Question

Assume a UFS file system as described in the text (that is, inodes with 15 block pointers, the first 12 being direct, followed by 1 single indirect, 1 double indirect, and 1 triple indirect pointer).

The disk has an effective access time per block of 10ms. An infinite, but initially empty, buffer cache is installed. What is the block EAT of an application reading blocks 1 through 16 (inclusive) of a file? (Assume the inode number is known a priori; that is, no directories need be accessed. Also assume a copy of the superblock is stored in memory.)

Answer

Reading the inode requires 1 block access (since the inode number and the superblock are available, we can go straight to the inode). The first 12 blocks require 1 access each (12 total). Block 13 triggers the loading of the first indirect block (2 accesses). Blocks 14, 15, and 16 require only 1 access each (3 total). The total number of blocks accessed is 18, requiring 180ms. Thus, the EAT of a block as seen by the application is $180/16 = 11.25$ms.