

hw4

第一题

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(2) for  $i=1$  to  $n-1$  do /* 各处理器找主元候选者 */
    (2.1) value=0
    (2.2) for  $j=1$  to  $n/p$  do
        if  $\text{marked}_j = 0 \ \& \ |a_{ji}| > \text{value}$  then
            value= $|a_{ji}|$ 
            picked= $j$ 
        endif
    endfor
    (2.3) winner= $i$  /* 标记控制主元行的处理器 */
    (2.4) MAX. TOURNAMENT ( $i$ , value, winner)
          /* 调用 MAX 选全局最大主元 */
    (2.5) if  $i = \text{winner}$  then
        (i)  $\text{marked}_{\text{picked}} = 1$ 
        (ii)  $\text{pivot}_{\text{picked}} = i$ 
        (iii) for  $j=i$  to  $n$  do
            temp. vector $j$ = $a_{\text{picked}, j}$ 
        endfor
        (iv) temp. vector $n+1$ = $b_{\text{picked}}$ 
    endif
    (2.6) HC. BROADCAST( $i$ , winner, temp. vector $i, n+1$ )
          /* 主元处理器播送主元给其他处理器 */
    (2.7) for  $j=1$  to  $n/p$  do /* 未选中的行中消去列  $i$  之元素 */

        if  $\text{marked}_j = 0$  then
            (i)  $\text{temp} = a_{ji} / \text{temp. vector}_i$ 
            (ii) for  $k=i+1$  to  $n$  do
                 $a_{jk} = a_{jk} - \text{temp. vector}_k \times \text{temp}$ 
            endfor
            (iii)  $b_j = b_j - \text{temp. vector}_{n+1} \times \text{temp}$ 
        endif
    endfor
endfor

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在 (2.7) 中, 时间复杂度为:

$$O\left(\sum_{i=1}^{n-1} [(n-i) * (\frac{n}{p} - \frac{1}{p} * i)]\right)$$

$$= O\left(\frac{2n^3 - 3n^2 + n}{6P}\right)$$

其中 $(n-i)$ 指 for $k = i+1$ to n 部分.

$(\frac{n}{P} - \frac{1}{P} \times i)$ 指 for $j = 1$ to $\frac{n}{P}$ 部分.

i 每自增 1, markedj=0 在此处理器存在可能性
减了 $\frac{i}{P}$

第二题

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(1) for k=0 to n-1 do
    c[k] = b[k]
endfor

(2) for h from log(n)-1 to 0 do
    (2.1) p = 2^h
    (2.2) q = n / p
    (2.3) z = exp(-2 * pi * i / p)
    (2.4) for k=0 to n-1 do
        if (k mod p == k mod (2*p)) then
            (i) c_temp = c[k]
            (ii) c[k] = c_temp + z * c[k + q]
            (iii) c[k + q] = c_temp - z * c[k + q]
        endif
    endfor
endfor

(3) for k=0 to n-1 do
    a[r(k)] = c[k] / n
endfor

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