George Litvinov
Topics in SWE
Project Progress Report
Spring 2022

Teaching Security – The Practical Way: Implementing the Course Material

Proposed Topic:
As discussed previously, I would like to continue upon my midterm paper and implement the practical CTF-like course material for the fundamental theory-centric security course at Columbia – *COMS W4181 Security I*, in order to introduce the practical component of the course in a gamified way.

Value to User Community:
The value of this project to the user community is two-fold. The portal would make instructors' lives easier in terms of planning and incorporating practical components into their courses. The goal is to build a modular, user-friendly and updatable practical component framework. From the students' perspective, the implementation of such a practical component into the classroom would allow them to study the material in a gamified manner, and perform additional research in topics that interest them, all while gaining a strong practical background that is important to have for a future security professional.

Planned Project Flow:
1. Study Fundamental Security Syllabuses, and identify topics that can be tied into practical components.
2. Meet with Columbia Security Professors in order to pitch the idea, discuss features and needs from such an application.
3. Research open-source CTF frameworks in order to identify the most useful one based on the features and needs of Professors.
4. Implementation of the framework in order to have all required features.
5. Implementation of a sample of practical component questions for each identified topic.
6. Presentation of project to professors and students to receive feedback.
7. Tweak and improve before the final submission deadline.

Research Questions:
1. Is the implementation of a CTF framework a suitable way of adding a practical component to a security course?
2. What are features that instructors deem important in a practical homework framework?
3. What are some challenges of tying such a homework framework into the classroom?

Demo:
The classroom demo will include the presentation of the framework from the student and instructor side. I will most likely be demonstrating the following flow:
1. Instructor releases practical questions to specific topic.
2. Student solves one challenge and submits their work.

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3. Professor views the submission.

Progress Report:

1. I have had two meetings with Professor Bellovin where he stated that this is a novel and interesting idea that he is looking forward to continuously discussing. During our second meeting we have identified some required things from an instructor's perspective for such a framework to work as well as some difficulties that may arise when tying it into a classroom setting.
2. I have researched and started developing the additional features on the CTFd framework (https://ctfd.io/).
3. I have identified the topics in security courses that are good candidates for challenge development.

Project progress is at an estimated 50% currently.