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PC/RVD

Remote Virtual Disk Client for the IBM Personal Computer

Supplement to PC/IP User's Guide

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CONTENTS

General

Introduction
Remote Virtual Disk Packs
Installation of RVD on the IBM/PC
Disk Drive Letter Assignments
Scenario Using a Pre-existing RVD Pack
Scenario Setting up a Brand New RVD Pack
Hazards

Command descriptions

mkrfs
rvdexch *(not available)*
rvddown
rvdflush
rvdlog (see rvdstats)
rvdtab (see spinup)
rvdsize (see mkrfs)
rvdstats
rvdwho
spindown (see spinup)
spinup

PC/RVD

Introduction

PC/RVD is a remote virtual disk system that, in conjunction with RVD servers located elsewhere in the network, provides a PC with the appearance of up to ten additional disk drives and an unlimited number of removable disk packs. When a remote disk pack is "spun up", it appears to most DOS software to be just another disk drive. Although read and write requests are actually accomplished by sending messages across the network to the server, on a local area network the performance of a remote disk pack is only slightly less than that of a local fixed disk.

Remote Virtual Disk Packs

A remote virtual disk pack is a portion of a real disk, located on an RVD server. RVD packs are named and allocated by an administrator for the particular RVD server. The name (a character string) and the size (measured in sectors of 512 bytes) are negotiated between the administrator and the prospective user. The maximum size of an RVD pack, while limited by the server to available space, is limited by the implementation of PC/DOS 2.0 to 33.5 Megabytes, or 65,535 sectors. Once allocated, the space is reserved on the physical disk for the lifetime of the RVD pack.

When a client computer such as a PC uses ("spins up") an RVD pack it specifies one of three modes of access:

- r read-only access
- s read/write shared access
- x read/write exclusive access

The r and x modes follow the usual rules for read/write compatibility--there may be several simultaneous readers, or exactly one exclusive-mode user of any one virtual disk. The s mode is not currently implemented by the server.

Access to an RVD pack may be protected by passwords, with a separate one for each of the three modes of access. Thus one might protect an RVD pack used as a group library by requiring one password (or no password at all) for read access, and a different password for exclusive access. A private RVD pack might use the same password for all three modes. It is also possible, by arrangement with the server's administrator, to specify (by internet address) a preferred client that may spin up a password-protected RVD pack without providing the password.

When a new RVD pack is allocated, the first thing to do is create an initialized, empty file system on that pack. The section entitled "scenario setting up a brand new RVD pack" describes that process.

Installation of RVD on the IBM/PC

PC/RVD consists of a device driver and several management commands. PC/RVD is installed by replacing the usual PC/IP device driver file (NETDEV.SYS) with a different one (RVDDEV.SYS). RVDDEV.SYS supports all of the usual PC/IP functions, and in addition provides RVD client support. It is possible to customize RVDDEV using a previously customized NETDEV as a model (See the writeup of PC/custom for details.) In addition to the usual site customization, RVD requires customizing one extra parameter: the first RVD drive letter. The next section explains how to do that customization, which depends on what other disk devices and drives are also in use.

Disk drive letter assignments

PC/RVD provides ten disk drives which might, for example, be identified as C: . . . L: on a PC with two diskette drives named A: and B:. DOS automatically assigns disk drive identifiers in the order that device drivers are loaded. Drivers are loaded in the order they appear in the CONFIG.SYS file, so one must take some care in choosing that order.

Suppose, for example, an enhanced PC/AT (which has one diskette drive and one fixed disk drive) is configured with both a RAM disk (which operates an area of random access memory as though it were an identified disk drive) and RVD. One might use the following CONFIG.SYS:

```
DEVICE=VDISK.SYS
DEVICE=RVDDEV.SYS
```

In that case, the disk drive assignment would be as follows:

drive id	device	comment
A: and B:	diskette #1	(DOS simulates two diskettes)
C:	fixed disk	
D:	RAM DISK	
E: . . . N:	RVD's	

and the customization for RVD should say that the first RVD drive is "E:".

If the two lines in the CONFIG.SYS file were reversed, RVD would use drives D: . . . M:, and the RAM DISK would appear as drive N:. Customization for RVD in that case would say the first RVD drive is "D:".

Scenario Using a Pre-existing RVD Pack

- 1) Find the name of the virtual disk pack and the network address of its server.
- 2) Use the command PC/spinup to associate that RVD pack with one of the ten RVD drive identifiers on the PC, and to spin up the RVD pack at the server.
- 3) Use ordinary PC programs to read and write files on the RVD pack. A usage session may continue indefinitely, as long as the server remains in operation.
- 4) Use the command PC/spindown to release the spun up RVD pack and to disassociate that pack from the PC's device identifier.

Scenario Setting up a Brand New RVD Pack

- 1) Ask the administrator of an RVD server to create a new, empty virtual disk pack. Be sure you know its character string name and the network address of the server.
- 2) Using the command PC/spinup, spin up the new virtual disk pack in exclusive mode. WARNING: Do not issue any command that would read or write to an uninitialized RVD pack. The bit configuration that is found there may cause DOS to do strange things, including crashing or confusing its records of that drive's state.
- 3) Using the command PC/mkrfs, initialize the disk with an empty file system. This command is analogous to the PC/DOS format command--it wipes out all previous history of data on the pack. Thus it should be used only when setting up a new RVD pack or when the current contents of a pack are to be destroyed.
- 4) PC/mkrfs ends by spinning down the RVD pack, so as to force DOS to reset its disk unit description tables. The pack is now ready to be spun up and used, according to the previous scenario.

Hazards

- 1) If one tries to use an RVD drive that does not have a pack spun up, DOS will display the message

Not ready error reading drive X:
Abort, Retry, Ignore?

Retry will not be successful. The ignore option will return an error to the application program, while the abort option will return the user to DOS command level.

- 2) If the "not ready" message appears while using an RVD pack that was successfully spun up, it means that the RVD server no longer has the pack spun up. This case can arise if a maintenance operation forces the disk pack to be spun down (see the command PC/rvdflush,) or if the RVD server crashes and is rebooted.

- 3) If the RVD server stops responding while an RVD pack is spun up, the next attempt to use that pack will get the error message:

Sector not found error on drive X:
Abort, Retry, Ignore?

If the problem is one of network communications, one can wait until the network is repaired and then retry. Assuming that the server has not been rebooted in the interim, the operation should now succeed. If the server has been rebooted, the error message:

Not ready error reading drive X:
Abort, Retry, Ignore?

will now appear, and the situation is exactly as if the pack had never been spun up (see item 1 above).

- 4) It is possible to use other PC/IP programs while an RVD pack is spun up, but with one restriction: while the PC/IP program is running, RVD service is unavailable. This restriction has two effects: first, one cannot use tftp to and from an RVD pack. Second, if one calls a command interpreter from inside PC/telnet (using F10/!) while running that command interpreter one should be careful not to touch any RVD files. (If you plan to use F10/!, you should not also set your DOS PATH variable to include an RVD directory.)

- 5) If the PC crashes and requires rebooting or is powered down while it has RVD packs spun up, it loses its local record of spunup packs, but the server still has a record. Normally, simply spinning up each pack on the same drive as before will resynchronize the two records. (Note that spinning up the same pack on a different drive does not resynchronize the PC's record with that of a server. Such a spinup is treated by both the PC and the RVD server as a completely independent activity.) The DOS command CHKDSK can be used on an RVD pack to review and, if necessary, repair a file system damaged in a crash, just as with a local disk.

There is a general cleanup command, named PC/rvdflush, that sends a request to a server to spin down all RVD packs associated with this client. It is general good practice to execute PC/rvdflush at the end of each session of use of a PC, and also in the AUTOEXEC.BAT file of PC's that make regular use of RVD.

- 6) The device name "netcust" is applied to the installed version of rvddev.sys, and the customizer may be used to change customization parameters after the driver is loaded. Since the customization parameters of netcust are read only once at initialization time, and the RVD driver is initialized by DOS at the time it is loaded, changing the parameters in netcust has no effect on RVD. However, because PC/IP commands such as PC/telnet contain their own copy of the device driver, and that device driver is initialized at the time the command is executed, changes to netcust will affect them.

- 7) The following DOS commands can not be used with RVD disk packs:

```
format
diskcopy
diskcomp
```

As a general rule, all disk-using software will work correctly with RVD unless written in a way that depends on hardware parameters of specific physical disks.

- 8) When a disk drive has been spun down, that drive cannot be used again unless the DOS record of the state of that drive is reset. The command PC/spindown does not currently reset the DOS state record. The easiest way to reset the DOS record is to type the command "DIR d:" and when DOS replies that the drive is not ready, type "a" to abort the command. This sequence resets the drive and it can now be used for another RVD pack.

16 September 1985. This document is in RVD.TXT.

PC/mkrfs and rvdsize

Utilities to create an empty file system on an RVD pack.

Usage

mkrfms d: [size]

creates an empty DOS file system on drive "d:". If the optional argument "size" is not specified, the entire disk pack will be used. if size is specified, it must be no larger than the actual disk pack size and also no larger than 65535 sectors. If an RVD pack larger than 65535 sectors is mounted, mkrfs will initialize a DOS file system that uses the first 65535 sectors.

WARNING: If there was previously a file system on the pack, running mkrfs will cause its contents to be irretrievably lost.

Usage

rvdsize d:

displays the size, in 512-byte sectors, of an RVD pack that is correctly spun up on drive d:.

PC/rvddown

Forces spindown for all active users of a given rvd pack.

normal usage

rvddown server-name pack-name

where "server" is either the character-string name or the internet address of a host that provides a Remote Virtual Disk server.

PC/rvddown first displays a list of all clients that have currently spun up the named disk pack. It then asks the user to confirm that a forced spindown is really wanted. If the user answers yes, PC/rvddown requests that the user provide the exclusive-mode password for the named disk pack. It then sends a request to the indicated RVD server, which forces spindown for all users that have the named pack spun up. Finally, it displays any response message that comes back from the RVD server.

This command should be used with care, because forcing spindown of a disk pack will cause any client that has a file open on that disk pack to abort. In addition, if a file is open for writing, that file, the directory containing it, or the file allocation table for the entire disk pack may be in an inconsistent state, with the result that all contents of the disk pack may be in jeopardy.

The primary application of the PC/rvddown command is for the case where a private RVD pack has been accidentally left spun up at a workstation elsewhere, and the owner of the disk pack is quite sure that that workstation is not actively writing the pack. If the command reports that the pack is spun up in exclusive mode (which permits writing) it is advisable to run the DOS command CHKDSK on the pack after forcing its spindown, to verify that its contents are intact.

21 May 1985. This document is in rvddown.txt

PC/rvdexch

A command that sends a control request to an RVD server, asking that two RVD packs have their names exchanged.

Usage

```
rvdexch server packname1 packname2
```

where "server" is the IP address of an RVD server, and "packname1" and "packname2" are names of two RVD packs on that server. PC/rvdexch will prompt the user for the exclusive mode passwords of both packs. It will then send a name exchange request to the server. Name exchange does not affect users who currently have a disk pack spun up. The server will resolve future spinup requests using the new names.

This command is provided to allow library maintenance. A library manager might create two packs named, for example, "library" and "alt-library". Customers would be told to use "library", in read-only mode, and both packs would be protected with one exclusive-mode password known only the maintainer. When a library update should occur, the maintainer spins up "library" in read mode and "alt-library" in exclusive mode, copies the current contents of "library" to "alt-library", and then makes any desired updates to "alt-library". Once the updates are complete and consistent, the maintainer exchanges the two packnames with PC/rvdexch, and future users will get the updated library. Current users can continue using the old library until they are finished with it.

A maintainer of a PC/DOS library can help users keep track of what library they are using by placing a PC/DOS volume label in their RVD file systems. That label might contain a version number, e.g., "lib93".

PC/rvdflush

Spins down all RVD packs that this client has spun up.

normal usage

rvdflush server

where "server" is the character-string name or the internet address of a host that provides Remote Virtual Disk Service. PC/rvdflush sends a request to the indicated RVD server, which spins down all disk packs belonging to the PC that sent the request. It also displays any response from the RVD server.

maintenance usage

rvdflush server client

The maintenance argument "client" is the network address of some other RVD client. If "client" is specified, PC/rvdflush prompts for a maintenance password. The ability to spindown disk packs of another client is intended only for disaster recovery, not for normal operation. If a client is still actively using a disk pack that is spun down this way, its application may be forced to abort unexpectedly, and if a file on the disk pack was open for writing, that file, the directory, or the entire pack contents may be left inconsistent or inaccessible.

PC/rvdstats and rvdlog

These two commands are useful in debugging RVD installation problems. Because RVD is a device driver that operates under PC/DOS, it does not have any straightforward way of reporting network errors at the instant they occur. Instead, it collects these error reports in a log and in usage counters, which can be retrieved later by these two commands.

Usage

rvdstats

retrieves and displays several statistics of rvd network operations: the number of rvd packets sent and received, the number of timeouts, and the number of packet errors. All numbers are cumulative since the time that the RVD driver was initialized.

Usage

rvdlog

retrieves and displays a log of rvd and network activity. The contents of the log are determined by the settings of the PCIP debugging switches, which are described in the writeup of PC/custom. The switch APTRACE produces a one-line log entry for most RVD device driver calls. The log is kept in a circular buffer of 500 bytes, so only the most recent log entries are available. If very many logging options are turned on, or there has been very much RVD activity, newer log entries will have overwritten older log entries in the circular buffer, and the oldest entry displayed may be truncated from the front.

16 September 1985. This document is in RVDSTATS.TXT.

PC/rvdwho

Obtains a list of network addresses of users who have spun up a particular RVD pack.

Usage

rvdwho server packname

where server is the internet address of an RVD server, and packname is the name of an RVD pack on that server. PC/rvdwho sends an inquiry to that server, for which the response is a list of all current spinups of the named rvd pack.

19 April, 1985. This document is in RVDWHO.TXT

PC/spinup, spindown, and rvdtab

These commands manage connections between disk drive identifiers on the PC and named remote virtual disk packs on some server.

Usage

```
spinup d: server packname mode
```

where d: is one of the ten RVD disk drive identifiers on this PC, server is the octal or decimal network address of an RVD server (character-string names are not acceptable) packname is the name of a virtual disk pack on the server, and mode is one of r, s, or x.

If a password is required, PC/spinup will prompt the user for it. If the drive has been used previously but not reset, spinup will prompt the user to reset it.

Usage

```
spindown d:
```

or

```
spindown -all
```

where d: is the drive identifier associated with a previously spun up RVD pack. PC/spindown sends a spin down request to the server and clears the local record of use of drive d:. The option "-all" causes spindown of all RVD packs that the PC RVD driver thinks are currently spun up.

Usage

```
rvdtab
```

For each RVD that the PC RVD driver thinks is spun up, this command reports the drive identifier, the remote server internet address, the RVD pack name and size in 512-byte sectors, and the access mode.