IBM AIX Patch Management. Automated?

Common Europe Congress 2026, Lyon

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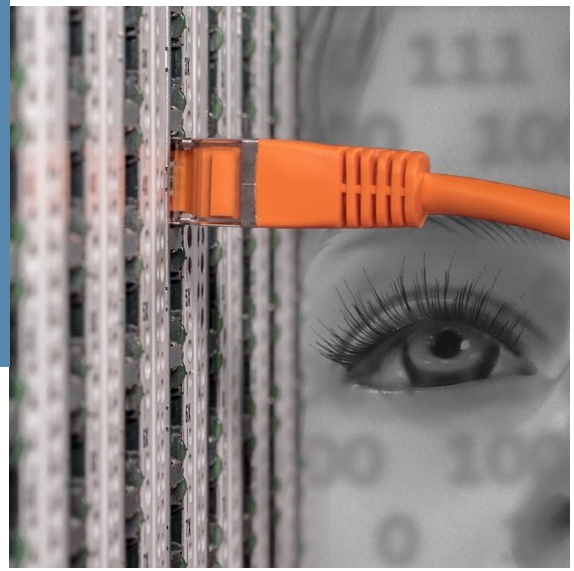
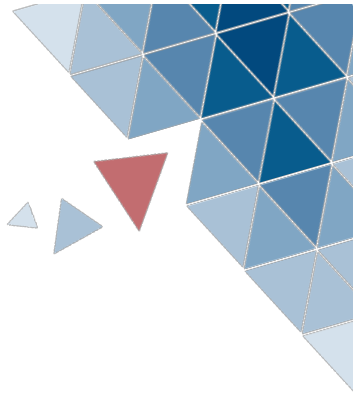
eNFence



— Obélix, more or less, every week at patch day

Today: how to stop being crazy.



Patch management is concerned with the identification, acquisition, distribution, and installation of patches to systems. Proper patch management can be a net productivity boost for the organization. Patches can be used to defend against and eliminate potential vulnerabilities of a system, so that no threats may exploit them. Problems that can arise during patch management, including buggy patches that either fail to fix their problem or introduce new issues. **Patch management tools** can help orchestrate all of the procedures involved in patch management.

A **patch** is data that is intended to be used to modify an existing software resource such as a program or a file, often to fix bugs and security vulnerabilities.[1][2] A patch may be created to improve functionality, usability, or performance. A patch is typically provided by a vendor for updating the software that they provide.

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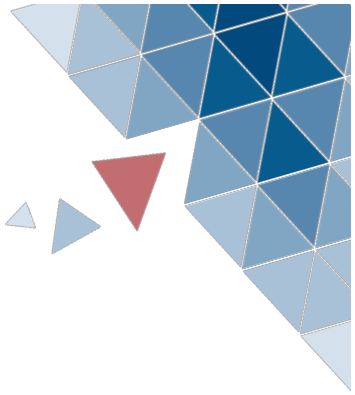
Before you start automating



- Understand how it works
- Standardize
- Define your strategy and make a process out of it

Before you start automating

- How oft should you patch?
- How fast should you install patches?
- Where do you get patches from?
- Do you have downtime?
- How big is the downtime?
- How many environments do you have?
- Do you have sandbox systems?
- How do you check if patches are installed?

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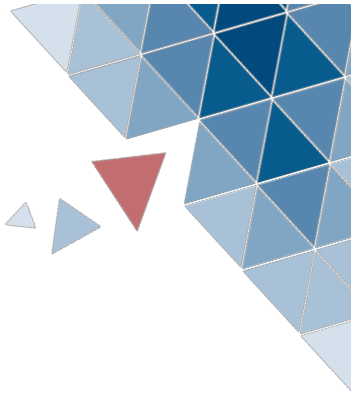
How many packaging formats are there in IBM AIX?



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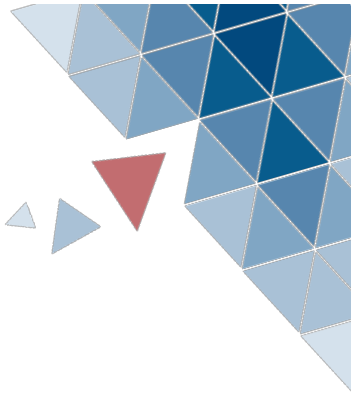
How many packaging formats are there in IBM AIX?



My answer:

BFF

RPM

ISMP

epkg.Z

tar.gz, zip, ...

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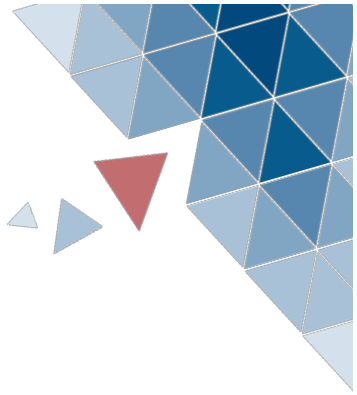
What parts has IBM AIX?



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What parts has IBM AIX?

My answer:

BOS (Base Operating System)

OpenSSL

OpenSSH

GSKit

IBM Directory Server

Network Authentication Service

Db2

Bash

Python

Perl

Java

XL C/C++ Runtime

XL Fortran Runtime

RSCT

Adapter Microcode

AIX Toolbox (RPM Pakete)

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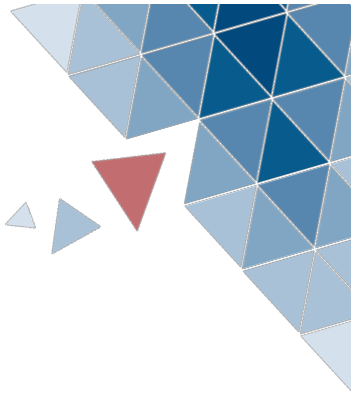
Which channels do you know to get AIX updates and patches?



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Which channels do you know to get AIX updates and patches?

My answer:

IBM ESS

IBM FixCentral

IBM Webpack for AIX

AIX Toolbox for Opensource Apps

IBM ~~FTP~~ Site

IBM HTTPS Site

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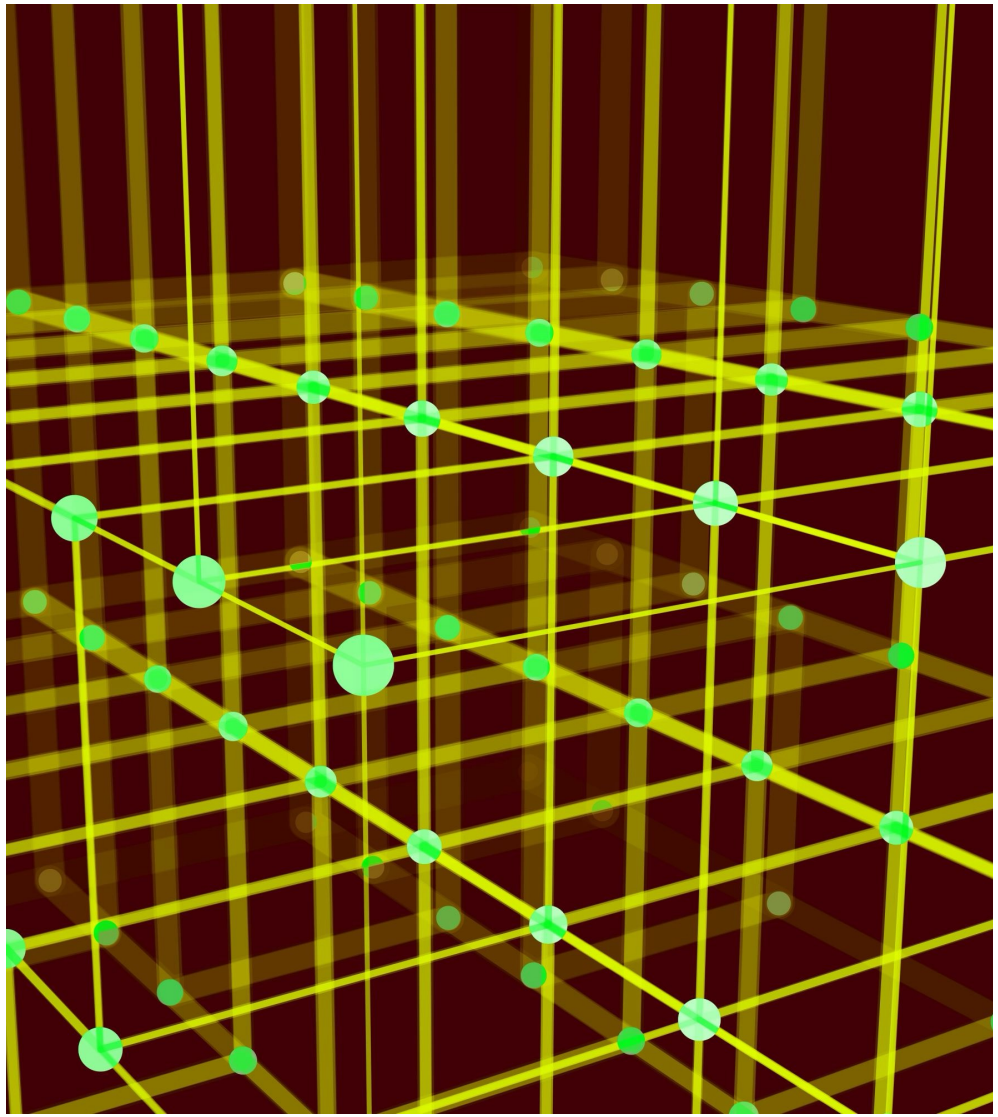
Bonus Question: Do you have NIM?



Theory

and a little bit practice

The most important question: What should I patch?

New TLs and SPs?

Security Fixes? (efixes)

RPM Updates?

Updates for additional components, like OpenSSH, Java, Python, ...

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Entitled Systems Support

https://www.ibm.com/servers/eserver/ess/landing/landing-page

- Login manually, choose software, download to local workstation and then upload to AIX

API? CLI?

🧐 What is this? Never heard...

- Choose HTTP Downloads and copy the links to the server
- Download with curl or wget

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Fix Central

https://www.ibm.com/support/fixcentral

Login manually, choose software, download to local workstation, then upload to AIX NIM

No published API, but there should be...

CLI: suma

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Webpack for IBM AIX

https://www.ibm.com/resources/mrs/assets?source=aixbp

Login manually, choose software, download to local workstation, then upload to AIX NIM

API? CLI?

🧐 What is this? Never heard...

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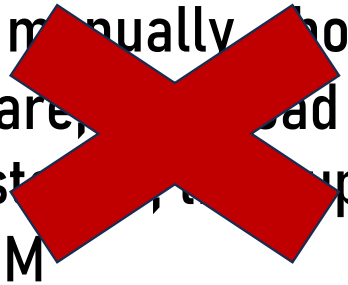
AIX Toolbox for Opensource Applications

https://www.ibm.com/support/pages/aix-toolbox-open-source-software-downloads-alpha

Login manually, choose software, download to local workstation, then upload to AIX NIM



Use DNF, Luke!

Hint:
https://blog.power-devops.com/p/update-aix-with-ansible-part-3a
https://blog.power-devops.com/p/update-aix-with-ansible-part-3b
https://blog.power-devops.com/p/update-aix-with-ansible-part-3c
https://blog.power-devops.com/p/update-aix-with-ansible-part-3d

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IBM HTTPS Site with Security Fixes

https://aix.software.ibm.com/aix/efixes/security/

Choose [illegible]s, d[illegible]load them to local w[illegible]ion, then upload [illegible]X f[illegible]

https://e[illegible]upport.ibm.com/customercare/flrt/[illegible]-security

Sort acc[illegible]g [illegible]he date and choose the suitable fixes

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IBM HTTPS Site with Security Fixes

https://github.com/Kristijan/aix_security_advisories

Python script to show the latest advisories

```
#/opt/freeware/bin/python3 aix_security_advisories.py -d 30
                                                    AIX/VIOS Security Advisories
```

Issued	Updated	Abstract	URL	Reboot	CVE	CVSS
15/05/2024	N/A	AIX is vulnerable to arbitrary command execution due to invscout (CVE-2024-27260)	https://aix.software.ibm.com/aix/ef…	no	CVE-2024-27260	8.4
03/06/2024	N/A	AIX is vulnerable to information disclosure due to openCryptoki (CVE-2024-0914)	https://aix.software.ibm.com/aix/ef…	no	CVE-2024-0914	5.9
04/06/2024	05/06/2024	AIX is vulnerable to denial of service due to ISC BIND	https://aix.software.ibm.com/aix/ef…	no	CVE-2023-4408 CVE-2023-50387 CVE-2023-50868 CVE-2023-5517 CVE-2023-5679 CVE-2023-6516	7.5 7.5 7.5 7.5 7.5 7.5

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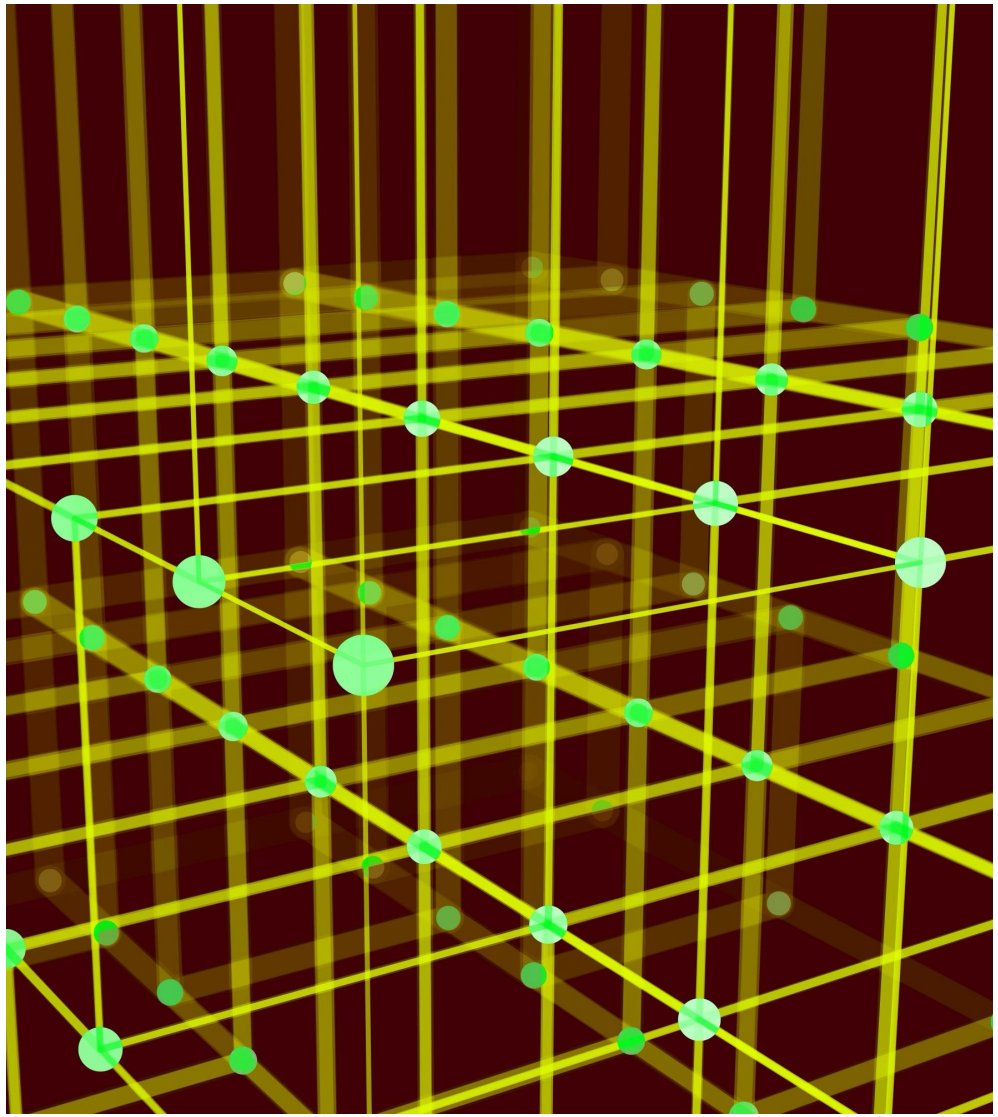

Practice

and a lot of theory

emgr_check_ifixes in Ansible

```yaml
---
- name: Show available fixes
  hosts: all
  gather_facts: true
  become: true

  tasks:
    - name: Ensure wget is installed (AIX 7.2)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      vars:
        ansible_python_interpreter: /opt/freeware/libexec/python3.12_32
      when: ansible_facts.distribution_version == "7.2"

    - name: Ensure wget is installed (AIX 7.3)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      when: ansible_facts.distribution_version != "7.2"

    - name: Get FLRTVC information
      ibm.power_aix.flrtvc:
        apar: sec
        check_only: true
      environment:
        PATH: /usr/bin:/opt/freeware/bin
      register: flrtvc

    - name: Output
      ansible.builtin.debug:
        var: flrtvc.meta['0.report']
```


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emgr_install_ifixes in Ansible

```yaml
---
- name: Install available fixes
  hosts: all
  gather_facts: true
  become: true

  tasks:
    - name: Ensure wget is installed (AIX 7.2)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      vars:
        ansible_python_interpreter: /opt/freeware/libexec/python3.12_32
      when: ansible_facts.distribution_version == "7.2"

    - name: Ensure wget is installed (AIX 7.3)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      when: ansible_facts.distribution_version != "7.2"

    - name: Install security fixes
      ibm.power_aix.flrtvc:
        apar: sec
        force: true
      environment:
        PATH: /usr/bin:/opt/freeware/bin
      register: flrtvc

    - name: Show installed fixes
      ansible.builtin.debug:
        var: flrtvc.meta['5.install']

    - name: Reboot server
      ibm.power_aix.reboot:
        reboot_timeout: 600
      when: "'REBOOT REQUIRED' in ( flrtvc.meta['5.install'] | join )"
```


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Can I do it with NIM? check_ifixes_nim

```yaml
---
- name: Show available fixes
  hosts: all
  gather_facts: true
  become: true

  tasks:
    - name: Ensure wget is installed (AIX 7.2)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      vars:
        ansible_python_interpreter: /opt/freeware/libexec/python3.12_32
      when: ansible_facts.distribution_version == "7.2"

    - name: Ensure wget is installed (AIX 7.3)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      when: ansible_facts.distribution_version != "7.2"

    - name: Get FLRTVC information
      ibm.power_aix.nim_flrtvc:
        targets: ALL
        apar: sec
        check_only: true
      environment:
        PATH: /usr/bin:/usr/sbin:/opt/freeware/bin
      register: flrtvc

    - name: Output
      ansible.builtin.debug:
        var: item.value['0.report']
      loop: "{{ flrtvc.meta | dict2items }}"
      loop_control:
        label: "{{ item.key }}"
      when: item.value['0.report'] is defined
```


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Can I do it with NIM? install_ifixes_nim

```yaml
---
- name: Install available fixes
  hosts: all
  gather_facts: true
  become: true

  tasks:
    - name: Ensure wget is installed (AIX 7.2)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      vars:
        ansible_python_interpreter: /opt/freeware/libexec/python3.12_32
      when: ansible_facts.distribution_version == "7.2"

    - name: Ensure wget is installed (AIX 7.3)
      ansible.builtin.dnf:
        name: wget
        use_backend: dnf4
      when: ansible_facts.distribution_version != "7.2"

    - name: Install security fixes
      ibm.power_aix.nim_flrtvc:
        targets: ALL
        apar: sec
        force: true
      environment:
        PATH: /usr/bin:/usr/sbin:/opt/freeware/bin
      register: flrtvc

    - name: Show installed fixes
      ansible.builtin.debug:
        var: item.value['5.install']
      loop: "{{ flrtvc.meta | dict2items }}"
      loop_control:
        label: "{{ item.key }}"
```


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Am I secure? — what is installed

```
"EPKG NUMBER       LABEL              OPERATION          RESULT          ",
"===========       ==============     =================  ==============  ",
"1                 IJ58140m2a         INSTALL            SUCCESS         ",
"2                 14524ma            INSTALL            SUCCESS         ",
"3                 IJ55897m1a         INSTALL            SUCCESS         ",
"4                 3272897ma          INSTALL            SUCCESS         ",
"",
"Return Status = SUCCESS"
# ls -l /var/adm/ansible/work/*tar
-rw-r--r--    1 root     system      1413120 Jun 10 2025  /var/adm/ansible/work/curl_fix7.tar
-rw-r--r--    1 root     system      1423360 Dec 10 23:02 /var/adm/ansible/work/curl_fix8.tar
-rw-r--r--    1 root     system      1413120 Apr 15 21:02 /var/adm/ansible/work/curl_fix9.tar
-rw-r--r--    1 root     system     25610240 Mar 13 19:01 /var/adm/ansible/work/libxml2_fix10.tar
-rw-r--r--    1 root     system     20490240 May 28 20:02 /var/adm/ansible/work/libxml2_fix11.tar
-rw-r--r--    1 root     system     41943040 Jul 17 2025  /var/adm/ansible/work/libxml2_fix9.tar
-rw-r--r--    1 root     system      8376320 Dec 02 2025  /var/adm/ansible/work/nim_fix2.tar
-rw-r--r--    1 root     system     25159680 Mar 17 2025  /var/adm/ansible/work/openssh_fix18.tar
-rw-r--r--    1 root     system     25159680 Jun 10 2025  /var/adm/ansible/work/openssh_fix19.tar
-rw-r--r--    1 root     system     13690880 Jan 06 21:02 /var/adm/ansible/work/openssh_fix20.tar
-rw-r--r--    1 root     system     13670400 May 28 20:01 /var/adm/ansible/work/openssh_fix21.tar
-rw-r--r--    1 root     system     34304000 Dec 10 23:02 /var/adm/ansible/work/openssl_fix45.tar
-rw-r--r--    1 root     system     30341120 Mar 09 20:02 /var/adm/ansible/work/openssl_fix46.tar
-rw-r--r--    1 root     system     30361600 May 04 21:01 /var/adm/ansible/work/openssl_fix47.tar
-rw-r--r--    1 root     system    191477760 Jun 26 2025  /var/adm/ansible/work/perl_fix10.tar
-rw-r--r--    1 root     system    291276800 Sep 16 2025  /var/adm/ansible/work/perl_fix11.tar
-rw-r--r--    1 root     system    191508480 Feb 05 22:02 /var/adm/ansible/work/perl_fix12.tar
-rw-r--r--    1 root     system    191508480 Mar 17 21:02 /var/adm/ansible/work/perl_fix13.tar
-rw-r--r--    1 root     system    259563520 May 20 2025  /var/adm/ansible/work/python_fix15.tar
-rw-r--r--    1 root     system    258344960 Aug 20 2025  /var/adm/ansible/work/python_fix16.tar
-rw-r--r--    1 root     system    258324480 Nov 19 2025  /var/adm/ansible/work/python_fix17.tar
-rw-r--r--    1 root     system    164956160 Mar 17 21:02 /var/adm/ansible/work/python_fix18.tar
-rw-r--r--    1 root     system    164904960 Apr 15 21:01 /var/adm/ansible/work/python_fix19.tar
```


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Am I secure? — what FLRTVC says

```
"EPKG NUMBER       LABEL           OPERATION          RESULT       ",
"============     ==============  =================  ==============",
"1                 IJ58140m2a      INSTALL            SUCCESS      ",
"2                 14524ma         INSTALL            SUCCESS      ",
"3                 IJ55897m1a      INSTALL            SUCCESS      ",
"4                 3272897ma       INSTALL            SUCCESS      ",
"",
"Return Status = SUCCESS"
```


```
    "flrtvc.meta['0.report']": [
        "Fileset|Current Version|Type|EFix Installed|Abstract|Unsafe Versions|APARs|Bulletin URL|Download URL|CVSS Base Score|Reboot Required|Last Update|Fixed In",
        "openssh.base.client|9.7.3013.1000|sec||NOT FIXED - AIX is vulnerable to potential code execution (CVE-2025-61984 CVE-2025-61985) due to OpenSSH|9.2.112.0-9.7.3013.1000|35414ma / 61985sa / CVE-2025-61984 / CVE-2025-61985|https://aix.software.ibm.com/aix/efixes/security/openssh_advisory20.asc|https://aix.software.ibm.com/aix/efixes/security/openssh_fix20.tar|CVE-2025-61984:3.6 CVE-2025-61985:3.6|NO|01/06/2026|See Bulletin",
        "openssh.base.client|9.7.3013.1000|sec||NOT FIXED - Multiple vulnerabilities in OpenSSH affect AIX|9.2.112.0-9.7.3013.1000|35414ma / CVE-2026-35385 / CVE-2026-35386 / CVE-2026-35387 / CVE-2026-35388 / CVE-2026-35414|https://aix.software.ibm.com/aix/efixes/security/openssh_advisory21.asc|https://aix.software.ibm.com/aix/efixes/security/openssh_fix21.tar|CVE-2026-35385:8.1 CVE-2026-35386:8.1 CVE-2026-35387:6.5 CVE-2026-35388:2.5 CVE-2026-35414:8.1|NO|05/28/2026|See Bulletin",
        "openssh.base.server|9.7.3013.1000|sec||NOT FIXED - AIX is vulnerable to potential code execution (CVE-2025-61984 CVE-2025-61985) due to OpenSSH|9.2.112.0-9.7.3013.1000|35414ma / 61985sa / CVE-2025-61984 / CVE-2025-61985|https://aix.software.ibm.com/aix/efixes/security/openssh_advisory20.asc|https://aix.software.ibm.com/aix/efixes/security/openssh_fix20.tar|CVE-2025-61984:3.6 CVE-2025-61985:3.6|NO|01/06/2026|See Bulletin",
        "openssh.base.server|9.7.3013.1000|sec||NOT FIXED - Multiple vulnerabilities in OpenSSH affect AIX|9.2.112.0-9.7.3013.1000|35414ma / CVE-2026-35385 / CVE-2026-35386 / CVE-2026-35387 / CVE-2026-35388 / CVE-2026-35414|https://aix.software.ibm.com/aix/efixes/security/openssh_advisory21.asc|https://aix.software.ibm.com/aix/efixes/security/openssh_fix21.tar|CVE-2026-35385:8.1 CVE-2026-35386:8.1 CVE-2026-35387:6.5 CVE-2026-35388:2.5 CVE-2026-35414:8.1|NO|05/28/2026|See Bulletin",
        "openssl.base|3.0.15.1001|sec||NOT FIXED - AIX is vulnerable to an out-of-bounds read (CVE-2025-9230 CVE-2025-9232) due to OpenSSL|3.0.0.0-3.0.16.1000|301610sa / 301610mc / 301610mb / CVE-2025-9230 / CVE-2025-9232|https://aix.software.ibm.com/aix/efixes/security/openssl_advisory45.asc|https://aix.software.ibm.com/aix/efixes/security/openssl_fix45.tar|CVE-2025-9230:7.5 CVE-2025-9232:5.9|NO|12/10/2025|See Bulletin",
        "openssl.base|3.0.15.1001|sec||NOT FIXED - Multiple vulnerabilities impact AIX due to OpenSSL|3.0.0.0-3.0.16.1000|301610mc / 301610mb / CVE-2025-15467 / CVE-2025-68160 / CVE-2025-69418 / CVE-2025-69419 / CVE-2025-69420 / CVE-2025-69421 / CVE-2026-22795 / CVE-2026-22796|https://aix.software.ibm.com/aix/efixes/security/openssl_advisory46.asc|https://aix.software.ibm.com/aix/efixes/security/openssl_fix46.tar|CVE-2025-15467:9.8 CVE-2025-68160:4.7 CVE-2025-69418:4 CVE-2025-69419:7.4 CVE-2025-69420:7.5 CVE-2025-69421:7.5 CVE-2026-22795:5.5 CVE-2026-22796:5.3|NO|03/09/2026|See Bulletin",
        "openssl.base|3.0.15.1001|sec||NOT FIXED - Multiple vulnerabilities impact AIX due to OpenSSL|3.0.0.0-3.0.16.1000|301610mc / CVE-2026-28387 / CVE-2026-28388 / CVE-2026-28389 / CVE-2026-28390 / CVE-2026-31789 / CVE-2026-31790|https://aix.software.ibm.com/aix/efixes/security/openssl_advisory47.asc|https://aix.software.ibm.com/aix/efixes/security/openssl_fix47.tar|CVE-2026-28387:8.1 CVE-2026-28388:7.5 CVE-2026-28389:7.5 CVE-2026-28390:7.5 CVE-2026-31789:9.8 CVE-2026-31790:7.5|NO|05/04/2026|See Bulletin",
        "perl.rte|5.38.2.1|sec||NOT FIXED - AIX is vulnerable to denial of service and possible code execution due to Perl (CVE-2024-8176 CVE-2024-56406)|5.38.0.0-5.38.2.2|CVE-2024-56406 / CVE-2024-8176|https://aix.software.ibm.com/aix/efixes/security/perl_advisory10.asc|https://aix.software.ibm.com/aix/efixes/security/perl_fix10.tar|CVE-2024-56406:8.6 CVE-2024-8176:7.5|NO|06/26/2025|See Bulletin",
        "perl.rte|5.38.2.1|sec||NOT FIXED - AIX/VIOS is vulnerable to a race condition in directory handling due to Perl (CVE-2025-40909)|5.38.0.0-5.38.2.2|CVE-2025-40909|https://aix.software.ibm.com/aix/efixes/security/perl_advisory11.asc|https://aix.software.ibm.com/aix/efixes/security/perl_fix11.tar|CVE-2025-40909:5.9|NO|09/16/2025|See Bulletin",
        "perl.rte|5.38.2.1|sec||NOT FIXED - AIX is vulnerable to denial of service and possible code execution due to Perl (WS-2025-0004)|5.38.0.0-5.38.2.3|WS-2025-0004|https://aix.software.ibm.com/aix/efixes/security/perl_advisory12.asc|https://aix.software.ibm.com/aix/efixes/security/perl_fix12.tar|WS-2025-0004:7.5|NO|02/05/2026|See Bulletin",
        "perl.rte|5.38.2.1|sec||NOT FIXED - AIX Perl is vulnerable to a null pointer dereference (CVE-2026-24515) and an integer overflow (CVE-2026-25210)|5.38.0.0-5.38.2.4|CVE-2026-24515 / CVE-2026-25210|https://aix.software.ibm.com/aix/efixes/security/perl_advisory13.asc|https://aix.software.ibm.com/aix/efixes/security/perl_fix13.tar|CVE-2026-24515:2.5 CVE-2026-25210:6.9|NO|03/17/2026|See Bulletin",
        "python3.11.base|3.11.10.0|sec||NOT FIXED - AIX is affected by a denial of service (CVE-2024-8176) due to Python|3.11.0.0-3.11.10.0|CVE-2024-8176|https://aix.software.ibm.com/aix/efixes/security/python_advisory15.asc|https://aix.software.ibm.com/aix/efixes/security/python_fix15.tar|CVE-2024-8176:7.5|NO|05/20/2025|See Bulletin",
        "python3.11.base|3.11.10.0|sec||NOT FIXED - AIX/VIOS is affected by arbitrary code execution (CVE-2025-47273 CVE-2025-4330 CVE-2024-12718 CVE-2025-4138 CVE-2025-4517) due to Python|3.11.0.0-3.11.10.1|CVE-2024-12718 / CVE-2025-4138 / CVE-2025-4330 / CVE-2025-4517 / CVE-2025-47273|https://aix.software.ibm.com/aix/efixes/security/python_advisory16
```


ENFENCE

Am I secure? — when installs fail

```
        "",
        "EPKG NUMBER       LABEL              OPERATION          RESULT          ",
        "===========       ==============     =================  ==============  ",
        "1                 IJ50424s7a         INSTALL            FAILURE         ",
        "2                 IJ50428s1a         INSTALL            SUCCESS         ",
        "3                 IJ50432s3a         INSTALL            FAILURE         ",
        "4                 IJ50433s4a         INSTALL            FAILURE         ",
        "5                 IJ50508s1a         INSTALL            FAILURE         ",
        "",
        "Return Status: FAILURE"
    ]
}

PLAY RECAP *********************************************************************************************
nim                        : ok=4    changed=1    unreachable=0    failed=0    skipped=1    rescu
ed=0    ignored=0
```


ENFENCE

Other options? ibm.power_aix.emgr

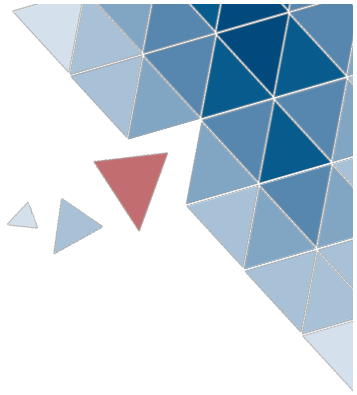
```yaml
---
- name: Install epkg
  hosts: all
  gather_facts: false
  become: true

  tasks:
    - name: Install security fix
      ibm.power_aix.emgr:
        action: install
        ifix_package: /tmp/301610mc.260424.epkg.Z
        from_epkg: true
        extend_fs: true
      register: emgr

    - name: Show result
      ansible.builtin.debug:
        var: emgr
```


ENFENCE

Can I do it better?



Repository with fixes?

Information about OS-versions?

Analyze security advisories?

Check signatures?

Automatically download fixes?

ENFENCE

Repository with all fixes for my systems? Part 1.

```yaml
---
- name: Create AIX fixes repository
  hosts: nim
  gather_facts: false

  tasks:
    - name: Check prereqs
      ansible.builtin.include_tasks: prereqs.yml

    - name: Create filesystem
      ansible.builtin.include_tasks: fixes_fs.yml

    - name: Analyze our clients and download fixes
      ibm.power_aix.nim_flrtvc:
        targets: ALL
        apar: sec
        download_only: true
        extend_fs: true
        path: /nim/fixes
      register: flrtvc

    - name: Build fixes list
      ansible.builtin.include_tasks: get_fix_info.yml
      loop: "{{ flrtvc.meta | dict2items }}"
      loop_control:
        label: "{{ report.key }}"
        loop_var: report
      when: report.value['0.report'] is defined
```


ENFENCE

Repository with all fixes for my systems? Part 2.

```
- name: Check that fixes are downloaded
  ansible.builtin.stat:
    path: "/nim/fixes/work/{{ item }}"
  register: fix_exist
  loop: "{{ fixes }}"

- name: Stop if some fix is not found
  ansible.builtin.fail:
    msg: "{{ item.item }} was not found"
  when: not item.stat.exists
  loop: "{{ fix_exist.results }}"

- name: Unpack fixes
  ansible.builtin.command:
    cmd: "tar xf /nim/fixes/work/{{ item }}"
    chdir: /nim/fixes
  loop: "{{ fixes }}"

- name: Find directories
  ansible.builtin.find:
    paths: /nim/fixes
    file_type: directory
    recurse: false
  register: fix_dirs
```


ENFENCE

Repository with all fixes for my systems? Part 3.

You can find IBM public key in /etc/security/certificates/AIX_PSIRT_pubkey.txt since AIX 7.2 TL5 SP3.
Thanks to Sascha Korzen (OEDIV) for the tip.

```
    - name: Set correct permissions on directories
      ansible.builtin.file:
        path: "{{ item.path }}"
        mode: "0755"
        owner: root
        group: system
      loop: "{{ fix_dirs.files }}"
      loop_control:
        label: "{{ item.path }}"

    - name: Find advisories
      ansible.builtin.find:
        paths: /nim/fixes
        file_type: file
        recurse: true
        depth: 2
        patterns: Advisory.asc
      register: advisories

    - name: Check signature on advisories
      ansible.builtin.command:
        cmd: "openssl dgst -sha256 -verify /etc/security/certificates/AIX_PSIRT_pubkey.txt -signatur
e {{ item.path }}.sig {{ item.path }}"
      changed_when: false
      loop: "{{ advisories.files }}"
      loop_control:
        label: "{{ item.path }}"
```


ENFENCE

Repository with all fixes for my systems? Part 4.

```
    - name: Find fixes
      ansible.builtin.find:
        paths: /nim/fixes
        file_type: file
        recurse: true
        depth: 2
        patterns: '*.epkg.Z'
      register: epkg

    - name: Check signature on fixes
      ansible.builtin.command:
        cmd: "openssl dgst -sha256 -verify /etc/security/certificates/AIX_PSIRT_pubkey.txt -signatur
e {{ item.path }}.sig {{ item.path }}"
      changed_when: false
      loop: "{{ epkg.files }}"
      loop_control:
        label: "{{ item.path }}"
```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Repository with all fixes for my systems? Part 5.

```
- name: Analyze fixes
  ansible.builtin.include_tasks: fix_analyze.yml
  loop: "{{ epkg.files }}"
  loop_control:
    label: "{{ item.path }}"

- name: Save information about all fixes
  ansible.builtin.copy:
    content: "{{ epkgs | to_nice_json }}"
    dest: /nim/fixes/fixes.json
    owner: root
    group: system
    mode: "0644"
```


ENFENCE

Repository with all fixes for my systems? Appendix A. get_fix_info.yml

```
---
- name: Get available fixes
  ansible.builtin.set_fact:
    fixes: "{{ fixes | d([]) + [ item | regex_search('https://aix.software.ibm.com/aix/efixes/sec
urity/([A-Za-z0-9_]+.tar)', '\\1') ] }}"
  loop: "{{ report.value['0.report'] }}"

- name: Remove duplicates and nulls
  ansible.builtin.set_fact:
    fixes: "{{ fixes | flatten | unique | select() | sort }}"
```


ENFENCE

Repository with all fixes for my systems? Appendix B. fix_analyze.yml

```yaml
---
- name: Get efix information
  ansible.builtin.command:
    cmd: "emgr -d -v3 -e {{ item.path }}"
  changed_when: false
  register: efix_info

- name: Parse information
  ansible.utils.cli_parse:
    text: "{{ efix_info.stdout }}"
    parser:
      name: ansible.netcommon.native
      template_path: epkg_template.yml
    set_fact: epkg_info

- name: Get data
  ansible.builtin.set_fact:
    epkg_data: "{{ epkg_info.data }}"
  when: epkg_info.data is defined

- name: Add path information into data
  ansible.builtin.set_fact:
    epkg_data: "{{ epkg_data | combine( { 'path': item.path } ) }}"
  when: epkg_data is defined

- name: Add epkg information
  ansible.builtin.set_fact:
    epkgs: "{{ epkgs | d([]) + [ epkg_data ] }}"
  when: epkg_data is defined
```


ENFENCE

Repository with all fixes for my systems? Appendix C. epkg_template.yml

```
---
- example: 'LABEL:            IJ55968mAa'
  getval: 'LABEL: +(?P<label>[A-Za-z0-9]+)'
  result:
    data:
      label: "{{ label }}"
  shared: true

- example: 'bos.sysmgt.nim.client 7.2.5.202 7.2.5.204'
  getval: '(?P<fileset>[A-Za-z0-9_.]+) (?P<minver>[0-9.]+) (?P<maxver>[0-9.]+)'
  result:
    data:
      "{{ fileset }}":
        fileset: "{{ fileset }}"
        minver: "{{ minver }}"
        maxver: "{{ maxver }}"
```


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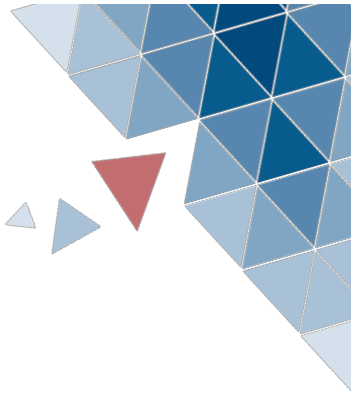
OK, I have my repository. How do I install the fixes?



EASY!
Mount the NFS share and run emgr!

ENFENCE

Installation of fixes. Part 1.

```yaml
---
- name: Install fixes on AIX
  hosts: all
  gather_facts: false
  vars:
    reboot_reqd: false

  tasks:
    - name: Get LPP information
      ibm.power_aix.lpp_facts:

    - name: Create temporary directory
      ansible.builtin.tempfile:
        path: /tmp
        prefix: emgr.
        state: directory
      register: emgr_mnt_dir

    - name: Mount fixes repo
      ibm.power_aix.mount:
        state: mount
        node: nim
        mount_dir: /nim/fixes
        mount_over_dir: "{{ emgr_mnt_dir.path }}"

    - name: Read fixes information
      ansible.builtin.slurp:
        src: "{{ emgr_mnt_dir.path }}/fixes.json"
      register: fixes_json

    - name: Set variables
      ansible.builtin.set_fact:
        fixes: "{{ fixes_json.content | b64decode | from_json }}"
```


ENFENCE

Installation of fixes. Part 2.

```
- name: Find installable fixes
  ansible.builtin.include_tasks: check_fix.yml
  loop: "{{ fixes }}"
  loop_control:
    label: "{{ fix.label }}"
    loop_var: fix

- name: Simplify list of fixes to install
  ansible.builtin.set_fact:
    install_list: "{{ install_list | sort(attribute='path') }}"

- name: Show fixes to install
  ansible.builtin.debug:
    var: install_list

- name: Install fix
  ansible.builtin.include_tasks: install_emgr.yml
  loop: "{{ install_list }}"
  loop_control:
    label: "{{ item.path }}"

- name: Unmount fixes repo
  ansible.posix.mount:
    state: unmounted
    path: "{{ emgr_mnt_dir.path }}"
    fstab: /dev/null

- name: Remove temporary directory
  ansible.builtin.file:
    path: "{{ emgr_mnt_dir.path }}"
    state: absent

- name: Reboot system
  ibm.power_aix.reboot:
    reboot_timeout: 600
  when: reboot_reqd
```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Installation of fixes. Appendix A. check_fix.yml

```yaml
---
- name: Get list of filesets to patch
  ansible.builtin.set_fact:
    filesets: "{{ fix.keys() | list | difference( [ 'label', 'path' ] ) }}"

- name: Add fix to the list to be installed
  ansible.builtin.include_tasks: check_fileset.yml
  loop: "{{ filesets }}"
  loop_control:
    loop_var: fileset
  when: fileset in ansible_facts.filesets
```


ENFENCE

Installation of fixes. Appendix B. check_fileset.yml

```
---
- name: Get current installed fileset version
  ansible.builtin.set_fact:
    curver: "{{ ansible_facts.filesets[fileset].levels.keys() | first }}"

- name: Add fixes to installation list
  ansible.builtin.set_fact:
    install_list: "{{ install_list | d([]) + [ { 'path': fix.path | regex_replace('/nim/fixes', e
mgr_mnt_dir.path), 'fileset': fileset } ] }}"
  when: |
    curver is version(fix[fileset].maxver, '<=') and
    curver is version(fix[fileset].minver, '>=')
```


ENFENCE

Installation of fixes. Appendix C. install_emgr.yml

```yaml
---
- name: Install security fix (1st attempt)
  ibm.power_aix.emgr:
    action: install
    ifix_package: "{{ item.path }}"
    from_epkg: true
    extend_fs: true
  failed_when: false
  register: emgr1

- name: Check if the fileset is locked
  ansible.builtin.shell:
    cmd: "/usr/sbin/emgr -P | grep ^{{ item.fileset }}"
  changed_when: false
  failed_when: false
  register: check_result
  when: |
    "'return code 1' in emgr1.msg and
     'is locked by efix' in emgr1.stderr"

- name: Remove installed fixes if needed
  ibm.power_aix.emgr:
    action: remove
    ifix_label: "{{ label | split | last }}"
  loop: "{{ check_result.stdout_lines }}"
  loop_control:
    loop_var: label
  when:
    - "'return code 1' in emgr1.msg and 'is locked by efix' in emgr1.stderr"
    - check_result.rc == 0

- name: Install security fix (2nd attempt)
  ibm.power_aix.emgr:
    action: install
    ifix_package: "{{ item.path }}"
    from_epkg: true
    extend_fs: true
  register: emgr2
  when: "'return code 1' in emgr1.msg and 'is locked by efix' in emgr1.stderr"

- name: Check if reboot required
  ansible.builtin.set_fact:
    reboot_reqd: true
  when: |
    (emgr1.reboot_required is defined and emgr1.reboot_required) or
    (emgr2.reboot_required is defined and emgr2.reboot_required)
```


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Done?

No 😢

We are missing:

- Additional components like OpenSSH and OpenSSL
- RPMs
- Service Packs and TLs Updates
- AIX Upgrade

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Done!

See my posts 🤗

https://blog.power-devops.com/p/upgrade-aix-72-to-73-with-ansible
https://blog.power-devops.com/p/update-aix-with-ansible
https://blog.power-devops.com/p/update-aix-with-ansible-part-2
https://blog.power-devops.com/p/update-aix-with-ansible-part-3a
https://blog.power-devops.com/p/update-aix-with-ansible-part-3b
https://blog.power-devops.com/p/update-aix-with-ansible-part-3c
https://blog.power-devops.com/p/update-aix-with-ansible-part-3d
https://blog.power-devops.com/p/update-aix-with-ansible-part-4

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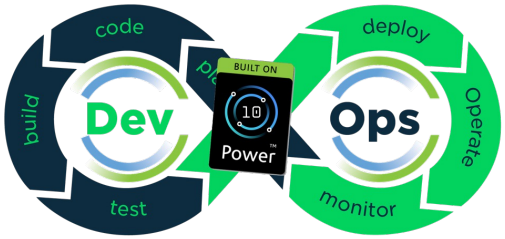
About me



- Andrey Klyachkin
- IBM Champion on IBM Power
- IBM AIX Community Advocate
- IBM Certified Advanced Technical Expert, Red Hat Certified Engineer
- Author of different IBM AIX and IBM Power certifications
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eNFence portfolio

- IBM Power and AIX Managed Services
- IT Automation and DevOps
- Security Audits and Hardening
- Private, Public and Hybrid Clouds
- Porting Software to IBM Power (IBM AIX, Linux on IBM Power)

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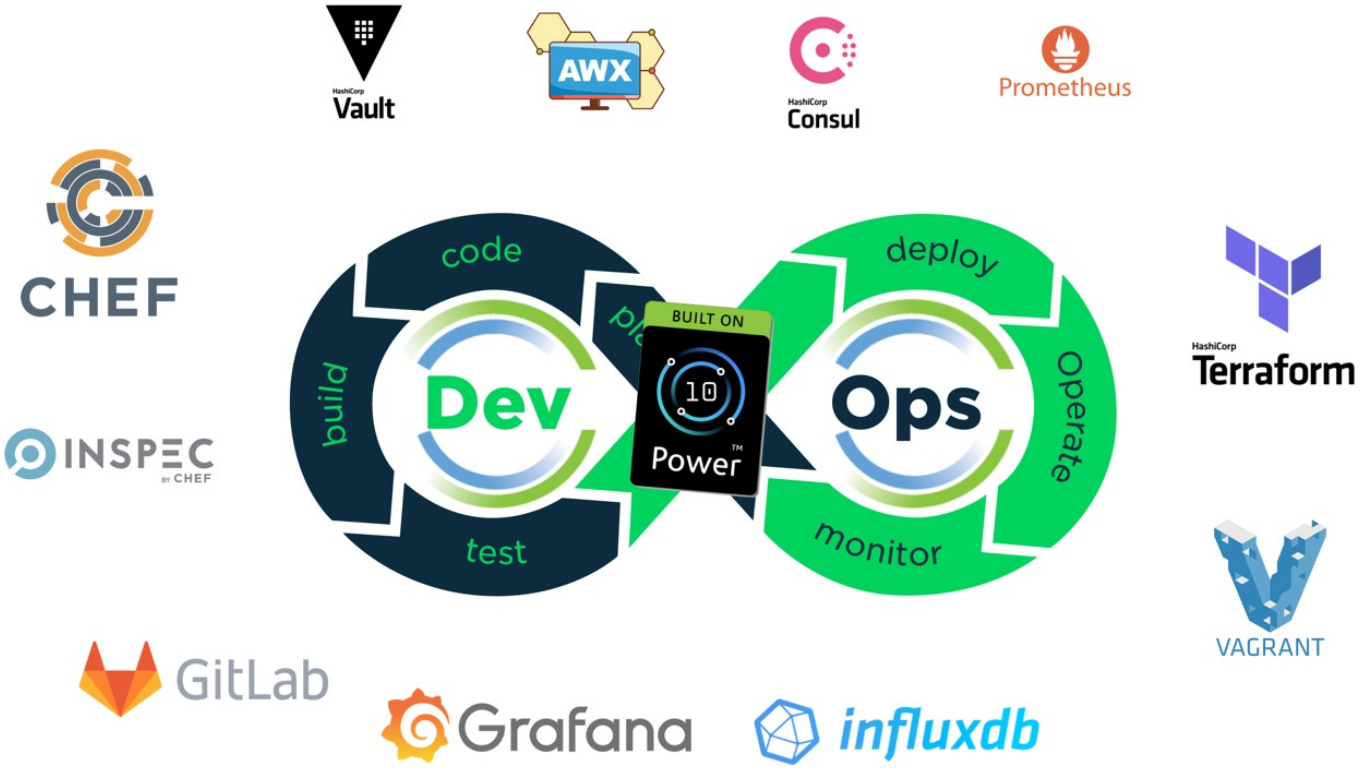

ENFENCE

IBM HTTPS Site with Security Fixes

man emgr_check_ifixes
Checks the availability of security interim fixes for the current operating system level.

```
# oslevel -s
7300-02-01-2346
# emgr_check_ifixes
Gathering system information
+-------------------------------------------------------------------------------+
p0.mtm=9040-MR9
p0.fw=VM950_145
p0.parnm=is3197
p0.os=aix
p0.aix=7300-02-01-2346
+-------------------------------------------------------------------------------+
Checking interim fixes on the system ...
+-------------------------------------------------------------------------------+
There is no efix data on this system.

Searching for AIX security fixes ...
+-------------------------------------------------------------------------------+
ERROR: HTTP connection failed. Data cannot be extracted
ERROR: failed to download CRL, http status log in  /tmp/ifix/crl.der
```


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IBM HTTPS Site with Security Fixes

man emgr_download_ifix
Downloads individual security patches and interim fixes.

NB: APAR IJ49379:
https://www.ibm.com/support/pages/apar/IJ49379
Fixed in AIX 7.3 TL2 SP2, AIX 7.2 TL5 SP8.

```
# oslevel -s
7300-02-01-2346
# emgr_download_ifix -L https://aix.software.ibm.com/aix/efixes/security/bind_fix26.tar
ssl connection failed, logs saved in  /tmp/ifix_22020366/ssl_connection_software.log
# grep error /tmp/ifix_22020366/ssl_connection_software.log
verify error:num=19:self-signed certificate in certificate chain
00000001:error:0A000086:SSL routines:tls_post_process_server_certificate:certificate verify failed:ssl/statem/statem_clnt.c:1890:
Verification error: self-signed certificate in certificate chain
```

```
# lslpp -w /var/ssl_aix/certs/DigiCert_Global_Root_CA.crt
  File                                        Fileset              Type
  ----------------------------------------------------------------------------
  /var/ssl_aix/certs/DigiCert_Global_Root_CA.crt
                                             bos.rte.install       File
# cp /var/ssl/certs/DigiCert_Global_Root_G2.crt /var/ssl_aix/certs/
# ln -s /var/ssl_aix/certs/DigiCert_Global_Root_G2.crt /var/ssl_aix/certs/607986c7.0
# emgr_download_ifix -L https://aix.software.ibm.com/aix/efixes/security/bind_fix26.tar
HTTP connection error. Data cannot be extract
error downloading CRL, http status log in  /tmp/ifix_14680380/crl.der
```


ENFENCE

IBM HTTPS Site with Security Fixes

wget or curl just works...

```
# wget https://aix.software.ibm.com/aix/efixes/security/bind_fix26.tar
--2024-06-08 15:02:08--  https://aix.software.ibm.com/aix/efixes/security/bind_fix26.tar
Resolving aix.software.ibm.com... 170.225.126.13
Connecting to aix.software.ibm.com|170.225.126.13|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 409989120 (391M) [application/x-tar]
Saving to: 'bind_fix26.tar'

bind_fix26.tar                      100%[=================================================================>] 391.00M   275KB/s    in 24m 25s

2024-06-08 15:26:33 (273 KB/s) - 'bind_fix26.tar' saved [409989120/409989120]
```


ENFENCE

Security Fixes: Installation

man emgr_sec_patch

the emgr_sec_patch command extracts the .tar file, identifies the applicable interim fixes for the current operating system level and installs the individual security interim fixes.

```
# emgr_sec_patch bind_fix26.tar
Downloaded Tar file name is: /tmp/fix/bind_fix26.tar
+-------------------------------------------------------------+
Verifying contents of /tmp/fix/bind_fix26.tar
+-------------------------------------------------------------+
+-------------------------------------------------------------+
Verifying integrity of Advisory.asc
+-------------------------------------------------------------+
Advisory.asc integrity verification passed
ERROR: 71bind.rte is not found in the tar file
```

IBM packed the fix another way!

ENFENCE

Security Fixes: Installation

I have many more fixes to test 😅

```
# emgr_sec_patch invscout_fix6.tar
Downloaded Tar file name is: /tmp/fix/invscout_fix6.tar
+-----------------------------------------------------------------------------+
Verifying contents of /tmp/fix/invscout_fix6.tar
+-----------------------------------------------------------------------------+
+-----------------------------------------------------------------------------+
Verifying integrity of Advisory.asc
+-----------------------------------------------------------------------------+
Advisory.asc integrity verification passed
+-----------------------------------------------------------------------------+
Checking System Level Prerequisites
+-----------------------------------------------------------------------------+
calling emgr -p -e /tmp/emgr_14680436/invscout_fix6/is22026s1a.240514.epkg.Z
Found the ifix /tmp/emgr_14680436/invscout_fix6/is22026s1a.240514.epkg.Z for the
+-----------------------------------------------------------------------------+
Verying signature of ifix
+-----------------------------------------------------------------------------+
ifix: /tmp/emgr_14680436/invscout_fix6/is22026s1a.240514.epkg.Z
Signature file found
Certificate found
Verified OK
Signature verification passed for /tmp/emgr_14680436/invscout_fix6/is22026s1a.24
Installing ifix /tmp/emgr_14680436/invscout_fix6/is22026s1a.240514.epkg.Z ...
+-----------------------------------------------------------------------------+
```


ENFENCE

Bonus: What is wrong with bind_fix26.tar?

This is not emgr.Z, but BFF!

```
# tar xvf bind_fix26.tar
x bind_fix26/71bind916.tar, 128491520 bytes, 250960 tape blocks
x bind_fix26/71bind916.tar.sig, 256 bytes, 1 tape blocks
x bind_fix26/72bind916.tar, 140738560 bytes, 274880 tape blocks
x bind_fix26/72bind916.tar.sig, 256 bytes, 1 tape blocks
x bind_fix26/73bind916.tar, 140738560 bytes, 274880 tape blocks
x bind_fix26/73bind916.tar.sig, 256 bytes, 1 tape blocks
x bind_fix26/Advisory.asc, 12424 bytes, 25 tape blocks
x bind_fix26/Advisory.asc.sig, 256 bytes, 1 tape blocks
```

```
# cd bind_fix26
# tar xvf 73bind916.tar
x 73bind916/73bind.rte, 140729344 bytes, 274862 tape blocks
```

```
# cd 73bind916
# installp -Ld 73bind.rte
bind.rte:bind.rte:7.3.916.4800::I:T:::::N:BIND Domain Name System::::0::
```


ENFENCE

Can I install the same fix twice?

No! Return Code == 0!

```
# emgr_sec_patch invscout_fix6.tar
Downloaded Tar file name is: /tmp/fix/invscout_fix6.tar
+-------------------------------------------------------------------------------+
Verifying contents of /tmp/fix/invscout_fix6.tar
+-------------------------------------------------------------------------------+
+-------------------------------------------------------------------------------+
Verifying integrity of Advisory.asc
+-------------------------------------------------------------------------------+
Advisory.asc integrity verification passed
/tmp/emgr_19071308/invscout_fix6/is22026s1a.240514.epkg.Z is already installed
# echo $?
0
```


ENFENCE

What happens if there is nothing to patch?

Nothing! Return Code == 0!

```
# emgr_sec_patch invscout_fix6.tar
Downloaded Tar file name is: /tmp/fix/invscout_fix6.tar
+-------------------------------------------------------------------------------+
Verifying contents of /tmp/fix/invscout_fix6.tar
+-------------------------------------------------------------------------------+
+-------------------------------------------------------------------------------+
Verifying integrity of Advisory.asc
+-------------------------------------------------------------------------------+
Advisory.asc integrity verification passed
+-------------------------------------------------------------------------------+
Checking System Level Prerequisites
+-------------------------------------------------------------------------------+
calling emgr -p -e /tmp/emgr_15532396/invscout_fix6/is22026s1a.240514.epkg.Z
Skipping ifix
See /var/adm/ras/emgr.log for more details
# echo $?
0
```


ENFENCE

Older patches?

Failed! Return Code == 1!

```
# emgr_sec_patch sendmail_fix3.tar
Downloaded Tar file name is: /tmp/fix/sendmail_fix3.tar
+-------------------------------------------------------------------------------+
Verifying contents of /tmp/fix/sendmail_fix3.tar
+-------------------------------------------------------------------------------+
+-------------------------------------------------------------------------------+
Verifying integrity of Advisory.asc
+-------------------------------------------------------------------------------+
00000001:error:02000068:rsa routines:ossl_rsa_verify:bad signature:crypto/rsa/rsa_sign.c:430:
00000001:error:1C880004:Provider routines:rsa_verify:RSA lib:providers/implementations/signature/rsa_sig.c:774:
ERROR: /tmp/emgr_15270376/sendmail_fix3/Advisory.asc integrity verification failed
# echo $?
1
```


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Use-cases from practice, which I did not test.

An older version of the fix is already installed. Will it be automatically uninstalled?

Two almost identical fixes – one for AIX and one for VIOS, with the same Dependencies section. Which fix will be installed?

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