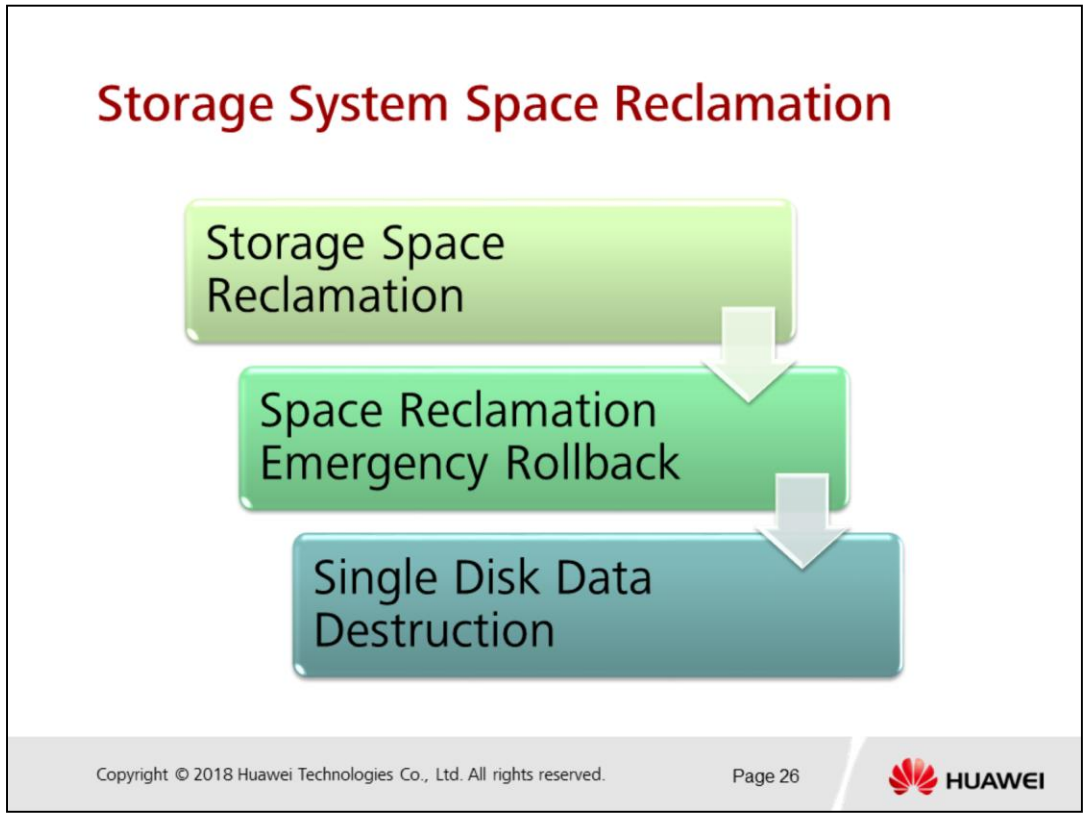
- Key indicators for measuring storage system performance include:
    - IOPS: I/O per second, refers to the number of I/Os that can be processed per second, which is used to measure the I/O processing capability of the storage system. In the application scenarios such as database OLTP (Online Transaction Processing) service and SPC-1 authentication, the performance of the system is usually measured by IOPS.
    - Bandwidth: The amount of data that can be processed per second, often measured in MB/s or GB/s, is used to measure the throughput of a storage system. In the database OLAP (Online Analytical Processing) services, media services, video surveillance and other application scenarios, the system performance is usually measured in bandwidth.
    - Delay: The time interval between the initiation of an I/O request and the completion of I/O processing, usually in milliseconds (ms). Commonly used indicators include average response time and maximum response time. For example, the database OLTP service generally requires a delay of 10ms or less. The VDI (Virtual Desktop Infrastructure) scenario typically requires a delay of less than 30ms. The video-on-demand and video monitoring delay requirements vary with the code rate and stream rate.
- For the Huawei OceanStor V3 storage system, the DeviceManager management software do not need to be installed separately. Thus, users can directly log in to DeviceManager using the browser of the maintenance terminal without installation. Users can view the real-time performance monitoring data, alarms, and power consumption information of the storage system through the DeviceManager. Compared to DeviceManager, SystemReporter needs to be installed before it can be used. However, SystemReporter provides more comprehensive and detailed performance monitoring and performance analysis information.



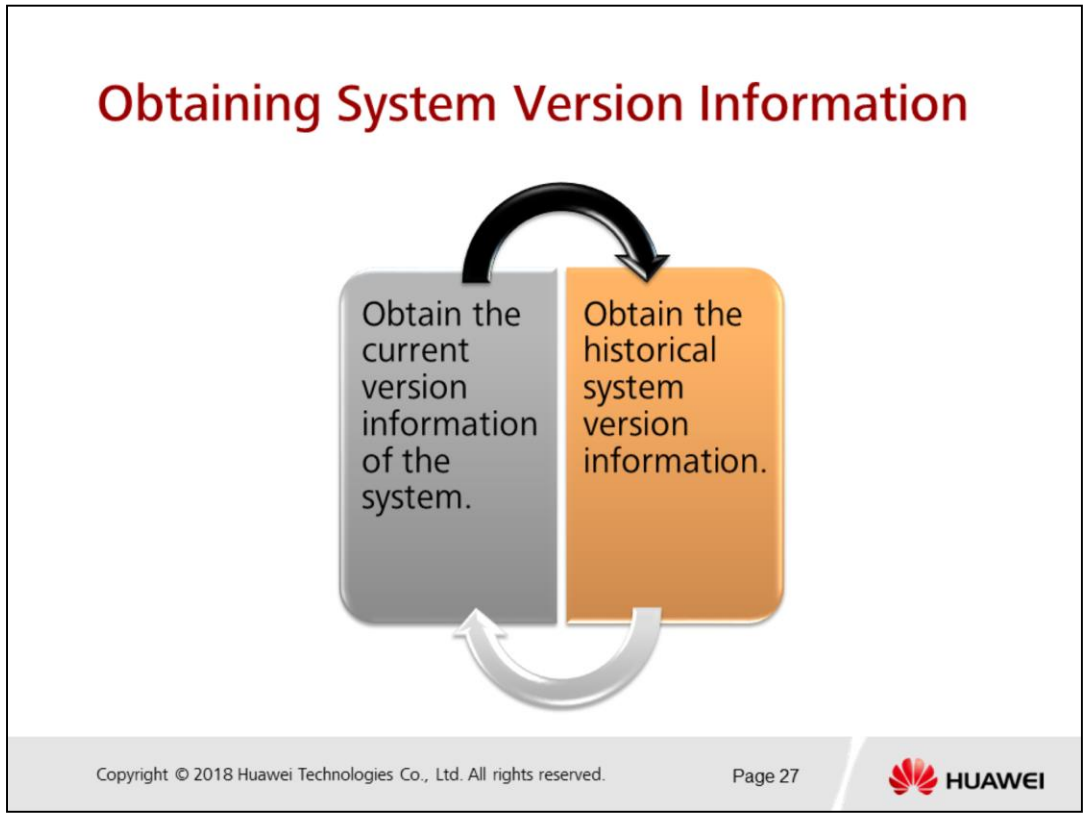

- Configuring the system time: When the time of the storage system deviates, you need to modify the time of the storage system so that the alarm logs can accurately locate the time when the alarm is generated. Through this operation, you can synchronize the client time to the device, set NTP to automatically synchronize, or manually modify the device time.
  - NTP (Network Time Protocol) is a protocol that synchronizes computer system time. It can synchronize the computer's system time to UTC (Universal Time Coordinated). Servers that support the NTP protocol are called NTP servers.
  - By synchronizing the client time, you can adjust the storage system time to match the client time.
  - By setting up NTP automatic synchronization, you can use the NTP server as an external time source to periodically and automatically synchronize the time to the device.
- Modifying the device name and location information: This operation allows you to set the name of the device and the geographical location of the device.



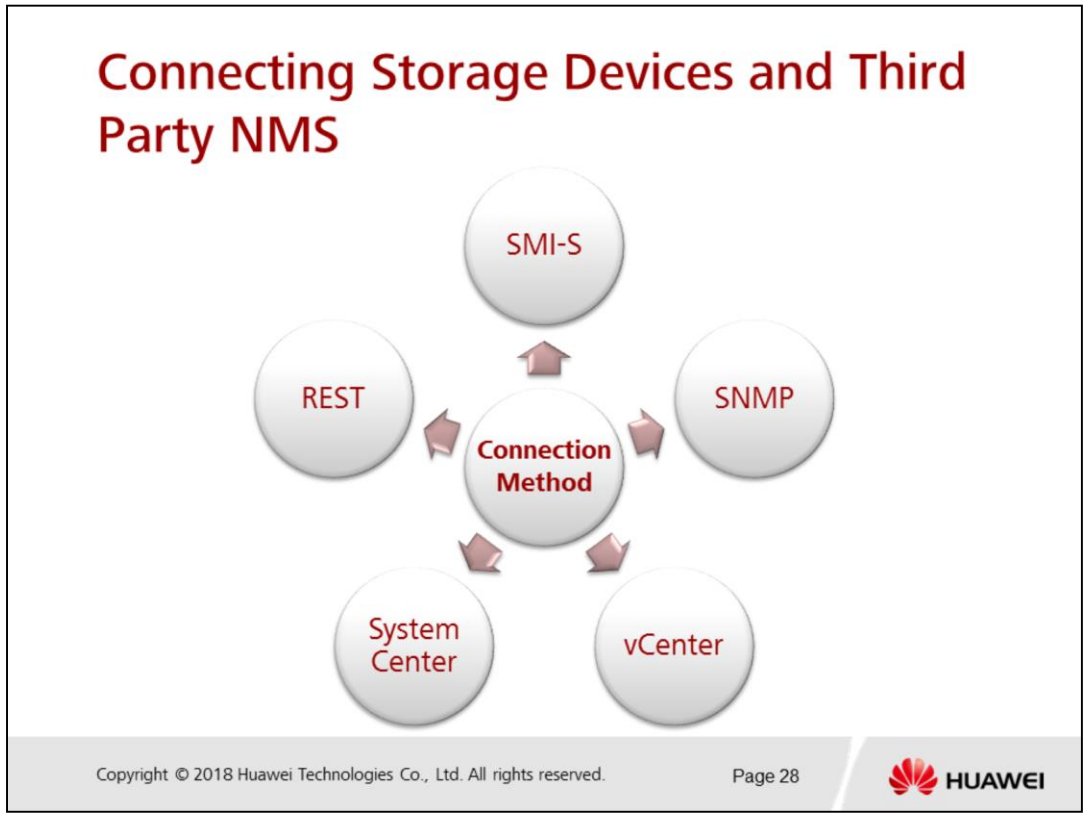

- Viewing activated license information: Before using the value-added service, you need to check the activated license file to ensure that the license file for the feature is available.
- Back up the activated license files: After the license file on the device becomes faulty, you can import the backup license file again for usage.




- Storage system space reclamation: When all or part of the storage system services do not need to be in operation, or the allocated capacity of the capacity expansion is not actually used, this part of space can be reclaimed, and these spaces can be used to run new services to improve the utilization of storage space.
    - Space recovery is divided into two types: full recovery and partial recovery.
    - Before implementing space recovery, it is necessary to complete preparations such as running status checks of the host and storage devices and backup of disk information to ensure that the space recovery process can be implemented smoothly.
- Emergency recovery of space reclamation: In the event of an exception, anomaly or failure during the space reclamation process, emergency rollback can be performed. The emergency recovery of space reclamation involves two scenarios which are, full recovery and partial recovery.
- Single disk data destruction: When data on a hard disk is no longer needed, single-disk data destruction can be performed on the hard disk. After this operation is performed, the deleted data cannot be restored to ensure data security. Data destruction can only be performed on encrypted disks that have not been added to the disk domain.

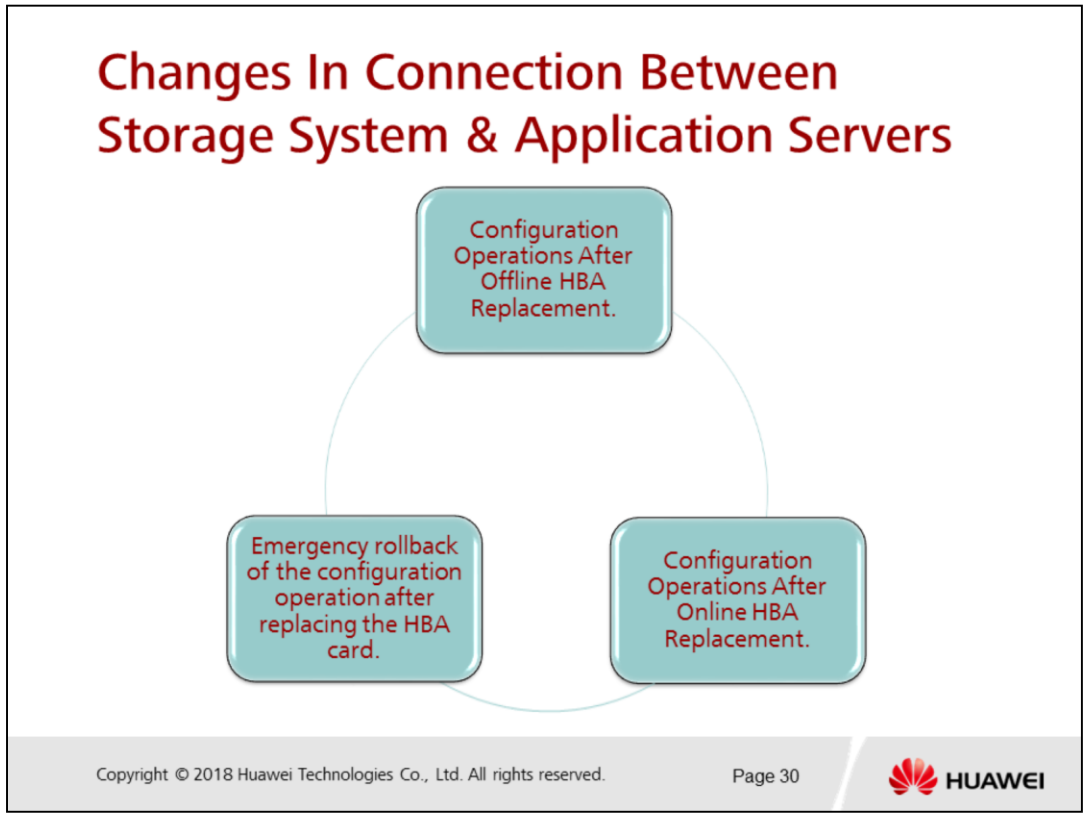



- Obtain the current version information of the system: Users can query and learn the current version information of the storage system through the DeviceManager.
- Obtaining historical system version information: Users can query and learn about the historical version information of the storage system through the CLI.




- Huawei storage devices support interface protocols such as SNMP and SMI-S. Users can manage storage devices through a third-party network management system based on these protocols.
- SMI-S: By installing the SMI-S provider on a third-party Windows/Linux server, users can manage the Huawei storage system through the SMI-S provider.
- SNMP: The third-party NMS can view information about storage devices such as LUNs, ports, and storage pools through the SNMP protocol.
- vCenter: OceanStor VMware vCenter Plug-in (referred to as vCenter plug-in) is a storage management plug-in developed based on the vSphere Web Services SDK (Software Development Kit) to implement management of Huawei storage devices through the vSphere client.

- System Center: Storage Microsoft System Center Plug-in is a plug-in developed by Huawei based on Microsoft SCOM (System Center Operations Manager). It is used to monitor Huawei storage devices after importing SCOM.
- REST: RESTful API is an open interface based on the REST (Representational State Transfer) standard provided by the OceanStor DeviceManager. Third-party developers can use RESTful APIs to authorize access to the open resources of OceanStor DeviceManager, such as alarm query, performance monitoring, and resource allocation.
- For more information: Please log in to the Huawei Enterprise Network (http://enterprise.huawei.com), to search and download the latest supporting documents.

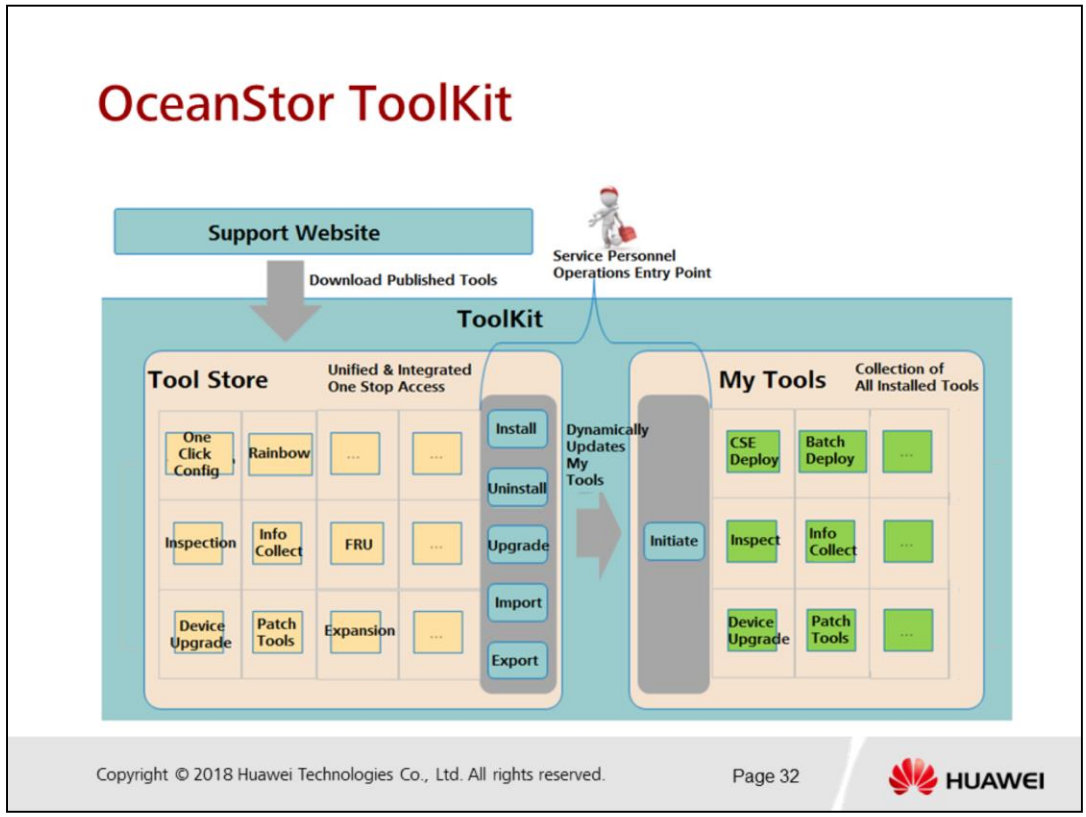



- After the connection between the storage system and the application server is changed, you need to change the configuration on the storage system and application server so that the application server uses the storage space of the storage system through the new connection channel.
- After the HBA of the host is replaced, configure the storage system and the host to make the replaced HBA work normally. Before configuring the replacement HBA card, you need to complete preparations such as host multipath and disk information backup and running status check on storage device to ensure that the space configuration process can be implemented smoothly.
- After an HBA is replaced, an emergency rollback can be performed if an exception or fault occurs during the configuration operation on the host or storage side.

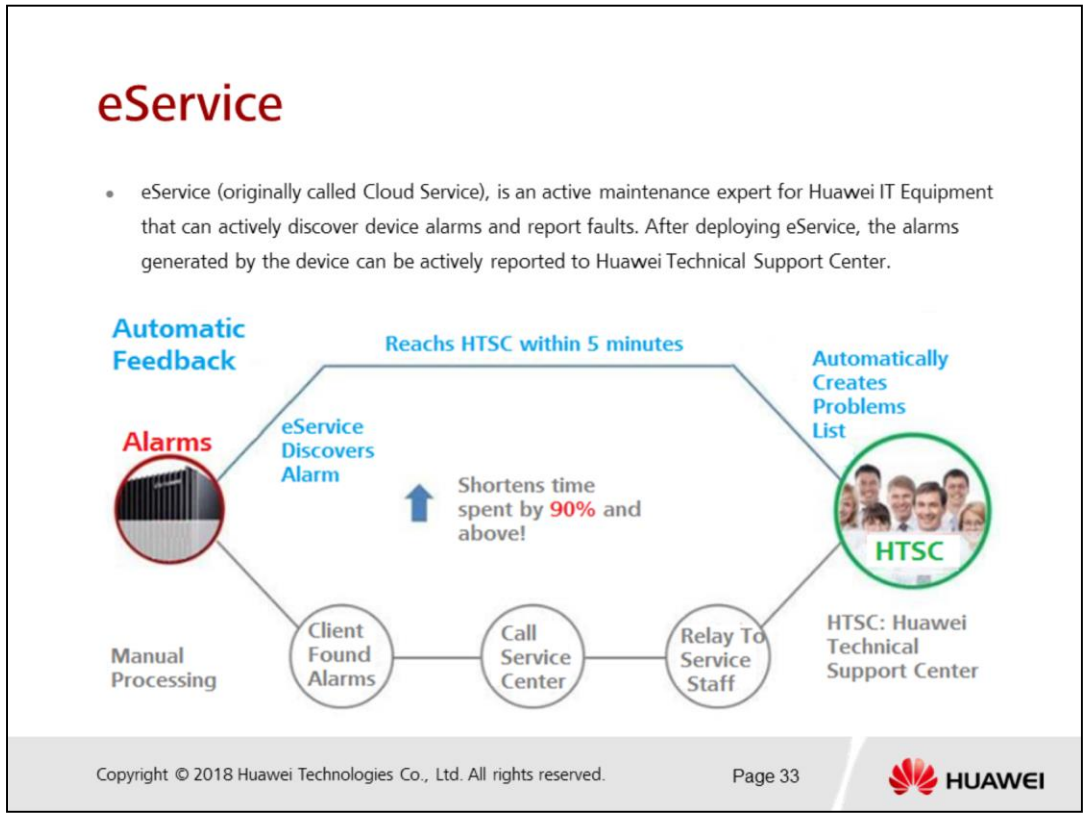
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- OceanStor Toolkit is a serviceability tool developed by Huawei. It is a unified desktop management platform for all IT tools. Its built-in tool store can quickly download, install, or upgrade tools, and can automatically check installed systems to see whether the installed tools needs to be upgraded.
- The Toolkit contains various tools required for the deployment, maintenance, and upgrade of IT equipment. It can help service engineers and maintenance engineers perform accurate operations on the equipment in the O&M process, reducing the difficulty of operation and maintenance, thus improving work efficiency.
- The maintenance tool Toolkit of the storage product is a one-stop management tool used in various operation and maintenance scenarios to improve the efficiency of the various service operations such as product deployment, daily maintenance, and upgrade, and reduce the operation difficulty.
- Due to the fact that maintenance operation has the operating rights and professional skill requirements, the tool settings have permission/access right control. For more details on the specific tool permission/access rights, please contact technical support engineers.
- You can search for product documents related to the OceanStor ToolKit at http://e.huawei.com.

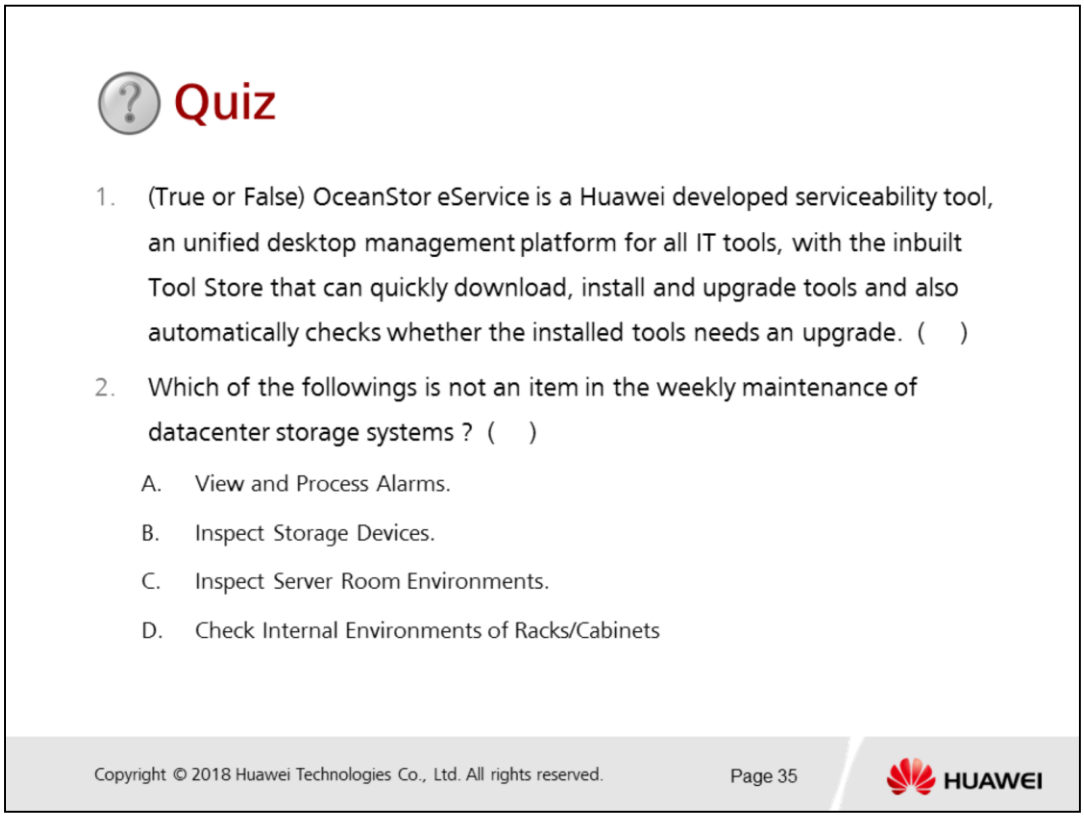



- The traditional service support method is fully manual local service which means that the problem need to reported to the local support center before support personnel can act on those problems. In the fault discovery process, technical service personnel are faced with the challenge of not finding the problem in time and failing to deliver the information. When a device fails, the alarm reporting function provided by the eService can transmit all the fault information to the Huawei technical support center in a timely manner, shortening the time for troubleshooting and processing, and meeting the current urgent needs of the enterprise.
- The eService is deployed on a customer-supplied server to receive device alarm information and send it to Huawei technical support center. It also supports uploading device logs and inspection reports to Huawei technical support centers.
- You can search for http://e.huawei.com to obtain product documentation related to the eService tool.

# Summary

- This module mainly introduced:
  - The daily operation guide for Storage Administrators in the datacenter.
  - The daily maintenance items for datacenter storage systems.
  - The daily management tasks for datacenter storage systems.
  - The common operation and maintenance (O&M) tools for datacenter storage systems.

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- Answers:
  - False.
  - A.

# Thank You

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