

Introduction to information flow management (IFC)

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Abstract - Data flow management is very important today. The article discusses security and integrity in data flow management, tags, explicit and implicit flows, and the level of granularity.

Key Words: IFC, data, security, flows, data flow.

1. INTRODUCTION

The way we use computers today is fascinating in terms of privacy. Once the program has been installed, it gets to do almost nothing with your data. It can read files, listen to a microphone, transmit confidential information over the Internet, and much more. What if a normally well-behaved program was used by a hacker or virus? You don't know.

Fortunately, very smart people have developed technologies that offer security, integrity, and therefore privacy in computer systems. This is done by tracking information "flows". Let's dive in, shall we?

2. SECURITY AND INTEGRITY

In the scientific literature in this field, the terms "security and integrity" are of particular importance: Security (or privacy) means that data cannot flow from a higher level of cleaning ("secret") to a lower ("public data") and that programs with a low level of treatment cannot flow data to higher levels. Pay attention to the directions of these flows. This is, for example, fine for, a top-secret report that will be based on (also) public data.

Integrity means that recipients know that senders can make a data stream to them. These two properties are applied by adding metadata to your data and checking that no violations occur during processing.

3. TAGS AND LABELS

In the field of information flow management, tags are considered fully semantic metadata. They can be linked to data, and that's pretty much it.

A subset of tags is called tags. Each unit of data (I'll get to what it means in a bit) gets different sets of labels assigned to it. One set is usually for security and one for the data integrity level.

When a data unit interacts with some other data unit, the data is tainted by whatever labels the other one has. Let's look at all the processes at the moment. The process can be started with a "public data" security tag, but then it has been instructed to read some "top secret" data. When this data flowed to him, the process was then tainted as "top secret", and everything he does afterward will be treated as "top secret". The surrounding enforcement system, whether it is the runtime of a programming language or an operating system, may prohibit it from accessing the Internet, for example, since only "public data" processes can do this.

Formally, labels must be ordered by a subset (i.e., "public data" is a subset of "top secret"). This means that they can be visualized as a grid, such as a Hasse diagram.

4. EXPLICIT AND IMPLICIT STREAMS

The most obvious flows are explicit ones. The programmer is trying to make a data flow from one layer to another, and the system can easily detect it and perform its sanity checks.

Less obvious are implicit flows. They are where another process (possibly in collusion if the original was illegally altered) can indirectly deduce something about the secret data, how the original process behaves. A typical implicit flow class is when you simply use a control flow to modify less sensitive data

by assigning values to it based on values that have more secret data.

5. CONCLUSION

Information flow management assigns metadata to data flows (data transfer over the network, reading files from disk, etc.) and verifies that no sensitive information can flow from a higher-security context to a lower-security context.

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