CIS 4360 Introduction to Computer Security

Home Assignment 8, Fall 2011, with answers

Due: Thu 9:30pm, 11/10/2011

This concerns Security models.
Some of the questions refer to a Practice Sheet, which is at the end of this assignment.

1. The Biba model attaches labels to objects and subjects. What are these called?
   Answer: integrity labels.

2. The Clark-Wilson model, in the broadest sense, can also be interpreted as attaching labels to objects and subjects.
   What are the labels for (i) the objects and (ii) the subjects.
   Answer: (i) constrained (high), unconstrained (low); (ii) certified (TPs), uncertified (others).

3. In the Practice Sheet it is said that there is a critical distinction between the two models.
   • Which two models? Answer: Biba and Clark-Wilson.
   • What is the distinction. Answer: In Biba there are no certification rules, while in CW the TPs certify data items.
   • In Biba there is no procedure for verifying actions.
   • In Clark-Wilson a TP certifies an upgrade.

4. In the Practice Sheet it is stated that: “As with the Bell-LaPadula Model, if the Biba model does not have tranquility, trusted entities must change the objects integrity levels, and the method of upgrading need not be certified.”
   • In this context what does tranquility mean? Answer: The integrity labels of subjects or objects cannot be upgraded or downgraded.

5. The Practice Sheet states “the method of upgrading may not be certified” (without tranquility). In Clark-Wilson we have TPs which are separate entities (separation of duties) that upgrade entities or actions, which captures the basic requirements for a certification process.
   • Who certifies users in Clark-Wilson. Answer: The TPs.
   • What are data items called (i) before certification and (ii) after certification.
     Answer: (i) UDIs (unconstrained), (ii) CDI (constrained).

6. The Practice Sheet states that: “the Biba model requires that a trusted entity, such as a security officer, pass on every input sent to a process running at an integrity level higher than that of the input. This is not practical. However, the Clark-Wilson model requires that a trusted entity (again, perhaps a security officer) certify the method of upgrading data to a higher integrity level. Thus, the trusted entity would not certify each data item being upgraded; it would only need to certify the method for upgrading data, and the data items could be upgraded. This is quite practical.”
   • Can you explain this by completing the following sentence:
     In Biba we need a trusted entity to check every input sent to a process running at a higher integrity level than the input while with CW the trusted entity need only certify the method of upgrading.

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