

X-Sender: hector@db.stanford.edu  
Date: Mon, 26 Apr 2004 10:39:40 -0700  
To: Diane Shankle <shankle@ee.Stanford.EDU>  
From: Hector Garcia-Molina <hector@cs.stanford.edu>  
Subject: Re: Qualls Questions 2004 Overdue

At 10:17 AM 4/26/2004, you wrote:

The Spring Quarter is coming to a close in less than seven weeks!

Send in your Qualls Question so I can mark you off my list!

Hector Garcia-Molina  
EE Qualls Question 2004  
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Consider two vectors  $A[1] \dots A[N]$  and  $B[1] \dots B[N]$  stored in two arrays. We want to compute the dot product defined as

$$d = A[1]*B[1] + A[2]*B[2] + \dots + A[N]*B[N]$$

(1) Write a statement (pseudo-code) to compute the dot product.

(2) A sparse vector is one which contains very few non-zero values. If  $N$  is large, it is not effective to store a sparse vector in array, since a lot of space is wasted storing zeroes. Suggest an alternate representation for a sparse vector, which uses space proportional to the number of non-zero entries (not space proportional to  $N$ ).

(3) Write pseudo-code to compute the dot product when two vectors are represented using the data structure of Part (2).