Algorithm Design

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Solution of Exercise R-5.8

Employ the trick used in Java, C, and C++, where we terminate an OR early if one its terms is 1. The probability that one of the terms in each row-column product is $1/k^2$; hence, the expected time for any row-column product is constant. Therefore, the expected running time of the entire product of A and B is $O(n^2)$. If k is n, on the other hand, then the probability than an entry in a row-column product is 1 is $1/n^2$; hence, the expected running time for a row-column product is $O(n)$ in this case. That is, in this case, the expected time to multiply A and B is $O(n^3)$.