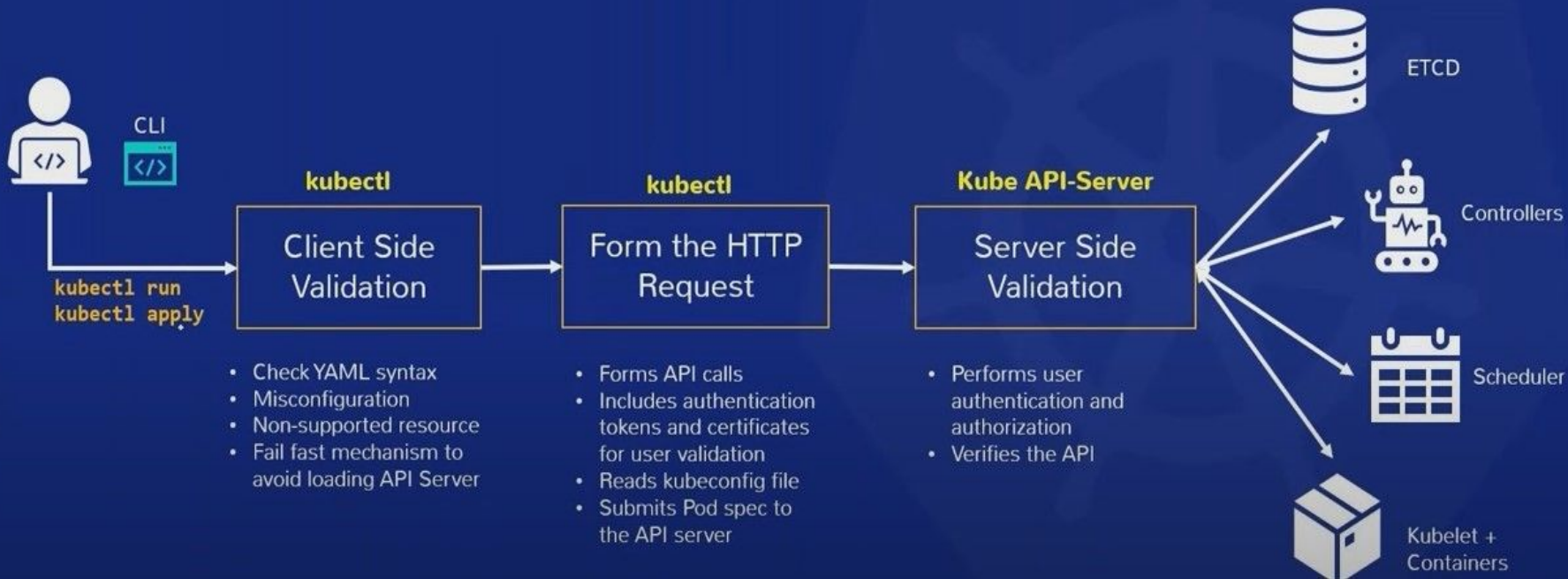# Kubectl

- kubectl is a command line utility used to communicate with Kubernetes API servers to create, read, update, delete(**CRUD**) workloads within Kubernetes

CLI

`kubectl run`
`kubectl apply`

kubectl

Client Side Validation

- Check YAML syntax
- Misconfiguration
- Non-supported resource
- Fail fast mechanism to avoid loading API Server

kubectl

Form the HTTP Request

- Forms API calls
- Includes authentication tokens and certificates for user validation
- Reads kubeconfig file
- Submits Pod spec to the API server

Kube API-Server

Server Side Validation

- Performs user authentication and authorization
- Verifies the API

ETCD

Controllers

Scheduler

Kubelet + Containers

Kubernetes

Minikube

- **minikube** is local Kubernetes, focusing on making it easy to learn and develop for Kubernetes
- It creates a single node cluster
- Available for **Linux, macOS, and Windows**
- Inbuilt support for **Metallb**, dashboard, storage provisioners etc
- Master node is untainted

- **Prerequisites**
    1. 2 CPUs or more
    2. 2GB of free memory
    3. 20GB of free disk space
    4. Internet connection
    5. Container or virtual machine manager, such as: Docker, Hyperkit, Hyper-V, KVM, Podman, VirtualBox, or VMWare

Minikube

- Start Minikube Cluster – **minikube start --driver=virtualbox --memory=4096 --cpus=4 --kubernetes-version=v1.20.2**

- Get Minikube IP – **minikube ip**

- Get Minikube Addons – **minikube addons list**

- Enable MetalLB Addon – **minikube addons enable metallb**

  (installs some objects under metallb-system namespace)

- Configure MetalLB – **minikube addons configure metallb**

  (configure the range of **LoadBalancer** IPs depending on Minikube IP)

```
$ minikube addons list

|---------------------|----------|------------|
|     ADDON NAME      | PROFILE  |  STATUS    |
|---------------------|----------|------------|
| ambassador          | minikube | disabled   |
| auto-pause          | minikube | disabled   |
| csi-hostpath-driver | minikube | disabled   |
| dashboard           | minikube | disabled   |
| default-storageclass| minikube | enabled ✅ |
| helm-tiller         | minikube | disabled   |
| ingress             | minikube | disabled   |
| ingress-dns         | minikube | disabled   |
| istio               | minikube | disabled   |
| istio-provisioner   | minikube | disabled   |
| kubevirt            | minikube | disabled   |
| logviewer           | minikube | disabled   |
| metallb             | minikube | enabled ✅ |
| metrics-server      | minikube | disabled   |
| pod-security-policy | minikube | disabled   |
| registry            | minikube | disabled   |
| registry-aliases    | minikube | disabled   |
| registry-creds      | minikube | disabled   |
| storage-provisioner | minikube | enabled ✅ |
|---------------------|----------|------------|
```

```
└─$ minikube addons configure metallb
-- Enter Load Balancer Start IP: 192.168.99.105
-- Enter Load Balancer End IP: 192.168.99.120
✓  metallb was successfully configured
```
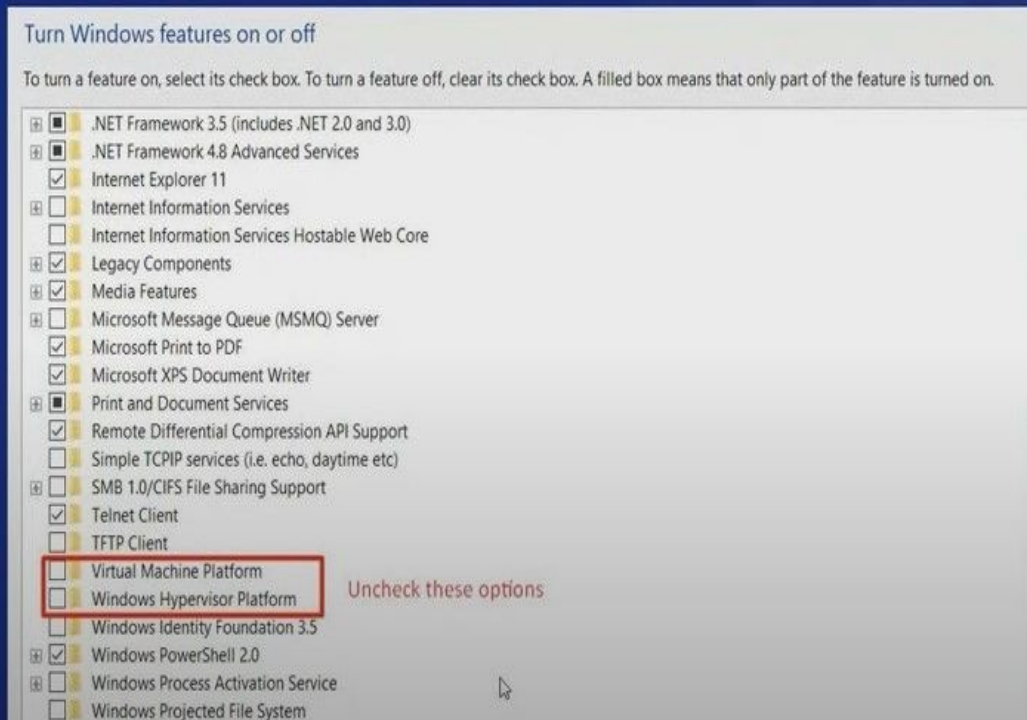
Minikube

```
$ minikube start --driver=virtualbox
* minikube v1.23.2 on Microsoft Windows 10 Home Single Language 10.0.19043 Build 19043
* Kubernetes 1.22.2 is now available. If you would like to upgrade, specify: --kubernetes-version=v1.22.2
* Using the virtualbox driver based on existing profile
* Starting control plane node minikube in cluster minikube
* Creating virtualbox VM (CPUs=2, Memory=6166MB, Disk=20000MB) ...
! StartHost failed, but will try again: creating host: create: precreate: This computer doesn't have VT-X/AMD-v enabled. Enabling it in the BI
ry
* Creating virtualbox VM (CPUs=2, Memory=6166MB, Disk=20000MB) ...
* Failed to start virtualbox VM. Running "minikube delete" may fix it: creating host: create: precreate: This computer doesn't have VT-X/AMD-v
bling it in the BIOS is mandatory

X Exiting due to HOST_VIRT_UNAVAILABLE: Failed to start host: creating host: create: precreate: This computer doesn't have VT-X/AMD-v enabled.
in the BIOS is mandatory
* Suggestion: Virtualization support is disabled on your computer. If you are running minikube within a VM, try '--driver=docker'. Otherwise,
systems BIOS manual for how to enable virtualization.
* Related issues:
  - https://github.com/kubernetes/minikube/issues/3900
  - https://github.com/kubernetes/minikube/issues/4730
```

- Enable VT-X/AMD-V

- Disable vtx check – `minikube start --no-vtx-check`

Minikube

- Turn off Windows features Hyper-V, Virtual Machine Platform, and Windows Hypervisor Platform to be able to use VirtualBox
- Unfortunately, removing Virtual Machine Platform means you won't be able to use WSL.

Minikube

```
$ minikube start --no-vtx-check --driver=virtualbox
* minikube v1.22.2 on Microsoft Windows 10 Home Single Language 10.0.19043 Build 19043
* Using the virtualbox driver based on user configuration
* Starting control plane node minikube in cluster minikube
* Creating virtualbox VM (CPUs=2, Memory=4000MB, Disk=20000MB) ...
[init] Using Kubernetes version: v1.22.2
[preflight] Running pre-flight checks
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your internet connection
[preflight] You can also perform this action in beforehand using 'kubeadm config images pull'
* Verifying Kubernetes components...
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

INSTALLING MINIKUBE IN WINDOWS 10/11

Install kubectl binary with curl on Windows 🔗

1. Download the latest 1.28 patch release: kubectl 1.28.3.

   Or if you have `curl` installed, use this command:

   ```
   curl.exe -LO "https://dl.k8s.io/release/v1.28.3/bin/wi
   ```

   > **Note:** To find out the latest stable version (for example, for scripting), take a look at https://dl.k8s.io/release/stable.txt.

2. Validate the binary (optional)

   Download the `kubectl` checksum file:

Welcome to Kubernetes – Minikube Setup

Setup will guide you through the installation of Kubernetes - Minikube.

It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.

Click Next to continue.

Next >   Cancel

Kubernetes - Minikube Setup

Choose Install Location

Choose the folder in which to install Kubernetes - Minikube.

Setup will install Kubernetes - Minikube in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.

Destination Folder

```
C:\Program Files\Kubernetes\Minikube
```

Browse...

Space required: 82.6 MB
Space available: 7.6 GB

< Back   Install   Cancel

Kubernetes - Minikube Setup

Installation Complete
Setup was completed successfully.

Completed

Show details

< Back   Next >   Cancel

INSTALLING KUBECTL COMMAND BINARY IN WINDOWS

Install kubectl on Windows

The following methods exist for installing kubectl on Windows:

- Install kubectl binary with curl on Windows
- Install on Windows using Chocolatey, Scoop, or winget

Install kubectl binary with curl on Windows

1. Download the latest release v1.26.0.

   Or if you have `curl` installed, use this command:

   ```
   curl.exe -LO "https://dl.k8s.io/release/v1.26.0/bin/windows/amd64/kubectl.exe"
   ```

   > **Note:** To find out the latest stable version (for example, for scripting), take a look at
   > https://dl.k8s.io/release/stable.txt.

2. Validate the binary (optional)

Create new folder mytools folder in C drive

📁	Intel	10/14/2023 2:10 PM	File folder
☑ 📁	mytools	11/4/2023 4:38 PM	File folder

Paste kubectl binary on this folder

This PC > Local Disk (C:) > mytools   ∨ ↻ 🔍 Sea

☐ Name	Date modified	Type	Size
☐ 📧 kubectl	11/4/2023 4:37 PM	Application	49,407 KB

Copy path of this folder

📁 > This PC > Local Disk (C:) > mytools
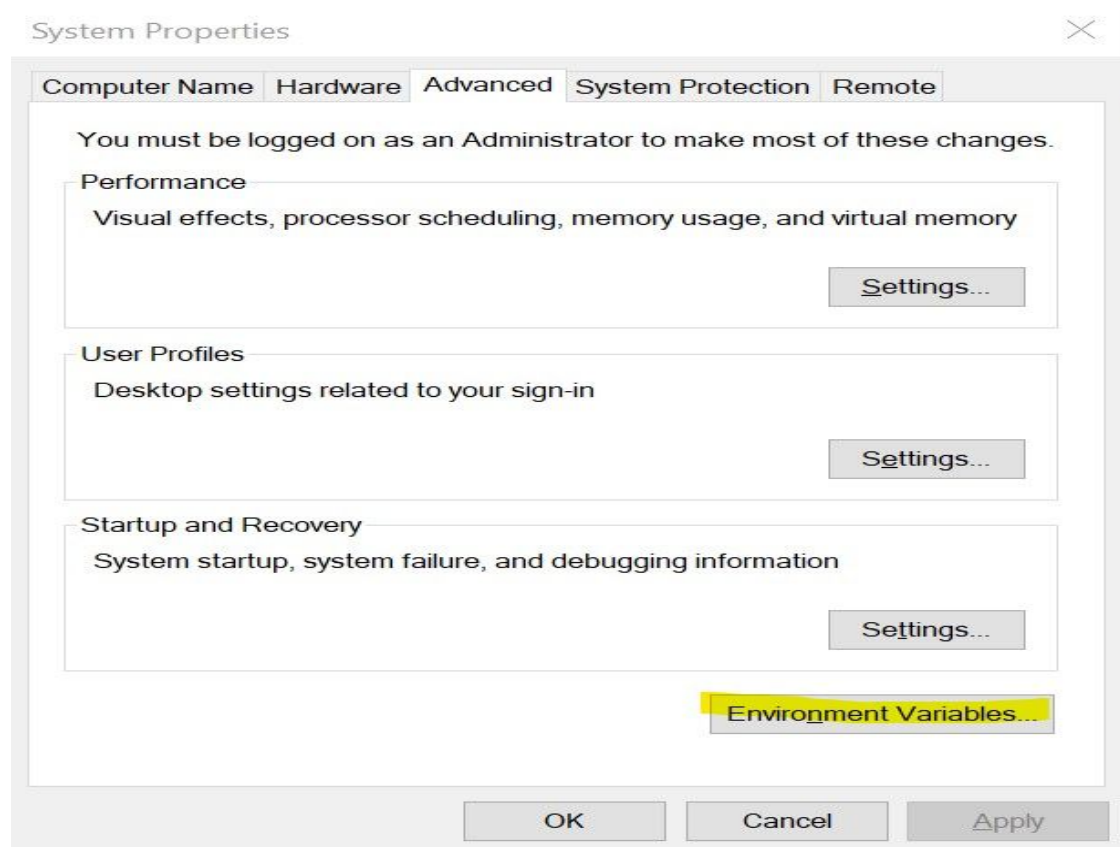
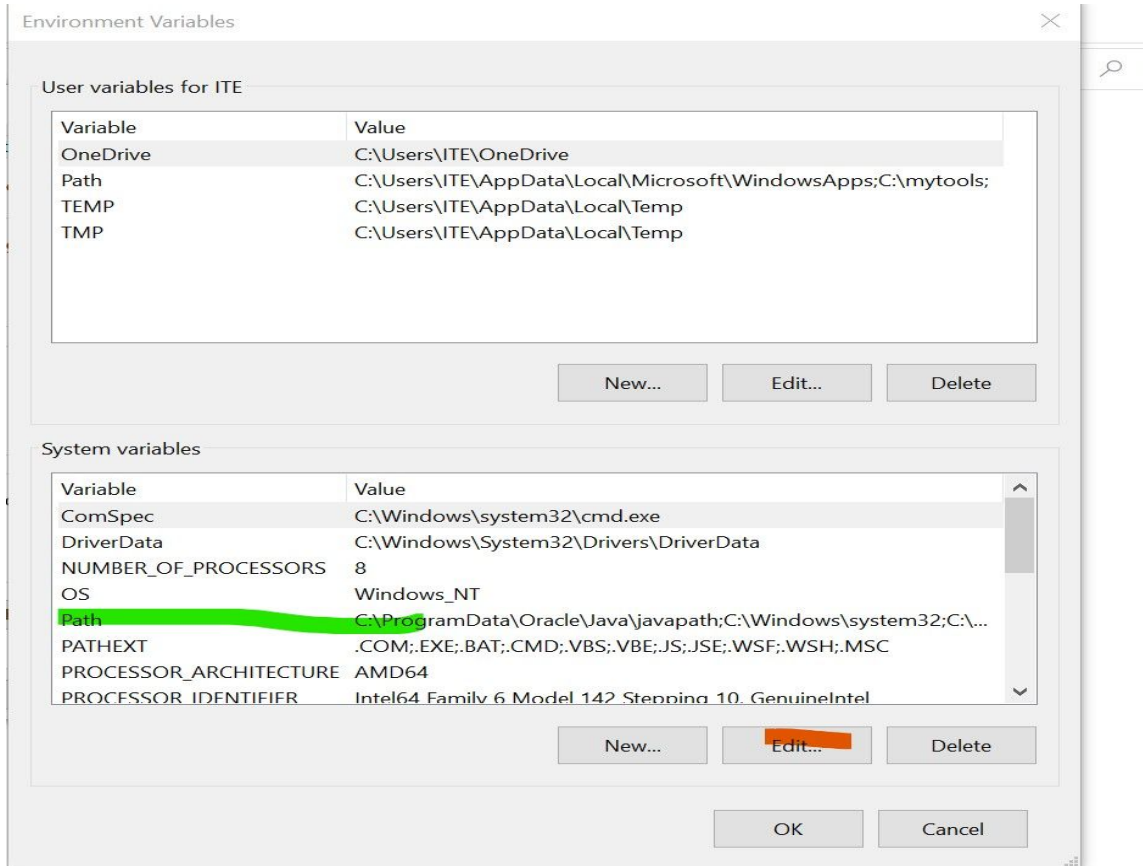| ☐ Name	Date modified	Type
☐ 📧 kubectl	11/4/2023 4:37 PM	Applicatio

Setting up env variable in windows

Click on path and edit the new variable in list

Edit environment variable

C:\ProgramData\Oracle\Java\javapath	**New**
C:\Windows\system32	
C:\Windows	**Edit**
C:\Windows\System32\Wbem	
C:\Windows\System32\WindowsPowerShell\v1.0\	**Browse...**
C:\Windows\System32\OpenSSH\	
C:\Program Files\Intel\WiFi\bin\	**Delete**
C:\Program Files\Common Files\Intel\WirelessCommon\	
C:\Program Files\Kubernetes\Minikube	
C:\mytools	**Move Up**
	Move Down
	Edit text...

OK　　**Cancel**

```
Microsoft Windows [Version 10.0.19045.3570]
(c) Microsoft Corporation. All rights reserved.

C:\Users\ITE>kubctl version
'kubctl' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\ITE>kubectl version
Client Version: v1.28.3
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
Unable to connect to the server: dial tcp [::1]:8080: connectex: No connection could be made because the target machine
actively refused it.

C:\Users\ITE>minikube start --driver=virtualbox --memory=4096 --cpus=2
* minikube v1.31.2 on Microsoft Windows 10 Home 10.0.19045.3570 Build 19045.3570
* Using the virtualbox driver based on user configuration
* Downloading VM boot image ...
E1104 16:44:14.085729   16660 iso.go:90] Unable to download https://storage.googleapis.com/minikube-builds/iso/16971/min
ikube-v1.31.0-amd64.iso: getter: &{Ctx:context.Background Src:https://storage.googleapis.com/minikube-builds/iso/16971/m
inikube-v1.31.0-amd64.iso?checksum=file:https://storage.googleapis.com/minikube-builds/iso/16971/minikube-v1.31.0-amd64.
iso.sha256 Dst:C:\Users\ITE\.minikube\cache\iso\amd64\minikube-v1.31.0-amd64.iso.download Pwd: Mode:2 Umask:--------- D
etectors:[0x45ff5e8 0x45ff5e8 0x45ff5e8 0x45ff5e8 0x45ff5e8 0x45ff5e8 0x45ff5e8] Decompressors:map[bz2:0xc000711f88 gz:0
xc000711fe0 tar:0xc000711f90 tar.bz2:0xc000711fa0 tar.gz:0xc000711fb0 tar.xz:0xc000711fc0 tar.zst:0xc000711fd0 tbz2:0xc0
00711fa0 tgz:0xc000711fb0 txz:0xc000711fc0 tzst:0xc000711fd0 xz:0xc000711fe8 zip:0xc000711ff0 zst:0xc0003c8070] Getters:
map[file:0xc0006520a0 http:0xc000f80000 https:0xc000f80050] Dir:false ProgressListener:0x4593370 Insecure:false DisableS
ymlinks:false Options:[0x1911520]}: invalid checksum: Error downloading checksum file: bad response code: 404
* Downloading VM boot image ...
    > minikube-v1.31.0-amd64.iso....:  65 B / 65 B [---------] 100.00% ? p/s 0s
    > minikube-v1.31.0-amd64.iso:  33.63 MiB / 289.20 MiB  11.63% 4.79 MiB p/s
```