Research Log Krish Chaudhary

- ➢ Link to code repository (e.g., github links) or project files: <Insert links here>
- ➢ Link to the documentation/reproducibility document: <Insert link here>

Fall 2022

Week 1	Week 2	Week 3	Week 4	Week 5
Week 6	Week 7	Week 8	Week 9	Week 10

Week 11

Winter 2023

Week 1	Week 2	Week 3	Week 4	Week 5
Week 6	Week 7	Week 8	Week 9	Week 10

Spring 2023

Week 1	Week 2	Week 3	Week 4	Week 5
Week 6	Week 7	Week 8	Week 9	Week 10

Week 11(December 5 - December 11) logs:

- **Summary of grad mentor/research group meeting**:
    a. This week we did not meet with our Professors or Ph.D. advisor because it was finals week and a group agreement that we would not have a meeting this week.
- **Meeting with Chinmay:**
    a. We did not have a meeting with Chinmay this week.
- **Summary of team meeting**:
    a. We met this week and recorded the first draft of our presentation. We then sent it to Professor Mirza for review and she gave us feedback to work on. During our group meeting, we went over the comments that Professor Mirza gave us last week regarding our research proposal. We worked for two hours and completed the final draft of the proposal.
- **Weekly goals**:
    1. Continue development of Goobox
    2. Begins implementing vulnerabilities into the application
    3. Meet with the team to discuss new updates regarding our project and project plan

- **Accomplishments**:
    1. Presented our presentation to the entire class and introduced our project
    2. We completed the final draft of the research proposal

Week 10(Nov 28 - December 4) logs:

- **Summary of grad mentor/research group meeting**:

    a. We met on November 30th with Noah regarding final Fall updates and an updated timeline for the coming month. We agreed that we will put more time into the project during the break and we will meet with Noah virtually at least once. We all gave Noah updates on what we had completed over the past week. Noah discussed what should be completed by the time we meet next as well as giving us advice on teamwork and distributing work. He also looked over our presentation and proposal and gave us advice on that.
- **Meeting with Chinmay:**
    a. We did not have a meeting with Chinmay this week.
- **Summary of team meeting**:
    a. We did not meet this week because of Thanksgiving Break and the fact that we were all at home or sick.
- **Weekly goals**:
    4. Move our primary communication channel from messenger to slack
    5. Complete the database connection with Flask, comment updates, and upload the new project files to GitHub
    6. Once the entire application is completed, move it to the UCSB server
    7. Begin exploring vulnerabilities for the project that we wish to include

- **Accomplishments**:
    3. Completed the project presentation for the Fall Quarter
    4. Explored the K3S environment so that there is a stronger understanding and direct implementation knowledge for moving the application to Cloud
    5. Altered the database tables for potential unit testing with admin data
    6. Studied APIs related to database connection to help fix error

Week 9(Nov 20 - Nov 27) logs:

- **Summary of grad mentor/research group meeting**:
    a. On November 18th, we met with Noah to make up for the week 9 meeting that he could not attend due to the holidays. However, during the meeting, we went over

the proposal and he gave us harsh but fair criticism as he used to work as a technical writer. He fully connected all of us to the Abrams server and gave us a Kubernetes tutorial to experiment with on the Abrams server itself. By giving us such help he allowed us to get unstuck and not worry about the Cloud connection.

- **Meeting with Chinmay:**
    a. On November 23rd, we plan to meet with Chinmay and Professor Mirza regarding comments on our research proposal.
- **Summary of team meeting**:
    a. On November 20th, we met on Zoom to discuss the research proposal. Our main priority was fixing the errors with the research proposal that we had discovered in the last meeting. In addition, we also worked to fix the comments Noah had written. Finally, we incorporated comments from the peer review to make sure our draft received a holistic review. We finalized the research paper and are ready for the final phase of peer review. We just found out Mirza gave us all passes in each section!

- **Weekly goals**:
    8. Complete the Goo Box application so that we can move to the next step
    9. Begin readings on Flannel technology
    10. Continue experimenting with servers to upload the Goo Box application on the server

- **Accomplishments**:
    7. Completed the first strong version of the research proposal draft
    8. Worked with datasets and understanding data in class
    9. Explored the Kubernetes and UCSB server environments
    10. Understood the direction of the project a little better
    11. Got questions on graduate school answered that give me a clearer picture of my future

[Graduate Students Answers]

Week 8(Nov 13 - Nov 19) logs:

- **Summary of grad mentor/research group meeting**:
    a. On November 15th, we met with Noah in the Security Lab conference room. We shared our research proposal and he decided to look over it after the meeting. In the meeting, we were added to the Sec Lab servers using our SSH keys. We also discussed updates about our project.

- **Meeting with Chinmay:**
    a. On November 15th, we met with Chinmay to discuss our project. We explained the progress that we had made along with how our weekly meetings without our professors and advisors went. Chinmay advised me to take 4 units of the research course and then 2 other CS courses max and one GE. I will use this advice and likely take CS 64, 130a, 196, and then Econ 1A.
- **Summary of team meeting**:
    a. On November 13th, we met as a team at the Library. The entire time we discussed the research proposal and thoroughly added to it. First, we completed our individual sections within the first 30 minutes. Then, over the next hour, we edited each other's sections as a group and made the changes on the spot. Finally, we ended by adding the evaluation section and adding more critical citations that would improve the paper.

- **Weekly goals**:
    11. I will meet with Daryl this week to discuss the backend and writing scripts to get the database up and running.
    12. Figure out the Google Cloud Application that Noah mentioned during the meeting
    13. Follow up with Noah about K3S implementation with the project

- **Accomplishments**:
    12. We completed the first draft of the research proposal. Now we have a clear idea of where the project is headed and what we want to see at the end
    13. Continued working on bugs on the Pastebin project and researching technologies

Week 7(Nov 6 -Nov 12) logs:

- **Summary of grad mentor/research group meeting**:
    a. On November 8th, we met with Noah in the Security Lab. We discussed what we had done over the last week. Noah advised us to develop a simple end-to-end application rather than one with a microservice architecture because he believes it would be much simpler. Our group is not sure which we want to pursue but we are contemplating his idea. In addition, he gave us some sources for places where we can look for and find vulnerabilities in the application. Finally, we walked through a Kubernetes tutorial on deploying clusters and pods with Docker Containers.
- **Meeting with Chinmay:**

    a. Our meeting with Chinmay on November 8th was cancelled because he had some computer problems. We will look to reschedule.
- **Summary of team meeting**:
    a. We met on November 6th to discuss what the proposal was supposed to look like. In a round-robin fashion, we wrote the solution part of the proposal. We also discussed connecting the app logic to the front end and back end. Finally, we worked in Notion to break apart some of the tasks of each of the services that we wanted.

- **Weekly goals**:
    14. Communicate with Daryl to automate the database scripts and connect them to the Frontend
    15. Continue working with Kubernetes in order to eventually integrate the application
    16. Begin discussing QA and unit testing into our application for flawless code
    17. Look to interview graduate students

- **Accomplishments**:
    14. I contributed to the project proposal and we got closer to the final version
    15. Researched the Flask to Postgress database connection error
    16. Looked at Kubernetes commands and understood the technology more

Week 6(Oct 30 -Nov 5) logs:

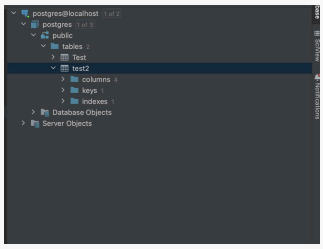
- **Summary of grad mentor/research group meeting**:
    a. On November 1st, we had an in-person meeting in the security hall conference room. We introduced ourselves and talked about each other's backgrounds for a bit. Then, we designed a timeline, for the rest of the year, which includes creating the app, deploying it on the Cloud, data collection on security measures, and paper writing. We also set up our notion page and invited him to the page. Finally, he recommended two books to use about Kubernetes and the Cloud.
- **Summary of team meeting**:
    a. On October 30th, we met as a group and worked on our proposal for the first half of the meeting. We created a solid rough draft for the introduction of the paper. Then in the second half of the meeting, we discussed what we completed in terms of the project. I explained to Daryl that I was having trouble working with

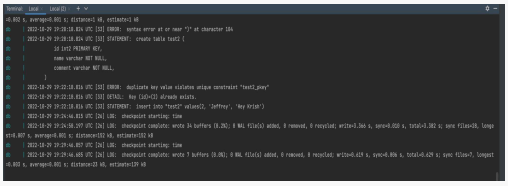
Flask and Postgress at the same time. We also discussed general project layout and restructuring since the Professors did not like our previous architecture.

- **Weekly goals**:
    18. Troubleshoot the issue with connecting the Postgress with the Flask application. Having trouble writing the scripts for accessing CRED commands for the project.
    19. Read some more about Kubernetes and install K3 on my computer. Try to write some basic commands to test the application if time permits.
    20. Research communication protocols with UWSGI and NGINX.
    21. Attend speed advising event.

- **Accomplishments**:
    17. Learned some basic Docker commands as well as Docker concepts
    18. Researched ways to implement the backend for our Pastebin idea
    19. Set up the Postgress DB container in project
    20. Learned MySQL commands to manually update tables/data

Below are some images from my work in the past week



Week 5(Oct 23 - Oct 29) logs:

- **Summary of grad mentor/research group meeting**:
    a. On October 25th, we met for the first time with our PHD advisor Noah and Professor Krugel and Vigna at the same time
        - The professors explained that our communication architecture behind our microservices was weak and that we needed something else
        - Noah asked for our GitHub information such as username and keys so that he could share the resources as well as add us to the SB servers
        - The professors re-explained that for the backend we would need to create our own container and database as we would not be using AWS.

        - They explained that our immediate next step should be to deploy our hello world application on Kubernetes with the help of Noah.
- **Summary of team meeting**:
    a. On October 23rd we met and discussed the research proposal assignment only. We worked as a group to get the citations up and write a clear and concise summary in the related works section.
    b. On October 27th, we met with our Ph.D. advisor Noah for the first time. He went over SMART goals and we asked him quick questions about our project like the communication gateway.

- **Weekly goals**:
    22. Start watching videos on the backend services such as MySQL containers. Begin planning for my part of the project.
    23. Practice Python coding more
    24. Figure out a proper communication gateway/architecture
    25. Continue developing the research proposal

- **Accomplishments**:
    21. Asked a lot of thorough questions and assumptions about the project early on during our research group meeting which cleared a lot of questions.

Week 4(Oct 16 - Oct 22) logs:

- **Summary of grad mentor/research group meeting**:
    a. We were told to meet Noah to discuss hosting the application on UCSB servers
    b. They also asked us for updates about what we do in CS 110
- **Summary of team meeting**:
    a. On October 16th we met as a group
        - I was feeling under the weather so I joined the meeting on Zoom
        - The rest of the team drew up a sketch for the general microservice application that we plan to build

        - We agreed on an idea where users can log in and save notes. The user can only see their notes on the website. It can be used for reminders or general note-taking.
        - We also finished our discussion on containerization
    b. On October 20th, we met as a group to get in contact with our Ph.D. Advisor Noah. We also created a plan of who would handle each container of the project. I will be handling the database and mySQL container.

- **Weekly goals**:
    26. Present my findings on microservices in class on Monday
    27. Build a related research diagram list on Wednesday
    28. Meet with Professor Kruegel and Vigna to discuss the next steps
    29. Set up a meeting with our grad mentors for access to UCSB servers and introductions

- **Accomplishments**:
    22. Figured out the NGINX container configuration and arranged it with the flask container configuration.

Monday Teaching Assignment:

1. I want my student to be able to explain what a microservice is, how they work, how we can integrate them into our project, and microservice communication using diagrams.
2. Questions 2 and 3 are done on the slides themselves, which have been attached below

Microservices/ Distributed Systems Presentation

Week 3 (Oct 9 - Oct 15) logs:

- **Summary of grad mentor/research group meeting**:

a. On October 12th, we met with Professor Kruegel
    - He mentioned that we were at a good pace with our accomplishments in Week 1
    - For the next week he told us to message Noah about getting our project connected with the UCSB security lab servers
    - He assigned us learning to contanerize our hello world application
    - Finally, he told us that it was up to us what specific task our application completed as long as the end product was a honeypot.

- **Summary of team meeting**:
    a. On October 9th, we met as a group
        - We discussed the main topic ad each other's topics. I will be talking about microservices and distributed systems next week.
        - We also updated each other on research and worked together to continue to set up the environment
        - We ran into a lot of trouble trying to install UWSGI but we will ask the professors about it on Tuesday

- **Weekly goals**:
    30. Add an additional layer of UWsgi onto the Flask application and hello world file
    31. Present our research paper to the class after reading
    32. Meet with Professor Kruegel and Vigna to discuss the next steps

- **Accomplishments**:
    23. I got the hello world application to run on my computer
    24. Ran into trouble with SSH keys but I realized I needed one on my computer as the other SSH key on GitHub was from the CSIL computers. First, I tested whether the SSH key for my local computer existed, and an error response came up that showed it didnt. Installed the necessary files, which included the public and private keys, which allowed me to pull the group GitHub files.
    25. Got the basic setup done that the professors asked of Flask and a hello world application on a port.
    26. Met with the Professor and had a good discussion about project path

October 9th, 2022
Reading Notes part 2

October 12, 2022
Teaching Topics Learning Notes

Week 2 (Oct 2 - Oct 8) logs:

- **Summary of grad mentor/research group meeting**:

    a. On Otocber 4th, we met for the first time with Professor Vigna and Professor Kruegel. We exchanged greetings and discussed the overall project layout.
    b. Some things we talked about in class were potential Ph.D. advisors, the tech stack for the project(NGINX, Flask API, Docker, and Python), and initial steps for starting the project: developing a web application using flask and putting it in a container, and final objectives - developing a honeypot to test vulnerabilities with real-time hackers.
- **Summary of team meeting**: We plan to have our team meeting on Sunday to discuss what the Professors discussed in our meeting.
- **Weekly goals**:
    33. Complete Research Paper Assignment
    34. Meet with project advisor
    35. Read and understand the assigned research paper on project
    36. Begin initial steps as highlighted by research mentors
- **Accomplishments**:
    a. Got a meeting with professors to begin discussions
    b. Met with the team for a quick 30-minute chat to go over initial setup details

October 4th, 2022
Reading Notes

Week 1 (Sept 25 - Oct 1) logs:

- ➢ Link to github repo:
- ➢ Link to reproduce latest results (reproducibility document):

Log Reflection:

1) Tony's log journal had an emphasis on writing all the goals and clarifying what needs to get done. Jacqui posted all her results and specific metrics which a reviewer could understand and see, which others did not do much. Miranda's journal was a lot more like a journal where she communicated all her findings and thoughts very well so it was easy to follow. Adrian does a good job of highlighting the different sections and keeping the writing organization the same as before.
2) I think the logs were useful because they indicated a stopping point in the researcher's journey or a recent accomplishment, which helped make marks that indicated progress and served as reminders. In addition, specific commands or issues that were solved or reached could help teammates or the research mentor avoid them or solve them if they saw the same issue. The log also forms an outline of the project and shows the general path of the project from start to finish, which is really helpful when writing reports or for future research projects.
3) The students keeping their goals did seem to get their goals completed. In the beginning, the students generally tried a bunch of things and learned a ton of new things, which slowly helped them reach their goals. There is a lot more content, which indicates a lot more gaps being filled by their learning. By the end of the project, each of the researchers was able to reach it more efficiently, which goes to show that they probably improved in terms of organization, research, skills, and knowledge. The progress that they made is impressive to see.
4) I think that keeping a well-detailed log is essential to doing a good job because it's the backbone of the project as it has all the important discoveries, failures, confusion, and other important aspects. Documenting everything is key, but also making sure it's readable and concise is important.

- **Summary of grad mentor/research group meeting**: <Topic of the meeting, who attended, who presented, what did you learn, your interaction with the professor, your tasks, and what questions are you left with>
- **Summary of team meeting**: <This is a meeting among you and your team members. Summary of your common understanding from the meeting with the prof., tasks for the week and distribution of the tasks. Summary of questions for your grad mentor or professor and things that are blocking you>
- **Summary of meeting with Chinmay**: <Starts in the second half of the Fall quarter> <Any new insights from discussions with Chinmay, and changes in the task distribution, challenges that Chinmay helped you resolved, refined versions of your questions for your mentors, anything that is still blocking you, any other concerns>

- **Weekly goals**:
    a. (Maybe) Attend research group meeting and record attendance
    b. Set up research log
    c. Complete Reflection 1: Identity and ERSP preliminary thoughts
    d. Reflect on research logs
- **Accomplishments**: <List of things other than the above goals that you completed in the week>
- Details of how you accomplished your goals

Tuesday (1.5 hours) for log set up and reflection

1. Set up log. I chose to use Googledocs for my first log because I have much more familiarity with Google Docs and I find using its features a lot more efficient.
2. Wrote log reflection
3. I think I am excited to learn some new skills and technologies, as well as meet professors/other students. I am excited to broaden my knowledge and take away some good skills as well from the program. I really hope to develop good research and improve upon my understanding of the universe in some way.
4. I am nervous about digesting all the material and performing research, which is new to me. I am also nervous about working on such an important and big project that will have real-life applications.

Thursday ABC hours for XYZ (at least 2-3 lines summary)