

# Automating Oracle and AIX Installation with Ansible Tools

Presented by:

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# Objectives of today's Webinar

- Introduction to Ansible
- Using Ansible to manage AIX
- Using Ansible to manage Oracle on AIX
- Resources to help you use Ansible!
- Questions and Answers

# What is Ansible ?

Ansible delivers simple IT automation that ends repetitive tasks—including cloud provisioning, configuration management, application deployment and much more

**SIMPLE TO USE**—it's an "agentless" technology; no daemons or other complexity needed on compute nodes

**Vibrant open source technology with commercial options from Red Hat**

## Example: Install and run a NGINX web server

```
1 ---
2 - name: Install nginx _____ Playbook
3   hosts: host.name.ip
4   become: true
5
6   tasks:
7     - name: Add epel-release repo _____ Task
8       yum: _____ Module
9         name: epel-release
10        state: present
11
12    - name: Install nginx
13      yum:
14        name: nginx
15        state: present
16
17    - name: Insert Index Page
18      template:
19        src: index.html
20        dest: /usr/share/nginx/html/index.html
21
22    - name: Start NGiNX
23      service:
24        name: nginx
25        state: started
26
27
```



Provisioning



Configuration Management



Application Deployment



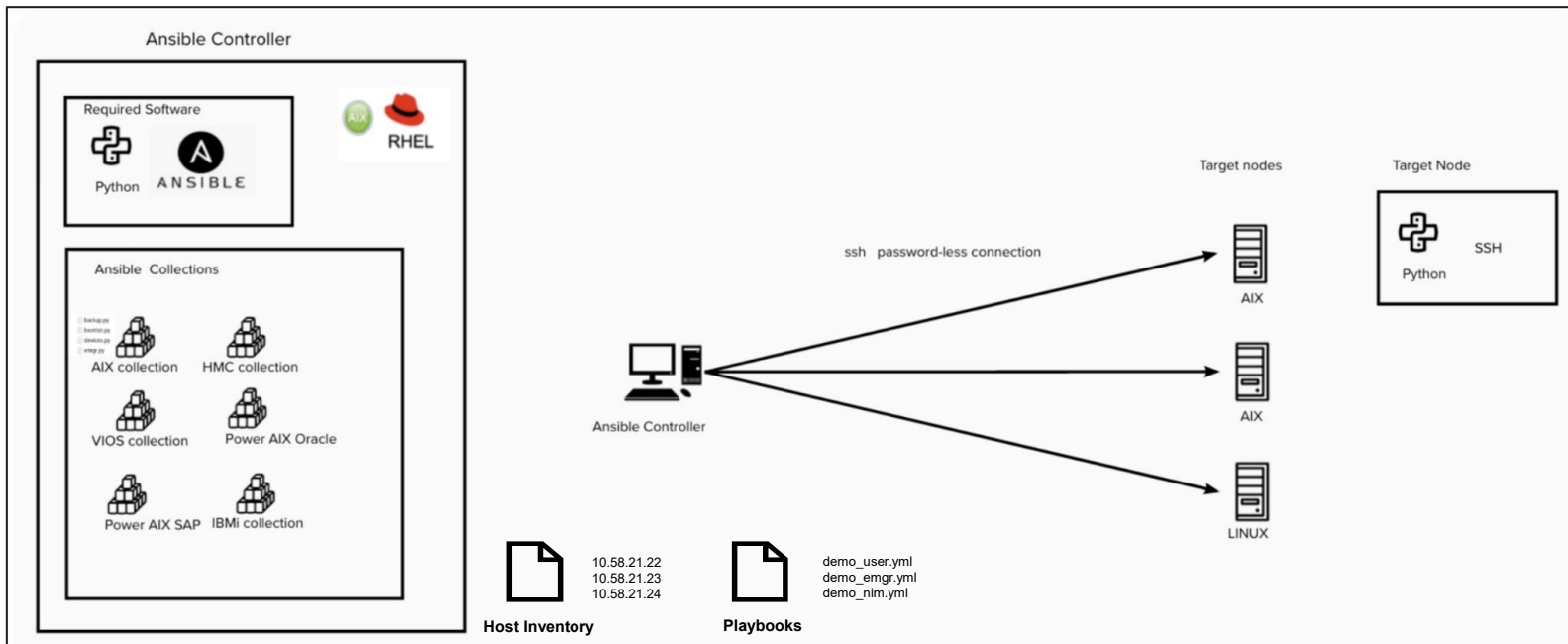
Continuous Delivery



Orchestration



Security Automation



# Ansible Terminology

**Controller node:** Any machine that has Ansible installed and is used to run the playbooks.

**Managed nodes** (Endpoints) : Endpoint devices that are managed with Ansible (Eg: AIX, IBM i, Linux etc).

**Inventory:** List of managed nodes so that Ansible understands the overall IT landscape.

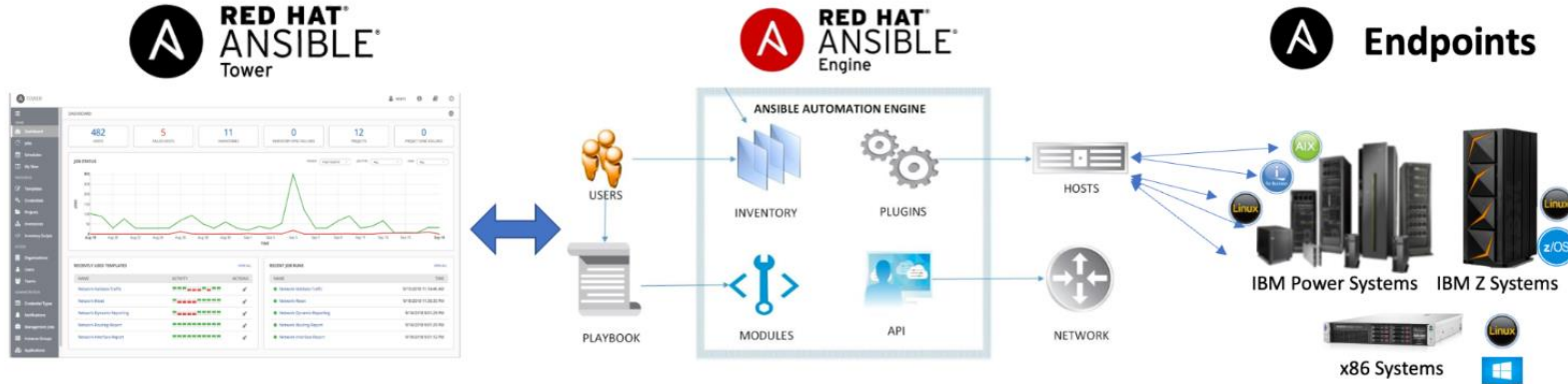
**Modules:** Code script that Ansible executes, thousands of playbooks available for immediate use.

**Tasks:** Unit of action in Ansible (Invoke a set of modules to do something useful).

**Playbooks:** Ordered list of tasks, written in YAML.



# Ansible Automation Platform 1.x for IBM Power Systems



## 1 Red Hat Ansible Tower

- Enterprise-wide graphical control of Ansible estate
- Runs on Linux

## 2 Red Hat Ansible Engine

- Enterprise-wide control – i.e., runs playbooks
- Runs on Linux

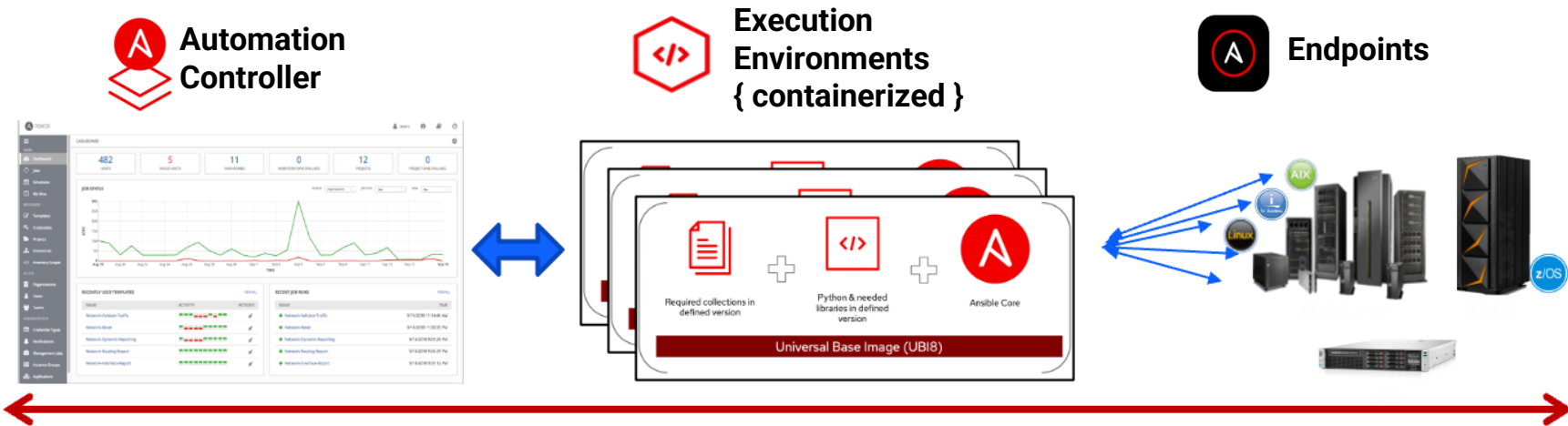
## 3 Red Hat Ansible Endpoints

- Enterprise-wide automation; modules are executed here



**Official Enterprise support ends after September 2023**  
Community support will continue

# Ansible Automation Platform 2.x for IBM Power Systems



## 1 Ansible Automation Controller

- Enterprise-wide graphical management of multi-platform Ansible estate



**Supported on**  
x86 Linux

## 2 Ansible Execution Environments

- Execution plane for automation.
- Contains Ansible core, Python and Collections - All Containerized



**Supported on**  
x86 Linux  
(requires podman container runtime)

## 3 Ansible Endpoints

- Enterprise-wide automation; modules are executed here



**commercial support**  
available from Red Hat

**Introduced in 4Q2021**



# Ansible Content for IBM Power systems

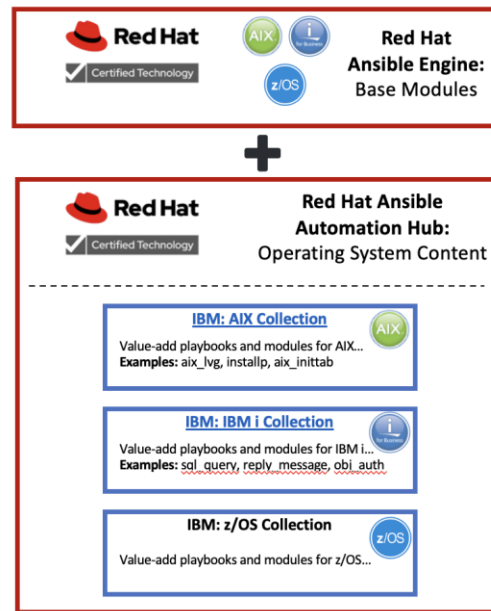
Collections are the standard way to extend and complement base Ansible content—**and now AIX and IBM i content is available**—in both community and commercial form.

## COMMUNITY ENABLED: NO CERTIFICATION

Collections are distributed via [Ansible Galaxy](#) and are provided with community-level support (i.e., no paid enterprise support subscriptions from Red Hat)

## ENTERPRISE READY: CERTIFIED CONTENT FROM RED HAT

Collections can additionally be [certified](#) by Red Hat + 3<sup>rd</sup> parties by certifying them and putting them in [Red Hat Ansible Automation Hub](#) made available via Red Hat subscriptions



# Ansible and AIX

Through a collection of Ansible modules, administrators can perform common AIX tasks across multiple AIX endpoints without needing to logging into individual instances directly.

Enables administrators to accomplish common tasks without deep AIX skills.

All modules are openly available in Ansible Galaxy for free community consumption:  
[https://galaxy.ansible.com/ibm/power\\_aix](https://galaxy.ansible.com/ibm/power_aix)

All modules are also available in Red Hat Ansible Automation Hub for customers that want enterprise support from Red Hat

## Enabled Use Cases:

- Initial Install of AIX.
- AIX patching (i-fixes, service packs).
- AIX updates (TLs, AIX version upgrades).
- User and group management.
- Filesystems management.
- File level operations (create, update, edit, search, etc.).
- AIX open source package installation and update via yum or pip for Python.
- AIX configuration file management (for performance tunables, etc.).
- Boot management, including inittab details.
- Ad-hoc commands for very specific AIX admin tasks.
- Create Ansible playbooks to run a workflow with multiple actions performed via available modules.

# Managing AIX at scale with Ansible Automation

The screenshot shows the Ansible Galaxy repository page for the 'power\_aix' collection. At the top, it displays the IBM logo and the collection name 'power\_aix'. Below this, it states 'Ansible Content for IBM Power Systems - AIX provides a collection of content used to manage and deploy Power Systems AIX.' The page includes a 'Details' tab, a 'Read Me' button, and a 'Content' button. The 'Info' section shows the installation command: `$ ansible-galaxy collection install ibm.power_aix`. It also notes that installing collections with ansible-galaxy is only supported in ansible 2.9+ and provides a 'Download tarball' link. The 'Install Version' is 1.5.1, released 2 months ago. The 'Tags' section includes 'infrastructure', 'ibm', 'power', and 'aix'. The 'Content Score' section shows a community score of 4.3 / 5, based on 4 surveys. The surveys include: Quality of docs? (4/5), Ease of use? (4/5), Does what it promises? (Y/N), Works without change? (Y/N), and Ready for production? (Y/N).

Over 160,000 downloads of the AIX module collection and growing.

60+ weeks of IBM's Expert Lab Services engagements with over 25 Clients.

- Collections are also available in Red Hat Automation Hub with full Red Hat and IBM Support
- [IBM i](#), [HMC](#) and [VIOS](#) Ansible collections are also available
- IBM has also made Ansible roles available for [Oracle](#), [Oracle RAC](#), and [SAP](#) on AIX
- The Galaxy collection includes [demo playbooks](#)

# AIX Collection Categories

## Fix Management

- iFIX management
- Service Update Management Assistant (SUMA)
- Fix Level Recommendation Tool (FLRT)
- Generic Installation tools (geninstall)
- Individual Installation and updates of software

## Filesystem Management

- Volume Group management
- Logical Volume management
- Backup for Volume Groups and Logical Volumes
- Filesystem Management
- Alternate rootvg disk management
- Backup of Volume

## Inventory

- Logical Volume Manager information
- Filesystem or updates information
- Logical Partition information
- Multipath I/O device information
- Filesystem Management
- **Improvements in LPAR attribute, LLP, and fix information inventory collection**

## Network Installation Manager (NIM)

- NIM operations (server setup, install packages, update SP or TL, service boots).
- NIM backups of LPAR and VIO Clients
- NIM for Fix Level Recommendation Tool (FLRT)
- NIM for SUMA.
- **Automated AIX migration using NIM**
- **Alternate Disk Migration (NIMADM)**
- **NIM resource manager**

## VIOS Management via NIM

- Update a single or a pair VIOS servers.
- Backup root volume group
- Create/Clean an alternate rootvg
- Check if a pair of VIOS can be updated.
- Upgrade the VIOS software

## Miscellaneous

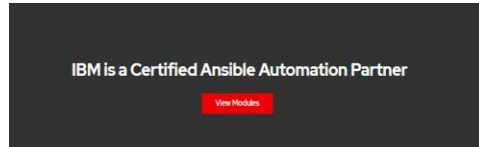
- Devices Management
- System Management (reboot, boot list, smtctl)
- User Management
- Group Management
- Networking Management
- **Automation of kernel tuning parameters**

\* Recent Updates in Bold Blue

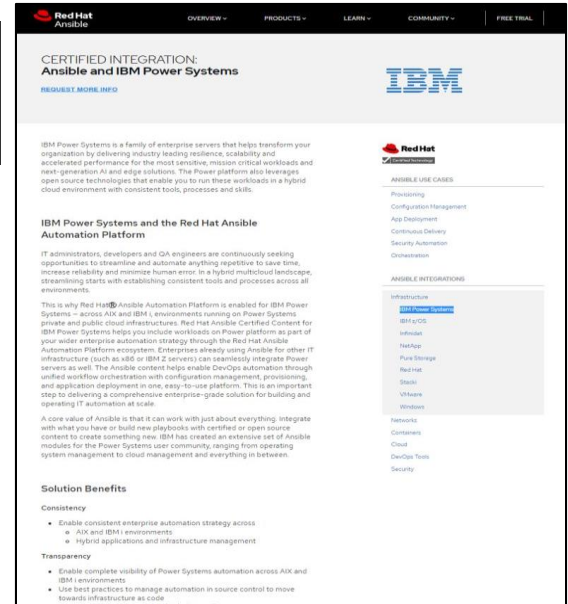
# Ansible Automation Platform Integrates with IBM Power

IBM Power has been added to the Certified Integrations section of the Red Hat Ansible website

<https://www.ansible.com/integrations/infrastructure/ibm-power-systems>



Ansible Collections for IBM Power	
<a href="#">AIX Collection</a>	Certified and Community
<a href="#">HMC Collection</a>	Certified and Community
<a href="#">IBM I Collection</a>	Certified and Community
<a href="#">VIOS Collection</a>	Certified and Community
<a href="#">Oracle SI AIX Collection</a>	Community only
<a href="#">Oracle RAC AIX Collection</a>	Community only
<a href="#">PowerODBA AIX Collection</a>	Community only
<a href="#">OpenStack Collection</a> (for PowerVC) <a href="#">[Link to article with examples]</a>	Community only
<a href="#">IBM Cloud Collection</a> (for Power Virtual Server)	Community only
Linux on Power Collection [Content Identical to x86]	Certified and Community
PowerHA Collection [Coming Soon]	N/A
SAP HANA on Power Collection [Coming Soon]	N/A



# Oracle on AIX Ansible Collections

# Ansible: Automating Oracle tasks on AIX

## Where we were:

- **Published a collection** that installs Single Instance Oracle 19c on AIX JFS2 and on Oracle ASM.
- **See:**  
[https://galaxy.ansible.com/ibm/power\\_aix\\_oracle](https://galaxy.ansible.com/ibm/power_aix_oracle)
- **Published a new collection** that installs Oracle 19c RAC on ASM.
  - Allows user choice of how many nodes to create.
  - Contains checks that look for potential problems before the collection is implemented
- **See:**  
[https://galaxy.ansible.com/ibm/power\\_aix\\_oracle\\_rac\\_asm](https://galaxy.ansible.com/ibm/power_aix_oracle_rac_asm)

## Where are we now:

- **For Single Instance collection**, added support for AIX 7.3 and AAP v2.
- **For RAC collection**, added support for AIX 7.3 and AAP v2.
- Both collections are tested on PowerVS as well.
- **Published the PowerODBA collection which** automates many Database administrative tasks on AIX. Originally developed by Oravirt for Linux Operating systems
  - **See:**  
[https://galaxy.ansible.com/ibm/power\\_aix\\_oracle\\_dba](https://galaxy.ansible.com/ibm/power_aix_oracle_dba)

## Where are we going:

- **For Single Instance** - adding support for downloading binaries from various resources (nfs)
- **For RAC** - staging Oracle database home on JFS2 instead of ACFS
- **For PowerODBA** - adding support to upgrade multiple databases on a single LPAR.



# Automate: Oracle Database Installation on AIX

- Oracle Single Instance & RAC Installation 19c
- Makes use of the following AIX collections

Modules	Roles
ibm.power_aix.filesystem	ibm.power_aix.power_aix_bootstrap
ibm.power_aix.lvg	
ibm.power_aix.mount	
ibm.power_aix.devices	
ibm.power_aix.reboot	

Reference: <https://ibm.github.io/ansible-power-aix/index.html>

- Open-source code available in GitHub
  - <https://github.com/IBM/power-aix-oracle-rac-asm>
  - <https://github.com/IBM/ansible-power-aix-oracle>
- Available in Ansible Galaxy
  - [https://galaxy.ansible.com/ibm/power\\_aix\\_oracle](https://galaxy.ansible.com/ibm/power_aix_oracle)
  - [https://galaxy.ansible.com/ibm/power\\_aix\\_oracle\\_rac\\_asm](https://galaxy.ansible.com/ibm/power_aix_oracle_rac_asm)



# Ansible: 19c RAC Installation

## Automate Oracle RAC Implementation on AIX

- Ansible® Oracle® RAC ASM collection installs Oracle RAC 19c on AIX® operating System running IBM® Power® Systems servers.
- Tested on 1, 2, 3, 4, 5, 7 and 8 nodes clusters.

## Key value propositions

### Automate for speed and consistency

Setting up an Oracle Application Clusters (RAC) on AIX involves setting up an AIX environment on the hosts that meet the RAC's specific requirements from kernel tunables, network attributes, shared disk attributes, passwordless to user equivalent ssh connections etc. The manual process to accomplish these tasks is tedious and error prone. During the Grid and Database install, the GUI frequently prompts for entering input that ties up the user for a long time.

### Save time with infrastructure automation

The whole installation can take two days for seasoned users. With the help of Ansible Oracle RAC ASM collection, it takes typically 5 hours to complete a 4-node RAC installation, a tremendous time saving. It's completely hands-free and can consistently recreate Oracle RAC for other projects. The value of this collection helps your organization to improve significant productivity.

## This playbook contains four roles

**bootstrap** – sets up the basic environment to enable full functionality of Ansible and passwordless connections to the RAC nodes.

**preconfig** – sets up basic environment such as time of day, configure for accessing Internet and consistent AIX version, release, TL, and SP. NFS mounts AIX filesets and installs the filesets.

**config** – sets up AIX to meet the requirements for installing a RAC.

**Install** – creates ASM disk groups, ACFS, prepares for installing Grid and database and finally install them. Moving to staging binaries in JFS2 in upcoming releases.

# Automate: Oracle Database Management on AIX

- The Power Oracle Database Automation (PowerODBA) Collection modules support common management activities required for Oracle Database use.
- They are based on the Oravirt collection and have been modified and tested to work with AIX.
  - Added 3 new roles to provide the capability to upgrade Single Instance DB installations
  - Credit to that project
    - Reference: <https://github.com/oravirt/ansible-oracle>
- PowerODBA provides 36 roles which can be used to administer Oracle Database, major aspects include: Patching, Single instance GI & Database upgrades along with other administration tasks explained in subsequent slides.
  - Added Oracle Database Upgrade capabilities expanding on from Oravirt
- Open-source code available in GitHub
  - <https://github.com/IBM/ansible-power-aix-oracle-dba>
- Available in Ansible Galaxy
  - [https://galaxy.ansible.com/ibm/power\\_aix\\_oracle\\_dba](https://galaxy.ansible.com/ibm/power_aix_oracle_dba)

# PowerODBA: Automate Oracle Management on AIX

## Install maintain

### 1. Database creation:

Creates and drops databases on Single instance as well as RAC. Multitenant architecture is also supported.

### 2. ASM management:

Prepares OS disks for ASM diskgroups.  
Drops ASM diskgroups/disks.

### 3. ACFS:

Creates/Drops ACFS mounts.

### 4. Patching:

Applies/Rollbacks Release update patches. Supports Standalone database NOT part of GI, RAC & Single Instance GI. [Added shared home patching on ACFS](#)

### 5. User/Role management:

Creates/drops users & roles.

### 6. Privilege management:

Grants and revokes privileges to/from users/roles

## Modify

### 7. Pluggable database management:

Creates/drops/unplugs a PDB.

### 8. Tablespace management: Creates/Drops:

tablespaces, support for bigfile tablespaces as well.

### 9. Executes arbitrary sql scripts:

Executes single/multiple SQL scripts & queries.

### 10. Database directories:

Creates/drops database directories.

### 11. AWR management:

Manages AWR retention policy.

### 12. DBMS jobs:

Does the following

Creates/drops DBMS jobs.

Creates/drops job schedules.

Creates/drops Job classes.

Creates/drops job windows.

## Manage

### 13. Creates/Drops:

Resource consumer groups

### 14. Initialization parameters:

Sets/unsets initialization parameters for RAC & Non-RAC

### 15. Redo log management:

Drops/Creates redo logs.

### 16. Statistics Management:

Sets/Removed preferences.

### 17. Facts:

Gathers facts about the databases/RAC services.

## Added Upgrade capability

### 1. Single Instance Grid

Upgrades Single Instance Grid Infrastructure from 12c R1 & R2 to 19c with RU on multiple LPARS.

### 2. Single Instance Database

Upgrades Single Instance Database from 12c R1 & R2 to 19c with RU on multiple LPARS.

# Automate: Oracle Patch Management

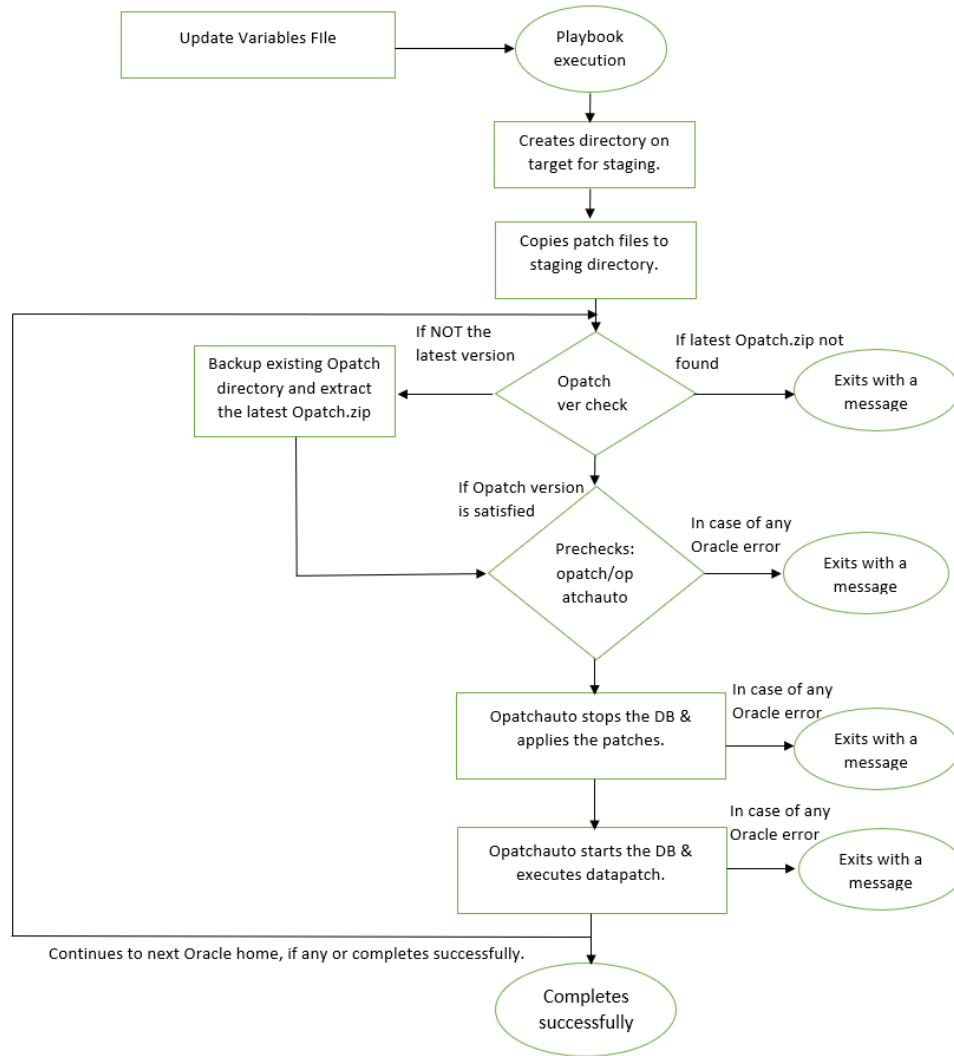
## ODBA Patching Capabilities

Applying Release Update & one-off patches on Oracle grid infrastructure & Oracle database homes. Both Single Instance and RAC

Following scenarios can be achieved:

- I. Patch standalone Grid Infrastructure.
- II. Patch Grid Infrastructure (RAC).
- III. Patch standalone Oracle database homes.
- IV. Patch RAC database homes. (with ACFS & with JFS2)
- V. Patch multiple Oracle database homes on the same LPAR.
- VI. Apply one-off patches using opatch.

# Ansible Automation Workflow for DB Home Release Update (RU) Patching.



Place the latest opatch.zip file in the controller location/or correct the name in the variables file and rerun the playbook.

Fix the error and rerun the playbook.

Fix the error and rerun the playbook.

Fix the error and rerun the playbook.

# Automate: Oracle Patch Management - Demo

In this demo, we've used 5 Oracle homes installed on an LPAR all on 19.3 version.

- Single Instance Grid Infrastructure
- 4 Database homes with 1 database each.

**Grid:**

/u01/grid19c	19.3	→	19.14
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**Database:**

/u01/19.3.0.0/19c_ansible	19.3	→	19.14
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/u01/db19c	19.3	→	19.14
------------	------	---	-------

/u02/base/db19c	19.3	→	19.14
-----------------	------	---	-------

/u02/base/homedb19c	19.3	→	19.14
---------------------	------	---	-------

This is a scenario that may be encountered when installing multiple homes from Oracle base media.

The Oracle homes can also be at different patch levels.

If one of the updates encounters an error, the remaining tasks are terminated, and can resume later

# Automate: Oracle Patch Management - Demo

This video can be viewed with voice over at 34:00 minutes into the live recording of the session at:  
[https://ibm.biz/Automating\\_Oracle\\_and\\_AIX\\_with\\_Ansible](https://ibm.biz/Automating_Oracle_and_AIX_with_Ansible)

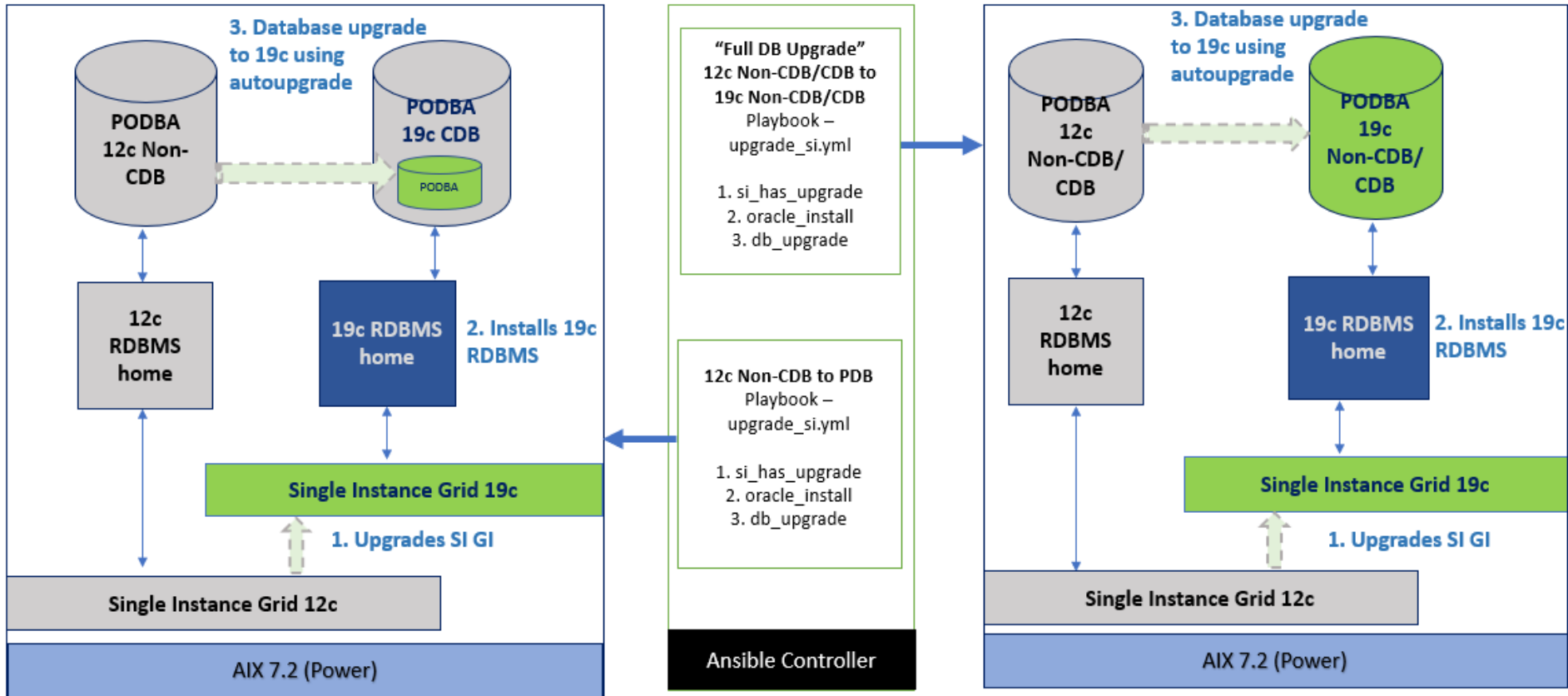
Shiva Laveti (IBM)

# Automate: Upgrade 12c (R1 and R2) to 19c on AIX

- On AIX ODBA uniquely provides following upgrade capabilities
  - 12c Single Instance Grid Infrastructure and databases to 19c version.
- The following Ansible roles are used when upgrading:
  - `si_has_upgrade`: Upgrades Single Instance 12c Grid to 19c.
  - `oracle_install`: Installs 19c Oracle database home with release update patch
  - `db_upgrade`: Upgrades the database using `autoupgrade.jar` utility.
- Full Database upgrades supported:
  - 12c Non-CDB to 19c Non-CDB
  - 12c CDB database upgrade to 19c CDB
- 12c Non-container to 19c Pluggable Database upgrade:
  - Existing 12c Non-CDB can be plugged and upgraded into an existing 19c Container Database.



# Automate: Upgrade 12c (R1 and R2) to 19c on AIX



# Supported Version

Ansible Collections for Oracle on Power	Leverages power-aix Collection	Support confirmed with ...				
		AIX 7.2	AIX 7.3	PowerVS	AAP1	AAP2
Oracle DB Single Instance Install	Yes	Yes	Yes	Yes	Yes	Yes
Oracle DB RAC Install	Yes	Yes	Yes	Yes	Yes	Yes
PowerODBA DB Management	Not required	Yes	Yes	Yes	Yes	Yes

- Single instance install  
Open-Source code location in GitHub  
<https://github.com/IBM/ansible-power-aix-oracle>  
Available in Ansible Galaxy  
Ansible Galaxy is Ansible's official hub for sharing Ansible content.  
[https://galaxy.ansible.com/ibm/power\\_aix\\_oracle](https://galaxy.ansible.com/ibm/power_aix_oracle)
- RAC installation  
Open-Source code location in GitHub  
<https://github.com/IBM/power-aix-oracle-rac-asm>  
Available in Ansible Galaxy  
[https://galaxy.ansible.com/ibm/power\\_aix\\_oracle\\_rac\\_asm](https://galaxy.ansible.com/ibm/power_aix_oracle_rac_asm)
- Power ODBA  
Open-Source code location in GitHub  
<https://github.com/IBM/ansible-power-aix-oracle-dba>  
Available in Ansible Galaxy  
[https://galaxy.ansible.com/ibm/power\\_aix\\_oracle\\_dba](https://galaxy.ansible.com/ibm/power_aix_oracle_dba)

# Ansible for IBM Power: Resources

## White Paper – Ansible in Depth:

<https://www.ansible.com/hubfs/pdfs/Ansible-InDepth-WhitePaper.pdf>

## Red Hat Ansible Automation Platform – Power Systems integration:

<https://www.ansible.com/integrations/infrastructure/ibm-power-systems>

## Ansible Galaxy – open source repository of Power modules:

<https://galaxy.ansible.com/search?keywords=ibm%20and%20power>

## Automate AIX and IBM i Admin tasks with Ansible (Red Hat Webinar):

<https://www.ansible.com/resources/webinars-training/automate-aix-and-ibm-i-admin-tasks-with-ansible-content-webinar>

## Red Hat Ansible Automation Platform trial:

<https://www.redhat.com/en/technologies/management/ansible/try-it>

## Ansible documentation:

<https://docs.ansible.com/ansible/latest/index.html>

## Introduction to Ansible for Power (demo video):

<ibm.biz/ansible-power-trailer>

## Using Ansible for AIX (demo video):

<ibm.biz/ansible-aix>

## Using Ansible for IBM i (demo video):

<ibm.biz/ansible-i>

Get started Log in Download & install

TRY

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A single, self-supported 60-day subscription for Red Hat® Ansible® Automation Platform for Red Hat Enterprise Linux®

Access to Red Hat's award-winning Customer Portal, including documentation, helpful videos, discussions, and more

RED HAT ANSIBLE Automation

ansible.com

WHITEPAPER

## ANSIBLE IN DEPTH

*"Ansible is quite fun to use right away. As soon as you write five lines of code it works. With SSH and Ansible I can send commands to 500 servers without having even used the servers before."*

**INTRODUCTION**

Ansible is an open source IT configuration management, deployment, and orchestration tool. It is unique from other management tools in many respects, aiming to provide large productivity gains to a wide variety of automation challenges as a more productive drop-in replacement for many core capabilities in other automation solutions. Furthermore, Ansible seeks to solve major unmet IT challenges such as clear orchestration of complex multi-tier workflows and cleanly unifying OS configuration and application software deployment under a single banner.

Ansible is designed to be minimal in nature, consistent, secure, and highly reliable, with an extremely low learning curve for administrators, developers, and IT managers. Ansible seeks to keep descriptions of IT easy to build, and easy to understand - such that new users can be quickly brought into new IT projects, and longstanding automation content is easily understood even after months of being away from a project. Ansible seeks to make things powerful for expert users, but equally accessible for all skill levels, ensuring a quicker time to market for IT projects and faster, less-error prone burnaround on IT configuration change.

**ARCHITECTURE, AGENTS, AND SECURITY**

One of the primary differentiators between Ansible and many other tools in this space is its architecture. Ansible is an agentless tool that runs in a "push" model - no software is required to be installed on remote machines to make them manageable. Ansible by default manages remote machines over SSH (Linux and UNIX) or WinRM (Windows), using the remote management frameworks that already exist natively on those platforms.

Ansible builds on this by not requiring dedicated users or credentials - it respects the credentials that the user supplies when running Ansible. Similarly, Ansible does not require administrator access, leveraging sudo, su, and other privilege escalation methods on request when necessary.

# Thank you and acknowledgements

- Many thanks to the contributors of the Oracle collections
  - Shiva Latveti
  - Bhargvaram Akula
  - Blake Hilstrom
- Questions on using Oracle with IBM Systems?
  - Email [ibmoracle@us.ibm.com](mailto:ibmoracle@us.ibm.com)



# Backup

# What is Red Hat Automation Hub platform ?

Red Hat's all-inclusive, flagship automation platform

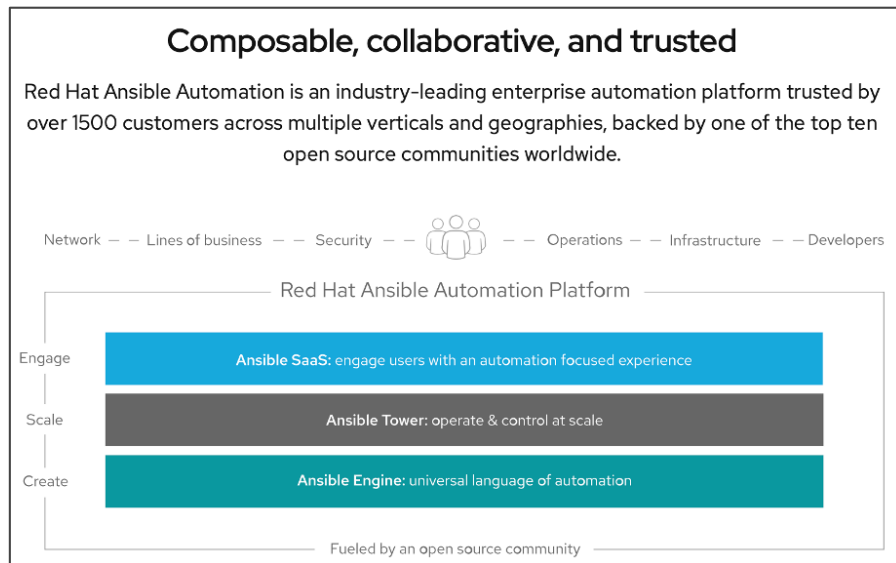
Combination of on-prem products, SaaS technology and ecosystem

## Licensing

Available for subscription purchase from Red Hat

## Technologies and Services Included

1. [Ansible Engine](#)
2. [Ansible Tower](#)
3. [Automation Analytics](#) (SaaS)
4. [Automation Hub](#) (ecosystem)
5. [Security Automation](#)
6. [Network Automation](#)



# Ansible: The Big Picture

