

# Question 2

Monday, January 21, 2019 2:11 AM

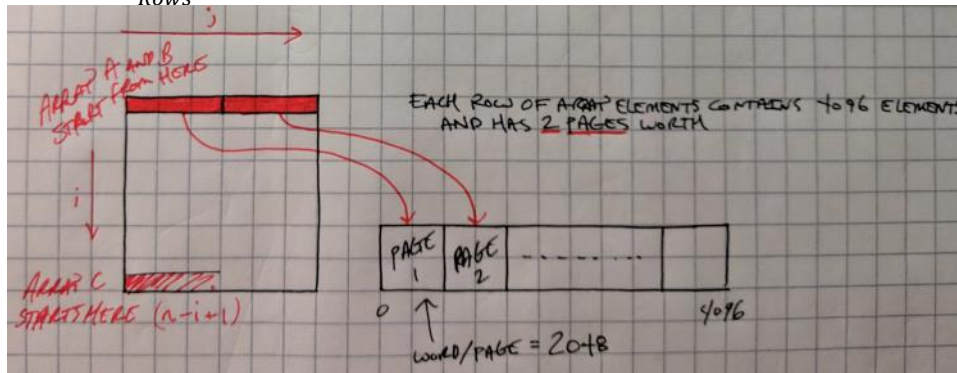
(a) Row-major order

```

for i := 1 to 4096 do
  for j := 1 to 4096 do {
     $A[i, j] := A[i, j] * B[i, j];$  // After this assume  $B[i, j]$  is in memory
     $B[i, j] := C[n - i + 1, j] * B[i, j];$  ;
  }

```

2 fetchs of page A  
 2 writes of dirty page A  
 2 fetchs of page B  
 2 writes of dirty page B  
 2 fetchs of page C  
 10 total pages of read and write from  $i = 1, \dots, 4096$   
 $10 \cdot 4096 = 40960$  total page transfers



(b) Column-major order

```

for i := 1 to 4096 do
  for j := 1 to 4096 do {
     $A[j, i] := A[j, i] * B[j, i];$  // After this assume  $B[j, i]$  is in memory
     $B[j, i] := C[j, n - i + 1] * B[j, i];$  ;
  }

```

4096 fetchs of page A  
 4096 writes of dirty page A  
 4096 fetchs of page B  
 4096 writes of dirty page B  
 4096 fetchs of page C  
 20480 total page reads/writes from  $j = 1$  and  $i = 1, \dots, 4096$   
 $20480 \cdot 4096 = 83,886,080$  total page transfers