Removable Disk Cartridge

RDX

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Agenda

- General
  - What is RDX all about

- AIX
  - Using RDX with AIX
  - Gareth Coates

- IBM I
  - Using RDX with IBM I
  - Jyoti Dodhia
Highlights

- Disk backup solution

- Durable, reliable and secure removable

- Affordable, high-capacity, shock-resistant 320 GB, 500 GB, 1.0 TB and 1.5TB cartridges

- Fast, efficient USB performance, up to 96 MBps

- Internal and external options
Pictures paint thousands of words
Pictures paint thousands of words
Pictures paint thousands of words
Pictures paint thousands of words
Removable Disk Drive (RDX)

Key point review:
• Entry tape alternative to VXA-2, VXA-320, DAT72, DAT160, DAT320 or 8mm
• For AIX/Linux/IBM i on POWER6 or POWER7 servers
• Rugged & Fast
• Good fit for “dirty” environments like back offices - much better than tape
• Lower total cost of ownership for many tape cartridge users

- BladeCenter support
  - RDX already available for BladeCenter PS703/704
  - Attach an external docking station (#1104) to USB port on the blade
### RDX

<table>
<thead>
<tr>
<th>Existing Docking stations</th>
<th>New Docking Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Docking Station #1103</td>
<td>Internal Docking Station #EU03</td>
</tr>
<tr>
<td>External Docking Station #1104</td>
<td>External Docking Station #EU04</td>
</tr>
<tr>
<td>Internal Docking Station #1123</td>
<td>Internal Docking Station #EU23</td>
</tr>
</tbody>
</table>

- Faster than tape
- Portable (DLPAR supports it)
- Rugged
- Direct access
- Up to 1.5TB per cartridge
- Can move to bigger media without needing to buy a new drive

Prices are USA suggested list prices for a model 730 / 740 (Oct 2012) and are subject to change. Reseller.
RDX Media

- RDX capacity shown is uncompressed. Any RDX compression done by software in server, not the drive.

- DAT160 compresses in the drive. DAT160 capacity uncompressed is 80GB per cartridge.

- Typical 2X compression provides for 160GB capacity. 3X compression would yield 240GB. 4X compression would yield 320GB. Etc, etc.
New RDX 1.5 TB Cartridge (#EU15)

- Expanding strategic ENTRY save/restore technology
- 50% larger capacity than previous max capacity
- Larger capacity than DAT 80/160 cartridge
- Lower cost per GB RDX storage
  - 1770% more no compression (80GB)
  - 830% more with 2X compression (160 GB)
  - 360% more with 4X compression (320 GB)
- Works on all RDX docking stations
  - #EU03, #EU04, #EU23, #1103, #1104, #1123
- Supported by AIX, IBM i, Linux

<table>
<thead>
<tr>
<th>RDX Cartridge</th>
<th>320GB #EU08</th>
<th>500GB #1107</th>
<th>1 TB #EU01</th>
<th>1.5 TB #EU15</th>
</tr>
</thead>
<tbody>
<tr>
<td>$/GB</td>
<td>$0.70</td>
<td>$0.59</td>
<td>$0.35</td>
<td>$0.33</td>
</tr>
</tbody>
</table>

160GB #1106 RDX withdrawn from marketing

Prices shown are IBM USA suggested list prices as of Feb 2013 on a Power 720 and are subject to change without notice; Reseller prices may vary.
RDX Potential Benefits vs Other Entry Tape Options

- Equivalent throughput to DAT160 or VXA
- Much faster access, save 30 seconds or more on start/finish of each job
- Direct access to files saves a lot of time if there are multiple files per tape and you access a single file
- Capacity - Up to 1TB uncompressed capacity per cartridge
- Media durability – RDX drives/cartridges can last for many years, up to 50 times more loads/unloads
- Cleaner: No cleaning operations or cleaning drives. Save time, money and avoid save/restore problems caused by dirty heads
RDX Potential Benefits vs Other Entry Tape Options

- Environmentally tough: Ability to work well even in 'office-dirty' environments such as a typical back office or store room.

- Rugged: tougher than most tape cartridges, designed to withstand drops from table top heights.

- Inexpensive docking stations.

- Can move to larger capacity RDX drives from smaller capacity RDX drives without changing docking stations.

- Natural fit for applications such as data logging.

- Combining the ability for quickly accessing different files on the cartridge and a large 1TB capacity, can more easily use one cartridge to do daily backups without operator involvement.
This web server is hosting the Hardware Management Console application. Click on the link below to begin.

Log on and launch the Hardware Management Console web application.

You can also view the online help for the Hardware Management Console.

<table>
<thead>
<tr>
<th>System Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status is good.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attention LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status is good.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serviceable Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status is good.</td>
</tr>
</tbody>
</table>
No USB in the LPAR

# lsdev | grep usb
usb0       Defined     USB System Software
#
No adapter

The table below details the current I/O usage for this partition. Select slot to view the properties of each device.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Description</th>
<th>Added</th>
<th>Bus</th>
<th>Pool ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 0  Filtered: 0
Add it
We now have some devices

# lsdev | grep usb
usb0   Defined          USB System Software
usbhc0 Defined  00-08 USB Host Controller (33103500)
usbhc1 Defined  00-09 USB Host Controller (33103500)
usbhc2 Defined  00-0a USB Enhanced Host Controller (3310e000)

# cfgmgr

# lsdev | grep usb
usb0   Available     USB System Software
usbhc0 Available  00-08 USB Host Controller (33103500)
usbhc1 Available  00-09 USB Host Controller (33103500)
usbhc2 Available  00-0a USB Enhanced Host Controller (3310e000)
usbms0  Available  2.3  USB Mass Storage
AIX

- AIX names the drive usbmsx
  - usbms0

- AIX also can use the device as a raw device,
  - rusbms0

- AIX uses the removable disk drive differently depending on the program being used.
AIX

- The AIX tar, backup, restore, dd, and cpio commands can write to the removable disk drive as a raw device or “cooked” (nonraw) device.

- You might get improved performance by using the device as a raw device.

- See the AIX documentation for additional information.
**tar - “tape archive”**

```
# time tar cvf /dev/usbms0 ./snap.pax.Z a ./snap.pax.Z 101087 blocks.

real    0m14.48s
user    0m0.01s
sys     0m0.19s
#

# time tar cvf /dev/rmt0 ./snap.pax.Z a ./snap.pax.Z 101087 blocks.

real    1m16.35s
user    0m0.02s
sys     0m0.13s
#```
mksysb

- builds a list of files to back up,
- creates a universal disk format (UDF) file system
- puts a boot image and the root volume group on the removable disk drive.
- When the mksysb process is complete the removable disk drive can be used to boot the system.
- If you mount the removable disk drive, you can display and copy files to and from the UDF file system on the removable disk drive.
mksysb – bootable system backup

# time mksysb -e -X -p /dev/usbms0

Creating list of files to back up.

Populating the UDF file system...

bosboot: Boot image is 34816 512 byte blocks.

Backing up 86750 files..........................
3858 of 86750 files (4%)..........................
62275 of 86750 files (71%)...........

86750 of 86750 files (100%)
0512-038 mksysb: Backup Completed Successfully.

real    11m52.80s
user    1m10.90s
sys     1m20.49s
smitty mountfs

Mount a File System

Type or select values in entry fields. Press Enter AFTER making all desired changes.

FILE SYSTEM name
DIRECTORY over which to mount
TYPE of file system
FORCE the mount?
REMOTE NODE containing the file system
to mount
Mount as a REMOVABLE file system?
Mount as a READ-ONLY system?
Disallow DEVICE access via this mount?
Disallow execution of SUID and sgid programs in this file system?

[Entry Fields]

[/dev/usbms0] +
[/rdx] +
udfs +
no +
[]

F1=Help F2=Refresh F3=Cancel F4=List
F5=Reset F6=Command F7=Edit F8=Image
F9=Shell F10=Exit Enter=Do

/usr/sbin/mount -v'udfs' /dev/usbms0 /rdx
filesystem

# ls -l /rdx
total 24
-rw-r--r-- 1 root system 6195 17 Apr 07:03 bosinst.data
-rw-r--r-- 1 root system 302 17 Apr 07:03 .files_not_found
-rw-r--r-- 1 root system 9502 17 Apr 07:03 image.data
drwxrwxrwx 1 root system 16384 17 Apr 07:02 lostfile.dir
-rw-r--r-- 1 root system 60 17 Apr 07:14 mkcd.data
-rw-r--r-- 1 root system 16 17 Apr 07:03 OSLEVEL
drwxr-xr-x 2 root system 2048 17 Apr 07:03 ppc
drwxr-xr-x 3 root system 2048 17 Apr 07:03 root
drwxr-xr-x 2 root system 2048 17 Apr 07:03 sbin
drwxr-xr-x 8 root system 2048 17 Apr 07:03 usr
#

# cd /rdx
# touch hello_world
# ls -l he*
-rw-r--r-- 1 root system 0 17 Apr 07:44 hello_world
#
JFS2

# mkfs -V jfs2 /dev/usbms0
mkfs: destroy /dev/usbms0 (yes)? yes
File system created successfully.
156281832 kilobytes total disk space.
Device /dev/usbms0:
   Standard empty filesystem
   Size: 312563664 512-byte (DEVBLKSIZE) blocks
#

# mount -o log=NULL /dev/usbms0 /rdx
#

# ls -l /rdx
total 0
  drwxr-xr-x  2 root  system  256 17 Apr 07:49 lost+found
#
booting
booting

Welcome to AIX.
  boot image timestamp: 06:03:23 04/17/2013
  The current time and date: 06:30:16 04/17/2013
  processor count: 4; memory size: 4096MB; kernel size: 36256296
  boot device: /pci@800000020000201/usb@1,1/hub@1/usb-
  scsi@1/disk@0,0:\ppc\chrp\bootfile.exe

******* Please define the System Console. *******

Type a 1 and press Enter to use this terminal as the
system console.
Pour definir ce terminal comme console systeme, appuyez
sur 1 puis sur Entree.
Taste 1 und anschliessend die Eingabetaste druecken, um
diese Datenstation als Systemkonsole zu verwenden.
Premere il tasto 1 ed Invio per usare questo terminal
come console.
Escriba 1 y pulse Intro para utilizar esta terminal como
consola del sistema.
Escriviu 1 1 i premeu Intro per utilitzar aquest
terminal com a consola del sistema.
Digite um 1 e pressione Enter para utilizar este terminal
como console do sistema.
Using the drive with Linux

- Linux configures the drive as a disk drive with a name in the format sdx,
  - sda

- See the Linux documentation for information about using Linux copy and backup commands.
Removable Disk Cartridge (RDX) and IBM i

Jyoti Dodhia
jyoti_dodhia@uk.ibm.com
IBM i RDX Support

- Strategic alternate entry media option to DAT160
- Can improve performance, reliability, operations
- POWER6 and POWER7 config options
- IBM i RDX support provided in two ways
  - Via USB interface
    - IBM i 7.1 TR5
    - For POWER7 servers
    - #EU03 or #EU04 docking stations
  - Via SATA interface … new RDX docking station
    - IBM i 6.1.1 and 7.1 TR5
    - Used for many POWER6 and POWER7 servers

- Oct 2012 announcement letter

- Wiki

- Blog entry
  - http://ibmsystemsmagblogs.com/i_can/2012/12/removable-mass-storage.html
What is supported from IBM i perspective?

<table>
<thead>
<tr>
<th></th>
<th>USB Internal Docking EU03</th>
<th>USB Internal Docking EU23</th>
<th>USB External Docking EU04</th>
<th>SATA Internal Docking EU07</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power 6</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Y 520, 550</td>
</tr>
<tr>
<td><strong>Power 7</strong></td>
<td>Y 720, 740, 750, 760</td>
<td>-</td>
<td>Y 710→780</td>
<td>Y 720, 740, 750, 760</td>
</tr>
<tr>
<td><strong>IBM i6.1.1 + PTFs</strong> (alternate IPL not supported)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Y dev type 632A</td>
</tr>
<tr>
<td><strong>IBM i7.1 + TR5</strong> (alternate IPL supported)</td>
<td>Y</td>
<td>-</td>
<td>Y</td>
<td>Y dev type 63B8</td>
</tr>
<tr>
<td>Client = i7.1 TR5 or i6.1.1+PTFs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>VIOS</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
IBM i USB RDX Support Details

- IBM i 7.1 TR5 required
  - Alternate IPL supported
  - (See SATA RDX #EU07 for IBM i 6.1)

- Used for POWER7 servers
  - Internal docking station:
    • Power 720 (8202-E4B/E4C/E4D)
    • Power 740 (8205-E6B/E6C/E6D)
    • Power 750 (8233-E8B/8408-E8D)
    • Power 760 (9109-RMD)
  - External docking station:

- #EU03 internal and #EU04 external docking stations
  - #EU23 internal docking station not supported
  - Older USB-2 #1103/#1104/#1123 not supported

IBM i supports the USB ports on the system unit, but does not support the USB adapter #2728. Note on the 9117-MMC/D and 9179-MHC/MHD a Multifunction Card #1768/#1769 is required for the USB ports on that system unit to be active.
IBM i SATA RDX Support Details

- IBM i 6.1.1 with PTFs or 7.1 TR5 required
  - Alternate IPL supported for 7.1 TR5
  - Alternate IPL not supported for 6.1.1
  - (If IBM i 7.1 see also USB RDX #EU03/EU04)

- Used for POWER6 servers
  - Internal docking station:
    - Power 520 (8203-E4A, 9407-M15, 9408-M25)
    - Power 550 (8204-E8A, 9409-M50)

- Used for POWER7 servers
  - Internal docking stations:
    - Power 720 (8202-E4B/E4C/E4D)
    - Power 740 (8205-E6B/E6C/E6D)
    - Power 750 (8233-E8B/8408-E8D)
    - Power 760 (9109-RMD)

- #EU07 SATA Internal Docking Station
  - External SATA docking stations: Not offered
IBM i RDX Operational Details/Insights


- Section on Storage Solutions on InfoCenter provides key RDX information for IBM i clients: http://pic.dhe.ibm.com/infocenter/iseries/v7r1m0/index.jsp?topic=/rzam4/rzam4rms.htm

- For example …
  - “RMS devices and media are similar to optical storage regarding behavior and access interfaces. They are managed and used with existing optical device functions and commands. See Optical storage as a reference guide for use of these devices and media. RMS media are handled the same as optical volumes, and as such are also accessible through the QOPT file system by using the hierarchical file system (HFS) and integrated file system (IFS) APIs. RMS media are formatted with the industry standard Universal Disk Format (UDF) version 2.5.”

- Shows up at RMSxx device
- IBM i 7.1 can virtualize to other IBM i partitions
- VIOS does not virtualize RDX
- Alternate IPL supported for 7.1 TR5
  - Without an HMC, there is no way to tag the USB bus as the source for a D-mode IPL. So…
    - You must IPL from a DVD
    - Use the alternate device support at DST to select a USB device
    - This is true for ALL the USB devices
BRMS Updated to Support RDX

This offering will show up as RMSxx devices, but will be classified as Optical (random access spinning media) and associated commands.

BRMS support via Optical Support

- 32 character volume ids
- Volume selection done upfront
- DUPMEDBRM (DUPOPT), etc.

BRMS PTF requirements for RDX listed on BRMS for i wiki:

  - i7.1 TR5 + SI47039
  - i6.1.1 + SI47038, SI47648, MF54369
BRMS RDX Considerations

There are RDX operational differences of “optical” vs “tape” in BRMS … true for all optical (RDX is categorized as optical)

Restrictions/Requirements

- The media policy option to ‘Mark history for duplication’ is restricted to “NO. BRMS does not allow duplication of optical history items.
- BRMS does not provide tracking of opposite side volume identifiers or double-sided volumes. Each piece of media is viewed as a single volume.
- No optical support for the following BRMS functions: Dump BRMS (DMPBRM), Add Media Information to BRM (ADDMEDIBRM), Extract Media Information (EXTMEDIBRM), Print Media Exceptions for BRM (PRTMEDBRM), and no reclaim support.
- Only one Device (DEV) parameter can be specified. Optical support does not support cascading or parallel processing.
- Optical media libraries cannot be shared between systems in a BRMS network.
- Duplicate media using BRM (DUPMEDBRM) will only duplicate entire optical volumes and the output volume must have the same physical characteristics as the volume specified on the FROMVOL parameter.
- Optical does not support remote duplication. Duplicate media using BRM (DUPMEDBRM) values for the From system (FROMSYS) parameter only support "LCL."
- Optical devices do not support software data encryption.
- BRMS has the same restrictions as the system save/restore commands.
New RDX 1.5 TB Cartridge (#EU15)

- Expanding strategic ENTRY save/restore technology
- 50% larger capacity than previous max capacity
- Larger capacity than DAT 80/160 cartridge
- Lower cost per GB RDX storage
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<table>
<thead>
<tr>
<th>RDX Cartridge</th>
<th>320GB #EU08</th>
<th>500GB #1107</th>
<th>1 TB #EU01</th>
<th>1.5 TB #EU15</th>
</tr>
</thead>
<tbody>
<tr>
<td>$/GB</td>
<td>$0.70</td>
<td>$0.59</td>
<td>$0.35</td>
<td>$0.33</td>
</tr>
</tbody>
</table>

160GB #1106 RDX withdrawn from marketing

Prices shown are IBM USA suggested list prices as of Feb 2013 on a Power 720 and are subject to change without notice; Reseller prices may vary.
Performance

- Performance better than typical for low cost tape drives (DAT)
- SATA device can achieve rates over 180GB/Hr.
- Performance Capabilities Reference
  - [http://www-03.ibm.com/systems/resources/systems_power_software_i_perfmgmt_pcrm_feb2013.pdf](http://www-03.ibm.com/systems/resources/systems_power_software_i_perfmgmt_pcrm_feb2013.pdf)
  - Chapter 9.1 Supported Backup Device Rates
    - RDX USB – 5.5 MB/s, 2.8 compaction factor
    - RDX SATA - 26 MB/s, 2.8 compaction factor
  - Chapter 9.29 RDX Device Performance
    - Detailed table comparing tape drives and SATA/USB RDX with and without data compression for different type of save/restore
Work with Device Descriptions

System: DIAMOND5

Position to . . . . . . . . . Starting characters

Type options, press Enter.
2=Change  3=Copy  4=Delete  5=Display  6=Print  7=Rename
8=Work with status  9=Retrieve source

Opt  Device      Type  Text
_  QPADEV0001   3477  Device created for DIAMOND5.
_  QPADEV0002   V100  Device created for DIAMOND5.
_  QQAHOST      *APPC
_  QTIDA        *APPC
_  QTIDA2       *APPC
_  RMS01        63B8  CREATED BY AUTO-CONFIGURATION

Parameters or command

===>
F3=Exit  F4=Prompt  F5=Refresh  F6=Create  F9=Retrieve  F12=Cancel
F14=Work with status

IBM Power Systems

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IBM Power Systems

Session A - [24 x 80]

Host: hmc10.aiwncc.ukibm   Port: 2300

Display Device Description

Device description: RMS01
Option: *BASIC
Category of device: OPT
Device type: 63B8
Device model: 005
Resource name: RMS01
Local internet address: *NONE

Online at IPL: *YES
Message queue: QSYSOPR
  Library: QSYS
Current message queue: QSYSOPR
  Library: QSYS
Last activity date:

Press Enter to continue

F3=Exit  F11=Display keywords  F12=Cancel

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Device description: RMS01
Option: *SPTMEDTYP
Category of device: *OPT

--- Supported media types ---

<table>
<thead>
<tr>
<th>Media types</th>
<th>Read</th>
<th>Write</th>
<th>Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>*RDX</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Press Enter to continue.

F3=Exit   F11=Display keywords   F12=Cancel
Work with Optical Volumes

Device: *ALL
Side information: *ALL

Type options, press Enter:
1=Add  2=Change  3=Copy  4=Remove  5=Display  8=Work with directories
10=Initialize  11=Work with object links  12=Duplicate ...

Opt  Volume  Device  Type  Media  Type  Authorization  List

---
121219105306 RMS01  *UNKNOWN  *UNKNOWN  QOPTSEC

Parameters or command

---
F3=Exit  F4=Prompt  F5=Refresh  F6=Print list  F9=Retrieve  F11=View 2
F12=Cancel  F14=Show extended information  F24=More keys

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Display Optical Volume Attributes

Volume: 121219105306
Device: RMS01
Authorization list: QOPTSEC

Volume Header Information:
  Internal Volume ID: 121219105306
  Serial Number:
  Volume type: *UNKNOWN
  Media type: *UNKNOWN
  Media format: *UNKNOWN
  Coded character set ID: 500
  Volume-full threshold: 100
  Volume sequence number: 0
  Create date:
  Create time:
  Text:

Press Enter to continue.

F3=Exit  F12=Cancel  F14=Additional volume attributes
Display Optical Volume Attributes

Usage Information:
- Last reference date: 19/12/12
- Volume on opposite side: 512
- Volume capacity (bytes): 160037691392
- Space available on volume (bytes): 0
- Percentage used: 0.0

Status Information:
- Volume location: RMS01
- Volume access: Writeable
- Double volume: No
- Double sided: No
- IPL capable: No
- Volume held by: *NONE

Press Enter to continue.

F3=Exit  F12=Cancel  F14=Additional volume attributes
INZOPT NEWVOL(JDRDXTTEST) DEV(RMS01) TEXT('Testing for RDX on IBM i') :
SAVLIB LIB(QGPL) DEV(RMS01)

→ 91 objects saved from library QGPL

Display Optical:

```
Volume . . . . . . . . . . . . . : JDRDXTEST
Device . . . . . . . . . . . . : RMS01
Authorization list . . . . . . : QOPTSEC

Volume Header Information:
Internal Volume ID . . . . . : JDRDXTEST
Serial Number . . . . . . . : 5166025
Volume type . . . . . . . . : *PRIMARY
Media type . . . . . . . . : *UNKNOWN
Media format . . . . . . . : *UDF
Coded character set ID . . . : 500
Volume-full threshold . . . : 100
Volume sequence number . : 0
Create date . . . . . . . . : 19/12/12
Create time . . . . . . . . : 11:34:42
Text . . . . . . . . . . . . . : Testing for RDX on IBM i

Press Enter to continue.

F3=Exit  F12=Cancel  F14=Additional volume attributes
```

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Usage Information:
- Last reference date: 19/12/12
- Volume on opposite side: 512
- Volume capacity (bytes): 160037891392
- Space available on volume (bytes): 159031462400
- Percentage used: .62

Status Information:
- Volume location: RMS01
- Volume access: Writeable
- Double volume: No
- Double sided: No
- IPL capable: No
- Volume held by: *SYSTEM

Press Enter to continue.

F3=Exit  F12=Cancel  F14=Additional volume attributes
**DSPOPT VOL(*MOUNTED) DEV(RMS01) DATA(*SAVRST) PATH(*ALL):**

![Image of the DSPOPT command output]

<table>
<thead>
<tr>
<th>Opt</th>
<th>Object</th>
<th>Type</th>
<th>Attribute</th>
<th>Owner</th>
<th>Size (K)</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>QGPL</td>
<td>LIB</td>
<td>PROD</td>
<td>QSYS</td>
<td>5304</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>QZDAPKG</td>
<td>SQLPKG</td>
<td></td>
<td>QSYS</td>
<td>96</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>QBASE</td>
<td>JOBQ</td>
<td></td>
<td>QPGMR</td>
<td>32</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>QDATCH</td>
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F3=Exit  F11=Alternate view  F12=Cancel  F16=Display header
RSTLIB SAVLIB(QGPL) DEV(RMS01) RSTLIB(JYOTI) :

```
Library:    JYOTI    Number of objects: 89
Type:       PROD    Library ASP number: 1
Create authority: *SYSVAL    Library ASP device: *SYSBAS
                           Library ASP group: *SYSBAS

Type options, press Enter.
   5=Display full attributes   8=Display service attributes

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```
When done....

Vary off RMS01 - VRYCFG CFGOBJ(RMS01) CFGTYPE(*DEV)  
STATUS(*OFF)

Note:

The external USB devices allow the cable to be unplugged without a configuration change (removing the IOA from the partition, or powering off), but the device should be varied off (VRYCFG) before the device is unplugged.
USB devices

- Without an HMC
  - There is no way to tag the USB bus as the source for a D-mode IPL
  - So...
    - You must IPL from a DVD
    - Use the alternate device support at DST to select a USB device
    - This is true for ALL the USB devices

- Note: new – IBM i supports USB Flash Drive
  - IBM i 7.1 TR 6 on POWER7+ and POWER7 systems
  - Device appears to the system when plugged into a USB port that is configured to be in an
    i partition.
  - Like RDX, it is an optical class device, and may be used with save/restore or with the
    QOPT file system in IFS

- More info at :
- IBM i Technology Updates wiki
  - IBM i I/O Support Details
- Blog entry
  - http://ibmsystemsmagblogs.com/i_can/2013/02/ibm-i-now-supports-usb-flash-drives.html
Resources

- Oct 2012 announcement letter

- Wiki

- Blog entry
  - http://ibmsystemsmag.blogs.com/i_can/2012/12/removable-mass-storage.html

- Hardware Infocenter – Managing removable disk drives -
  http://pic.dhe.ibm.com/infocenter/powersys/v3r1m5/topic/p7hdt/p7hdt-rdx.htm

- Section on Storage Solutions on InfoCenter provides key RDX information for IBM i clients:
  http://pic.dhe.ibm.com/infocenter/iseries/v7r1m5/topic/p7hdt/p7hdt-rdx.htm

- BRMS PTF requirements for RDX listed on BRMS for i wiki :

- Performance Capabilities Reference
Summary

- The RDX family of docking stations and cartridges offer flexible and cost-effective alternatives to tape drives.

- They are easy to use and are very portable.
Thanks !!!