Signature Project: Automated Essay Scoring System

Github: https://github.com/blueandhack/Automated-Essay-Scoring-System-With-K8S

Step 1. Wrap application to a docker image

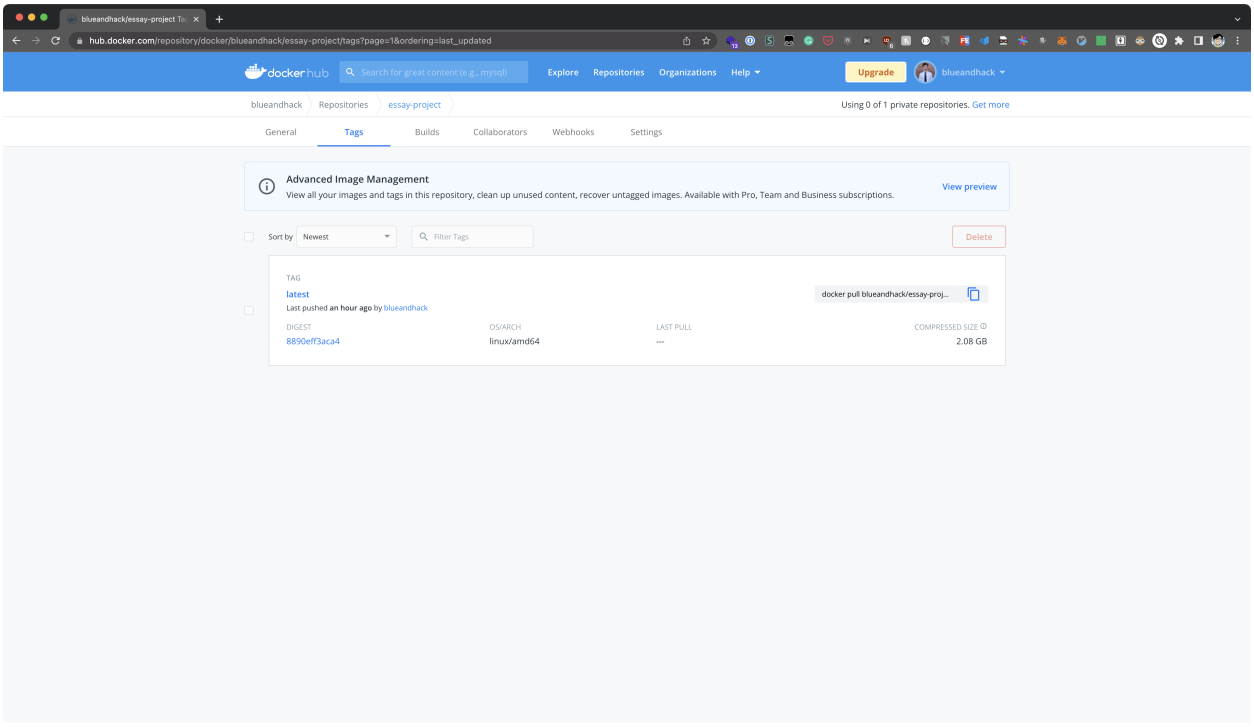
1. Build docker image and push

Create `Dockerfile`

```
FROM ubuntu:20.04
SHELL ["/bin/bash", "-c"]
ENV TZ=America/Los_Angeles
RUN ln -snf /usr/share/zoneinfo/$TZ /etc/localtime && echo $TZ > /etc/timezone
RUN apt-get update -y
RUN apt-get upgrade -y
RUN apt-get install build-essential -y
RUN apt-get install libxml-parser-perl wget git pip unzip pkg-config libpng-dev libfreetype6-dev freetype2-demos python3 python3-pip python
RUN mkdir -p /home/project/
WORKDIR /home/project/
RUN mkdir -p /tmp/
RUN wget --load-cookies /tmp/cookies.txt \
    "https://docs.google.com/uc?export=download&confirm=$(wget \
    --quiet --savecookies /tmp/cookies.txt --keep-session-cookies \
    --no-check-certificate 'https://drive.google.com/file/d/1RxfZOYyNvzvCf37_vABfJMkohAsEZKtH/' \
    -O- | sed -rn 's/.confirm=([0-9A-Za-z_]+)./\1\n/p')&id=1RxfZOYyNvzvCf37_vABfJMkohAsEZKtH" \
    -O rough.zip && rm -rf /tmp/cookies.txt
RUN wget https://s3.amazonaws.com/models.huggingface.co/bert/bert-large-uncased.tar.gz
RUN unzip rough.zip
RUN cpan install XML::Parser::PerlSAX
RUN cpan install XML::RegExp
RUN cpan install XML::DOM
WORKDIR /home/project/RELEASE-1.5.5
RUN ./runROUGE-test.pl
WORKDIR /home/project/
RUN git clone https://github.com/bheinzerling/pyrouge.git
WORKDIR /home/project/pyrouge
RUN pip install -e .
WORKDIR /home/project/
RUN git clone https://github.com/Quan25/flask-summary.git
RUN cd /home/project/
RUN pip3 install torch torchvision torchaudio --extra-index-url https://download.pytorch.org/whl/cpu
RUN pip3 install flask pandas sklearn nltk gensim==3.8.3 pytorch-pretrained-bert matplotlib==3.0.1
RUN echo $'import nltk\nnltk.download("punkt")' > punktDownload.py
RUN python3 punktDownload.py
WORKDIR /home/project/flask-summary
RUN echo $'#!/bin/bash\nsed -i "s/\/home\/quan\/Downloads\/bert-large-uncased/\/home\/project\/bert-large-uncased.tar.gz/g" summarizer/Bert
RUN chmod +x replacePath.sh
RUN ./replacePath.sh
EXPOSE 5000
CMD ["python3", "app.py"]
```

```
docker build -t blueandhack/essay-project .
docker push blueandhack/essay-project
```

```
# Yoga @ Yogas-iMac in ~/Projects/NPU/CS571/project on git:main o [16:29:04]
$ docker push blueandhack/essay-project
Using default tag: latest
The push refers to repository [docker.io/blueandhack/essay-project]
5df2f5511564: Pushed
1e54d4e5c083: Pushed
3612b4e9039c: Pushed
5f70bf18a086: Pushed
41d44ea2e19d: Pushed
b4ff2c43503a: Pushed
c9365da53e67: Pushed
538d20348479: Pushed
4e6ab15c7909: Pushed
5fc21d5be3f1: Pushed
03b9408a41e8: Pushed
513afc9b917a: Pushed
18dbad1234d9: Pushed
0d89ade2707b: Pushed
070baf4086db: Pushed
b23c1b84d962: Pushed
bec19dc918a8: Pushed
e084ab1cd79c: Pushed
06531f8e608c: Pushed
fd463765db86: Pushed
4e61589f3262: Pushed
bbcbd491e854: Pushed
9a847a4eaea5: Pushed
66926c6f5373: Pushed
867d0767a47c: Mounted from library/ubuntu
latest: digest: sha256:8890eff3aca4d71e56a037ad81fe91b86481765a1b79bc17c090424e58bca86f size: 7009
```



Step 2. K8S configuration and deploy

1. Create cluster with high performance virtual machine (c2-standard-4)

```
gcloud container clusters create essay-project --num-nodes=1 --machine-type=c2-standard-4 --region=us-west1-a
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ gcloud container clusters create essay-project --num-nodes=1 --machine-type=c2-standard-4 --region=us-west1-a
Default change: VPC-native is the default mode during cluster creation for versions greater than 1.21.0-gke.1500. To create advanced routes based clusters, please pass the `--no-enable-ip-alias` flag
Note: Your Pod address range (`--cluster-ipv4-cidr`) can accommodate at most 1008 node(s).
Creating cluster essay-project in us-west1-a... Cluster is being health-checked (master is healthy)...done.
Created [https://container.googleapis.com/v1/projects/cs571-project-339206/zones/us-west1-a/clusters/essay-project].
To inspect the contents of your cluster, go to: https://console.cloud.google.com/kubernetes/workload_/gcloud/us-west1-a/essay-project?project=cs571-project-339206
kubeconfig entry generated for essay-project.
NAME: essay-project
LOCATION: us-west1-a
MASTER_VERSION: 1.21.9-gke.1002
MASTER_IP: 35.230.14.188
MACHINE_TYPE: c2-standard-4
NODE_VERSION: 1.21.9-gke.1002
NUM_NODES: 1
STATUS: RUNNING
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl get nodes
NAME                                          STATUS   ROLES    AGE     VERSION
gke-essay-project-default-pool-5708f1dc-qtdg   Ready    <none>   5m14s   v1.21.9-gke.1002
lin19604@cloudshell:~/final_project (cs571-project-339206)$
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl get nodes -o wide
NAME                                          STATUS   ROLES    AGE   VERSION            INTERNAL-IP   EXTERNAL-IP    OS-IMAGE                             KERNEL-VERSION   CONTAINER-RUNTIME
gke-essay-project-default-pool-5708f1dc-qtdg   Ready    <none>   25m   v1.21.9-gke.1002   10.138.0.21   34.83.29.163   Container-Optimized OS from Google   5.4.170+         containerd://1.4.8
```

2. Create deployment, service and ingress yaml

Create `essay-project-deployment.yaml`

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: essay-project-deployment
spec:
  selector:
    matchLabels:
      app: essay-project-deployment
  replicas: 1
  template:
    metadata:
      labels:
        app: essay-project-deployment
    spec:
      containers:
      - name: essay-project-deployment
        image: blueandhack/essay-project
        ports:
        - containerPort: 5000
```

Create `essay-project-service.yaml`

```
apiVersion: v1
kind: Service
metadata:
  name: essay-project-service
spec:
  selector:
    app: essay-project-deployment
  ports:
  - protocol: TCP
    port: 5000
    targetPort: 5000
```

Create `essay-project-service-ingress.yaml`

```
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: essay-project-service-ingress
  annotations:
    nginx.ingress.kubernetes.io/rewrite-target: /$2
spec:
```

```
  rules:
    - host: essay.blueandhack.com
      http:
        paths:
          - path: /
            pathType: Prefix
            backend:
              service:
                name: essay-project-service
                port:
                  number: 5000
```

3. Create resources by yaml files

```
kubectl create -f essay-project-deployment.yaml
kubectl create -f essay-project-service.yaml
kubectl create -f essay-project-service-ingress.yaml
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl create -f essay-project-deployment.yaml
deployment.apps/essay-project-deployment created
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl create -f essay-project-service.yaml
service/essay-project-service created
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl create -f essay-project-service-ingress.yaml
ingress.networking.k8s.io/essay-project-service-ingress created
```

4. Check status and ingress external address IP

```
kubectl get pods
kubectl get svc
kubectl get ingress
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl get pods
NAME                                     READY   STATUS    RESTARTS   AGE
essay-project-deployment-7b8dfc5c58-q8cjd   1/1     Running   0          4m3s
```

```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl get svc
NAME                   TYPE        CLUSTER-IP    EXTERNAL-IP   PORT(S)    AGE
essay-project-service  ClusterIP   10.32.8.102   <none>        5000/TCP   21m
kubernetes             ClusterIP   10.32.0.1     <none>        443/TCP    28m
```

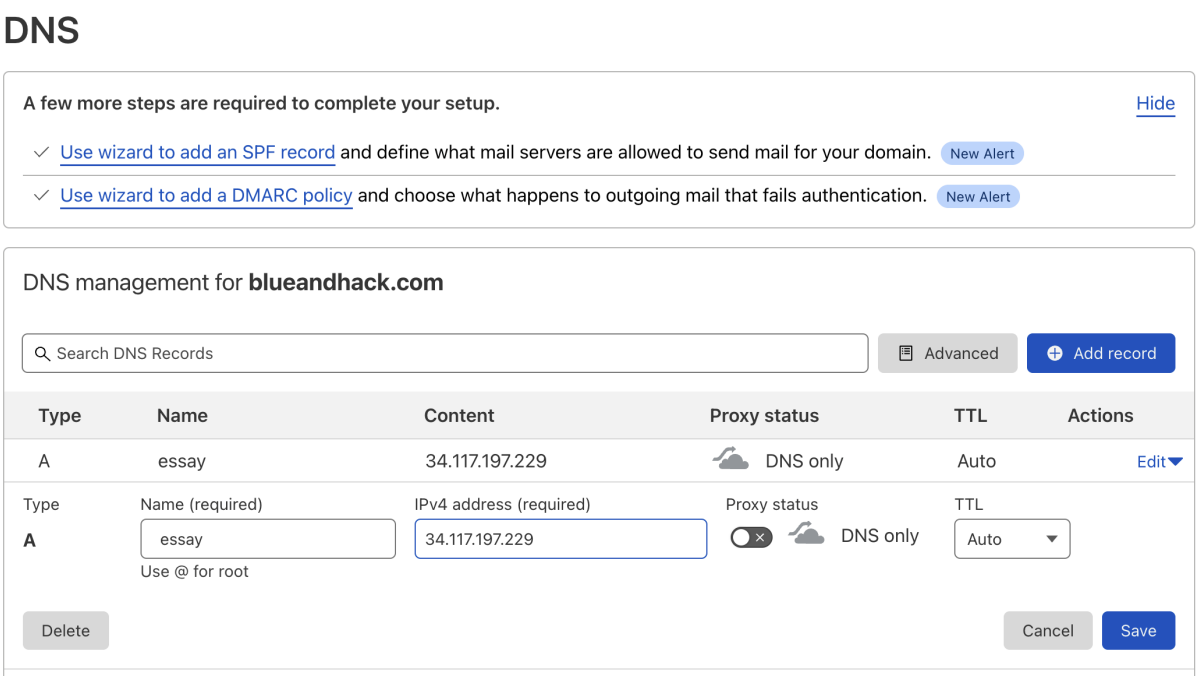
```
lin19604@cloudshell:~/final_project (cs571-project-339206)$ kubectl get ingress
NAME                        CLASS    HOSTS                 ADDRESS          PORTS   AGE
essay-project-service-ingress   <none>   essay.blueandhack.com   34.117.197.229   80      13m
```

Copy ingress address IP

Step 3. DNS and Testing

1. DNS setting

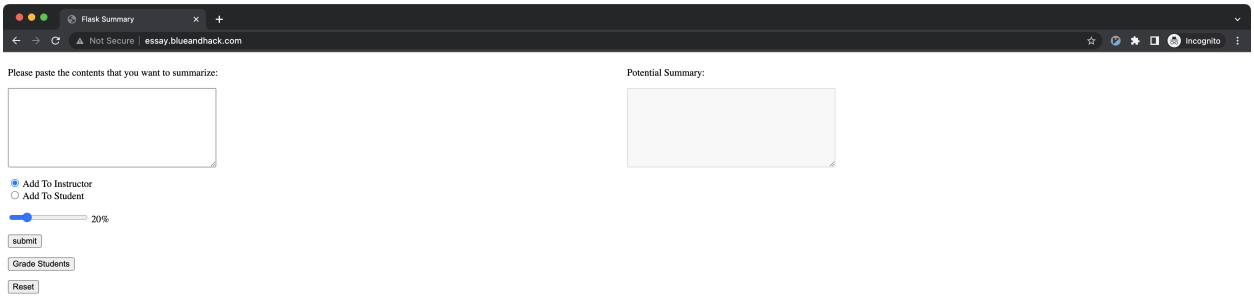
Go to Cloudflare to setting up DNS, for the project, I want to using the subdomain “essay”, so set A type record with Name “essay” and IPv4 “34.117.197.229”

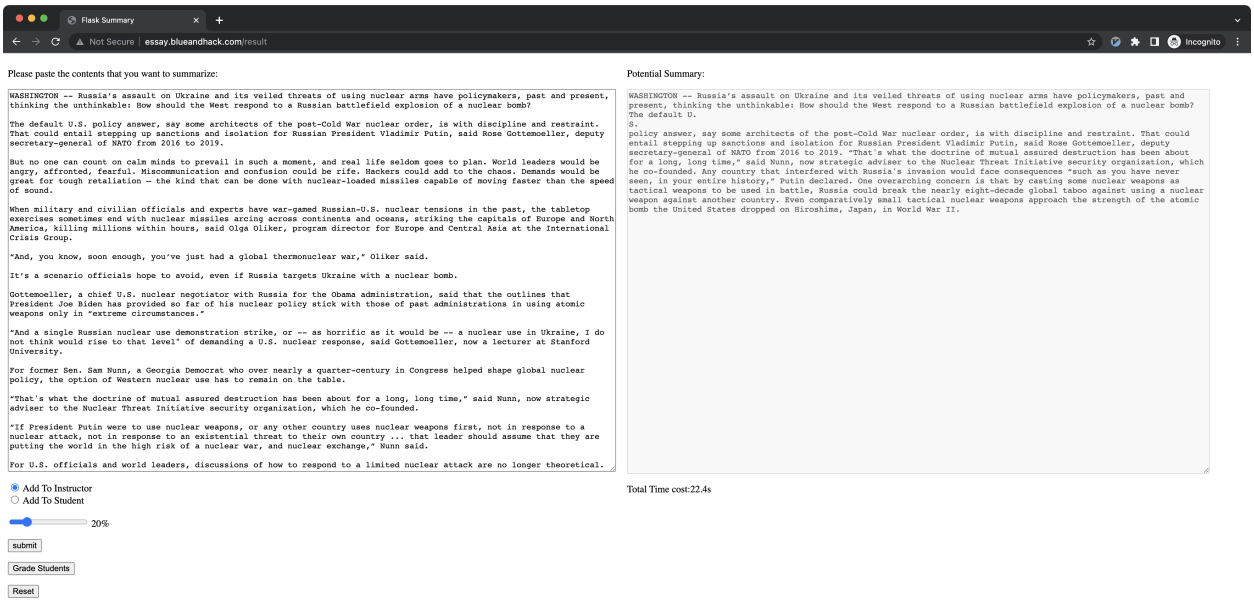


Try to ping the domain to make sure DNS is set correctly

```
# Yoga @ Yogas-iMac in ~ [17:47:22]
$ ping essay.blueandhack.com
PING essay.blueandhack.com (34.117.197.229): 56 data bytes
64 bytes from 34.117.197.229: icmp_seq=0 ttl=58 time=13.007 ms
64 bytes from 34.117.197.229: icmp_seq=1 ttl=58 time=11.010 ms
64 bytes from 34.117.197.229: icmp_seq=2 ttl=58 time=10.354 ms
64 bytes from 34.117.197.229: icmp_seq=3 ttl=58 time=12.668 ms
64 bytes from 34.117.197.229: icmp_seq=4 ttl=58 time=10.210 ms
^C
--- essay.blueandhack.com ping statistics ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 10.210/11.450/13.007/1.170 ms
```

2. Open browser and type domain http://essay.blueandhack.com (After finishing the project, I shut down the cluster)


Flask Summary
Not Secure | essay.blueandhack.com
Incognito
Please paste the contents that you want to summarize:
Potential Summary:
Add To Instructor
Add To Student
20%
submit
Grade Students
Reset


Flask Summary
Not Secure | essay.blueandhack.com/result
Incognito
Please paste the contents that you want to summarize:
WASHINGTON -- Russia's assault on Ukraine and its veiled threats of using nuclear arms have policymakers, past and present, thinking the unthinkable: How should the West respond to a Russian battlefield explosion of a nuclear bomb?
The default U.S. policy answer, say some architects of the post-Cold War nuclear order, is with discipline and restraint. That could entail stepping up sanctions and isolation for Russian President Vladimir Putin, said Rose Gottemoeller, deputy secretary-general of NATO from 2016 to 2019.
But no one can count on calm minds to prevail in such a moment, and real life seldom goes to plan. World leaders would be angry, affronted, fearful. Miscommunication and confusion could be rife. Hackers could add to the chaos. Demands would be great for tough retaliation — the kind that can be done with nuclear-loaded missiles capable of moving faster than the speed of sound.
When military and civilian officials and experts have war-gamed Russian-U.S. nuclear tensions in the past, the tabletop exercises sometimes end with nuclear missiles arcing across continents and oceans, striking the capitals of Europe and North America, killing millions within hours, said Olga Oliker, program director for Europe and Central Asia at the International Crisis Group.
"And, you know, soon enough, you've just had a global thermonuclear war," Oliker said.
It's a scenario officials hope to avoid, even if Russia targets Ukraine with a nuclear bomb.
Gottemoeller, a chief U.S. nuclear negotiator with Russia for the Obama administration, said that the outlines that President Joe Biden has provided so far of his nuclear policy stick with those of past administrations in using atomic weapons only in "extreme circumstances."
"And a single Russian nuclear use demonstration strike, or -- as horrific as it would be -- a nuclear use in Ukraine, I do not think would rise to that level" of demanding a U.S. nuclear response, said Gottemoeller, now a lecturer at Stanford University.
For former Sen. Sam Nunn, a Georgia Democrat who over nearly a quarter-century in Congress helped shape global nuclear policy, the option of Western nuclear use has to remain on the table.
"That's what the doctrine of mutual assured destruction has been about for a long, long time," said Nunn, now strategic adviser to the Nuclear Threat Initiative security organization, which he co-founded.
"If President Putin were to use nuclear weapons, or any other country uses nuclear weapons first, not in response to a nuclear attack, not in response to an existential threat to their own country ... that leader should assume that they are putting the world in the high risk of a nuclear war, and nuclear exchange," Nunn said.
For U.S. officials and world leaders, discussions of how to respond to a limited nuclear attack are no longer theoretical.
Potential Summary:
WASHINGTON -- Russia's assault on Ukraine and its veiled threats of using nuclear arms have policymakers, past and present, thinking the unthinkable: How should the West respond to a Russian battlefield explosion of a nuclear bomb?
The default U.
S.
policy answer, say some architects of the post-Cold War nuclear order, is with discipline and restraint. That could entail stepping up sanctions and isolation for Russian President Vladimir Putin, said Rose Gottemoeller, deputy secretary-general of NATO from 2016 to 2019. "That's what the doctrine of mutual assured destruction has been about for a long, long time," said Nunn, now strategic adviser to the Nuclear Threat Initiative security organization, which he co-founded. Any country that interfered with Russia's invasion would face consequences "such as you have never seen, in your entire history," Putin declared. One overarching concern is that by casting some nuclear weapons as tactical weapons to be used in battle, Russia could break the nearly eight-decade global taboo against using a nuclear weapon against another country. Even comparatively small tactical nuclear weapons approach the strength of the atomic bomb the United States dropped on Hiroshima, Japan, in World War II.
Total Time cost:22.4s
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Instructor Essay Summary

- Instructor:

  Essay Summary: WASHINGTON -- Russia's assault on Ukraine and its veiled threats of using nuclear arms have policymakers, past and present, thinking the unthinkable: How should the West respond to a Russian battlefield explosion of a nuclear bomb?The default U. S. policy answer, say some architects of the post-Cold War nuclear order, is with discipline and restraint. That could entail stepping up sanctions and isolation for Russian President Vladimir Putin, said Rose Gottemoeller, deputy secretary-general of NATO from 2016 to 2019. "That's what the doctrine of mutual assured destruction has been about for a long, long time," said Nunn, now strategic adviser to the Nuclear Threat Initiative security organization, which he co-founded. Any country that interfered with Russia's invasion would face consequences "such as you have never seen, in your entire history," Putin declared. One overarching concern is that by casting some nuclear weapons as tactical weapons to be used in battle, Russia could break the nearly eight-decade global taboo against using a nuclear weapon against another country. Even comparatively small tactical nuclear weapons approach the strength of the atomic bomb the United States dropped on Hiroshima, Japan, in World War II.

Student Grade Rank (From High to Low)

Student Score Percentile

Name	Student 2	Student 1	Student 3	Student 4
student percentile	1.0	0.75	0.5	0.25

- Student Name: Student 2

  Essay Summary: the first us deaths related to coronavirus might have occurred weeks earlier than previously thought

- Student Name: Student 1

  Essay Summary: the contagious respiratory illness continues to spread worldwide. health and government officials have asked every one of us to help slow the spread in our communities

- Student Name: Student 3

  Essay Summary: the cdc recommend that all people wear cloth face masks in public places where it is difficult to maintain a 6-foot (2-meter) distance from others. this will help slow the spread of the virus from asymptomatic people and people who do not know that they have contracted it.

- Student Name: Student 4

  Essay Summary: the entire speech requires about 10 minutes to read. there are two sections i wish to draw to your attention. the first principle is that you must not fool yourself