

BRUTE FORCE ATTACK

CYBER SECURITY

Time: 60 mins

Introduction

In this class, the student/s will learn the workings of Brute Force attacks by cracking the password of a few protected files.

New Commands Introduced

- `strip()` removes any leading, and trailing whitespaces in the string.
- `split(separator)` splits a string into a list using a specified separator.
- `open()` opens a file, and returns it as a file object.
- `itertools.product()` returns the cartesian product of all the iterable provided as the argument.
- `join()` takes all items in an iterable and joins them into one string.

Vocabulary

- Intruder: an unauthorized person attempting to gain access.
- Hacker: a person who uses his/her skills to explore, modify, or improve technology systems, regardless of authorization.
- Cyber Security: is the protection of computers and systems from information theft or damage.
- Captcha: It stands for the Completely Automated Public Turing test to tell Computers and Humans Apart. CAPTCHAs are tools you can use to differentiate between real users and automated users, such as bots.

Learning Objectives

Student/s should be able to:

- **Identify** and **Understand** different types of Brute force attacks and time they take.
- **Explain** how Brute force attacks work on password protected files and systems.
- **Demonstrate** the password cracking of a zip file and a pdf file.

Activities

1. Class Narrative: (3 mins)

- Brief the student/s that they did a fantastic job on creating a multiplayer Ludo game and an email app.

2. Concept Introduction Activity: (4 mins)

- Let the student/s undertake the explore-activity to observe different types of Brute Force attacks to crack passwords of protected files.
- Using the slides, explain that the student/s will learn:
 - to crack the 4-character password
 - to crack any length password
 - to crack password using the Dictionary attack

3. Activity 1: Crack the 4-character password (16 mins)

Teacher Activity: (8 mins)

- Explain about the Brute force attack and how it works.
- Demonstrate how to crack a 4-character password protected zip file using a Brute Force attack.

Student Activity: (8 mins)

- Guide the student/s to fetch the content of a zip file which is protected with a 4 character password.

4. Activity 2: Crack any length password (10 mins)

- Explain the algorithm to crack a password of any length using Brute Force simple attack.
- Demonstrate how to crack any password protected zip file.

Student Activity: (10 mins)

- Guide the student/s to fetch the content of a password protected zip file.

5. Activity 3: Dictionary Attack (12 mins)

- Introduce to the student/s that Brute Force attacks can take a really long time in days or even months if the length of the password is not known.
- Explain how Dictionary attacks can be more efficient than simple Brute Force attacks.
- Demonstrate how to crack a password protected pdf file.

Student Activity: (6 mins)

- Guide the students to open a password protected pdf file.

6. Introduce the Post class project: (2 min)

- Crack the Wifi password using the Brute Force Dictionary attack.

7. Test and Summarize the class learnings: (5 mins)

- Check for understanding through quizzes and summarize learning after respective activities.
- Summarize the overall class learning towards the end of the class.

8. Additional activities:

- Encourage the student/s to calculate the time it took to crack the password.
- Encourage the student/s to crack the password for both PDF and ZIP files using the same code.

9. State the Next Class Objective: (1 min)

- In the next class, student/s will learn about DDOS attacks and how to battle it.

U.S. Standards:

CSTA: 2-AP-11, 2-AP-12, 2-AP-13, 2-AP-14, 2-AP-19

Links Table		
Activity	Activity Name	Link
Class Presentation	Brute Force Attack	https://s3-whjr-curriculum-uploads.whjr.online/54a3b1f9-ff91-4314-9e68-ea86fe907878.html
Explore Activity	Brute Force Attack	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS-BP
Teacher Activity 1	Crack the 4-character password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-TAS-BP
Teacher Reference: Teacher Activity 1 Solution	Crack the 4-character password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-TAS
Student Activity 1	Crack the 4-character password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS-BP
Teacher Reference: Student Activity 1 Solution	Crack the 4-character password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS
Teacher Activity 2	Crack any length password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-TAS-BP

Teacher Reference: Teacher Activity 2 Solution	Crack any length password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-TAS
Student Activity 2	Crack any length password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS-BP
Teacher Reference: Student Activity 2 Solution	Crack any length password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS
Teacher Activity 3	Dictionary Attack	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-TAS-BP
Teacher Reference: Teacher Activity 3 Solution	Dictionary Attack	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-TAS
Student Activity 3	Dictionary Attack	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS-BP
Teacher Reference: Student Activity 3 Solution	Dictionary Attack	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS
Student's Additional Activity 1	Calculate Time Taken	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS-BP
Teacher Reference: Student's Additional Activity 1 Solution	Calculate Time Taken	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS
Student's Additional Activity 2	Crack for different type of files	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS-BP
Teacher Reference: Student's Additional Activity 2 Solution	Crack for different type of files	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-SAS
Post Class Project	Crack the Wifi Password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-PCP-BP
Teacher Reference: Post Class Project Solution	Crack the Wifi Password	https://github.com/Tynker-Computer-Networks/TNK-M16-C121-PCP