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Post Graduate Program in DevOps

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Management Education**

Configuration Management with Ansible and Terraform



YAML Basics

A Day in the Life of an Azure Architect

You are an employee of an organization that is looking for a commonly used data serialization file format.

The goal is to write configuration files and work in concurrence with any programming language.

The company wants a solution that can be used to create automation processes using the automation tool Ansible. The employees should be able to add the file to GitHub so that changes can be tracked and audited.

To achieve all the above, along with some additional features, you will be learning a few concepts in this lesson that will help find a solution for the given scenario.



Learning Objectives

By the end of this lesson, you will be able to:

- 👁 Define YAML and its uses
- 👁 Describe YAML structure and syntax
- 👁 List out data types in YAML
- 👁 Write simple YAML script



Introduction to YAML

Data Serialization

Data serialization is the process of converting data objects present in complex data structures into a byte stream for storage, transfer, and distribution purposes on physical devices.



Data Serialization

Commonly used data serialization formats are:

01

XML

04

BSON

02

YAML

05

MessagePack

03

JSON

06

Protobuf

What Is YAML?

YAML is a data serialization language that is often used to write configuration files and works in concurrence with any programming language.

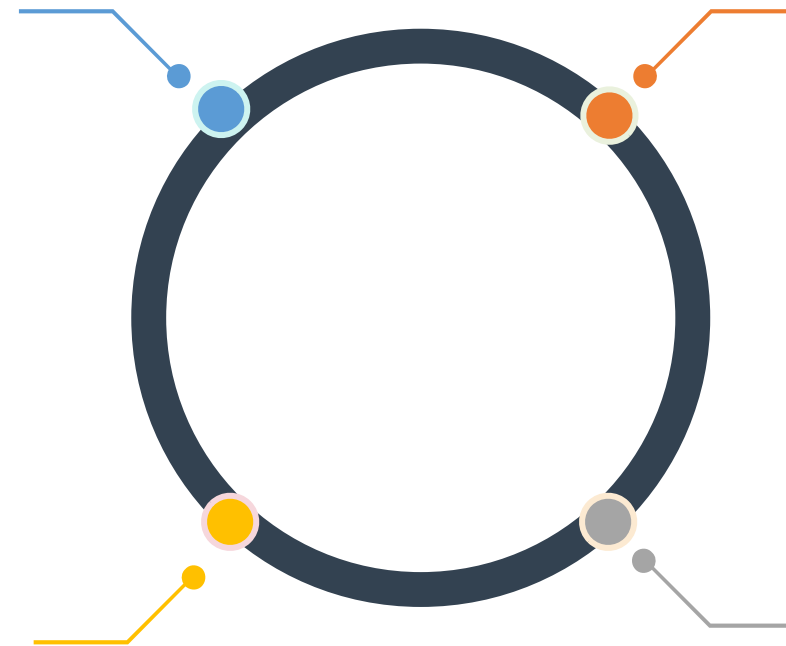


YAML stood for “Yet Another Markup Language”. The acronym was later changed to “YAML Ain’t Markup Language”.

What Is YAML Used for?

The most common use for YAML is to create configuration files.

Kubernetes resources and deployments can be created using YAML files.



YAML is also used by the automation tool Ansible to create automation processes.

YAML files can be added to GitHub so that changes can be tracked and audited.

YAML Features

Some of the features of YAML are:

Multi-Document Support

Users can add multiple documents to a single YAML file by separating different documents with three dashes (---).

No Tabs

YAML does not allow tabs. Spaces are the only way to achieve indentation.



Built-In Comments

Users can add comments to their code using the `#` symbol.

Clean Syntax

YAML relies on indentations to show the levels and structure in the data.

YAML Features

Some of the features of YAML are:

Precise Feedback

It helps the user in quickly finding and fixing errors.

Explicit Data Types with Tags

It auto-detects the type of data, but users are free to specify the type they need.



Support for Complex Structures

It helps the user in referring to other data objects.

No Executable Commands

It does not have executable commands, which makes the language highly secure.

Overview of YAML Syntax

Basic YAML Rules

YAML has some rules in place to avoid challenges related to ambiguity about different languages and editing programs.



YAML files are saved with **.yml** or **.yaml** extension.



YAML is case-sensitive.

YAML

YAML has features that are derived from Perl, C, XML, HTML, and other programming languages.

1

Scalars, lists, and arrays come from Perl.

2

The three-dash separator comes from MIME.

3

Whitespace wrapping comes from HTML.

4

Escape sequences come from C.

YAML Syntax

The structure of a YAML file is a Map or a List.

Colon and a single space define a scalar (or a variable):

```
string: "17"  
integer: 17  
float: 17.0  
boolean: No
```

YAML Syntax

A `|` character denotes a string that preserves newlines, and a `>` character denotes a string that folds newlines.

```
data: |  
  
Every one  
  
Of these  
  
Newlines  
  
Will be  
  
Broken up.
```

```
data: >  
  
This text  
  
is wrapped  
  
and will  
  
be formed into  
  
a single paragraph.
```

YAML Maps

Maps associate key-value pairs, which is an important part of setting up data.

A YAML configuration file can start like this:

```
---  
  
apiVersion: v3  
  
kind: Pod  
  
metadata:  
  
  name: rss-site  
  
  labels:  
  
    app: web
```

YAML Lists

A list is a collection of values in a specific order that can contain any number of entries.

- A list sequence starts with a dash (-) and a space.
- Indentation separates it from the parent.
- A list can be embedded into a map.

Sample YAML Script

Simple YAML script for student records that follows syntax rules

```
---
#Student Details

Student-Id: 202104

First-Name: John

Parents-Name:
  - Andrew
  - Cathy

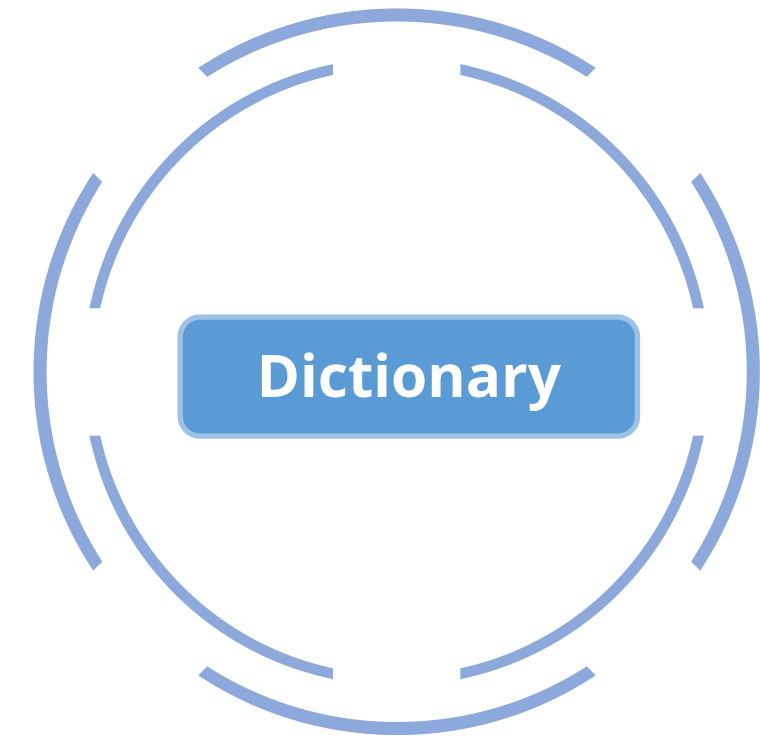
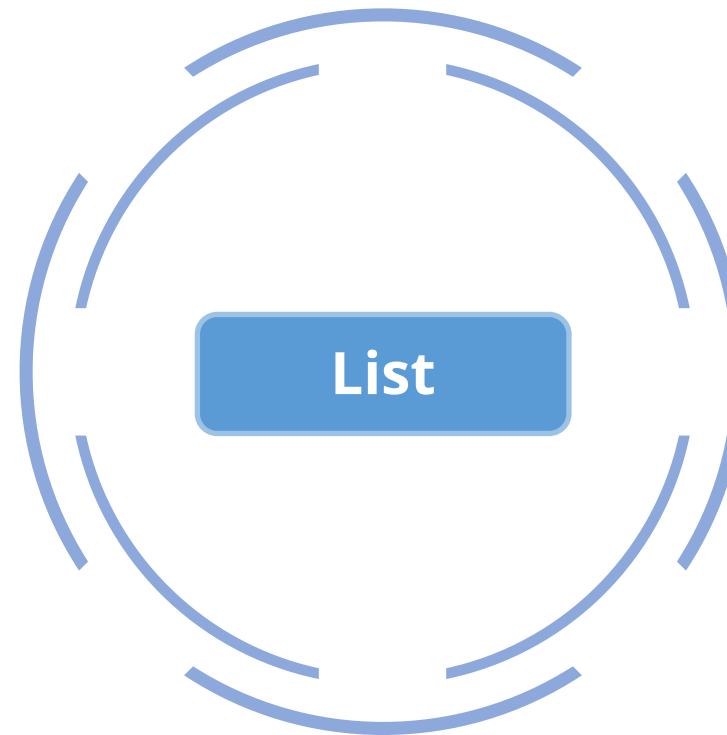
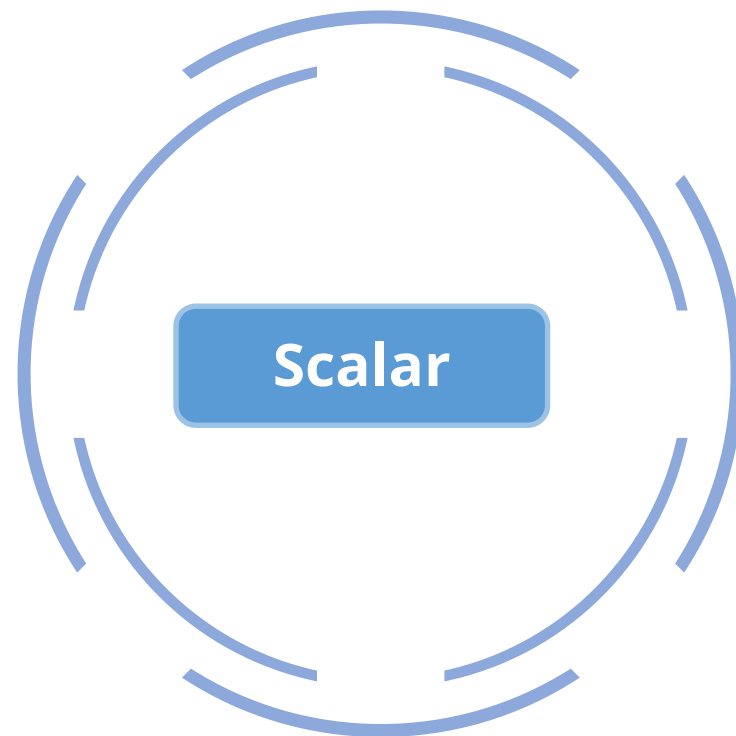
Address:
  - street: 13 Main st.
    city: Houston
    state: TX

education: |
  4 GCSEs
  3 A-Levels
...
```

Data Types in YAML

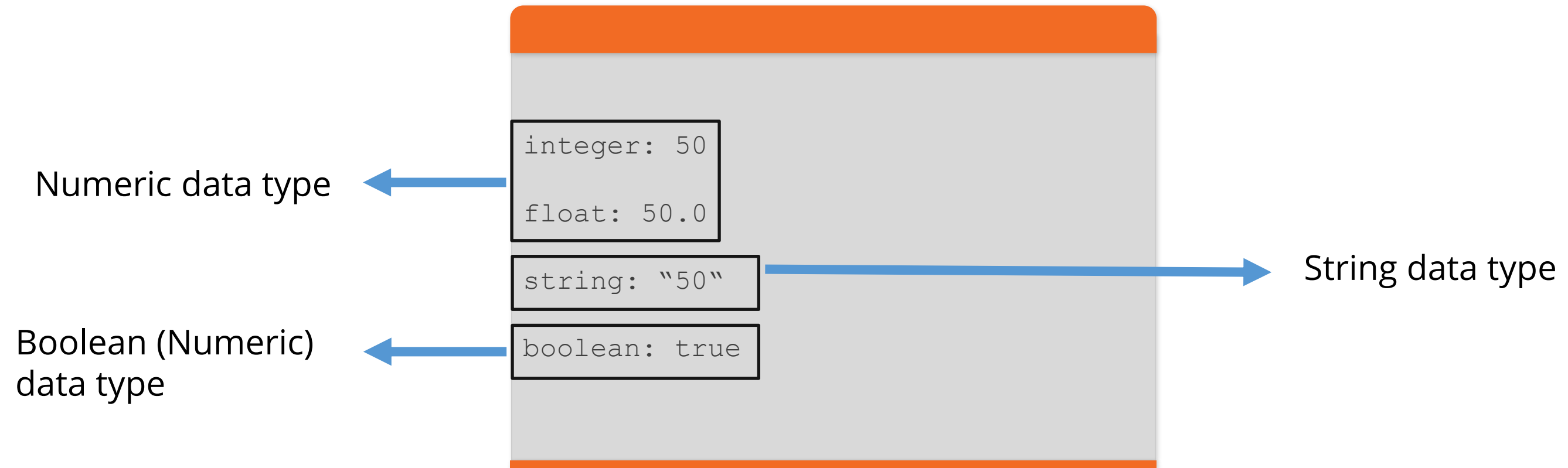
Data Types in YAML

The basic data types of YAML are:



Scalar

In YAML, scalar means a simple value for a key.



Scalars are often called variables in programming.

Scalar

Following are the examples of numeric data types:

Integer and Floating

```
---  
  
age: 11223  
  
octal: 011223  
  
hex: 0x12d4  
  
floating: 180.0  
  
exp: 12.3015e+05
```

Boolean

```
---  
  
booleanvalue1: True  
  
booleanvalue2: False  
  
value1: On  
  
value2: Off
```

Scalar

In YAML, strings are unicode.

String Data Type

```
---  
  
string: this is a string  
  
str: "the cost is 390\n"  
  
nullstr1: null  
  
nullstr2: ~
```

List

In YAML, each item in the list is of key-value pairs, commonly called a “hash” or a “dictionary”.

List

```
---

#List in a single line
items: [6, 7, 8, 9, 10]
name: [six, seven, eight]

# List in multiple line
items:
  - 6
  - 7
  - 8

#complex objects
newitems:
  - values:
      value1:
      value2:
      value3:
```

Dictionary

Dictionary is a collection of key-value pairs.

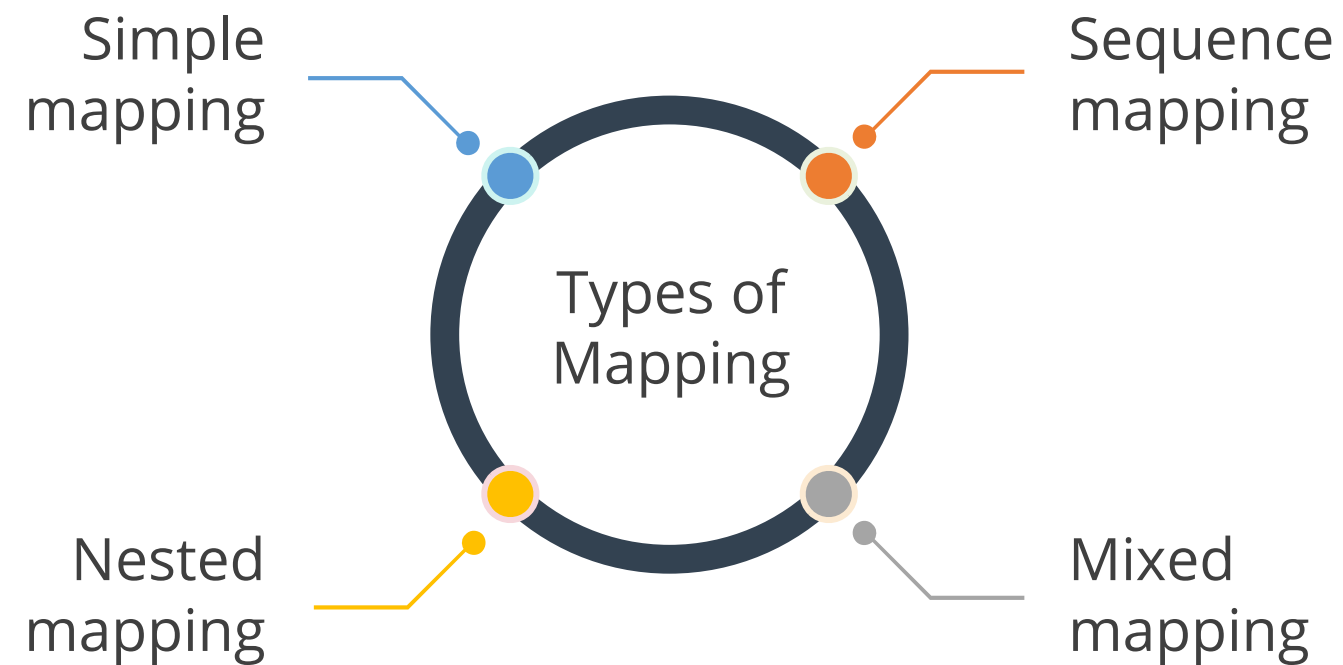
Dictionary

```
---  
  
- developer1:  
  empname: john  
  skills:  
    - python  
    - java  
    - yaml  
  
- developer2:  
  empname: martin  
  skills:  
    - C  
    - perl  
    - ruby
```

Sequence and Mapping in YAML

YAML Mapping

YAML mappings are associative arrays, hash tables, key-value pairs, or collections.



Note

In mapping, the name of two keys can't be the same.

YAML Mapping

Below are the examples of simple and sequence mapping:

Simple Mapping

```
---  
  
hosts: xyz  
  
emp: harry  
  
job: developer
```

Sequence Mapping

```
---  
  
student: chris  
  
subjects:  
  
  - maths  
  
  - science
```

YAML Mapping

Below are the examples of nested and mixed mapping:

Nested Mapping

```
---  
  
hosts: xyz  
  
name: john  
  
  address: canada  
  
  lane: 13  
  
  street: 42
```

Mixed Mapping

```
---  
  
student: chris  
  
details:  
  fatherName: adam  
  motherName: liam  
  
subjects:  
  - subject1  
  - subject2
```

YAML Sequences

In YAML, collections are represented in sequences in the form of lists or arrays.

```
---
```

```
hobbies:
```

- dancing
- music
- singing
- painting

YAML Sequences

Nested Sequence with items and subitems can be achieved by placing a single space before each dash in the sub-items.

Nested Sequence

```
---  
  
hosts: xyz  
name: john  
  
  address: canada  
  
  lane: 13  
  
  street: 42  
  
skills:  
  
  - python  
  
  - java
```

Assisted Practice

Validation of Apache Web Server

Duration: 15 Min.

Problem Statement:

Apache web server is a free and open-source web server which helps in delivering web content through the internet. You are assigned to install and validate the Apache web server.

Assisted Practice: Guidelines

Steps to be performed:

1. Establishing connectivity between Ansible controller and node machine
2. Writing Ansible YAML script to install Apache server
3. Running Ansible YAML script
4. Validating Apache Web Server setup



Key Takeaways

- YAML is a data serialization language that is often used to write configuration files.
- In a YAML file, multiple documents can be added by separating them with three dashes (`---`).
- A `|` character denotes a string that preserves newlines, and a `>` character denotes a string that folds newlines.
- A list is a collection of values in a specific order that can contain any number of entries.



Installing Apache Tomcat Using Ansible Playbook on Ubuntu

Duration: 25 Min.

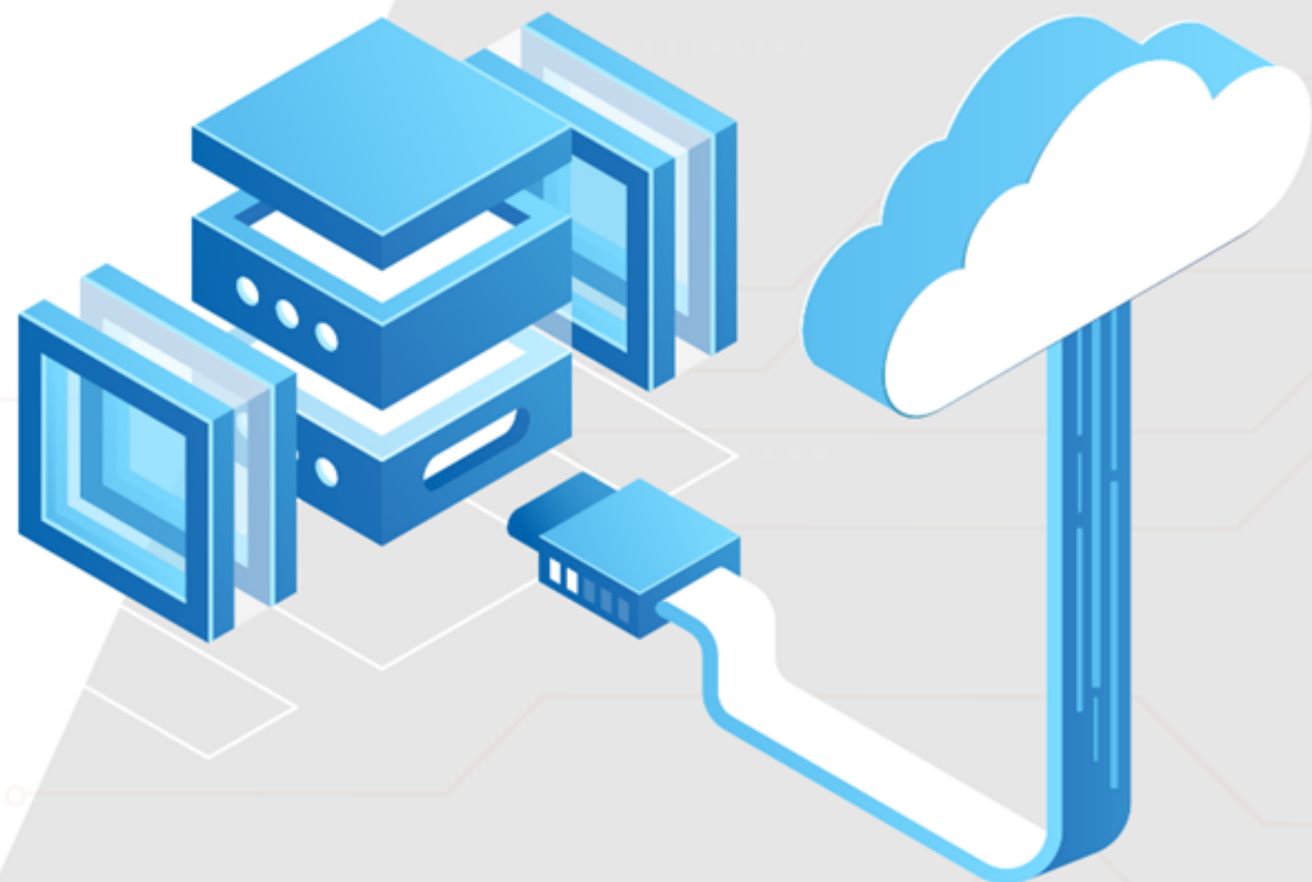


Project agenda: To Install Apache Tomcat Using Ansible Playbook on Ubuntu

Description: Apache Tomcat is often used as an application server for strictly web-based applications. It executes Java servlets and renders web pages that include JSP coding.

Perform the following:

- Installing Ansible
- Configuring Ansible
- Establishing Connectivity between Ansible controller and node machine
- Creating Apache Playbook
- Executing the Playbook
- Confirming the installation



Thank you