Sri Lanka Institute of Information Technology

Year 3 – Semester 2

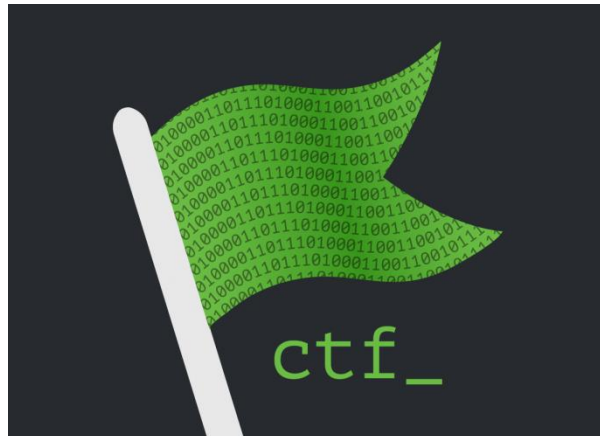# Information Security Project (IE3092)

Capture the Flag Tournament (CTF 2020)
Project Proposal

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1. Introduction

<u>What is a CTF?</u>

CTF (Capture The Flag) is a kind of information security competition that challenges contestants to solve a variety of tasks ranging from a scavenger hunt on Wikipedia to basic programming exercises, to hacking your way into a server to steal data. In these challenges, the contestant is usually asked to find a specific piece of text that may be hidden on the server or behind a webpage. This goal is called the flag, hence the name!

There are 3 main types of CTF's out there namely jeopardy style, attack-defense style and mixed. Jeopardy style CTFs provide a list of challenges and award points to individuals or teams that complete the challenges, groups with the most points wins.

Attack/Defense style CTFs focus on either attacking an opponent's servers or defending one's own. These CTFs are typically aimed at those with more experience and are conducted at a specific physical location.

Mixed is a combination of both Jeopardy and Attack/Defense styles.

2. Scenario and Theme

Our CTF box is based on J.K Rowling's Harry Potter Universe. Harry Potter is a series of fantasy novels written by British author, J. K. Rowling. The novels chronicle the lives of a young wizard, Harry Potter, and his friends Hermione Granger and Ron Weasley, all of whom are students at Hogwarts School of Witchcraft and Wizardry. The series was later made into 8 movies which are popular all around the world.

Our CTF is called "Accio Flags!" and the word "Accio" means "I summon" in Latin. So the meaning of our CTF name is "I summon Flags".

Harry Potter along with his friends Ron and Hermione go through various challenges in order to destroy the evil dark wizard Lord Voldemort. To defeat him, Harry has to find and destroy 7 Horcruxes. A Horcrux is an object formed by dark magic that is used by a wizard or witch to achieve immortality by splitting a dark wizard's soul into separate pieces.

We created this CTF based on the 7 Horcruxes. Your mission is to collect all 7 Horcruxes in order to defeat Lord Voldemort.

3. Architecture

- The CTF is created as a Web Application

- Operating system - Linux in which the ova file is compatible with Oracle VM Virtualbox

- Server- Apache Server

- OS – Ubuntu Server 16.4

- IDE – Notepad++ / Visual Studio Code

- The CTF box will require the following specifications:

    1. 1 core CPU

    2. 1512MB RAM

- The VM will be set to a bridged network adapter by default.

- The VM will acquire IP by default.

- Each section has 2 levels:
  - 1st level $\rightarrow$ Finding the horcrux
  - 2nd level $\rightarrow$ Destroy the horcrux

- The final level is level 15.

- Includes a total of 15 levels.

- Estimated time taken to finish the CTF - 9 hours.

- The levels include challenges from different aspects of information security such as

    1. Cryptography

    2. SQL injection

    3. Cross site scripting

    4. Social Engineering

    5. Digital Forensics

    6. Programming

    7. Steganography

GitHub Link: https://github.com/Himashi-Karunathilake/Accio-Flags

YouTube Link: https://www.youtube.com/c/ChamodiPitumpe

4. Game Structure

There are 7 categories namely,

- Horcrux 1 The Diary
- Horcrux 2 The Ring
- Horcrux 3 The Cup
- Horcrux 4 The Locket
- Horcrux 5 The Diadem
- Horcrux 6 Harry Potter
- Horcrux 7 The Snake

Each category has 2 Levels. To go to the next level, the flag from the previous level is needed. When you complete 2 levels from each Horcrux category, you will collect the flag that will let you destroy that Horcrux. The objective is to collect all the flags from 14 levels. The final level is level 15 where you have to collect the flag by combining 2 flags from the previous levels.

The 14 levels are created under 7 categories as follows

Hocrux 1 The Diary	Hocrux 2 The Ring	Hocrux 3 The Cup	Hocrux 4 The Locket	Hocrux 5 The Diadem	Hocrux 6 Harry Potter	Hocrux 7 The Snake
The Diary - Discover	The Ring - Discover	The Cup - Discover	The Locket - Discover	The Diadem - Discover	Harry Potter - Discover	The Snake - Discover
The Diary - Destroy	The Ring - Destroy	The Cup - Destroy	The Locket - Destroy	The Diadem - Destroy	Harry Potter - Destroy	The Snake - Destroy

5. Drill Plan

It is important to thoroughly test the application before deployment. Our drill plan consists penetration tests done first by our team members to discover weaknesses and to know the flow of the CTF.

It consists of 2 stages.
- Testing the web application.
- Testing the web application after integrating it with the virtual machine.

Then by using members of the targeted audience to get their feedback. For this we plan to use a team of 2nd and 3rd year undergraduate students who will have to complete their internships.

6. Audience

The main audience is cyber security intern recruiters. Cyber Security interns are being recruited more than before by companies due to the rapid growth in the field of information security. However, there is no proper interviewing process to check the skills of potential interns. Therefore, this CTF is aimed at assessing their skills. Challenges will be given and the time taken to solve the CTF will be measured. Employees will be able to assess the skills of potential recruits. The uniqueness of this CTF is that many areas of cyber security will be assessed.

We also have a secondary audience. There are a growing number of Information Security degrees offered by universities. However, students don't always understand what "Information Security" is before joining degree programs and they often ask their peers what information security exactly means and what information security professionals do. Our aim is to target undergraduate students who have an interest in having a career in the field of information security and who are interested in specializing in cyber security as the secondary audience. By participating in this CTF they will be able to get a clear understanding on the principals of information security and the methods and techniques used. It provides them a way to have fun while learning a vast amount of new knowledge.
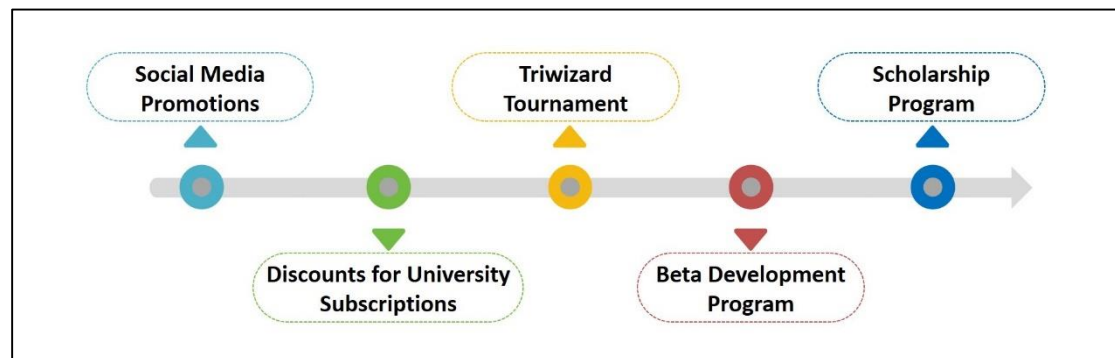
7. Budget Plan

PROJECT STAGE	UNIT PRICE ($)	QTY	TOTAL
Documentation	$3.00	1	$3.00
Task Designing	$5.00	1	$5.00
Development	$30.00	1	$30.00
Testing	$5.00	1	$5.00
Data Cost	$25.00	4	$100.00
Scope Cost	$3.00	1	$3.00
Web Hosting Cost	$8.00	6	$48.00
Total			$194.00

Budget for 6 months

8. Market Plan

"Accio Flags!" has its own website. In order to spread awareness regarding this project, social media platforms such as Twitter and Facebook will be used. Additionally, the product will be promoted via advertisements in YouTube.

This CTF box is open to anyone to try. Individuals can purchase the CTF box for $9.99 where as if a university decide to purchase this for a number of individuals at once, a discount of 15% will be given.

After the initial release of "Accio Flags!", a selected batch from a particular university will be able to participate in a CTF challenge named "Triwizard Tournament". Here, the top three students will be granted a special opportunity.

The top three students selected from the Triwizard Tournament will be able to participate in the Beta Development Program. Additionally, when other top candidates appear, they too will be granted the opportunity to participate in the Beta Development Program.

The participants who actively participate in the Beta Development Program will be granted a scholarship.

9. Business Value

We estimate that "Accio Flags!" has a value of around 500 USD. This includes the Web Application, domain and the Server.

10. Time Line

The following Gantt Chart shows the work plan that describes the amount of work to be done throughout the semester.

TASK	TIME ALLOCATION
Project Discussion and Planning	Week 1
Requirement Gathering	Week 2
Project Proposal	Week 3
Designing Tasks	Week 4 – Week 5
Level Development	Week 6 – Week 11
Integration	Week 12
Testing	Week 13
Drill Plan Testing	Week 14