



Best Practices: Managing AIX Updates using SUMA, NIM, and AIX Service Tools

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1 Introduction

Determining a method to keep a network of systems up-to-date with AIX software updates can be challenging. A solution may involve establishing a way to download updates to a NIM master, maintaining updates on a NIM master, and using the repositories of updates on the NIM master to update various client systems.

This paper details a method of using the AIX Service Update Management Assistant (SUMA) to download AIX Technology Levels (TL's), Service Packs (SP's), and PTF's from an AIX fix server, and then using the Network Installation Manager (NIM) to install the updates to various NIM clients. SUMA and NIM are provided as a part of the base AIX operating system.

Note, IBM System Director Update Manager also has the capability of downloading and installing AIX updates, as well as updates for VIOS, HMC, Power Systems Firmware, and other operating systems.

In addition, AIX provides numerous tools to assist with managing updates. These tools are described along with sample usage scenarios.

Prior to updating a client system, it is recommended to create a system backup to allow for recovery. Please refer to the "System Backup and Recovery" section of this paper for commands that are useful in system backup and recovery planning.

2 Best Practices using SUMA and NIM

This section describes some best practices for using the Service Update Management Assistant (SUMA) to download updates, then using the Network Installation Manager (NIM) to distribute the updates to NIM client systems.

2.1 Getting updates for a single system using SUMA

This scenario will detail the steps to retrieve the latest SP for a single system running a specific TL (uses TL specified in the *suma* FilterML field), in this case AIX TL 6100-06.

Prior to running the *suma* command to download updates, any authentication should be performed to ensure the system has internet access. To verify the system is connected to the internet, enter the following command (performs a 'Preview' download with no files being downloaded):

```
suma -x -a Action=Preview -a RqType=Latest
```

If the following message is returned, the system is not authenticated to access the internet and you should contact your administrator to determine the steps necessary to allow your system to access the internet.

0500-013 Failed to retrieve list from fix server.

2.1.1 Download the latest SP

Perform the following steps to download the latest SP for the TL specified in the *suma* FilterML field. The FilterML field specifies that the customer system is at the 6100-06 level.

1. To create a task (it will not run the task) that will download the latest SP from an IBM fix server, type:

```
suma -w -a RqType=Latest -a FilterML=6100-06
```

Note: A task ID will be returned for this newly created task. This example will utilize SUMA task defaults, as displayed by *suma -D*, for any Field=Value pair not specified on the command line. For example, with the task default of *DLTarget=/usr/sys/inst.images*, the updates (in installp format) will be downloaded into */usr/sys/inst.images/installp/ppc*.

2. If you wish to run this newly created task immediately, and perform a Preview operation instead of a Download, type the following command to return a list and byte count of the PTFs in the latest SP (assume task ID 2 was returned from the task created in step 1):

```
suma -x -a Action=Preview 2
```

3. If you wish to **list** information on the above SUMA task, type:

```
suma -l 2
```

4. If you wish to run this newly created task to Download the latest SP, type the following command. In this case, the filesets will be downloaded (no installation will occur).

```
suma -x -a Action=Download 2
```

5. To determine the version level (VRMF) of the PTFs downloaded, you may run the following command (assumes a DLTarget of /usr/sys/inst.images):

```
installp -ld /usr/sys/inst.images/installp/ppc
```

Note: to rename the PTF files downloaded to include the fileset/VRMF in their name, for example, change “U836082.bff” to “bos.rte.install.6.1.6.2.U”, type:

```
bffcreate -c -d /usr/sys/inst.images/installp/ppc
```

2.1.2 Download a specific TL

In addition to the steps in the “Download the latest SP” section which describe how to create, list, and run a *suma* task, the following command may be used to download a specific Technology Level.

1. To download a specific TL, type:

```
suma -x -a RqType=TL -a RqName=6100-06-00-1036 -a FilterML=6100-05
```

2.1.3 Download a specific SP

In addition to the steps in the “Download the latest SP” section which describe how to create, list, and run a *suma* task, the following command may be used to download a specific Service Pack.

1. To download a specific SP, type:

```
suma -x -a RqType=SP -a RqName=6100-06-03-1048 -a FilterML=6100-05
```

Specifying FilterML=6100-05 in the above command indicates the system is at the 6100-05 level, such that TL6 (6100-06-00-1036) will be downloaded in addition to TL6 SP3 (6100-06-03-1048). Had FilterML=6100-06 been specified, only TL6 SP3 would have been downloaded.

2.1.4 Download a specific PTF

Only certain PTFs are available for individual download. For example, PTFs containing `bos.rte.install`, `bos.alt_disk_install.rte`, or PTFs that are released between Service Packs. Otherwise, the TL or SP must be downloaded.

Type a command similar to the following to download a specific PTF:

```
suma -x -a RqType=PTF -a FilterML=6100-06 -a RqName=U836082
```

Note: This example will utilize SUMA task defaults, as displayed by `suma -D`, for any Field=Value pair not specified on the command line.

If the PTF is not available for individual download, the following message will be returned:

0500-058 The update can not be downloaded individually. A TL or SP must be requested.

2.2 Getting updates and installing NIM clients

This scenario will detail the steps to retrieve AIX updates for NIM client systems, building on the information provided in the above “single system” section. The scenario only covers updating existing client systems, and not installing new clients from a NIM SPOT.

The AIX `suma` command can be used to download updates to a NIM master, and NIM can be used to install the updates to the NIM clients.

You may download the AIX TL's and SP's by setting up `suma` tasks on the NIM master. If the NIM master does not have internet access, then `suma` must be run on a system that does, and the updates can be transferred to the NIM master.

Prior to running the `suma` command to download updates, any authentication should be performed to ensure the system has internet access. To verify the system is connected to the internet, enter the following command (performs a ‘Preview’ download with no files being downloaded):

```
suma -x -a Action=Preview -a RqType=Latest
```

If the following message is returned, the system is not authenticated to access the internet and you should contact your administrator to determine the steps necessary to allow your system to access the internet.

0500-013 Failed to retrieve list from fix server.

2.2.1 *Organizing NIM lpp_source objects*

When setting up NIM lpp_source objects on your NIM master there are a few things to keep in mind if one of your considerations is to manage AIX updates on a network of client systems.

When running a NIM operation to perform an update_all on a client system, it is recommended to have all filesets contained in a single lpp_source. For example, if upgrading a 6100-05 system to 6100-06-03, the AIX updates for both the 6100-06 TL and the 6100-06-03 SP should be contained in the same lpp_source. This allows the client system to be installed by running a single NIM operation, rather than separate operations to install first the TL, and then the SP.

Note, that following this logic, if the NIM master were to maintain lpp_source objects for multiple SP's within the same TL, for example TL6 SP1, TL6 SP2, TL6 SP3, that each of these lpp_source objects would duplicate the TL6 filesets (a TL can contain upward of 500 filesets). Therefore, depending on the number and content of lpp_source objects being maintained on the NIM master, if disk space is a consideration, a method of organizing lpp_source objects that keeps the TL and SP separate could be considered to allow for space saving. In this case, for example if separate lpp_source objects were kept for TL6, SP1, SP2, and SP3, the TL and SP filesets could be combined into a temporary lpp_source that would hold both TL6 and SP3 prior to running a NIM update_all operation. If filesets are being combined into an lpp_source, the .toc file should be removed from the lpp_source.

If disk space is not an issue, it is acceptable to maintain multiple lpp_source objects that contain both TL and SP filesets (for example, TL6 SP1, TL6 SP2, etc).

2.2.2 *Updating a NIM client to a new SP level*

The term "update" refers to installing a new Service Pack level on a system, keeping the system at its existing Technology Level. To update a NIM client with a new SP level, the first step is to use *suma* to download an SP into a single directory on a NIM master.

1. To download a specific SP, type:

```
suma -x -a RqType=SP -a RqName=7100-00-01-1037 -a FilterML=7100-00 -a DLTarget=/export/7100.00.01
```

2. To download the latest SP for a specific TL, type:

```
suma -x -a RqType=Latest -a FilterML=7100-00 -a DLTarget=/export/7100.00.SP
```

If an lpp_source has already been created, you may enter the lpp_source name in the DLTarget, for example:

```
suma -x -a RqType=Latest -a FilterML=7100-00 -a DLTarget=7100_00_01_lppsrc
```

3. To setup a directory (e.g. /export/7100.00.01) as a NIM lpp_source resource, type the following where “7100_00_01_lppsrc” is the NIM resource name being assigned:

```
nim -o define -t lpp_source -a server=master -a location=/export/7100.00.01  
7100_00_01_lppsrc
```

4. Update the NIM client to AIX 7.1 TL0 SP1 by running the following NIM operation on the NIM master:

```
nim -o cust -a lpp_source=7100_00_01_lppsrc -a fixes=update_all <client1>
```

Note, the NIM operation can also be initiated by running the following command from the NIM client:

```
nimclient -o cust -a lpp_source=7100_00_01_lppsrc -a fixes=update_all
```

2.2.3 Upgrading a NIM client to a new TL level

The term “upgrade” refers to installing new updates on a system, moving the system to a new Technology Level. To upgrade a NIM client with a new TL level, the first step is to use *suma* to download a TL into a single directory on a NIM master.

1. To download a specific TL, specifying the system is already at the 6100-05 level, type:

```
suma -x -a RqType=TL -a RqName=6100-06-00-1036 -a FilterML=6100-05 -a  
DLTarget=/export/6100.06.00
```

2. To setup a directory (e.g. /export/6100.06.00) as a NIM lpp_source resource, type the following where “6100_06_00_lppsrc” is the NIM resource name being assigned:

```
nim -o define -t lpp_source -a server=master -a location=/export/6100.06.00  
6100_06_00_lppsrc
```

3. Update the NIM client to AIX 6.1 TL6 by running the following NIM operation on the NIM master:

```
nim -o cust -a lpp_source=6100_06_00_lppsrc -a fixes=update_all <client1>
```

Note, the NIM operation can also be initiated by running the following command from the NIM client:

```
nimclient -o cust -a lpp_source=6100_06_00_lppsrc -a fixes=update_all
```

2.2.4 Upgrading a NIM client to a new TL level and SP level

The term “upgrade” refers to installing new updates on a system, moving the system to a new Technology Level. When upgrading a system, it may also be taken to a new SP level at the same time it is being upgraded to a new TL.

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To update a NIM client with a new TL and SP level, the first step is to use *suma* to download the updates into a single directory on a NIM master.

1. To download the TL and SP updates, type:

```
suma -x -a RqType=SP -a RqName=6100-06-03-1048 -a FilterML=6100-05 -a  
DLTarget=/export/6100.06.03
```

Specifying FilterML=6100-05 in the above command indicates the system is already at the 6100-05 level, such that TL6 will be downloaded in addition to TL6 SP3. Had FilterML=6100-06 been specified, only SP3 would have been downloaded.

2. To setup a directory (e.g. /export/6100.06.03) as a NIM lpp_source resource, type the following where “6100_06_03_lppsrc” is the NIM resource name being assigned:

```
nim -o define -t lpp_source -a server=master -a location=/export/6100.06.03  
6100_06_03_lppsrc
```

3. Update the NIM client to AIX 6.1 TL6 SP3 by running the following NIM operation on the NIM master:

```
nim -o cust -a lpp_source=6100_06_03_lppsrc -a fixes=update_all <client1>
```

Note, the NIM operation can also be initiated by running the following command from the NIM client:

```
nimclient -o cust -a lpp_source=6100_06_03_lppsrc -a fixes=update_all
```

2.2.5 Setting up a NIM machine group

You may update a single NIM client or setup a machine group to assist in updating multiple NIM clients.

1. To setup multiple NIM clients as a machine group (so they can be updated with one command), type the following, where 61_client_grp is the name of the machine group being created:

```
nim -o define -t mac_group -a add_member=<client1> \  
-a add_member=<client2> 61_client_grp
```

For an environment with a large number of NIM clients it may be more convenient to setup the machine group thru the SMIT menus instead of listing each client on the command line. In this case, type:

```
smitty nim_mkgrp_standalone
```

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2. To perform a NIM operation to update all software on a machine group of NIM clients or a single NIM client, type the following:

To update the 61_client_grp machine group, type:

```
nim -o cust -a lpp_source=6100_06_03_lppsrc -a fixes=update_all 61_client_grp
```

To update a single client, type:

```
nim -o cust -a lpp_source=6100_06_03_lppsrc -a fixes=update_all <client1 >
```

3 Tools

There are numerous tools available to assist with keeping software updates current on your system.

3.1 `niminv`

The NIM inventory command (`niminv`) allows system administrators to generate and compare installation inventory of NIM objects. The `niminv` command is run on a NIM master.

3.1.1 *Functional Highlights*

The `niminv` command provides the following functions:

- Software inventory can be gathered for the following NIM objects: master, standalone, mkysyb, lpp_source and SPOT
- Hardware inventory can be gathered for master and standalone NIM objects
- Accessible through command line or the SMIT NIM “Installation Inventory” subpanel (fastpath: `nim_inventory`)
- Can provide comma-separated list of multiple NIM objects
- Reports are time stamped to allow for regular gathering

3.1.2 *Use “`niminv -o invget`” to Get Installation Inventory*

The following is a sample command that will generate installation inventory for a NIM client and `lpp_source`:

```
niminv -o invget -a targets=client1,6100_06_LPP -a location=/tmp/inventory
```

```
Installation Inventory for client1 saved to
/tmp/inventory.inventory.client1.100619230651
Installation Inventory for 6100_06_LPP saved to
/tmp/inventory/inventory.6100_06_LPP.100619230651
```

The inventory file will be generated in list style format (similar to `lspp -L`), and a portion of the NIM client inventory file, showing software and hardware inventory, is shown below:

Installation Name	Level	Type	State	Description
Java6.sdk	6.0.0.175	F	C	Java SDK 32-bit
wio.common	6.1.6.0	F	C	Common I/O Support for Workload Partitions
wio.vscsi	6.1.6.0	F	C	VSCSI I/O Support for Workload Partitions

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xlC.aix61.rte	11.1.0.1	F	C	C/C++ AIX 6.1 Runtime
cdrecord-1.9-7	1.9-7	R	C	A command line CD/DVD recording program.
mkisofs-1.13-4	1.13-4	R	C	Creates an image of an ISO9660 filesystem.
cd.IBM-RMBO002050	H1A9	H	C	IDE DVD-RAM Drive
cd.IBM-DVRM00203	A150	H	C	SCSI DVD-RAM Drive (4700 MB)
ent.14106902	GOL002	H	C	10/100/1000 Base-TX PCI-X Adapter
fcs.df1080f9	100305	H	C	FC Adapter
hdisk.ST33660.53313133	43353048	H	C	16 Bit LVD SCSI Disk Drive (36400 MB)
sissscsia.44415255	050A008a	H	C	PCI-X Dual Channel Ultra320
sys.System Firmware	RG080425_d79e22_regatta	H	C	System Object

3.1.3 Use “niminv -o invcmp” to Compare Installation Inventory

The following is a sample command that will compare installation inventory for a NIM master, lpp_source, NIM SPOT, NIM client, and mksysb:

```
niminv -o invcmp -a targets=master,61L_SP1_LPP,61L_SP1_SPOT,client1,6100_02_mksysb -a base=any -a location=/tmp/inventory
```

Note, by specifying “-a base=any” the comparison base will be the highest level fileset installed on any of the NIM objects, such that all filesets on all NIM objects will be listed in the report. Had a specific comparison base been specified (e.g. “-a base=master”) then only the filesets installed on the NIM master (assuming -a base=master was given) would be included in the report.

A portion of the comparison inventory file is shown below:

#	base	1	2	3	4	5
AIX-rpm-6.1.2.0-1	6.1.2.0	-	-	-	same	-
AIX-rpm-6.1.6.0-1	6.1.6.0-1	-	-	same	-	same
DirectorCommonAgent	6.2.0.1	same	-	-	-	6.2.0.0
Java5.sdk	5.0.0.345	same	-	-	-	5.0.0.290
Java6.sdk	6.0.0.215	same	-	-	-	6.0.0.175
perfagent.tools	6.1.6.1	same	same	same	6.1.2.0	6.1.6.0
perl.rte	5.8.8.120	same	same	same	5.8.2.90	same
printers.rte	6.1.6.0	same	-	same	6.1.2.0	same
rpm.rte	3.0.5.51	same	-	same	3.0.5.42	same

```
base = comparison base = any
1    = 61L_SP1_LPP
2    = 61L_SP1_SPOT
3    = master
4    = 6100_02_mksysb
5    = client1
'- ' = name not in system or resource
same = name at same level in system or resource
```

3.2 SUMA

As system administration becomes more time consuming and complex, it is often a roadblock that prevents maintaining systems with current software fixes. The Service Update Management Assistant (SUMA) moves the system administrator away from the manual task of retrieving maintenance updates from the Web. SUMA provides customers with flexible, task-based options allowing them to perform unattended downloads of AIX software updates from the IBM Support Web site, thereby allowing customers to move toward an automatic maintenance strategy which helps reduce the time spent on system administration.

The SUMA AIX Web site contains a technical white paper with a high-level overview of SUMA functionality

(<http://www14.software.ibm.com/webapp/set2/sas/f/genunix/suma.html>).

Please refer to the “*Getting updates for a single system using SUMA*” section for examples of SUMA commands.

3.2.1 *Functional Highlights*

SUMA offers system administrators the power to setup the capability of automating the download of maintenance fixes onto a system and supports a comprehensive set of features:

- Automated task-based retrieval of multiple fix types (Technology Level, Service Pack, Latest, PTF)
- Three task actions allow for download preview, actual download of updates, or combining the download with a fix repository cleanup (utilizing lppmgr)
- A scheduling module allows policies to be run at various intervals in order to conform to necessary maintenance windows
- E-mail notification of update availability and task completion
- Support for HTTP and HTTPS transfer protocols and proxy servers
- Filtering options allow comparisons against an installed technology level

3.3 Compare_report

The AIX *compare_report* command allows customers to maintain a proactive fix strategy by providing them an easy way to ensure their systems are at an expected level. A comparison can be done between the filesets installed on a standalone system and the contents of a NIM lpp_source or fix repository, or the comparison can also include the software inventory of a system, as generated by the “*lspp -Lc*” command.

The *compare_report* command can be run on any system, including a NIM master or client.

3.3.1 *Functional Highlights*

The `compare_report` command provides the following functions:

- Compares the filesets installed on a system to a NIM lpp_source or fix repository
- Generates reports, at the fileset/vrmf level, showing if a system has higher or lower levels of software, or if a system has software not present on the system being compared to

Note: The `compare_report` data files containing the latest fileset information are no longer produced by IBM. Please review the Service Strategy document found at the link below for an explanation of moving away from installing individual fixes and towards a Service Pack strategy: <http://www14.software.ibm.com/webapp/set2/sas/f/best/home.html>

3.3.2 *Compare Installed Software on Two Systems*

The following is a sample command that will generate reports, at the fileset/vrmf level, that compare the installed software on a base system to another system. The `base.lslpp.out` and `other.lslpp.out` files in the sample command below are generated by running “`lslpp -Lc`”.

```
compare_report -b /tmp/base.lslpp.out -o /tmp/other.lslpp.out -l -h -m -n
```

The following report files will be generated:

- **baselower.rpt** (-l) lists filesets on the base system that are at a lower level than the other system.
- **basehigher.rpt** (-h) lists filesets on the base system that are at a higher level than the other system.
- **baseonly.rpt** (-m) lists filesets on the base system that are not installed on the other system.
- **otheronly.rpt** (-n) lists filesets on the other system that are not installed on the base system.

3.3.3 *Compare Installed Software to a Fix Repository*

The following is a sample command that will generate reports, at the fileset/vrmf level, that compare filesets installed on a system to filesets contained in a NIM lpp_source or fix repository.

```
compare_report -s -i 6100_06_LPP -l -h -m -n  
or
```

```
compare_report -s -i /tmp/imagedir -l -h -m -n
```

Report files, similar to those described above, will be generated.

3.3.4 Compare Installed Software on a base system to a Fix Repository

The following shows sample commands that will generate reports, at the fileset/vrmf level, that compare the software inventory of a base system to filesets contained in a NIM lpp_source or fix repository. The base.lslpp.out file in the sample commands below is generated by running “lspp -Lc”.

To compare an lspp output file (/tmp/base.lslpp.out) containing the installed software inventory of a base system with a NIM lpp_source (6100_06_LPP), type:

```
compare_report -b /tmp/base.lslpp.out -i 6100_06_LPP -l -h -m -n
```

To compare an lspp output file (/tmp/base.lslpp.out) containing the installed software inventory of a base system with filesets contained in a directory (/tmp/imagedir), type:

```
compare_report -b /tmp/base.lslpp.out -i /tmp/imagedir -l -h -m -n
```

Report files, similar to those described above, will be generated.

4 System Backup and Recovery

Having a backup and recovery plan in place is one of the most important aspects of system administration. Things can go wrong, everything from power outages and disk drive failures, to a root user running commands in the wrong directory.

Performing system maintenance is one of the times that you want to be sure you have a reliable and fast recovery scenario in place. Introducing any change to a system is a risk, and some changes can be easier to back out than others.

The emgr Mount Option (-m)

The *emgr -m* (mount) option can be used when applying an interim fix, meaning that the interim fix files are mounted over the target files instead of replacing them. This process of applying a fix is very useful for special situations such as installing an interim fix containing *libc.a*, because once executables run and link to *libc.a* it may be difficult to remove the interim fix and return to the original *libc.a* if problems are encountered. Utilizing the *emgr* mount option allows a system reboot to restore the original files automatically since a reboot will unmount all existing mounted files and only mount what is specified in */etc/filesystems* when the system is restarted.

Restoring PTF and Interim Files

Most files can be easily rolled back, since interim fixes and PTF updates are created to allow files to be easily restored. So even though it is recommended to have a backup scenario in place, the first option for recovery when applying a PTF update or an interim fix should be to “reject” the update or to “remove” the interim fix.

Since the “reject” operation is not recommended for Technology Levels, a recovery plan should be in place in case problems are encountered when upgrading to a new TL.

The AIX *alt_disk_install*, *mksysb*, and *multibos* commands are also very useful for backup and recovery planning.

4.1 alt_disk_install

The *alt_disk_install* command allows users a way to update the operating system to the next release or Technology Level without taking the machine down for an extended period of time. This can be done in two ways: by installing a *mksysb* image on a separate disk, or by cloning the current system and then applying updates to get to the next Technology Level on a separate disk. If a problem is encountered with the new level, the *bootlist* command can be run after the new disk has been booted, and the bootlist can be changed to boot back to the original disk in order to get the system back to the original level.

4.2 mksysb

The *mksysb* command creates a backup of the operating system (specifically, the root volume group). You can use this backup to reinstall a system to its original state after it has been corrupted. If you create the backup on tape, the tape is bootable and includes the installation programs needed to install from the backup.

4.3 multibos

The *multibos* utility allows the root level administrator to create and maintain two bootable instances of the AIX Base Operating System (BOS) within the same root volume group (rootvg). This utility is provided primarily as an upgrade vehicle.

The *multibos* utility allows the administrator to access, install maintenance, update, and customize the standby instance of BOS (during setup or in subsequent customization operations) without affecting production on the running instance. Migration to later releases of AIX is also supported.

The file systems */*, */usr*, */var*, and */opt*, along with the boot logical volume must exist privately in each instance of BOS. The administrator has the ability to share or keep private all other data in the rootvg. As a general rule, shared data should be limited to file systems and logical volumes containing data not affected by an upgrade or modification of private data.

When updating the non-running BOS instance, it is best to first update the running BOS instance with the latest available version of *multibos*, which is in the *bos.rte.bosinst* fileset.

5 Previewing Updates

When PTF updates are downloaded using SUMA (Service Update Management Assistant) or from the IBM Support Web site (Fix Central), or retrieved from media, you should always perform a preview installation before attempting any software install.

The preview option is available from SMIT, or when using the `installp` and `install_all_updates` commands (with the `-p` option). The preview option will verify that all of the updates are available, including any requisite updates. While `installp` will always attempt to apply as many updates as it can, it is not recommended to install any updates if everything is not in place for a successful install, especially with Technology Levels.

Keeping updates in separate repositories (or `lpp_source`'s for NIM) is a good idea if you only want to apply specific updates to your machines. If you keep all of your updates in one repository, you may get warnings about superseded updates when trying to apply specific fixes. The `lppmgr` command can help maintain your repository by cleaning up superseded updates.

Note, prior to performing a preview installation, the `bos.rte.install` fileset at the new target level should be applied. Otherwise, the preview action will only report that the `bos.rte.install` update needs to be installed.

Best Practices: Managing AIX Updates



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