
Algorithm 4: TSLU 2021

Require: S , the number of processors $P_{i=1:S}$ assigned to the binary reduction tree;

Require: S be a power of 2;

Require: The input panel $W(1 : m, 1 : n)$ distributed using a 1-D block row layout;

Ensure: W_{P_i} is the block of rows belonging to P_i ;

for d from 1 to $\log_2(S)$ **do**

for k from 1 to S , strided by $1 \ll (d + 1)$ **do**

 Receiver = k ; Sender = $k \ll (d + 1)$;

if $P_i = \text{Receiver}$ **then**

 Pivot rows of W_{P_i} to produce winning rows and row IDs;

 Receive winning b rows from Sender;

 Receive winning row IDs from Sender;

 Combine b rows from W_{P_i} and Sender to form new W_{P_i} ;

 Combine row IDs from W_{P_i} and Sender to form new set of row IDs;

else if $P_i = \text{Sender}$ **then**

 Pivot rows of W_{P_i} to produce winning rows and row IDs;

 Send winning b rows to Receiver;

 Send winning row IDs to Receiver;

end

if $P_i = \text{root}$ **then**

 Receive winning row IDs from all other P_i ;

else

 Sending winning row IDs to $P_i = \text{root}$;

end

end

Compute ΠW according to pivoting information stored in row IDs;

if $P_i = \text{root}$ **then**

 Compute $\Pi W = LU$ using GE;

end
