Password Security Analysis Report

1. Password Samples with Varying Complexity

Generated Passwords:

- weak123 (Lowercase + numbers, 7 chars)
- P@ssword1 (Mixed case + symbol + number, 9 chars)
- Tr0ub4d0ur&3 (Complex pattern, 11 chars)
- xK8#qP$2mL!9zR*5 (Fully random, 16 chars)
- CorrectHorseBatteryStaple! (Long passphrase, 25 chars)

2. Tools Used for Testing

All tests performed in Kali Linux using built-in tools:

- **cracklib-check** - Basic password policy checker
- **grep + rockyou.txt** - Dictionary attack simulation
- **Python scripts** - Custom strength analysis
- **hashcat** - Advanced hash cracking (for demonstration)
- **John the Ripper** - Password cracking suite

3. Commands Used

Hashcat Commands:

```
# Dictionary attack with rockyou.txt
hashcat -m 0 -a 0 hashes.txt rockyou.txt

# Brute force attack (mask attack)
hashcat -m 0 -a 3 hashes.txt ?a?a?a?a?a?a?a?a

# Show cracked passwords
hashcat --show hashes.txt
```

John the Ripper Commands:

```
# Basic dictionary attack
john --wordlist=rockyou.txt hashes.txt

# Incremental mode (brute force)
john --incremental hashes.txt

# Show cracked passwords
john --show hashes.txt
```

Grep Commands:

```
# Check if password exists in rockyou.txt
grep -Fx "P@ssword1" /usr/share/wordlists/rockyou.txt

# Case insensitive search for variations
grep -i "password" /usr/share/wordlists/rockyou.txt
```

4. Password Test Results

Password	Length	Complexity	cracklib-check	Dictionary Test	Estimated Crack Time
weak123	7	Low	"too short"	Found in rockyou.txt	Instant
P@ssword1	9	Medium	"OK"	Variation found	2 hours
Tr0ub4d0ur&3	11	High	"OK"	Not found	3 years
xK8#qP$2mL!9zR*5	16	Very High	"OK"	Not found	Millions of years

5. Best Practices Identified

Strong Password Characteristics:

- Minimum 12 characters (longer is better)
- Mix of uppercase (A-Z), lowercase (a-z), numbers (0-9), and symbols (!@#$)
- Avoid dictionary words and predictable patterns
- Use passphrases (e.g., "PurpleElephant$RunsFast!")
- Never reuse passwords across accounts

Tools Recommendation:

- Use **KeePassXC** or **Bitwarden** for password management
- Enable Two-Factor Authentication (2FA) wherever possible
- Regularly check password strength with **cracklib-check**

6. Common Password Attacks

Attack Type	Description	Protection Method
Brute Force	Tries all possible combinations	Long, complex passwords
Dictionary	Uses common words/phrases	Avoid dictionary words
Phishing	Tricks users into revealing passwords	Verify website authenticity
Credential Stuffing	Uses leaked passwords from other sites	Unique passwords per site

7. Password Complexity vs Security

Key Findings:

- Length matters more than complexity:
  - "CorrectHorseBatteryStaple!" (25 chars) is stronger than "P@ssw0rd!" (9 chars)
- Randomness defeats dictionary attacks:
  - "xK8#qP$2mL!9zR*5" resists both brute force and dictionary attacks
- Password reuse enables credential stuffing:
  - 60% of users reuse passwords across multiple sites (Verizon DBIR 2023)

Security Impact Table:

Password Type	Crack Time (GPU cluster)	Security Level
6 lowercase letters	Instant	Very Weak
8 chars with mixed case	2 days	Weak
12 chars with symbols	34 years	Strong
16+ random chars	Millions of years	Very Strong

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All tests performed in controlled virtual environment