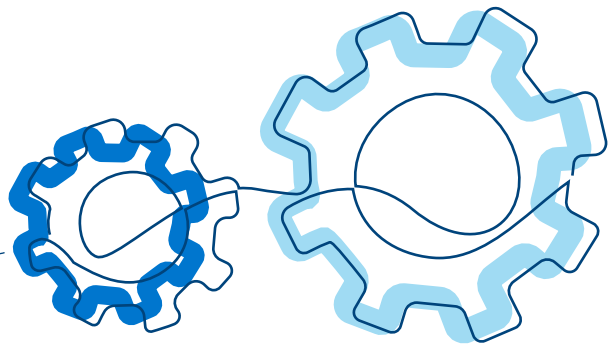


# From Ad-hoc to Operationally Mature

WITH UNSTRUCTURED DATA INFRASTRUCTURE **AS CODE**



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# Growing Need for Automation

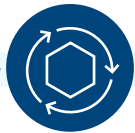


If you look at what is driving automation more so today than ever before:



## Manage Large Scale Operations Across the Hybrid Cloud (without expensive errors)

The sheer scale of IT operations with a rapidly growing digital footprint: number of new applications, the enormous amount of data they are producing and of course the analytical engines to make sense of all that data and generate insights.



## Support DevOps Cycles with Infrastructure as Code

A key driver is the pace at which new applications and services are built and the emergence of DevOps as a completely automated paradigm for continuous application deployment.



## Deliver Cloud-like Self Service Experience

Another key driver is the need for a cloud like self-service for the various users of IT infrastructure and services. Self-service of IT resources can rapidly accelerate time to market for new applications and operational initiatives.

Let's take a deeper look at these >



# IT Operations at Scale

Growing scale of IT operations means a tight collaboration between multiple functions like the teams for application development, build and test, deployment and IT infrastructure teams.

The challenge here is to run operations in a consistent and repeatable way without expensive manual errors that can be catastrophic when they affect business critical services. And when it comes to data and system security, variation in the policies is at the root of potential loop holes that are exploited in cyber attacks. Adopting automation tools is essential for IT Management in making sure governance models and best practices are uniformly implemented across all these dimensions of modern IT operations.



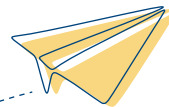
Consistent



Error-free



Secure



## Modern disruptors have mastered scale.

In fact scale has been a key ingredient for disruptive technologies to dominate entire categories. The good thing is the architectural principles and the platforms that enabled these success stories have become mainstream with infrastructure as code platforms. E.g.: 12-factor applications, pub-sub architecture, CI/CD pipelines, Kubernetes for rapid application deployment, Ansible and Puppet for configuration management, etc.

**NETFLIX**

Streaming at scale disrupted media consumption.

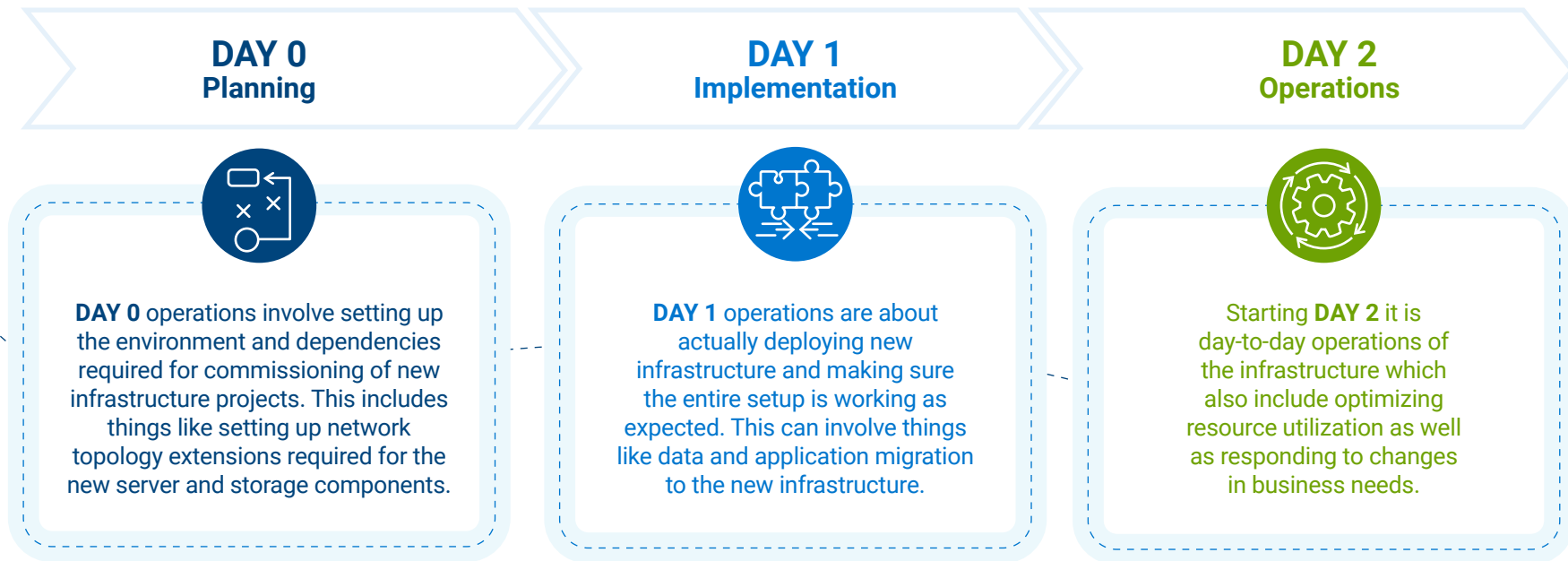
**zoom**

Reliable video at scale helped rapid growth in a crowded marketplace.

**slack**

Collaboration at scale enabled by pub-sub architecture.

When we talk about IT Ops automation there are mainly three stages of infrastructure lifecycle.



Automation platforms like Ansible enable automated workflows throughout the infrastructure lifecycle by driving consistent, secure and most efficient operations.



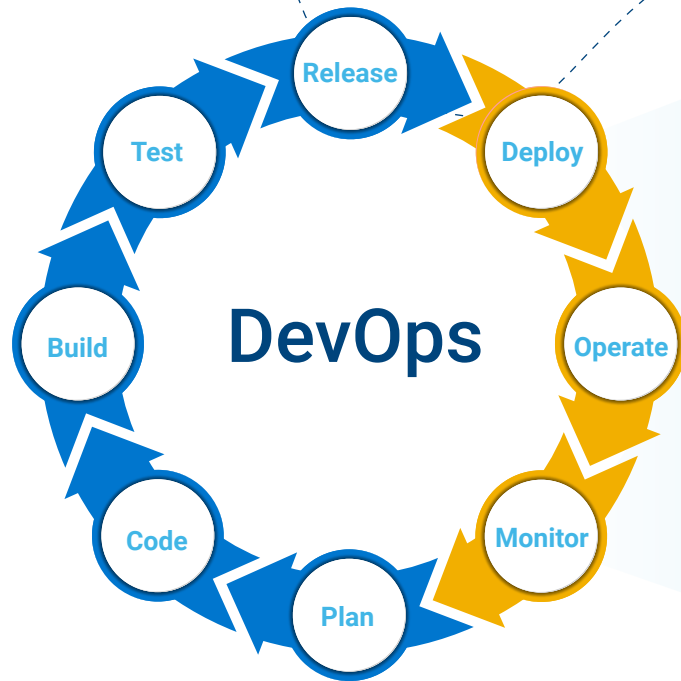
# DevOps Automation

## Continuous Integration | Continuous Deployment.

Today's DevOps processes and tools aim to achieve a model of continuous pipeline of software features. This requires an unbroken chain of processes that seamlessly feed into each other with shared ownership across multiple functions. In recent times the infrastructure provisioning is also coming into the fold of Continuous Deployment pipelines.

### Declarative Infrastructure State

To make this work, infrastructure needs to be available as code, and we are not talking about just a REST API, which is just the starting point for DevOps integration. Today the industry is moving towards a declarative state-based control of the infrastructure that helps to deploy applications with the exact configuration of the infrastructure including the make up of the compute and network environment as well as the storage.



CI/CD orchestration  
requires infrastructure  
as `</code>`

Declarative, state-based  
configuration management  
of infrastructure

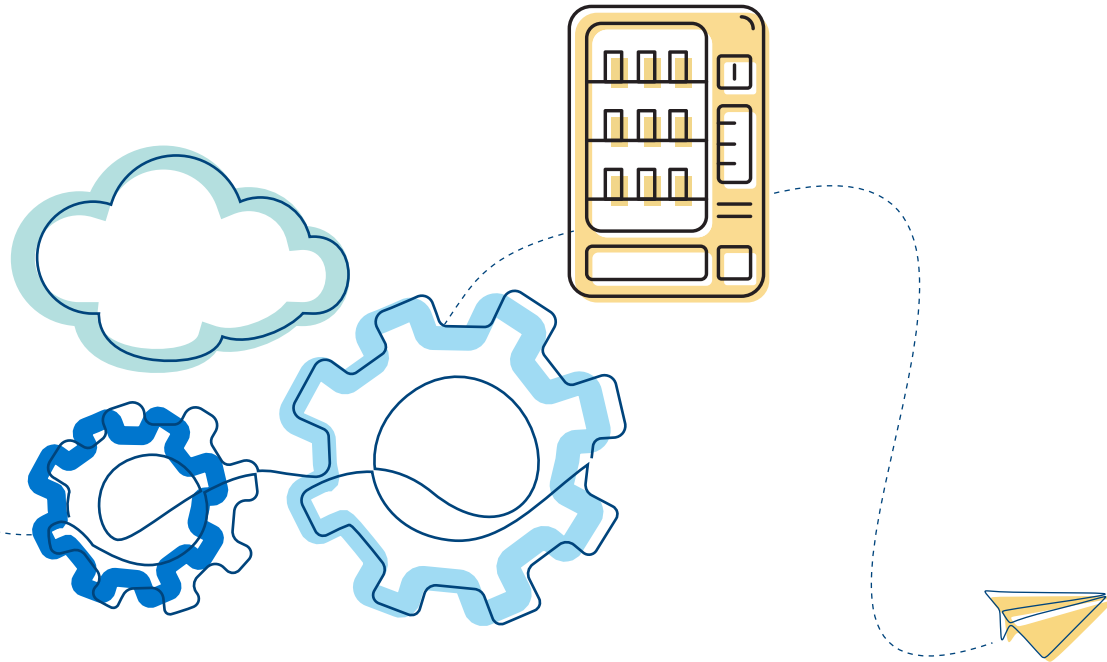


# Self Service / Cloud-like Consumption Model

Self service is increasingly the norm when it comes to consumption of IT infrastructure and is at the core of a flexible and agile hybrid cloud experience.

Today if we look at the IT Operations of leading businesses they have invested heavily to build extensive self service catalogs for application development, analytics services, marketing services and so on.

Thanks to some modern automation platforms by VMware and ServiceNow, such self service catalogs can be built with much ease.

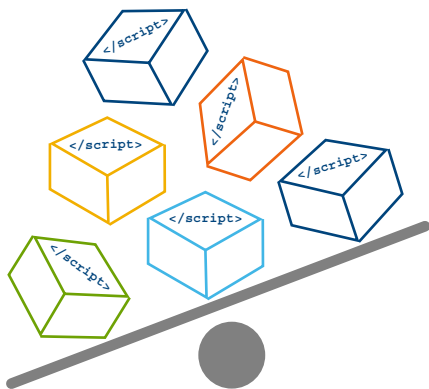


# The Best Part: Automation Has Gotten Much Easier.



## PROCEDURAL SCRIPTING

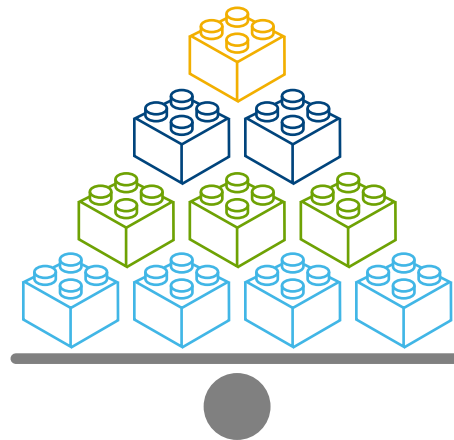
- » Required a lot of skill
- » Time consuming
- » Hard to maintain



Before, automation meant heavy use of low level programming that requires a lot of skill and there are lot of preferences of programming languages among IT professionals that created automation solutions that don't work with each other, they are not scalable. And such automation tools are hard to maintain as well.

## ASSEMBLING PRE-BUILT MODULES

- » Fast to develop
- » Scalable
- » Declarative
- » Easy to maintain



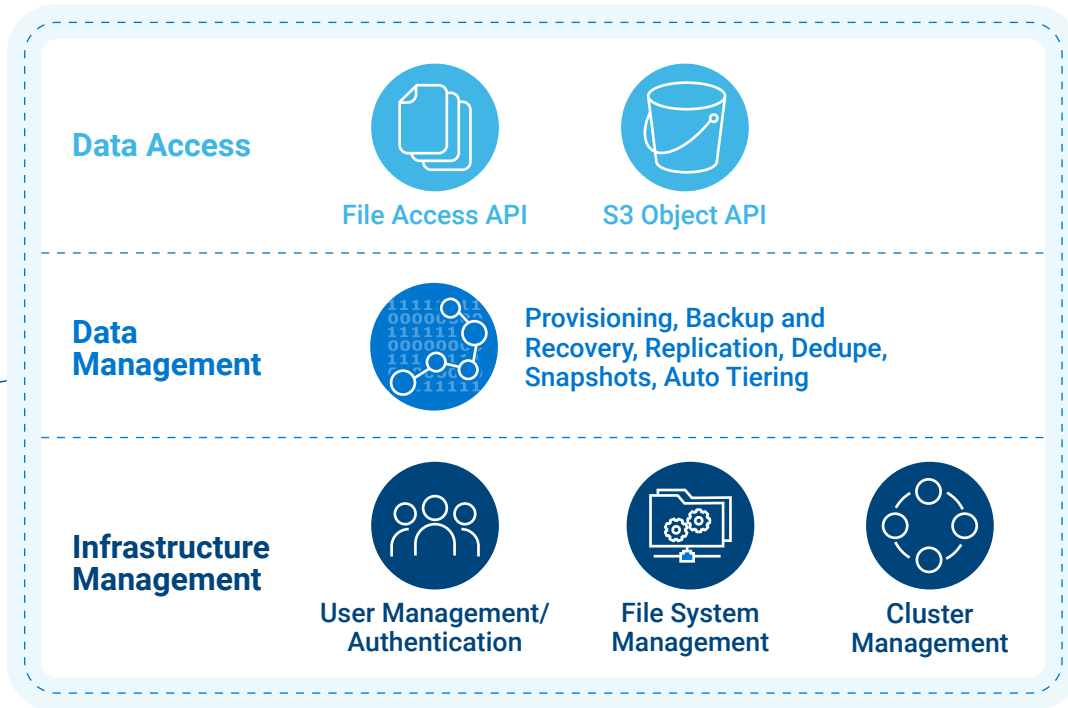
Whereas today's automation platforms require very minimal amount of coding (low-code and no-code platforms) from the end user, thanks to the wide ecosystem support such platforms have garnered, where enterprise software and hardware vendors built integrations into these platforms. Eg.: Ansible, ServiceNow, VMware vRealize Suite, etc.

# Foundation: OneFS REST API

API is at the foundation of the integrations with DevOps and Automation platforms.

API function calls can be made from practically any programming language. PowerScale OneFS API has a very extensive API interface with which users can:

- » Directly access File and Object Data
- » Configure data management and data protection
- » Manage users, file systems and the storage clusters

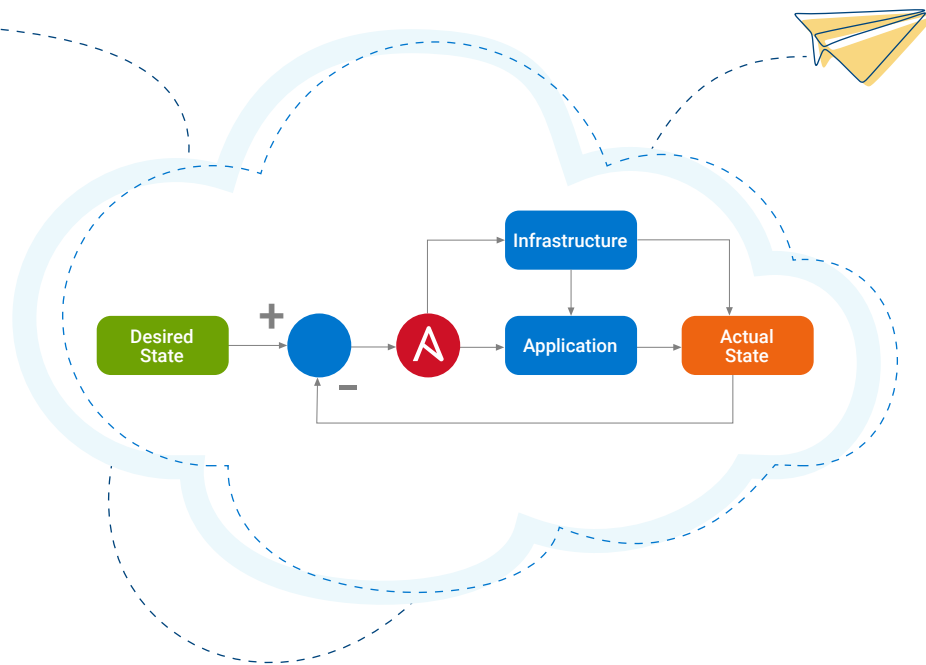


# Configuration Management / Ansible

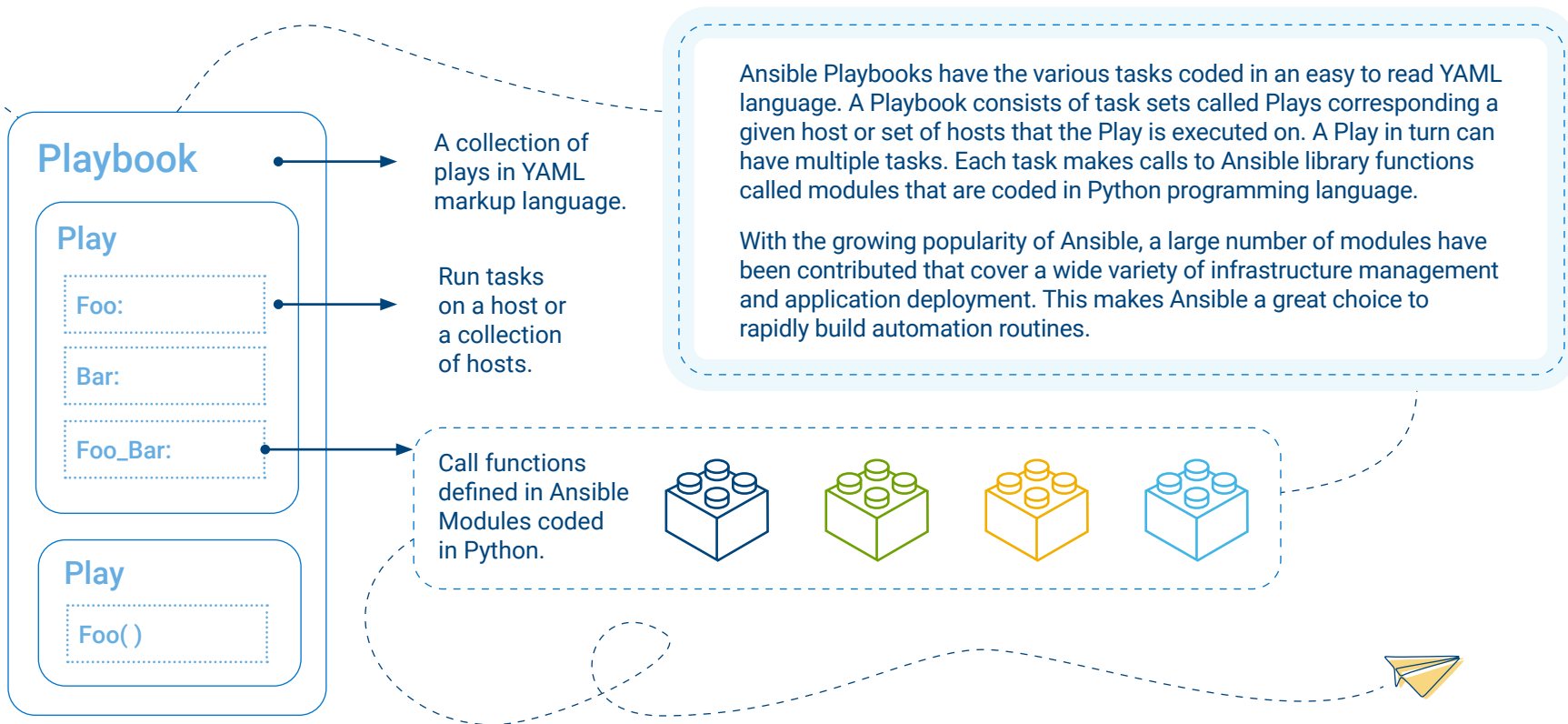
Ansible is a very popular platform to automate IT Operations and modern DevOps workflows across the hybrid cloud.

Ansible implements automation in a unique model that is growing popularity in large scale infrastructure management: configuration management. In the latest sense of the phrase “configuration management”, a desired state or configuration of the applications and infrastructure is provided by the user, in a simple markup language called YAML, as the input to the Ansible engine. Ansible’s job is to bring and maintain the state of the configuration using the levers it has over the infrastructure and applications.

This is very different from traditional procedural script based automation where tasks are executed mostly without any awareness of the current state of infrastructure. This kind of rote automation can lead to a drift in the configuration because of repeated execution of the automation sequences. Whereas in Configuration Management tools like Ansible, the required tasks are executed only when the current configuration does not match the specified desired configuration. This state-aware execution of tasks is what gives Ansible operations the property of idempotency.



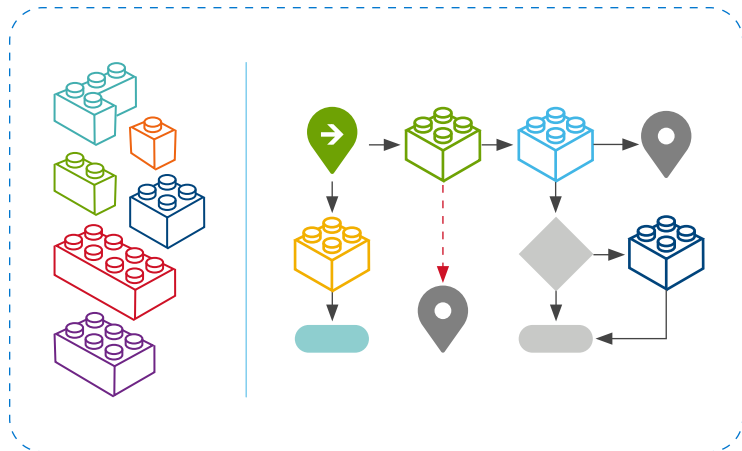
## Ansible Playbook Structure.



# VMWare vRealize Orchestrator

## Drag and drop your world.

VMware vRealize Orchestrator (vRO) is an IT process automation tool that allows automated management and operational tasks across both VMware and third-party applications. With vRO IT admins can create automation routines for elaborate workflows using a simple drag and drop approach. The workflows can span across different pieces of infrastructure and scale to very large task volume.

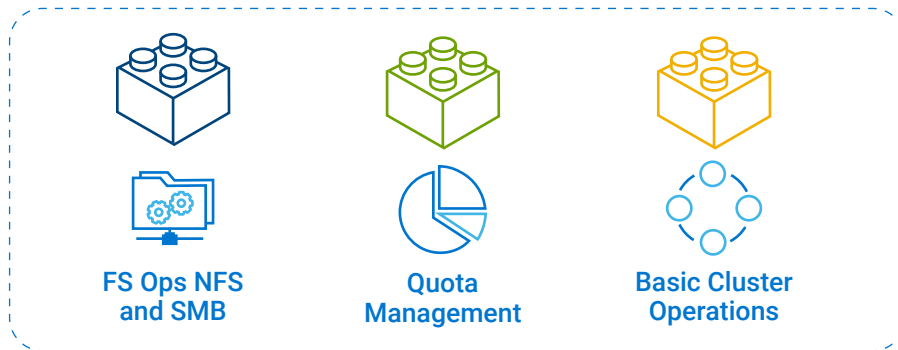


## PowerScale workflows with vRO plugin.

vRO plugin for PowerScale brings an extensive range of storage functionality in the form of programmable blocks that can be dropped into a workflow's process map. Functionality includes:

- » File System Operations for NFS and SMB
- » Quota management
- » Cluster operations

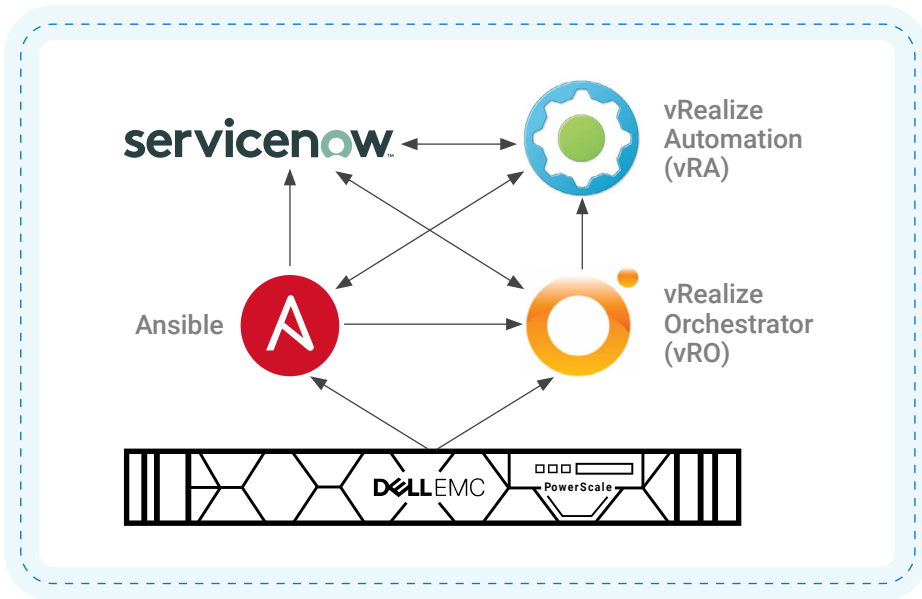
The different tasks under the above categories form the basic building blocks that can then be used together with any of the compute and networking tasks to form an end to end operation that is easy to read, maintain and build on.



## Multiple upstream automation paths to choose from

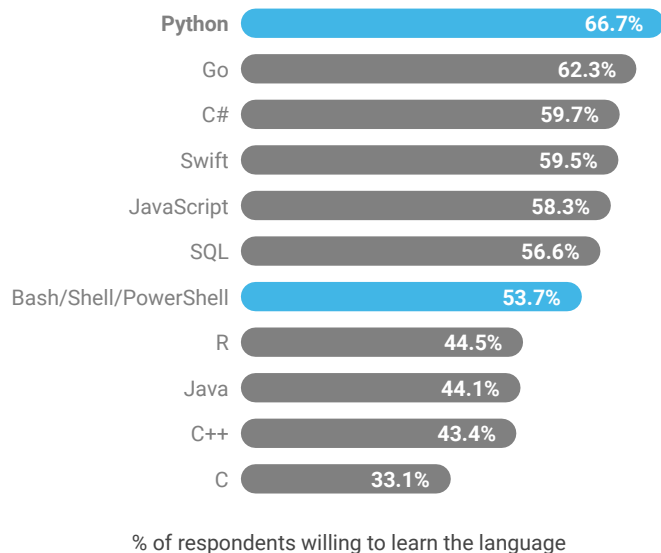
Thankfully ITOps platforms are highly interoperable. This means Operations admins can continue to use their tool of choice: like vAdmins using vRealize and higher level integration admins using something like ServiceNow and still be able to collaborate and integrate their automation projects.

For example automation routines built on Ansible and vRealize Suite can be embedded in platforms like ServiceNow so that you can reuse the process automation that is already developed and don't have to reprogram entire sequences in ServiceNow.

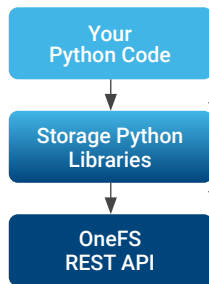


# If You Really Need to Code

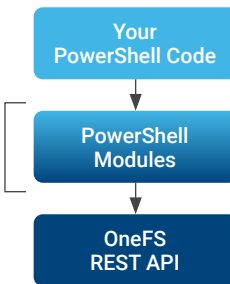
## Data from Stack Overflow Developer Survey 2020



## Python Integration



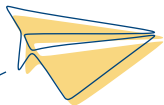
## PowerShell Integration



Storage  
functionality  
available as code  
building blocks

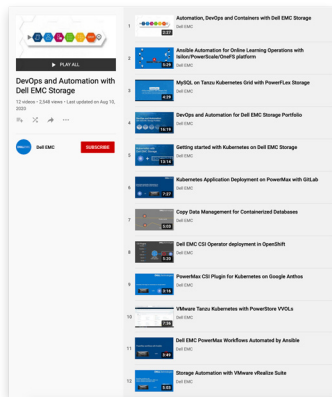



If your team prefers a particular programming language you can always use the OneFS REST API to code infrastructure operational and monitoring routines. The API also easily lends itself to create modules for other automation platforms like Chef and Puppet. Given the popularity of Python in general and PowerShell in Windows Server and SQL Server database environments we have created libraries and modules that you can use as building blocks in your code.

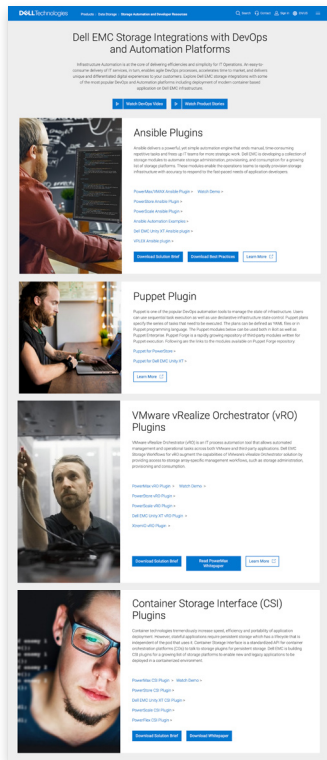


# Resources

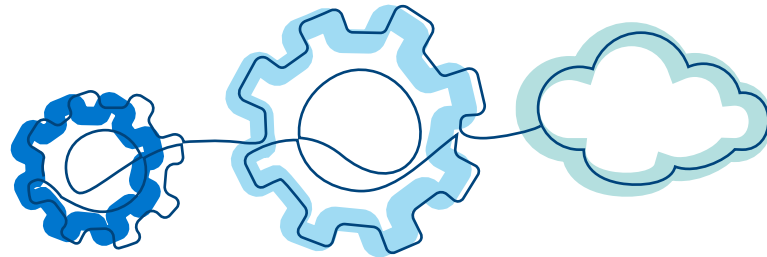
[click any image or caption to navigate]





 YouTube Demo Gallery: DevOps and Automation with Dell EMC Storage



 Dell EMC Storage Automation and Developer Resources



 API reference for OneFS/PowerScale

 API reference for ECS Object Storage

 VMware vRO Plugin for PowerScale

 Ansible Plugin for PowerScale

 PowerShell Plugin for PowerScale (Community-contributed)

 Python SDK for PowerScale