Operating System Foundations

Two operating systems OS-A and OS-B offer only synchronous system calls, for example, for I/O. In addition, OS-A supports only one process per user-level address-space whereas OS-B supports multi-threaded applications.

(a) (i) Explain how an application-level runtime system or library running on OS-A can provide the user threads needed by concurrent programs. [8 marks]

(ii) Discuss any disadvantages of supporting a concurrent programming language in this way. [3 marks]

(iii) Are there any advantages of having only user threads? [1 mark]

(b) (i) Explain the differences from the runtime described for OS-A of a runtime for OS-B which maps user threads to kernel threads. [5 marks]

(ii) Are the disadvantages you discussed in part (a)(ii) overcome? Explain. [2 marks]

(iii) Have any problems been introduced by the use of kernel threads? [1 mark]