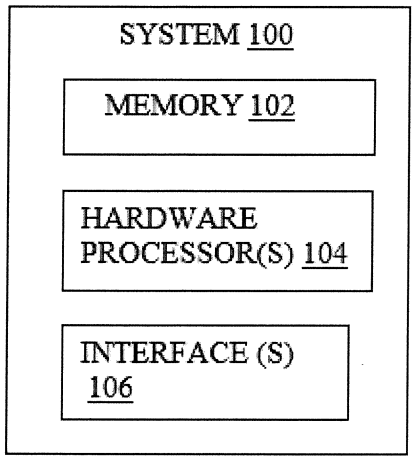

SYSTEM 100
MEMORY 102
HARDWARE PROCESSOR(S) 104
INTERFACE (S) 106

FIG. 1

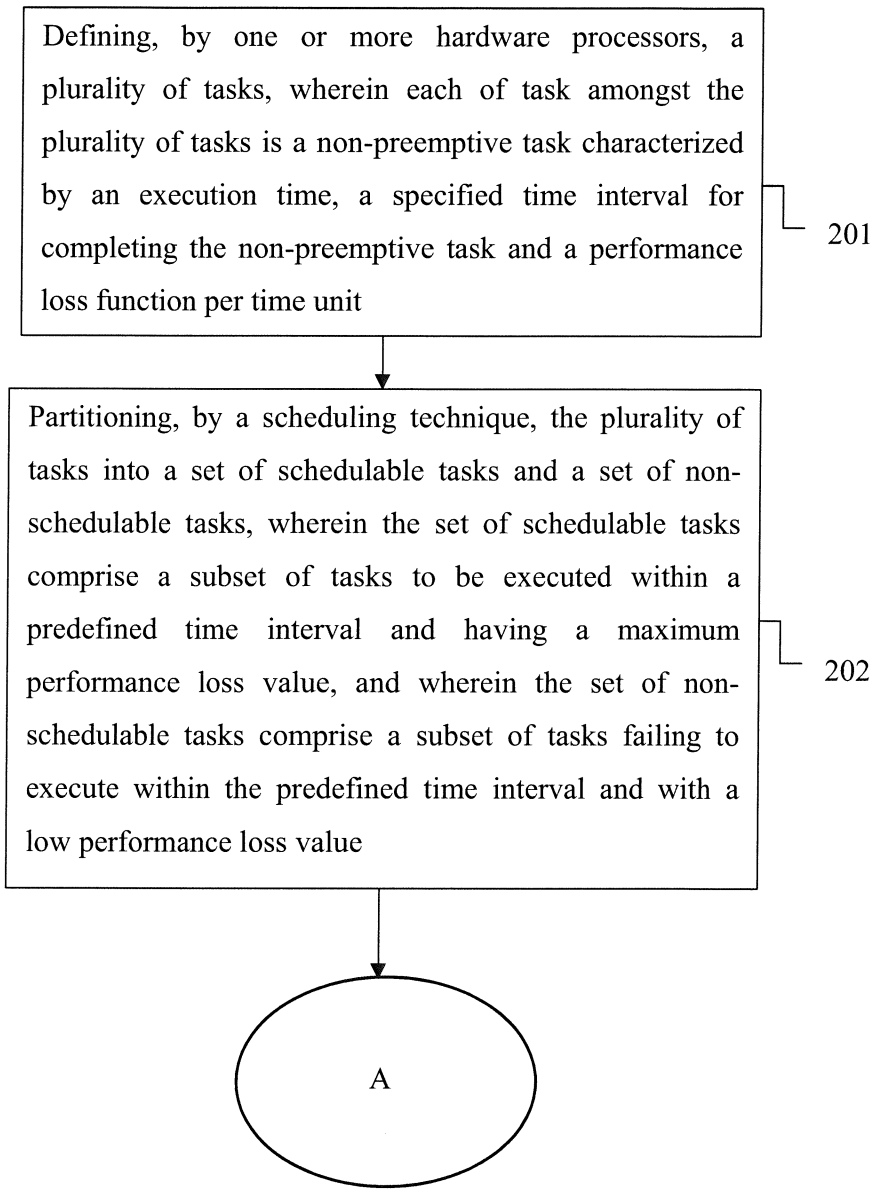

Defining, by one or more hardware processors, a plurality of tasks, wherein each of task amongst the plurality of tasks is a non-preemptive task characterized by an execution time, a specified time interval for completing the non-preemptive task and a performance loss function per time unit
201
Partitioning, by a scheduling technique, the plurality of tasks into a set of schedulable tasks and a set of non-schedulable tasks, wherein the set of schedulable tasks comprise a subset of tasks to be executed within a predefined time interval and having a maximum performance loss value, and wherein the set of non-schedulable tasks comprise a subset of tasks failing to execute within the predefined time interval and with a low performance loss value
202
A

FIG. 2A

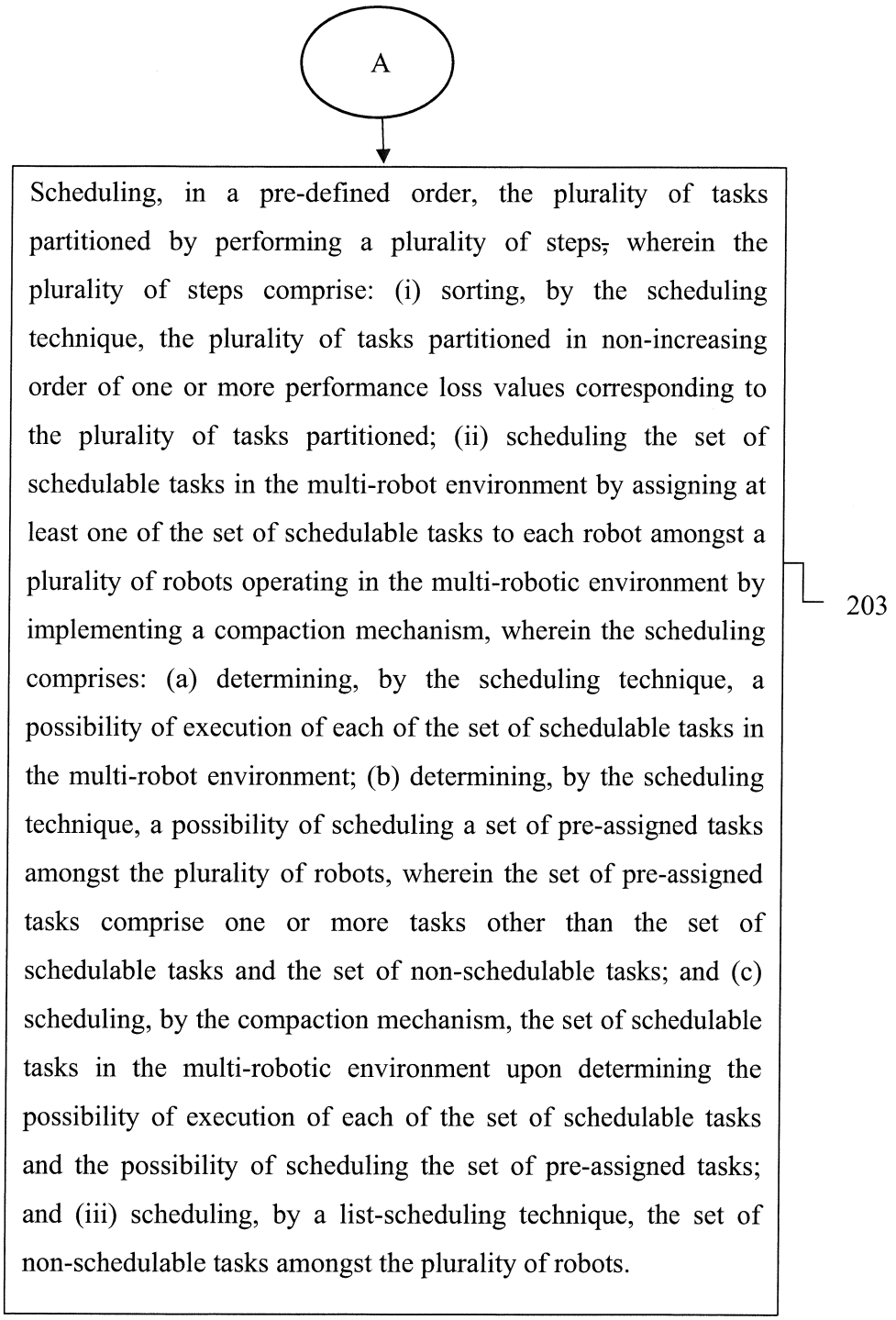

A
Scheduling, in a pre-defined order, the plurality of tasks partitioned by performing a plurality of steps, wherein the plurality of steps comprise: (i) sorting, by the scheduling technique, the plurality of tasks partitioned in non-increasing order of one or more performance loss values corresponding to the plurality of tasks partitioned; (ii) scheduling the set of schedulable tasks in the multi-robot environment by assigning at least one of the set of schedulable tasks to each robot amongst a plurality of robots operating in the multi-robotic environment by implementing a compaction mechanism, wherein the scheduling comprises: (a) determining, by the scheduling technique, a possibility of execution of each of the set of schedulable tasks in the multi-robot environment; (b) determining, by the scheduling technique, a possibility of scheduling a set of pre-assigned tasks amongst the plurality of robots, wherein the set of pre-assigned tasks comprise one or more tasks other than the set of schedulable tasks and the set of non-schedulable tasks; and (c) scheduling, by the compaction mechanism, the set of schedulable tasks in the multi-robotic environment upon determining the possibility of execution of each of the set of schedulable tasks and the possibility of scheduling the set of pre-assigned tasks; and (iii) scheduling, by a list-scheduling technique, the set of non-schedulable tasks amongst the plurality of robots.
203

FIG. 2B

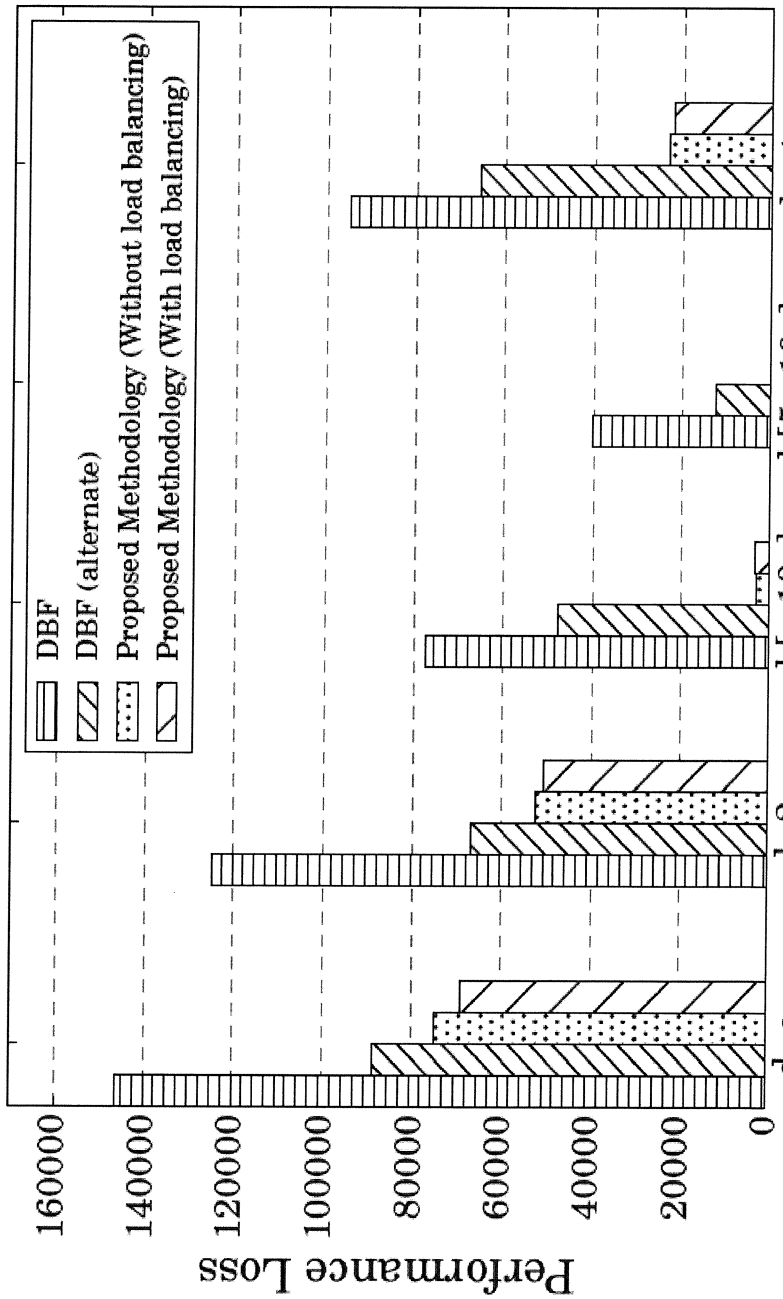

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Performance Loss
0
20000
40000
60000
80000
100000
120000
140000
160000
d=e
d=2e
d [e,10e]
d [5e,10e]
d mix
Dataset

FIG. 3A

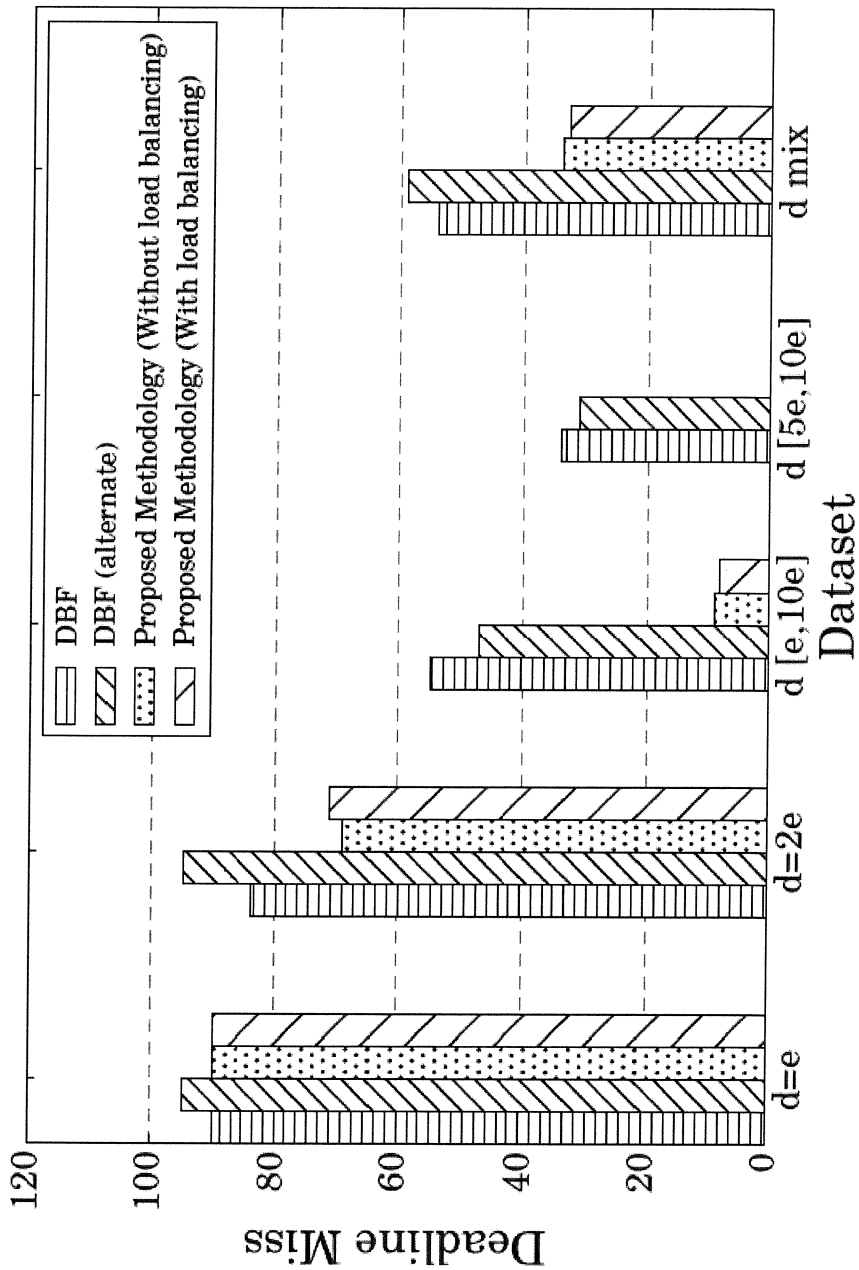

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Deadline Miss
120
100
80
60
40
20
0
d=e
d=2e
d [e,10e]
d [5e,10e]
d mix
Dataset

FIG. 3B

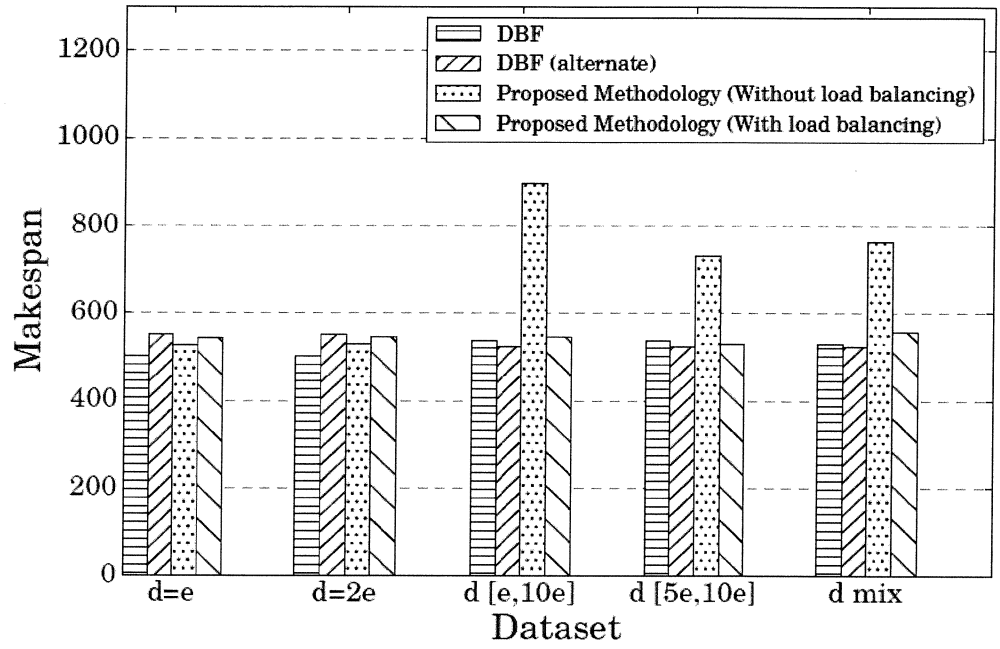

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Makespan
1200
1000
800
600
400
200
0
d=e
d=2e
d [e,10e]
d [5e,10e]
d mix
Dataset

FIG. 3C

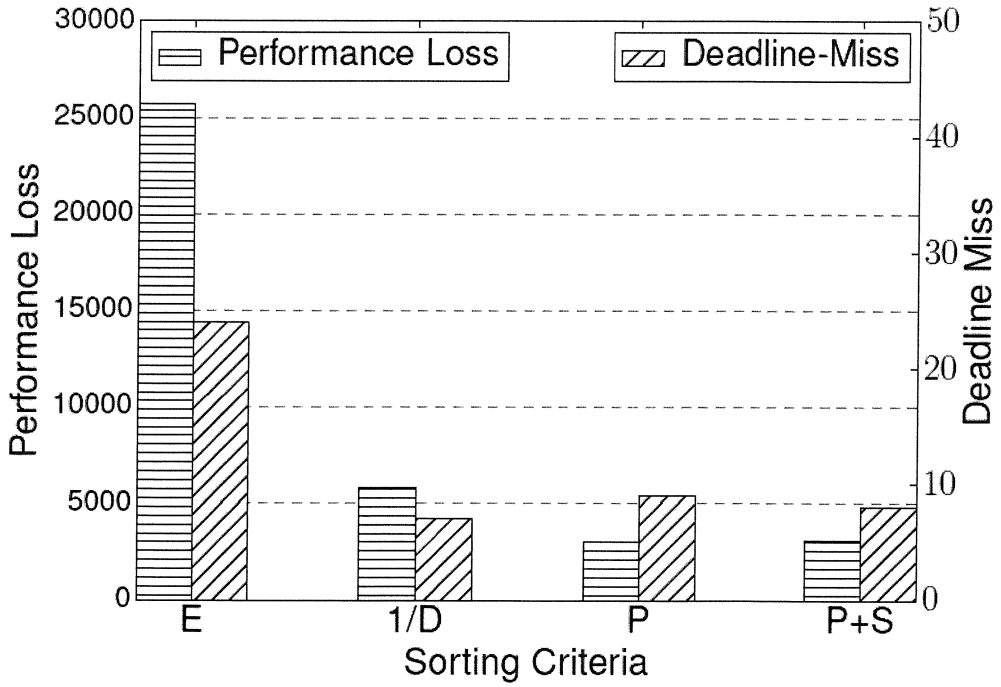

Performance Loss
Deadline-Miss
Performance Loss
Deadline Miss
30000
25000
20000
15000
10000
5000
0
50
40
30
20
10
0
E
1/D
P
P+S
Sorting Criteria

FIG. 4

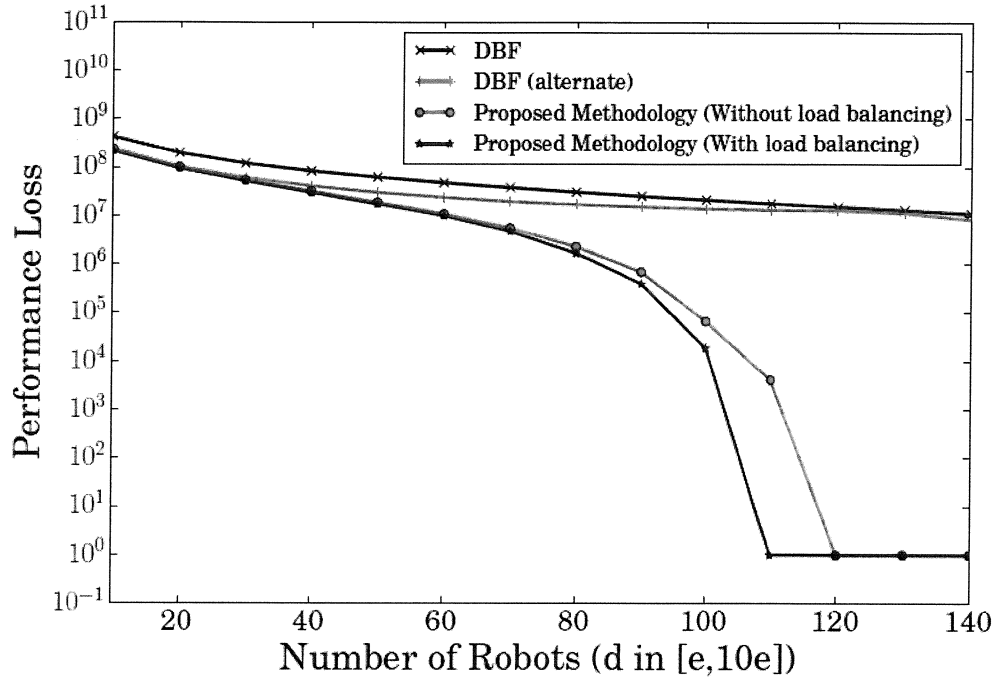

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Performance Loss
10^{11}
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
10^{2}
10^{1}
10^{0}
10^{-1}
20
40
60
80
100
120
140
Number of Robots (d in [e,10e])

FIG. 5A

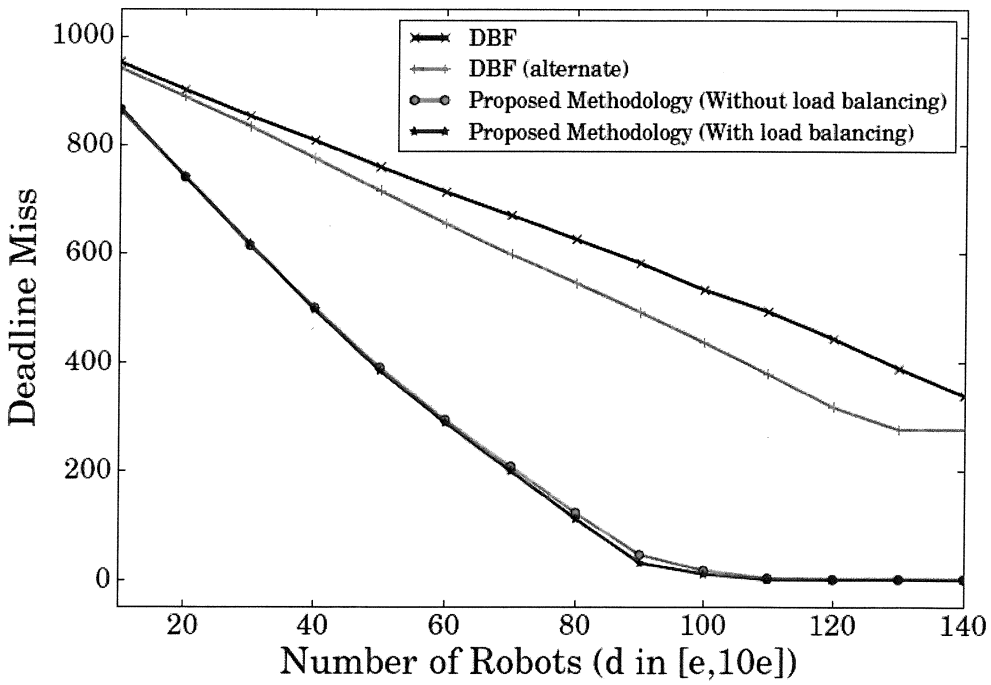

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Deadline Miss
1000
800
600
400
200
0
20
40
60
80
100
120
140
Number of Robots (d in [e,10e])

FIG. 5B

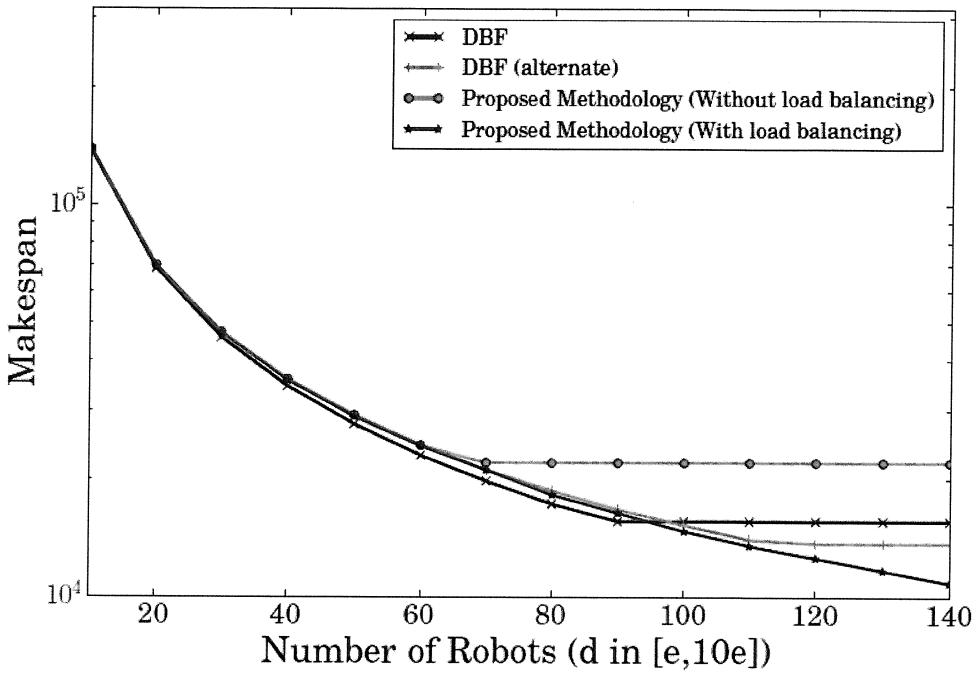

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Makespan
10^5
10^4
20
40
60
80
100
120
140
Number of Robots (d in [e,10e])

FIG. 5C

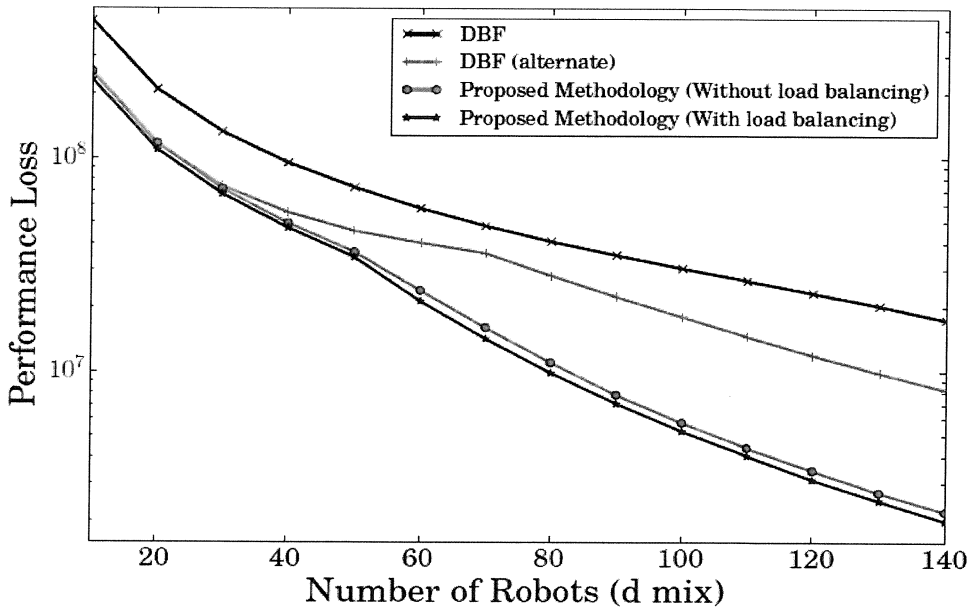

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Performance Loss
10^8
10^7
20
40
60
80
100
120
140
Number of Robots (d mix)

FIG. 6A

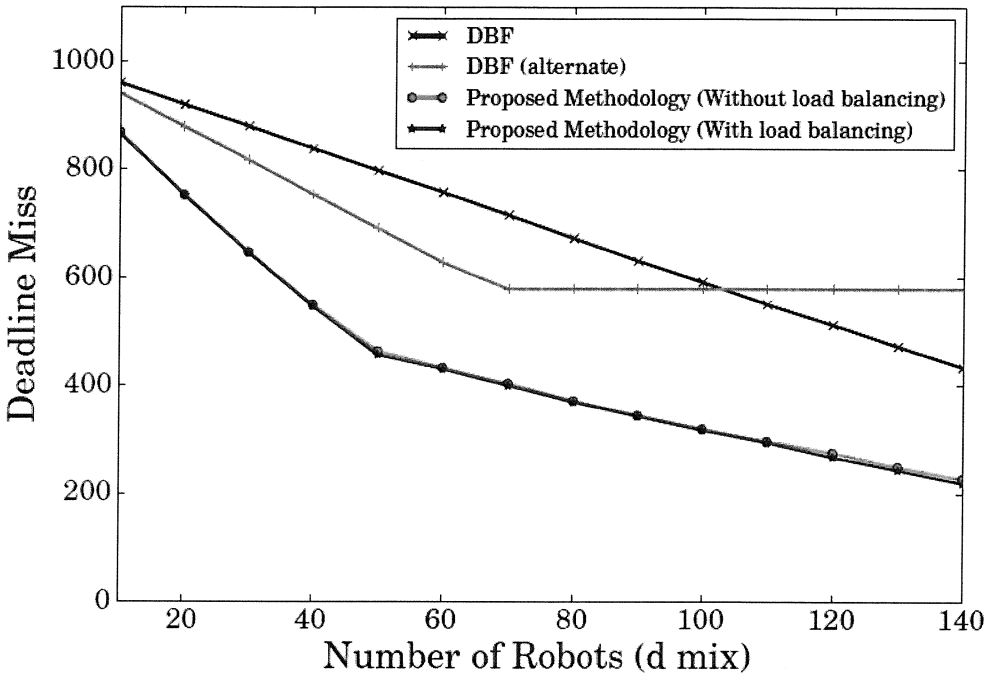

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Deadline Miss
0
200
400
600
800
1000
20
40
60
80
100
120
140
Number of Robots (d mix)

FIG. 6B

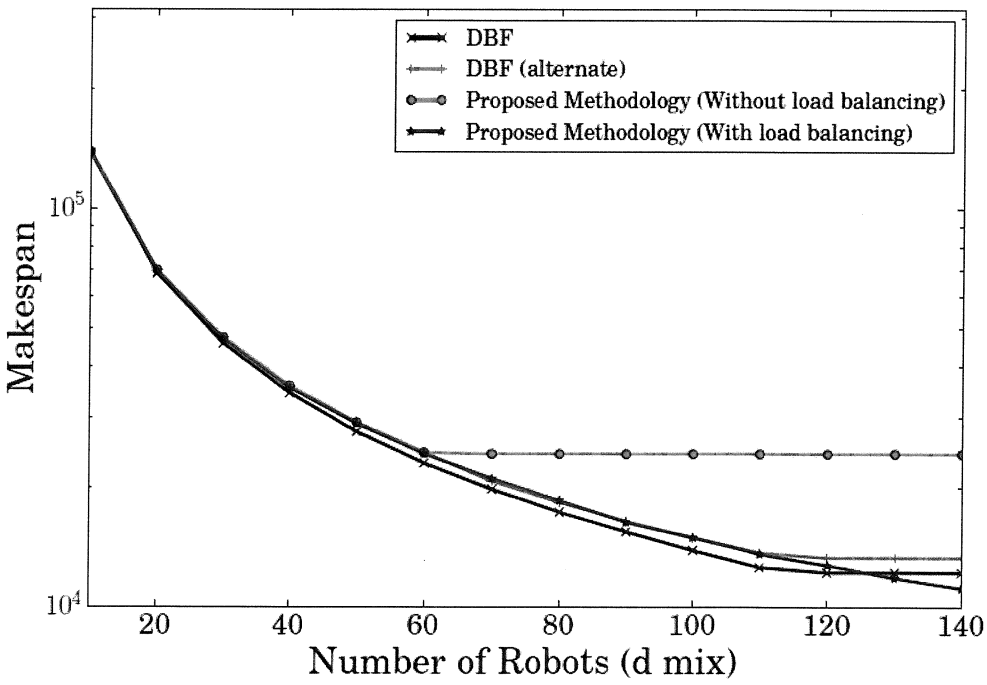

DBF
DBF (alternate)
Proposed Methodology (Without load balancing)
Proposed Methodology (With load balancing)
Makespan
10^5
10^4
20
40
60
80
100
120
140
Number of Robots (d mix)

FIG. 6C