4 Access Control

Assume you are developing an access control policy for a university according to the Bell-LaPadula model. To this end, lecturers are assigned security clearance "high" for the modules they teach and students clearance "low" for the modules they take. Moreover, exams are classified as "high" and homeworks as well as assignments as "low" for the corresponding modules.

4.1 Tasks

T4.1 Define a starting state $z_0 = (b_0, m_0, f_0)$ in which the following holds:

- *Alice* is a lecturer for module *Security*. *Bob* is a student of *Security* and *Eve* a student of *Logics*.
- *Ex1* is an exam for module *Logics*. *Hw1* is a homework for *Security* and *A1* an assignment for *Logics*.
- *Alice* has given edit (read/write) rights for *Ex1*, read rights for *A1*, and write rights for *Hw1*. *Bob* has read/write rights for *Hw1* and *Eve* for *A1*.
- Currently *Bob* is editing (reading and writing) *Hw1* whereas *Alice* is reading *A1*.
- The current security level of all subjects to an object is initialized with their maximum security level for this object.

T4.2 Argue whether or not the state described above is secure.

T4.3 Describe the new state arising when *Bob* stops writing to *Hw1* and *Alice* changes the exam (i.e., executes read/write rights on the exam), and use the security theorem to argue whether or not the new state is secure.

T4.4 Assume *Alice* wants to comment on *Bob*'s homework *Hw1*, i.e., execute write rights on it. (i) Explain how this is possible, (ii) define the corresponding protection state $z_1 = (b_1, m_1, f_1)$, such that it fulfils the security conditions, and (iii) show that it is secure using the security theorem.