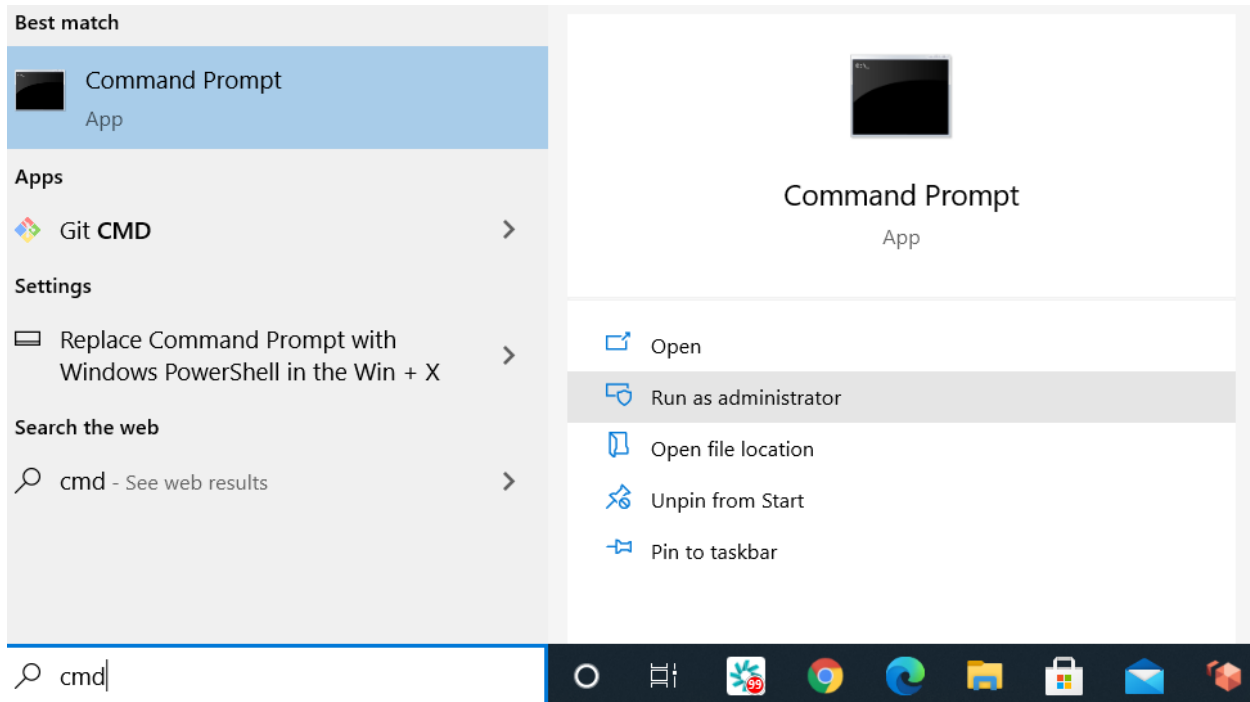


Experiment 02: Working With Kind

In the Foundation experiment/lab we installed Docker and KIND, validate our Docker installation, and now we'll use KIND.

Open a Windows Command Prompt with “run as administrator”



```
C:\> mkdir c:\projects
```

```
C:\> mkdir c:\projects\kind
```

```
C:\> cd c:\projects\kind
```

```
C:\projects\kind> kind create cluster
```

```
Administrator: Command Prompt

to read about a specific subcommand or concept.
See 'git help git' for an overview of the system.

C:\Windows\system32>cd \projects\kind

C:\projects\kind>kind create cluster
Creating cluster "kind" ...
  • Ensuring node image (kindest/node:v1.18.2) ...
    [ ] Ensuring node image (kindest/node:v1.18.2) [ ]
  • Preparing nodes [ ] [ ] ...
    [ ] Preparing nodes [ ] [ ]
  • Writing configuration [ ] [ ] ...
    [ ] Writing configuration [ ] [ ]
  • Starting control-plane [ ] [ ] ...
    [ ] Starting control-plane [ ] [ ]
  • Installing CNI [ ] [ ] ...
    [ ] Installing CNI [ ] [ ]
  • Installing StorageClass [ ] [ ] ...
    [ ] Installing StorageClass [ ] [ ]
Set kubectrl context to "kind-kind"
You can now use your cluster with:

kubectrl cluster-info --context kind-kind

Have a nice day! [ ] [ ]

C:\projects\kind>
```

Super simple, execute “kind create cluster”, and go grab a refill on your favorite beverage while it spins for a few minutes depending on your network speed. Any delay in our initial cluster loading is in grabbing the images we need to build our cluster.

C:\projects\kind> **kind get clusters**

Kind

Next install **kubectrl**.

Based on your operating system you could homebrew to install the kubectrl or chocolatey for Windows.

<https://kubernetes.io/docs/tasks/tools/install-kubectrl/>

For Windows we’re using Chocolatey for the installation

```
c:\> choco install kubernetes-cli
```

Verify your install

```
C:\>kubectrl version --client
```

```
Client Version: version.Info{Major:"1", Minor:"19", GitVersion:"v1.19.0",
GitCommit:"e19964183377d0ec2052d1f1fa930c4d7575bd50", GitTreeState:"clean",
```

```
BuildDate:"2020-08-26T14:30:33Z", GoVersion:"go1.15", Compiler:"gc",  
Platform:"windows/amd64"}
```

Check the kind cluster we just created

```
C:\> kubectl cluster-info --context kind-kind
```

Kubernetes master is running at https://127.0.0.1:51089

KubeDNS is running at https://127.0.0.1:51089/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.

Notice we need to use the --context or set our default context to kind-kind

The newest installation of KIND automatically creates the ~/.kube/config file targeted at kind-kind, so you won't have to create that file. If your ~/.kube/config file is not created you will have to do that.

```
C:\> cd %USERPROFILE%
```

```
C:\Users\wcsadmin> mkdir .kube
```

```
C:\Users\wcsadmin> cd .kube
```

```
C:\Users\wcsadmin\.kube> notepad config
```

The file should look similar to below, and of course the server port reference will be from the information that was returned from your "kubectl cluster-info"

```
apiVersion: v1
```

```
clusters:
```

```
- cluster:
```

```
  certificate-authority-data:
```

```
LS0tLS1CRUdJTiBDRVJUSUZJQ0FURStLS0tCk1JSUN5RENDQWJDZ0F3SUJBZ0lCQURB  
TkJna3Foa2lHOXcwQkFRc0ZBREFTWTVJND0VRWURWUWFERXdwcmRXSmwKY201bGRHV  
npNQjRYRFRJd01Ea3dPREF3TWpJME0xb1hEVE13TURd05qQXdNakkwTTFvd0ZURVRN  
VHQTFRVQpBeE1LYTNWVWpYSnVaWFJsY3pDQ0FTSXdEUVlKS29aSWWh2Y05BUUVCQIFB  
RGdnRVBIBRENDQVFvQ2dnRUJBTBJJck9oYXpaZjJNamx1WFh5aTQ0cFRBbKxPZEZ5QIJV  
b0FIRmZHUtlZrzd3UkJWMzNMaU5DUDRCMINvUTZUb20zejMkK2pydUZsUWhZK0grQ1A3U  
jByRGMwUmozbxXHM0dPckJYcnRBNzB6N2MrTUdMMm5QaEt0OTZ4Q0lNdVlvZ1NUbgpIMV  
FuY0pkM3l1T3RGd1I2czdGbWxyb1RRNkFoVE5GZktBMTV2UHZ4Mmw2bEV3a0JGRIMrNjZ3  
dERPT2dJZy9CCklwQklzcWZ3bzYwbFRFUGorOEcZbnBEYtDPNkVTNXNmZFIWJWJGTndIT2  
1DL0cvdnN2Yks4MXV0anNNM1oyWmgKNUExNkxnlUpNOXk2RzI2bllyjNlekM2UWNMVG9Y  
Vm94YU95d0l0MFJlaXBIVkN3U2hKRg9qcjU0ZTBWVXlncQo5MIFpeE1GWEphUndVc1M0eV  
U4Q0F3RUFBYU1qTUNFd0RnWURWUjBQZVFIL0JBUURBZ0trTUE4R0ExVWRFd0VCCi93U  
UZnQU1CQWY4d0RRWUpLb1pJaHZjTkFRRUxCUUFEZ2dFQkFMVUxZMkNXTVINSiJUb0dQ  
ZGVWSmQ3MmZoL24KbIFGWHRyT3dQbldmMEISR0grYTVwOVcyZytKRzQ4QjUwSUtZWFEr  
VEZOTVZ0QUYrMDFWTFJRbzFQUEhudTM5NQppYlphSnNyBTBhWGVwOHFISWF2LzI0MUx  
HcWk5dThkdFV6cjYvVEkwK2dUK2IEZIZ3bHRYSiZiVXN4Q2U1VE5UCmdQTW9GWjBOdDVC  
THUzRkdrV0x3OXRNSlkyU0JNckNZZ0ZhZHg5bkVSMjd4L0NsdjEvR3picEhWRmJmYVlubmQ  
KUFNZbVRiWncxYlgyZzJBdC9pQ1BSbDJGbgXYzbXBtENjaEppVDNkK0U5aEtpV2p4T0kvVD  
FsN2E5UWwJTXdpdApIdjZ0MIJkUTQvZVdkeTFxY2hDYkZ6N0UyZEtvSXRONFFseFhQcVIMQ  
1VnYzB4TEFGK2kxdkV1bDM3Zz0KLS0tLS1FTkQgQ0VSVEIGSUNBVEUtlLS0tLQo=
```

```
  server: https://127.0.0.1:51089
```

```
  name: kind-kind
```

```
contexts:
- context:
  cluster: kind-kind
  user: kind-kind
  name: kind-kind
current-context: kind-kind
kind: Config
preferences: {}
users:
- name: kind-kind
  user:
    client-certificate-data:
LS0tLS1CRUdJTiBDRVJUSUJZQ0FURStLS0tCk1JSUM4akNDQWRxZ0F3SUJBZ0lJU3VyaX
QxdGJKNN3RFFZSkvWklodmNOQVFFTEJRQXdGVEVUTUJFR0ExVUUKQXhNS2EzVmla
WEp1WlhSbGN6QWVGdzB5TURBNU1EZ3dNREI5TkROYUZ3MHINVEE1TURnd01ESXIORFJ
hTURReApGekFWQmdOVkJBb1REbk41YzNSbGJUcHRZWE4wWlhfKek1Sa3dGd1IEVIFRREV
4QnJkV0psY201bGRHVnpMV0ZrCmJXbHVNSUICSWpBTkNa3Foa2IHOXcwQkFRRUZBQU9
DQVE4QU1JSUJDZ0tDQVFFQXo1K1d0L242RGtEbm5QblcKMFVmb3kxM1ArSldjQi9BMXdBT
TU3L2RSREplZ1g4N1lqOFRibkRDdUNhcElxVFY0ZjBqdW9JdDRDZmNKQUxMVgpXTWxhYV
hncmljSXgxejdBdzlEUDVNRHM2VkdJcWRKaGc1Z0ROQWVYdTlZUNuaUgxVDBnUFJxNjdK
WHY4YW9VCi9YbY3UFdXNDVGbDlvd0NwSEc5Vlp4MUNlaVVOd1RVb09pd29oYzhpWmh6Q
zNHdS9CZ3FRbDR5K3hMVU0wTDkKWXXZEY0NBU2dYdEhCQkU3TWN2SWxlQWFFdmdKVV
k0c1MvMUhZMytZQmZVcCtzUzZjchBKWFpveXhaTGdaMm51YgpTYmVhQ0J0Wk9wbGR3YT
gvV29SbGtrRkFpK0RURkt3cEZmTC9DYkxqOHd3QTVXdnNtWVdyWkFRZGE2aTBKQ2k5Cmd
aMzhCUUIEQVFBQm95Y3dKVEFPQmdOVkhROEJBZjhFQkFNQ0JhQXdFd1IEVllwbEJBd3dD
Z1lJS3dZQkJRvUgKQXdJd0RRWUpLb1pJaHZjTkFRRUxCUUFEZ2dFQkFCOS9FL3o1cnNB
eDNoaDVxVlo3ZUswTy95bUtES05SOFVDTApwc21kaVl2dm1qZEVkc0l2WFhWM2dMeWQ1Tm
F0SSt2WU5rbS9YODlqNTIURXNVEGhtS2V2SEorQmRZWXBpCpEQ5CmY3Y3dBNNnNIS2IEcGJ
UMVVuajRoeHJoZyt6VEFXN3hleHZEam8vdG5xazg1dDR1bzVLdFVrRjRFNEN1QXQ3TFUKUj
JaTlBta2UwdTRsUWgzaFU5Slg1bzY5N3FHb21EMkZTeDdvb212eXdDMS8rbFBIvKNURk95U2
pPbXEya001VApiZCtRbmhoeVVTRXJheC9sbnV5SDhkUIJYZkZWelk1WEILNS81RnBBMFFUU
klRXJUVExSem5mcktnQXVaS3VTCjVFL0d4Z083MU1vZGN3ajM2NWZKWE9JT1c0UIZ4TXJa
bEpnQVZla0IGUitQSUV0bEIrRT0KLS0tLS1FTkQgQ0VSVEIGSUNBVEUtLS0tLQo=
    client-key-data:
LS0tLS1CRUdJTiBSU0EgUUFJJVkfURSBURVktLS0tLQpNSUJFCEJFJQkFBS0NBUUVBejUrV3Q
vbjZEa0RublBuVzBVZm95MTNQK0pXY0lvQTF3QU01Ny9kUkRKSgYODdZCmo4VGJuREN
1Q2FwSXFUVjRmMGp1b0l0NENmY0pBTEwVW01sYWYFYZ3JpY0l4MXo3QXc5RFA1TURzNIZ
HSXFKSmgKZzVnRE5BZVh1MjNIQ25pSDFUMGdQUeE2N0pYdjhhb1UvWG5WN1BXVzQ1Rm
w5b3dDcEhHOVZaeDFDSGIVTndUVQpvT2l3b2hjOGLaaHpDM0d1L0JncVFsNHkreExVTTBMO
VI2RGNDQVNnWHRIQkJFN01jdklsSEFhRXZnSIVZNHNTCi8xSFkzK1ICZlVwK3NTNmNwcEp
YWm95eFpMZ1oybnViU2JlYUNCdFpPcGxkd2E4L1dvUmxra0ZBaStEVEZLd3AKRmZML0NiT
Go4d3dBNVd2c21ZV3JaQVFkYTZpMEpDaTlnWjM4QlFJREFRQUJBb0lCQUVzYmxFNWhvO
C9jTXUxYQpoQmVaUitHcHdqNVBBTzd1T3NPSFowSWoyYkIPWTNqRIB4cGpRSDYwTFIGW
mxJZUJ6R0ZmWk5PM0IHbWFjQ3RNCmhsbGtIY3pocC81aHZkMzcyWWY4MWZnT3dxVjAxV
mQ1djhUM0ROR1puWTQwSklydEoxWkFrcFVJUW02cm51MXgKZGI1c2dMTUQ5TjNHRDnpd
EZAZWZmYnFtcXlreEYvN2tTQ0ZKSEpyR0JoMk9GT3JSTXdxUXREaFBjWS9DTzN6VQoybV
BOTXN2Rk5JQjBoK2IKVXEWEpwoHAvd3hmYkYva3FuRXBEYTZhaTFXT21NdzhUjQjFtRFZq
SjR3TWtZdEkWcCjZrTWFTdHYvVVBBeVlVZzFvV0ZTeGFGcGs4OEh6UUp1ZnpXamZ6c2Z4bD
N4ZnNwY1FKNzNZUIZzb29kRFdWTEUKRkwxVFRBRUNnWUVBODVWwKIMcHp3M0ISa21rQ
kJOT0VLYk5wWWNOZEYyOUNDOGNuYWJRMFdmNVlqUWEzdzBYMgo5YXdiVIIQVXBCck1w
ZUY0VINPalhSTWplazkwZDlVMD1dwRlRkdjJlUjBjSTXdrYy9MVXNlVjJ6S2xUczZmanZFCi8vU0
```

```
VTRm9FS2ZmWmkzbjAzUm81R3gvdWZxK1YwUnl6L0pNMzIKeDI5N0o5NHVHdE1FSEVCY1
VDZ1IFQTJqVXoKK1VzSnRBQ2NwNkJ3TDNOV1h3U29aMk9nbzZnYjBOclpTUW9YbnNwdGt0
UmF0R3NER3JTWG1CeGJNRUIoVklERQpKbDBNTGc3QnFEaDcwVklBbmNJWmQzQkhNd0
NYMmgzNDN6NmJZSTZ1RFBSU1k0amd4WHB0djBaVDdIV1ZDVFGwCk9TWnArYkpuMFpJb3
gwSzBHc0FlcDk2WThlZnRReUoyU2FOendVRUNnWUUVBbytzWFVONEluMk01RGdVWnIXeX
EKQ1FJU2pkYII0NzVjZk42VjJGMkx5Smkzc0pmdnVZbFV5emo1NEE5cVh0RW1IUTloVWpJO
GNwczVTK0YrYUEzeQpNSUdWZm9DQmM0QTBNTI4bHpkaGhtVFE0NkpMRjc0VE1ZZ1VL
VGhpaXZIZTcyeXY2c2NGM1FvZERpWU5OUDhTCjVJc1I0Y3dWaDFVWHdFSE1zYWZnU1Yw
Q2dZRUFpUmY2RW5zeG1uVHo5MkVXZXNsMUQzZW1zbVptcTh2WHhnMXAKakxrWmcvdG
NnbTZHbW1uTlpuN2w2M3IOVWpHS0xVUKZISERuVVJ5V1VURkRvWXhxdExNWk92QkEyMn
RZL0lldQpOWnhwRkc0d0xoVm1tZ0NLyJZmdXdjald1MjVZZDVQOVg5YWhxRzZOU1o4Um5iZ
HlzbzZkZ0x1YXpTSWI0QjBMCndsSStUTUVDZ1ICSTFrek5EeHhWUFVucERleXNnWmxIS3Qw
cDltTzhKWJlGcU5UM044eXY1OEZnbitkSFU2WmYKWXZUNDdkK3FxdHRYREJEa1ZIWKJ4Kz
VSdW5kWlGxM3NKUkg2NUhVeE5QczBkdGVLa3RObnh5Zm9ubEFZTU13QgorWXBIMFVUT2
xaK3FOT3d1UzFkZHM2MU14SVZWRIJxTDVzVGIVZGdkU3VLenU3ZW41R2hIY3c9PQotLS0t
LUVORCBSU0EgUFJJVkfURSBRLVktLS0tLQo=
```

Create a folder under your projects or profile folder and switch directory to our new folder

```
C:\projects\kind> mkdir kind-wp
```

```
C:\projects\kind> cd kind-wp
```

Create kustomization.yaml with the following content

```
C:\projects\kind\kind-wp> notepad kustomization.yaml
```

Paste the following content into our file and save.

```
secretGenerator:
- name: mysql-pass
  literals:
  - password=VerySecure2020
resources:
- mysql-deployment.yaml
- wordpress-deployment.yaml
```

Download the following two resource files to our c:\projects\kind\kind-wp folder

<https://kubernetes.io/examples/application/wordpress/mysql-deployment.yaml>

<https://kubernetes.io/examples/application/wordpress/wordpress-deployment.yaml>

Copy or move the two resource YAML files that we downloaded to the c:\projects\kind\kind-wp folder, if it wasn't save there.

NOTE TO MAYA: Paste the output from the commands below each of them below please

From the kind-wp folder run the kubectl apply

```
C:\projects\kind\kind-wp> kubectl apply -k ./
```

Run the following commands to inspect the deployment

```
C:\projects\kind\kind-wp> kubectl get secrets
```

```
C:\projects\kind\kind-wp> kubectl get pvc
```

```
C:\projects\kind\kind-wp> kubectl get pods
```

Once the “get pods” shows status as Running, rather than ContainerCreating we’ll check the services for wordpress

```
C:\projects\kind\kind-wp> kubectl get services wordpress
```

Try accessing the normal default wordpress at

open <http://localhost:8080/>

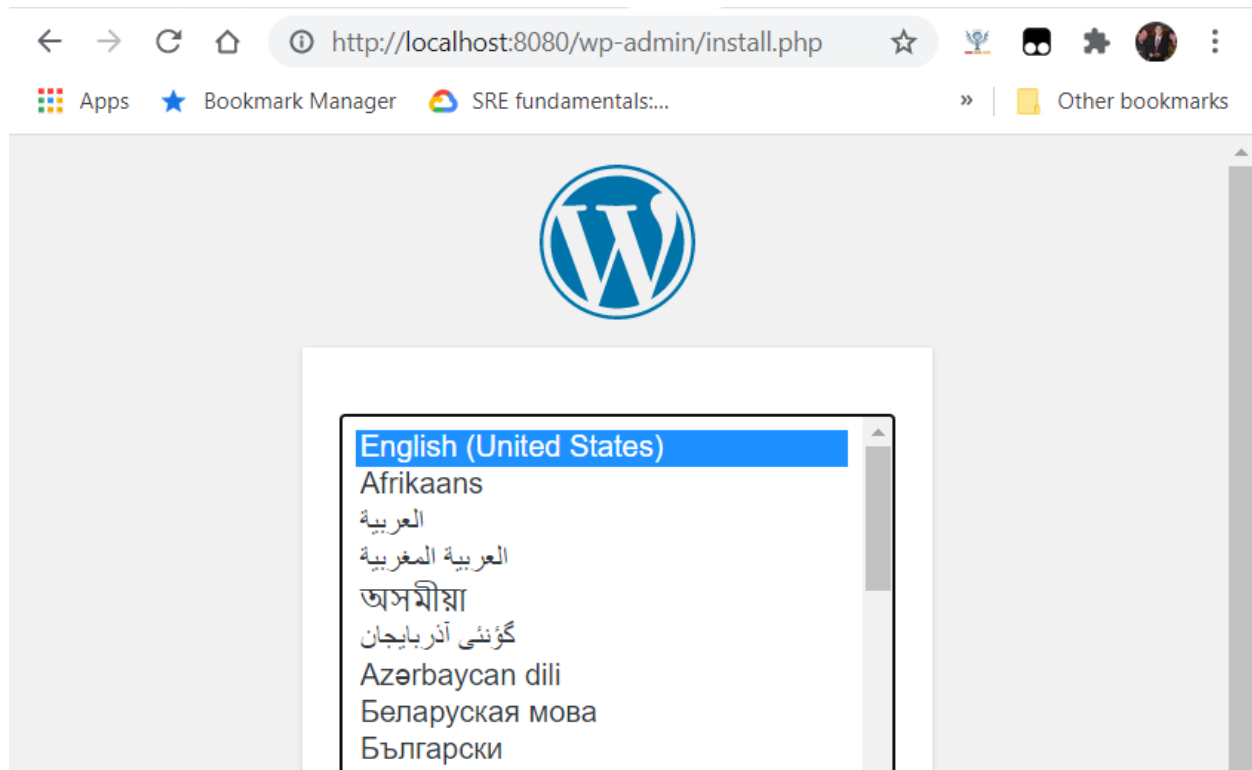
Note: We see that this is refused but recall that we see our service, but have not enabled a port forward to get to that WordPress instance

Create a port forward to allow us to access our Wordpress environment

```
C:\projects\kind\kind-wp> kubectl port-forward svc/wordpress 8080:80
```

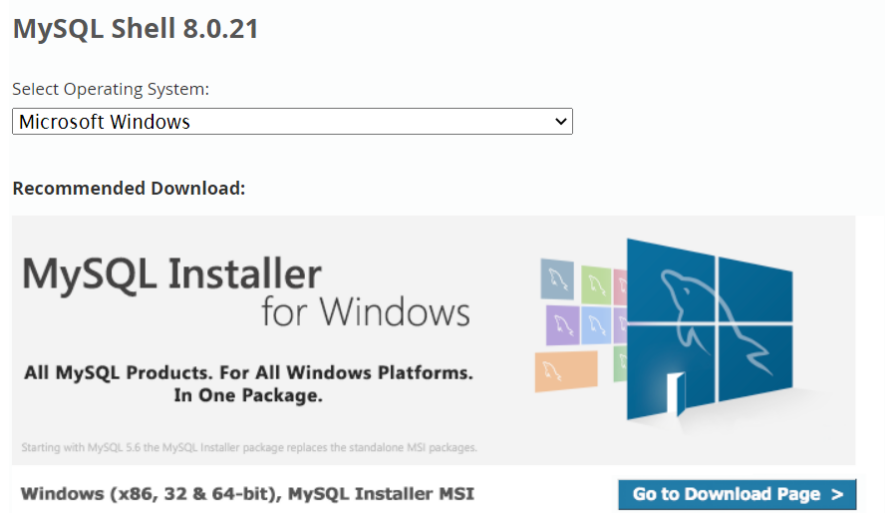
Now reopen or refresh

<http://localhost:8080/>



Download the MySQL Shell if you don't already have it from the below URL

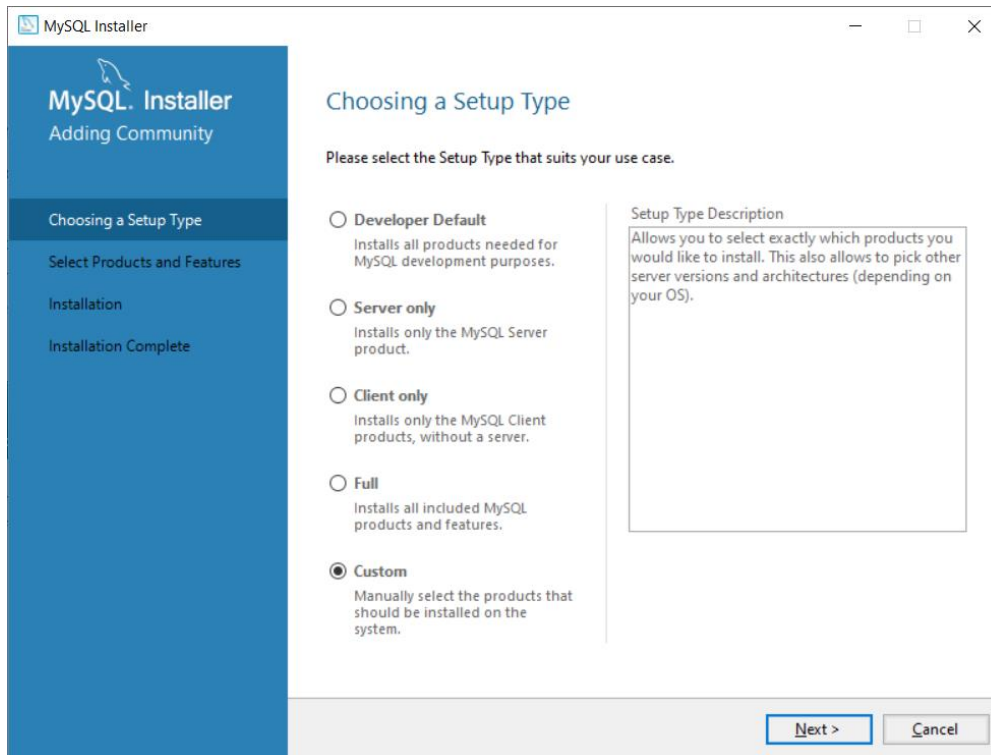
<https://dev.mysql.com/downloads/shell/>



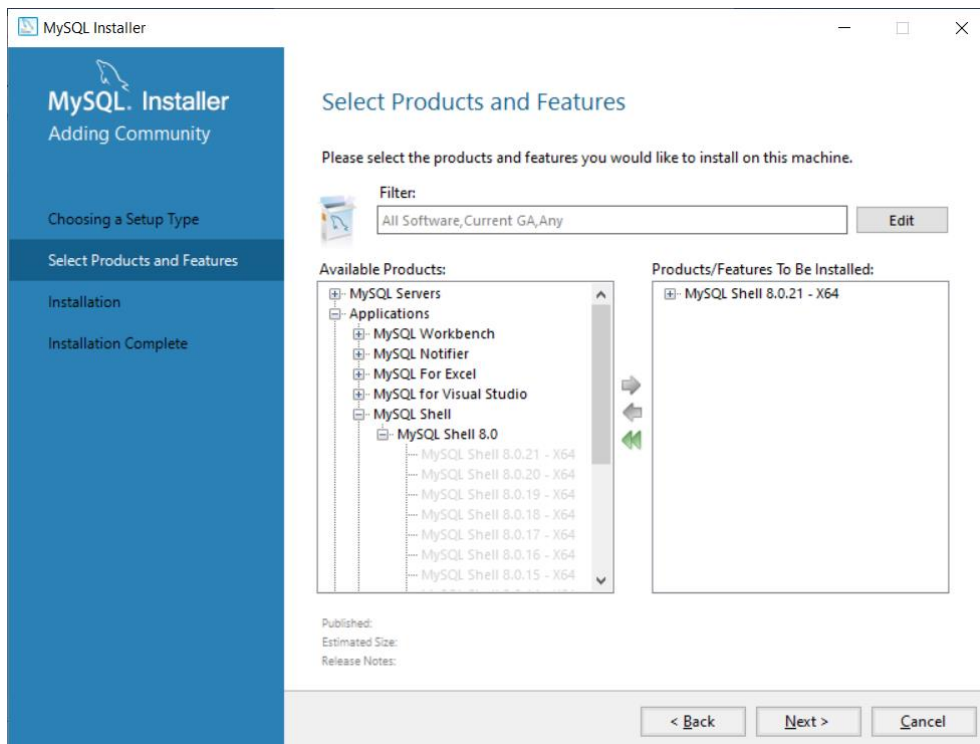
If you have an Oracle account, you can login or you can select “No thanks, just download”

Install the MySQL Shell, by running the downloaded installer

Select the “Custom” unless you prefer to install the server and such locally.

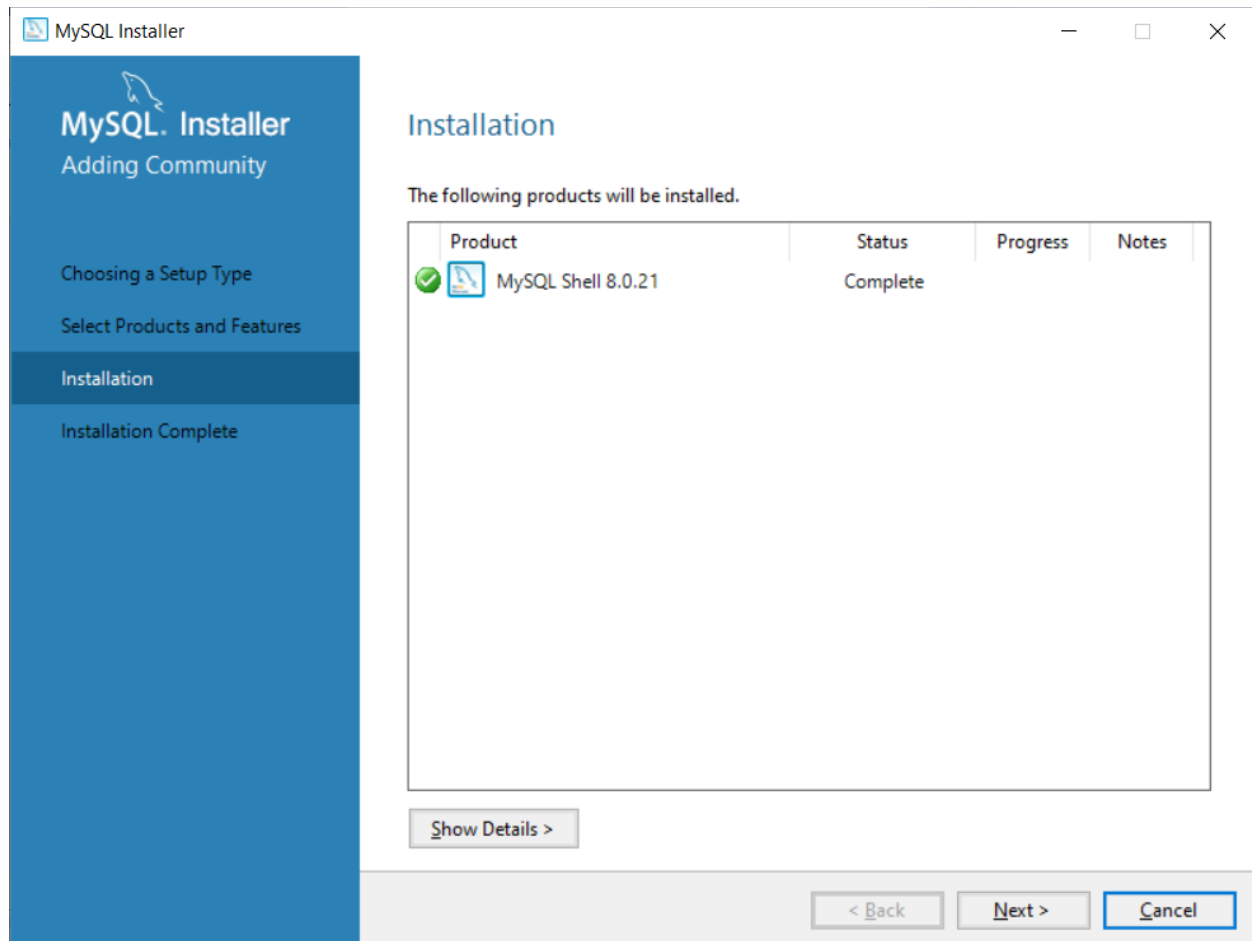


Select "Next"

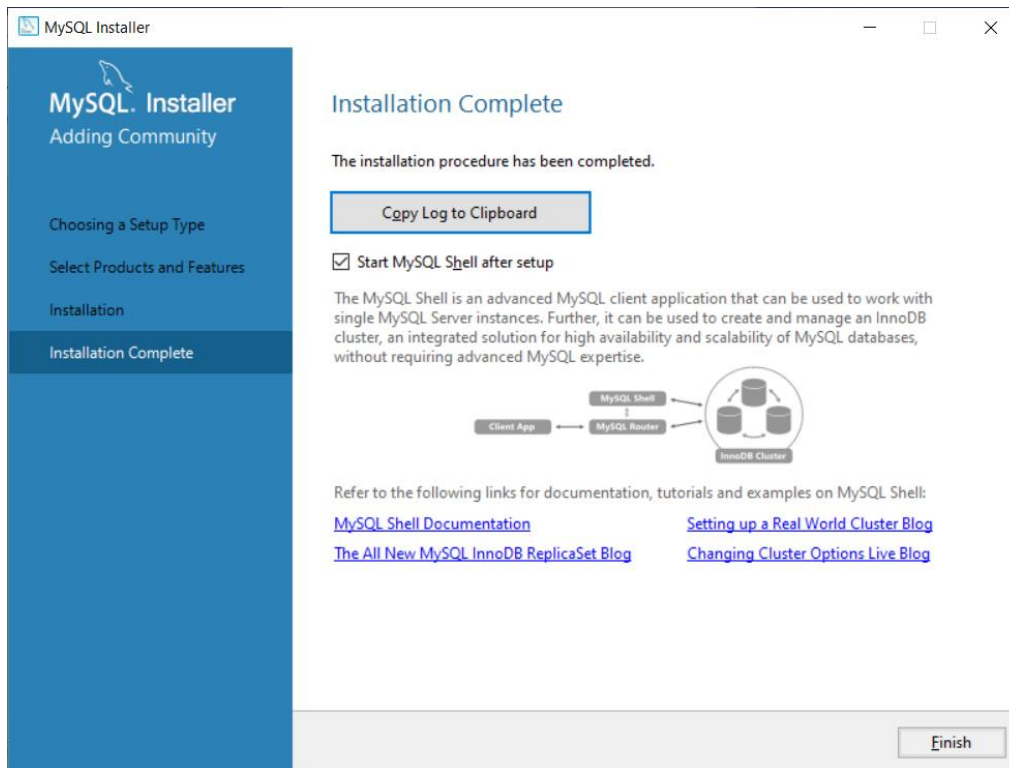


Expand the options under Applications -> MySQL Shell -> MySQL Shell 8.0 and then select MySQL Shell 8.0.21, selecting the top arrow to add that to the Products/Features To Be Installed list.

Select "Execute" to download the MySQL Shell



Select "Next"



Select “Finish”

In a command shell check your pods and create a port forward for MySQL

```
Administrator: Command Prompt - kubectl port-forward wordpress-mysql-65b8f6b6bd-bmf8l 3306:3306
Microsoft Windows [Version 10.0.18363.1016]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Windows\system32>kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
wordpress-74984574d4-rw525         1/1     Running   0           36m
wordpress-mysql-65b8f6b6bd-bmf8l   1/1     Running   0           36m

C:\Windows\system32>kubectl port-forward wordpress-mysql-65b8f6b6bd-bmf8l 3306:3306
Forwarding from 127.0.0.1:3306 -> 3306
Forwarding from [::1]:3306 -> 3306
```

From your MySQL Shell

Enter \connect root@localhost:3306

```
C:\Program Files\MySQL\MySQL Shell 8.0\bin\mysqlsh.exe
MySQL Shell 8.0.21

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Oracle is a registered trademark of Oracle Corporation and/or its affiliates.
Other names may be trademarks of their respective owners.

Type '\help' or '? for help; '\quit' to exit.
MySQL JS > \connect root@localhost:3306
Creating a session to 'root@localhost:3306'
Please provide the password for 'root@localhost:3306': *****
Save password for 'root@localhost:3306'? [Y]es/[N]o/[e]ver (default No): Y
Fetching schema names for autocompletion... Press ^C to stop.
Your MySQL connection id is 5
Server version: 5.6.49 MySQL Community Server (GPL)
No default schema selected; type \use <schema> to set one.
```

You can review your **kustomization.yaml** to find the MySQL password set or if you used the default noted in this lab, it will be **VerySecure2020**

```
C:\Program Files\MySQL\MySQL Shell 8.0\bin\mysqlsh.exe
MySQL localhost:3306 JS > \sql show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| wordpress |
+-----+
4 rows in set (0.0040 sec)
MySQL localhost:3306 JS > \sql use wordpress;
Query OK, 0 rows affected (0.0020 sec)
MySQL localhost:3306 wordpress JS > \sql show tables;
Empty set (0.0023 sec)
```

Enter **\sql show databases;**

The list of databases in MySQL is listed, including our WP DB

Enter **\sql use wordpress;**

This selects the WordPress DB that we've created in our deployment

Enter **\sql show tables;**

You'll notice that no tables are created, since we've not created our WordPress instance, as yet.

Go back to the WordPress admin screen, fill in the information and select "Install WordPress"

Please provide the following information. Don't worry, you can always change these settings later.

Site Title

Username
Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password
Medium

Your Email
Double-check your email address before continuing.

Search Engine Visibility ☐ Discourage search engines from indexing this site
It is up to search engines to honor this request.

Return to your MySQL Shell and look at the tables again in our WordPress DB

```
C:\Program Files\MySQL\MySQL Shell 8.0\bin\mysqlsh.exe
MySQL localhost:3306 JS > \sql show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| wordpress |
+-----+
4 rows in set (0.0040 sec)
MySQL localhost:3306 JS > \sql use wordpress;
Query OK, 0 rows affected (0.0020 sec)
MySQL localhost:3306 wordpress JS > \sql show tables;
Empty set (0.0023 sec)
MySQL localhost:3306 wordpress JS > \sql show tables;
+-----+
| Tables_in_wordpress |
+-----+
| wp_commentmeta |
| wp_comments |
| wp_links |
| wp_options |
| wp_postmeta |
| wp_posts |
| wp_term_relationships |
| wp_term_taxonomy |
+-----+
```

Lab complete, kill the port-forwarding session by Ctrl-C

Run the following command to delete your Secret, Deployments, Services and PersistentVolumeClaims:

From our kind-wp folder in a command prompt

```
C:\projects\kind\kind-wp> kubectl delete -k ./
```

```
Handling connection for 8080
Handling connection for 8080

C:\projects\kind\k8s-wp>kubectl delete -k ./
secret "mysql-pass-d2dmhcd6k7" deleted
service "wordpress-mysql" deleted
service "wordpress" deleted
deployment.apps "wordpress-mysql" deleted
deployment.apps "wordpress" deleted
persistentvolumeclaim "mysql-pv-claim" deleted
persistentvolumeclaim "wp-pv-claim" deleted

C:\projects\kind\k8s-wp>
```

```
C:\projects\kind\kind-wp> kind help delete
```

Deletes one of [cluster]

Usage:

kind delete [command]

Available Commands:

cluster Deletes a cluster
clusters Deletes one or more clusters

Flags:

-h, --help help for delete

Global Flags:

--loglevel string DEPRECATED: see -v instead
-q, --quiet silence all stderr output
-v, --verbosity int32 info log verbosity

Use "kind delete [command] --help" for more information about a command.

```
C:\projects\kind\kind-wp>kind delete cluster --help
```

Deletes a resource

Usage:

kind delete cluster [flags]

Flags:

```
-h, --help            help for cluster
--kubeconfig string   sets kubeconfig path instead of $KUBECONFIG or
$HOME/.kube/config
--name string         the cluster name (default "kind")
```

Global Flags:

```
--loglevel string    DEPRECATED: see -v instead
-q, --quiet          silence all stderr output
-v, --verbosity int32  info log verbosity
```

```
C:\projects\kind\kind-wp> kind delete cluster --name Kind
Deleting cluster "Kind" ...
```