



# **NETWORK AUTOMATION**

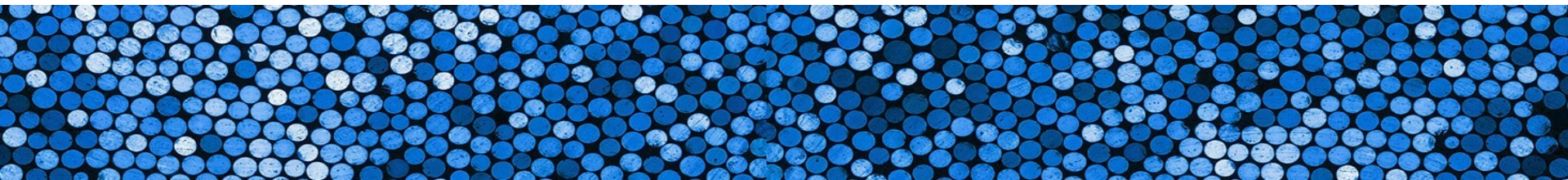
**MICHELLE OPIYO**  
**WORKONLINE COMMUNICATIONS**

**An innovative pan-African  
Network Service Provider**

## WHAT IS NETWORK AUTOMATION?



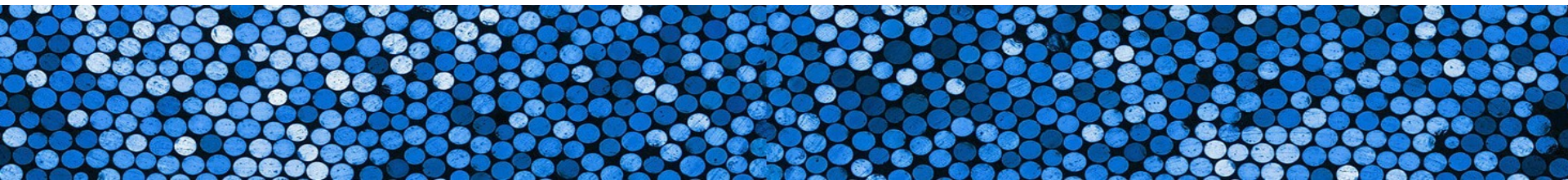
Network automation is the process of codifying repeatable tasks such as the configuration, management, testing and deployment of physical and virtual devices within a network, so that they can be performed quickly and without error.



## WHAT IS NETWORK ORCHESTRATION?



Orchestration involves codifying a string of tasks that may need to take place on several devices to accomplish a work-flow or process.



WHY ALL THE CONTROVERSY?

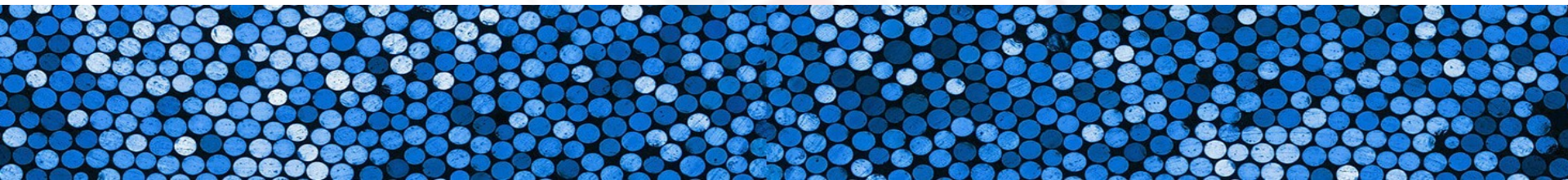


## WHY ALL THE CONTROVERSY?

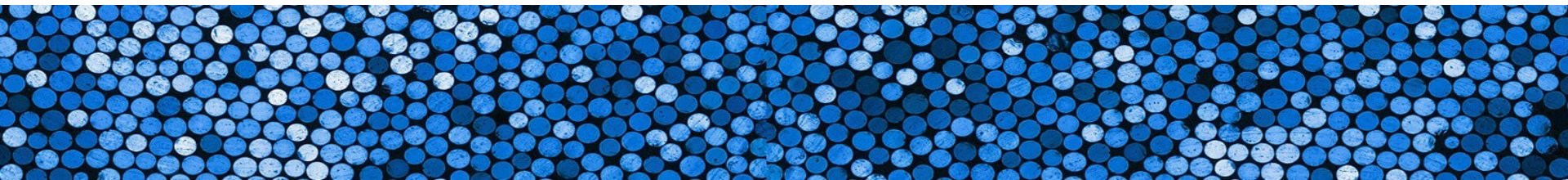


- Who wants to learn to code?
- Why would I want to automate myself out of a job?
- What about the corner cases? My network is really unique..



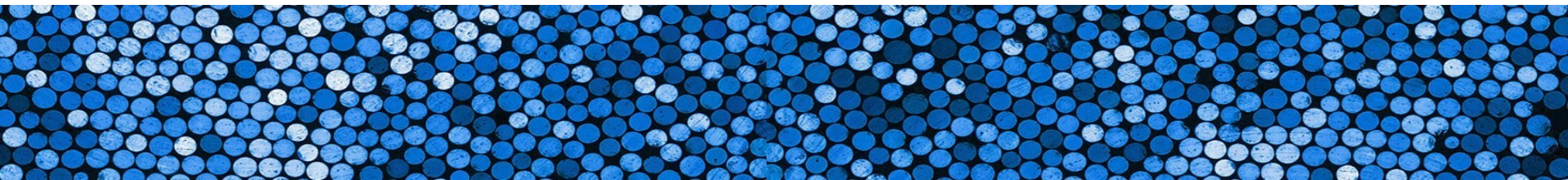


- Performing repetitive network config tasks is a thankless job. Once the process is understood, template is created; It is no longer interesting
- Majority of failures are caused by people making changes when tired, bored, distracted, chemically influenced or over-worked.
- Maintenance windows and network changes tend to happen at inconvenient hours.



Numerous options are available:

- Ansible
- Puppet
- Chef
- SALT
- Etc..

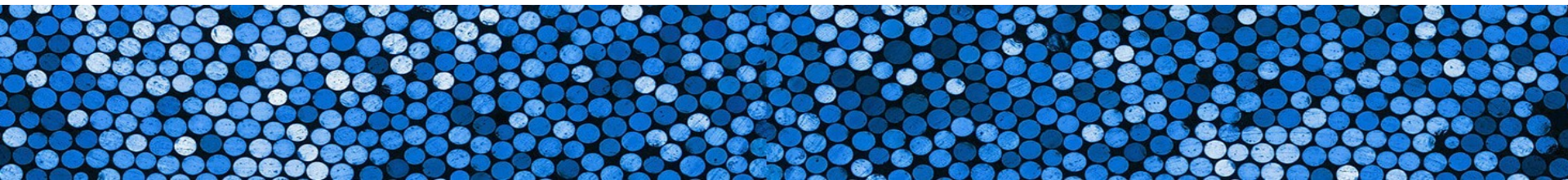




## WHY ANSIBLE?



- Ansible is written in Python and is master-less and agent-less
- Uses SSH as transport, authentication is generally done using SSH keys
- Ships Python modules to the target device, which are then executed
- Can log to a variety of log services



## WHAT IS NAPALM?

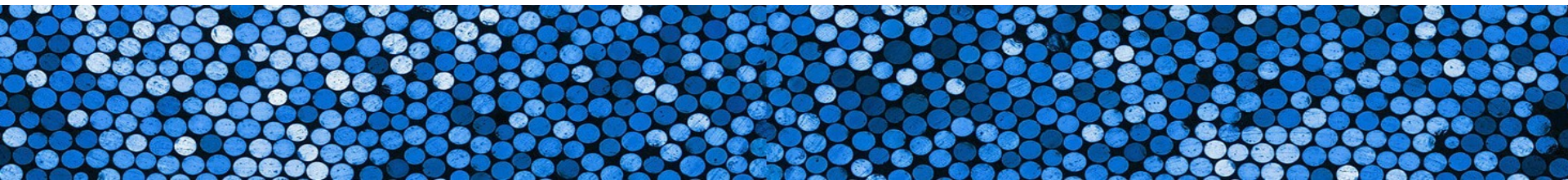


- NAPALM - Network Automation and Programmability Abstraction Layer with Multivendor support
- NAPALM is a Python library that can provide a unified API to a number of different router vendors.
- The napalm-ansible module provides a way to call the NAPALM API inside Ansible Playbooks

## WHAT IS NAPALM?



- Supported Network Operating Systems
  - Arista EOS
  - Cisco IOS, IOS-XR, NX-OS
  - Fortinet FortiOS
  - IBM
  - Juniper JunOS
  - Mikrotik RouterOS
  - Palo Alto NOS
  - Pluribus NOS



## WHAT IS NAPALM?



- In general, you're still going to be writing configuration templates for your different vendors.
- Template then gets merged into running config, and can be checked for diffs.
- Power comes from the consistent "getters" API.
- Allows "verifiers" to be written to

## HOW DO YOU INSTALL ANSIBLE?



```
$ sudo apt-get update
```

```
$ sudo apt-get install software-properties-common
```

```
$ sudo apt-add-repository --yes --update  
ppa:ansible/ansible
```

```
$ sudo apt-get install ansible
```

HOW DO YOU INSTALL NAPLAM?



```
$pip install napalm
```

## EXAMPLE YAML TASK



---

```
- name: render configs
  template:
    src: "{{ template }}"
    dest: "{{ render_dir }}/
{{ hostname }}.conf"
    backup: false
    force: true
```

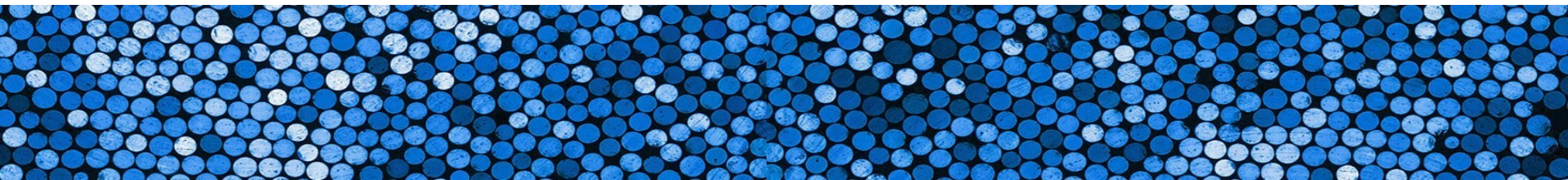


## EXAMPLE



---

- name: configure routers  
  napalm\_install\_config:  
    hostname: "{{ napalm\_hostname }}"  
    username: "{{ napalm\_username }}"  
    password: "{{ napalm\_password }}"  
    dev\_os: "{{ napalm\_driver }}"





optional\_args:

global\_delay\_factor: "{{ napalm\_global\_delay\_factor }}"

auto\_file\_prompt: false

config\_file: "{{ render\_dir }}/{{ hostname }}.conf"

replace\_config: true

commit\_changes: "{{ deploy }}"

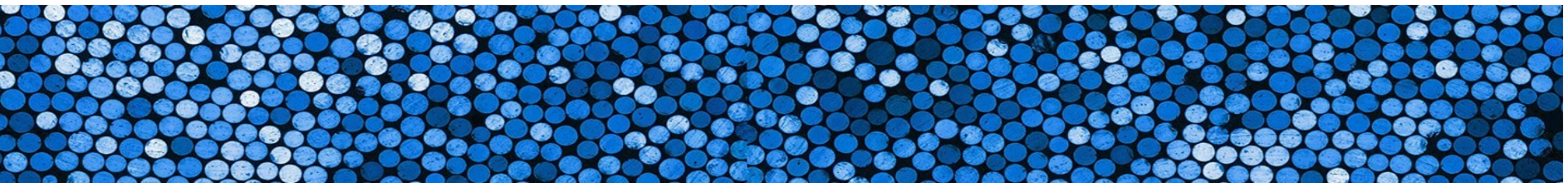
get\_diffs: true

diff\_file: "{{ diff\_dir }}/{{ hostname }}.diff"

register: configure\_result

```
register: configure_result  
when: configure  
until: configure_result is success  
retries: 2  
tags:  
- configure
```

...



## FREE VS PAID ANSIBLE

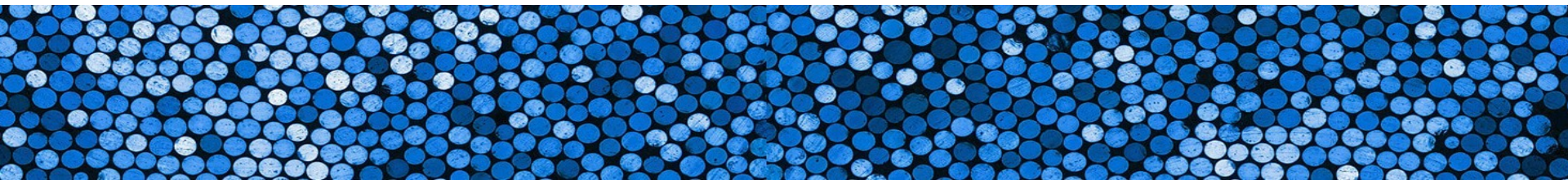


- Out of the box, Ansible is designed around the user running Ansible playbooks to push and verify configuration.
- Basic automation of playbook scheduling is included (ansible-pull + cron)
- For more, this is where Ansible Tower (\$\$) comes in
- Schedule Playbook runs
- Real time job status updates
- Job logging
- Etc

LET'S GET PRACTICAL



- What are some of the things we can do?
- - Template building
  - Device Configurations
  - Vendor Migrations
  - IPv4 to IPv6 Migration/Roll out.

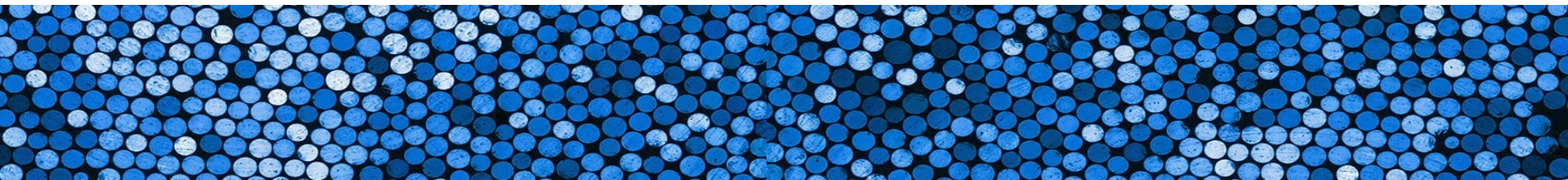


LET'S GET PRACTICAL



- - **Data Collection**

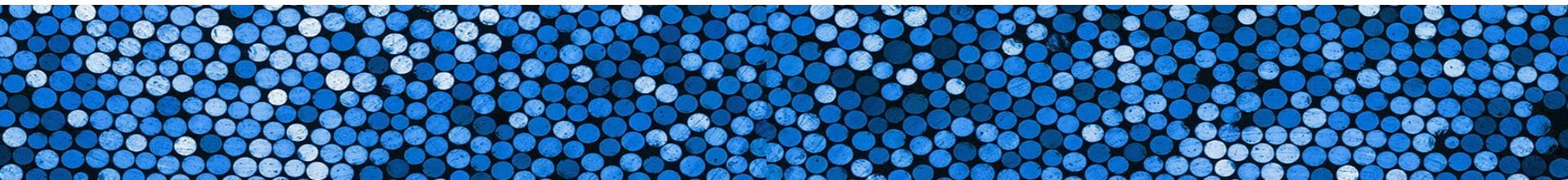
- Cable Checking ( using LLDP or CDP)
- Serial Numbers (for support and good old documentation)
- Line Cards
- Etc



LET'S GET PRACTICAL



- - Troubleshooting
  - Cabling
  - L2 & L3 Adjacencies
  - Interface errors



LET'S GET PRACTICAL



- - **Source Control**
  - Creating configuration templates for standardization
  - Etc

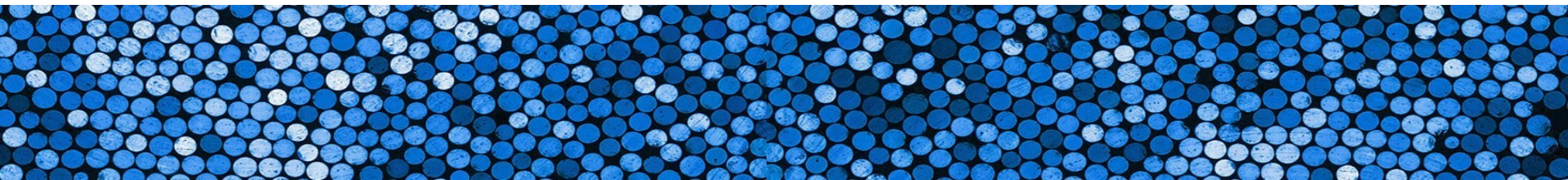


LET'S GET PRACTICAL



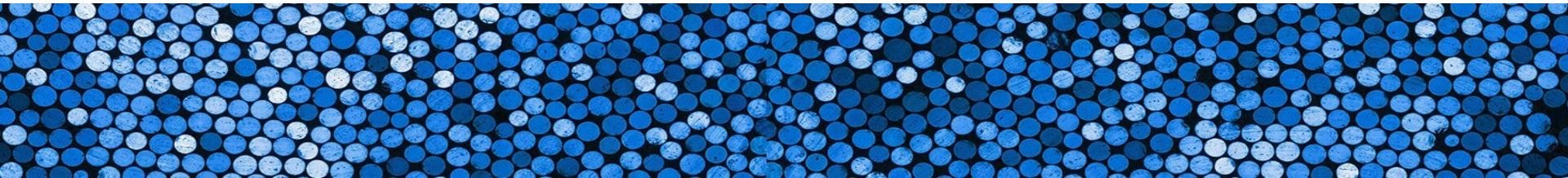
- - Provisioning

- Deploying new services
- Modifying old services
- Removing decommissioned services
- Other on-off changes

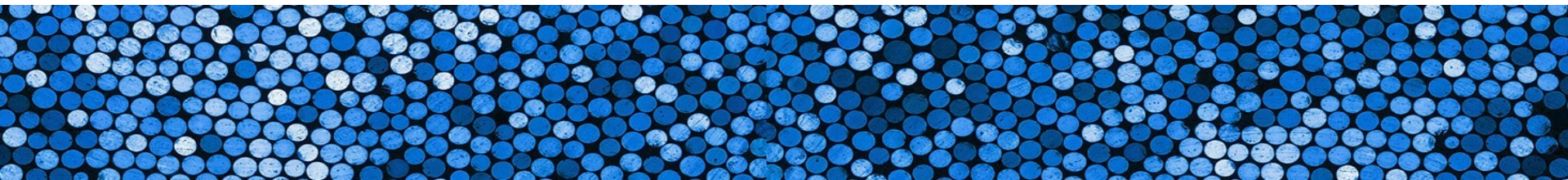




- Develop understanding of network automation, technologies, tools and trends
- Learn how automation can deliver benefits across a range of operational task, network and management devices and technologies
- Define the automation approaches that can benefit your operations



- Create a road- map prioritizing your automation projects and the order in which you will implement them.
- Start with manual and repetitive workflows



- Confirm that the solution meets your requirements
- Implement a simplified architecture that's simple to manage

