Chapter 2

Odd Even Transposition Sort

2.1 Objectives:

At the end of this lecture the learner will be able to:

- Understand the meaning of Odd Even Transposition sort
- Understand a method for carrying out odd even transposition sort in parallel.
- Apply odd even transposition sort algorithm to sort a list of numbers.

2.2 Definition of Odd Even Transposition Sort

Now let us start our discussion with the definition of odd even transposition sort.

Definition 2. *The odd even transposition algorithm sorts a given set of n numbers where n is even in n phases. Each phase requires n/2 compare and exchange operations. It oscillates between odd and even phases successively.*

Let $<$ b_1,b_2,..,b_n $>$ be the sequence to be sorted. During the odd phase the elements with odd numbered subscripts are compared their neighbors on the right and exchanged if necessary. That is the elements (b_1,b_2),(b_3,b_4)..(b_{n-1},b_n) are compared and exchanged, where n is odd.

During the even phase the elements with even numbered subscripts are compared with their neighbors on the right and exchanged if necessary. That is the elements (b_2,b_3),(b_4,b_5)..(b_{n-2},b_{n-1}) are compared and exchanged, where n is even. After n phases the elements are sorted

Now we will discuss an algorithm for odd even transposition sort for one dimensional mesh processor array.

2.3 Algorithm for Odd Even Transposition Sort

Procedure OddEvenTransposition(1D Mesh Processor Array)
begin
for i= 1 to n/2 do
begin
for all P_k k varies from 0 to n-1 do
begin
if j $<$ n-1 and j$\%$2 not equal to 0 then

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temp= successor(a)
successor(a)=maximum(a,t)
a=minimum(a,t)
endif
if j%2 equal to 0 then
temp=successor(a)
successor(a)=maximum(a,t)
a=minimum(a,t)
endif
end
end
end
```

2.4 Example

Let n=4 and a=<5,2,1,4>

According to the algorithm i varies from 1 to 2 The processors are P_0, P_1, P_2 and P_3. Let i=1

Since 0 is even, process P_0 will compare even vertices with its successor and exchange if necessary. That is a becomes <2,5,1,4>

P_1 will compare odd vertices with its successor and exchange if necessary. That is a becomes<2,1,5,4>

P_2 will make a as <1,2,4,5> and P_3 will retain a.

Next i becomes 2 but no change in a.

Hence the final sequence is <1,2,4,5>.

2.5 Diagrammatic Representation of Odd Even Transposition Sort

Figure 2.1: A representation of Odd Even Transposition Sort