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IBM i Network Install

Introduction / Overview

This IBM® Redpaper™ addresses IBM i Network Install. The following topics are included:

- IBM i scratch installation
- IBM i licensed program installation
- IBM i operating system upgrade
- IBM i program temporary fix (PTF) installation

This IBM Redbooks® publication is intended for IT professionals, such as IBM clients, IBM Business Partners, information architects, business intelligence administrators, and database administrators.

Setup IBM i Network Install Server

Before you install or upgrade an IBM i system through the network, you must set up a Network installation server. This server contains not only images of IBM i Internal Code and Operating System, but also licensed programs, PTFs, and so on.

Prerequisites

The following are the hardware requirement for an IBM i network installation server:

- The system must be at IBM i 6.1 or later and with latest PTF.
- The server must be able to share virtual optical images that use version 3 or later of the Network File System (NFS).
- The images to be served must exist in an image catalog that has an image catalog path name that is limited to 127 characters. Path name characters are limited to A-Z, a-z, 0-9, and / (slash). Each image file name is limited to 127 characters.
- A volume list (VOLUME_LIST) file containing the list of images to be loaded in the virtual optical device must exist in the image catalog directory.

Tip: If you choose to create your own volume list, it must have the following characteristics

- Must be called VOLUME_LIST
- Each line is either an image file name or a comment
- Must be ASCII format
- All entries must terminate by the end of a line
- All characters that follow the number sign (#) are considered comments until the end of the line
- Comments can be added after the number sign (#) and must be followed by a EOL character
- Provides the order that the image files are processed on the client system
- File names are limited to 127 characters
- Can be created with the Verify Image Catalog (VFYIMGCLG) entry with the NFSSHR(*YES) parameter, or manually by using an ASCII editor
- No tabs or line feeds can be used in the path name
- Changes to VOLUME_LIST file are not active until the next time the client device is varied off/on

Configuring a virtual optical device

To create a virtual optical device and vary it on, complete these steps:

1. To create a device description, enter this command:

   ```
   CRTDEVOPT DEVD(virtual-device-name) RSRCNAME(*VRT) ONLINE(*YES)
   TEXT(text-description)
   ```

2. Vary on the virtual device that was created in previous step, enter this command:

   ```
   VRYCFG CFGOBJ(virtual-device-name) CFGTYPE(*DEV) STATUS(*ON)
   ```

Configuring image catalog

After virtual optical device is ready, create an image catalog, add IBM i images, and load it to this device by completing these steps:

1. Use the following Create Image Catalog (CRTIMGCLG) command to associate an image catalog with a target directory where the optical image files are loaded:

   ```
   CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path) CRTDIR(*YES)
   TEXT(text-description)
   ```

2. Add an image catalog entry for each physical media or optical image file that you have. You must repeat this step for each volume of media. Add the physical media or optical image files in the same order as though you were going to install from them. Start with the first media in the list and continue until all the media are loaded.

   a. To add an image entry to an image catalog from an integrated-file-system file that is already in the image catalog directory, enter this command:

      ```
      ADDIMGCLGE IMGCLG(catalog-name) FROMFILE(file-name) TOFILE(*fromfile)
      TEXT(text-description)
      ```

b. To add an image catalog entry to an image catalog from an existing integrated-file-system optical image file from a directory other than the image catalog directory, enter this command:

```
ADDIMGCLGE IMGCLG(catalog-name) FROMFILE(/directory-name/file-name)
TOFILE(file-name or *FROMFILE) TEXT(text-description)
```

c. To add an image catalog entry to an image catalog from a physical optical media that uses an optical device named OPT01, enter this command:

```
ADDIMGCLGE IMGCLG(catalog-name) FROMDEV(OPT01) TOFILE(file-name or *GEN)
TEXT(text-description)
```

3. Associates the virtual optical device to the image catalog. Only one image catalog at a time can be associated with a specific virtual optical device. To load the image catalog, enter the following command:

```
LODIMGCLG IMGCLG(catalog-name) DEV(virtual-device-name) OPTION(*LOAD)
```

4. Verify that the images are in the correct order. If you are preparing for an installation, verify that the required media exist and are sorted in the correct sequence. You also must verify that your software agreements have been accepted, you have enough storage on the load source, and you have enough reserved storage for the Licensed Internal Code. Enter the following command:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*UPGRADE) SORT(*YES)
```

If you want to set up the network installation server for PTF installation, create a dedicated Image Catalog, and add the PTF images to it. Then, use following command to verify it:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*PTF) SORT(*YES)
```

The system puts the images in the correct order. To see the order of the images, use the Work with Image Catalog Entries (WRKIMGCLGE) command:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

5. After the image catalog is created and loaded, verify the image catalog to create a volume list file (VOLUME_LIST). This list is used by the virtual optical device on the client system. To create the volume list file, enter the following command:

```
VFYIMGCLG IMGCLG(INSTALL) TYPE(*UPGRADE) NFSSHR(*YES)
```

The VFYIMGCLG command creates the volume list file and adds a subdirectory that is called BOOTP in the image catalog directory. The subdirectory contains files that are required to complete the IBM i installation.

The volume list file can also be created by using an ASCII editor. There are specific guidelines that must be met when you create a volume. For more information, see Requirements for virtual optical storage within a Network File System network

Tip: If you want to set up the network installation server for PTF installation, use following command to create the volume list file:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*PTF) NFSSHR(*YES)
```

Configuring NFS service

The IBM i network installation server acts as an NFS Server to export images to client. To configure the NFS service on server system, complete these steps:

1. Enter either of the following Start Network File System Server (STRNFSSVR) commands:
   - Run all these commands on your servers:

     ```
     STRNFSSVR *RPC
     STRNFSSVR *SVR
     STRNFSSVR *MNT
     ```

   - Or start all the servers with this command:

     ```
     STRNFSSVR *ALL
     ```

2. Export the image catalog directory. This example restricts access by all NFS clients because it is read-only.

   ```
   CHGNFSEXP OPTIONS('-i -o ro') DIR('directory-name')
   ```

3. Ensure that the NFS user has the correct authority. Specify the level of authority for the user ID (UID), group ID (GID), or *PUBLIC that owns or manages the image catalog directory and the image files. The following is the minimum authority that is required:
   - Execute (*X) data authority for the exported directory and any subdirectories.
   - Read (*R) data authority for files in the exported directory and any subdirectories.

   The following example is for the use of the authority *PUBLIC:

   ```
   CHGAUT OBJ('/catalog_directory') USER(*PUBLIC) DTAAUT(*RX) SUBTREE(*ALL)
   ```

Configuring TFTP service

If a client system needs scratch installation from the network, some files must be transferred from server to client to start it. You can use TFTP to transfer these files for IBM i network installation by using these steps:

1. Add the /CATALOG_DIR/BOOTP directory as the Trivial File Transfer Protocol (TFTP) alternate source directory by using CHGTFTPA command:

   ```
   CHGTFTPA AUTOSTART(*YES) ALTSRCDIR('/catalog_directory/BOOTP')
   ```

2. Ensure that the QTFTP user has the correct authority. Modify QTFTP's specific authorities so it has *RX authority to all installation files in the TFTP alternate source directory:

   ```
   CHGAUT OBJ('/catalog_directory/BOOTP') USER(QTFTP) DTAAUT(*RX) SUBTREE(*ALL)
   ```

3. Ensure that the TFTP servers are started and reflect the previous changes made by stopping/starting the servers:

   ```
   ENDTCPSVR *TFTP
   STRTCPSVR *TFTP
   ```

   Tip: After restart the TFTP server, you can run a TFTP command remotely to check whether it is running properly:

   ```
   C:\ TFTP192.168.144.10 get /netinstall/BOOTP/netipl
   ```

   You should get something similar to the following output:

   ```
   Transfer successful: 512 bytes in 1 second, 512bytes/s
   ```

Installing a new system from the network

The following sections introduce how to complete a scratch installation on IBM i client.

Prerequisites

Installing a new system requires these prerequisites:

- Hardware Management Console (HMC) V7R7.2.0 (V7R7.3.0 or later for logical Host Ethernet Adapter (LHEA) or Virtual Ethernet Adapter as the installation source)
- IBM POWER6® with Firmware 01Ex350_085 or later (01Ex730_049 or later for Virtual Ethernet Adapter)
- IBM POWER7® with Firmware 01Ax720 or later; 01Ax710_097 or later (01Ax730_049 or later for Virtual Ethernet Adapter)
- Installation media must be 6.1.1 or later

Editing the client partition profile in HMC

Edit the client partition profile in HMC, ensure that the Alternate restart device is an Ethernet adapter, as shown in Figure 1. This device can be a PCI Ethernet adapter, a Host Ethernet Adapter (HEA), or a Virtual Ethernet adapter.

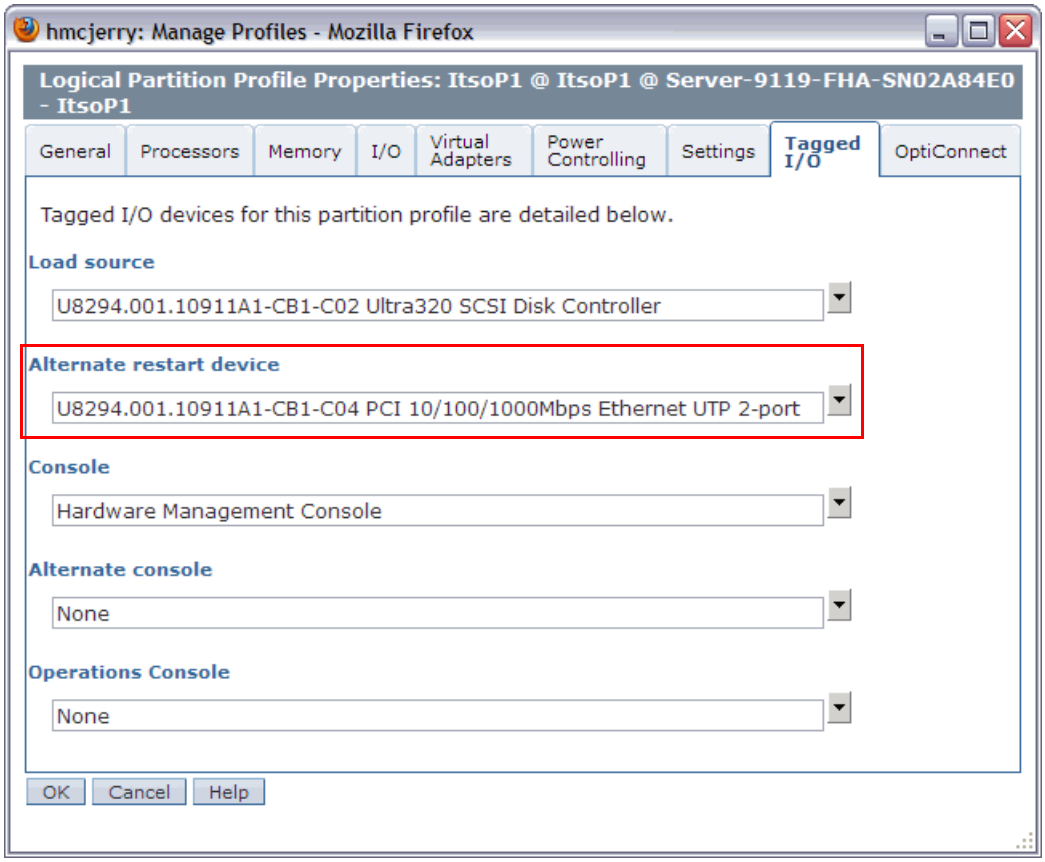

Figure 1 Alternative Installation Device of Client partition profile

Activating the client partition in HMC CLI

Sign on the HMC CLI, and run CHSYSSTATE with parameters to activate the client partition, as shown in Example 1.

Example 1 Activating the client partition from HMC CLI

```
hscroot@hmc50:~> chsysstate -m managed_system -n partition_name -f profile_name -o
on -r lpar -i IPL_source -k manual --ip client_IP_address --netmask 255.255.255.0
--gateway gateway_IP_address --serverip server_IP_address --serverdir
/server_image_directory --speecd network_speed --duplex auto --mtu 1500
```

The CHSYSSTATE command has the following parameters:

-m The managed system's name.

-n The name of the partition or system profile on which to run the operation.

-f The name of the profile to use when activating a partition.

-o on Power on action

-r lpar Object is a logical partition.

-r The IPL source to use when activating an IBM i partition: a, b, c, or d.

-k The keylock position. Valid values are:

- **manual** Manual
- **norm** Normal

--ip The IP address to use to run a network installation of an IBM i partition.

--netmask The IPv4 network mask.

--gateway The gateway IP address.

--serverip The server IP address.

--serverdir The server directory.

--speed The speed setting for the network interface. Valid values are:

- **auto** Automatically detect and set speed (default)
- **1** 1 Mbps
- **10** 10 Mbps
- **100** 100 Mbps
- **1000** 1000 Mbps

--duplex The duplex setting for the network interface. Valid values are:

- **auto** Automatically detect and set duplex (default)
- **half** Half duplex
- **full** Full duplex

--mtu The maximum transmission unit for the network interface. Valid values are:

- **1500** 1500 bytes (default)
- **9000** 9000 bytes

After few minutes, you will get the dedicated service tools (DST) interface and can start installing the Licensed Internal Code. For IBM i installation guide, see these documents:

- V6R1M0:

  PDF:

  http://publib.boulder.ibm.com/infocenter/iseries/v6r1m0/topic/rzahc/sc415120.pdf

  HTML:

  http://publib.boulder.ibm.com/infocenter/iseries/v6r1m0/index.jsp?topic=/rzahc/rzahc1.htm

- V7R1M0:

  PDF:

  http://publib.boulder.ibm.com/infocenter/iseries/v7r1m0/topic/rzahc/sc415120.pdf

  HTML:

  http://publib.boulder.ibm.com/infocenter/iseries/v7r1m0/index.jsp?topic=/rzahc/rzahc1.htm

Installing the base operating system for IBM i client

After the Licensed Internal Code is installed, the system will restart manually from IPL_source A. You can sign on to the DST and start install IBM i base operation system by completing these steps:

1. Specify **Install the operating system**, as shown in Figure 2.

```
                    Use Dedicated Service Tools (DST)

 Select one of the following:

      1. Perform an IPL
      2. Install the operating system
      3. Work with Licensed Internal Code
      4. Work with disk units
      5. Work with DST environment
      6. Select DST console mode
      7. Start a service tool
      8. Perform automatic installation of the operating system

     10. Work with remote service support

     13. Work with system security
     14. End batch restricted state

 Selection
      2
```

Figure 2 Install the operating system

2. Select **Network device** as the install device, as shown in Figure 3.

```
                        Install Device Type Selection

Select the installation device type:

     1. Tape
     2. Optical
     3. Virtual device - preselected image catalog
     4. Current alternate selected device
     5. Network device

Selection
     5
```

Figure 3 Selecting the install device

3. Verify the Server IP, the Path Name, the Local IP, Subnet Mask, Gateway IP, and MTU, as shown in Figure 4.

```
                        Network Device - Configuration


Status         : Current Selected
Server IP      : 192.168.144.10
Path Name      : /NETINST
Bus            :   513
Board          :     0
Card           :     0
Port           :     0
Local IP       : 192.168.144.40
Subnet Mask    : 255.255.255.0
Gateway IP     : 192.168.144.1
MTU Size       :  1500
DRC Index      : 553714177
```

Figure 4 Verifying network installation parameters

The IBM i base operating system installation is then started.

Setting up service tools server (STS) for DST

After the base operating system is installed, you can access the IBM i main menu. The TCP/IP Licensed Program is not yet installed, so you must set up the service tools server by completing these steps:

1. Log on to SST.
2. Select option 8, **Work with service tools user IDs and Devices**.
3. Press F13, and select an available adapter.

Remember: You can use the same port (for example, gigabit adapter) for the Service Tools Server that is used for TCP/IP. If you do so, end TCP/IP (ENDTCP) and vary off the TCP/IP line before configuring the Service Tools Server (STS).

4. Enter the TCP/IP information, including **Internet address, Gateway, Subnet mask,** and so on, as shown in Figure 5.

```
                          Configure Adapter Port

Type choices, press Enter to verify input.

  Resource name . . . . . :   CMN05
  Adapter type  . . . . . :   5706
  Adapter model . . . . . :   001
  Adapter serial number . . . :   00-EC76B26

  Internet address  . . . . . .   192.168.144.30
  Gateway router address  . . .   192.168.144.1
  Subnet mask . . . . . .         255.255.255.0
  Host name for service tools .   104E97R303
  Node  . . . . . .               000000000000    (0 is default)
  Duplex  . . . . . .             AUTO            HALF, FULL, AUTO
  Network speed . . . . . .       AUTO            4, 10, 16, 100, AUTO

  Ethernet standard . . . . . .   ETHV2           ETHV2


F3=Exit          F5=Load        F6=Clear   F7=Store   F12=Cancel
F13=Deactivate   F14=Activate   F15=Reset Config on next D-IPL
F17=Deactivate followed by activate
```

Figure 5 Configure adapter port

5. Press F7 to restore the information.
6. Press F14 to activate the STS service. STS service is available now.

Tip: After you complete this configuration, verify it by using the **PING client_ip_address** command remotely.

Setting up the virtual optical device on the client system

After activated the STS service, set up a virtual optical device to load the IBM i images from network by completing these steps:

1. Create a virtual optical device type 632B-003 with the following commands:

```
CRTDEVOPT DEVD(NETOPT) RSRCNAME(*VRT) LCLINTNETA(*SRVLAN)
RMTINTNETA('X.X.XXX.XXX') NETIMGDIR('/network')
```

Consideration: The RMTINTNETA is the remote IP address of the Network File System (NFS) server where this virtual optical device looks for virtual image files.

The NETIMGDIR parameter specifies the network path on the NFS server that contains the virtual image files that were prepared for use with this device. The path is limited to 127 characters. The character set is limited to A-Z, a-z, 0-9, and / (slash).

2. Vary on the virtual optical device with following command:

```
VRYCFG CFGOBJ(virtual_device_name) CFGTYPE(*DEV) STATUS(*ON)
```

Tip: The Work with Optical Volumes (WRKOPTVOL) command shows a list of optical volumes that are known to the system. The WRKOPTVOL command shows only the volumes that are mounted in the device.

With the Work with Image Catalog Entries (WRKIMGCLGE) command, you can work with the entries for the specified virtual optical device. The WRKIMGCLGE command shows the mounted and loaded volumes. You must specify IMGCLG(*DEV) and the NFS backed optical device for the DEV parameter.

Installing the licensed program on the client system

As the virtual optical device are varied on, the network images are mounted on the client system. You can now install licensed programs on it.

Verify correct installation device as shown in Figure 6.

```
                              Install Options
Type choices, press Enter.

   Installation device  . . .   optnet01     Name

   Objects to install . . . .   1            1=Programs and language objects
                                             2=Programs
                                             3=Language objects

   Nonaccepted agreement  . .   2            1=Do not install licensed program
                                             2=Display software agreement

   Automatic IPL  . . . . . .   N            Y=Yes
                                             N=No
```

Figure 6 Verify correct installation device

Start the installation, and the system mounts correct image automatically.

Upgrading the IBM i client from the network

This section addresses upgrading a IBM i system from the network. Ensure that the IBM i network installation server is set up properly.

Prerequisites

If you want to upgrade IBM i system from network, the client must meet these requirements:

- IBM i 6.1 or later.
- IBM POWER6 or later.
- The installation media must be IBM i 6.1.1 or later.

- The following IBM i 6.1 PTFs are required:

  SI39400 (Lead PTF, which causes the other PTFs to be ordered and installed), SI39390, SI35186, SI35189, SI35747, MF47284, MF47285.
- Either a service tools server or a LAN console connection must be configured. For more information about STS configuration, see “Setting up service tools server (STS) for DST” on page 8.
- The Internet Protocol (IP) must be Version 4.
- The 632B-003 optical device must be created. For more information, see “Setting up the virtual optical device on the client system” on page 9.

Completing the network upgrade

The network installation is initiated with the STRNETINS command. There are two choices for upgrade: Automatic or manual:

- Automatic upgrade

  For information about completing your upgrade, see the “Upgrading or replacing software using automatic installation” topic in the IBM i Information Center for your version:

  V6R1M0:

  http://publib.boulder.ibm.com/infocenter/iseries/v6r1m0/index.jsp?topic=/rzahc/autoins.htm

  V7R1M0:

  http://publib.boulder.ibm.com/infocenter/iseries/v7r1m0/index.jsp?topic=/rzahc/autoins.htm

  After you are ready to power down the system for upgrade, use the following command instead of the PWRDWNSYS command:

  ```
  STRNETINS DEV(virtual-device-name) OPTION(*ALL) KEYLCKMOD(*NORMAL)
  ```

  The system runs checks for required media in the selected network optical device, and whether licensed agreements are accepted. If all checks complete successfully, a PWRDWNSYS command is issued to start the installation. You will be prompted with a Confirm Power Down of System panel. To confirm power down, press F16 for the installation to continue. You can also press F12 to cancel. The following processes are similar to normal IBM i installation.

3. Manual upgrade

   For information about completing your install, see the “Upgrading or replacing software using manual installation” topic in the IBM i Information Center for your version:

   V6R1M0:

   http://publib.boulder.ibm.com/infocenter/iseries/v6r1m0/index.jsp?topic=/rzahc/manual.htm

   V7R1M0:

   http://publib.boulder.ibm.com/infocenter/iseries/v7r1m0/index.jsp?topic=/rzahc/manual.htm

   After you are ready to power down the system for upgrade, use the following command instead of the PWRDWNSYS command:

   ```
   STRNETINS DEV(virtual-device-name) OPTION(*ALL) KEYLCKMOD(*MANUAL)
   ```

The system runs checks for required media in the selected network optical device, and whether licensed agreements are accepted. If all checks complete successfully, a PWRDWNSYS command is issued to start the installation. You will be prompted with a Confirm Power Down of System panel. To confirm power down, press F16 for the installation to continue. You can also press F12 to cancel. The following processes are similar to normal IBM i installation.

Installing PTF on the client from network

This section addresses installing PTF for a IBM i client system from network.

Prerequisites

To install PTF from network, the client system must meet following requirements:

- The operating system on the Client system is IBM i 6.1 or later.
- The Operations Console with LAN Connectivity or Service Tools Server for DST is configured.
- The Internet Protocol (IP) must be Version 4.
- A virtual optical device with type of 632B-003 must be created.
- The image catalog that contains PTF images in the server is verified. The images must be in the correct sequence and the volume list file must be created. For more information, see “Configuring image catalog” on page 2.
- A directory contains PTF images has been exported by NFS in the server. For more information, see “Configuring NFS service” on page 4.

Completing PTF installation from network

To install PTF for an IBM i client system from network, complete the following steps:

1. Verify parameters for the image catalog in client system by using the DSPDEVD DEVD(Device_name) command as shown on Figure 7.

```
                        Display Device Description

Device description . . . . . :   OPTNET01
Option . . . . . :   *BASIC
Category of device . . . . . :   *OPT

Device type  . . . . . :   632B
Device model . . . . . :   003
Resource name  . . . . . :   OPTVRT01
Local internet address . . . . . :   *SRVLAN

Remote internet address  . . . . . :   192.168.144.10

Network image directory  . . . . . :   /NETINST


User ID number . . . . . :   0
Group ID number  . . . . . :   0
```

Figure 7 Display and verify optical device parameter

2. Vary on the optical device. After it is varied on, you can see the content of PTF image with Work with Optical Volumes (WRKOPTVOL) command.
3. End all subsystems and install the PTF from the optical device.

The system mounts the correct image automatically because the volume list file exists in the server. The processes are similar to the normal steps of a PTF installation.

References

For more information about IBM Application Runtime Expert for i, see the following web pages:

- IBM i Information Center

  http://publib.boulder.ibm.com/infocenter/iseries/v7r1m0/index.jsp
- IBM i Network Install using Network File System

  ftp://ftp.software.ibm.com/systems/support/power/i/nfs_optical_upgrade.pdf
- Installing, upgrading, or deleting IBM i and related software

  http://publib.boulder.ibm.com/infocenter/iseries/v7r1m0/topic/rzahc/sc415120.pdf

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