

Examples

Example of readying RHEL7 nodes for Spectrum Scale Installation and Deployment of Protocols

Configure promptless SSH (*promptless ssh is required*)

```
ssh-keygen
ssh-copy-id <FQDN of node>
ssh-copy-id <IP of node>
ssh-copy-id <non-FQDN hostname of node>
- repeat on all nodes to all nodes, including current node
```

Turn off firewalls (*alternative is to open ports specific to each Spectrum Scale functionality*)

```
systemctl stop firewalld
systemctl disable firewalld
- repeat on all nodes
```

How to check if a yum repository is configured correctly

yum repolist -> should return no errors. It must also show an RHEL7.x base repository. Other repository possibilities include a satellite site, a custom yum repository, an RHEL7.x DVD iso, an RHEL7.x physical DVD.

How to configure a yum repository from an RHEL DVD iso image (*an iso repo is not required but a base OS repository is required*)

Alternatively, a satellite site or custom yum repository can be used so long as all RHEL7.x base rpms are available within

```
mkdir /mnt/dvdiso
mount -o loop /path_to_dvd_iso/dvd.iso /mnt/dvdiso
cp /mnt/dvdiso/media.repo /etc/yum/repos.d/rhel7dvd.repo
chmod 644 /etc/yum/repos.d/rhel7dvd.repo
vi /etc/yum/repos.d/rhel7dvd.repo
--change--
gpgcheck=1
--add--
enabled=1
baseurl=file:///mnt/rhel7dvd
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release
--save/exit--
yum clean all
subscription-manager clean
yum list --noplugin
```

Pre-install pre-req rpms to make installation and deployment easier

```
yum install kernel-devel gcc gcc-c++ glibc sssd ypbind openldap-clients
```

Turn off selinux (*or set to permissive mode*)

```
sestatus
vi /etc/selinux/config
- change SELINUX=xxxxxx to SELINUX=disabled
- save and reboot
- repeat on all nodes
```

Setup a default path to Spectrum Scale commands (*not required*)

```
vi /root/.bash_profile
--add this line--
export PATH=$PATH:/usr/lpp/mmfs/bin
--save/exit--
logout and back in for changes to take effect
```

Example of adding protocol nodes to an ESS

Starting point

- 1) The cluster containing ESS is active and online
- 2) RHEL7.x, SLES12, or Ubuntu16.04 is installed on all nodes that are going to serve as protocol nodes
- 3) RHEL7.x, SLES12, or Ubuntu 16.04 base repository is set up on nodes that are going to serve as protocol nodes
- 4) The nodes that will serve as protocol nodes have connectivity to the GPFS cluster network
- 5) Use the ESS GUI or CLI to create a CES shared root file system >=4GB.
- 6) Mount the CES shared root file system on the EMS node and set it to automount. When done with this full procedure, make sure the protocol nodes are set to automount the CES shared root file system as well.
- 7) Use the ESS GUI or CLI to create additional file systems for protocols if desired. Configure each file system for nfsv4 ACLs
- 8) Enable CCR on the existing GPFS cluster if it is not already enabled
- 9) Pick a protocol node to run the Install Toolkit from.
- 10) The Install Toolkit is contained within these packages: Spectrum Scale Protocols Standard or Advanced or Data Management Edition
- 11) Download and extract one of the Spectrum Scale Protocols packages to the protocol node that will run the Install Toolkit
- 12) Once extracted, the Install Toolkit is located in the /usr/lpp/mmfs/5.0.0.x/installer directory.
- 13) Inputting the configuration into the Install Toolkit with the commands detailed below, involves pointing the Install Toolkit to the EMS node, telling the Install Toolkit about the mount points and paths to the CES shared root and optionally, the Object file systems, and designating the protocol nodes and protocol config to be installed/deployed.

Install Toolkit commands:

```
./spectrumscale setup -s 10.11.10.11 -st ess <- internal GPFS network IP on the current Installer node that can see all protocol nodes
./spectrumscale config populate -N ems-node <- OPTIONAL. Have the Install Toolkit traverse the existing cluster and auto-populate its config.
./spectrumscale node list <- OPTIONAL. Check the node configuration discovered by config populate.
./spectrumscale node add ems-node -a -e <- designate the EMS node for the Install Toolkit to use for coordination of the install/deploy
./spectrumscale node add cluster-node1 -p
./spectrumscale node add cluster-node2 -p
./spectrumscale node add cluster-node3 -p
./spectrumscale node add cluster-node4 -p
./spectrumscale config protocols -e 172.31.1.10,172.31.1.11,172.31.1.12,172.31.1.13,172.31.1.14
./spectrumscale config protocols -f cesSharedRoot -m /ibm/cesSharedRoot
./spectrumscale enable nfs
./spectrumscale enable smb
./spectrumscale enable object
./spectrumscale config object -e mycluster-ces
./spectrumscale config object -o Object_Fileset
./spectrumscale config object -f ObjectFS -m /ibm/ObjectFS
./spectrumscale config object -au admin -ap -dp
./spectrumscale node list
```

```
./spectrumscale install --precheck
./spectrumscale install <- The install will install GPFS on the new protocol nodes and add them to the existing ESS cluster
```

```
./spectrumscale deploy --precheck <- It's important to make sure CES shared root is mounted on all protocol nodes before continuing
./spectrumscale deploy <- The deploy will install / configure protocols on the new protocol nodes provided they are part of the GPFS cluster
```

Install Outcome:

- EMS node used as an admin node by the Install Toolkit, to coordinate the installation
- 4 new nodes installed with GPFS and added to the existing ESS cluster
- Performance sensors automatically installed on the 4 new nodes and pointed back to existing collector / GUI on the EMS node
- ESS I/O nodes, NSDs/vdisks, left untouched by the Install Toolkit.

Deploy Outcome:

- CES Protocol stack added to 4 nodes, now designated as Protocol nodes with server licenses
- 4 CES-IPs distributed among the protocol nodes
- Protocol configuration and state data will use the cesSharedRoot file system, which was pre-created on the ESS
- Object protocol will use the ObjectIFS filesystem, which was pre-created on the ESS

Example of Upgrading protocol nodes / other nodes in the same cluster as an ESS

Pre-Upgrade planning:

- Refer to the Knowledge Center for supported upgrade paths of Spectrum Scale nodes
- "Caution" if protocol nodes are included in the ESS xcat config: updatenode scripts are unaware of CES suspend/upgrade requirements
- Consider whether OS, FW, or drivers on the protocol node(s) should be upgraded and plan this either before or after the install toolkit upgrade
- SMB: requires quiescing all I/O for the duration of the upgrade. Due to the SMB clustering functionality, differing SMB levels cannot co-exist within a cluster at the same time. This requires a full outage of SMB during the upgrade.
- NFS: Recommended to quiesce all I/O for the duration of the upgrade. NFS experiences I/O pauses, and depending upon the client, mounts may disconnect during the upgrade.
- Object: Recommended to quiesce all I/O for the duration of the upgrade. Object service will be down or interrupted at multiple times during the upgrade process. Clients may experience errors or they might be unable to connect during this time. They should retry as appropriate.
- Performance Monitoring: Collector(s) may experience small durations in which no performance data is logged, as the nodes upgrade.

Install Toolkit commands for Scale 5.0.0.0 or higher

If upgrading to a Scale version below 5.0.0.0, refer to the ESS 5.2 QDG chapter 2

```
./spectrumscale setup -s 10.11.10.11 -st ess <- internal gpfs network IP on the current Installer node that can see all protocol nodes
```

```
./spectrumscale config populate -N ems1 <- Always point config populate to the EMS node when an ESS is in the same cluster
** If config populate is incompatible with your configuration, add the nodes and CES configuration to the install toolkit manually **
```

```
./spectrumscale node list <- This is the list of nodes the Install Toolkit will upgrade. Remove any non-CES nodes you would rather do manually
./spectrumscale upgrade --precheck
./spectrumscale upgrade
```

Example of a new Spectrum Scale Cluster

installation followed by a Protocol Deployment

Install Toolkit commands for Installation:

- Toolkit is running from cluster-node1 with an internal cluster network IP of 10.11.10.11, which all nodes can reach

```
cd /usr/lpp/mmfs/5.0.0.x/installer/
./spectrumscale setup -s 10.11.10.11
./spectrumscale node add cluster-node1 -a -g
./spectrumscale node add cluster-node2 -a -g
./spectrumscale node add cluster-node3
./spectrumscale node add cluster-node4
./spectrumscale node add cluster-node5 -n
./spectrumscale node add cluster-node6 -n
./spectrumscale nsd add -p node5.tuc.stglabs.ibm.com -s node6.tuc.stglabs.ibm.com -u dataAndMetadata -fs cesSharedRoot -fg 1 "/dev/sdb"
./spectrumscale nsd add -p node6.tuc.stglabs.ibm.com -s node5.tuc.stglabs.ibm.com -u dataAndMetadata -fs cesSharedRoot -fg 2 "/dev/sdc"
./spectrumscale nsd add -p node5.tuc.stglabs.ibm.com -s node6.tuc.stglabs.ibm.com -u dataAndMetadata -fs ObjectFS -fg 1 "/dev/sdd"
./spectrumscale nsd add -p node6.tuc.stglabs.ibm.com -s node5.tuc.stglabs.ibm.com -u dataAndMetadata -fs ObjectFS -fg 2 "/dev/sde"
./spectrumscale nsd add -p node6.tuc.stglabs.ibm.com -s node5.tuc.stglabs.ibm.com -u dataAndMetadata -fs ObjectFS -fg 2 "/dev/sdf"
./spectrumscale nsd add -p node6.tuc.stglabs.ibm.com -s node5.tuc.stglabs.ibm.com -u dataAndMetadata -fs ObjectFS -fg 2 "/dev/sdg"
./spectrumscale nsd add -p node5.tuc.stglabs.ibm.com -s node6.tuc.stglabs.ibm.com -u dataAndMetadata -fs fs1 -fg 1 "/dev/sdh"
./spectrumscale nsd add -p node5.tuc.stglabs.ibm.com -s node6.tuc.stglabs.ibm.com -u dataAndMetadata -fs fs1 -fg 2 "/dev/sdi"
./spectrumscale nsd add -p node5.tuc.stglabs.ibm.com -s node6.tuc.stglabs.ibm.com -u dataAndMetadata -fs fs1 -fg 2 "/dev/sdj"
./spectrumscale nsd add -p node5.tuc.stglabs.ibm.com -s node6.tuc.stglabs.ibm.com -u dataAndMetadata -fs fs1 -fg 2 "/dev/sdk"
./spectrumscale config perfmom -r on
./spectrumscale config ntp -e on -s ntp_server1,ntp_server2,ntp_server3
./spectrumscale callhome enable <- If you prefer not to enable callhome, change the enable to a disable
./spectrumscale callhome config -n COMPANY_NAME -i COMPANY_ID -cn MY_COUNTRY_CODE -e MY_EMAIL_ADDRESS
./spectrumscale config gpfs -c mycluster
./spectrumscale node list
./spectrumscale install --precheck
./spectrumscale install
```

Install Outcome: A 6node Spectrum Scale cluster with active NSDs

- 2 GUI nodes
- 2 NSD nodes
- 2 client nodes
- 10 NSDs
- configured performance monitoring
- callhome configured
- **3 file systems defined, each with 2 failure groups. File systems will not be created until a deployment**

Install Toolkit commands for Protocol Deployment (*assumes cluster created from above configuration/*

- Toolkit is running from the same node that performed the install above, cluster-node1

```
./spectrumscale node add cluster-node3 -p
./spectrumscale node add cluster-node4 -p
./spectrumscale config protocols -e 172.31.1.10,172.31.1.11,172.31.1.12,172.31.1.13,172.31.1.14
./spectrumscale config protocols -f cesSharedRoot -m /ibm/cesSharedRoot
./spectrumscale enable nfs
./spectrumscale enable smb
./spectrumscale enable object
./spectrumscale config object -e mycluster-ces
./spectrumscale config object -o Object_Fileset
./spectrumscale config object -f ObjectFS -m /ibm/ObjectFS
./spectrumscale config object -au admin -ap -dp
./spectrumscale node list
./spectrumscale deploy --precheck
./spectrumscale deploy
```

Deploy Outcome:

- 2 Protocol nodes
- Active SMB and NFS file protocols
- Active Object protocol
- cesSharedRoot file system created and used for protocol configuration and state data
- ObjectFS file system created with an Object_Fileset created within
- fs1 file system created and ready

Next Steps:

- Configure Authentication with mmuserauth or by configuring authentication with the Install Toolkit and re-running the deployment

Example of adding protocols to an existing cluster

Pre-req Configuration

- Decide on a file system to use for cesSharedRoot (>=4GB). Preferably, a standalone file system solely for this purpose.
- Take note of the file system name and mount point. Verify the file system is mounted on all protocol nodes.
- Decide which nodes will be the Protocol nodes
- Set aside CES-IPs that are unused in the current cluster and network. Do not attempt to assign the CES-IPs to any adapters.
- Verify each Protocol node has a pre-established network route and IP not only on the GPFS cluster network, but on the same network the CES-IPs will belong to. When Protocols are deployed, the CES-IPs will be aliased to the active network device matching their subnet. The CES-IPs must be free to move among nodes during failover cases.
- Decide which protocols to enable. The protocol deployment will install all protocols but will enable only the ones you choose.
- Add the new to-be protocol nodes to the existing cluster using mmaddnode (or use the Install Toolkit).
- In this example, we will add the protocol functionality to nodes already within the cluster.

Install Toolkit commands:

- Toolkit is running on a node that will become a protocol node

```
./spectrumscale setup -s 10.11.10.15 <- internal gpfs network IP on the current Installer node that can see all protocol nodes
./spectrumscale config populate -n cluster-node5 <- pick a node in the cluster for the toolkit to use for automatic configuration
./spectrumscale node add cluster-node5 -a -p
./spectrumscale node add cluster-node6 -p
./spectrumscale node add cluster-node7 -p
./spectrumscale node add cluster-node8 -p
./spectrumscale config protocols -e 172.31.1.10,172.31.1.11,172.31.1.12,172.31.1.13,172.31.1.14
./spectrumscale config protocols -f cesSharedRoot -m /ibm/cesSharedRoot
./spectrumscale enable nfs
./spectrumscale enable smb
./spectrumscale enable object
./spectrumscale config object -e mycluster-ces
./spectrumscale config object -o Object_Fileset
./spectrumscale config object -f ObjectFS -m /ibm/ObjectFS
./spectrumscale config object -au admin -ap -dp
./spectrumscale callhome enable <- If you prefer not to enable callhome, change the enable to a disable
./spectrumscale callhome config -n COMPANY_NAME -i COMPANY_ID -cn MY_COUNTRY_CODE -e MY_EMAIL_ADDRESS
./spectrumscale node list
./spectrumscale deploy --precheck
./spectrumscale deploy
```

Deploy Outcome:

- CES Protocol stack added to 4 nodes, now designated as Protocol nodes with server licenses
- 4 CES-IPs distributed among the protocol nodes
- Protocol configuration and state data will use the cesSharedRoot file system
- Object protocol will use the ObjectIFS filesystem

Example of Upgrading protocol nodes / other nodes (not in an ESS)

Pre-Upgrade planning:

- Refer to the Knowledge Center for supported upgrade paths of Spectrum Scale nodes
- Consider whether OS, FW, or drivers on the protocol node(s) should be upgraded and plan this either before or after the install toolkit upgrade
- SMB: requires quiescing all I/O for the duration of the upgrade. Due to the SMB clustering functionality, differing SMB levels cannot co-exist within a cluster at the same time. This requires a full outage of SMB during the upgrade.
- NFS: Recommended to quiesce all I/O for the duration of the upgrade. NFS experiences I/O pauses, and depending upon the client, mounts may disconnect during the upgrade.
- Object: Recommended to quiesce all I/O for the duration of the upgrade. Object service will be down or interrupted at multiple times during the upgrade process. Clients may experience errors or they might be unable to connect during this time. They should retry as appropriate.
- Performance Monitoring: Collector(s) may experience small durations in which no performance data is logged, as the nodes upgrade.

Install Toolkit commands:

```
./spectrumscale setup -s 10.11.10.11 -st ss <- internal gpfs network IP on the current Installer node that can see all protocol nodes
```

```
./spectrumscale config populate -N <hostname_of_any_node_in_cluster>
** If config populate is incompatible with your configuration, add the nodes and CES configuration to the install toolkit manually **
```

```
./spectrumscale node list <- This is the list of nodes the Install Toolkit will upgrade. Remove any non-CES nodes you would rather do manually
./spectrumscale upgrade --precheck
./spectrumscale upgrade
```