🔐 Password Cracking & Credential Attack Suite (Ethical Security Assessment Project)

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1. Introduction

Passwords remain one of the most commonly used authentication mechanisms in modern computing systems. However, weak password practices such as short length, predictable patterns, and dictionary-based passwords make systems vulnerable to credential-based attacks.

This project, **Password Cracking & Credential Attack Suite**, is designed to demonstrate how attackers exploit weak passwords using dictionary and brute-force techniques, and how defenders can analyze and strengthen password security. The project is implemented strictly in a **controlled and ethical environment** for educational purposes.

2. Project Objectives

The main objectives of this project are:

- To understand common password attack techniques.
- To simulate dictionary-based and brute-force password attacks.
- To analyze password strength using complexity and entropy.
- To generate a security audit report with mitigation recommendations.
- To demonstrate both **Red Team (attack)** and **Blue Team (defense)** perspectives.

3. Ethical Considerations

⚠️ Important Note

This project is developed strictly for:

- Educational purposes
- Authorized security testing
- Controlled laboratory environments

No real user accounts, live systems, or unauthorized credentials were targeted.
Unauthorized password cracking is illegal and unethical.

4. System Requirements & Tools Used

4.1 Operating System

Kali Linux

4.2 Programming Language

Python 3

4.3 Development Tools

Kali Linux Terminal

`nano` text editor

4.4 Python Libraries Used

`itertools`

`string`

`math`

`datetime`

(All libraries are part of Python's standard library.)

5. Project Architecture & Workflow

Workflow Steps:

Dictionary generation using common patterns.

Brute-force password attack simulation.

Password strength analysis (entropy & complexity).

Final security audit report generation.

Logical Flow:

Input → Dictionary Generation → Brute Force Simulation
→ Password Strength Analysis → Audit Report

6. Project Structure

```
Password-Attack-Suite/
 |
├── dictionary_generator.py
├── brute_force.py
├── password_analyzer.py
├── report_generator.py
├── generated_wordlist.txt
├── security_audit_report.txt
```

7. Module 1: Dictionary Generator

Purpose

To generate realistic password wordlists using common patterns attackers rely on.

Techniques Used

- Name-based passwords
- Year appending
- Capitalization
- Leet-speak substitutions

Code: `dictionary_generator.py`

```
names = ["admin", "user", "test"]
years = ["1999", "2000", "2023", "2024"]
symbols = ["!", "@", "#"]

leet_map = {"a":"@", "e":"3", "i":"1", "o":"0", "s":"$"}

def leet_transform(word):
    for char, rep in leet_map.items():
        word = word.replace(char, rep)
    return word

def generate_dictionary():
    wordlist = set()
    for name in names:
        wordlist.add(name)
        wordlist.add(name.capitalize())
        for year in years:
            wordlist.add(name + year)
            wordlist.add(name.capitalize() + year)
        for sym in symbols:
            wordlist.add(name + sym)
        wordlist.add(leet_transform(name))
    return wordlist
```

Output

Generated password list stored in `generated_wordlist.txt`.

8. Module 2: Brute-Force Simulator

Purpose

To simulate brute-force password attacks and demonstrate how password length affects security.

Features

- Incremental password guessing
- Attempt counter
- Time calculation

Code: `brute_force.py`

```
import itertools
import string
import time

TARGET_PASSWORD = "ab1"
CHARSET = string.ascii_lowercase + string.digits

def brute_force():
    attempts = 0
    start_time = time.time()
    for length in range(1, 6):
        for guess in itertools.product(CHARSET, repeat=length):
            attempts += 1
            if ''.join(guess) == TARGET_PASSWORD:
                print("Password Found:", ''.join(guess))
                print("Attempts:", attempts)
                print("Time Taken:", time.time() - start_time)
                return
```

Result

- Demonstrates how weak passwords are cracked quickly.
- Shows exponential growth in attempts as password length increases.

9. Module 3: Password Strength Analyzer

Purpose

To evaluate password security from a defensive (Blue Team) perspective.

Analysis Factors

- Length
- Uppercase & lowercase characters
- Numbers & symbols
- Entropy calculation

Code: `password_analyzer.py`

```
import math
import string

def calculate_entropy(password):
    charset = 0
    if any(c.islower() for c in password): charset += 26
    if any(c.isupper() for c in password): charset += 26
    if any(c.isdigit() for c in password): charset += 10
    if any(c in string.punctuation for c in password):
        charset += len(string.punctuation)
    return len(password) * math.log2(charset)

def analyze_password(password):
    score = 0
    if len(password) >= 8: score += 1
    if any(c.islower() for c in password): score += 1
    if any(c.isupper() for c in password): score += 1
    if any(c.isdigit() for c in password): score += 1
    if any(c in string.punctuation for c in password): score += 1
    entropy = calculate_entropy(password)
    return score, entropy
```

Output

- Password classified as **Weak / Medium / Strong / Very Strong**
- Entropy value displayed

10. Module 4: Security Audit Report Generator

Purpose

To generate a final audit report summarizing vulnerabilities and recommendations.

Code: `report_generator.py`

```
from datetime import datetime

def generate_report():
    report = []
    report.append("PASSWORD SECURITY AUDIT REPORT")
    report.append(f"Date: {datetime.now()}")
    report.append("Weak passwords are vulnerable to brute-force attacks.")
    report.append("Recommendations:")
    report.append("- Use long, complex passwords")
    report.append("- Avoid predictable patterns")
    return "\n".join(report)
```

Output

`security_audit_report.txt` containing findings and mitigation steps.

11. Results & Analysis

- Weak passwords were cracked quickly using brute-force methods.
- Short and predictable passwords had low entropy.
- Strong passwords significantly increased attack complexity.
- Entropy directly correlates with password strength.

12. Learning Outcomes

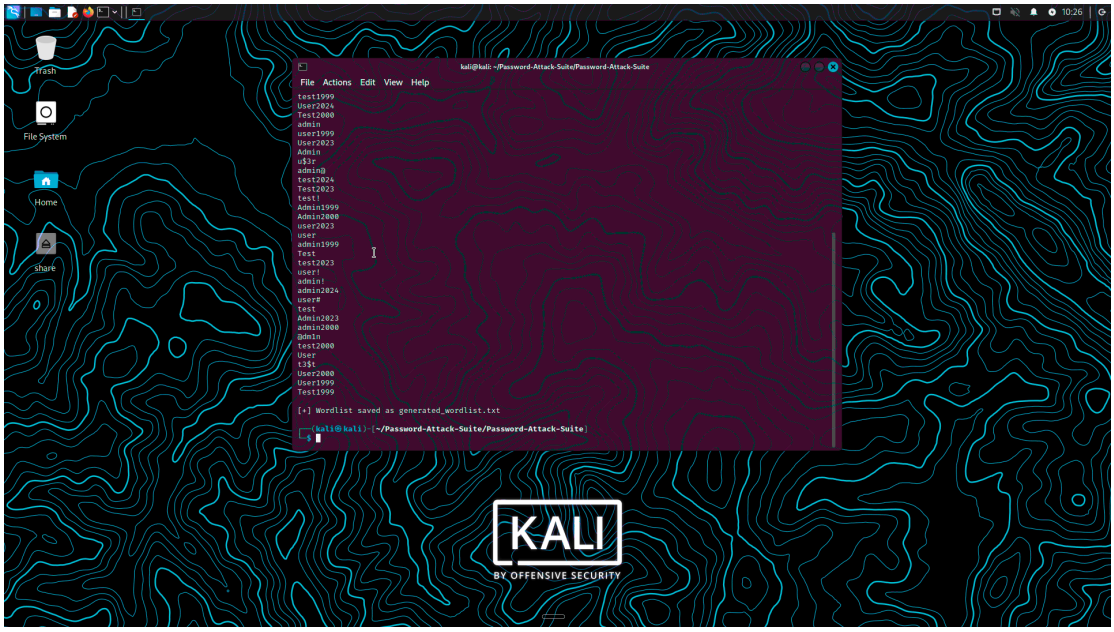
This project helped in understanding:

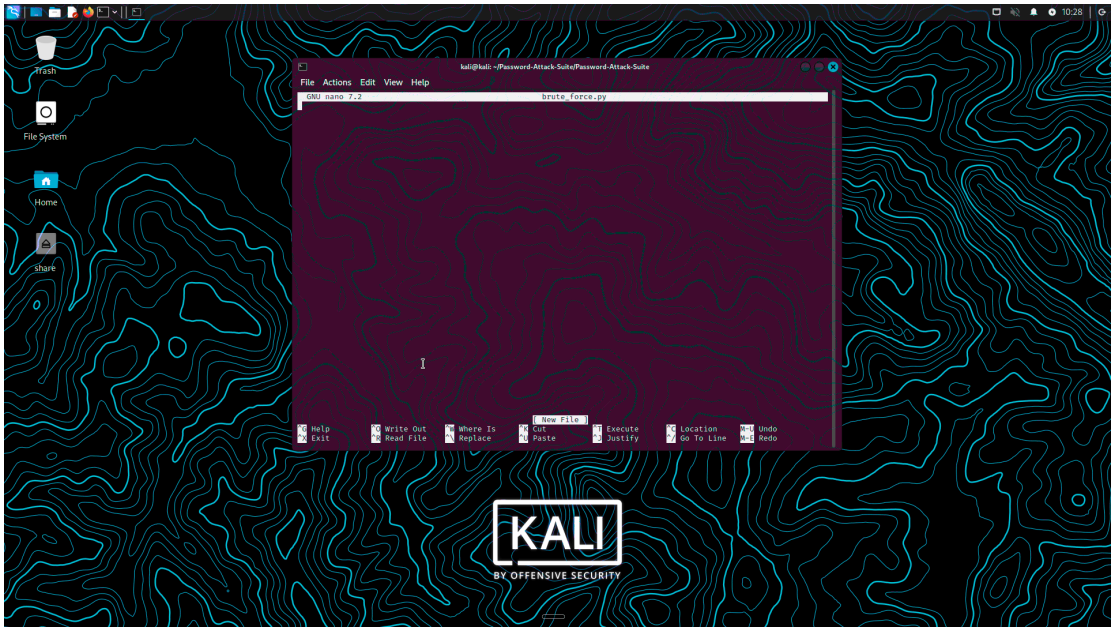
- How password attacks are performed.
- Why weak passwords are dangerous.
- How to analyze password strength.
- Red Team vs Blue Team security approaches.
- Ethical security testing practices.

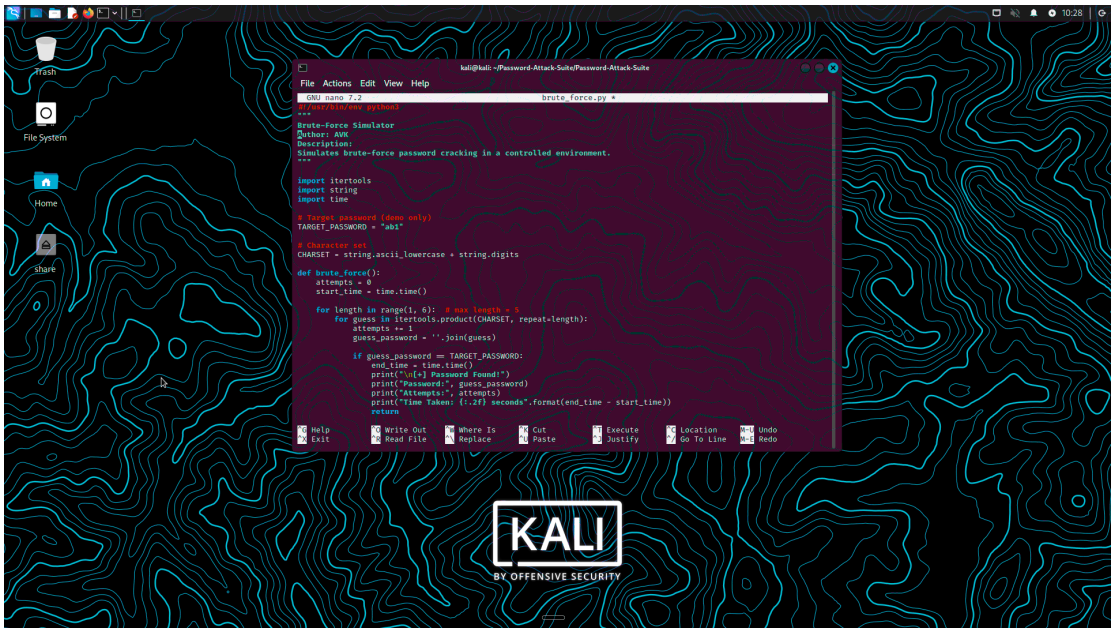
13. Conclusion

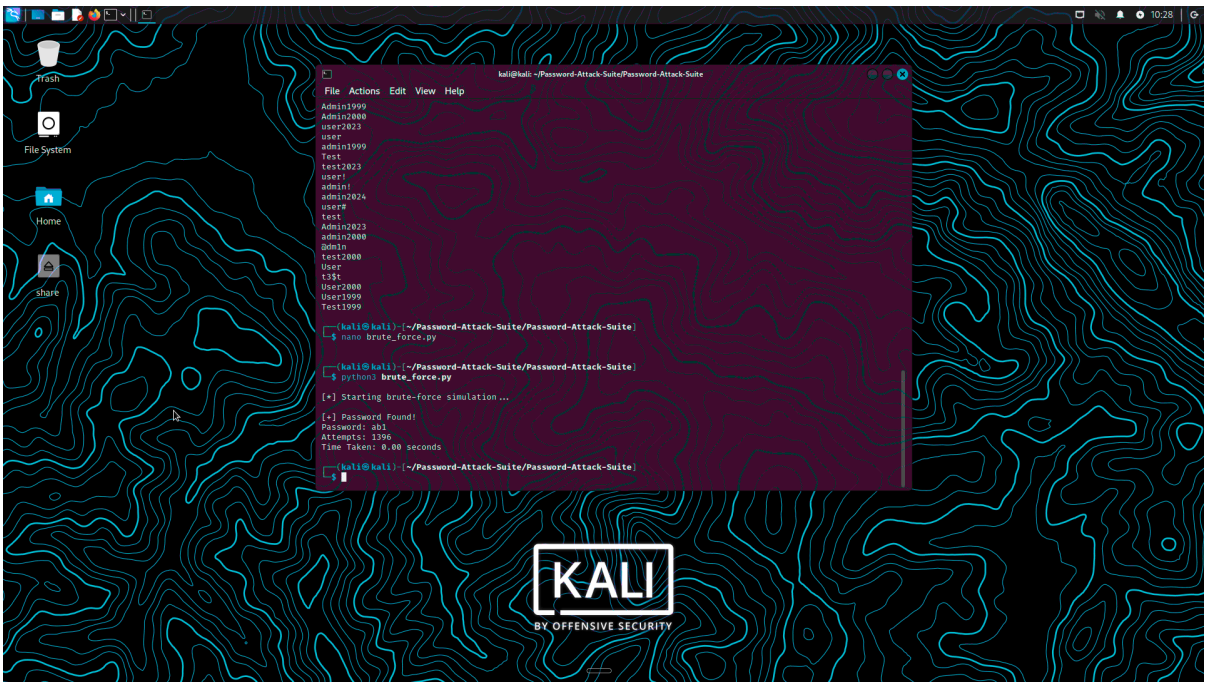
This project successfully demonstrated the risks associated with weak password practices through dictionary-based and brute-force simulations. By integrating password strength analysis and audit reporting, the project highlights the importance of strong password policies in securing systems against credential-based attacks.

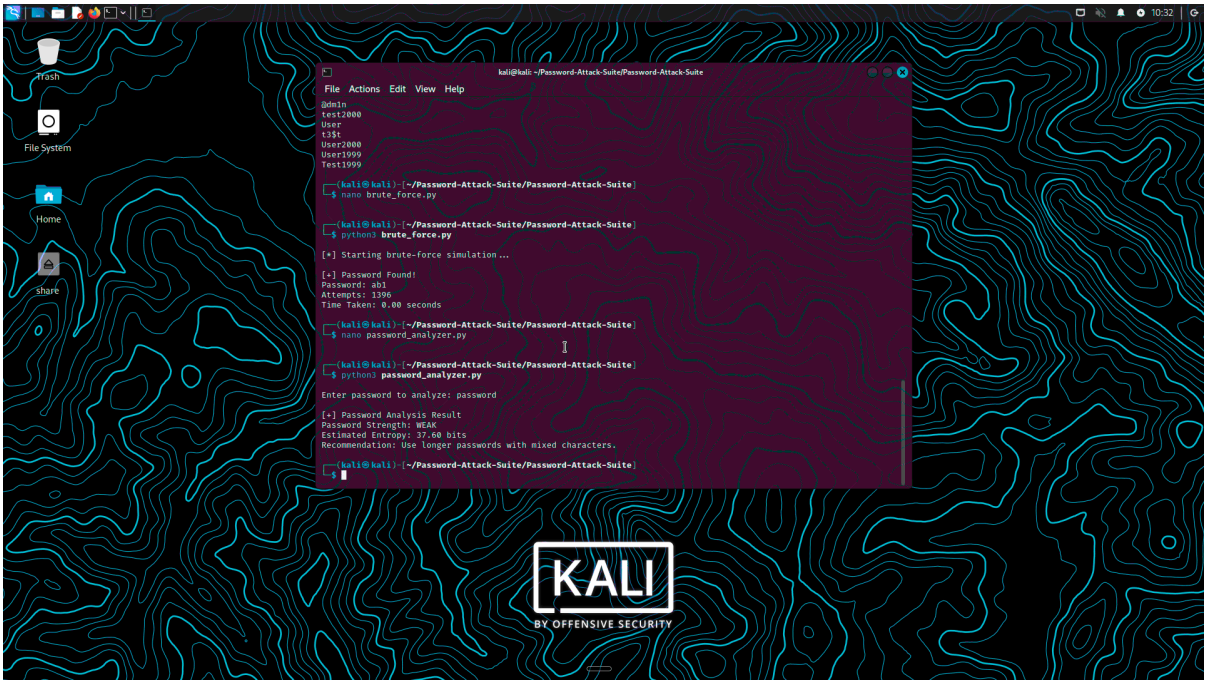
Screenshots

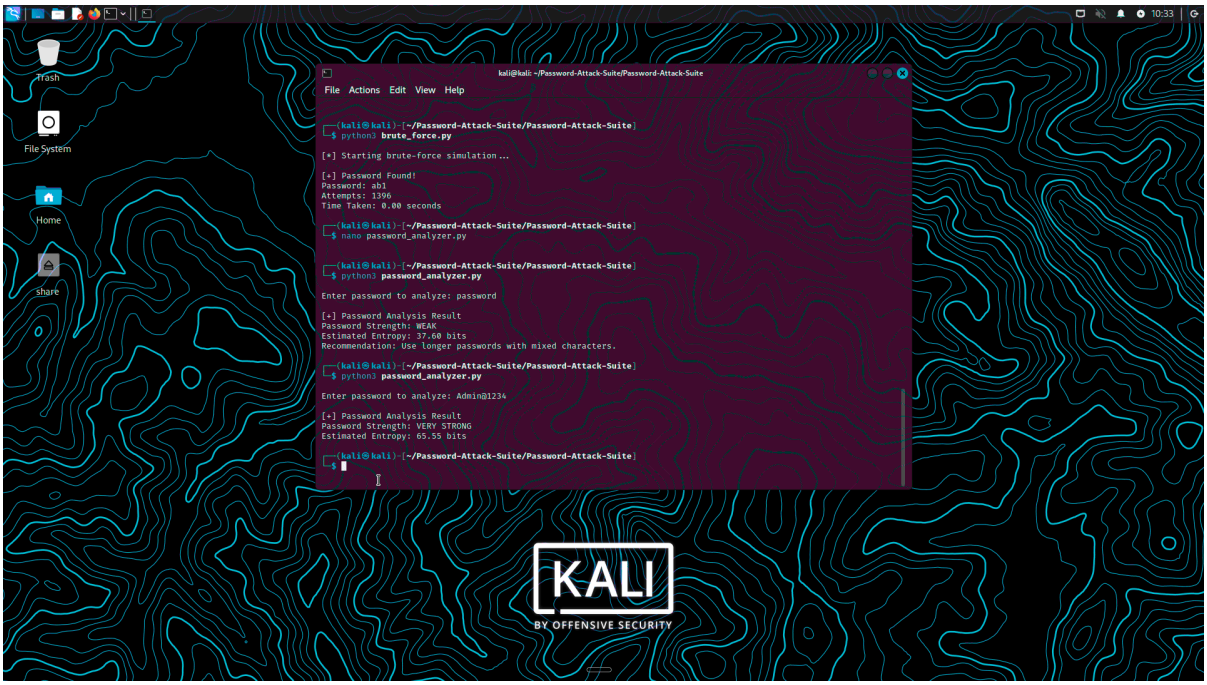

kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
test1999
User2024
Test2000
admin
user1999
User2023
Admin
u$3r
admin@
test2024
Test2023
test!
Admin1999
Admin2000
user2023
user
admin1999
Test
test2023
user!
admin!
admin2024
user#
test
Admin2023
admin2000
@dmin
test2000
User
t3$t
User2000
User1999
Test1999
[+] Wordlist saved as generated_wordlist.txt
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
KALI
BY OFFENSIVE SECURITY


kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
GNU nano 7.2
brute_force.py
[New File]
^G Help
^X Exit
^O Write Out
^R Read File
^W Where Is
^\ Replace
^K Cut
^U Paste
^T Execute
^J Justify
^C Location
M-G Go To Line
M-U Undo
M-E Redo
KALI
BY OFFENSIVE SECURITY


kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
GNU nano 7.2
brute_force.py *
#!/usr/bin/env python3
"""
Brute-Force Simulator
Author: AVK
Description:
Simulates brute-force password cracking in a controlled environment.
"""
import itertools
import string
import time
# Target password (demo only)
TARGET_PASSWORD = "ab1"
# Character set
CHARSET = string.ascii_lowercase + string.digits
def brute_force():
attempts = 0
start_time = time.time()
for length in range(1, 6): # max length = 5
for guess in itertools.product(CHARSET, repeat=length):
attempts += 1
guess_password = ''.join(guess)
if guess_password == TARGET_PASSWORD:
end_time = time.time()
print("\n[+] Password Found!")
print("Password:", guess_password)
print("Attempts:", attempts)
print("Time Taken: {:.2f} seconds".format(end_time - start_time))
return
^G Help
^X Exit
^O Write Out
^R Read File
^W Where Is
^\ Replace
^K Cut
^U Paste
^T Execute
^J Justify
^C Location
M-G Go To Line
M-U Undo
M-E Redo
KALI
BY OFFENSIVE SECURITY


Trash
File System
Home
share
kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
Admin1999
Admin2000
user2023
user
admin1999
Test
test2023
user!
admin!
admin2024
user#
test
Admin2023
admin2000
@dmin
test2000
User
t3$t
User2000
User1999
Test1999
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ nano brute_force.py
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ python3 brute_force.py
[*] Starting brute-force simulation...
[+] Password Found!
Password: ab1
Attempts: 1396
Time Taken: 0.00 seconds
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$
KALI
BY OFFENSIVE SECURITY


Trash
File System
Home
share
kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
@dmin
test2000
User
t3$t
User2000
User1999
Test1999
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ nano brute_force.py
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ python3 brute_force.py
[*] Starting brute-force simulation...
[+] Password Found!
Password: ab1
Attempts: 1396
Time Taken: 0.00 seconds
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ nano password_analyzer.py
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ python3 password_analyzer.py
Enter password to analyze: password
[+] Password Analysis Result
Password Strength: WEAK
Estimated Entropy: 37.60 bits
Recommendation: Use longer passwords with mixed characters.
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$
KALI
BY OFFENSIVE SECURITY


Trash
File System
Home
share
kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
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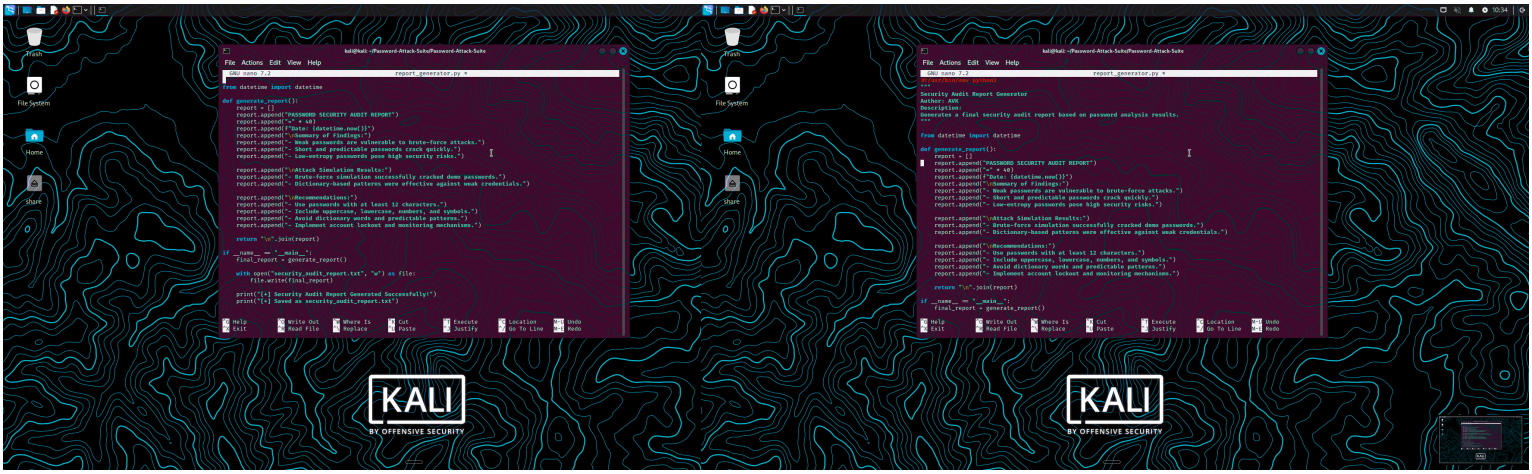
Estimated Entropy: 37.60 bits
Recommendation: Use longer passwords with mixed characters.
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$ python3 password_analyzer.py
Enter password to analyze: Admin@1234
[+] Password Analysis Result
Password Strength: VERY STRONG
Estimated Entropy: 65.55 bits
┌──(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
└─$
KALI
BY OFFENSIVE SECURITY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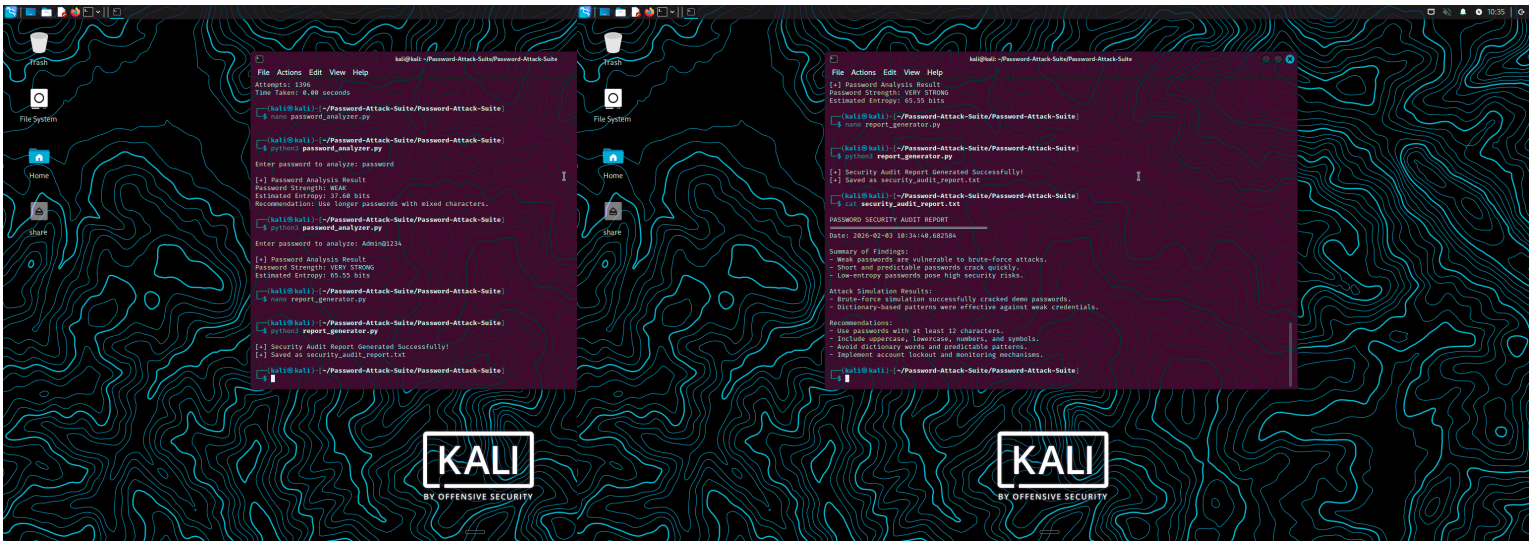
File Actions Edit View Help
GNU nano 7.2 report_generator.py *
#!/usr/bin/env python3
"""
Security Audit Report Generator
Author: AVK
Description:
Generates a final security audit report based on password analysis results.
"""
from datetime import datetime
def generate_report():
report = []
report.append("PASSWORD SECURITY AUDIT REPORT")
report.append("=" * 40)
report.append(f"Date: {datetime.now()}")
report.append("\nSummary of Findings:")
report.append("- Weak passwords are vulnerable to brute-force attacks.")
report.append("- Short and predictable passwords crack quickly.")
report.append("- Low-entropy passwords pose high security risks.")
report.append("\nAttack Simulation Results:")
report.append("- Brute-force simulation successfully cracked demo passwords.")
report.append("- Dictionary-based patterns were effective against weak credentials.")
report.append("\nRecommendations:")
report.append("- Use passwords with at least 12 characters.")
report.append("- Include uppercase, lowercase, numbers, and symbols.")
report.append("- Avoid dictionary words and predictable patterns.")
report.append("- Implement account lockout and monitoring mechanisms.")
return "\n".join(report)
if __name__ == "__main__":
final_report = generate_report()
with open("security_audit_report.txt", "w") as file:
file.write(final_report)
print("[+] Security Audit Report Generated Successfully!")
print("[+] Saved as security_audit_report.txt")
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Undo
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^/ Go To Line M-E Redo
KALI
BY OFFENSIVE SECURITY


kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
Attempts: 1396
Time Taken: 0.00 seconds
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ nano password_analyzer.py
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ python3 password_analyzer.py
Enter password to analyze: password
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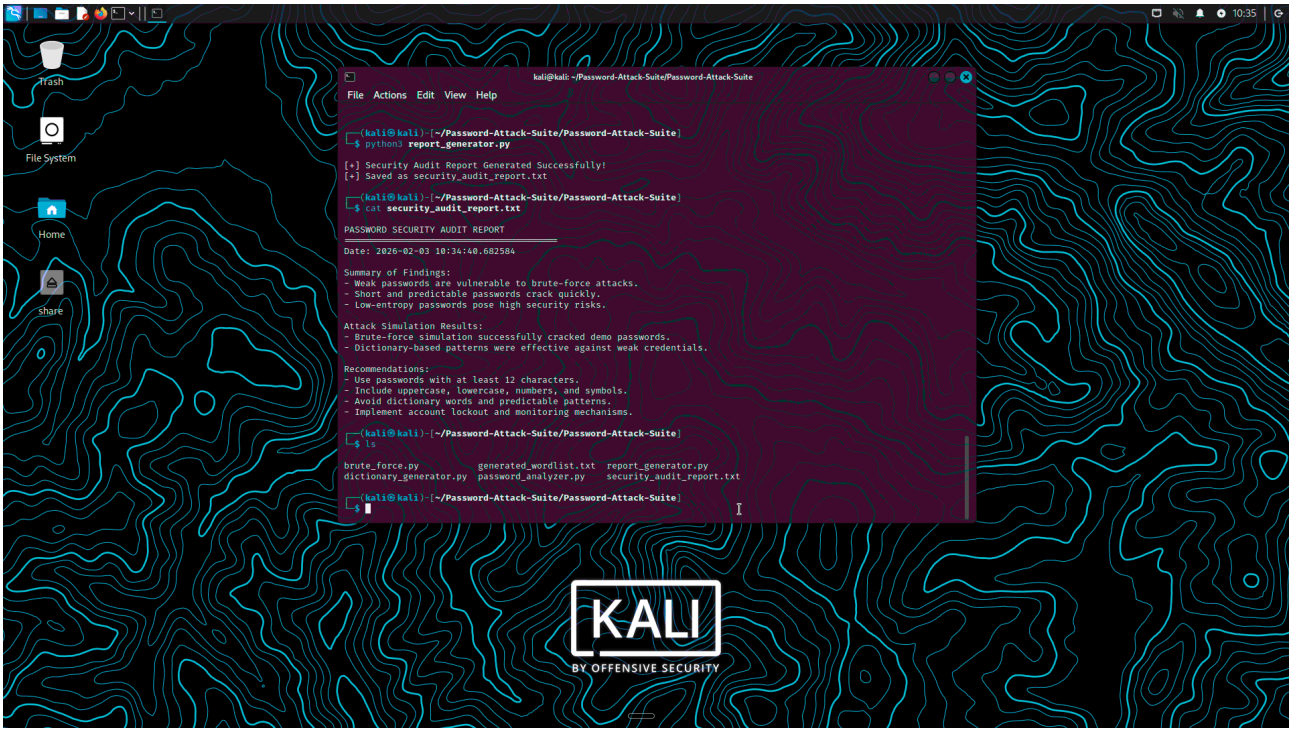
$ python3 password_analyzer.py
Enter password to analyze: Admin@1234
[+] Password Analysis Result
Password Strength: VERY STRONG
Estimated Entropy: 65.55 bits
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ nano report_generator.py
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ python3 report_generator.py
[+] Security Audit Report Generated Successfully!
[+] Saved as security_audit_report.txt
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$
KALI
BY OFFENSIVE SECURITY

kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
[+] Password Analysis Result
Password Strength: VERY STRONG
Estimated Entropy: 65.55 bits
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ nano report_generator.py
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ python3 report_generator.py
[+] Security Audit Report Generated Successfully!
[+] Saved as security_audit_report.txt
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ cat security_audit_report.txt
PASSWORD SECURITY AUDIT REPORT
Date: 2026-02-03 10:34:40.682584
Summary of Findings:
- Weak passwords are vulnerable to brute-force attacks.
- Short and predictable passwords crack quickly.
- Low-entropy passwords pose high security risks.
Attack Simulation Results:
- Brute-force simulation successfully cracked demo passwords.
- Dictionary-based patterns were effective against weak credentials.
Recommendations:
- Use passwords with at least 12 characters.
- Include uppercase, lowercase, numbers, and symbols.
- Avoid dictionary words and predictable patterns.
- Implement account lockout and monitoring mechanisms.
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$
KALI
BY OFFENSIVE SECURITY


kali@kali: ~/Password-Attack-Suite/Password-Attack-Suite
File Actions Edit View Help
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ python3 report_generator.py
[+] Security Audit Report Generated Successfully!
[+] Saved as security_audit_report.txt
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ cat security_audit_report.txt
PASSWORD SECURITY AUDIT REPORT
Date: 2026-02-03 10:34:40.682584
Summary of Findings:
- Weak passwords are vulnerable to brute-force attacks.
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Recommendations:
- Use passwords with at least 12 characters.
- Include uppercase, lowercase, numbers, and symbols.
- Avoid dictionary words and predictable patterns.
- Implement account lockout and monitoring mechanisms.
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$ ls
brute_force.py generated_wordlist.txt report_generator.py
dictionary_generator.py password_analyzer.py security_audit_report.txt
(kali㉿kali)-[~/Password-Attack-Suite/Password-Attack-Suite]
$
Trash
File System
Home
share
10:35
KALI
BY OFFENSIVE SECURITY