

Foundations of Computer Security

Lecture 22: Biba's Other Policies

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Biba's Integrity Models

Ken Biba (1977) proposed three different integrity access control policies.

- 1 The Low Water Mark Integrity Policy
- 2 The Ring Policy
- 3 Strict Integrity

One difference among them is the amount of trust invested in subjects.

Strict Integrity places very little trust in subjects and constrains all reads and writes to ensure that information never flows up in integrity.

Biba's Low Water Mark Integrity Policy

In general, a *water mark* policy is one where an attribute monotonically floats up (high water mark) or down (low water mark), but may be “reset” at some point.

Biba's Low Water Mark Policy has the following two rules:

- 1 If s reads o , then $i'(s) = \min(i(s), i(o))$, where $i'(s)$ is the subject's new integrity level after the read.
- 2 Subject s can write to object o only if $i(o) \leq i(s)$.

What is the underlying assumption about subjects in this policy?
Are they considered at all trustworthy?

A potential of the LWM Integrity policy is to monotonically decrease the integrity level of a subject unnecessarily.

This sort of problem is called *label creep* and may result in an overly conservative analysis.

This focuses on direct modification and solves some problems of the LWM Policy.

- 1 Any subject can read any object, regardless of integrity levels.
- 2 Subject s can write to object o only if $i(o) \leq i(s)$.

Does the Ring policy make some assumption about the subject that the LWM policy does not?

- In Biba's Low Water Mark policy, a subject's integrity level falls if it ever reads low integrity information.
- The Ring Policy is more trusting of the subject, assuming that a subject can properly filter the information it receives.
- All of Biba's three policies preclude a subject from writing up in integrity.

Next lecture: Lipner's Model