

procedure CRCW MATRIX MULTIPLICATION (A, B, C)

for $i = 1$ to m do in parallel
 for $j = 1$ to k do in parallel
 for $s = 1$ to n do in parallel
 (1) $c_{ij} \leftarrow 0$
 (2) $c_{ij} \leftarrow a_{is} \times b_{sj}$
 end for
 end for
end for. □

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- $t(n) = O(1)$ and $c(n) = O(n^3) * O(1) = O(n^3)$

Vector-Matrix Multiplication-Tree

procedure TREE MV MULTIPLICATION (A, U, V)

do steps 1 and 2 **in parallel**

(1) **for** $i = 1$ **to** n **do in parallel**

for $j = 1$ **to** m **do**

(1.1) compute $u_i \times a_{ji}$

(1.2) send result to parent

end for

end for

(2) **for** $i = n + 1$ **to** $2n - 1$ **do in parallel**

while P_i receives two inputs **do**

(2.1) compute the sum of the two inputs

(2.2) **if** $i < 2n - 1$ **then** send the result to parent

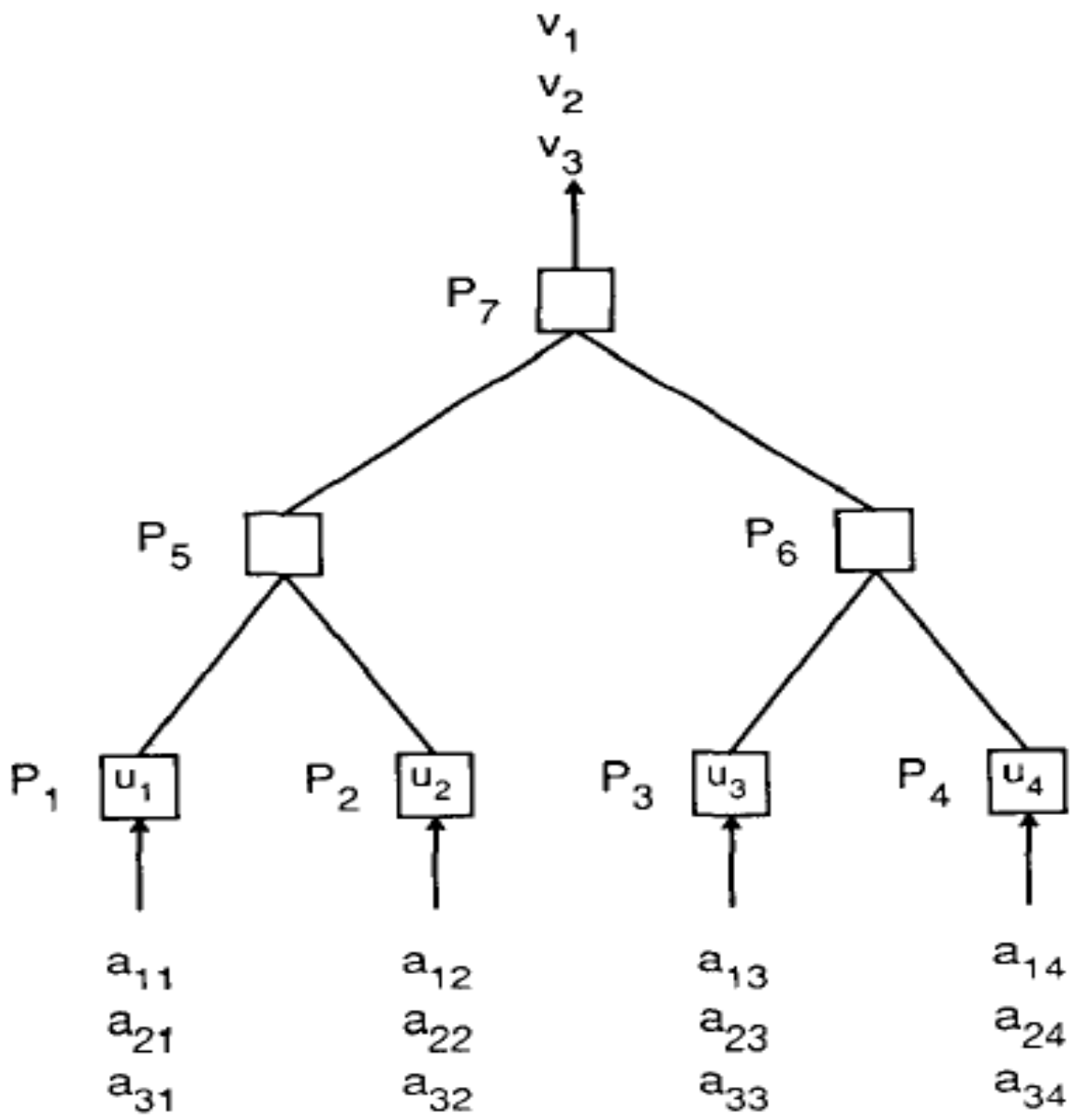
else produce the result as output

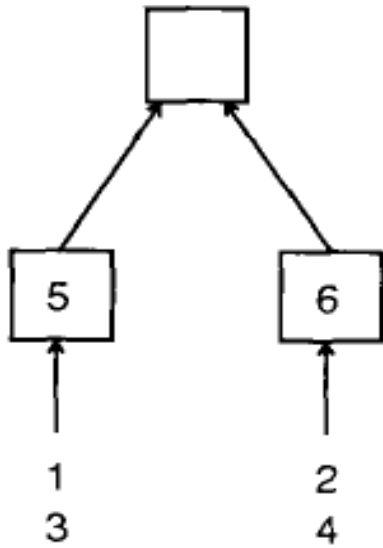
end if

end while

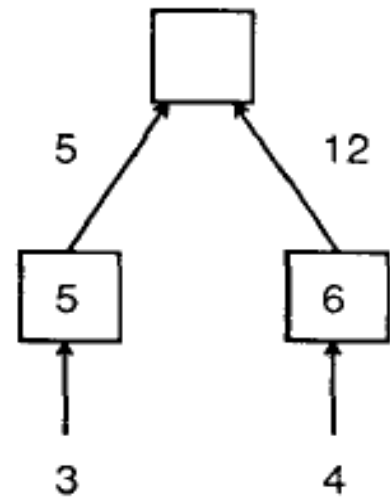
end for. \square

Example-

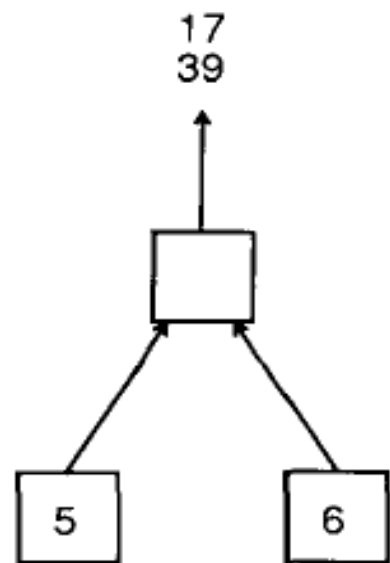
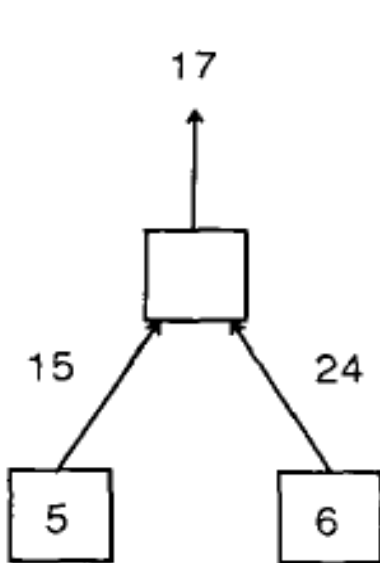




(a)



(b)



• Analysis-

$t(n) = m-1 + \log n$

$p(n) = n$ leaf processors, $n-2$ intermediate processors
and 1 root processor

$c(n) = O(n^2)$ i.e., cost-optimal