LIST OF SYMBOLS

\( n \) number of Grid tasks
\( m \) number of heterogeneous nodes
\( x_i \) variable representing the node to execute the task \( i \)
\( x_i^{(u)} \) maximum allowed value of \( x_i \)
\( x_i^{(l)} \) minimum allowed value of \( x_i \)
\( ETC_{ij} \) expected time for node \( j \) to process task \( i \)
\( C_j \) completion time of node \( j \)
\( V \) set of \( v \) tasks
\( E \) set of \( e \) communication edges
\( p_j \) Computing node \( j \)
\( B_{m,n} \) communication bandwidth between \( p_m \) and \( p_n \)
\( L_m \) communication startup cost of computing node \( p_m \)
\( data_{i,j} \) amount of communication data which is to be transmitted from task \( n_i \) to task \( n_j \)
\( t_{\text{max}} \) Maximum running time of algorithm
\( \bar{B} \) average communication bandwidth
\( \bar{L} \) average communication startup cost
\( \text{rank}_u(n_i) \) upward rank of a task \( n_i \)
\( \text{succ}(n_i) \) set of immediate successor of task \( n_i \)
\( n_{\text{exit}} \) exit task
\( \text{EST}(n_i,p_j) \) Earliest Start Time of the task \( n_i \) on the computing node \( p_j \)
\( \text{EFT}(n_i,p_j) \) Earliest Finish Time of the task \( n_i \) on the computing node \( p_j \)
\( \text{ready\_time}(n_i) \) time when all data needed by \( n_i \) have arrived at the computing node \( p_j \)
\( \text{avail\_time}(p_j) \) earliest time at which the computing node \( p_j \) is ready for the task execution
\( N_p \) size of the parent population \( P \)
\( U_i \) offspring
\( D \) number of decision variables