Indian Institute of Technology Kanpur - Department of Computer Science and Engineering

CS628 Computer System Security - Fall 2023

Instructor - Angshuman Karmakar

Assignment 1 – Principles of Least Privilege

Problem Statement: Assignment1.c contains C programming code runs with root privilege because some part of the code requires it. You have to create componentization of the program to enforce the least privilege principle so that only the part which requires root privilege will be run as root.

Deliverables: Assignment1.c contains different functions where only few functions require root privilege to run it. You need to understand each function and analyze if that particular function necessarily needs to be run with root privilege. You need to submit the following.,

You need to submit a total of 3 files.

1. After analyzing **Assignment1.c**, extract the functions that necessarily require root privilege and submit as **PrivilagedCode.c →file 1**
2. Extract the functions that don't require root privilege and submit as **UserCode.c → file 2**
3. A report that contain explanation and reasons on how you have componentized **PrivilagedCode.c** and **UserCode.c → file 3**

Grading Schema - Total 50 Marks

1. Each function rightly categorized into the respective codes (PrivilagedCode.c, UserCode.c) will be given 2 marks each - **20 Marks**
2. Report - **30 marks**
    a. Briefly explain the functionality of each function (Strictly not exceeding 10 lines for each function).
    b. Provide code snippets which cause the function to execute with normal/root privilege (Don't write the whole function again)
    c. A proper reasoning/explanation about the code snippet is required.

Instructions to access the Lab VM machine for the assignment

1. Connect to your **iitk wifi network** before you open the url sent to your mail. (https://172.29.233.235/). (preferably)
2. Open the url in any of your browser and login with your credentials (sent to your mail).
3. You will then have access to the **UBUNTU 20.04** machine with user **cs628**. By giving the **password as cs628** (cs is small), you can access the machine.
4. You change your password with the url sent to you in the mail, after your 1st login.

(Remember this password and don't share it to anyone)

5. To get the code for your assignment, type the following command in the terminal from your desktop and you can see **Assignment1.c.**

   $ wget 172.29.233.235:8000/Assignment1.c

6. Don't worry if the program gives errors when run with user or root. Functionality of each function matters most. Your main task is to understand and debug the code, not to fix errors.
7. You must create 2 files on the desktop naming **PrevilagedCode.c** (functions which require root access)**, UserCode.c** (functions which require user access) after analyzing **Assignment1.c.** (Don't change any function names or any part of the code)
8. For report making, there is a requirement for you to provide code snippets. Include **only specific code snippets** which you think is **responsible for user/root permission** while executing that particular function. **Recommendation :** Use libreoffice writer for report making.
9. Make a zip that includes all 3 files (**PrevilagedCode.c, UserCode.c, Report.pdf**) and go to (http://172.29.233.235/) from your browser inside your lab VM machine and upload the file named ROLLNUMBER_NAME.zip

Instructions for Report Making: (Use the following template)

1. **Headings - Style** → Ubuntu, **Word Size** → 16
2. **Subheadings - Style** → Ubuntu**, Word Size** →14
3. **Normal Text - Style** → Ubuntu**, Word Size** → 12
4. **Figure Name/Description - Style** → Ubuntu**, Word Size -** 12

Important Note: Justify all the lines in the document. You are expected to write every sentence in your own words. You should not rely on manpages. Your report will be thoroughly checked in turnitin and other AI tools for plagiarism. If the plagiarism is more than **20%** your submission is not considered for grading although you have categorized every function correctly.

Caution: Once you have access to the machine, **everything will be recorded and logged.** You can do whatever that is required to solve the assignment, but if you were found doing anything out of scope, there is a reduction in your marks by **half**. You will only be evaluated with **half of the respective assignment marks.**

Submission Deadline: 23:55 of 03-09-2023
There will be a 10% penalty for each 24 hour delay in submitting an assignment.