IBM Tivoli Storage Manager V6.3

Node replication

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In this Tivoli® Storage Manager version 6.3 training module you learn how to configure node replication between a single source server and a single target server.

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Objectives

When you have completed this training module, you can perform these tasks:

- Describe some of the benefits gained from implementing the Tivoli Storage Manager V6.3 node replication feature
- Name the command used to set a replication server username and password
- Name the commands used to set a replication server high level and low-level address
- Configure a Tivoli Storage Manager V6.3 source server for node replication
- Configure a Tivoli Storage Manager V6.3 target server for node replication

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When you have completed this training module you can perform these tasks:

- Describe node replication benefits

- Setup a replication server account username and password

- Setup both a high level and a low level address

- Configure source server node replication and configure target server node replication

Node replication feature benefits

Node replication is a new feature available in Tivoli Storage Manager V6.3 that provides these benefits high availability benefits:

- Client nodes connect to multiple Tivoli Storage Manager servers
- Failover hot standby server functionality
- Ensures Tivoli Storage Manager server functionality always available to client nodes

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The node replication feature is new for Tivoli Storage Manager V6.3. Configuring and using this feature ensures that the client node's stored data content will always be available. The architecture calls for configuring a pair of Tivoli Storage Manager servers with one being in hot standby backup to the other. One Tivoli Storage Manager server node is configured as the source server and the other as the target server. The target server can become active automatically if client nodes cannot connect to the source server.

Node replication feature benefits

Node Replication is a new feature available in Tivoli Storage Manager V6.3 that provides these stored data benefits:

- Source server data content backed up to target server
- Target server data content made identical to source server
- Storage data repository content replication
  - Must have Tivoli Storage Manager V6.3
  - Client nodes can be V6.3 or earlier
  - Data can originate from V6.2 or earlier Tivoli Storage Manager now updated to V6.3

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Links between the two servers transmit and receive data to ensure that the two servers have identical data stores.

Verifying the source server IP address connection

Obtain an IP address and ping the source server

```
C:\Users\Administrator>ping 192.168.64.100

Pinging 192.168.64.100 with 32 bytes of data:
Reply from 192.168.64.100: bytes=32 time<1ms TTL=128
Reply from 192.168.64.100: bytes=32 time<1ms TTL=128
Reply from 192.168.64.100: bytes=32 time<1ms TTL=128
Reply from 192.168.64.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.64.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\Administrator>_
```

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Get the IP address for both the source server and the target server. Use the Ping utility to verify the IP address of the source server. Make sure that there is a good connection for data communication from the target server IP address to the source server IP address. Later in the training module this source server is named TSM1.

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Verifying the target server IP address connection

Obtain an IP address and ping the target server

```
C:\Users\Administrator>ping 192.168.64.150

Pinging 192.168.64.150 with 32 bytes of data:
Reply from 192.168.64.150: bytes=32 time<1ms TTL=128
Reply from 192.168.64.150: bytes=32 time<1ms TTL=128
Reply from 192.168.64.150: bytes=32 time<1ms TTL=128
Reply from 192.168.64.150: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.64.150:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\Administrator>_
```
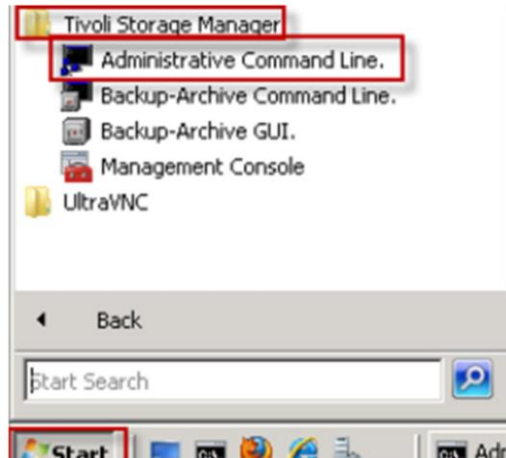
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Get the IP addresses for both the source server and the target server. Use the Ping utility to verify the IP address of the target server. Later in the training module this server is named as TSM2.

Accessing the target server administrative command-line interface

Open the administrative command-line interface
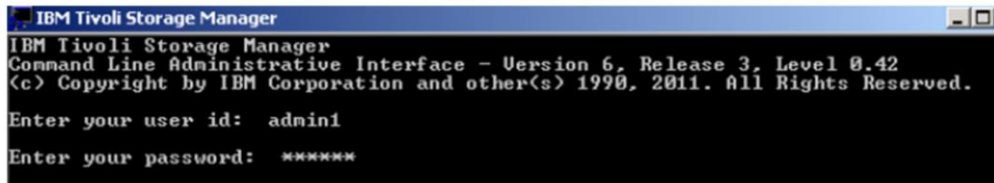**Tivoli Storage Manager > Administrative Command Line**

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Open the Tivoli Storage Manager software application and go to the Administrative Command Line screen. The path is **Start** > **All Programs** > **Tivoli Storage Manager** > **Administrative Command Line**.

Log in to the Tivoli Storage Manager version 6.3 target server administrative interface with a valid user ID and password. The default username and password is admin1/admin1.

Setting the target server name

Run the command `set servname tsm2`

```
tsm: TSM_SERVER1>set servername tsm2
ANR2586W This command will set the server name to TSM2.

Changing the server name could adversely affect:  communication from the
to the Admin Center, backup archive nodes, event logging, virtual volume
library sharing, and storage agents used for LAN-free and server-to-serv
operations such as enterprise configuration.  See the administrator's gu
more information on these areas and the impact of changing the server na

Do you wish to proceed? <Yes (Y)/No (N)> y
ANR2094I Server name set to TSM2.
ANR4865W The server name has been changed. Windows clients that use
"passwordaccess generate" may be unable to authenticate with the server.
```

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In this slide, the system **admin** is logged into the new target server. From the target server administrative interface, the target server name is set to TSM2 with the command **set servername tsm2**. After reading the popup message, a **y** is entered to proceed with the server name assignment.

Setting the target server password

Set the target server password to **tsm2pass** with the command
`set serverpassword tsm2pass`

```
tsm: TSM_SERUER1>set serverpassword tsm2pass
ANR2131I Server password set.
```

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Here the system **admin** is logged in on the target server. The TSM2 target server default password is changed with the command string **set serverpassword tsm2pass**. The system sends an acknowledgement response confirming that the target server password has been changed successfully. Be sure to choose a strong and unique password for the target server. Document and safeguard the new target server password.

Setting the target server high-level address

Set the target server high-level address

```
tsm: ISM2>set serverhladdress 192.168.64.150
ANR2132I Server hladdress set to 192.168.64.150.
```

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The target server must be available for access and communication with both the client nodes and the TSM1 source server. The command **set serverhladdress 192.168.64.150** sets the high level IP address for target server TSM2. The high level IP address allows access and communication with client nodes and redundantly configured Tivoli Storage Manager servers.

Setting the target server low-level address

Set the target server low-level address

```
tsm: TSM2>set serverlladdress 1500
ANR2133I Server lladdress set to 1500.
```

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The **set serverlladdress** command is used to configure TCP port 1500 as a low level address. Entering this command is necessary when setting up Tivoli Storage Manager server-to-server communications. This TCP/IP port address in most cases matches the TCPPORT setting within the server options file. Later in this procedure IBM Tivoli Storage Manager uses this TCP port low level address when issuing the **DEFINE SERVER** command with the **CROSSDEFINE=YES** option.

Turning on the target server crossdefine functionality

Run the `set crossdefine on` command for the target server

```
tsm: TSM2>set crossdefine on
ANR2135I Crossdefine set to ON.
```

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Issue a **set crossdefine on** command for the target server TSM2. The system responds with an acknowledgement stating **Crossdefine set to ON**. Cross-defining allows the target server to be set up for server-to-server communications with another server. If cross-define is set to off then target server TSM2 is unable to communicate with source server TSM1. In such a scenario, node replication is not available.

Enabling the target server for server access

Run the command **enable sessions server**

```
tsm: TSM2>enable sessions server
ANR2552I Server now enabled for Server access.
```

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Issue the **enable sessions server** command to enable target server TSM2 for server-to-server communications and server access. A response message will confirm that target server TSM2 is now enabled for server access.

Accessing the source server administrative command-line interface

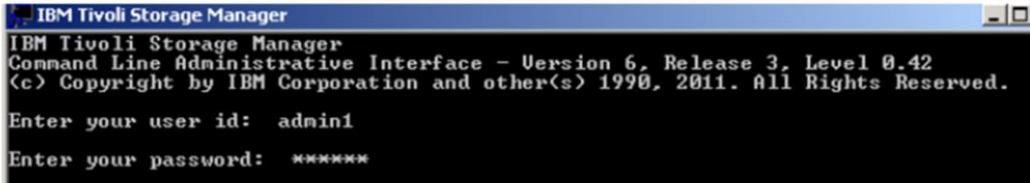Click **Tivoli Storage Manager > Administrative Command Line**
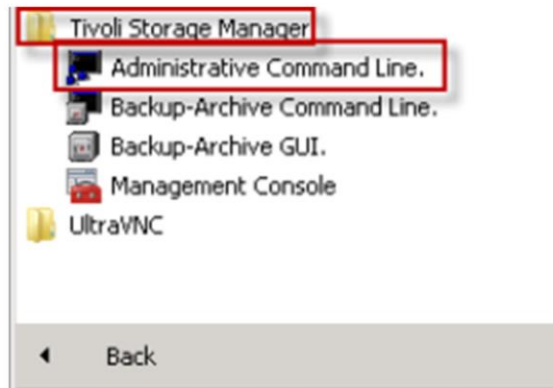
Open the Tivoli Storage Manager software application on the source server and go to the Administrative Command Line screen. The path is **Start** > **All Programs** > **Tivoli Storage Manager** > **Administrative Command Line**.

Logging in to the source server

Log in to the source server with the default username and password

IBM Tivoli Storage Manager

```
IBM Tivoli Storage Manager
Command Line Administrative Interface - Version 6, Release 3, Level 0.42
(c) Copyright by IBM Corporation and other(s) 1990, 2011. All Rights Reserved.

Enter your user id:  admin1

Enter your password:  ******
```

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Use the Tivoli Storage Manager default username and password to log in to the source server. The default log in is admin1/admin1.

Changing the default source server name

To change the default source server name, run the command `set servername`

```
tsm: TSM1>set servername tsm1
Session established with server TSM: Windows
  Server Version 6, Release 3, Level 0.0
  Server date/time: 08/08/2011 20:33:29  Last access: 08/08/2011 20:06:48

ANR2586W This command will set the server name to TSM1.

Changing the server name could adversely affect:  communication from the ser
to the Admin Center, backup archive nodes, event logging, virtual volumes,
library sharing, and storage agents used for LAN-free and server-to-server
operations such as enterprise configuration.  See the administrator's guide
more information on these areas and the impact of changing the server name.

Do you wish to proceed? (Yes (Y)/No (N)) y
ANR2094I Server name set to TSM1.
ANR4865W The server name has been changed. Windows clients that use
"passwordaccess generate" may be unable to authenticate with the server.
```

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Choose a server name for the source server. In this example, the default source server name is changed to TSM1. The command string **set servername tsm1** is issued to perform the name change. Enter **y** when prompted to accept the source server name change.

Set source server password, addresses, and crossdefine functionality

Set the source server **password**, **addresses**, and turn **crossdefine on**

```
tsm: TSM1>set serverpassword tsm1pass
ANR2131I Server password set.

tsm: TSM1>set serverhladdress 192.168.64.100
ANR2132I Server hladdress set to 192.168.64.100.

tsm: TSM1>set serverlladdress 1500
ANR2133I Server lladdress set to 1500.

tsm: TSM1>set crossdefine on
ANR2135I Crossdefine set to ON.

tsm: TSM1>enable session server
ANR2552I Server now enabled for Server access.
```

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In this slide, the source server password is changed to tsm1pass. The high level and low level address are set to 192.168.64.100 and TCP port 1500. The crossdefine functionality is turned on to prepare the source server for server access and server-to-server communications. The **enable session server** command is issued and the system response confirms that the source server is enabled for server access. These commands are identical to those used earlier to set up the target server.

Defining the target server from the source server

Define the target server and await the defined successfully confirmation message

```
tsm: TSM1>define server tsm2 hladdress=192.168.64.150 lladdress=1500 serverpassw
ord=object00
ANR1660I Server TSM2 defined successfully.
```

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Set the definition of the target server TSM2 for the source server TSM1. A system response message confirms that the target server TSM2 password, high level address, and low level address have been defined successfully.

Defining the target server from the source server

Define the target server from the source server

```
tsn: TSM1>define server tsm2 hladdress=192.168.64.150 lladdress=1500 serverpassw
ord=tsm2pass
ANR1660I Server TSM2 defined successfully.
```

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The command **define server** is issued from the source server to define the target server. The target server name, high level address, low level address, and server password parameters are defined.

Defining the source server from the target server

Define the source server from the target server

```
tsm: TSM2>define server tsm1 hladdress=192.168.64.100 lladdress=1500 serverpassw
ord=tsm1pass
Session established with server TSM2: Windows
  Server Version 6, Release 3, Level 0.0
  Server date/time: 08/24/2011 11:53:28  Last access: 08/24/2011 11:32:12

ANR1660I Server TSM1 defined successfully.
```

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The command **define server** is issued from the TSM2 target server to define the TSM1 source server. The source server TSM1, high level address, low level address, and server password parameters are defined. A message confirms that the TSM1 source server has been defined successfully.

Verifying the source server to target server connectivity

Run a ping command from the source server to verify connectivity to the target server

```
tsn: TSM1)ping server tsm2
ANR1706I Ping for server 'TSM2' was able to establish a connection.
```

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Log in to the Tivoli Storage Manager V6.3 source server administrative interface. Issue a ping command to verify the ability to connect to the Tivoli Storage Manager V6.3 target server. Wait for the response message confirming that the Tivoli Storage Manager V6.3 source server was able to establish a connection to the target server. In this slide, the target server is named TSM2. TSM2 was pinged from the source server TSM1. The response message states **Ping for server 'TSM2' was able to establish a connection.**

Verifying the target server to source server connectivity

Run a ping command from the target server to verify connectivity to the source server

```
tsm: TSM2)ping server tsm1
ANR1706I Ping for server 'TSM1' was able to establish a connection.

tsm: TSM2>
```

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Log in to the Tivoli Storage Manager V6.3 target server administrative interface. Issue a ping command to verify the ability to connect to the Tivoli Storage Manager V6.3 source server. Wait for the response message confirming that the Tivoli Storage Manager V6.3 target server was able to establish a connection to the source server. In this slide, the source server is named TSM1. TSM1 was pinged from the target server TSM2. The response message states **Ping for server 'TSM1' was able to establish a connection**.

Accessing the source server administrative command-line interface

Click **Tivoli Storage Manager > Administrative Command Line**
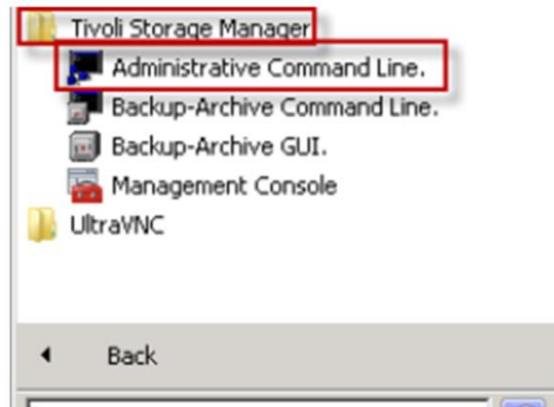
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Open the Tivoli Storage Manager software application on the source server and go to the Administrative Command Line screen. The path is **Start > All Programs** > **Tivoli Storage Manager** > **Administrative Command Line**.

Setting the server as a target replication server

Set TSM2 as the replication server with the command `set replserver tsm2`

```
tsm: TSM>set replserver tsm2
ANR1634I Default replication server name set to TSM2.
```

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An individual source replication server can point to only a single target replication server. Multiple source replication servers can however point to that same target replication server. From the prior example slide, you are logged in to the administrative interface of the source server. Also from prior slides, connectivity has been established between the example source server named TSM1 and the example target server named TSM2. Issue the command **set replserver tsm2** from the source server. This action assigns the example server TSM2 as the target replication server of the example source server. A response message confirms that TSM2 has been set as the target replication server.

Displaying the target replication server default settings

Run a **query status** command from the source server

```
                Total Size of File System (MB): 69,632.88
               Space Used on File System (MB): 39,339.27
                    Free Space Available (MB): 30,101.61
                          Encryption Strength: AES
        Client CPU Information Refresh Interval: 180
                         Outbound Replication: Enabled
                    Target Replication Server: TSM2
       Default Replication Rule for Archive: ALL_DATA
        Default Replication Rule for Backup: ALL_DATA
Default Replication Rule for Space Management: ALL_DATA
           Replication Record Retention Period: 30 Day(s)
```

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It is important to see the settings of the target replication server. The displayed settings let users know what kind of data is stored on the target replicated server and how long it is kept there. In this slide, the **query status** command is entered. It is entered from the TSM1 source server administrative interface to display TSM2 target replication server settings. In response to the query, the status for target server TSM2 is displayed. The default settings for replication servers are: AES encryption, ALL_DATA replication rules for archive, backup, space management, and a thirty day data retention period.

File management classes and replicated server file rules

When a source server file is sent to the target server, it is governed by these rules:

- The source replication server sends the target replication server the name of the management class to which the file is bound
- Files are bound to an assigned source server management class except when same named management class exists on the target server
- Source replication servers manage file expiration and deletion processing for replicated data
- Replicated data file expiration and deletion capability is disabled on target replication servers

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When source server files are replicated, they do not always inherit the management class they had on the source server. If that management class does not exist on the target server, then the file is assigned the target replication server default file management class. Source replication servers also control file expiration and deletion. File expiration and deletion functionality is disabled on target servers for all replicated data that is stored on the target server.

Displaying replicated file management classes

Display the available management classes on a server with the command **q mgmtclass**

```
tsm: TSM2>q mgmtclass

Policy         Policy        Mgmt          Default
Domain         Set Name      Class         Mgmt
Name                         Name          Class ?
----------     ----------    ----------    ----------
CRITICAL-      ACTIVE        CRITICAL-     Yes
 _BACKUP                      _MANAGE-
                             MENT_CL-
                             ASS
CRITICAL-      ACTIVE        STANDARD      No
 _BACKUP
CRITICAL-      STANDARD      CRITICAL-     Yes
 _BACKUP                      _MANAGE-
                             MENT_CL-
                             ASS
CRITICAL-      STANDARD      STANDARD      No
 _BACKUP
NEWBACKUP      ACTIVE        NEWBACKC-     Yes
                             LASS
NEWBACKUP      NEWPOLSET     NEWBACKC-     Yes
                             LASS
STANDARD       ACTIVE        STANDARD      Yes
```

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On this slide, the **q mgmtclass** command is used to display the file management classes that are available on target server TSM2. The last column shows which of the available management classes is a default class. When replicated files are stored on TSM2, the management target server classes are compared to the source-assigned management class for the file. If there is no match available on the target server, then a target server default file class is assigned to the newly stored replicated file.

Replication enablement rules and precedence

Tivoli Storage Manager servers, client nodes, and file spaces have data replication rules:

- One rule applies to backup data, the other applies to archive and space-managed data
- During replication processing, file space rules take precedence over rules for individual nodes, and rules over individual nodes take precedence over server rules
- Client nodes are either enabled or disabled for replication when first registered on a source server
- Commands are used after initial registration to change the enablement setting
- If you enable replication, a definition for the client node on the target replication server is created the first time replication occurs
- Disabling replication means that replication does not occur until you enable it

File space replication rules take precedence over individual node replication rules. Rules over individual node replication take precedence over server rules. Client nodes can be either enabled for replication or disabled for replication. This occurs when the client node is first registered on the source server. The enablement or disablement setting can also take place when a client node enablement definition is updated.

Viewing defined source server clients

To view all the defined source server clients, run the command **q node**

```
tsm: TSM_SERVER1>q node

Node Name                        Platform Policy Domain  Days Since Days Since Locked?
                                          Name           Last Acce-  Password
                                                              ss        Set
--------------------------------- -------- -------------- ---------- ---------- -------
CLIENT                           WinNT    CRITICAL_BACK-          3          8  No
                                          UP
LABNODE1                         WinNT    CRITICAL_BACK-          3          3  No
                                          UP
LABNODE2                         <?>      CRITICAL_BACK-          3          3  No
                                          UP
```

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The **q node** command is used to see if clients are defined on the source server and exactly how many clients are defined. The response shown on this slide informs you that three clients are defined on source server TSM1. These three clients cannot be defined on the TSM2 target replication server. **CLIENT**, **LABNODE1**, and **LABNODE2** are only defined on the source server TSM1 and not on target server TSM2.

Updating nodes to enable replication to a target server

To enable replication for client, run the command
update node client replstate=enabled

```
tsm: TSM1>update node client replstate=enabled
ANR2063I Node CLIENT updated.
```

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On this slide, the client node on the source server is being updated for replication to the target server. The command **update node client replstate=enabled** is entered. A response confirms that the node named **Client** has been successfully updated. In summary, the setting for replication has been changed from disabled to enabled for the source server TSM1 node **Client**.

Here **LABNODE1** on source server TSM1 is being updated for replication to target server TSM2. The command **update node client replstate=enabled** is entered. A response confirms that the node has been successfully updated.

Tivoli Storage Manager version 6.3 data types and replication settings

Tivoli Storage Manager V6.3 data types are:

- Backup data
- Archived data
- Space-managed data migrated by Tivoli Storage Manager for Space Management clients

Data types include backup data, archive data, and the space-managed data migrated by Tivoli Storage Manager for Space Management clients.

Tivoli Storage Manager version 6.3 data types and replication settings

Tivoli Storage Manager V6.3 data replication settings:

- ALL_DATA
- ACTIVE_DATA
- ALL_DATA_HIGH_PRIORITY
- ACTIVE_DATA_HIGH_PRIORITY
- DEFAULT
- NONE

These settings shown here are available in Tivoli Storage Manager V6.3: ALL_DATA, ACTIVE_DATA, ALL_DATA_HIGH_PRIORITY, ACTIVE_DATA_HIGH_PRIORITY, DEFAULT and NONE.

Rules governing replication

Replication rules determine what data is replicated and the order in which it is replicated

Rules can be assigned to:

- All nodes: All of the nodes defined on a Tivoli Storage Manager server
- Specific nodes: Either one or not all of the nodes defined on a Tivoli Storage Manager server
- Specific filespaces: Specific data storage file or directory locations
- Data types: Backup, archived, space-managed

Replication rules control what data is replicated and the order in which it is replicated. These rules can be assigned to all nodes, specific nodes, and even specific file spaces. Replication rules are also assigned to data types.

Updating nodes to enable replication to a target server

Run the command
```
update node labnode1 bkreplruledefault=all_data_high_priority
```

```
tsm: TSM1>update node labnode1 bkreplruledefault=all_data_high_priority
ANR2063I Node LABNODE1 updated.
```

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Update node commands are often issued that specifically apply to one type of data. On this slide, the command **update node labnode1 bkreplruledefault= all_data_high_priority** is entered. After issuing this command, the default backup rule now applies to all, both active and inactive, high priority data from LABNODE1 that is being replicated.

Updating the filespace replication settings

Modification is made to the filespace setting for the client node

```
tsm: TSM1>update filespace client \\tsm\c$ datatype=backup replrule=active_data
nanetype=unicode
ANR1999I UPDATE FILESPACE completed successfully.
```

A modification is made to the file space setting for the TSM1 client node.

Starting the replication process for data type backup

Start replication for datatype backup

```
tsm: TSM1>replicate node labnode1 datatype=backup
ANR2110I REPLICATE NODE started as process 3.
```

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Here the replication process is started manually for LABNODE1 for a specific data type. The data type is backup data.

Summary

Now that you have completed this training module, you can accomplish these tasks:

- Describe some of the benefits gained from implementing the Tivoli Storage Manager V6.3 Node Replication feature
- Name the command used to set a replication server username and password
- Name the commands used to set a replication server high level and low-level address
- Configure a Tivoli Storage Manager V6.3 source server for node replication
- Configure a Tivoli Storage Manager V6.3 target server for node replication

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Now that you have completed this training module, you can accomplish these tasks:

- Describe node replication feature benefits

- Setup a replication server account username and password

- Setup a high level and low level address

- Configure both source server and target server node replication

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