

CyberSecurity: Principle and Practice

*BSc Degree in Computer Science
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Lesson 7: Introduction to Web Vulnerabilities

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DIPARTIMENTO 1
MATEMATICA



- What does hacking mean?
- What is the goal of an attacker?
- Why is doing it?
- Who can be an hacker?



Is this Hacking?

“A computer hacker is any skilled computer expert who uses his technical knowledge to overcome a problem.”

__cit Wikipedia



The attacker is **often** seen as... “super skilled”
...is it really/always the case?



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...is it really/always the case?

- **probably yes**, if he attacks “super secure” systems (e.g., NASA)



Confirmed: NASA Has Been Hacked

Forbes - Jun 20, 2019

The U.S. National Aeronautics and Space Administration (**NASA**) this week confirmed that its Jet Propulsion Laboratory (JPL) has been **hacked**.

NASA hacked because of unauthorized Raspberry Pi ...

ZDNet - Jun 21, 2019

[View all](#)

The attacker is **often** seen as... “super skilled”
...is it really/always the case?

- **probably yes**, if he attacks “super secure” systems (e.g., NASA)
- **probably no**, if he attacks “normal” systems



Aveva violato la piattaforma "**Rousseau**" del Movimento 5 ...

PadovaOggi - Feb 6, 2018

L'**hacker**, intervistato a suo tempo anche da alcune testate dopo l'incursione, ... E proprio Matematica studierebbe all'Università di **Padova**.

Rousseau, preso l'**hacker**. Cos'è e come funziona la ...

In-Depth - [Quotidiano.net](#) - Feb 6, 2018

- A **fundamental** consideration is:
 - who am I (the hacker) fighting against?
- The **defender**, the one that developed a target system:
 - is usually a **normal** guy, like you
 - maybe with more experience
 - might not be a security expert
- What **often** happen is that who develop a system do not focus on its security, but has a priority on:
 - **functionality**: the system does what it has to do
 - **performance**: the system is efficient

When security aspects are **secondary** in a system...
troubles start



you

VS



target

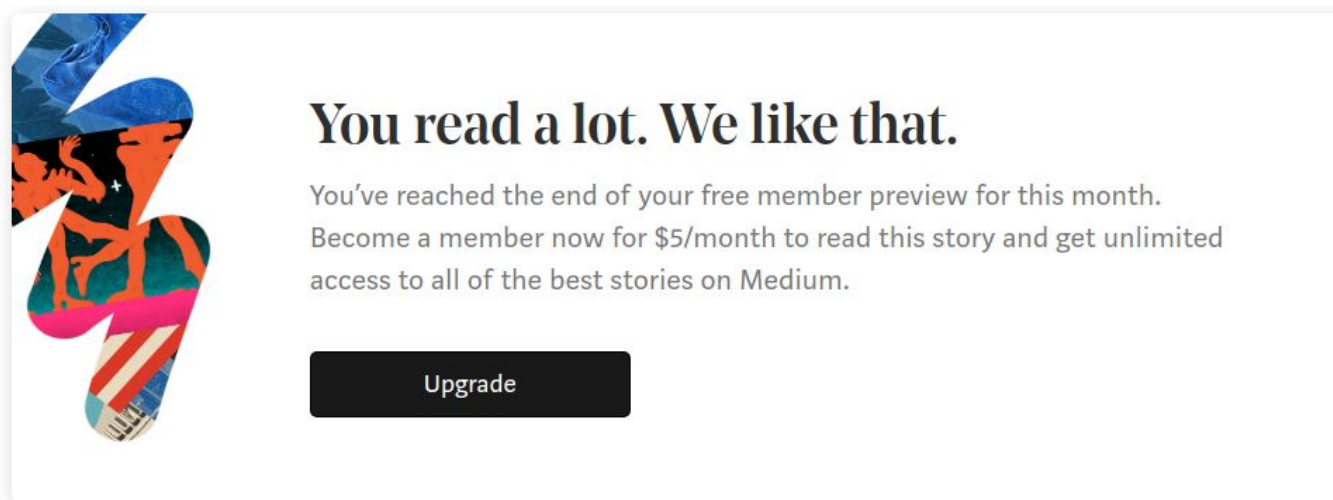
How can we proceed?

How can we proceed?

- Gather **as much info as possible** about the target
 - e.g., OS, program language, typo of services, protocols
...the more we know about the target, the better!
- **for each component** we can find (on the web), the **vulnerabilities**
 - search on the web: this is not an exam; the victims won't complain this lack of "fairness" -- hacking is not a sport
 - e.g., for a programming language there are some common and well known vulnerabilities
 - if you know what you want, you can easily understand if these vulnerabilities are useful
- Look online for **tools** that can help you

Example 1

- **Target:** [Toward Data Science](#)
- **System Type:** scientific journal, web app
- **Problem:** After reading for free few articles, the system ask you to upgrade your account
- **Attacker Goal:** infinite free access to the contents



Example 2

- **Target:** T-Rex Game (chrome://dino/)
- **System Type:** web game
- **Problem:** the game is way too difficult
- **Attacker Goal:** show to my friends how good am I in this game



No internet

Try:

- Checking the network cables, modem, and router
- Reconnecting to Wi-Fi

ERR_INTERNET_DISCONNECTED

Example 2

- **Target:** T-Rex Game (chrome://dino/)
- **System Type:** web game
- **Problem:** the game is way too difficult
- **Attacker Goal:** show to my friends how good am I in this game



```
1 // Keep a copy of original runner
2 var originalRunner=Runner.prototype.gameOver
3 // Overwrite gameover function so we don't die
4 Runner.prototype.gameOver=function(){console.log("Its over when I say its over");}
5 // Super speed run
6 Runner.prototype.setSpeed(15000)
7 // Change back to original game when you are sick of cheating
8 Runner.prototype.gameOver=originalRunner
```

- Today exercises focus on the *inspect* section of your browser
- Let's play a bit

- Exercise 1:
 - Javascript is checking the login password off of an ajax call, The verification is being done on the client side. Making a direct call to the ajax page will return the expected password
- Exercise 2:
 - You control the browser
- Exercise three
 - You control the browser

Questions? Feedback? Suggestions?



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