CyberSecurity: Principle and Practice

BSc Degree in Computer Science
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Lesson 9: Language Vulnerabilities

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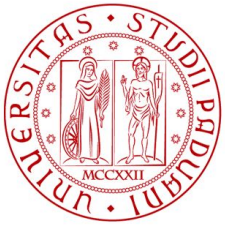

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DIPARTIMENTO MATEMATICA

Introduction

- How many of you think about security during a system deployment?

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- How many of you think about security during a system deployment?
- Hope some of you …
- But what about the security derived from the program language that you are using?

Program Languages Vulnerabilities

- Program Languages are well known for several security threats that they provide
- Some functions might expose your application to threats
- It is a good practice to be aware of these risks
  - to prevent attacks

- C is kind of the father of every program language
- it is considered High Level
- several stuffs are left to the programmer
  - e.g., memory management (variable allocations / deallocations)
- several threats can be found
  - for a better description see link
- We go in details during the pwn topic at the end of the course

"gets()" function

- reads infinites characters given a stream and stores them in the string str
- in the example, what happen if we insert more than 15 characters?
  - ***memory corruption***

```
char buff[15];
int pass = 0;

printf("\n Enter the password : \n");
gets(buff);
```

"strcpy()" function

- copy the characters contained in src to trg
- in the example, what happen if we copy more than 10 characters?
  - ***memory corruption***

```
1  char str1[10];
2  char str2[]="WeWantToOverwriteMemory";
3  strcpy(str1,str2);
```

Type Juggling

- PhP, as JS and Python, is a dynamically typed programming language
- the variables types are checked at runtime
- this sometimes can be a problem …
- (“7 puppies” == 7) -> True
- see more at link1 and link2

```
$example_int = 7

$example_str = “7”

if ($example_int == $example_str) {

   echo("PHP can compare ints and strings.")

}
```

How to do in practice

1. Identify the programming language used in the application
2. Identify the version
3. Identify possible libraries used
4. Check on Google for possible vulnerabilities

Exercises

1. You are given the code of a webapp. What is it hiding?
2. Because creating real pwn challs was to mainstream, we decided to focus on the development of our equation solver using OCR
3. The authors tried to protect their JS code … is that enough to scare an attacker?

Questions? Feedback? Suggestions?