Further Modula-3

Arrays in Modula-3 can be indexed only by ordinal types, which means that, for example, it is not possible to have an array indexed by TEXT strings. One way of overcoming this restriction is to use hash tables.

Write a generic interface, Table, to manage tables of values of type Value.T indexed by values of type Key.T. A Table.T should be an opaque object with methods

- init to initialise the hash table to a particular size, and
- put and get to store and recover values,

all having appropriate signatures. Use exceptions to indicate duplicate or missing keys. [6 marks]

Sketch a generic implementation of the Table module giving a concrete revelation of T and providing appropriate default methods. It is not necessary to protect the data structure against concurrent access. [8 marks]

What constraints do your interface and implementation impose on interfaces supplied for Key and Value when instantiating Table? [2 marks]

Show how Table could be instantiated to provide an array of integers indexed by text strings, and indicate how this might be used to manage a (write-once) telephone directory. [4 marks]