Mark Richmond, Zach Colangelo, Jared Thomas (Group 9)
CSC496 - Project Deliverable 3
May 8, 2020

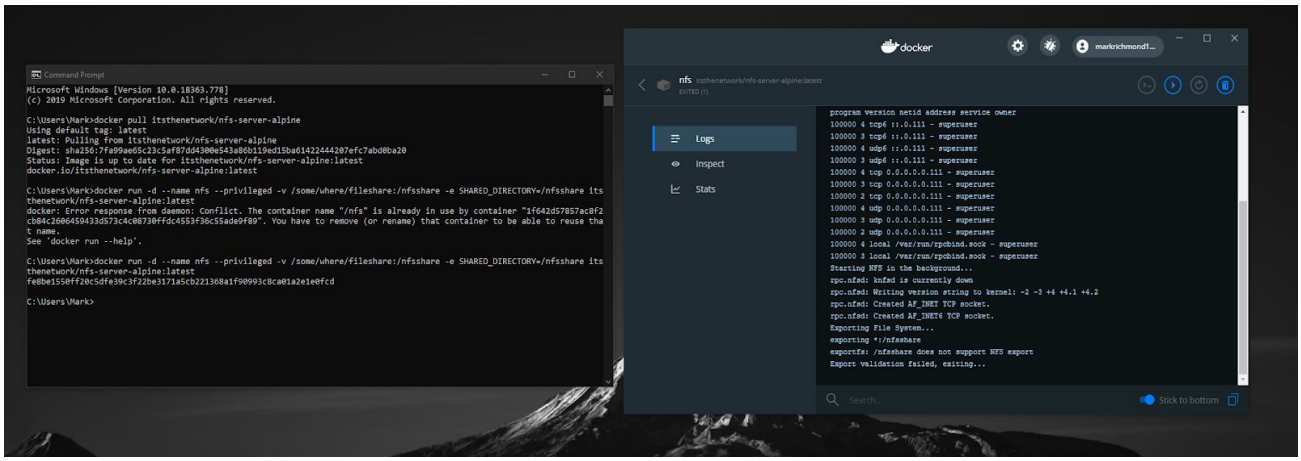
NFS File System Demonstrated Within Docker Containers

The goal of our project was to set up a network file system (NFS) over a server that multiple users can access and use as long as the server is running. For demonstration purposes we were going to use two docker containers, using Ubuntu as a base image. One docker container would contain the NFS server and the other would contain a client that would access the NFS over the network. We used github to manage all of our repositories and scripts. We have three separate branches for the project. The master branch is the default (containing the 'READ ME'). The other two branches are nfsclient and nfsserver. The nfsserver branch has the files that create a server container using an Ubuntu base image. The nfsclient branch is similar to the server, using an Ubuntu base image, but it's meant as the end user. They are the users of the networked file system and that container contains files to interact with the nfsserver to access the files within the server container.

The NFS will be set up through docker using a container. The container made by the docker host accesses the files through the NFS. These files are supplied through a custom image. The image is then given the information for the local file paths necessary for successful file export/import destinations. Running: $ docker pull markrichmond1994/nfsserver will download the files off docker hub for the NFS server. Running $ docker run -d --name server --privileged --net=host -v /some/where/fileshare:/nfsshare -e SHARED_DIRECTORY=/nfsshare markrichmond1994/csc496server will create the container to run the NFS server. Unfortunately the server would not stay running long enough to troubleshoot. The logs in the Docker Desktop dashboard were empty. We desperately tried different commands inside the command prompt and modifying the setup scripts on github. We searched for some insight as to why our container would not run. Eventually, we tried another NFS server on docker hub. We made it further with this attempt but still encountered issues. This time we went through the logs and these two lines below were our issue.

Exportfs: /nfsshare does not support NFS export

Export validation failed, exiting…



From what we gathered online, this issue can result from an encrypted drive or other problems. Our drive should not have any encryption so we are still unsure what the issue is. Although it has something to do with the export list in /usr/sbin/exportfs, we still are not sure what the issue is. It might also be an issue with our environment variable path.

The server is unable to actually run and appears in the docker desktop as running. However, the docker commands that create the image and container do run in docker without error. However, there has been a repeating error involving export destinations. The nfsshare repository is not correctly validating the exports within the file system. This may be an issue related to connections between the docker application and github. It is also likely that it is an error within our scripts. However, because it did not leave any logs within docker desktop it was difficult to troubleshoot and locate the issue. It is possible that there is an error within our install script and it will need to be re-evaluated moving forward. We had the same issue trying to run our client container. It did not want to start and there were no logs, just like our attempt to create a server container.

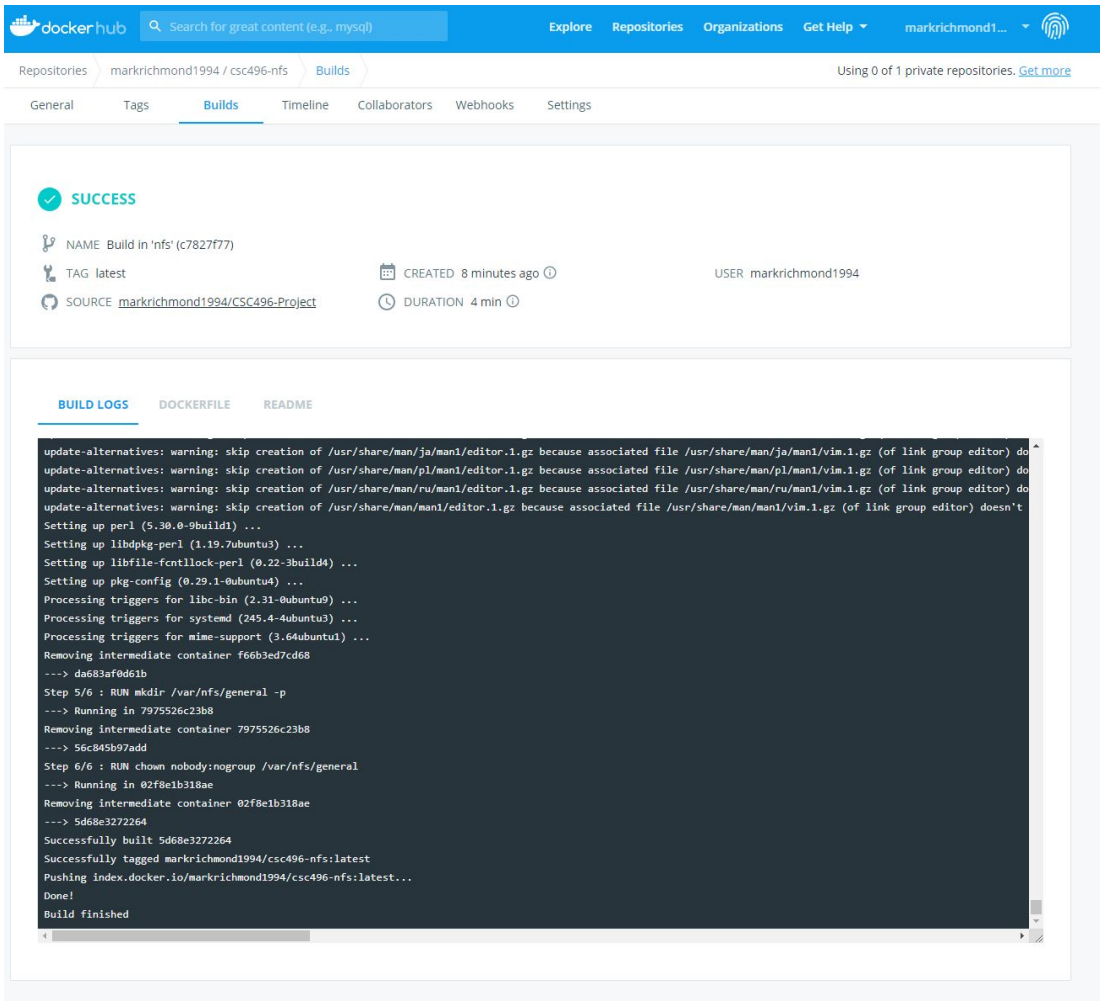
We also created a few batch files to run the docker commands within the command prompt automatically. This helped save a little time. We used the batch files many times to create new containers and test the scripts that set up our NFS server/client.

In terms of fully meeting the second deliverable, we are unable to provide a fully working example of our NFS. However, we were able to meet some progress by successfully being able to upload an image and (hypothetically) make an accessible container; although we were not able to fully get it to function properly. Although we have not successfully completed the deliverable to the fullest extent, the growing pains were necessary to help us get as familiar with the structure of NFS systems. Ultimately we all learned how to troubleshoot and understand docker containers a little more, even if our attempts were a failure. We learned a lot from our failures.

With that being said, now we are moving onto project deliverable 3. Although we have encountered some issues, we started to do some troubleshooting on our assignment.

Transitioning Into Project Deliverable 3

We noticed that another group was working on a similar project, and we glanced at their Github to see how they approached the problem. Then we saw some things we did wrong, then we built from there. We combined our github branches into one. A new large branch called “nfs”. We combined the two branches named “nfsserver” and “nfsclient” to form the new single branch, “nfs”. We started modifying our dockerfile to install everything necessary for our NFS server/client. We created new scripts for the server and client installs as well. After we created a new Github repository we also needed to create a new repository on DockerHub so it can be accessed through Docker desktop. Using Docker desktop, we are trying to get the server to run. We created a txt file on the github repository for console commands, that contain the set instructions to set up the server. We then realized that docker can be unreliable for an nfs server. Which may have prevented us from achieving forward progress from an early stage. We also experimented some with docker swarm trying to get our NFS server up and running. That did not present the results we were looking for either.



Overall this project was very frustrating to try to get running. I think we would have benefited greatly from some more in class hands on, it is easier to troubleshoot in person with other classmates and the professor. We also could have benefited by having a larger group. Not that the project was not within our reach, but with other courses going on another member or two would have helped us a lot. The task before us seemed so insurmountable that we went in all different directions trying to find some reputable sources to help guide us. In the end we were not able to create a NFS server and client out of docker containers.

Appendix

Github repository: https://github.com/markrichmond1994/CSC496-Project/tree/nfs