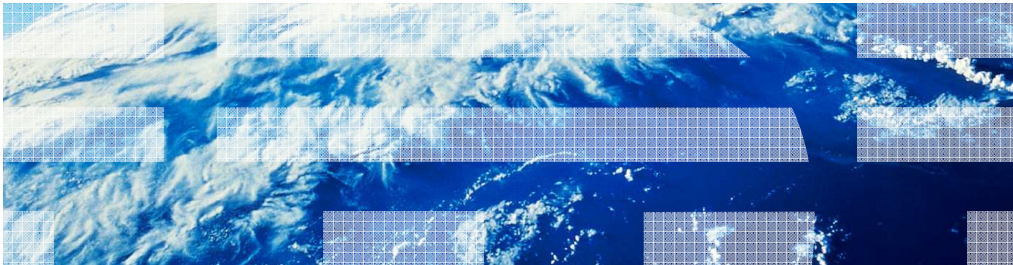


z/OS V1R13

z/OS shells and utilities:
Add symbolic links to shared root file system



Overview

- **Problem Statement**

- As a z/OS® S&U user, I want to be able to mount my version-root file system read-only, without having to make post-installation actions for some utilities (cron, mail, and uucp) after each new release.

- **Solution**

- Eliminate the post-installation actions, by defining the symbolic links these utilities need to function in a read-only version-root file system at installation time.
- Provide a new Migration Health Checker to determine if the user will be affected by a one-time migration action due to this change.

- **Benefit**

- These post-installation actions will be eliminated, if the user takes advantage of the provided symbolic links.

Usage and invocation (1 of 5)

- As of z/OS V1R13, ServerPac is delivered with the /usr/lib/cron, /usr/mail and /usr/spool directories as symbolic links to /var. ServerPac users will not need to take any action to create these symbolic links.
- For CBPDO Users, the required directories and symbolic link structure are created during execution of the BPXMKDIR REXX exec in SYS1.SAMPLIB.

Usage and invocation (2 of 5)

- The symbolic links are directed to /var directories as follows:

Directory	→	Linked to...
/usr/lib/cron	→	../var/cron
/usr/spool	→	../var/spool
/usr/mail	→	../var/mail

Usage and invocation (3 of 5)

- For files used by uucp, these files are delivered as symbolic links that are directed to the /var directories as follows:

File name	→	Linked to...
/usr/lib/uucp/Systems	→	../../../../var/uucp/System
/usr/lib/uucp/Devices	→	../../../../var/uucp/Devices
/usr/lib/uucp/Dialers	→	../../../../var/uucp/Dialers
/usr/lib/uucp/Dialcodes	→	../../../../var/uucp/Dialcodes
/usr/lib/uucp/Permissions	→	../../../../var/uucp/Permissions
/usr/lib/uucp/config	→	../../../../var/uucp/config

- The /var file system provided by ServerPac will not contain these files, they are provided when the utilities are configured and used.

Usage and invocation (4 of 5)

CBPDO considerations:

- The following issues will cause a failure in BPXMKDIR, the Migration Health Check will verify both:

1) Symbolic link targets created ahead of time must be created exactly as shown in the previous slides, otherwise BPXMKDIR and the Health Check will fail. For example:

<code>/usr/mail</code>	→	<code>../var/mail</code>	-	Acceptable
<code>/usr/mail</code>	→	<code>/var/mail</code>	-	Not Acceptable

Usage and invocation (5 of 5)

CBPDO considerations (2 of 2):

2) Customer content must be moved before running BPXMKDIR.

/usr/lib/cron - Must be empty.

/usr/mail - Must be empty.

/usr/lib/uucp - Should contain the IBM files uucc, uucico, uuxqt and contains the IBM subdirectory.

/usr/spool - May contain the following empty IBM subdirectories:

cron, locks, cron/atjobs, cron/crontabs,

uucp, uucppublic, uucp/.Xqtdir, uucp/.Sequence, uucp/.Status

Interactions and dependencies

- The verification used in the V1R13 BPXMKDIR and the V1R11 and V1R12 Migration Health Check is essentially the same.
- The Migration Health Check will be written in System REXX, so the System REXX service, as well as the Health Checker started task, must be available on the system to run this check.

Migration and coexistence considerations (1 of 5)

- A user will be notified by the Health Check that a one-time migration action will need to be taken if either of the following is true:
 - 1) You have performed the post-installation activities to make uucp, cron, or mail supported for a read-only z/OS version-root. You do not necessarily have to be running with the z/OS version-root as read-only, but only have the post-installation customization as described in z/OS UNIX® System Services Planning.
 - 2) You have used uucp, cron, or mail facilities and have not performed the post-installation customization as described in z/OS UNIX System Services Planning.

Migration and coexistence considerations (2 of 5)

- While this migration action should be performed before the first IPL of z/OS V1R13, the changes to use /var for this support can be done at any time.
 - Although previous documentation had shown the use of /etc in examples, we now recommend using /var for these utilities.
- If you use /etc or another directory today for your post-installation customization:
 - You may continue to use this directory, though it is not recommended.
 - Moving to the /var structure that is provided with z/OS V1R13 is recommended because of the reasons on the next two slides.

Migration and coexistence considerations (3 of 5)

- 1) You can minimize any subsequent post-installation customization, since the symbolic links to /var will be provided for you by IBM.
 - Continued use of non-/var directories may mean post-installation work for every new release, to remove the delivered structure and replace it with your own.
 - Use of non-/var directories negate the benefits of the provided symbolic links, because the post-installation actions will be changed, but not eliminated.

Migration and coexistence considerations (4 of 5)

- 2) Continued use of /etc (or another directory), requires you to manage and maintain the symbolic links required from /var to that directory, which is “double symlinking.” This “double symlinking” might be confusing for those that maintain the system.
- In order to use a non-/var directory, you will have to create an additional symbolic link from the /var directory to your chosen target directory. For example, if you chose to use a directory other than /var/mail (such as /etc/mail), you will need to create an additional symbolic link from /var/mail to this directory. These “double symlinks” can be reused for future releases, if you continue to provide the intermediate links for each release.

Migration and coexistence considerations (5 of 5)

- If you have any user files under `/usr/spool`, `/usr/lib/cron`, or `/usr/mail` in the version-root file system (that is, they have not been symlinked under `/var` or another directory to support the read-only version-root), then those files must be moved to `/var/spool`, `/var/cron`, or `/var/mail` (or another directory besides the `/var` that you choose).
- For `uucp`: If you have any files, except those listed below, under `/usr/lib/uucp` in the version-root file system (that is, they have not been symlinked under `/var` or another directory to support the read-only version-root), then those files must be moved to `/var/uucp` (or another directory besides the `/var` that you choose):

Files: `uucc`, `uucico`, `uuxqt`

Subdirectory: `IBM`

Installation (1 of 3)

- For both ServerPac and CBPDO Users, the Health Check ZOSMIGV1R13_RO_SYMLINKS provided in APARS OA35636 & OA28684 should be used to check if a one-time migration action will need to be taken when migrating from z/OS V1R11 or V1R12.
- Install the APARS OA35636 & OA28684 on V1R11 or V1R12.
- Activate the ZOSMIGV1R13_RO_SYMLINKS Health Check.
- Examine the results.

Installation (2 of 3)

Health Check Success Messages:

BPXH910I The directory /usr/mail is not customized.

BPXH920I The directory /usr/lib/cron is customized to the ../../var/cron directory.

Overall Success Message:

BPXH913I All directories verified were found to be acceptable for the new symlinks added in z/OS V1R13.

A migration action is not required.

Installation (3 of 3)

Health Check Error Messages:

BPXH912I The directory /usr/lib/cron has additional files or directories found as follows:

file1

file2

directory1

BPXH911I The directory /usr/mail has a symlink to /var/mail.

Overall Failure Message:

BPXH915E One or more of the directories verified were found to contain post-install customization

that is expected to be affected by the new symlinks added in z/OS V1R13.

A migration action is required.

Appendix - References

- See z/OS 1.13 UNIX System Services Planning (GA22-7800)
- See z/OS 1.13 Migration (GA22-7499)
- For ZOSMIGV1R13_RO_SYMLINK, see z/OS 1.13 Health Checker for z/OS 1.13 User Guide (SA22-7994)
- For BPXMKDIR, see z/OS 1.13 Program Directory (GI10-0670)



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