

1993 Paper 3 Question 1

Further Modula-3

Describe the MUTEX type and the LOCK..DO..END construction in Modula-3 for restricting concurrent access to critical regions. Illustrate your answer with an example. [6 marks]

Show how the LOCK..DO..END construction is expanded by the compiler into calls to the Thread library and some exception handling. [4 marks]

The built-in facilities for restricting concurrency in Modula-3 allow only one thread at a time to be executing within the critical region. A different approach is to distinguish *shared* and *exclusive* access to a critical region; any number of *readers* may share access at the same time but only one *writer* may acquire exclusive access, also excluding any readers while it does so. Define a MultiMutex type and sketch suitable library procedures to implement such a scheme. [10 marks]