

Homework #2

Due: April 28, 2025**Points:** 100

Questions

1. (20 points) Consider the construction of the three-parent joint creation operation from the two-parent joint creation operation shown in Section 3.5.2. One paper had $cr_C(s, c) = c/R_3$ and $link_2(\mathbf{S}, \mathbf{A}_3) = \mathbf{A}_3/t \in dom(\mathbf{S})$. Why is this not sufficient to derive the three-parent joint creation operation from the two-parent joint creation operation?
2. (18 points) Given the security levels L_4, L_3, L_2, L_1 , and L_0 (ordered from highest to lowest), and the categories C_1, C_2 , and C_3 , specify what type of access (read, write, both, or neither) under the Bell-LaPadula model is allowed in each of the following situations. Assume that discretionary access controls allow anyone access unless otherwise specified.
 - (a) Tom, cleared for $(L_4, \{C_2, C_3\})$, wants to access a document classified $(L_3, \{C_2\})$.
 - (b) Annie, cleared for $(L_2, \{C_1\})$, wants to access a document classified $(L_2, \{C_2\})$.
 - (c) Katie, cleared for $(L_0, \{C_3\})$, wants to access a document classified $(L_4, \{C_1, C_3\})$.
 - (d) Paul, cleared for $(L_3, \{C_1, C_2\})$, wants to access a document classified $(L_3, \{C_1, C_2\})$.
 - (e) Judy, cleared for $(L_4, \{C_1, C_2, C_3\})$, wants to access a document classified $(L_3, \{C_1, C_2\})$.
 - (f) Sylvester, cleared for (L_0, \emptyset) , wants to access a document classified $(L_4, \{C_1\})$.
3. (18 points) Repeat the above question, but under the Biba Strict Integrity Policy model rather than the Bell-LaPadula model.
4. (20 points) Prove Theorem 6.1 for the strict integrity policy of Biba's model.
5. (14 points) In the Clark-Wilson model, must the TPs be executed serially, or can they be executed in parallel? If the former, why; if the latter, what constraints must be placed on their execution?
6. (10 points) In the Brewer-Nash (Chinese Wall) model, why must sanitized objects be in a single company dataset in their own conflict of interest class, and not in the company dataset corresponding to the institution producing the sanitized object?