Foundations of Computer Security

Lecture 10: Tranquility and BLP

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Changing Labels

Simple Security and the *-property constrain accesses to objects by subjects according to the relationship between their labels. *But what if the labels are allowed to change?*

Assume you could somehow change an object's label from

(Top Secret: { Crypto })

to

(Unclassified: {})

independent of the object's contents. This would clearly violate confidentiality. *Why?*

John McLean of the Naval Research Lab pointed out that our rules so far don't prohibit this.

Tranquility Properties

We clearly need an additional rule that governs changing labels. You might choose one of these:

The Strong Tranquility Property: Subjects and objects do not change labels during the lifetime of the system.

The Weak Tranquility Property: Subjects and objects do not change labels *in a way that violates the "spirit" of the security policy.*

Are these useful? Are they overly restrictive? What if a user needs to operate at different levels during the course of the day?

Weak Tranquility

The Weak Tranquility Property: Subjects and objects do not change labels *in a way that violates the "spirit" of the security policy.*

What does this mean?

- Suppose your system includes a command to *lower* the level of a object in an unconstrained way. Does that violate the goals of simple security or the *-property?
- Suppose your system includes a command to *raise* the level of a object in an unconstrained way. Does that violate the goals of simple security or the *-property?
- What about subjects? Can they change levels up or down?

Bell and LaPadula

The Simple Security Property, *-Property and Tranquility Property formalize a large portion of *multi-level security*, which is also sometimes called *military security*.

This formalization is due to D. Elliott Bell and Len LaPadula (1973–75) and is called the *Bell and LaPadula Model* (BLP).

Despite its age BLP is still a cornerstone of modern computer security and is still very widely used as a policy.

Lessons

- The ability to change labels arbitrarily can subvert security, so we need a *tranquility* property to deal with that threat.
- Simple Security, the *-Property, and Tranquility together form the basis of the Bell and LaPadula (BLP) model of security.
- BLP is a widely used model of military security.

Next lecture: Access Control Policies