Review “Lattice Model”

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*Paper Name：*

Denning, D. E. (1976). A lattice model of secure information flow. *Communications of the ACM*, *19*(5), 236-243.

**Contribution:**

In this paper, Denning comes up with a model which guarantees Secure Information Flow. This model uses mathematical framework to formulate requirements and unifies all systems that restrict information flow, which leads to automatic certification programs. In this paper, author uses a set of axioms to limit program code which violates security classes, and though this model, Secure Information Flow is guaranteed.

**Motivation:**

There lacks work in analyzing how the basic security objectives of confidentiality, integrity and availability are related to information flow policy. There also lacks work in solving dynamic Data Mark Machine problem. In Data Mark Machine problem, whenever information flows from objects to a dynamically bound object, the class of the dynamically bound object is updated to be the join of the class of the objects and the class of the program counter. Security violations can occur using this system because it does not adequately consider implicit flow.

**Related works:**

Applications of securing information flow include: (1) separating information into confidential and non-confidential ones, and restricting service process from having access to confidential data; (2) control flow of correlations of data in databases.

**Methodology:**

Denning’s Flow Model (in static security classes)

FM = <N, P, SC, ⊕,→>

where: N = Objects

P = Processes

SC = Security Classes

⊕ = Join operation on SC

→ = Can-flow relation on SC

Example:

(H → H) H ⊕ H = H

(L → L) L ⊕ L = L

(L → H) L ⊕ H = H

(H not → L) H ⊕ L = H

**Results:**

Lattice Model guarantees Secure Information Flow, even in case of Data Mark Machine problem.

**Take away:**

The lattice model as lots of applications. However some requirements fulfilled by access matrix have been omitted. In reality, practical systems also need access and flow control.