EECS-358 ASSIGNMENT 2

Problem 1 a:

The vector is distributed in portions of elements in the last process-column only. The entire vector must be distributed on each row of processes before the multiplication can be performed. First, the vector is aligned along the main diagonal. For this, each process in the rightmost column sends its vector elements to the diagonal process in its row. Then a columnwise one-to-all broadcast of these elements takes place. Each process then performs n^2/p multiplications and locally adds the sets of products. At the end of this step. Each process has partial sums that must be accumulated along each row to obtain the result vector. Hence, the last step of the algorithm is an all-to-one reduction of the values in each row, with the rightmost process of the row as the destination.

Tp = n^2/p + Ts + Tw*n/p^½

For Hypercube : (Ts + Tw * n) /p^½ * log(p^½) + (Ts + Tw * n) / p^½ * log(p^½)

Approximately, n^2/p Ts * log(p) + Tw * (n - n/p)

For Torus : n^2*p+ 2∗Ts(p^½ −1) +Tw(n−n*p)

Problem 2:

64 Quadrants:

Time for Processor 1 : 15.60272

Time for Processor 2 : 8.018536

Time for Processor 4 : 4.338771

Time for Processor 8 : 2.592208

Time for Processor 16 : 2.051494

Time for Processor 32 : 1.483605

Time for Processor 64 : 1.180677

Time for Processor 128 : 1.669161

128 Quadrants:

Time for Processor 1 : 8.039937

Time for Processor 2 : 4.253517

Time for Processor 4 : 2.402682

Time for Processor 8 : 1.566250

Time for Processor 16 : 1.178027

Time for Processor 32 : 1.044186

Time for Processor 64 : 0.879386

Time for Processor 128 : 1.656551

256 Quadrants:

Time for Processor 1 : 4.274323

Time for Processor 2 : 2.384039

Time for Processor 4 : 1.487347

Time for Processor 8 : 1.052641
Time for Processor 16 : 1.162921
Time for Processor 32 : 0.888345
Time for Processor 64 : 0.704276
Time for Processor 128 : 1.714005