

Starting C:\algo\build-h-Desktop_Qt_5_6_0_MinGW_32bit-Debug\debug\h.exe...

number of jobs to how many files have this jobs. for example (10,12) means 12 files have 10 jobs tasks

QMap((10, 60)(50, 180)(100, 180)(500, 180)(1000, 180))

"number of input=130. distribution=U. range=[1, 100] #jobs=all. #machines=all"

"-----START 1 from 130-----"

"input file number 1: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_0.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_0.txt"

****Data from file U_1_0010_05_0.txt: machinesNum=5 jobsNum=10"

****SOLUTION Data from file SOL_U_1_05_0010_0.txt: machinesNum=5 jobsNum=10 lowerBound=101 upperBound=101 isOptimal=1"

Content of machines summed (92, 87, 94, 96, 101)

input selected: size 10 sum 470

----Our Results-----

best from Our local search found:

target function = 106, num of machines=5, square root lms=210.442391166799

machines content(number of jobs=10):

bucket1 sum:92, content= (92)

bucket2 sum:87, content= (80, 5, 2)

bucket3 sum:94, content= (68, 26)

bucket4 sum:96, content= (61, 35)

bucket5 sum:101, content= (53, 48)

"----Comparison for the 0 example----"

****tf from benchmark was 106(we added the number of machines) and target function from our local search is 106"

***RESULT IS THE SAME

Run time: 0.018 seconds

"Correct (size-numberCorrect):" QMap((10, 1))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: nan"

"-----END 1 from 130-----"

"-----START 2 from 130-----"

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"input file number 2: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_1.txt"
****Data from file U_1_0010_05_1.txt: machinesNum=5 jobsNum=10"
****SOLUTION Data from file SOL_U_1_05_0010_1.txt: machinesNum=5 jobsNum=10 lowerBound=86 upperBound=86 isOptimal=1"
Content of machines summed (86, 78, 76, 75, 77)
input selected: size 10 sum 392

----Our Results-----
best from Our local search found:
target function = 91, num of machines=5, square root lms=175.527775579821
machines content(number of jobs=10):
bucket1 sum:86, content= (86)
bucket2 sum:78, content= (67, 11)
bucket3 sum:76, content= (52, 24)
bucket4 sum:77, content= (44, 33)
bucket5 sum:75, content= (31, 40, 4)
"----Comparison for the 1 example----"
****tf from benchmark was 91(we added the number of machines) and target function from our local search is 91"
***RESULT IS THE SAME
Run time: 0.073 seconds
"Correct (size-numberCorrect):" QMap((10, 2))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 2 from 130-----"
"-----START 3 from 130-----"
"input file number 3: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_2.txt"
****Data from file U_1_0010_05_2.txt: machinesNum=5 jobsNum=10"
****SOLUTION Data from file SOL_U_1_05_0010_2.txt: machinesNum=5 jobsNum=10 lowerBound=116 upperBound=116 isOptimal=1"
Content of machines summed (111, 101, 116, 106, 116)
input selected: size 10 sum 550
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----Our Results-----

best from Our local search found:

target function = 121, num of machines=5, square root lms=246.312809248727

machines content(number of jobs=10):

bucket1 sum:106, content= (34, 72)

bucket2 sum:111, content= (81, 30)

bucket3 sum:116, content= (72, 44)

bucket4 sum:101, content= (20, 81)

bucket5 sum:116, content= (63, 53)

"----Comparison for the 2 example----

***tf from benchmark was 121(we added the number of machines) and target function from our local search is 121"

***RESULT IS THE SAME

Run time: 0.026 seconds

"Correct (size-numberCorrect):" QMap((10, 3))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 3 from 130-----"

"-----START 4 from 130-----"

"input file number 4: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_3.txt"

***Data from file U_1_0010_05_3.txt: machinesNum=5 jobsNum=10"

***SOLUTION Data from file SOL_U_1_05_0010_3.txt: machinesNum=5 jobsNum=10 lowerBound=125 upperBound=125 isOptimal=1"

Content of machines summed (100, 125, 120, 112, 120)

input selected: size 10 sum 577

----Our Results-----

best from Our local search found:

target function = 130, num of machines=5, square root lms=258.783693458456

machines content(number of jobs=10):

bucket1 sum:100, content= (97, 3)

bucket2 sum:125, content= (85, 40)

bucket3 sum:120, content= (78, 42)

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bucket4 sum:112, content= (68, 44)
bucket5 sum:120, content= (62, 58)
"----Comparison for the 3 example----"
"***tf from benchmark was 130(we added the number of machines) and target function from our local search is 130"
***RESULT IS THE SAME
Run time: 0.018 seconds
"Correct (size-numberCorrect):" QMap((10, 4))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 4 from 130-----"
"-----START 5 from 130-----"
"input file number 5: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_4.txt"
"***Data from file U_1_0010_05_4.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_U_1_05_0010_4.txt: machinesNum=5 jobsNum=10 lowerBound=89 upperBound=89 isOptimal=1"
Content of machines summed (69, 76, 68, 80, 89)
input selected: size 10 sum 382

----Our Results-----
best from Our local search found:
target function = 94, num of machines=5, square root lms=171.703232351636
machines content(number of jobs=10):
bucket1 sum:69, content= (65, 4)
bucket2 sum:76, content= (63, 13)
bucket3 sum:80, content= (28, 52)
bucket4 sum:68, content= (14, 54)
bucket5 sum:89, content= (50, 39)
"----Comparison for the 4 example----"
"***tf from benchmark was 94(we added the number of machines) and target function from our local search is 94"
***RESULT IS THE SAME
Run time: 0.034 seconds
"Correct (size-numberCorrect):" QMap((10, 5))

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"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 5 from 130-----"
"-----START 6 from 130-----"
"input file number 6: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_5.txt"
"***Data from file U_1_0010_05_5.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_U_1_05_0010_5.txt: machinesNum=5 jobsNum=10 lowerBound=121 upperBound=121 isOptimal=1"
Content of machines summed (95, 95, 109, 109, 121)
input selected: size 10 sum 529
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----Our Results-----

best from Our local search found:

target function = 126, num of machines=5, square root lms=237.598400668018

machines content(number of jobs=10):

bucket1 sum:95, content= (95)

bucket2 sum:95, content= (85, 6, 4)

bucket3 sum:109, content= (79, 30)

bucket4 sum:109, content= (77, 32)

bucket5 sum:121, content= (69, 52)

"----Comparison for the 5 example----"

"***tf from benchmark was 126(we added the number of machines) and target function from our local search is 126"

***RESULT IS THE SAME

Run time: 0.023 seconds

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"Correct (size-numberCorrect):" QMap((10, 6))
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"Mistakes(size-numberMistakes):" QMap()
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"Avegare error: 0"

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"-----END 6 from 130-----"
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"-----START 7 from 130-----"
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"input file number 7: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_6.txt and
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solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_6.txt"
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"***Data from file U_1_0010_05_6.txt: machinesNum=5 jobsNum=10"
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****SOLUTION Data from file SOL_U_1_05_0010_6.txt: machinesNum=5 jobsNum=10 lowerBound=113 upperBound=113 isOptimal=1"
Content of machines summed (113, 113, 108, 92, 83)
input selected: size 10 sum 509

----Our Results-----

best from Our local search found:

target function = 118, num of machines=5, square root lms=228.571651785605

machines content(number of jobs=10):

bucket1 sum:93, content= (83, 10)

bucket2 sum:93, content= (93)

bucket3 sum:97, content= (92, 5)

bucket4 sum:113, content= (40, 34, 39)

bucket5 sum:113, content= (67, 46)

"----Comparison for the 6 example----

****tf from benchmark was 118(we added the number of machines) and target function from our local search is 118"

***RESULT IS THE SAME

Run time: 0.022 seconds

"Correct (size-numberCorrect):" QMap((10, 7))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 7 from 130-----"

"-----START 8 from 130-----"

"input file number 8: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_7.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_7.txt"

****Data from file U_1_0010_05_7.txt: machinesNum=5 jobsNum=10"

****SOLUTION Data from file SOL_U_1_05_0010_7.txt: machinesNum=5 jobsNum=10 lowerBound=99 upperBound=99 isOptimal=1"

Content of machines summed (99, 90, 88, 93, 93)

input selected: size 10 sum 463

----Our Results-----

best from Our local search found:

target function = 104, num of machines=5, square root lms=207.265530178079

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machines content(number of jobs=10):
bucket1 sum:99, content= (99)
bucket2 sum:90, content= (90)
bucket3 sum:88, content= (68, 20)
bucket4 sum:93, content= (63, 20, 10)
bucket5 sum:93, content= (56, 26, 11)
"----Comparison for the 7 example----"
"***tf from benchmark was 104(we added the number of machines) and target function from our local search is 104"
***RESULT IS THE SAME
Run time: 0.051 seconds
"Correct (size-numberCorrect):" QMap((10, 8))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 8 from 130-----"
"-----START 9 from 130-----"
"input file number 9: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_8.txt"
"***Data from file U_1_0010_05_8.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_U_1_05_0010_8.txt: machinesNum=5 jobsNum=10 lowerBound=116 upperBound=116 isOptimal=1"
Content of machines summed (100, 106, 102, 112, 116)
input selected: size 10 sum 536

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----Our Results-----
best from Our local search found:
target function = 121, num of machines=5, square root lms=240.083318870762
machines content(number of jobs=10):
bucket1 sum:106, content= (90, 16)
bucket2 sum:100, content= (9, 91)
bucket3 sum:102, content= (85, 17)
bucket4 sum:112, content= (69, 43)
bucket5 sum:116, content= (66, 50)
"----Comparison for the 8 example----"

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****tf from benchmark was 121(we added the number of machines) and target function from our local search is 121"
***RESULT IS THE SAME
Run time: 0.032 seconds
"Correct (size-numberCorrect):" QMap((10, 9))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 9 from 130-----"
"-----START 10 from 130-----"
"input file number 10: inputName=C:/algo/h/docs/benchMark/all/U_1_0010_05_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0010_9.txt"
****Data from file U_1_0010_05_9.txt: machinesNum=5 jobsNum=10"
****SOLUTION Data from file SOL_U_1_05_0010_9.txt: machinesNum=5 jobsNum=10 lowerBound=104 upperBound=104 isOptimal=1"
Content of machines summed (85, 97, 104, 94, 86)
input selected: size 10 sum 466
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----Our Results-----

best from Our local search found:

target function = 109, num of machines=5, square root lms=209.002392330806

machines content(number of jobs=10):

bucket1 sum:85, content= (80, 5)

bucket2 sum:97, content= (69, 28)

bucket3 sum:104, content= (68, 36)

bucket4 sum:94, content= (53, 41)

bucket5 sum:86, content= (43, 43)

"----Comparison for the 9 example----

****tf from benchmark was 109(we added the number of machines) and target function from our local search is 109"

***RESULT IS THE SAME

Run time: 0.019 seconds

"Correct (size-numberCorrect):" QMap((10, 10))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 10 from 130-----"


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"-----START 11 from 130-----"

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----Our Results-----

best from Our local search found:

target function = 565, num of machines=5, square root lms=0

machines content(number of jobs=50):

bucket1 sum:560, content= (97, 88, 80, 76, 60, 52, 47, 43, 14, 3)

bucket2 sum:560, content= (96, 89, 79, 77, 59, 53, 47, 42, 18)

bucket3 sum:560, content= (96, 86, 84, 73, 61, 50, 49, 46, 10, 5)

bucket4 sum:559, content= (91, 90, 84, 76, 59, 50, 49, 40, 18, 1, 1)

bucket5 sum:559, content= (91, 89, 84, 67, 66, 55, 48, 32, 21, 6)

"----Comparison for the 11 example----"

****tf from benchmark was 565(we added the number of machines) and target function from our local search is 565"

***RESULT IS THE SAME

Run time: 0.001 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 2))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 12 from 130-----"

"-----START 13 from 130-----"

"input file number 13: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_2.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_2.txt"

****Data from file U_1_0050_05_2.txt: machinesNum=5 jobsNum=50"

****SOLUTION Data from file SOL_U_1_05_0050_2.txt: machinesNum=5 jobsNum=50 lowerBound=452 upperBound=452 isOptimal=1"

Content of machines summed (452, 452, 452, 452, 450)

input selected: size 50 sum 2258

----Our Results-----

best from Our local search found:

target function = 457, num of machines=5, square root lms=0

machines content(number of jobs=50):

bucket1 sum:452, content= (99, 79, 71, 58, 47, 40, 28, 17, 8, 5)

bucket2 sum:452, content= (99, 78, 70, 58, 47, 38, 29, 23, 7, 3)

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bucket3 sum:451, content= (92, 83, 76, 52, 47, 44, 26, 22, 7, 2)
bucket4 sum:452, content= (91, 87, 66, 61, 47, 35, 31, 25, 5, 4)
bucket5 sum:451, content= (88, 88, 63, 62, 52, 35, 30, 16, 12, 5)
"----Comparison for the 12 example----"
"***tf from benchmark was 457(we added the number of machines) and target function from our local search is 457"
***RESULT IS THE SAME
Run time: 0.001 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 3))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 13 from 130-----"
"-----START 14 from 130-----"
"input file number 14: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_3.txt"
"***Data from file U_1_0050_05_3.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_05_0050_3.txt: machinesNum=5 jobsNum=50 lowerBound=572 upperBound=572 isOptimal=1"
Content of machines summed (572, 572, 572, 572, 570)
input selected: size 50 sum 2858

----Our Results-----
best from Our local search found:
target function = 577, num of machines=5, square root lms=0
machines content(number of jobs=50):
bucket1 sum:571, content= (92, 76, 65, 48, 42, 31, 22, 12, 96, 87)
bucket2 sum:572, content= (95, 90, 91, 70, 66, 53, 38, 32, 23, 14)
bucket3 sum:572, content= (93, 90, 69, 68, 50, 46, 29, 21, 8, 98)
bucket4 sum:572, content= (97, 94, 84, 61, 48, 37, 32, 26, 1, 92)
bucket5 sum:571, content= (95, 94, 87, 83, 59, 49, 45, 28, 16, 15)
"----Comparison for the 13 example----"
"***tf from benchmark was 577(we added the number of machines) and target function from our local search is 577"
***RESULT IS THE SAME
Run time: 0.05 seconds

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"Correct (size-numberCorrect):" QMap((10, 10)(50, 4))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 14 from 130-----"
"-----START 15 from 130-----"
"input file number 15: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_4.txt"
"***Data from file U_1_0050_05_4.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_05_0050_4.txt: machinesNum=5 jobsNum=50 lowerBound=540 upperBound=540 isOptimal=1"
Content of machines summed (540, 540, 540, 540, 538)
input selected: size 50 sum 2698

```

----Our Results-----

best from Our local search found:

target function = 545, num of machines=5, square root lms=0

machines content(number of jobs=50):

bucket1 sum:540, content= (99, 93, 85, 80, 53, 43, 41, 24, 15, 7)

bucket2 sum:540, content= (99, 91, 88, 74, 55, 51, 36, 27, 13, 6)

bucket3 sum:539, content= (99, 91, 87, 70, 59, 49, 39, 24, 11, 10)

bucket4 sum:539, content= (96, 96, 85, 62, 60, 49, 42, 23, 16, 10)

bucket5 sum:540, content= (96, 94, 85, 80, 53, 49, 34, 29, 10, 10)

"----Comparison for the 14 example----

"***tf from benchmark was 545(we added the number of machines) and target function from our local search is 545"

***RESULT IS THE SAME

Run time: 0.005 seconds

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"Correct (size-numberCorrect):" QMap((10, 10)(50, 5))

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"Mistakes(size-numberMistakes):" QMap()

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"Avegare error: 0"

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"-----END 15 from 130-----"

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"-----START 16 from 130-----"

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"input file number 16: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_5.txt"

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****Data from file U_1_0050_05_5.txt: machinesNum=5 jobsNum=50"
****SOLUTION Data from file SOL_U_1_05_0050_5.txt: machinesNum=5 jobsNum=50 lowerBound=497 upperBound=497 isOptimal=1 "
Content of machines summed (497, 497, 497, 497, 495)
input selected: size 50 sum 2483

----Our Results-----

best from Our local search found:

target function = 502, num of machines=5, square root lms=0

machines content(number of jobs=50):

bucket1 sum:497, content= (98, 61, 49, 18, 16, 5, 74, 66, 40, 70)

bucket2 sum:496, content= (89, 80, 59, 54, 27, 21, 18, 5, 75, 68)

bucket3 sum:497, content= (90, 80, 75, 66, 58, 52, 25, 23, 15, 13)

bucket4 sum:496, content= (91, 85, 71, 64, 64, 44, 39, 19, 15, 4)

bucket5 sum:497, content= (88, 85, 68, 58, 41, 20, 16, 13, 37, 71)

"----Comparison for the 15 example----

****tf from benchmark was 502(we added the number of machines) and target function from our local search is 502"

***RESULT IS THE SAME

Run time: 0.128 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 6))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 16 from 130-----"

"-----START 17 from 130-----"

"input file number 17: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_6.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_6.txt"

****Data from file U_1_0050_05_6.txt: machinesNum=5 jobsNum=50"

****SOLUTION Data from file SOL_U_1_05_0050_6.txt: machinesNum=5 jobsNum=50 lowerBound=541 upperBound=541 isOptimal=1 "

Content of machines summed (541, 541, 541, 541, 540)

input selected: size 50 sum 2704

----Our Results-----

best from Our local search found:

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target function = 546, num of machines=5, square root lms=0
machines content(number of jobs=50):
bucket1 sum:541, content= (99, 91, 75, 73, 66, 52, 39, 29, 17)
bucket2 sum:541, content= (99, 92, 77, 70, 63, 47, 44, 28, 20, 1)
bucket3 sum:541, content= (99, 83, 81, 75, 59, 53, 34, 29, 22, 6)
bucket4 sum:540, content= (96, 92, 77, 66, 63, 55, 32, 29, 23, 6, 1)
bucket5 sum:541, content= (93, 89, 78, 60, 63, 57, 31, 30, 22, 18)
"----Comparison for the 16 example----"
"***tf from benchmark was 546(we added the number of machines) and target function from our local search is 546"
***RESULT IS THE SAME
Run time: 0.013 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 7))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 17 from 130-----"
"-----START 18 from 130-----"
"input file number 18: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_7.txt"
"***Data from file U_1_0050_05_7.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_05_0050_7.txt: machinesNum=5 jobsNum=50 lowerBound=536 upperBound=536 isOptimal=1"
Content of machines summed (536, 536, 536, 536, 533)
input selected: size 50 sum 2677

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----Our Results-----

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best from Our local search found:
target function = 541, num of machines=5, square root lms=0
machines content(number of jobs=50):
bucket1 sum:536, content= (71, 68, 45, 36, 32, 15, 10, 84, 96, 79)
bucket2 sum:535, content= (83, 75, 75, 59, 49, 39, 30, 27, 98)
bucket3 sum:536, content= (96, 79, 74, 57, 47, 39, 33, 28, 5, 78)
bucket4 sum:534, content= (91, 78, 75, 55, 55, 38, 28, 28, 5, 81)
bucket5 sum:536, content= (88, 88, 77, 70, 68, 46, 35, 33, 12, 11, 8)

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"----Comparison for the 17 example----

****tf from benchmark was 541(we added the number of machines) and target function from our local search is 541"

***RESULT IS THE SAME

Run time: 0.059 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 8))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 18 from 130-----"

"-----START 19 from 130-----"

"input file number 19: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_8.txt"

****Data from file U_1_0050_05_8.txt: machinesNum=5 jobsNum=50"

****SOLUTION Data from file SOL_U_1_05_0050_8.txt: machinesNum=5 jobsNum=50 lowerBound=471 upperBound=471 isOptimal=1"

Content of machines summed (471, 471, 471, 471, 471)

input selected: size 50 sum 2355

----Our Results-----

best from Our local search found:

target function = 476, num of machines=5, square root lms=0

machines content(number of jobs=50):

bucket1 sum:471, content= (96, 75, 66, 58, 53, 35, 34, 28, 26)

bucket2 sum:471, content= (93, 79, 66, 57, 53, 35, 34, 28, 22, 4)

bucket3 sum:471, content= (93, 75, 74, 54, 51, 38, 31, 29, 21, 4, 1)

bucket4 sum:471, content= (90, 82, 64, 60, 47, 39, 34, 29, 17, 9)

bucket5 sum:471, content= (89, 82, 64, 61, 46, 42, 34, 27, 15, 11)

"----Comparison for the 18 example----

****tf from benchmark was 476(we added the number of machines) and target function from our local search is 476"

***RESULT IS THE SAME

Run time: 0.001 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 9))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

```
"-----END 19 from 130-----"
"-----START 20 from 130-----"
"input file number 20: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_05_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0050_9.txt"
"***Data from file U_1_0050_05_9.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_05_0050_9.txt: machinesNum=5 jobsNum=50 lowerBound=498 upperBound=498 isOptimal=1"
Content of machines summed (498, 498, 498, 498, 497)
input selected: size 50 sum 2489
```

----Our Results-----

best from Our local search found:

target function = 503, num of machines=5, square root lms=0

machines content(number of jobs=50):

bucket1 sum:498, content= (97, 64, 43, 33, 21, 15, 8, 75, 66, 76)

bucket2 sum:498, content= (95, 83, 75, 64, 52, 48, 33, 27, 14, 7)

bucket3 sum:498, content= (92, 85, 66, 50, 48, 34, 29, 14, 5, 75)

bucket4 sum:498, content= (90, 88, 71, 65, 45, 32, 20, 17, 3, 67)

bucket5 sum:497, content= (90, 87, 65, 64, 42, 32, 26, 13, 2, 76)

"----Comparison for the 19 example----

"***tf from benchmark was 503(we added the number of machines) and target function from our local search is 503"

***RESULT IS THE SAME

Run time: 0.088 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 10))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

```
"-----END 20 from 130-----"
"-----START 21 from 130-----"
```

"input file number 21: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_0.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_0.txt"

"***Data from file U_1_0050_10_0.txt: machinesNum=10 jobsNum=50"

"***SOLUTION Data from file SOL_U_1_10_0050_0.txt: machinesNum=10 jobsNum=50 lowerBound=242 upperBound=242 isOptimal=1"

Content of machines summed (242, 242, 242, 242, 242, 242, 242, 242, 242, 239)

input selected: size 50 sum 2417

----Our Results-----

best from Our local search found:

target function = 252, num of machines=10, square root lms=0

machines content(number of jobs=50):

bucket1 sum:242, content= (96, 27, 9, 75, 35)

bucket2 sum:242, content= (95, 69, 44, 23, 11)

bucket3 sum:242, content= (95, 68, 45, 23, 11)

bucket4 sum:242, content= (90, 41, 25, 86)

bucket5 sum:242, content= (89, 67, 48, 29, 9)

bucket6 sum:241, content= (88, 80, 19, 16, 38)

bucket7 sum:242, content= (87, 63, 51, 32, 9)

bucket8 sum:242, content= (15, 58, 52, 33, 12, 72)

bucket9 sum:242, content= (86, 55, 53, 33, 15)

bucket10 sum:240, content= (85, 83, 30, 6, 36)

"----Comparison for the 20 example----"

***tf from benchmark was 252(we added the number of machines) and target function from our local search is 252"

***RESULT IS THE SAME

Run time: 0.718 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 11))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 21 from 130-----"

"-----START 22 from 130-----"

"input file number 22: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_1.txt"

***Data from file U_1_0050_10_1.txt: machinesNum=10 jobsNum=50"

***SOLUTION Data from file SOL_U_1_10_0050_1.txt: machinesNum=10 jobsNum=50 lowerBound=227 upperBound=227 isOptimal=1"

Content of machines summed (227, 227, 227, 227, 227, 227, 227, 227, 227, 223)

input selected: size 50 sum 2266

----Our Results-----

best from Our local search found:

target function = 237, num of machines=10, square root lms=0

machines content(number of jobs=50):

bucket1 sum:227, content= (96, 71, 20, 35, 5)

bucket2 sum:227, content= (96, 45, 20, 6, 60)

bucket3 sum:227, content= (95, 76, 33, 19, 4)

bucket4 sum:227, content= (94, 76, 34, 17, 6)

bucket5 sum:227, content= (92, 76, 12, 10, 37)

bucket6 sum:227, content= (91, 48, 27, 61)

bucket7 sum:226, content= (91, 59, 46, 25, 5)

bucket8 sum:225, content= (89, 58, 53, 24, 1)

bucket9 sum:227, content= (88, 83, 33, 11, 7, 5)

bucket10 sum:226, content= (88, 55, 54, 26, 3)

"----Comparison for the 21 example----

****tf from benchmark was 237(we added the number of machines) and target function from our local search is 237"

***RESULT IS THE SAME

Run time: 0.377 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 12))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 22 from 130-----"

"-----START 23 from 130-----"

"input file number 23: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_2.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_2.txt"

****Data from file U_1_0050_10_2.txt: machinesNum=10 jobsNum=50"

****SOLUTION Data from file SOL_U_1_10_0050_2.txt: machinesNum=10 jobsNum=50 lowerBound=209 upperBound=209 isOptimal=1"

Content of machines summed (209, 209, 209, 209, 209, 209, 209, 209, 209, 209)

input selected: size 50 sum 2090

----Our Results-----

best from Our local search found:

target function = 219, num of machines=10, square root lms=660.916030975191

machines content(number of jobs=50):

bucket1 sum:209, content= (70, 64, 22, 6, 47)

bucket2 sum:209, content= (99, 31, 50, 29)

bucket3 sum:209, content= (64, 49, 31, 38, 27)

bucket4 sum:209, content= (87, 42, 26, 5, 49)

bucket5 sum:209, content= (81, 61, 39, 21, 7)

bucket6 sum:209, content= (79, 98, 3, 19, 10)

bucket7 sum:209, content= (79, 59, 28, 15, 28)

bucket8 sum:209, content= (72, 64, 46, 19, 8)

bucket9 sum:209, content= (99, 34, 47, 17, 12)

bucket10 sum:209, content= (69, 65, 16, 7, 3, 49)

"----Comparison for the 22 example----

****tf from benchmark was 219(we added the number of machines) and target function from our local search is 219"

***RESULT IS THE SAME

Run time: 2.748 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 13))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 23 from 130-----"

"-----START 24 from 130-----"

"input file number 24: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_3.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_3.txt"

****Data from file U_1_0050_10_3.txt: machinesNum=10 jobsNum=50"

****SOLUTION Data from file SOL_U_1_10_0050_3.txt: machinesNum=10 jobsNum=50 lowerBound=272 upperBound=272 isOptimal=1"

Content of machines summed (272, 272, 272, 272, 272, 272, 272, 272, 272, 271)

input selected: size 50 sum 2719

----Our Results-----

best from Our local search found:

target function = 282, num of machines=10, square root lms=0

machines content(number of jobs=50):

bucket1 sum:272, content= (31, 31, 49, 19, 14, 10, 8, 38, 4, 68)

bucket2 sum:272, content= (33, 97, 59, 33, 50)

bucket3 sum:272, content= (95, 56, 72, 49)

bucket4 sum:271, content= (95, 56, 51, 68, 1)

bucket5 sum:272, content= (32, 73, 63, 5, 99)

bucket6 sum:272, content= (91, 75, 67, 39)

bucket7 sum:272, content= (87, 74, 73, 38)

bucket8 sum:272, content= (82, 71, 24, 71, 24)

bucket9 sum:272, content= (81, 68, 49, 74)

bucket10 sum:272, content= (80, 79, 42, 71)

"----Comparison for the 23 example----"

****tf from benchmark was 282(we added the number of machines) and target function from our local search is 282"

***RESULT IS THE SAME

Run time: 12.711 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 14))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 24 from 130-----"

"-----START 25 from 130-----"

"input file number 25: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_4.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_4.txt"

****Data from file U_1_0050_10_4.txt: machinesNum=10 jobsNum=50"

****SOLUTION Data from file SOL_U_1_10_0050_4.txt: machinesNum=10 jobsNum=50 lowerBound=252 upperBound=252 isOptimal=1"

Content of machines summed (252, 252, 252, 252, 252, 252, 252, 252, 252, 245)

input selected: size 50 sum 2513

----Our Results-----

best from Our local search found:

target function = 262, num of machines=10, square root lms=0

machines content(number of jobs=50):

bucket1 sum:251, content= (99, 62, 10, 48, 32)

bucket2 sum:252, content= (99, 60, 51, 33, 9)

bucket3 sum:251, content= (70, 8, 33, 51, 89)
bucket4 sum:252, content= (89, 75, 30, 13, 45)
bucket5 sum:252, content= (89, 70, 29, 14, 50)
bucket6 sum:251, content= (70, 40, 2, 49, 90)
bucket7 sum:250, content= (86, 74, 47, 28, 15)
bucket8 sum:252, content= (85, 74, 47, 27, 19)
bucket9 sum:251, content= (85, 74, 45, 47)
bucket10 sum:251, content= (81, 77, 52, 20, 20, 1)

"----Comparison for the 24 example----

***tf from benchmark was 262(we added the number of machines) and target function from our local search is 262"

***RESULT IS THE SAME

Run time: 1.17 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 15))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 25 from 130-----"

"-----START 26 from 130-----"

"input file number 26: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_5.txt"

***Data from file U_1_0050_10_5.txt: machinesNum=10 jobsNum=50"

***SOLUTION Data from file SOL_U_1_10_0050_5.txt: machinesNum=10 jobsNum=50 lowerBound=277 upperBound=277 isOptimal=1"

Content of machines summed (277, 277, 277, 277, 277, 277, 277, 277, 277, 274)

input selected: size 50 sum 2767

----Our Results-----

best from Our local search found:

target function = 287, num of machines=10, square root lms=875.003428564711

machines content(number of jobs=50):

bucket1 sum:277, content= (49, 34, 84, 32, 78)

bucket2 sum:277, content= (89, 69, 61, 39, 19)

bucket3 sum:277, content= (81, 67, 22, 28, 79)

bucket4 sum:276, content= (94, 67, 32, 17, 66)

```

bucket5 sum:276, content= (42, 94, 55, 85)
bucket6 sum:277, content= (94, 59, 15, 32, 77)
bucket7 sum:277, content= (60, 77, 47, 93)
bucket8 sum:276, content= (82, 43, 17, 50, 84)
bucket9 sum:277, content= (83, 28, 45, 7, 4, 89, 21)
bucket10 sum:277, content= (94, 47, 45, 26, 65)
"----Comparison for the 25 example----"
"***tf from benchmark was 287(we added the number of machines) and target function from our local search is 287"
***RESULT IS THE SAME
Run time: 2.649 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 16))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 26 from 130-----"
"-----START 27 from 130-----"
"input file number 27: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_6.txt"
"***Data from file U_1_0050_10_6.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_10_0050_6.txt: machinesNum=10 jobsNum=50 lowerBound=257 upperBound=257 isOptimal=1"
Content of machines summed (257, 257, 257, 257, 257, 257, 257, 257, 257, 252)
input selected: size 50 sum 2565

----Our Results-----
best from Our local search found:
target function = 267, num of machines=10, square root lms=0
machines content(number of jobs=50):
bucket1 sum:257, content= (31, 99, 65, 53, 9)
bucket2 sum:256, content= (95, 70, 26, 10, 55)
bucket3 sum:257, content= (46, 10, 92, 74, 35)
bucket4 sum:257, content= (92, 24, 16, 49, 76)
bucket5 sum:257, content= (74, 23, 69, 91)
bucket6 sum:256, content= (70, 4, 92, 36, 54)

```

```
bucket7 sum:257, content= (90, 78, 41, 36, 12)
bucket8 sum:257, content= (89, 58, 35, 5, 53, 17)
bucket9 sum:257, content= (86, 82, 39, 16, 34)
bucket10 sum:254, content= (84, 83, 38, 37, 12)
"----Comparison for the 26 example----"
"***tf from benchmark was 267(we added the number of machines) and target function from our local search is 267"
***RESULT IS THE SAME
Run time: 2.831 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 17))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 27 from 130-----"
"-----START 28 from 130-----"
"input file number 28: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_7.txt"
"***Data from file U_1_0050_10_7.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_10_0050_7.txt: machinesNum=10 jobsNum=50 lowerBound=230 upperBound=230 isOptimal=1"
Content of machines summed (230, 230, 230, 230, 230, 230, 230, 230, 230, 225)
input selected: size 50 sum 2295

----Our Results-----
best from Our local search found:
target function = 240, num of machines=10, square root lms=0
machines content(number of jobs=50):
bucket1 sum:230, content= (40, 32, 4, 96, 58)
bucket2 sum:229, content= (57, 48, 25, 98, 1)
bucket3 sum:230, content= (92, 51, 23, 7, 57)
bucket4 sum:230, content= (91, 61, 37, 9, 32)
bucket5 sum:230, content= (68, 50, 23, 7, 82)
bucket6 sum:230, content= (64, 53, 22, 6, 2, 83)
bucket7 sum:228, content= (81, 62, 54, 16, 15)
bucket8 sum:229, content= (77, 72, 36, 33, 11)
```

bucket9 sum:229, content= (79, 62, 55, 33)
bucket10 sum:230, content= (79, 72, 51, 14, 14)
"----Comparison for the 27 example----"
"***tf from benchmark was 240(we added the number of machines) and target function from our local search is 240"
***RESULT IS THE SAME
Run time: 1.247 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 18))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 28 from 130-----"
"-----START 29 from 130-----"
"input file number 29: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_8.txt"
"***Data from file U_1_0050_10_8.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_10_0050_8.txt: machinesNum=10 jobsNum=50 lowerBound=235 upperBound=235 isOptimal=1"
Content of machines summed (235, 235, 235, 235, 235, 235, 235, 235, 231)
input selected: size 50 sum 2346

----Our Results-----

best from Our local search found:
target function = 245, num of machines=10, square root lms=0
machines content(number of jobs=50):
bucket1 sum:235, content= (97, 61, 57, 20)
bucket2 sum:235, content= (92, 44, 27, 59, 13)
bucket3 sum:235, content= (96, 18, 12, 51, 58)
bucket4 sum:235, content= (89, 66, 43, 25, 12)
bucket5 sum:235, content= (88, 54, 73, 20)
bucket6 sum:234, content= (84, 57, 24, 15, 54)
bucket7 sum:235, content= (83, 41, 21, 15, 75)
bucket8 sum:234, content= (81, 74, 40, 18, 21)
bucket9 sum:233, content= (79, 75, 40, 32, 5, 2)
bucket10 sum:235, content= (78, 35, 33, 15, 61, 13)

"----Comparison for the 28 example----

***tf from benchmark was 245(we added the number of machines) and target function from our local search is 245"

***RESULT IS THE SAME

Run time: 1.462 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 19))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 29 from 130-----"

"-----START 30 from 130-----"

"input file number 30: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_10_9.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0050_9.txt"

***Data from file U_1_0050_10_9.txt: machinesNum=10 jobsNum=50"

***SOLUTION Data from file SOL_U_1_10_0050_9.txt: machinesNum=10 jobsNum=50 lowerBound=235 upperBound=235 isOptimal=1"

Content of machines summed (235, 235, 235, 235, 235, 235, 235, 235, 235, 233)

input selected: size 50 sum 2348

----Our Results-----

best from Our local search found:

target function = 245, num of machines=10, square root lms=0

machines content(number of jobs=50):

bucket1 sum:235, content= (24, 21, 20, 41, 13, 12, 33, 7, 20, 44)

bucket2 sum:235, content= (56, 98, 29, 52)

bucket3 sum:234, content= (56, 53, 5, 21, 99)

bucket4 sum:235, content= (95, 60, 48, 24, 8)

bucket5 sum:235, content= (90, 64, 30, 51)

bucket6 sum:235, content= (87, 69, 3, 45, 31)

bucket7 sum:235, content= (86, 75, 22, 35, 17)

bucket8 sum:234, content= (86, 71, 40, 37)

bucket9 sum:235, content= (80, 75, 41, 39)

bucket10 sum:235, content= (76, 76, 53, 30)

"----Comparison for the 29 example----

***tf from benchmark was 245(we added the number of machines) and target function from our local search is 245"

***RESULT IS THE SAME

Run time: 8.166 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 20))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 30 from 130-----"

"-----START 31 from 130-----"

"input file number 31: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_0.txt"

***Data from file U_1_0050_25_0.txt: machinesNum=25 jobsNum=50"

***SOLUTION Data from file SOL_U_1_25_0050_0.txt: machinesNum=25 jobsNum=50 lowerBound=115 upperBound=115 isOptimal=1"

Content of machines summed (98, 98, 97, 100, 98, 99, 97, 97, 100, 100, 101, 101, 100, 104, 102, 106, 109, 108, 110, 110, 109, 111, 108, 115,
111)

input selected: size 50 sum 2589

----Our Results-----

best from Our local search found:

target function = 140, num of machines=25, square root lms=518.512294936195

machines content(number of jobs=50):

bucket1 sum:98, content= (98)

bucket2 sum:100, content= (95, 5)

bucket3 sum:97, content= (96, 1)

bucket4 sum:97, content= (96, 1)

bucket5 sum:98, content= (95, 3)

bucket6 sum:99, content= (89, 10)

bucket7 sum:97, content= (12, 85)

bucket8 sum:100, content= (80, 20)

bucket9 sum:100, content= (19, 81)

bucket10 sum:101, content= (79, 22)

bucket11 sum:101, content= (23, 78)

bucket12 sum:100, content= (77, 23)

bucket13 sum:102, content= (76, 26)

```

bucket14 sum:98, content= (12, 84, 2)
bucket15 sum:106, content= (75, 31)
bucket16 sum:108, content= (37, 71)
bucket17 sum:109, content= (38, 71)
bucket18 sum:110, content= (68, 42)
bucket19 sum:109, content= (41, 68)
bucket20 sum:111, content= (66, 45)
bucket21 sum:110, content= (40, 70)
bucket22 sum:104, content= (76, 28)
bucket23 sum:111, content= (51, 60)
bucket24 sum:115, content= (60, 55)
bucket25 sum:108, content= (46, 62)
"----Comparison for the 30 example----"
"***tf from benchmark was 140(we added the number of machines) and target function from our local search is 140"
***RESULT IS THE SAME
Run time: 979.964 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 21))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 31 from 130-----"
"-----START 32 from 130-----"
"input file number 32: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_1.txt"
"***Data from file U_1_0050_25_1.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_25_0050_1.txt: machinesNum=25 jobsNum=50 lowerBound=102 upperBound=102 isOptimal=1"
Content of machines summed (97, 100, 98, 100, 100, 100, 97, 98, 98, 98, 100, 99, 99, 98, 96, 97, 96, 99, 102, 102, 101, 102, 97, 99, 98)
input selected: size 50 sum 2471

----Our Results-----
best from Our local search found:
target function = 127, num of machines=25, square root lms=494.278261710952
machines content(number of jobs=50):

```

```
bucket1 sum:97, content= (97)
bucket2 sum:95, content= (95)
bucket3 sum:96, content= (5, 91)
bucket4 sum:99, content= (89, 10)
bucket5 sum:97, content= (7, 90)
bucket6 sum:98, content= (84, 14)
bucket7 sum:100, content= (86, 14)
bucket8 sum:97, content= (11, 86)
bucket9 sum:99, content= (18, 81)
bucket10 sum:100, content= (18, 82)
bucket11 sum:99, content= (20, 79)
bucket12 sum:98, content= (84, 14)
bucket13 sum:101, content= (79, 22)
bucket14 sum:98, content= (83, 15)
bucket15 sum:99, content= (26, 73)
bucket16 sum:99, content= (25, 74)
bucket17 sum:98, content= (70, 24, 4)
bucket18 sum:100, content= (70, 11, 19)
bucket19 sum:102, content= (66, 36)
bucket20 sum:102, content= (65, 37)
bucket21 sum:101, content= (63, 38)
bucket22 sum:102, content= (62, 40)
bucket23 sum:97, content= (57, 40)
bucket24 sum:99, content= (53, 46)
bucket25 sum:98, content= (52, 46)
"----Comparison for the 31 example----"
"***tf from benchmark was 127(we added the number of machines) and target function from our local search is 127"
***RESULT IS THE SAME
Run time: 344.606 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 22))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
```

"-----END 32 from 130-----"

"-----START 33 from 130-----"

"input file number 33: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_2.txt"

****Data from file U_1_0050_25_2.txt: machinesNum=25 jobsNum=50"

****SOLUTION Data from file SOL_U_1_25_0050_2.txt: machinesNum=25 jobsNum=50 lowerBound=111 upperBound=111 isOptimal=1"

Content of machines summed (96, 95, 95, 97, 96, 97, 97, 96, 97, 95, 98, 100, 95, 101, 100, 110, 103, 111, 108, 104, 103, 103, 104, 105, 106)

input selected: size 50 sum 2512

----Our Results-----

best from Our local search found:

target function = 136, num of machines=25, square root lms=502.983101107781

machines content(number of jobs=50):

bucket1 sum:96, content= (96)

bucket2 sum:95, content= (95)

bucket3 sum:95, content= (95)

bucket4 sum:97, content= (94, 3)

bucket5 sum:96, content= (90, 6)

bucket6 sum:97, content= (9, 88)

bucket7 sum:97, content= (8, 89)

bucket8 sum:103, content= (30, 73)

bucket9 sum:101, content= (25, 76)

bucket10 sum:96, content= (9, 87)

bucket11 sum:100, content= (76, 24)

bucket12 sum:96, content= (5, 11, 1, 79)

bucket13 sum:100, content= (78, 22)

bucket14 sum:96, content= (14, 82)

bucket15 sum:96, content= (13, 83)

bucket16 sum:110, content= (73, 37)

bucket17 sum:97, content= (16, 3, 78)

bucket18 sum:111, content= (71, 40)

bucket19 sum:108, content= (68, 40)

```
bucket20 sum:104, content= (44, 60)
bucket21 sum:103, content= (42, 61)
bucket22 sum:104, content= (64, 40)
bucket23 sum:103, content= (62, 41)
bucket24 sum:105, content= (55, 50)
bucket25 sum:106, content= (54, 52)
"----Comparison for the 32 example----"
"***tf from benchmark was 136(we added the number of machines) and target function from our local search is 136"
***RESULT IS THE SAME
Run time: 640.525 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 23))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 33 from 130-----"
"-----START 34 from 130-----"
"input file number 34: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_3.txt"
"***Data from file U_1_0050_25_3.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_25_0050_3.txt: machinesNum=25 jobsNum=50 lowerBound=111 upperBound=111 isOptimal=1"
Content of machines summed (109, 108, 110, 100, 92, 110, 110, 90, 90, 108, 108, 110, 110, 110, 110, 110, 107, 103, 107, 110, 109, 107, 108,
110, 111)
input selected: size 50 sum 2657

----Our Results-----
best from Our local search found:
target function = 136, num of machines=25, square root lms=531.613581466839
machines content(number of jobs=50):
bucket1 sum:99, content= (99)
bucket2 sum:101, content= (91, 10)
bucket3 sum:103, content= (94, 9)
bucket4 sum:102, content= (92, 10)
bucket5 sum:102, content= (92, 10)
```

```
bucket6 sum:107, content= (91, 16)
bucket7 sum:106, content= (8, 98)
bucket8 sum:108, content= (84, 24)
bucket9 sum:109, content= (90, 19)
bucket10 sum:109, content= (19, 90)
bucket11 sum:108, content= (84, 24)
bucket12 sum:109, content= (29, 80)
bucket13 sum:110, content= (82, 28)
bucket14 sum:109, content= (79, 30)
bucket15 sum:106, content= (75, 31)
bucket16 sum:107, content= (73, 34)
bucket17 sum:105, content= (36, 69)
bucket18 sum:106, content= (69, 37)
bucket19 sum:106, content= (35, 71)
bucket20 sum:109, content= (45, 64)
bucket21 sum:110, content= (44, 66)
bucket22 sum:107, content= (62, 45)
bucket23 sum:104, content= (51, 53)
bucket24 sum:104, content= (49, 55)
bucket25 sum:111, content= (43, 44, 24)
"----Comparison for the 33 example----"
"***tf from benchmark was 136(we added the number of machines) and target function from our local search is 136"
***RESULT IS THE SAME
Run time: 235.207 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 24))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 34 from 130-----"
"-----START 35 from 130-----"

"***Data from file U_1_0050_25_4.txt: machinesNum=25 jobsNum=50"
```

****SOLUTION Data from file SOL_U_1_25_0050_4.txt: machinesNum=25 jobsNum=50 lowerBound=111 upperBound=111 isOptimal=1"
Content of machines summed (111, 111, 104, 91, 91, 91, 111, 111, 85, 85, 111, 111, 111, 107, 111, 109, 109, 109, 111, 110, 110, 111, 111, 107, 105)
input selected: size 50 sum 2634

----Our Results-----

best from Our local search found:

target function = 136, num of machines=25, square root lms=527.205842152759

machines content(number of jobs=50):

bucket1 sum:109, content= (28, 46, 35)

bucket2 sum:98, content= (98)

bucket3 sum:99, content= (97, 2)

bucket4 sum:98, content= (91, 7)

bucket5 sum:102, content= (13, 89)

bucket6 sum:103, content= (91, 12)

bucket7 sum:101, content= (10, 91)

bucket8 sum:99, content= (86, 13)

bucket9 sum:107, content= (85, 22)

bucket10 sum:108, content= (85, 23)

bucket11 sum:111, content= (84, 27)

bucket12 sum:99, content= (99)

bucket13 sum:109, content= (30, 79)

bucket14 sum:111, content= (84, 27)

bucket15 sum:109, content= (28, 81)

bucket16 sum:107, content= (65, 42)

bucket17 sum:109, content= (67, 42)

bucket18 sum:109, content= (67, 42)

bucket19 sum:107, content= (37, 70)

bucket20 sum:110, content= (64, 46)

bucket21 sum:104, content= (50, 54)

bucket22 sum:101, content= (51, 50)

bucket23 sum:104, content= (48, 56)

bucket24 sum:111, content= (77, 34)
bucket25 sum:109, content= (34, 39, 36)
"----Comparison for the 34 example----"
"***tf from benchmark was 136(we added the number of machines) and target function from our local search is 136"
***RESULT IS THE SAME
Run time: 419.732 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 25))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 35 from 130-----"
"-----START 36 from 130-----"
"input file number 36: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_5.txt"
"***Data from file U_1_0050_25_5.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_25_0050_5.txt: machinesNum=25 jobsNum=50 lowerBound=121 upperBound=121 isOptimal=1"
Content of machines summed (100, 103, 106, 104, 106, 109, 108, 111, 111, 107, 110, 110, 109, 110, 111, 113, 112, 113, 112, 121, 114, 119,
119, 119, 118)
input selected: size 50 sum 2775

----Our Results-----

best from Our local search found:
target function = 146, num of machines=25, square root lms=555.612274882404
machines content(number of jobs=50):
bucket1 sum:100, content= (99, 1)
bucket2 sum:106, content= (96, 10)
bucket3 sum:103, content= (97, 6)
bucket4 sum:104, content= (96, 8)
bucket5 sum:110, content= (22, 88)
bucket6 sum:111, content= (21, 90)
bucket7 sum:111, content= (21, 90)
bucket8 sum:106, content= (95, 11)
bucket9 sum:108, content= (93, 15)

[illegible]

----Our Results-----

best from Our local search found:

target function = 124, num of machines=25, square root lms=479.243153315726

machines content(number of jobs=50):

bucket1 sum:99, content= (99)

bucket2 sum:99, content= (99)

bucket3 sum:97, content= (97)

bucket4 sum:97, content= (97)

bucket5 sum:96, content= (96)

bucket6 sum:95, content= (95)

bucket7 sum:95, content= (95)

bucket8 sum:94, content= (94)

bucket9 sum:95, content= (88, 7)

bucket10 sum:96, content= (86, 10)

bucket11 sum:96, content= (83, 13)

bucket12 sum:95, content= (83, 12)

bucket13 sum:95, content= (74, 21)

bucket14 sum:95, content= (69, 16, 10)

bucket15 sum:96, content= (67, 29)

bucket16 sum:95, content= (63, 18, 14)

bucket17 sum:96, content= (28, 41, 27)

bucket18 sum:96, content= (39, 57)

bucket19 sum:96, content= (37, 59)

bucket20 sum:96, content= (44, 52)

bucket21 sum:96, content= (47, 49)

bucket22 sum:96, content= (23, 36, 28, 9)

bucket23 sum:95, content= (29, 30, 36)

bucket24 sum:95, content= (18, 19, 58)

bucket25 sum:95, content= (30, 54, 11)

"----Comparison for the 36 example----"

"***tf from benchmark was 124(we added the number of machines) and target function from our local search is 124"

***RESULT IS THE SAME

Run time: 786.649 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 27))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 37 from 130-----"

"-----START 38 from 130-----"

"input file number 38: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_7.txt"

****Data from file U_1_0050_25_7.txt: machinesNum=25 jobsNum=50"

****SOLUTION Data from file SOL_U_1_25_0050_7.txt: machinesNum=25 jobsNum=50 lowerBound=98 upperBound=98 isOptimal=1"

Content of machines summed (98, 87, 89, 92, 91, 93, 95, 94, 92, 91, 91, 88, 87, 86, 87, 87, 87, 85, 86, 88, 85, 88, 88, 87, 91)

input selected: size 50 sum 2233

----Our Results-----

best from Our local search found:

target function = 122, num of machines=24, square root lms=446.852324599526

machines content(number of jobs=50):

bucket1 sum:98, content= (98)

bucket2 sum:91, content= (85, 6)

bucket3 sum:92, content= (12, 80)

bucket4 sum:91, content= (79, 12)

bucket5 sum:91, content= (6, 83, 2)

bucket6 sum:93, content= (76, 17)

bucket7 sum:95, content= (74, 21)

bucket8 sum:94, content= (73, 21)

bucket9 sum:93, content= (70, 23)

bucket10 sum:93, content= (24, 69)

bucket11 sum:91, content= (61, 30)

bucket12 sum:93, content= (64, 29)

bucket13 sum:91, content= (59, 32)

bucket14 sum:91, content= (61, 30)

bucket15 sum:93, content= (25, 68)

```

bucket16 sum:92, content= (38, 54)
bucket17 sum:93, content= (38, 55)
bucket18 sum:92, content= (35, 57)
bucket19 sum:94, content= (44, 50)
bucket20 sum:97, content= (50, 47)
bucket21 sum:90, content= (32, 58)
bucket22 sum:94, content= (50, 22, 22)
bucket23 sum:98, content= (49, 49)
bucket24 sum:93, content= (39, 28, 26)
"----Comparison for the 37 example----"
"***tf from benchmark was 123(we added the number of machines) and target function from our local search is 122"
***Different -1
Run time: 589.633 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 27))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.027027"
"-----END 38 from 130-----"
"-----START 39 from 130-----"
"input file number 39: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_8.txt"
"***Data from file U_1_0050_25_8.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_U_1_25_0050_8.txt: machinesNum=25 jobsNum=50 lowerBound=97 upperBound=97 isOptimal=1"
Content of machines summed (97, 97, 97, 94, 90, 89, 96, 97, 97, 97, 97, 97, 90, 95, 94, 91, 97, 97, 97, 82, 96, 96, 97, 95, 97)
input selected: size 50 sum 2369

----Our Results-----
best from Our local search found:
target function = 122, num of machines=25, square root lms=473.855463195266
machines content(number of jobs=50):
bucket1 sum:97, content= (97)
bucket2 sum:97, content= (97)
bucket3 sum:94, content= (94)

```

```
bucket4 sum:94, content= (94)
bucket5 sum:91, content= (4, 87)
bucket6 sum:93, content= (89, 4)
bucket7 sum:93, content= (3, 90)
bucket8 sum:95, content= (82, 13)
bucket9 sum:94, content= (80, 14)
bucket10 sum:94, content= (11, 9, 74)
bucket11 sum:96, content= (23, 73)
bucket12 sum:94, content= (19, 75)
bucket13 sum:96, content= (22, 74)
bucket14 sum:95, content= (70, 25)
bucket15 sum:94, content= (65, 29)
bucket16 sum:95, content= (65, 17, 13)
bucket17 sum:96, content= (35, 61)
bucket18 sum:97, content= (62, 35)
bucket19 sum:96, content= (36, 60)
bucket20 sum:94, content= (17, 62, 15)
bucket21 sum:94, content= (41, 53)
bucket22 sum:94, content= (39, 55)
bucket23 sum:97, content= (52, 45)
bucket24 sum:95, content= (49, 46)
bucket25 sum:94, content= (45, 38, 11)
"----Comparison for the 38 example----"
"***tf from benchmark was 122(we added the number of machines) and target function from our local search is 122"
***RESULT IS THE SAME
Run time: 314.409 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 28))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0263158"
"-----END 39 from 130-----"
"-----START 40 from 130-----"
```

"input file number 40: inputName=C:/algo/h/docs/benchMark/all/U_1_0050_25_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0050_9.txt"

****Data from file U_1_0050_25_9.txt: machinesNum=25 jobsNum=50"

****SOLUTION Data from file SOL_U_1_25_0050_9.txt: machinesNum=25 jobsNum=50 lowerBound=115 upperBound=115 isOptimal=1"

Content of machines summed (103, 100, 104, 103, 101, 101, 102, 102, 105, 108, 106, 114, 115, 114, 111, 110, 114, 110, 110, 114, 113, 115,
114, 109, 107)

input selected: size 50 sum 2705

----Our Results-----

best from Our local search found:

target function = 140, num of machines=25, square root lms=541.602252580249

machines content(number of jobs=50):

bucket1 sum:104, content= (98, 6)

bucket2 sum:103, content= (99, 4)

bucket3 sum:100, content= (1, 99)

bucket4 sum:101, content= (94, 7)

bucket5 sum:103, content= (94, 9)

bucket6 sum:108, content= (22, 86)

bucket7 sum:105, content= (18, 87)

bucket8 sum:102, content= (91, 11)

bucket9 sum:101, content= (9, 92)

bucket10 sum:102, content= (88, 14)

bucket11 sum:114, content= (31, 83)

bucket12 sum:106, content= (22, 84)

bucket13 sum:115, content= (82, 33)

bucket14 sum:114, content= (73, 41)

bucket15 sum:110, content= (74, 36)

bucket16 sum:111, content= (76, 35)

bucket17 sum:110, content= (74, 36)

bucket18 sum:114, content= (74, 40)

bucket19 sum:114, content= (34, 80)

bucket20 sum:110, content= (34, 76)

```

bucket21 sum:113, content= (70, 43)
bucket22 sum:115, content= (69, 46)
bucket23 sum:114, content= (67, 47)
bucket24 sum:109, content= (59, 50)
bucket25 sum:107, content= (59, 48)
"----Comparison for the 39 example----"
"***tf from benchmark was 140(we added the number of machines) and target function from our local search is 140"
***RESULT IS THE SAME
Run time: 466.703 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.025641"
"-----END 40 from 130-----"
"-----START 41 from 130-----"
"input file number 41: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_0.txt"
"***Data from file U_1_0100_05_0.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_05_0100_0.txt: machinesNum=5 jobsNum=100 lowerBound=922 upperBound=922 isOptimal=1"
Content of machines summed (922, 921, 921, 921, 921)
input selected: size 100 sum 4606

----Our Results-----
best from Our local search found:
target function = 927, num of machines=5, square root lms=0
machines content(number of jobs=100):
bucket1 sum:922, content= (99, 95, 86, 85, 68, 65, 62, 54, 49, 48, 40, 37, 32, 29, 22, 18, 15, 10, 6, 1, 1)
bucket2 sum:922, content= (99, 94, 87, 84, 70, 65, 60, 54, 51, 47, 40, 36, 32, 31, 22, 18, 14, 10, 5, 3)
bucket3 sum:922, content= (98, 96, 86, 80, 72, 65, 62, 53, 51, 46, 40, 38, 32, 27, 26, 18, 13, 10, 8, 1)
bucket4 sum:920, content= (98, 93, 87, 85, 67, 66, 63, 52, 52, 43, 41, 39, 34, 26, 25, 18, 11, 11, 9)
bucket5 sum:920, content= (97, 97, 86, 77, 77, 64, 60, 56, 49, 42, 41, 40, 34, 26, 21, 19, 16, 11, 4, 3)
"----Comparison for the 40 example----"
"***tf from benchmark was 927(we added the number of machines) and target function from our local search is 927"

```


***RESULT IS THE SAME

Run time: 0.007 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 1))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.025"

"-----END 41 from 130-----"

"-----START 42 from 130-----"

"input file number 42: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_1.txt"

***Data from file U_1_0100_05_1.txt: machinesNum=5 jobsNum=100"

***SOLUTION Data from file SOL_U_1_05_0100_1.txt: machinesNum=5 jobsNum=100 lowerBound=952 upperBound=952 isOptimal=1"

Content of machines summed (952, 952, 951, 951, 951)

input selected: size 100 sum 4757

----Our Results-----

best from Our local search found:

target function = 957, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:952, content= (98, 89, 87, 79, 72, 69, 67, 59, 53, 50, 41, 41, 33, 30, 26, 25, 15, 11, 4, 2, 1)

bucket2 sum:952, content= (97, 91, 86, 78, 75, 68, 66, 56, 53, 51, 46, 37, 34, 29, 27, 24, 20, 9, 4, 1)

bucket3 sum:951, content= (97, 91, 86, 77, 75, 68, 66, 55, 54, 51, 45, 41, 32, 29, 26, 25, 20, 7, 4, 2)

bucket4 sum:951, content= (96, 92, 84, 80, 75, 68, 64, 63, 51, 49, 45, 36, 34, 32, 26, 23, 12, 12, 5, 4)

bucket5 sum:951, content= (95, 93, 83, 82, 70, 70, 68, 54, 53, 51, 48, 35, 35, 32, 26, 21, 21, 11, 3)

"----Comparison for the 41 example----

***tf from benchmark was 957(we added the number of machines) and target function from our local search is 957"

***RESULT IS THE SAME

Run time: 0.006 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 2))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0243902"

"-----END 42 from 130-----"

"-----START 43 from 130-----"

"input file number 43: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_2.txt"
"***Data from file U_1_0100_05_2.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_05_0100_2.txt: machinesNum=5 jobsNum=100 lowerBound=972 upperBound=972 isOptimal=1"
Content of machines summed (972, 972, 972, 972, 972)
input selected: size 100 sum 4860

----Our Results-----

best from Our local search found:

target function = 977, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:972, content= (97, 90, 72, 68, 65, 59, 58, 55, 52, 50, 43, 41, 32, 31, 28, 25, 13, 10, 7, 76)

bucket2 sum:972, content= (97, 87, 77, 75, 67, 66, 59, 57, 56, 52, 48, 45, 39, 34, 31, 27, 27, 12, 9, 7)

bucket3 sum:972, content= (97, 86, 78, 75, 70, 62, 61, 58, 56, 52, 48, 43, 41, 33, 32, 27, 24, 14, 11, 4)

bucket4 sum:972, content= (97, 85, 83, 70, 70, 62, 60, 60, 54, 54, 47, 46, 38, 34, 31, 29, 18, 14, 11, 9)

bucket5 sum:972, content= (93, 93, 74, 67, 66, 59, 58, 54, 53, 52, 42, 36, 35, 32, 29, 17, 16, 11, 8, 77)

"----Comparison for the 42 example----

"***tf from benchmark was 977(we added the number of machines) and target function from our local search is 977"

***RESULT IS THE SAME

Run time: 0.174 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 3))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0238095"

"-----END 43 from 130-----"

"-----START 44 from 130-----"

"input file number 44: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_3.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_3.txt"

"***Data from file U_1_0100_05_3.txt: machinesNum=5 jobsNum=100"

"***SOLUTION Data from file SOL_U_1_05_0100_3.txt: machinesNum=5 jobsNum=100 lowerBound=1051 upperBound=1051 isOptimal=1"

Content of machines summed (1051, 1051, 1051, 1051, 1048)

input selected: size 100 sum 5252

----Our Results-----

best from Our local search found:

target function = 1056, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1051, content= (95, 91, 88, 86, 78, 70, 63, 59, 55, 49, 47, 39, 34, 28, 25, 20, 11, 10, 5, 98)

bucket2 sum:1051, content= (99, 96, 90, 89, 85, 78, 71, 62, 60, 55, 49, 47, 38, 34, 30, 24, 19, 14, 10, 1)

bucket3 sum:1051, content= (98, 95, 90, 89, 83, 78, 73, 62, 58, 58, 49, 46, 35, 34, 30, 27, 18, 14, 10, 4)

bucket4 sum:1050, content= (95, 94, 88, 80, 79, 68, 65, 60, 57, 49, 46, 43, 32, 28, 24, 17, 16, 9, 1, 99)

bucket5 sum:1049, content= (97, 97, 90, 88, 88, 75, 68, 65, 60, 53, 50, 47, 44, 31, 27, 23, 20, 16, 8, 2)

"----Comparison for the 43 example----

***tf from benchmark was 1056(we added the number of machines) and target function from our local search is 1056"

***RESULT IS THE SAME

Run time: 0.154 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 4))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0232558"

"-----END 44 from 130-----"

"-----START 45 from 130-----"

"input file number 45: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_4.txt"

***Data from file U_1_0100_05_4.txt: machinesNum=5 jobsNum=100"

***SOLUTION Data from file SOL_U_1_05_0100_4.txt: machinesNum=5 jobsNum=100 lowerBound=1009 upperBound=1009 isOptimal=1"

Content of machines summed (1008, 1007, 1009, 1009, 1008)

input selected: size 100 sum 5041

----Our Results-----

best from Our local search found:

target function = 1014, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1008, content= (98, 91, 88, 80, 76, 72, 67, 61, 52, 48, 48, 44, 40, 38, 30, 25, 22, 17, 10, 1)

bucket2 sum:1007, content= (97, 91, 89, 79, 77, 70, 68, 60, 52, 50, 48, 43, 40, 38, 30, 27, 20, 19, 9)

bucket3 sum:1009, content= (95, 94, 88, 78, 78, 70, 68, 58, 53, 51, 47, 46, 39, 37, 30, 25, 23, 16, 13)

bucket4 sum:1008, content= (95, 93, 85, 83, 75, 73, 68, 57, 53, 50, 48, 43, 42, 34, 33, 24, 24, 16, 7, 5)
bucket5 sum:1009, content= (95, 91, 90, 81, 75, 72, 66, 63, 51, 50, 46, 43, 42, 34, 30, 28, 20, 19, 4, 3, 3, 3)
"----Comparison for the 44 example----"
"***tf from benchmark was 1014(we added the number of machines) and target function from our local search is 1014"
***RESULT IS THE SAME
Run time: 0.007 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 5))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0227273"
"-----END 45 from 130-----"
"-----START 46 from 130-----"
"input file number 46: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_5.txt"
"***Data from file U_1_0100_05_5.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_05_0100_5.txt: machinesNum=5 jobsNum=100 lowerBound=1083 upperBound=1083 isOptimal=1"
Content of machines summed (1083, 1083, 1082, 1082, 1081)
input selected: size 100 sum 5411

----Our Results-----

best from Our local search found:

target function = 1088, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1083, content= (99, 94, 92, 88, 84, 81, 73, 70, 67, 62, 56, 47, 43, 36, 29, 24, 16, 14, 6, 2)

bucket2 sum:1083, content= (99, 93, 93, 88, 83, 82, 72, 71, 66, 64, 52, 51, 43, 35, 29, 23, 18, 12, 4, 3, 2)

bucket3 sum:1082, content= (98, 96, 91, 87, 84, 81, 76, 69, 65, 60, 58, 49, 41, 39, 27, 21, 19, 12, 8, 1)

bucket4 sum:1083, content= (98, 96, 91, 87, 84, 81, 76, 68, 65, 64, 51, 51, 45, 33, 32, 20, 19, 10, 9, 3)

bucket5 sum:1080, content= (97, 96, 89, 89, 85, 78, 78, 70, 65, 60, 58, 47, 40, 39, 29, 26, 16, 9, 9)

"----Comparison for the 45 example----"

"***tf from benchmark was 1088(we added the number of machines) and target function from our local search is 1088"

***RESULT IS THE SAME

Run time: 0.005 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 6))

```

"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0222222"
"-----END 46 from 130-----"
"-----START 47 from 130-----"
"input file number 47: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_6.txt"
"***Data from file U_1_0100_05_6.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_05_0100_6.txt: machinesNum=5 jobsNum=100 lowerBound=1045 upperBound=1045 isOptimal=1"
Content of machines summed (1045, 1045, 1045, 1045, 1042)
input selected: size 100 sum 5222

```

----Our Results-----

best from Our local search found:

target function = 1050, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1045, content= (93, 90, 85, 84, 76, 66, 55, 50, 50, 46, 41, 38, 34, 26, 18, 15, 11, 99, 2, 66)

bucket2 sum:1044, content= (98, 94, 89, 87, 82, 74, 68, 65, 58, 50, 48, 46, 40, 37, 33, 28, 18, 14, 14, 1)

bucket3 sum:1045, content= (98, 93, 90, 87, 82, 74, 68, 65, 55, 52, 50, 43, 40, 36, 36, 27, 18, 14, 10, 7)

bucket4 sum:1045, content= (97, 95, 88, 88, 81, 78, 62, 60, 50, 48, 42, 42, 40, 29, 29, 18, 16, 9, 8, 65)

bucket5 sum:1043, content= (96, 96, 88, 87, 84, 72, 69, 65, 54, 53, 48, 47, 40, 36, 36, 21, 20, 17, 9, 5)

"----Comparison for the 46 example----"

"***tf from benchmark was 1050(we added the number of machines) and target function from our local search is 1050"

***RESULT IS THE SAME

Run time: 0.459 seconds

```

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 7))

```

```

"Mistakes(size-numberMistakes):" QMap((50, 1))

```

```

"Avegare error: -0.0217391"

```

```

"-----END 47 from 130-----"

```

```

"-----START 48 from 130-----"

```

```

"input file number 48: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_7.txt and

```

```

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_7.txt"

```

```

"***Data from file U_1_0100_05_7.txt: machinesNum=5 jobsNum=100"

```

****SOLUTION Data from file SOL_U_1_05_0100_7.txt: machinesNum=5 jobsNum=100 lowerBound=977 upperBound=977 isOptimal=1 "
Content of machines summed (977, 977, 977, 977, 975)
input selected: size 100 sum 4883

----Our Results-----

best from Our local search found:

target function = 982, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:977, content= (95, 88, 85, 80, 75, 71, 69, 64, 58, 51, 44, 41, 35, 30, 29, 19, 16, 15, 8, 4)

bucket2 sum:976, content= (94, 89, 84, 80, 77, 70, 69, 64, 58, 50, 45, 40, 35, 32, 27, 23, 16, 13, 7, 3)

bucket3 sum:976, content= (94, 89, 84, 80, 77, 70, 68, 66, 57, 50, 45, 37, 36, 34, 26, 24, 16, 12, 6, 5)

bucket4 sum:977, content= (91, 91, 82, 82, 78, 70, 67, 67, 52, 51, 46, 41, 36, 30, 29, 19, 17, 15, 10, 3)

bucket5 sum:977, content= (91, 90, 88, 78, 72, 72, 70, 64, 63, 50, 42, 37, 36, 30, 30, 18, 17, 15, 11, 3)

"----Comparison for the 47 example----

****tf from benchmark was 982(we added the number of machines) and target function from our local search is 982"

***RESULT IS THE SAME

Run time: 0.007 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 8))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0212766"

"-----END 48 from 130-----"

"-----START 49 from 130-----"

"input file number 49: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_8.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_8.txt"

****Data from file U_1_0100_05_8.txt: machinesNum=5 jobsNum=100"

****SOLUTION Data from file SOL_U_1_05_0100_8.txt: machinesNum=5 jobsNum=100 lowerBound=1063 upperBound=1063 isOptimal=1 "

Content of machines summed (1063, 1063, 1063, 1063, 1063)

input selected: size 100 sum 5315

----Our Results-----

best from Our local search found:

target function = 1068, num of machines=5, square root lms=0

```

machines content(number of jobs=100):
bucket1 sum:1063, content= (90, 82, 74, 68, 65, 51, 46, 44, 41, 37, 32, 26, 21, 14, 11, 5, 97, 87, 76, 96)
bucket2 sum:1063, content= (99, 93, 91, 86, 77, 72, 68, 65, 49, 48, 43, 40, 39, 31, 26, 20, 14, 12, 2, 88)
bucket3 sum:1063, content= (99, 92, 92, 88, 86, 74, 67, 63, 61, 45, 43, 39, 33, 30, 27, 20, 13, 12, 2, 77)
bucket4 sum:1063, content= (94, 90, 87, 87, 76, 71, 69, 63, 61, 45, 43, 40, 32, 32, 26, 19, 17, 9, 3, 99)
bucket5 sum:1063, content= (94, 89, 89, 81, 77, 74, 70, 67, 49, 45, 44, 42, 34, 32, 28, 21, 17, 8, 7, 95)
"----Comparison for the 48 example----"
"***tf from benchmark was 1068(we added the number of machines) and target function from our local search is 1068"
***RESULT IS THE SAME
Run time: 0.653 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 9))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0208333"
"-----END 49 from 130-----"
"-----START 50 from 130-----"
"input file number 50: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_05_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0100_9.txt"
"***Data from file U_1_0100_05_9.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_05_0100_9.txt: machinesNum=5 jobsNum=100 lowerBound=1005 upperBound=1005 isOptimal=1"
Content of machines summed (1005, 1005, 1005, 1005, 1001)
input selected: size 100 sum 5021

```

----Our Results-----

best from Our local search found:

target function = 1010, num of machines=5, square root lms=0

machines content(number of jobs=100):

```

bucket1 sum:1005, content= (97, 92, 81, 81, 73, 71, 70, 62, 56, 56, 50, 47, 41, 31, 28, 25, 22, 12, 6, 4)
bucket2 sum:1005, content= (97, 90, 83, 81, 72, 72, 70, 62, 58, 55, 51, 47, 39, 32, 28, 26, 19, 12, 9, 2)
bucket3 sum:1004, content= (96, 87, 87, 79, 76, 70, 70, 61, 56, 54, 48, 48, 44, 31, 27, 23, 22, 12, 7, 6)
bucket4 sum:1003, content= (95, 94, 81, 78, 77, 70, 69, 62, 58, 54, 48, 48, 37, 32, 31, 27, 17, 13, 10, 2)
bucket5 sum:1004, content= (94, 94, 82, 78, 76, 71, 68, 62, 58, 52, 52, 47, 36, 34, 31, 26, 16, 15, 9, 3)

```

"----Comparison for the 49 example----"

```
****tf from benchmark was 1010(we added the number of machines) and target function from our local search is 1010"
***RESULT IS THE SAME
Run time: 0.021 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 10))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0204082"
"-----END 50 from 130-----"
"-----START 51 from 130-----"
"input file number 51: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_0.txt"
****Data from file U_1_0100_10_0.txt: machinesNum=10 jobsNum=100"
****SOLUTION Data from file SOL_U_1_10_0100_0.txt: machinesNum=10 jobsNum=100 lowerBound=546 upperBound=546 isOptimal=1"
Content of machines summed (546, 546, 546, 546, 546, 546, 546, 546, 546, 539)
input selected: size 100 sum 5453
```

----Our Results-----

best from Our local search found:

target function = 556, num of machines=10, square root lms=0

machines content(number of jobs=100):

bucket1 sum:546, content= (83, 73, 61, 55, 43, 29, 21, 99, 1, 81)

bucket2 sum:544, content= (98, 83, 79, 74, 61, 55, 39, 35, 19, 1)

bucket3 sum:545, content= (97, 86, 79, 72, 61, 54, 44, 27, 23, 2)

bucket4 sum:546, content= (97, 83, 72, 63, 51, 44, 32, 16, 9, 79)

bucket5 sum:545, content= (96, 87, 79, 71, 60, 56, 44, 27, 22, 3)

bucket6 sum:544, content= (96, 82, 80, 74, 60, 50, 47, 35, 16, 4)

bucket7 sum:546, content= (95, 80, 81, 76, 60, 50, 45, 36, 14, 9)

bucket8 sum:546, content= (94, 89, 78, 70, 63, 49, 45, 26, 24, 8)

bucket9 sum:546, content= (93, 89, 79, 66, 64, 59, 38, 25, 25, 8)

bucket10 sum:545, content= (92, 90, 79, 65, 64, 59, 38, 36, 11, 11)

"----Comparison for the 50 example----"

```
****tf from benchmark was 556(we added the number of machines) and target function from our local search is 556"
```

```
***RESULT IS THE SAME
```


Run time: 0.432 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 11))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.02"

"-----END 51 from 130-----"

"-----START 52 from 130-----"

"input file number 52: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_1.txt"

****Data from file U_1_0100_10_1.txt: machinesNum=10 jobsNum=100"

****SOLUTION Data from file SOL_U_1_10_0100_1.txt: machinesNum=10 jobsNum=100 lowerBound=442 upperBound=442 isOptimal=1"

Content of machines summed (442, 442, 442, 442, 442, 442, 442, 442, 442, 441)

input selected: size 100 sum 4419

----Our Results-----

best from Our local search found:

target function = 452, num of machines=10, square root lms=0

machines content(number of jobs=100):

bucket1 sum:442, content= (96, 66, 56, 50, 37, 31, 18, 11, 5, 72)

bucket2 sum:442, content= (98, 65, 54, 53, 36, 32, 16, 12, 5, 71)

bucket3 sum:442, content= (99, 73, 68, 51, 34, 33, 23, 8, 53)

bucket4 sum:442, content= (95, 75, 62, 60, 47, 39, 24, 8, 32)

bucket5 sum:442, content= (93, 75, 68, 47, 42, 26, 25, 10, 2, 54)

bucket6 sum:441, content= (92, 77, 62, 62, 47, 38, 25, 25, 11, 1, 1)

bucket7 sum:442, content= (87, 77, 69, 46, 37, 33, 15, 13, 6, 59)

bucket8 sum:442, content= (84, 79, 69, 59, 45, 42, 25, 25, 9, 5)

bucket9 sum:442, content= (81, 80, 70, 59, 43, 43, 29, 24, 7, 4, 2)

bucket10 sum:442, content= (81, 80, 70, 43, 43, 32, 14, 13, 6, 60)

"----Comparison for the 51 example----

****tf from benchmark was 452(we added the number of machines) and target function from our local search is 452"

***RESULT IS THE SAME

Run time: 3.737 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 12))

```
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0196078"
"-----END 52 from 130-----"
"-----START 53 from 130-----"
"input file number 53: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_2.txt"
"***Data from file U_1_0100_10_2.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_10_0100_2.txt: machinesNum=10 jobsNum=100 lowerBound=508 upperBound=508 isOptimal=1"
Content of machines summed (508, 508, 508, 508, 507, 507, 507, 508, 507, 507)
input selected: size 100 sum 5075
```

----Our Results-----

best from Our local search found:

target function = 518, num of machines=10, square root lms=0

machines content(number of jobs=100):

bucket1 sum:508, content= (98, 85, 81, 71, 59, 42, 35, 21, 13, 3)

bucket2 sum:508, content= (98, 84, 82, 69, 61, 41, 36, 20, 17)

bucket3 sum:508, content= (94, 87, 83, 68, 61, 43, 32, 23, 13, 3, 1)

bucket4 sum:508, content= (94, 87, 82, 75, 53, 45, 30, 23, 19)

bucket5 sum:508, content= (94, 87, 82, 75, 51, 47, 30, 23, 13, 6)

bucket6 sum:508, content= (94, 86, 84, 64, 62, 43, 36, 22, 8, 7, 2)

bucket7 sum:507, content= (94, 86, 79, 76, 57, 43, 29, 24, 19)

bucket8 sum:507, content= (93, 89, 79, 76, 51, 48, 27, 25, 19)

bucket9 sum:507, content= (92, 89, 78, 76, 51, 50, 26, 25, 20)

bucket10 sum:506, content= (92, 89, 77, 77, 51, 40, 39, 24, 6, 5, 2, 2, 2)

"----Comparison for the 52 example----

"***tf from benchmark was 518(we added the number of machines) and target function from our local search is 518"

***RESULT IS THE SAME

Run time: 0.008 seconds

```
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 13))
```

```
"Mistakes(size-numberMistakes):" QMap((50, 1))
```

```
"Avegare error: -0.0192308"
```

```

"-----END 53 from 130-----"
"-----START 54 from 130-----"
"input file number 54: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_3.txt"
"***Data from file U_1_0100_10_3.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_10_0100_3.txt: machinesNum=10 jobsNum=100 lowerBound=492 upperBound=492 isOptimal=1"
Content of machines summed (492, 492, 492, 492, 492, 492, 492, 492, 492, 492)
input selected: size 100 sum 4920

----Our Results-----
best from Our local search found:
target function = 502, num of machines=10, square root lms=0
machines content(number of jobs=100):
bucket1 sum:492, content= (46, 36, 19, 97, 79, 74, 54, 25, 62)
bucket2 sum:492, content= (96, 70, 45, 35, 27, 16, 10, 78, 53, 62)
bucket3 sum:492, content= (96, 79, 68, 67, 52, 35, 26, 15, 11, 43)
bucket4 sum:492, content= (92, 80, 63, 44, 34, 27, 19, 8, 71, 54)
bucket5 sum:492, content= (91, 81, 73, 55, 43, 39, 24, 14, 8, 1, 63)
bucket6 sum:492, content= (88, 82, 75, 62, 47, 33, 26, 19, 7, 53)
bucket7 sum:492, content= (87, 84, 75, 51, 48, 31, 28, 19, 6, 63)
bucket8 sum:492, content= (86, 82, 76, 61, 49, 49, 39, 13, 13, 24)
bucket9 sum:492, content= (86, 85, 72, 60, 59, 39, 21, 21, 5, 44)
bucket10 sum:492, content= (87, 81, 77, 60, 58, 43, 29, 29, 21, 7)
"----Comparison for the 53 example----"
"***tf from benchmark was 502(we added the number of machines) and target function from our local search is 502"
***RESULT IS THE SAME
Run time: 5.095 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 14))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0188679"
"-----END 54 from 130-----"
"-----START 55 from 130-----"

```

```
"input file number 55: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_4.txt"
"***Data from file U_1_0100_10_4.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_U_1_10_0100_4.txt: machinesNum=10 jobsNum=100 lowerBound=518 upperBound=518 isOptimal=1 "
Content of machines summed (518, 518, 518, 518, 518, 518, 518, 518, 517)
input selected: size 100 sum 5179
```

----Our Results-----

best from Our local search found:

target function = 528, num of machines=10, square root lms=0

machines content(number of jobs=100):

```
bucket1 sum:518, content= (99, 86, 81, 74, 65, 52, 28, 22, 10, 1)
bucket2 sum:518, content= (98, 85, 81, 73, 66, 51, 31, 19, 8, 6)
bucket3 sum:518, content= (97, 87, 80, 72, 68, 51, 31, 20, 8, 2, 2)
bucket4 sum:518, content= (97, 85, 84, 72, 64, 48, 34, 21, 12, 1)
bucket5 sum:518, content= (96, 88, 79, 76, 64, 48, 34, 19, 13, 1)
bucket6 sum:518, content= (95, 88, 83, 71, 67, 47, 33, 20, 14)
bucket7 sum:518, content= (94, 89, 78, 76, 62, 56, 31, 18, 12, 2)
bucket8 sum:518, content= (92, 90, 77, 77, 68, 44, 36, 18, 14, 2)
bucket9 sum:517, content= (92, 90, 77, 77, 61, 59, 28, 15, 15, 3)
bucket10 sum:518, content= (91, 90, 84, 71, 61, 43, 40, 25, 7, 6)
```

"----Comparison for the 54 example----

"***tf from benchmark was 528(we added the number of machines) and target function from our local search is 528"

***RESULT IS THE SAME

Run time: 0.069 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 15))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0185185"

"-----END 55 from 130-----"

"-----START 56 from 130-----"

```
"input file number 56: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_5.txt"
```

```

****Data from file U_1_0100_10_5.txt: machinesNum=10 jobsNum=100"
****SOLUTION Data from file SOL_U_1_10_0100_5.txt: machinesNum=10 jobsNum=100 lowerBound=530 upperBound=530 isOptimal=1"
Content of machines summed (530, 530, 530, 530, 530, 530, 530, 530, 530, 529)
input selected: size 100 sum 5299

----Our Results-----
best from Our local search found:
target function = 540, num of machines=10, square root lms=0
machines content(number of jobs=100):
bucket1 sum:530, content= (99, 88, 78, 67, 55, 47, 32, 21, 2, 41)
bucket2 sum:530, content= (99, 88, 77, 66, 60, 46, 31, 23, 40)
bucket3 sum:530, content= (99, 86, 80, 65, 57, 46, 31, 18, 9, 39)
bucket4 sum:530, content= (98, 90, 77, 64, 58, 46, 30, 17, 11, 39)
bucket5 sum:530, content= (98, 90, 75, 69, 53, 50, 29, 17, 9, 40)
bucket6 sum:530, content= (97, 91, 73, 70, 53, 52, 36, 28, 26, 4)
bucket7 sum:530, content= (97, 84, 83, 63, 58, 44, 35, 17, 9, 40)
bucket8 sum:530, content= (97, 83, 83, 62, 60, 50, 39, 27, 16, 11, 2)
bucket9 sum:530, content= (95, 91, 71, 70, 59, 50, 36, 27, 27, 4)
bucket10 sum:529, content= (92, 91, 83, 61, 58, 41, 41, 37, 14, 11)
"----Comparison for the 55 example----"
****tf from benchmark was 540(we added the number of machines) and target function from our local search is 540"
***RESULT IS THE SAME
Run time: 3.012 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 16))
"Mistakes(size-numberMistakes):" QMap((50, 1))
"Avegare error: -0.0181818"
"-----END 56 from 130-----"
"-----START 57 from 130-----"
"input file number 57: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_6.txt"
****Data from file U_1_0100_10_6.txt: machinesNum=10 jobsNum=100"
****SOLUTION Data from file SOL_U_1_10_0100_6.txt: machinesNum=10 jobsNum=100 lowerBound=516 upperBound=516 isOptimal=1"

```

Content of machines summed (516, 516, 516, 516, 516, 516, 516, 516, 516, 511)
input selected: size 100 sum 5155

----Our Results-----

best from Our local search found:

target function = 526, num of machines=10, square root lms=0

machines content(number of jobs=100):

bucket1 sum:515, content= (99, 74, 60, 53, 29, 15, 5, 63, 35, 82)

bucket2 sum:515, content= (96, 81, 76, 63, 60, 50, 40, 28, 17, 4)

bucket3 sum:516, content= (98, 83, 74, 64, 61, 49, 40, 25, 21, 1)

bucket4 sum:516, content= (95, 84, 73, 64, 62, 49, 37, 33, 13, 6)

bucket5 sum:516, content= (95, 78, 63, 60, 48, 42, 25, 18, 6, 81)

bucket6 sum:515, content= (94, 85, 71, 66, 62, 47, 42, 24, 22, 2)

bucket7 sum:516, content= (94, 81, 79, 64, 57, 54, 36, 32, 11, 8)

bucket8 sum:516, content= (94, 81, 79, 61, 45, 44, 24, 17, 7, 64)

bucket9 sum:515, content= (93, 86, 71, 65, 62, 53, 36, 32, 11, 6)

bucket10 sum:515, content= (92, 87, 69, 68, 56, 55, 34, 9, 8, 37)

"----Comparison for the 56 example----"

***tf from benchmark was 526(we added the number of machines) and target function from our local search is 526"

***RESULT IS THE SAME

Run time: 0.976 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 17))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0178571"

"-----END 57 from 130-----"

"-----START 58 from 130-----"

"input file number 58: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_7.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_7.txt"

***Data from file U_1_0100_10_7.txt: machinesNum=10 jobsNum=100"

***SOLUTION Data from file SOL_U_1_10_0100_7.txt: machinesNum=10 jobsNum=100 lowerBound=515 upperBound=515 isOptimal=1"

Content of machines summed (515, 515, 515, 515, 515, 515, 515, 515, 515, 514)

input selected: size 100 sum 5149

----Our Results-----

best from Our local search found:

target function = 525, num of machines=10, square root lms=0

machines content(number of jobs=100):

bucket1 sum:515, content= (63, 49, 32, 14, 8, 95, 83, 78, 53, 40)

bucket2 sum:515, content= (98, 75, 61, 57, 49, 37, 33, 14, 9, 82)

bucket3 sum:515, content= (97, 84, 74, 65, 54, 48, 30, 13, 11, 39)

bucket4 sum:515, content= (97, 81, 61, 47, 41, 28, 18, 8, 76, 58)

bucket5 sum:515, content= (96, 84, 77, 61, 56, 47, 42, 27, 19, 6)

bucket6 sum:514, content= (96, 84, 73, 66, 50, 37, 35, 13, 6, 54)

bucket7 sum:515, content= (85, 71, 67, 53, 52, 36, 27, 21, 4, 99)

bucket8 sum:515, content= (91, 87, 77, 60, 59, 44, 41, 26, 19, 11)

bucket9 sum:515, content= (91, 86, 78, 60, 43, 43, 25, 21, 11, 57)

bucket10 sum:515, content= (90, 90, 69, 68, 57, 43, 42, 23, 23, 10)

"----Comparison for the 57 example----

****tf from benchmark was 525(we added the number of machines) and target function from our local search is 525"

***RESULT IS THE SAME

Run time: 2.764 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 18))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0175439"

"-----END 58 from 130-----"

"-----START 59 from 130-----"

"input file number 59: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_8.txt"

****Data from file U_1_0100_10_8.txt: machinesNum=10 jobsNum=100"

****SOLUTION Data from file SOL_U_1_10_0100_8.txt: machinesNum=10 jobsNum=100 lowerBound=494 upperBound=494 isOptimal=1"

Content of machines summed (494, 494, 494, 494, 494, 494, 494, 494, 494, 493)

input selected: size 100 sum 4939

----Our Results-----

best from Our local search found:

target function = 504, num of machines=10, square root lms=0

machines content(number of jobs=100):

bucket1 sum:494, content= (76, 62, 54, 48, 34, 25, 7, 6, 83, 99)

bucket2 sum:494, content= (99, 76, 63, 53, 46, 22, 11, 1, 85, 38)

bucket3 sum:493, content= (99, 80, 62, 52, 46, 35, 22, 12, 1, 84)

bucket4 sum:494, content= (86, 73, 64, 56, 46, 34, 20, 14, 3, 98)

bucket5 sum:494, content= (96, 86, 71, 66, 57, 43, 20, 13, 3, 39)

bucket6 sum:494, content= (95, 88, 70, 66, 56, 42, 28, 7, 4, 38)

bucket7 sum:494, content= (95, 88, 69, 67, 52, 52, 34, 19, 15, 3)

bucket8 sum:494, content= (94, 88, 69, 67, 59, 42, 18, 14, 6, 37)

bucket9 sum:494, content= (92, 88, 82, 60, 51, 51, 31, 16, 16, 7)

bucket10 sum:494, content= (92, 88, 81, 62, 51, 41, 39, 28, 9, 3)

"----Comparison for the 58 example----"

****tf from benchmark was 504(we added the number of machines) and target function from our local search is 504"

***RESULT IS THE SAME

Run time: 4.098 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 19))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0172414"

"-----END 59 from 130-----"

"-----START 60 from 130-----"

"input file number 60: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_10_9.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0100_9.txt"

****Data from file U_1_0100_10_9.txt: machinesNum=10 jobsNum=100"

****SOLUTION Data from file SOL_U_1_10_0100_9.txt: machinesNum=10 jobsNum=100 lowerBound=461 upperBound=461 isOptimal=1"

Content of machines summed (461, 461, 461, 461, 461, 461, 461, 461, 461, 457)

input selected: size 100 sum 4606

----Our Results-----

best from Our local search found:

target function = 471, num of machines=10, square root lms=0


```
machines content(number of jobs=100):  
bucket1 sum:461, content= (77, 55, 46, 36, 31, 22, 7, 97, 72, 18)  
bucket2 sum:461, content= (75, 75, 57, 45, 40, 29, 24, 99, 17)  
bucket3 sum:461, content= (95, 84, 73, 53, 48, 35, 31, 24, 17, 1)  
bucket4 sum:461, content= (93, 85, 71, 53, 44, 40, 28, 24, 19, 2, 2)  
bucket5 sum:460, content= (93, 85, 67, 59, 43, 39, 27, 26, 3, 18)  
bucket6 sum:460, content= (92, 87, 67, 53, 49, 35, 33, 22, 19, 3)  
bucket7 sum:460, content= (92, 85, 52, 49, 34, 32, 22, 19, 2, 73)  
bucket8 sum:460, content= (92, 83, 70, 50, 50, 34, 33, 24, 13, 11)  
bucket9 sum:461, content= (90, 87, 66, 61, 43, 34, 33, 23, 12, 12)  
bucket10 sum:461, content= (89, 87, 64, 64, 42, 37, 27, 22, 20, 9)  
----Comparison for the 59 example----  
****tf from benchmark was 471(we added the number of machines) and target function from our local search is 471"  
***RESULT IS THE SAME  
Run time: 1.555 seconds  
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 20))  
"Mistakes(size-numberMistakes):" QMap((50, 1))  
"Avegare error: -0.0169492"  
"-----END 60 from 130-----"  
"-----START 61 from 130-----"  
"input file number 61: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_0.txt and  
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_0.txt"  
****Data from file U_1_0100_25_0.txt: machinesNum=25 jobsNum=100"  
****SOLUTION Data from file SOL_U_1_25_0100_0.txt: machinesNum=25 jobsNum=100 lowerBound=195 upperBound=195 isOptimal=1"  
Content of machines summed (195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195,  
195, 195, 172)  
input selected: size 100 sum 4852  
  
----Our Results-----  
best from Our local search found:  
target function = 220, num of machines=25, square root lms=0  
machines content(number of jobs=100):
```

bucket1 sum:194, content= (53, 42, 99)
bucket2 sum:194, content= (99, 56, 39)
bucket3 sum:195, content= (50, 98, 34, 13)
bucket4 sum:194, content= (35, 60, 99)
bucket5 sum:193, content= (96, 58, 35, 3, 1)
bucket6 sum:194, content= (95, 55, 9, 35)
bucket7 sum:195, content= (94, 60, 32, 9)
bucket8 sum:195, content= (94, 59, 32, 10)
bucket9 sum:195, content= (93, 61, 31, 10)
bucket10 sum:195, content= (92, 62, 30, 11)
bucket11 sum:194, content= (90, 63, 36, 5)
bucket12 sum:194, content= (87, 63, 7, 37)
bucket13 sum:194, content= (86, 68, 30, 10)
bucket14 sum:194, content= (85, 63, 7, 39)
bucket15 sum:194, content= (84, 70, 30, 10)
bucket16 sum:194, content= (83, 61, 9, 41)
bucket17 sum:194, content= (83, 48, 44, 19)
bucket18 sum:194, content= (83, 48, 43, 20)
bucket19 sum:193, content= (82, 46, 44, 21)
bucket20 sum:195, content= (81, 73, 29, 12)
bucket21 sum:195, content= (78, 73, 28, 16)
bucket22 sum:193, content= (77, 75, 28, 13)
bucket23 sum:193, content= (76, 76, 27, 13, 1)
bucket24 sum:193, content= (76, 75, 24, 18)
bucket25 sum:194, content= (76, 75, 23, 17, 3)

"----Comparison for the 60 example----"

****tf from benchmark was 220(we added the number of machines) and target function from our local search is 220"

***RESULT IS THE SAME

Run time: 45.4 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 21))

"Mistakes(size-numberMistakes):" QMap((50, 1))

"Avegare error: -0.0166667"

```
-----END 61 from 130-----"
```

```
"-----START 62 from 130-----"
```

```
"input file number 62: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_1.txt and  
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_1.txt"  
***Data from file U_1_0100_25_1.txt: machinesNum=25 jobsNum=100"  
***SOLUTION Data from file SOL_U_1_25_0100_1.txt: machinesNum=25 jobsNum=100 lowerBound=195 upperBound=195 isOptimal=1"  
Content of machines summed (195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195,  
195, 195, 193)  
input selected: size 100 sum 4873
```

```
----Our Results-----  
best from Our local search found:  
target function = 221, num of machines=25, square root lms=974.601970036999  
machines content(number of jobs=100):
```

```
bucket8 sum:194, content= (54, 2, 95, 43)  
bucket12 sum:196, content= (87, 31, 16, 62)  
bucket22 sum:194, content= (76, 69, 42, 7)  
bucket24 sum:194, content= (71, 69, 1, 3, 50)
```

```
"----Comparison for the 61 example----
```

```
"***tf from benchmark was 220(we added the number of machines) and target function from our local search is 221"  
***Different 1  
Run time: 1422.44 seconds  
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 21))  
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))  
"Avegare error: 0"  
-----END 62 from 130-----"
```

```
"-----START 63 from 130-----"
```

```
"input file number 63: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_2.txt and  
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_2.txt"  
***Data from file U_1_0100_25_2.txt: machinesNum=25 jobsNum=100"
```

****SOLUTION Data from file SOL_U_1_25_0100_2.txt: machinesNum=25 jobsNum=100 lowerBound=199 upperBound=199 isOptimal=1 "
Content of machines summed (199, 184)
input selected: size 100 sum 4960

----Our Results-----

best from Our local search found:

target function = 224, num of machines=25, square root lms=0

machines content(number of jobs=100):

bucket1 sum:199, content= (90, 68, 41)

bucket2 sum:198, content= (65, 95, 38)

bucket3 sum:198, content= (60, 96, 42)

bucket4 sum:199, content= (15, 41, 49, 94)

bucket5 sum:199, content= (43, 49, 91, 16)

bucket6 sum:198, content= (20, 85, 50, 43)

bucket7 sum:198, content= (90, 19, 50, 39)

bucket8 sum:199, content= (65, 92, 42)

bucket9 sum:197, content= (45, 87, 13, 52)

bucket10 sum:198, content= (53, 7, 50, 88)

bucket11 sum:198, content= (85, 7, 54, 52)

bucket12 sum:198, content= (84, 10, 63, 41)

bucket13 sum:198, content= (82, 24, 41, 51)

bucket14 sum:198, content= (81, 39, 24, 54)

bucket15 sum:198, content= (79, 25, 55, 39)

bucket16 sum:197, content= (79, 38, 12, 68)

bucket17 sum:199, content= (79, 63, 47, 10)

bucket18 sum:199, content= (75, 35, 28, 61)

bucket19 sum:199, content= (75, 34, 29, 61)

bucket20 sum:199, content= (74, 64, 49, 12)

bucket21 sum:199, content= (74, 60, 49, 16)

bucket22 sum:199, content= (72, 34, 29, 55, 9)

bucket23 sum:199, content= (72, 48, 64, 15)

bucket24 sum:198, content= (32, 30, 67, 69)

bucket25 sum:199, content= (69, 1, 3, 1, 1, 53, 71)

"----Comparison for the 62 example----

***tf from benchmark was 224(we added the number of machines) and target function from our local search is 224"

***RESULT IS THE SAME

Run time: 369.676 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 22))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 63 from 130-----"

"-----START 64 from 130-----"

"input file number 64: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_3.txt and solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_3.txt"

***Data from file U_1_0100_25_3.txt: machinesNum=25 jobsNum=100"

***SOLUTION Data from file SOL_U_1_25_0100_3.txt: machinesNum=25 jobsNum=100 lowerBound=200 upperBound=200 isOptimal=1"

[illegible]

input selected: size 100 sum 4997

----Our Results-----

best from Our local search found:

target function = 225, num of machines=25, square root lms=0

machines content(number of jobs=100):

bucket1 sum:200, content= (22, 26, 25, 26, 20, 81)

bucket2 sum:200, content= (23, 57, 21, 99)

bucket3 sum:200, content= (16, 97, 40, 47)

bucket4 sum:200, content= (57, 21, 24, 98)

bucket5 sum:199, content= (34, 15, 55, 95)

bucket6 sum:200, content= (36, 38, 27, 99)

bucket7 sum:200, content= (60, 54, 86)

bucket8 sum:200, content= (59, 87, 54)

bucket9 sum:200, content= (59, 15, 80, 46)

----Our Results-----

best from Our local search found:

target function = 216, num of machines=25, square root lms=951.207653459538

machines content(number of jobs=100):

bucket1 sum:191, content= (76, 21, 55, 38, 1)

bucket2 sum:190, content= (37, 99, 53, 1)

bucket3 sum:190, content= (97, 50, 41, 2)

bucket4 sum:189, content= (96, 41, 49, 3)

bucket5 sum:191, content= (48, 48, 95)

bucket6 sum:189, content= (36, 92, 46, 15)

bucket7 sum:189, content= (36, 5, 52, 96)

bucket8 sum:189, content= (91, 55, 4, 39)

bucket9 sum:190, content= (89, 54, 41, 3, 1, 2)

bucket10 sum:191, content= (34, 9, 87, 61)

bucket11 sum:189, content= (88, 3, 46, 52)

bucket12 sum:191, content= (87, 33, 12, 59)

bucket13 sum:190, content= (9, 48, 88, 45)

bucket14 sum:191, content= (83, 31, 15, 62)

bucket15 sum:191, content= (60, 26, 80, 25)

bucket16 sum:191, content= (67, 27, 20, 77)

bucket17 sum:190, content= (80, 67, 27, 16)

bucket18 sum:191, content= (66, 21, 25, 79)

bucket19 sum:191, content= (79, 64, 24, 24)

bucket20 sum:190, content= (64, 82, 44)

bucket21 sum:190, content= (9, 64, 39, 78)

bucket22 sum:191, content= (77, 45, 44, 25)

bucket23 sum:191, content= (71, 24, 96)

bucket24 sum:190, content= (71, 22, 24, 73)

bucket25 sum:190, content= (73, 16, 27, 74)

"----Comparison for the 64 example----

"***tf from benchmark was 216(we added the number of machines) and target function from our local search is 216"

***RESULT IS THE SAME

Run time: 1073.77 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 24))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 65 from 130-----"

"-----START 66 from 130-----"

"input file number 66: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_5.txt and solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_5.txt"

***Data from file U_1_0100_25_5.txt: machinesNum=25 jobsNum=100"

***SOLUTION Data from file SOL_U_1_25_0100_5.txt: machinesNum=25 jobsNum=100 lowerBound=219 upperBound=219 isOptimal=1"

[illegible]

input selected: size 100 sum 5459

----Our Results-----

best from Our local search found:

target function = 244, num of machines=25, square root lms=0

machines content(number of jobs=100):

bucket1 sum:219, content= (94, 19, 53, 53)

bucket2 sum:218, content= (96, 48, 54, 20)

bucket3 sum:219, content= (96, 54, 24, 45)

bucket4 sum:218, content= (96, 49, 19, 54)

bucket5 sum:218, content= (51, 57, 18, 92)

bucket6 sum:218, content= (91, 46, 58, 23)

bucket7 sum:218, content= (98, 58, 62)

bucket8 sum:219, content= (47, 85, 87)

bucket9 sum:218, content= (66, 45, 21, 86)

bucket10 sum:219, content= (87, 66, 44, 22)

bucket11 sum:218, content= (86, 64, 17, 51)

bucket12 sum:218, content= (86, 64, 52, 16)

bucket13 sum:218, content= (28, 78, 57, 55)

[illegible]

machines content(number of jobs=100):

bucket1 sum:194, content= (41, 54, 99)

bucket2 sum:194, content= (39, 97, 47, 11)

bucket3 sum:193, content= (98, 49, 46)

bucket4 sum:194, content= (39, 6, 51, 98)

bucket5 sum:194, content= (97, 53, 39, 5)

bucket6 sum:194, content= (95, 38, 9, 52)

bucket7 sum:194, content= (95, 53, 41, 5)

bucket8 sum:194, content= (94, 55, 36, 9)

bucket9 sum:194, content= (94, 52, 35, 13)

bucket10 sum:193, content= (93, 56, 35, 9)

bucket11 sum:192, content= (92, 52, 45, 3)

bucket12 sum:193, content= (89, 60, 35, 9)

bucket13 sum:193, content= (88, 61, 35, 9)

bucket14 sum:194, content= (88, 59, 34, 13)

bucket15 sum:192, content= (85, 58, 42, 7)

bucket16 sum:193, content= (84, 65, 29, 15)

bucket17 sum:193, content= (83, 66, 27, 17)

bucket18 sum:193, content= (80, 68, 26, 19)

bucket19 sum:192, content= (79, 67, 25, 21)

bucket20 sum:192, content= (78, 71, 25, 17, 1)

bucket21 sum:194, content= (78, 66, 44, 6)

bucket22 sum:191, content= (78, 65, 25, 23)

bucket23 sum:193, content= (75, 74, 24, 20)

bucket24 sum:192, content= (75, 46, 22, 49)

bucket25 sum:192, content= (75, 46, 46, 23, 2)

"----Comparison for the 66 example----"

****tf from benchmark was 219(we added the number of machines) and target function from our local search is 219"

***RESULT IS THE SAME

Run time: 13.768 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 26))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

```
"Avegate error: 0"  
"-----END 67 from 130-----"  
"-----START 68 from 130-----"  
"input file number 68: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_7.txt and  
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_7.txt"  
"***Data from file U_1_0100_25_7.txt: machinesNum=25 jobsNum=100"  
"***SOLUTION Data from file SOL_U_1_25_0100_7.txt: machinesNum=25 jobsNum=100 lowerBound=214 upperBound=214 isOptimal=1"  
Content of machines summed (214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214, 214,  
214, 214, 193)  
input selected: size 100 sum 5329
```

----Our Results-----

best from Our local search found:

target function = 239, num of machines=25, square root lms=0

machines content(number of jobs=100):

bucket1 sum:214, content= (94, 44, 76)

bucket2 sum:214, content= (70, 97, 47)

bucket3 sum:214, content= (98, 61, 55)

bucket4 sum:213, content= (99, 57, 4, 53)

bucket5 sum:212, content= (99, 49, 1, 63)

bucket6 sum:213, content= (98, 42, 45, 28)

bucket7 sum:213, content= (98, 54, 7, 54)

bucket8 sum:212, content= (98, 52, 6, 56)

bucket9 sum:212, content= (45, 6, 99, 62)

bucket10 sum:212, content= (62, 6, 45, 99)

bucket11 sum:213, content= (44, 10, 97, 62)

bucket12 sum:214, content= (95, 55, 45, 19)

bucket13 sum:214, content= (91, 49, 22, 52)

bucket14 sum:214, content= (75, 95, 44)

bucket15 sum:213, content= (67, 42, 11, 93)

```
bucket16 sum:213, content= (90, 41, 22, 60)
```

```
bucket17 sum:212, content=(87, 39, 20, 66)
```

[illegible]

```
bucket4 sum:205, content= (76, 60, 69)
bucket5 sum:205, content= (52, 93, 60)
bucket6 sum:204, content= (71, 92, 1, 40)
bucket7 sum:205, content= (39, 15, 63, 88)
bucket8 sum:205, content= (9, 89, 68, 39)
bucket9 sum:205, content= (38, 17, 63, 87)
bucket10 sum:205, content= (87, 97, 15, 6)
bucket11 sum:205, content= (53, 64, 88)
bucket12 sum:205, content= (69, 36, 9, 6, 85)
bucket13 sum:205, content= (75, 10, 35, 18, 67)
bucket14 sum:205, content= (81, 71, 35, 18)
bucket15 sum:205, content= (76, 69, 34, 26)
bucket16 sum:205, content= (52, 3, 64, 86)
bucket17 sum:205, content= (84, 12, 34, 19, 56)
bucket18 sum:205, content= (82, 71, 32, 20)
bucket19 sum:205, content= (85, 68, 30, 22)
bucket20 sum:204, content= (73, 26, 5, 75, 25)
bucket21 sum:205, content= (85, 73, 18, 25, 4)
bucket22 sum:204, content= (76, 71, 57)
bucket23 sum:204, content= (93, 71, 40)
bucket24 sum:204, content= (74, 24, 4, 76, 26)
bucket25 sum:205, content= (86, 56, 63)
"----Comparison for the 68 example----"
"***tf from benchmark was 230(we added the number of machines) and target function from our local search is 230"
***RESULT IS THE SAME
Run time: 555.323 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 28))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 69 from 130-----"
"-----START 70 from 130-----"
```

```
"input file number 70: inputName=C:/algo/h/docs/benchMark/all/U_1_0100_25_9.txt and  
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0100_9.txt"  
"***Data from file U_1_0100_25_9.txt: machinesNum=25 jobsNum=100"  
"***SOLUTION Data from file SOL_U_1_25_0100_9.txt: machinesNum=25 jobsNum=100 lowerBound=203 upperBound=203 isOptimal=1"  
Content of machines summed (203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203, 203,  
203, 203, 198)  
input selected: size 100 sum 5070
```

---Our Results-----

best from Our local search found:

target function = 228, num of machines=25, square root lms=1014.00197238467

machines content(number of jobs=100):

bucket1 sum:203, content= (31, 94, 25, 53)

bucket2 sum:203, content= (80, 9, 27, 24, 60, 3)

bucket3 sum:202, content= (56, 35, 98, 13)

bucket4 sum:203, content= (74, 61, 3, 26, 38, 1)

bucket5 sum:202, content= (58, 99, 45)

bucket6 sum:203, content= (98, 52, 45, 8)

bucket7 sum:203, content= (54, 96, 44, 9)

bucket8 sum:203, content= (97, 54, 8, 44)

bucket9 sum:202, content= (46, 4, 98, 54)

bucket10 sum:203, content= (85, 46, 24, 48)

bucket11 sum:203, content= (54, 52, 97)

bucket12 sum:203, content= (91, 70, 7, 35)

bucket13 sum:202, content= (99, 69, 34)

bucket14 sum:202, content= (89, 32, 69, 12)

```
bucket15 sum:203, content=(87, 30, 18, 68)
```

bucket16 sum:203, content= (87, 29, 19, 68)

bucket17 sum:203, content=(86, 29, 68, 20)

bucket18 sum:203, content=(95, 67, 28, 13)

bucket19 sum:203, content=(84, 91, 28)

bucket20 sum:203, content=(68, 75, 38, 22)

```

bucket21 sum:203, content= (82, 75, 27, 19)
bucket22 sum:203, content= (82, 75, 26, 20)
bucket23 sum:203, content= (82, 99, 22)
bucket24 sum:203, content= (82, 74, 26, 21)
bucket25 sum:203, content= (82, 77, 25, 11, 8)
"----Comparison for the 69 example----"
"***tf from benchmark was 228(we added the number of machines) and target function from our local search is 228"
***RESULT IS THE SAME
Run time: 646.14 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 70 from 130-----"
"-----START 71 from 130-----"
"input file number 71: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_0.txt"
"***Data from file U_1_0500_05_0.txt: machinesNum=5 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_05_0500_0.txt: machinesNum=5 jobsNum=500 lowerBound=5107 upperBound=5107 isOptimal=1"
Content of machines summed (5107, 5106, 5106, 5106, 5106)
input selected: size 500 sum 25531

----Our Results-----
best from Our local search found:
target function = 5112, num of machines=5, square root lms=0
machines content(number of jobs=500):
bucket1 sum:5107, content= (99, 99, 98, 97, 96, 95, 94, 93, 91, 91, 90, 89, 88, 88, 86, 85, 83, 83, 82, 81, 80, 79, 79, 77, 77, 76, 76, 74, 74, 72,
72, 71, 70, 69, 69, 68, 67, 66, 65, 63, 62, 60, 59, 58, 56, 56, 54, 53, 52, 52, 50, 49, 48, 48, 45, 44, 43, 42, 42, 41, 39, 39, 39, 37, 36, 36, 35, 34,
34, 33, 31, 30, 29, 29, 28, 27, 26, 25, 23, 22, 20, 19, 19, 18, 16, 16, 13, 13, 11, 10, 9, 8, 8, 7, 7, 5, 3, 3, 2, 2)
bucket2 sum:5107, content= (99, 99, 98, 97, 96, 95, 94, 92, 92, 91, 89, 89, 89, 88, 86, 85, 83, 83, 82, 81, 80, 79, 79, 77, 77, 76, 76, 74, 73, 73,
72, 71, 70, 69, 69, 68, 67, 66, 64, 64, 61, 60, 60, 58, 56, 55, 55, 53, 52, 51, 51, 49, 48, 47, 45, 44, 44, 42, 42, 41, 39, 39, 38, 38, 36, 36, 35, 34,
34, 32, 32, 30, 29, 29, 28, 27, 26, 25, 23, 21, 21, 19, 19, 17, 17, 15, 14, 12, 12, 9, 9, 9, 8, 7, 7, 4, 4, 3, 2, 1, 1)

```

bucket3 sum:5106, content= (99, 99, 98, 97, 96, 94, 94, 93, 92, 91, 89, 89, 89, 87, 87, 84, 84, 83, 81, 81, 81, 79, 79, 77, 77, 76, 76, 74, 73, 73, 72, 71, 70, 69, 69, 68, 67, 66, 64, 63, 62, 60, 60, 57, 57, 55, 54, 53, 53, 51, 51, 49, 48, 47, 45, 44, 43, 43, 42, 41, 39, 39, 38, 38, 36, 36, 35, 34, 34, 32, 31, 30, 29, 29, 29, 27, 26, 25, 22, 22, 20, 20, 18, 18, 17, 15, 14, 12, 12, 9, 9, 9, 8, 7, 6, 5, 4, 3, 2, 1)
bucket4 sum:5105, content= (99, 98, 98, 97, 96, 96, 94, 92, 92, 90, 90, 89, 89, 87, 87, 84, 84, 83, 81, 81, 81, 79, 78, 78, 77, 76, 75, 75, 73, 73, 72, 71, 70, 69, 69, 68, 66, 66, 65, 63, 62, 60, 59, 59, 56, 55, 54, 53, 53, 51, 50, 50, 48, 47, 45, 44, 43, 42, 42, 42, 39, 39, 38, 37, 37, 35, 35, 34, 34, 33, 31, 30, 29, 29, 29, 27, 25, 25, 24, 21, 20, 20, 18, 18, 17, 15, 14, 12, 11, 10, 9, 8, 8, 8, 6, 5, 4, 3, 2)
bucket5 sum:5106, content= (99, 98, 98, 97, 96, 94, 94, 94, 91, 91, 90, 89, 88, 88, 86, 86, 83, 82, 82, 81, 80, 80, 78, 77, 77, 77, 75, 75, 73, 72, 72, 71, 70, 70, 68, 68, 68, 65, 65, 62, 62, 61, 59, 59, 56, 55, 53, 53, 53, 52, 50, 49, 49, 46, 46, 44, 43, 42, 42, 40, 40, 39, 39, 37, 37, 35, 35, 34, 34, 33, 31, 30, 29, 29, 28, 27, 27, 24, 24, 21, 20, 19, 19, 18, 17, 15, 13, 13, 11, 10, 9, 8, 8, 7, 7, 5, 4, 2, 2, 2)

"----Comparison for the 70 example----

***tf from benchmark was 5112(we added the number of machines) and target function from our local search is 5112"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 1))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 71 from 130-----"

"-----START 72 from 130-----"

"input file number 72: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_1.txt"

***Data from file U_1_0500_05_1.txt: machinesNum=5 jobsNum=500"

***SOLUTION Data from file SOL_U_1_05_0500_1.txt: machinesNum=5 jobsNum=500 lowerBound=4971 upperBound=4971 isOptimal=1"

Content of machines summed (4971, 4970, 4970, 4970, 4970)

input selected: size 500 sum 24851

----Our Results-----

best from Our local search found:

target function = 4976, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4971, content= (99, 98, 98, 95, 95, 94, 93, 92, 91, 91, 90, 89, 89, 88, 87, 86, 86, 85, 84, 83, 82, 81, 80, 79, 79, 77, 77, 75, 73, 72, 70, 69, 66, 66, 64, 63, 63, 61, 59, 58, 57, 56, 53, 53, 51, 50, 50, 48, 48, 47, 47, 46, 45, 44, 44, 43, 41, 41, 39, 38, 38, 36, 35, 35, 33, 32, 32, 30, 29, 29, 28, 27, 26, 26, 26, 24, 24, 22, 21, 20, 19, 19, 18, 17, 17, 16, 16, 15, 13, 13, 11, 10, 10, 9, 8, 6, 5, 3, 3, 2)

bucket2 sum:4971, content= (99, 98, 98, 95, 95, 93, 93, 93, 91, 91, 90, 89, 89, 88, 87, 86, 86, 85, 84, 83, 82, 81, 80, 79, 79, 77, 77, 75, 73, 72, 70, 69, 66, 66, 64, 63, 62, 62, 59, 58, 57, 56, 53, 53, 51, 50, 50, 48, 48, 47, 47, 46, 45, 44, 43, 43, 42, 41, 39, 38, 37, 37, 35, 34, 34, 32, 31, 30, 29, 29, 28, 27, 27, 26, 26, 24, 23, 23, 21, 20, 19, 19, 18, 17, 16, 16, 16, 15, 14, 12, 12, 10, 10, 9, 7, 7, 5, 3, 3, 1, 1)

bucket3 sum:4970, content= (99, 98, 97, 95, 95, 94, 93, 92, 92, 91, 90, 89, 89, 88, 87, 86, 86, 85, 84, 83, 81, 81, 80, 80, 78, 78, 77, 75, 73, 72, 70, 68, 67, 65, 65, 63, 62, 61, 59, 59, 57, 55, 54, 52, 52, 50, 50, 48, 48, 47, 47, 46, 45, 44, 43, 43, 42, 41, 39, 38, 37, 37, 35, 34, 34, 32, 31, 30, 29, 29, 28, 27, 27, 26, 26, 24, 23, 23, 21, 20, 19, 19, 18, 17, 16, 16, 16, 15, 14, 12, 12, 10, 10, 8, 8, 7, 5, 3, 3, 1)

bucket4 sum:4969, content= (99, 98, 96, 96, 95, 94, 93, 92, 92, 91, 90, 89, 89, 87, 87, 86, 86, 86, 84, 82, 82, 81, 80, 80, 78, 78, 77, 74, 74, 71, 71, 68, 67, 65, 64, 63, 63, 60, 60, 58, 57, 57, 53, 52, 51, 51, 49, 49, 48, 47, 46, 46, 45, 44, 44, 43, 42, 40, 39, 39, 37, 36, 36, 34, 33, 33, 31, 30, 29, 29, 28, 27, 27, 26, 25, 25, 23, 22, 21, 21, 19, 19, 17, 17, 17, 16, 16, 15, 13, 13, 11, 11, 10, 8, 8, 7, 4, 4, 3)

bucket5 sum:4970, content= (99, 98, 96, 95, 95, 94, 93, 93, 91, 91, 90, 90, 88, 88, 87, 86, 86, 85, 84, 84, 81, 81, 80, 80, 78, 77, 77, 76, 72, 72, 69, 69, 67, 66, 64, 63, 63, 60, 60, 58, 57, 54, 54, 53, 52, 51, 49, 49, 48, 47, 46, 46, 45, 44, 44, 43, 42, 40, 39, 38, 38, 36, 35, 35, 33, 33, 31, 30, 29, 29, 28, 27, 27, 26, 25, 25, 23, 22, 21, 20, 20, 19, 17, 17, 17, 16, 16, 15, 13, 13, 11, 11, 9, 9, 8, 6, 6, 3, 2, 2)

"----Comparison for the 71 example----

****tf from benchmark was 4976(we added the number of machines) and target function from our local search is 4976"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 2))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 72 from 130-----"

"-----START 73 from 130-----"

"input file number 73: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_2.txt"

****Data from file U_1_0500_05_2.txt: machinesNum=5 jobsNum=500"

****SOLUTION Data from file SOL_U_1_05_0500_2.txt: machinesNum=5 jobsNum=500 lowerBound=5086 upperBound=5086 isOptimal=1"

Content of machines summed (5086, 5085, 5085, 5085, 5085)

input selected: size 500 sum 25426

----Our Results-----

best from Our local search found:

target function = 5091, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:5086, content=(99, 98, 97, 96, 95, 94, 94, 93, 92, 91, 91, 89, 89, 88, 87, 87, 85, 85, 82, 82, 80, 80, 78, 77, 76, 75, 74, 72, 72, 70, 70, 68, 67, 67, 65, 65, 64, 62, 62, 61, 60, 59, 59, 58, 57, 57, 55, 55, 53, 52, 51, 51, 49, 48, 47, 46, 45, 44, 42, 42, 39, 39, 39, 37, 36, 36, 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 25, 24, 22, 21, 21, 19, 18, 17, 17, 14, 13, 13, 11, 11, 9, 9, 7, 5, 5, 3, 3, 3, 1)

bucket2 sum:5085, content=(99, 98, 97, 96, 95, 94, 94, 92, 92, 92, 91, 89, 89, 88, 87, 86, 86, 84, 83, 82, 80, 80, 78, 77, 76, 75, 74, 72, 72, 70, 69, 69, 67, 66, 66, 65, 64, 62, 62, 61, 60, 59, 59, 58, 57, 57, 55, 54, 54, 52, 51, 51, 49, 48, 47, 45, 45, 44, 43, 41, 40, 39, 38, 38, 36, 36, 33, 33, 32, 31, 30, 30, 27, 27, 26, 26, 25, 24, 24, 23, 21, 20, 20, 18, 17, 16, 15, 13, 12, 12, 10, 10, 8, 8, 5, 5, 3, 3, 2, 1)

bucket3 sum:5085, content=(99, 97, 97, 97, 95, 94, 93, 93, 92, 92, 91, 89, 89, 88, 87, 86, 85, 85, 83, 82, 80, 80, 78, 77, 76, 75, 73, 73, 71, 71, 69, 69, 67, 66, 65, 65, 64, 63, 62, 60, 60, 60, 59, 58, 57, 56, 56, 54, 53, 53, 51, 51, 48, 48, 47, 46, 45, 44, 43, 41, 40, 39, 38, 38, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 26, 25, 24, 24, 23, 21, 20, 20, 18, 17, 16, 15, 13, 12, 11, 11, 10, 8, 8, 5, 5, 3, 3, 2, 1)

bucket4 sum:5085, content=(99, 97, 97, 97, 95, 94, 93, 93, 92, 92, 90, 90, 89, 88, 87, 86, 85, 85, 83, 81, 81, 79, 79, 77, 76, 75, 73, 73, 71, 71, 69, 69, 67, 66, 65, 65, 64, 63, 61, 61, 60, 59, 59, 59, 57, 56, 56, 54, 53, 53, 51, 50, 50, 47, 47, 46, 45, 44, 43, 41, 40, 39, 38, 38, 36, 35, 34, 33, 32, 31, 30, 28, 28, 27, 26, 26, 25, 25, 24, 22, 22, 20, 19, 19, 17, 16, 14, 14, 12, 11, 11, 10, 8, 6, 6, 5, 4, 3, 2, 1)

bucket5 sum:5085, content=(98, 98, 97, 96, 96, 94, 93, 93, 92, 91, 91, 90, 89, 88, 87, 86, 85, 85, 82, 82, 81, 79, 79, 77, 76, 74, 74, 73, 71, 71, 69, 67, 67, 67, 66, 65, 64, 62, 62, 61, 60, 59, 59, 58, 58, 56, 55, 55, 53, 52, 52, 50, 48, 48, 47, 46, 45, 44, 44, 40, 40, 39, 39, 37, 37, 34, 34, 33, 32, 31, 30, 30, 28, 27, 26, 25, 25, 24, 22, 22, 20, 19, 19, 17, 15, 15, 14, 12, 11, 11, 9, 9, 6, 6, 5, 4, 3, 2, 1)

"----Comparison for the 72 example----"

****tf from benchmark was 5091(we added the number of machines) and target function from our local search is 5091"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 3))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 73 from 130-----"

"-----START 74 from 130-----"

"input file number 74: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_3.txt"

****Data from file U_1_0500_05_3.txt: machinesNum=5 jobsNum=500"

****SOLUTION Data from file SOL_U_1_05_0500_3.txt: machinesNum=5 jobsNum=500 lowerBound=4888 upperBound=4888 isOptimal=1"

Content of machines summed (4888, 4888, 4888, 4887, 4887)

input selected: size 500 sum 24438

----Our Results-----

best from Our local search found:

target function = 4893, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4888, content=(99, 97, 96, 95, 94, 93, 92, 92, 90, 88, 88, 86, 85, 84, 84, 82, 81, 81, 80, 80, 79, 78, 77, 76, 76, 75, 74, 72, 72, 71, 69, 68, 67, 66, 66, 64, 64, 62, 62, 62, 59, 57, 56, 55, 54, 53, 52, 51, 50, 49, 48, 48, 46, 44, 43, 42, 42, 41, 40, 39, 38, 38, 36, 35, 34, 33, 33, 31, 31, 30, 28, 27, 25, 25, 23, 23, 21, 21, 19, 19, 17, 16, 15, 14, 14, 13, 12, 11, 10, 10, 10, 7, 7, 6, 6, 4, 4, 3, 2, 1)

bucket2 sum:4888, content=(99, 97, 96, 94, 94, 94, 92, 92, 90, 88, 88, 86, 85, 84, 83, 82, 82, 81, 80, 80, 79, 78, 77, 76, 76, 75, 74, 72, 72, 71, 69, 68, 67, 66, 66, 64, 64, 62, 62, 62, 58, 58, 56, 55, 54, 53, 52, 51, 50, 49, 48, 47, 47, 44, 43, 42, 41, 41, 40, 40, 38, 37, 37, 35, 34, 33, 33, 31, 31, 30, 28, 26, 26, 25, 23, 23, 21, 20, 20, 18, 18, 16, 15, 14, 14, 13, 12, 11, 10, 10, 9, 8, 7, 6, 6, 4, 4, 3, 2, 1)

bucket3 sum:4888, content=(99, 96, 96, 95, 94, 94, 92, 91, 91, 88, 88, 86, 85, 84, 83, 82, 82, 81, 80, 80, 79, 78, 77, 76, 76, 75, 74, 72, 72, 70, 69, 68, 67, 67, 65, 65, 63, 63, 62, 61, 59, 58, 56, 55, 53, 53, 52, 52, 50, 49, 48, 47, 46, 44, 44, 42, 41, 41, 40, 40, 38, 37, 37, 35, 34, 33, 32, 32, 31, 30, 27, 27, 26, 24, 24, 22, 22, 20, 20, 18, 17, 17, 15, 14, 13, 13, 13, 11, 10, 10, 9, 8, 7, 6, 5, 5, 4, 3, 2, 1)

bucket4 sum:4887, content=(98, 98, 95, 95, 94, 93, 93, 91, 90, 89, 87, 87, 85, 84, 83, 82, 81, 81, 81, 79, 79, 78, 77, 77, 76, 74, 74, 73, 72, 69, 69, 69, 67, 67, 65, 65, 63, 63, 62, 60, 59, 58, 56, 55, 54, 53, 52, 52, 50, 49, 48, 47, 45, 44, 44, 43, 41, 41, 40, 39, 39, 37, 36, 36, 34, 33, 32, 31, 31, 30, 28, 27, 26, 24, 24, 22, 22, 20, 20, 18, 17, 16, 16, 14, 13, 13, 13, 11, 10, 10, 8, 8, 7, 7, 5, 4, 4, 4, 1, 1)

bucket5 sum:4887, content=(98, 98, 95, 95, 94, 93, 93, 91, 90, 89, 87, 87, 85, 84, 82, 82, 82, 81, 81, 79, 79, 78, 77, 77, 76, 74, 74, 73, 71, 71, 69, 68, 67, 66, 66, 65, 63, 63, 62, 59, 59, 58, 56, 56, 54, 53, 52, 51, 51, 49, 48, 47, 44, 44, 44, 43, 42, 41, 40, 39, 38, 38, 36, 35, 34, 34, 32, 31, 31, 30, 28, 27, 25, 25, 23, 23, 21, 21, 19, 19, 17, 16, 15, 15, 13, 13, 12, 11, 10, 10, 10, 8, 7, 6, 5, 4, 4, 4, 1, 1)

"----Comparison for the 73 example----

***tf from benchmark was 4893(we added the number of machines) and target function from our local search is 4893"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 4))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 74 from 130-----"

"-----START 75 from 130-----"

"input file number 75: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_4.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_4.txt"

***Data from file U_1_0500_05_4.txt: machinesNum=5 jobsNum=500"

***SOLUTION Data from file SOL_U_1_05_0500_4.txt: machinesNum=5 jobsNum=500 lowerBound=4926 upperBound=4926 isOptimal=1"

Content of machines summed (4926, 4926, 4926, 4926, 4925)

input selected: size 500 sum 24629

----Our Results-----

best from Our local search found:

target function = 4931, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4926, content= (99, 99, 98, 96, 95, 91, 90, 90, 89, 88, 86, 86, 85, 84, 84, 82, 81, 80, 80, 79, 77, 76, 76, 74, 73, 71, 70, 69, 68, 68, 67, 66, 65, 65, 64, 64, 62, 60, 60, 58, 57, 57, 56, 54, 54, 53, 52, 51, 51, 50, 48, 48, 47, 45, 45, 44, 42, 42, 40, 40, 40, 38, 38, 37, 36, 34, 34, 32, 31, 31, 29, 29, 29, 28, 27, 27, 25, 24, 24, 23, 21, 20, 19, 17, 17, 16, 15, 14, 14, 11, 10, 8, 8, 7, 7, 5, 4, 3, 2, 1)

bucket2 sum:4926, content= (99, 99, 97, 97, 93, 92, 91, 90, 88, 88, 87, 86, 85, 84, 83, 82, 82, 80, 80, 79, 77, 76, 76, 74, 72, 72, 70, 69, 68, 68, 67, 66, 65, 65, 64, 64, 62, 60, 60, 58, 57, 57, 55, 55, 54, 53, 52, 51, 51, 49, 49, 48, 47, 45, 45, 43, 43, 41, 41, 40, 39, 39, 38, 37, 36, 34, 33, 33, 31, 30, 30, 29, 29, 28, 27, 26, 26, 24, 24, 22, 22, 20, 18, 18, 16, 16, 16, 14, 13, 12, 9, 9, 8, 7, 6, 5, 5, 3, 2, 1)

bucket3 sum:4926, content= (99, 98, 98, 96, 96, 91, 90, 89, 89, 88, 87, 86, 85, 84, 83, 82, 82, 80, 79, 79, 78, 76, 75, 75, 72, 72, 70, 69, 68, 67, 67, 66, 66, 65, 64, 63, 63, 60, 59, 58, 58, 56, 56, 55, 53, 53, 53, 51, 51, 49, 49, 48, 46, 46, 44, 44, 43, 41, 41, 40, 39, 39, 38, 37, 36, 34, 33, 32, 32, 30, 30, 29, 29, 28, 27, 26, 25, 25, 23, 23, 22, 20, 18, 18, 16, 16, 15, 15, 12, 12, 10, 9, 8, 7, 6, 5, 4, 3, 2, 2)

bucket4 sum:4926, content= (99, 98, 98, 96, 93, 92, 91, 90, 89, 88, 87, 86, 85, 84, 83, 82, 81, 81, 79, 79, 78, 76, 75, 74, 74, 71, 70, 69, 68, 67, 67, 66, 66, 65, 64, 63, 63, 60, 59, 58, 58, 56, 56, 55, 53, 53, 52, 52, 51, 49, 49, 47, 47, 46, 44, 44, 43, 41, 41, 40, 39, 39, 37, 37, 36, 35, 33, 32, 32, 30, 30, 29, 29, 28, 27, 26, 25, 25, 23, 23, 22, 19, 19, 17, 17, 16, 15, 14, 14, 12, 9, 9, 8, 7, 6, 5, 4, 3, 2, 2)

bucket5 sum:4925, content= (99, 98, 98, 96, 92, 92, 91, 90, 89, 88, 88, 86, 85, 84, 83, 82, 81, 80, 80, 79, 77, 77, 75, 74, 74, 71, 70, 69, 68, 67, 67, 66, 66, 65, 64, 63, 61, 61, 60, 58, 57, 57, 56, 55, 53, 53, 52, 52, 50, 50, 48, 48, 47, 45, 45, 44, 42, 42, 41, 40, 39, 38, 38, 37, 36, 34, 34, 32, 31, 31, 29, 29, 29, 28, 28, 26, 25, 24, 24, 23, 21, 20, 19, 17, 17, 16, 15, 14, 14, 11, 10, 9, 7, 7, 7, 5, 3, 3, 3, 1)

"----Comparison for the 74 example----

****tf from benchmark was 4931(we added the number of machines) and target function from our local search is 4931"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 5))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 75 from 130-----"

"-----START 76 from 130-----"

"input file number 76: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_5.txt"

***Data from file U_1_0500_05_5.txt: machinesNum=5 jobsNum=500"

***SOLUTION Data from file SOL_U_1_05_0500_5.txt: machinesNum=5 jobsNum=500 lowerBound=5221 upperBound=5221 isOptimal=1"

Content of machines summed (5221, 5220, 5220, 5220, 5220)

input selected: size 500 sum 26101

----Our Results-----

best from Our local search found:

target function = 5226, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:5221, content=(99, 99, 98, 98, 97, 96, 95, 95, 92, 92, 90, 89, 88, 87, 86, 85, 84, 82, 82, 80, 80, 78, 78, 76, 75, 75, 73, 72, 72, 70, 70, 69, 69, 68, 67, 67, 66, 64, 63, 62, 62, 60, 60, 58, 57, 57, 55, 54, 53, 53, 52, 52, 51, 51, 50, 49, 48, 47, 45, 45, 44, 43, 42, 41, 41, 40, 39, 37, 36, 35, 34, 34, 32, 32, 31, 30, 29, 28, 26, 25, 23, 21, 20, 20, 18, 17, 15, 14, 14, 12, 11, 10, 9, 7, 6, 5, 5, 5, 2, 1)

bucket2 sum:5220, content=(99, 99, 98, 97, 97, 96, 96, 95, 92, 92, 90, 89, 88, 86, 86, 85, 84, 83, 81, 81, 80, 78, 78, 76, 75, 74, 73, 73, 71, 71, 70, 69, 69, 68, 67, 67, 65, 65, 63, 62, 61, 61, 60, 58, 57, 56, 56, 54, 53, 53, 52, 52, 51, 50, 50, 50, 48, 46, 46, 45, 44, 43, 42, 41, 41, 40, 39, 37, 36, 35, 34, 34, 32, 32, 31, 30, 29, 28, 26, 25, 23, 21, 20, 20, 18, 16, 16, 14, 14, 12, 11, 10, 9, 7, 6, 5, 5, 4, 3)

bucket3 sum:5220, content=(99, 99, 98, 97, 97, 96, 96, 94, 93, 92, 89, 89, 89, 86, 86, 85, 84, 83, 81, 81, 79, 79, 78, 76, 75, 74, 73, 73, 71, 71, 70, 69, 68, 68, 68, 66, 66, 65, 63, 62, 61, 61, 59, 59, 57, 56, 56, 53, 53, 53, 52, 52, 51, 51, 50, 50, 47, 47, 46, 45, 44, 42, 42, 42, 40, 40, 39, 38, 36, 35, 34, 33, 33, 32, 30, 30, 30, 27, 26, 25, 24, 21, 20, 19, 19, 16, 15, 15, 13, 12, 12, 10, 8, 8, 6, 5, 5, 4, 2, 1)

bucket4 sum:5220, content=(99, 99, 98, 97, 97, 96, 96, 93, 93, 92, 90, 89, 88, 87, 86, 85, 84, 83, 81, 81, 79, 79, 77, 77, 75, 74, 73, 72, 72, 71, 70, 69, 68, 68, 68, 66, 66, 64, 63, 63, 61, 61, 59, 59, 57, 56, 55, 54, 53, 53, 52, 52, 51, 51, 50, 49, 48, 47, 46, 44, 44, 43, 42, 42, 40, 40, 39, 38, 36, 35, 34, 33, 33, 31, 31, 30, 29, 29, 26, 25, 23, 21, 20, 19, 19, 16, 15, 15, 13, 12, 12, 9, 9, 7, 7, 5, 5, 4, 2, 1)

bucket5 sum:5220, content=(99, 99, 98, 97, 97, 96, 96, 93, 93, 92, 90, 89, 87, 87, 86, 85, 85, 82, 82, 81, 79, 79, 77, 77, 75, 74, 73, 72, 72, 70, 70, 69, 69, 68, 67, 67, 66, 63, 63, 63, 62, 60, 60, 58, 57, 57, 55, 54, 53, 53, 52, 52, 51, 51, 50, 49, 48, 47, 45, 45, 44, 43, 42, 41, 41, 40, 39, 37, 37, 35, 34, 33, 33, 31, 31, 30, 29, 27, 27, 25, 23, 23, 20, 19, 17, 17, 15, 14, 14, 12, 11, 11, 8, 7, 6, 6, 5, 4, 1, 1, 1)

----Comparison for the 75 example----

***tf from benchmark was 5226(we added the number of machines) and target function from our local search is 5226"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 6))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 76 from 130-----"

"-----START 77 from 130-----"

"input file number 77: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_6.txt"

***Data from file U_1_0500_05_6.txt: machinesNum=5 jobsNum=500"

***SOLUTION Data from file SOL_U_1_05_0500_6.txt: machinesNum=5 jobsNum=500 lowerBound=5153 upperBound=5153 isOptimal=1"

Content of machines summed (5153, 5152, 5152, 5152, 5152)

input selected: size 500 sum 25761

----Our Results-----

best from Our local search found:

target function = 5158, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:5153, content= (99, 98, 97, 97, 95, 95, 94, 92, 92, 90, 89, 87, 87, 85, 84, 84, 82, 82, 80, 80, 79, 79, 78, 78, 77, 76, 75, 75, 73, 73, 72, 71, 70, 69, 68, 68, 66, 65, 64, 63, 63, 61, 60, 59, 58, 58, 57, 56, 55, 55, 54, 53, 51, 50, 50, 48, 47, 46, 45, 43, 42, 41, 41, 39, 38, 36, 36, 35, 34, 32, 32, 31, 30, 30, 29, 27, 25, 24, 23, 22, 22, 19, 19, 17, 17, 14, 13, 12, 11, 10, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1)

bucket2 sum:5152, content= (99, 98, 97, 97, 95, 95, 93, 93, 91, 91, 88, 88, 86, 86, 84, 84, 82, 82, 80, 80, 79, 79, 78, 78, 77, 76, 75, 74, 74, 73, 72, 71, 70, 69, 68, 68, 66, 65, 64, 63, 62, 62, 60, 59, 58, 57, 57, 56, 56, 55, 54, 53, 51, 50, 49, 49, 47, 46, 44, 44, 42, 41, 41, 38, 38, 37, 36, 35, 33, 33, 32, 31, 30, 30, 29, 26, 26, 24, 23, 22, 21, 20, 19, 17, 15, 15, 13, 13, 11, 10, 10, 9, 8, 7, 6, 5, 3, 3, 2, 1)

bucket3 sum:5152, content= (99, 98, 97, 96, 96, 95, 93, 93, 91, 90, 89, 88, 86, 85, 85, 84, 82, 81, 81, 80, 79, 79, 78, 77, 77, 77, 75, 74, 74, 72, 72, 71, 71, 69, 68, 67, 67, 65, 64, 63, 62, 62, 60, 59, 58, 57, 57, 56, 56, 55, 54, 52, 52, 50, 49, 48, 48, 46, 44, 43, 43, 41, 40, 40, 37, 37, 36, 35, 33, 33, 31, 31, 31, 30, 29, 26, 25, 25, 23, 22, 21, 20, 18, 18, 15, 14, 14, 12, 12, 10, 9, 9, 8, 8, 6, 4, 4, 3, 2, 1)

bucket4 sum:5152, content= (99, 98, 97, 96, 96, 94, 94, 93, 91, 90, 89, 87, 87, 85, 84, 84, 83, 81, 80, 80, 80, 79, 78, 77, 77, 77, 75, 74, 74, 72, 72, 71, 70, 69, 69, 67, 66, 66, 64, 63, 62, 61, 61, 59, 58, 57, 57, 56, 56, 54, 54, 53, 52, 50, 49, 48, 48, 45, 45, 43, 43, 41, 40, 40, 37, 37, 35, 35, 34, 33, 31, 31, 31, 30, 28, 28, 25, 24, 23, 22, 21, 20, 18, 17, 17, 14, 13, 12, 11, 10, 10, 9, 8, 7, 7, 4, 4, 3, 2, 1)

bucket5 sum:5152, content= (98, 98, 98, 96, 96, 94, 94, 93, 91, 89, 89, 88, 87, 85, 84, 84, 83, 81, 80, 80, 79, 79, 78, 78, 77, 76, 76, 74, 73, 73, 72, 71, 69, 69, 69, 68, 66, 65, 64, 63, 63, 61, 60, 59, 58, 58, 57, 56, 55, 55, 54, 53, 51, 50, 50, 48, 47, 47, 44, 43, 42, 42, 40, 40, 37, 36, 36, 35, 34, 32, 32, 31, 31, 30, 28, 28, 25, 24, 23, 22, 21, 20, 18, 17, 17, 14, 13, 12, 11, 10, 10, 9, 8, 7, 7, 4, 4, 3, 2, 1)

"----Comparison for the 76 example----

***tf from benchmark was 5158(we added the number of machines) and target function from our local search is 5158"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 7))

```

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 77 from 130-----"
"-----START 78 from 130-----"
"input file number 78: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_7.txt"
"***Data from file U_1_0500_05_7.txt: machinesNum=5 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_05_0500_7.txt: machinesNum=5 jobsNum=500 lowerBound=4841 upperBound=4841 isOptimal=1"
Content of machines summed (4841, 4841, 4841, 4840, 4840)
input selected: size 500 sum 24203

```

----Our Results-----

best from Our local search found:

target function = 4846, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4841, content= (99, 96, 96, 95, 94, 93, 91, 90, 90, 88, 86, 86, 84, 84, 82, 81, 80, 80, 79, 78, 77, 76, 74, 74, 73, 71, 71, 70, 69, 68, 67, 66, 65, 64, 63, 61, 60, 60, 58, 57, 56, 55, 55, 54, 54, 52, 52, 50, 50, 49, 49, 48, 48, 46, 45, 44, 44, 42, 41, 40, 40, 38, 37, 35, 35, 34, 34, 32, 31, 29, 28, 27, 26, 25, 24, 22, 20, 19, 19, 18, 17, 16, 16, 16, 15, 14, 13, 13, 11, 11, 9, 9, 8, 7, 6, 6, 5, 3, 2, 1)

bucket2 sum:4841, content= (98, 97, 96, 94, 94, 94, 91, 90, 89, 89, 86, 86, 84, 84, 82, 81, 80, 79, 79, 79, 77, 76, 74, 74, 73, 71, 71, 70, 69, 68, 67, 66, 65, 64, 62, 62, 60, 60, 57, 57, 56, 56, 55, 54, 54, 52, 51, 51, 50, 49, 49, 48, 47, 47, 45, 44, 43, 43, 41, 40, 40, 38, 36, 36, 35, 34, 33, 33, 31, 29, 28, 27, 26, 25, 24, 21, 21, 19, 19, 18, 17, 16, 16, 16, 15, 14, 13, 13, 11, 11, 9, 9, 8, 7, 6, 6, 5, 3, 2, 1)

bucket3 sum:4841, content= (98, 97, 95, 95, 94, 94, 91, 90, 89, 89, 86, 85, 85, 83, 83, 81, 80, 79, 79, 78, 78, 75, 75, 74, 72, 71, 71, 71, 68, 68, 67, 67, 65, 64, 62, 62, 60, 60, 57, 57, 56, 55, 55, 54, 54, 53, 51, 51, 50, 49, 49, 48, 47, 46, 46, 44, 43, 42, 42, 40, 39, 39, 36, 36, 35, 34, 33, 32, 31, 30, 28, 26, 26, 26, 23, 22, 21, 19, 19, 18, 17, 16, 16, 16, 14, 14, 14, 12, 12, 11, 9, 9, 8, 7, 6, 6, 4, 3, 2, 2)

bucket4 sum:4841, content= (98, 97, 95, 95, 94, 93, 92, 90, 89, 88, 87, 85, 84, 84, 82, 82, 80, 79, 79, 78, 78, 75, 75, 73, 73, 71, 71, 70, 70, 68, 67, 66, 65, 63, 63, 61, 61, 59, 58, 57, 56, 55, 55, 54, 54, 53, 51, 51, 50, 49, 49, 48, 47, 46, 46, 44, 43, 42, 42, 40, 39, 37, 37, 36, 35, 35, 33, 32, 31, 29, 29, 26, 26, 25, 25, 21, 20, 19, 19, 19, 17, 16, 16, 15, 15, 14, 14, 12, 12, 10, 10, 9, 7, 7, 7, 6, 4, 3, 2, 1, 1)

bucket5 sum:4839, content= (97, 97, 96, 95, 94, 92, 92, 91, 89, 88, 87, 85, 84, 84, 82, 81, 80, 80, 79, 78, 77, 76, 74, 74, 73, 71, 71, 70, 70, 68, 67, 66, 64, 64, 63, 61, 61, 59, 58, 57, 56, 55, 55, 54, 54, 53, 51, 50, 50, 50, 48, 48, 48, 46, 45, 44, 44, 42, 41, 41, 39, 37, 37, 36, 35, 34, 34, 32, 31, 29, 28, 27, 26, 25, 22, 22, 21, 20, 19, 18, 17, 17, 16, 15, 15, 14, 13, 13, 11, 11, 10, 8, 8, 7, 6, 6, 6, 2, 2)

"----Comparison for the 77 example----

"***tf from benchmark was 4846(we added the number of machines) and target function from our local search is 4846"

***RESULT IS THE SAME

Run time: 0.015 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 8))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 78 from 130-----"

"-----START 79 from 130-----"

"input file number 79: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_8.txt"

***Data from file U_1_0500_05_8.txt: machinesNum=5 jobsNum=500"

***SOLUTION Data from file SOL_U_1_05_0500_8.txt: machinesNum=5 jobsNum=500 lowerBound=4918 upperBound=4918 isOptimal=1"

Content of machines summed (4918, 4918, 4918, 4918, 4917)

input selected: size 500 sum 24589

----Our Results-----

best from Our local search found:

target function = 4923, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4918, content= (99, 99, 98, 97, 96, 94, 94, 92, 92, 90, 90, 89, 89, 88, 87, 86, 85, 82, 82, 82, 79, 78, 77, 76, 75, 75, 73, 73, 71, 70, 69, 67, 65, 64, 63, 63, 62, 60, 60, 58, 58, 57, 54, 54, 53, 53, 52, 50, 50, 50, 49, 48, 46, 45, 45, 44, 43, 41, 40, 40, 38, 37, 37, 36, 35, 35, 33, 32, 31, 29, 29, 27, 27, 26, 25, 23, 22, 21, 20, 19, 19, 17, 16, 14, 13, 12, 10, 10, 9, 9, 7, 7, 6, 6, 6, 4, 4, 3, 2, 1)

bucket2 sum:4918, content= (99, 99, 98, 97, 96, 94, 94, 92, 92, 90, 90, 89, 88, 88, 87, 87, 84, 83, 82, 81, 79, 78, 77, 77, 75, 75, 73, 72, 72, 70, 68, 68, 65, 64, 63, 63, 61, 61, 60, 58, 58, 57, 54, 54, 53, 53, 51, 51, 50, 50, 49, 47, 47, 45, 45, 44, 42, 42, 40, 40, 38, 37, 37, 36, 35, 34, 34, 31, 31, 30, 29, 27, 27, 26, 25, 23, 22, 21, 20, 19, 19, 17, 16, 13, 13, 12, 11, 10, 9, 9, 7, 7, 6, 6, 6, 4, 4, 3, 2, 1)

bucket3 sum:4918, content= (99, 99, 98, 97, 96, 94, 94, 92, 91, 91, 90, 89, 88, 88, 87, 86, 85, 83, 82, 81, 79, 78, 77, 76, 76, 75, 73, 72, 72, 70, 68, 68, 65, 64, 63, 63, 61, 61, 59, 59, 58, 56, 55, 54, 53, 53, 51, 51, 50, 50, 49, 47, 46, 46, 44, 44, 43, 42, 40, 39, 39, 37, 36, 36, 36, 34, 33, 32, 31, 30, 28, 28, 27, 26, 24, 24, 22, 21, 20, 19, 18, 18, 15, 14, 13, 12, 11, 10, 9, 8, 8, 7, 6, 6, 5, 5, 3, 3, 3, 1)

bucket4 sum:4918, content= (99, 98, 98, 98, 95, 95, 93, 93, 91, 91, 89, 89, 89, 88, 87, 86, 85, 83, 82, 80, 79, 78, 78, 76, 76, 74, 74, 72, 71, 71, 68, 66, 65, 64, 64, 63, 63, 60, 59, 59, 58, 56, 55, 54, 53, 52, 52, 51, 50, 50, 48, 48, 46, 46, 44, 44, 43, 41, 41, 39, 39, 37, 36, 36, 35, 35, 33, 32, 31, 30, 28, 28, 27, 25, 25, 23, 23, 20, 20, 20, 18, 18, 14, 14, 13, 12, 11, 10, 10, 8, 7, 7, 6, 6, 6, 5, 3, 3, 3, 1)

bucket5 sum:4917, content=(99, 98, 98, 97, 97, 94, 93, 93, 91, 91, 89, 89, 89, 88, 87, 86, 85, 83, 82, 79, 79, 79, 78, 76, 76, 74, 74, 72, 71, 70, 69, 65, 65, 64, 64, 63, 63, 60, 60, 59, 58, 55, 55, 54, 54, 52, 52, 50, 50, 50, 50, 47, 46, 46, 44, 44, 43, 41, 40, 40, 39, 37, 36, 36, 35, 35, 33, 32, 31, 30, 28, 28, 26, 26, 25, 23, 23, 20, 20, 20, 18, 18, 14, 14, 13, 12, 11, 10, 10, 8, 7, 7, 6, 6, 6, 4, 4, 3, 2, 1)

"----Comparison for the 78 example----

****tf from benchmark was 4923(we added the number of machines) and target function from our local search is 4923"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 9))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 79 from 130-----"

"-----START 80 from 130-----"

"input file number 80: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_05_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_0500_9.txt"

****Data from file U_1_0500_05_9.txt: machinesNum=5 jobsNum=500"

****SOLUTION Data from file SOL_U_1_05_0500_9.txt: machinesNum=5 jobsNum=500 lowerBound=5004 upperBound=5004 isOptimal=1"

Content of machines summed (5004, 5004, 5004, 5004, 5004)

input selected: size 500 sum 25020

----Our Results-----

best from Our local search found:

target function = 5009, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:5004, content=(99, 98, 97, 97, 96, 94, 94, 93, 92, 91, 91, 89, 88, 86, 86, 86, 83, 83, 82, 81, 81, 80, 80, 78, 77, 75, 74, 74, 72, 72, 71, 69, 69, 67, 66, 65, 63, 62, 61, 59, 58, 58, 56, 55, 54, 53, 51, 49, 49, 48, 48, 47, 46, 45, 44, 43, 42, 40, 40, 40, 39, 39, 38, 37, 35, 35, 33, 33, 31, 31, 29, 29, 28, 26, 26, 25, 23, 23, 22, 21, 20, 19, 19, 18, 16, 15, 15, 15, 12, 11, 10, 9, 8, 7, 6, 5, 3, 3, 3)

bucket2 sum:5004, content=(99, 98, 97, 97, 95, 95, 94, 93, 92, 91, 90, 90, 88, 86, 86, 85, 83, 83, 82, 82, 81, 80, 80, 78, 76, 75, 75, 73, 73, 72, 70, 70, 68, 68, 66, 65, 63, 62, 61, 59, 58, 58, 56, 55, 54, 52, 51, 50, 49, 48, 48, 47, 46, 45, 44, 43, 41, 41, 40, 40, 39, 39, 38, 36, 36, 35, 33, 33, 31, 30, 30, 29, 27, 27, 26, 24, 24, 23, 22, 21, 20, 19, 18, 18, 17, 15, 15, 14, 12, 12, 10, 9, 8, 7, 6, 5, 3, 3, 2, 1)

bucket3 sum:5004, content=(99, 98, 97, 97, 95, 95, 94, 92, 92, 92, 90, 90, 87, 87, 86, 84, 84, 83, 82, 82, 81, 80, 79, 79, 76, 75, 75, 73, 73, 71, 71, 70, 68, 68, 66, 64, 64, 62, 60, 60, 58, 57, 56, 55, 55, 52, 51, 50, 49, 48, 48, 47, 46, 45, 44, 42, 42, 41, 40, 40, 39, 38, 38, 37, 36, 34, 34, 32, 32, 30, 30, 29, 27, 27, 25, 25, 24, 23, 22, 20, 20, 20, 18, 18, 17, 15, 15, 14, 12, 12, 10, 9, 8, 7, 6, 4, 4, 3, 2, 1)

```

bucket4 sum:5004, content= (99, 98, 97, 96, 96, 95, 94, 92, 92, 92, 90, 89, 88, 87, 86, 84, 84, 83, 82, 81, 81, 81, 79, 77, 77, 76, 75, 73, 73, 71,
71, 69, 69, 67, 67, 64, 63, 62, 62, 59, 58, 57, 56, 55, 55, 52, 51, 50, 49, 48, 48, 47, 46, 44, 44, 43, 42, 41, 40, 40, 39, 38, 38, 37, 35, 35, 34, 32,
31, 31, 30, 28, 28, 27, 25, 25, 24, 22, 22, 21, 20, 20, 18, 18, 17, 15, 15, 13, 13, 12, 9, 9, 9, 7, 6, 4, 4, 3, 2, 1)
bucket5 sum:5004, content= (98, 98, 98, 96, 96, 94, 94, 93, 92, 92, 90, 89, 88, 87, 86, 84, 83, 83, 82, 82, 81, 81, 79, 77, 77, 76, 75, 73, 72, 72,
71, 69, 69, 67, 66, 66, 62, 62, 60, 60, 59, 57, 56, 55, 54, 53, 51, 49, 49, 49, 47, 47, 46, 46, 43, 43, 42, 41, 40, 40, 39, 38, 38, 37, 35, 35, 34, 32,
31, 31, 29, 29, 28, 26, 26, 25, 23, 23, 22, 21, 20, 19, 19, 18, 16, 16, 15, 13, 13, 11, 11, 9, 8, 7, 6, 4, 4, 3, 1, 1, 1)
"----Comparison for the 79 example----"
"***tf from benchmark was 5009(we added the number of machines) and target function from our local search is 5009"
***RESULT IS THE SAME
Run time: 0 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 10))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 80 from 130-----"
"-----START 81 from 130-----"
"input file number 81: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_0.txt"
"***Data from file U_1_0500_10_0.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_10_0500_0.txt: machinesNum=10 jobsNum=500 lowerBound=2520 upperBound=2520
isOptimal=1"
Content of machines summed (2520, 2520, 2520, 2520, 2520, 2520, 2520, 2520, 2520, 2517)
input selected: size 500 sum 25197

```

----Our Results-----

best from Our local search found:

target function = 2530, num of machines=10, square root lms=0

machines content(number of jobs=500):

```

bucket1 sum:2520, content= (98, 97, 95, 93, 89, 88, 86, 84, 83, 81, 80, 79, 75, 74, 73, 70, 67, 65, 64, 62, 60, 57, 55, 55, 51, 49, 48, 44, 42, 42,
38, 37, 34, 33, 30, 28, 27, 25, 24, 21, 21, 19, 18, 16, 14, 12, 8, 5, 3, 1)
bucket2 sum:2520, content= (98, 97, 95, 92, 90, 88, 86, 84, 83, 81, 80, 79, 75, 74, 72, 71, 67, 65, 64, 62, 59, 58, 55, 55, 51, 49, 48, 44, 42, 42,
38, 37, 34, 33, 30, 28, 27, 25, 23, 22, 20, 20, 18, 16, 14, 12, 8, 5, 3, 1)

```

bucket3 sum:2520, content= (98, 97, 95, 92, 90, 88, 85, 85, 82, 82, 80, 79, 75, 74, 72, 71, 67, 65, 64, 62, 59, 58, 55, 54, 51, 50, 48, 44, 42, 40, 40, 36, 35, 33, 30, 28, 27, 25, 23, 22, 20, 20, 17, 17, 13, 13, 7, 5, 4, 1)

bucket4 sum:2520, content= (98, 97, 95, 92, 90, 88, 85, 84, 83, 82, 80, 78, 76, 74, 72, 70, 68, 65, 64, 62, 59, 58, 55, 53, 52, 50, 47, 44, 43, 40, 40, 36, 35, 33, 30, 28, 26, 26, 23, 22, 20, 20, 17, 16, 14, 12, 9, 5, 3, 1)

bucket5 sum:2520, content= (98, 96, 96, 91, 91, 87, 86, 84, 83, 82, 80, 78, 75, 75, 72, 70, 66, 66, 65, 61, 60, 58, 55, 53, 52, 50, 47, 44, 43, 40, 40, 36, 35, 32, 31, 28, 26, 26, 22, 22, 21, 20, 17, 15, 15, 11, 10, 4, 3, 2)

bucket6 sum:2520, content= (98, 96, 94, 93, 91, 87, 86, 84, 83, 81, 81, 78, 75, 73, 73, 72, 66, 66, 64, 61, 60, 58, 55, 53, 52, 50, 47, 44, 43, 40, 40, 36, 34, 34, 29, 29, 26, 26, 22, 22, 21, 19, 18, 15, 15, 11, 9, 5, 3, 2)

bucket7 sum:2520, content= (98, 96, 94, 93, 91, 87, 86, 83, 83, 82, 81, 77, 76, 73, 73, 72, 66, 66, 63, 63, 59, 57, 56, 53, 51, 51, 46, 45, 43, 40, 40, 36, 34, 32, 31, 29, 26, 25, 24, 21, 21, 19, 18, 15, 15, 11, 7, 5, 4, 3)

bucket8 sum:2520, content= (98, 96, 94, 93, 89, 89, 86, 83, 83, 82, 81, 77, 76, 73, 73, 72, 66, 66, 63, 61, 60, 59, 55, 53, 51, 51, 46, 45, 43, 40, 39, 38, 34, 32, 29, 29, 28, 24, 24, 21, 21, 19, 18, 15, 15, 11, 7, 5, 4, 3)

bucket9 sum:2520, content= (98, 96, 94, 93, 89, 88, 87, 83, 83, 82, 81, 76, 76, 75, 73, 69, 68, 66, 63, 61, 60, 56, 56, 55, 51, 50, 49, 44, 42, 40, 39, 36, 35, 32, 31, 29, 26, 24, 24, 22, 21, 19, 18, 15, 15, 11, 6, 6, 4, 2, 1)

bucket10 sum:2517, content= (98, 96, 94, 93, 89, 88, 86, 85, 83, 81, 80, 79, 75, 73, 73, 69, 69, 65, 63, 63, 60, 56, 56, 55, 51, 49, 46, 45, 44, 40, 39, 35, 35, 34, 29, 29, 26, 26, 24, 21, 21, 18, 18, 17, 14, 11, 6, 6, 4)

"----Comparison for the 80 example----"

****tf from benchmark was 2530(we added the number of machines) and target function from our local search is 2530"

***RESULT IS THE SAME

Run time: 0.021 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 11))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 81 from 130-----"

"-----START 82 from 130-----"

"input file number 82: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_1.txt and solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_1.txt"

****Data from file U_1_0500_10_1.txt: machinesNum=10 jobsNum=500"

****SOLUTION Data from file SOL_U_1_10_0500_1.txt: machinesNum=10 jobsNum=500 lowerBound=2451 upperBound=2451 isOptimal=1"

Content of machines summed (2451, 2451, 2451, 2451, 2451, 2451, 2451, 2451, 2451, 2448)

input selected: size 500 sum 24507

----Our Results-----

best from Our local search found:

target function = 2461, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:2451, content= (98, 96, 93, 91, 90, 88, 86, 84, 84, 80, 78, 76, 74, 72, 71, 67, 65, 63, 62, 60, 58, 56, 54, 52, 50, 48, 47, 45, 43, 42, 40, 36, 34, 32, 30, 27, 25, 24, 22, 20, 18, 15, 13, 11, 9, 7, 5, 4, 3, 3)

bucket2 sum:2450, content= (99, 96, 93, 91, 90, 88, 86, 84, 83, 81, 78, 76, 74, 72, 71, 66, 65, 64, 62, 60, 58, 56, 53, 53, 50, 48, 47, 45, 43, 42, 39, 37, 34, 32, 30, 26, 26, 24, 22, 20, 18, 15, 13, 11, 9, 7, 5, 4, 3, 1)

bucket3 sum:2451, content= (99, 97, 93, 91, 90, 88, 86, 84, 83, 81, 78, 76, 74, 72, 71, 66, 65, 64, 61, 61, 57, 57, 53, 53, 50, 48, 47, 45, 43, 42, 39, 37, 34, 32, 30, 26, 26, 24, 22, 20, 18, 15, 13, 11, 9, 6, 6, 4, 3, 1)

bucket4 sum:2450, content= (98, 97, 93, 91, 90, 88, 86, 84, 83, 81, 78, 75, 74, 73, 70, 68, 64, 63, 62, 61, 57, 57, 53, 52, 51, 48, 47, 45, 43, 42, 39, 36, 35, 31, 31, 26, 26, 24, 22, 20, 18, 15, 13, 10, 10, 6, 5, 5, 3, 1)

bucket5 sum:2450, content= (98, 95, 95, 91, 89, 89, 86, 84, 83, 80, 79, 75, 74, 73, 70, 68, 64, 63, 62, 60, 59, 56, 53, 52, 51, 48, 47, 44, 44, 42, 39, 36, 35, 31, 31, 26, 25, 25, 21, 21, 18, 14, 13, 11, 10, 6, 5, 5, 3, 1)

bucket6 sum:2451, content= (98, 95, 94, 92, 89, 89, 86, 84, 83, 80, 79, 75, 74, 73, 70, 68, 64, 63, 62, 60, 59, 56, 53, 52, 51, 48, 47, 44, 44, 42, 39, 36, 34, 33, 30, 26, 25, 25, 21, 21, 17, 16, 13, 10, 8, 7, 6, 5, 3, 2)

bucket7 sum:2451, content= (98, 95, 94, 92, 89, 88, 86, 85, 82, 82, 77, 77, 73, 73, 69, 69, 64, 63, 62, 60, 59, 55, 54, 52, 51, 48, 46, 46, 43, 41, 40, 35, 35, 31, 31, 27, 25, 24, 22, 20, 19, 14, 13, 11, 8, 7, 6, 4, 4, 2)

bucket8 sum:2451, content= (98, 95, 94, 91, 90, 87, 87, 85, 82, 80, 79, 77, 73, 73, 69, 66, 66, 64, 62, 60, 59, 55, 54, 51, 51, 50, 46, 44, 43, 43, 38, 38, 34, 31, 29, 28, 25, 23, 23, 19, 19, 16, 12, 11, 8, 7, 6, 4, 4, 2)

bucket9 sum:2451, content= (97, 97, 93, 91, 90, 87, 87, 85, 82, 80, 79, 75, 75, 73, 69, 66, 65, 64, 63, 60, 59, 55, 54, 51, 51, 50, 46, 44, 43, 41, 40, 35, 35, 33, 29, 27, 26, 23, 22, 21, 19, 13, 13, 12, 8, 7, 6, 4, 4, 2)

bucket10 sum:2451, content= (97, 97, 92, 92, 90, 87, 87, 84, 84, 79, 79, 75, 75, 72, 71, 66, 65, 64, 62, 59, 59, 57, 53, 51, 51, 48, 47, 44, 44, 40, 40, 38, 33, 33, 28, 28, 26, 23, 22, 21, 17, 17, 12, 11, 8, 7, 6, 4, 4, 2)

"----Comparison for the 81 example----

****tf from benchmark was 2461(we added the number of machines) and target function from our local search is 2461"

***RESULT IS THE SAME

Run time: 0.931 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 12))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

```
"-----END 82 from 130-----"
"-----START 83 from 130-----"
"input file number 83: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_2.txt"
"***Data from file U_1_0500_10_2.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_10_0500_2.txt: machinesNum=10 jobsNum=500 lowerBound=2538 upperBound=2538
isOptimal=1"
Content of machines summed (2538, 2538, 2538, 2538, 2538, 2538, 2538, 2538, 2537, 2537)
input selected: size 500 sum 25378
```

----Our Results-----

best from Our local search found:

target function = 2548, num of machines=10, square root lms=0

machines content(number of jobs=500):

```
bucket1 sum:2538, content= (99, 99, 96, 94, 92, 89, 88, 86, 83, 80, 80, 78, 76, 74, 71, 70, 69, 66, 64, 62, 61, 58, 57, 53, 53, 50, 48, 45, 44, 43,
41, 39, 37, 34, 32, 30, 28, 25, 23, 23, 18, 17, 15, 13, 11, 9, 7, 4, 3, 1)
bucket2 sum:2538, content= (99, 98, 97, 94, 92, 89, 88, 86, 83, 80, 80, 77, 77, 73, 72, 70, 69, 66, 64, 62, 61, 58, 57, 53, 53, 50, 47, 46, 44, 43,
41, 39, 37, 34, 32, 30, 27, 26, 23, 22, 18, 18, 15, 13, 11, 9, 6, 5, 3, 1)
bucket3 sum:2538, content= (99, 98, 97, 94, 91, 90, 88, 85, 83, 82, 79, 77, 76, 74, 72, 70, 69, 66, 64, 62, 61, 58, 56, 54, 53, 50, 47, 46, 44, 43,
41, 39, 37, 33, 33, 30, 27, 26, 23, 22, 18, 18, 15, 13, 10, 10, 6, 5, 2, 2)
bucket4 sum:2538, content= (99, 98, 96, 95, 91, 90, 87, 87, 82, 82, 79, 77, 76, 74, 72, 70, 68, 67, 63, 63, 61, 58, 55, 55, 53, 50, 47, 46, 44, 43,
41, 38, 38, 33, 33, 29, 28, 26, 23, 21, 19, 18, 15, 12, 11, 10, 6, 5, 2, 2)
bucket5 sum:2538, content= (99, 98, 96, 95, 91, 89, 88, 87, 82, 82, 79, 77, 76, 74, 72, 70, 68, 67, 63, 63, 60, 59, 55, 55, 52, 51, 47, 45, 45, 42,
42, 38, 37, 34, 32, 31, 27, 25, 24, 21, 19, 17, 16, 12, 11, 8, 7, 6, 2, 1, 1)
bucket6 sum:2538, content= (99, 98, 96, 95, 90, 90, 88, 85, 84, 80, 80, 78, 76, 74, 71, 71, 68, 67, 63, 63, 60, 59, 55, 55, 52, 50, 48, 45, 45, 42,
42, 38, 36, 35, 32, 29, 28, 27, 23, 21, 19, 17, 14, 14, 11, 8, 7, 5, 4, 1)
bucket7 sum:2538, content= (99, 97, 97, 94, 92, 89, 88, 85, 84, 80, 80, 78, 75, 75, 71, 71, 68, 66, 64, 63, 59, 59, 57, 54, 52, 50, 48, 45, 45, 42,
41, 40, 36, 34, 32, 29, 28, 25, 25, 21, 19, 17, 14, 14, 11, 8, 7, 5, 4, 1)
bucket8 sum:2538, content= (99, 97, 97, 93, 93, 89, 88, 85, 83, 82, 79, 78, 75, 75, 71, 71, 68, 65, 65, 62, 61, 58, 57, 54, 52, 49, 48, 46, 44, 43,
40, 40, 36, 35, 31, 31, 28, 25, 24, 20, 20, 17, 14, 13, 11, 10, 7, 5, 2, 1, 1)
bucket9 sum:2537, content= (99, 97, 97, 93, 92, 90, 88, 85, 83, 82, 79, 78, 75, 75, 71, 71, 67, 67, 64, 62, 61, 58, 57, 54, 52, 49, 48, 46, 44, 43,
40, 40, 36, 34, 33, 28, 28, 27, 24, 20, 20, 16, 16, 13, 11, 7, 7, 6, 4)
```

bucket10 sum:2537, content= (99, 97, 97, 93, 92, 90, 88, 84, 84, 82, 79, 78, 75, 74, 73, 69, 69, 65, 65, 61, 61, 59, 57, 54, 51, 51, 48, 45, 43, 43, 42, 40, 36, 34, 31, 31, 28, 25, 24, 20, 20, 16, 16, 13, 11, 7, 7, 6, 4)

"----Comparison for the 82 example----"

***tf from benchmark was 2548(we added the number of machines) and target function from our local search is 2548"

***RESULT IS THE SAME

Run time: 0.015 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 13))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 83 from 130-----"

"-----START 84 from 130-----"

"input file number 84: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_3.txt"

***Data from file U_1_0500_10_3.txt: machinesNum=10 jobsNum=500"

***SOLUTION Data from file SOL_U_1_10_0500_3.txt: machinesNum=10 jobsNum=500 lowerBound=2392 upperBound=2392
isOptimal=1"

Content of machines summed (2392, 2392, 2392, 2392, 2392, 2392, 2392, 2392, 2392, 2392)

input selected: size 500 sum 23920

----Our Results-----

best from Our local search found:

target function = 2402, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:2392, content= (98, 97, 95, 93, 91, 90, 87, 84, 84, 80, 79, 76, 73, 71, 68, 68, 64, 62, 59, 57, 56, 53, 51, 50, 45, 45, 43, 39, 39, 36, 35, 33, 33, 29, 27, 26, 24, 22, 21, 19, 16, 15, 13, 12, 10, 10, 5, 4, 3, 2)

bucket2 sum:2392, content= (99, 97, 95, 93, 91, 89, 87, 85, 83, 81, 79, 75, 74, 71, 68, 68, 64, 62, 59, 57, 55, 53, 52, 49, 46, 45, 43, 39, 39, 36, 35, 33, 32, 30, 27, 26, 24, 22, 20, 20, 16, 15, 13, 12, 10, 10, 5, 4, 3, 1)

bucket3 sum:2392, content= (99, 97, 95, 93, 91, 89, 87, 85, 82, 81, 80, 75, 73, 71, 69, 68, 64, 61, 60, 57, 55, 53, 52, 48, 47, 45, 42, 40, 39, 36, 35, 33, 32, 30, 27, 26, 24, 22, 20, 20, 16, 15, 13, 12, 10, 9, 6, 4, 3, 1)

bucket4 sum:2392, content= (99, 97, 95, 92, 92, 89, 87, 85, 82, 81, 79, 77, 73, 70, 69, 68, 63, 63, 59, 57, 55, 53, 52, 48, 47, 45, 42, 40, 38, 37, 35, 33, 31, 31, 27, 25, 25, 22, 20, 19, 16, 15, 14, 12, 10, 9, 6, 4, 3, 1)

```

bucket5 sum:2392, content= (98, 98, 94, 93, 92, 88, 87, 85, 84, 80, 78, 78, 73, 70, 69, 67, 65, 61, 59, 58, 55, 53, 52, 48, 47, 44, 44, 39, 38, 37,
34, 34, 31, 30, 28, 25, 25, 22, 20, 19, 16, 15, 14, 12, 10, 8, 6, 5, 3, 1)
bucket6 sum:2392, content= (98, 97, 96, 92, 91, 91, 87, 84, 82, 81, 78, 78, 73, 70, 69, 67, 65, 61, 59, 58, 54, 54, 52, 48, 47, 44, 44, 39, 38, 37,
34, 34, 31, 30, 28, 25, 24, 23, 20, 19, 16, 15, 14, 11, 11, 8, 6, 5, 3, 1)
bucket7 sum:2392, content= (98, 97, 94, 93, 92, 88, 88, 85, 84, 80, 78, 77, 72, 72, 69, 66, 66, 61, 58, 58, 56, 53, 51, 50, 46, 44, 42, 41, 38, 36,
35, 34, 31, 30, 28, 25, 24, 22, 21, 18, 17, 15, 14, 11, 11, 8, 6, 5, 3, 1)
bucket8 sum:2392, content= (98, 97, 94, 93, 92, 88, 88, 85, 84, 80, 78, 75, 74, 72, 68, 68, 65, 60, 60, 58, 54, 53, 52, 50, 46, 44, 42, 41, 37, 37,
35, 34, 31, 29, 29, 25, 24, 22, 21, 18, 17, 15, 13, 12, 11, 7, 7, 4, 4, 1)
bucket9 sum:2392, content= (98, 97, 93, 93, 92, 91, 87, 85, 81, 81, 80, 75, 74, 71, 68, 68, 65, 60, 60, 57, 56, 53, 50, 50, 46, 45, 42, 41, 37, 37,
35, 34, 31, 29, 28, 26, 23, 23, 21, 18, 16, 16, 13, 12, 11, 7, 7, 4, 3, 2)
bucket10 sum:2392, content= (99, 96, 96, 93, 91, 88, 87, 86, 84, 80, 78, 74, 74, 72, 70, 66, 65, 63, 58, 57, 56, 53, 50, 50, 46, 45, 41, 41, 39, 36,
35, 34, 31, 29, 26, 26, 25, 23, 21, 17, 17, 15, 14, 12, 11, 7, 6, 5, 2, 2)
"----Comparison for the 83 example----"
"***tf from benchmark was 2402(we added the number of machines) and target function from our local search is 2402"
***RESULT IS THE SAME
Run time: 0.922 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 14))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 84 from 130-----"
"-----START 85 from 130-----"
"input file number 85: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_4.txt"
"***Data from file U_1_0500_10_4.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_10_0500_4.txt: machinesNum=10 jobsNum=500 lowerBound=2505 upperBound=2505
isOptimal=1"
Content of machines summed (2505, 2504, 2505, 2504, 2504, 2504, 2504, 2504, 2504, 2503)
input selected: size 500 sum 25041

----Our Results-----
best from Our local search found:
target function = 2515, num of machines=10, square root lms=0

```

machines content(number of jobs=500):

bucket1 sum:2505, content= (99, 98, 96, 94, 92, 91, 89, 87, 84, 84, 79, 78, 75, 72, 70, 68, 66, 64, 63, 60, 59, 57, 55, 51, 51, 49, 47, 45, 43, 41, 39, 36, 35, 31, 29, 29, 24, 22, 22, 20, 19, 16, 16, 14, 14, 11, 8, 7, 4, 2)
bucket2 sum:2505, content= (99, 98, 96, 94, 92, 91, 89, 87, 84, 83, 80, 78, 75, 72, 70, 67, 67, 64, 63, 60, 59, 56, 56, 51, 51, 49, 47, 45, 43, 41, 38, 37, 35, 31, 29, 27, 25, 23, 22, 20, 19, 16, 16, 14, 14, 11, 8, 7, 4, 1, 1)
bucket3 sum:2504, content= (99, 97, 97, 94, 92, 90, 90, 86, 85, 82, 80, 79, 75, 71, 71, 67, 67, 64, 63, 60, 58, 57, 54, 53, 51, 49, 47, 45, 43, 41, 38, 37, 34, 32, 29, 27, 25, 23, 22, 20, 19, 16, 16, 14, 14, 11, 8, 6, 5, 1)
bucket4 sum:2504, content= (99, 97, 96, 94, 92, 91, 90, 86, 85, 82, 80, 79, 75, 71, 71, 67, 67, 64, 62, 61, 58, 57, 54, 53, 50, 50, 47, 45, 42, 42, 38, 37, 34, 32, 29, 27, 25, 23, 21, 21, 18, 17, 15, 15, 13, 12, 8, 5, 5, 2)
bucket5 sum:2504, content= (99, 97, 96, 94, 92, 91, 90, 86, 85, 82, 80, 78, 76, 71, 70, 68, 66, 65, 62, 61, 58, 57, 54, 53, 50, 50, 46, 46, 42, 41, 39, 37, 34, 32, 29, 27, 25, 22, 22, 21, 18, 17, 15, 15, 13, 12, 8, 5, 5, 2)
bucket6 sum:2504, content= (99, 97, 95, 95, 92, 91, 90, 86, 85, 82, 80, 77, 77, 71, 69, 69, 66, 65, 62, 61, 58, 57, 54, 52, 51, 49, 47, 45, 44, 41, 38, 37, 34, 32, 29, 27, 24, 24, 21, 20, 20, 16, 15, 15, 13, 11, 9, 5, 5, 2)
bucket7 sum:2503, content= (99, 97, 95, 94, 93, 91, 88, 88, 84, 84, 80, 77, 75, 72, 69, 69, 66, 65, 62, 61, 58, 57, 54, 52, 51, 49, 47, 45, 44, 41, 37, 37, 35, 31, 30, 26, 25, 24, 21, 20, 20, 16, 15, 15, 12, 12, 8, 7, 5)
bucket8 sum:2504, content= (98, 98, 95, 94, 93, 91, 88, 87, 86, 81, 81, 77, 74, 74, 69, 69, 66, 65, 62, 60, 60, 56, 54, 52, 51, 49, 47, 44, 44, 40, 40, 37, 34, 31, 30, 26, 25, 22, 22, 21, 18, 17, 16, 14, 14, 10, 9, 7, 4, 2)
bucket9 sum:2504, content= (98, 98, 95, 94, 93, 91, 88, 87, 86, 81, 81, 77, 74, 74, 69, 69, 65, 65, 63, 60, 58, 58, 54, 52, 51, 48, 47, 46, 44, 40, 39, 37, 33, 32, 30, 26, 25, 22, 22, 21, 18, 17, 16, 14, 14, 10, 9, 7, 3, 3)
bucket10 sum:2504, content= (98, 98, 95, 94, 92, 91, 90, 87, 84, 84, 80, 77, 74, 73, 69, 68, 67, 64, 63, 60, 58, 58, 53, 53, 51, 48, 47, 46, 44, 40, 39, 36, 35, 31, 29, 29, 24, 22, 22, 20, 17, 17, 16, 15, 14, 9, 9, 8, 3, 3)

"----Comparison for the 84 example----

"***tf from benchmark was 2515(we added the number of machines) and target function from our local search is 2515"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 15))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 85 from 130-----"

"-----START 86 from 130-----"

"input file number 86: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_5.txt"

****Data from file U_1_0500_10_5.txt: machinesNum=10 jobsNum=500"

****SOLUTION Data from file SOL_U_1_10_0500_5.txt: machinesNum=10 jobsNum=500 lowerBound=2542 upperBound=2542
isOptimal=1"

Content of machines summed (2542, 2542, 2542, 2542, 2542, 2541, 2541, 2541, 2541, 2541)

input selected: size 500 sum 25415

----Our Results-----

best from Our local search found:

target function = 2552, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:2542, content= (99, 96, 94, 93, 93, 90, 90, 87, 87, 85, 83, 82, 77, 76, 74, 71, 71, 66, 64, 62, 59, 58, 55, 55, 52, 51, 47, 44, 40, 40, 38, 36, 35, 32, 31, 29, 27, 26, 23, 20, 18, 18, 15, 14, 12, 10, 7, 6, 4)

bucket2 sum:2542, content= (99, 96, 94, 93, 92, 91, 90, 87, 87, 85, 83, 81, 78, 76, 74, 71, 70, 67, 64, 62, 59, 58, 55, 54, 53, 51, 47, 44, 40, 40, 38, 36, 35, 32, 31, 29, 27, 25, 24, 20, 18, 18, 15, 14, 12, 10, 7, 6, 3, 1)

bucket3 sum:2542, content= (99, 96, 94, 93, 92, 91, 89, 88, 86, 86, 83, 80, 78, 77, 74, 71, 70, 66, 65, 61, 60, 58, 55, 54, 52, 52, 47, 43, 41, 39, 39, 36, 35, 32, 30, 30, 27, 25, 24, 20, 18, 18, 15, 14, 12, 9, 8, 6, 3, 1)

bucket4 sum:2542, content= (98, 97, 94, 93, 92, 91, 89, 88, 86, 86, 83, 80, 78, 77, 73, 72, 70, 66, 65, 61, 60, 57, 56, 54, 52, 50, 49, 43, 41, 39, 39, 36, 34, 33, 30, 29, 28, 25, 22, 21, 19, 18, 15, 14, 12, 8, 8, 7, 3, 1)

bucket5 sum:2542, content= (98, 96, 95, 93, 92, 91, 89, 88, 86, 86, 83, 79, 79, 77, 73, 72, 69, 67, 65, 61, 60, 57, 56, 54, 52, 50, 49, 43, 41, 39, 39, 36, 34, 33, 30, 29, 28, 25, 22, 21, 19, 18, 14, 14, 13, 8, 8, 7, 2, 2)

bucket6 sum:2542, content= (98, 95, 95, 94, 92, 91, 89, 88, 86, 86, 83, 79, 79, 77, 73, 72, 69, 67, 65, 61, 60, 57, 56, 54, 52, 50, 48, 44, 41, 39, 39, 36, 34, 33, 30, 29, 28, 25, 22, 21, 19, 18, 14, 14, 12, 10, 8, 6, 2, 2)

bucket7 sum:2542, content= (98, 95, 95, 94, 92, 90, 90, 88, 86, 86, 83, 79, 79, 76, 74, 72, 69, 67, 64, 63, 59, 57, 56, 53, 53, 50, 46, 45, 42, 39, 38, 37, 34, 33, 30, 29, 28, 24, 24, 20, 19, 18, 14, 14, 11, 11, 8, 6, 2, 1, 1)

bucket8 sum:2542, content= (98, 95, 95, 94, 91, 91, 90, 88, 86, 85, 84, 79, 79, 76, 74, 72, 68, 68, 63, 63, 60, 57, 56, 53, 53, 50, 46, 45, 42, 39, 38, 37, 34, 32, 31, 28, 28, 26, 22, 21, 19, 17, 16, 13, 11, 11, 7, 5, 4, 1, 1)

bucket9 sum:2540, content= (98, 95, 95, 93, 93, 90, 90, 88, 86, 84, 84, 82, 78, 75, 74, 71, 71, 66, 63, 63, 60, 57, 55, 55, 52, 50, 46, 44, 43, 39, 38, 37, 34, 31, 31, 30, 27, 26, 22, 20, 20, 17, 16, 13, 11, 10, 8, 4, 4, 1)

bucket10 sum:2539, content= (97, 97, 94, 93, 93, 90, 90, 87, 87, 84, 84, 82, 78, 74, 74, 73, 68, 67, 66, 61, 59, 58, 55, 55, 52, 49, 49, 44, 40, 40, 38, 35, 35, 33, 31, 28, 28, 26, 22, 20, 20, 16, 16, 14, 11, 10, 8, 4, 4)

"----Comparison for the 85 example----

****tf from benchmark was 2552(we added the number of machines) and target function from our local search is 2552"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 16))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 86 from 130-----"

"-----START 87 from 130-----"

"input file number 87: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_6.txt"

***Data from file U_1_0500_10_6.txt: machinesNum=10 jobsNum=500"

***SOLUTION Data from file SOL_U_1_10_0500_6.txt: machinesNum=10 jobsNum=500 lowerBound=2534 upperBound=2534
isOptimal=1"

Content of machines summed (2534, 2534, 2534, 2534, 2534, 2534, 2534, 2534, 2534, 2533)

input selected: size 500 sum 25339

----Our Results-----

best from Our local search found:

target function = 2544, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:2534, content= (99, 97, 95, 94, 92, 92, 90, 88, 86, 84, 82, 80, 79, 75, 72, 69, 68, 65, 63, 63, 61, 58, 57, 55, 53, 51, 47, 46, 45, 41, 40, 38, 36, 33, 30, 30, 26, 25, 21, 21, 19, 19, 13, 11, 9, 6, 4, 3, 2, 1)

bucket2 sum:2534, content= (99, 97, 95, 94, 92, 92, 90, 88, 86, 84, 82, 80, 78, 76, 71, 70, 67, 66, 63, 63, 61, 58, 57, 55, 52, 52, 47, 46, 45, 41, 40, 38, 36, 33, 30, 30, 26, 25, 21, 21, 19, 18, 14, 11, 9, 6, 4, 3, 2, 1)

bucket3 sum:2534, content= (99, 96, 96, 93, 93, 91, 91, 88, 86, 83, 82, 81, 78, 75, 72, 70, 67, 66, 63, 62, 62, 58, 57, 55, 52, 51, 48, 46, 45, 41, 39, 39, 35, 33, 31, 29, 27, 25, 21, 21, 19, 18, 14, 11, 9, 6, 4, 3, 2, 1)

bucket4 sum:2534, content= (99, 96, 96, 93, 93, 91, 91, 88, 86, 83, 82, 81, 78, 75, 72, 70, 66, 66, 64, 62, 61, 59, 57, 54, 53, 50, 49, 46, 44, 41, 40, 38, 37, 33, 30, 29, 27, 24, 22, 21, 19, 17, 14, 12, 9, 6, 4, 3, 2, 1)

bucket5 sum:2534, content= (99, 96, 95, 94, 93, 91, 91, 87, 87, 83, 82, 81, 77, 77, 71, 70, 66, 66, 64, 62, 61, 58, 58, 54, 53, 50, 47, 47, 46, 40, 40, 38, 37, 32, 31, 29, 26, 25, 22, 21, 19, 17, 14, 11, 10, 6, 4, 3, 2, 1)

bucket6 sum:2534, content= (98, 97, 95, 94, 93, 91, 90, 88, 86, 84, 82, 80, 79, 74, 73, 70, 66, 66, 64, 62, 61, 58, 58, 54, 53, 50, 47, 47, 44, 42, 40, 38, 37, 32, 31, 29, 26, 25, 22, 20, 20, 16, 14, 12, 8, 8, 4, 3, 2, 1)

bucket7 sum:2534, content= (98, 97, 95, 94, 93, 91, 90, 88, 85, 84, 83, 80, 79, 74, 73, 69, 68, 65, 64, 62, 60, 60, 57, 54, 53, 50, 47, 47, 44, 41, 40, 39, 37, 32, 31, 28, 28, 24, 22, 20, 20, 16, 14, 12, 8, 7, 5, 3, 2, 1)
bucket8 sum:2534, content= (98, 97, 95, 94, 92, 92, 90, 88, 85, 84, 83, 80, 79, 74, 73, 69, 68, 65, 64, 62, 60, 60, 56, 56, 52, 49, 49, 47, 44, 41, 40, 38, 35, 34, 31, 28, 28, 23, 23, 20, 20, 15, 14, 13, 8, 7, 4, 3, 3, 1)
bucket9 sum:2534, content= (98, 97, 95, 94, 92, 92, 89, 89, 85, 84, 82, 82, 77, 74, 73, 70, 68, 65, 63, 63, 60, 60, 56, 56, 52, 49, 49, 46, 44, 41, 40, 39, 35, 33, 32, 28, 28, 23, 23, 20, 20, 15, 14, 12, 10, 6, 4, 3, 3, 1)
bucket10 sum:2533, content= (98, 97, 94, 94, 93, 92, 89, 89, 85, 84, 82, 80, 79, 73, 73, 71, 68, 65, 63, 63, 60, 58, 58, 54, 54, 49, 49, 46, 43, 42, 40, 39, 35, 33, 32, 28, 26, 26, 21, 21, 20, 15, 14, 12, 10, 5, 5, 3, 2, 1)

"----Comparison for the 86 example----

***tf from benchmark was 2544(we added the number of machines) and target function from our local search is 2544"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 17))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 87 from 130-----"

"-----START 88 from 130-----"

"input file number 88: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_7.txt"

***Data from file U_1_0500_10_7.txt: machinesNum=10 jobsNum=500"

***SOLUTION Data from file SOL_U_1_10_0500_7.txt: machinesNum=10 jobsNum=500 lowerBound=2513 upperBound=2513
isOptimal=1"

Content of machines summed (2513, 2513, 2513, 2513, 2513, 2513, 2513, 2513, 2513, 2510)

input selected: size 500 sum 25127

----Our Results-----

best from Our local search found:

target function = 2523, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:2513, content= (99, 97, 95, 92, 92, 88, 86, 85, 83, 81, 79, 79, 77, 74, 73, 71, 70, 68, 64, 64, 60, 60, 57, 55, 52, 50, 47, 44, 43, 39, 37, 35, 33, 31, 29, 28, 26, 25, 22, 20, 18, 16, 15, 12, 11, 10, 8, 7, 5, 1)

```

bucket2 sum:2513, content= (99, 96, 96, 92, 92, 88, 86, 84, 84, 81, 79, 79, 77, 74, 73, 71, 70, 68, 64, 63, 61, 60, 57, 54, 53, 50, 46, 45, 43, 39,
37, 35, 33, 30, 30, 28, 26, 25, 22, 20, 18, 16, 15, 12, 11, 10, 8, 7, 4, 2)
bucket3 sum:2513, content= (99, 96, 96, 92, 91, 89, 86, 84, 84, 81, 79, 79, 76, 74, 73, 72, 69, 69, 64, 63, 61, 59, 58, 54, 53, 50, 46, 45, 43, 39,
37, 35, 33, 30, 30, 28, 26, 24, 23, 19, 19, 16, 15, 12, 11, 10, 8, 7, 4, 2)
bucket4 sum:2513, content= (99, 96, 95, 93, 91, 89, 86, 84, 84, 80, 80, 78, 78, 74, 73, 71, 69, 68, 65, 63, 61, 59, 58, 54, 52, 51, 46, 45, 43, 39,
37, 35, 32, 31, 30, 28, 26, 24, 23, 19, 19, 16, 14, 13, 11, 10, 8, 7, 4, 1, 1)
bucket5 sum:2512, content= (98, 97, 95, 93, 91, 89, 86, 84, 84, 80, 80, 78, 78, 74, 73, 71, 69, 67, 66, 63, 61, 59, 58, 54, 52, 50, 47, 45, 42, 40,
36, 36, 32, 31, 30, 28, 26, 24, 22, 20, 19, 16, 14, 13, 11, 9, 9, 7, 4, 1)
bucket6 sum:2513, content= (98, 97, 95, 93, 91, 88, 87, 84, 83, 82, 79, 78, 78, 74, 73, 71, 69, 67, 66, 63, 61, 59, 58, 54, 52, 49, 48, 45, 42, 39,
38, 34, 34, 30, 30, 27, 27, 24, 22, 20, 18, 17, 14, 12, 12, 9, 9, 7, 3, 3)
bucket7 sum:2513, content= (98, 97, 94, 94, 91, 88, 85, 85, 84, 82, 79, 78, 76, 75, 73, 72, 69, 67, 65, 64, 60, 60, 58, 53, 53, 49, 48, 44, 44, 38,
38, 34, 32, 32, 30, 27, 27, 24, 21, 21, 18, 17, 14, 12, 11, 10, 9, 7, 3, 3)
bucket8 sum:2513, content= (98, 97, 94, 93, 92, 87, 87, 85, 83, 82, 79, 78, 76, 75, 73, 71, 71, 67, 65, 62, 62, 59, 57, 56, 52, 48, 48, 44, 42, 40,
38, 34, 32, 32, 30, 27, 26, 25, 21, 21, 18, 17, 14, 12, 10, 10, 9, 8, 3, 3)
bucket9 sum:2511, content= (97, 97, 96, 93, 90, 90, 85, 85, 83, 80, 80, 79, 76, 74, 74, 71, 71, 66, 65, 64, 60, 60, 57, 56, 52, 48, 47, 46, 41, 40,
36, 36, 32, 31, 30, 28, 25, 25, 24, 19, 18, 15, 15, 14, 10, 10, 9, 6, 5)
bucket10 sum:2513, content= (97, 97, 96, 93, 90, 90, 85, 85, 82, 82, 80, 78, 75, 75, 73, 73, 69, 66, 66, 64, 60, 60, 57, 56, 51, 48, 48, 46, 40, 40,
38, 34, 34, 31, 29, 28, 25, 25, 24, 19, 18, 15, 15, 12, 12, 10, 8, 6, 5, 3)
"----Comparison for the 87 example----"
"***tf from benchmark was 2523(we added the number of machines) and target function from our local search is 2523"
***RESULT IS THE SAME
Run time: 0.015 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 18))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 88 from 130-----"
"-----START 89 from 130-----"
"input file number 89: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_8.txt"
"***Data from file U_1_0500_10_8.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_10_0500_8.txt: machinesNum=10 jobsNum=500 lowerBound=2569 upperBound=2569
isOptimal=1"

```

Content of machines summed (2569, 2569, 2569, 2569, 2569, 2569, 2568, 2569, 2568, 2568)

input selected: size 500 sum 25687

----Our Results-----

best from Our local search found:

target function = 2579, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:2569, content= (99, 95, 93, 91, 89, 87, 85, 83, 82, 80, 78, 76, 74, 72, 70, 69, 68, 66, 65, 63, 61, 61, 58, 56, 55, 51, 51, 48, 47, 44, 43, 42, 39, 37, 35, 32, 29, 29, 24, 23, 22, 19, 17, 15, 14, 11, 9, 7, 4, 1)

bucket2 sum:2569, content= (98, 96, 93, 91, 89, 87, 85, 83, 82, 80, 78, 76, 74, 72, 70, 69, 67, 67, 65, 63, 61, 60, 59, 56, 54, 52, 51, 48, 47, 44, 43, 42, 39, 37, 35, 31, 30, 28, 25, 23, 21, 19, 17, 16, 14, 11, 9, 7, 4, 1)

bucket3 sum:2569, content= (98, 96, 93, 91, 89, 87, 85, 83, 82, 80, 78, 76, 74, 72, 70, 69, 67, 67, 65, 62, 62, 60, 59, 56, 54, 52, 51, 48, 47, 44, 43, 42, 39, 37, 35, 31, 30, 28, 25, 23, 21, 19, 17, 16, 13, 12, 9, 7, 4, 1)

bucket4 sum:2569, content= (98, 96, 92, 92, 89, 87, 84, 84, 81, 81, 78, 76, 73, 73, 70, 69, 67, 66, 66, 62, 62, 60, 59, 56, 54, 52, 50, 49, 46, 45, 43, 42, 39, 37, 35, 31, 30, 28, 25, 23, 21, 19, 17, 16, 13, 12, 9, 6, 5, 1)

bucket5 sum:2569, content= (98, 95, 93, 91, 90, 87, 84, 84, 81, 81, 78, 75, 74, 73, 70, 69, 67, 66, 66, 62, 62, 60, 58, 57, 53, 53, 50, 49, 46, 45, 43, 41, 40, 36, 36, 31, 30, 27, 26, 23, 20, 19, 18, 15, 14, 10, 10, 8, 4, 1)

bucket6 sum:2569, content= (98, 95, 93, 91, 90, 86, 86, 83, 81, 81, 78, 75, 74, 72, 71, 68, 68, 66, 65, 63, 62, 60, 58, 57, 53, 53, 50, 49, 46, 45, 43, 41, 40, 36, 34, 33, 30, 27, 26, 23, 20, 19, 18, 15, 14, 10, 10, 8, 4, 1)

bucket7 sum:2569, content= (98, 94, 93, 92, 89, 87, 86, 82, 82, 81, 77, 77, 73, 72, 70, 69, 68, 66, 65, 63, 62, 59, 59, 57, 53, 53, 50, 49, 46, 44, 44, 41, 39, 38, 34, 32, 30, 27, 25, 23, 23, 19, 16, 15, 14, 10, 10, 8, 3, 2)

bucket8 sum:2569, content= (98, 94, 93, 92, 88, 88, 84, 84, 82, 80, 79, 75, 74, 72, 70, 69, 68, 66, 64, 64, 61, 61, 58, 55, 55, 53, 49, 49, 48, 44, 43, 41, 38, 38, 34, 32, 31, 27, 24, 24, 23, 18, 17, 15, 14, 10, 9, 8, 2, 2, 2)

bucket9 sum:2568, content= (97, 97, 92, 91, 88, 87, 86, 84, 81, 80, 77, 77, 74, 72, 70, 69, 68, 66, 64, 63, 62, 61, 58, 55, 55, 51, 51, 49, 48, 44, 43, 40, 40, 38, 33, 32, 29, 29, 24, 24, 23, 18, 17, 14, 14, 13, 8, 6, 5, 1)

bucket10 sum:2567, content= (97, 94, 94, 92, 88, 87, 86, 84, 81, 79, 79, 75, 75, 71, 71, 69, 68, 66, 64, 63, 62, 61, 57, 57, 55, 51, 51, 49, 45, 45, 44, 40, 40, 38, 33, 32, 29, 29, 24, 24, 20, 20, 18, 14, 14, 13, 8, 6, 5)

"----Comparison for the 88 example----

****tf from benchmark was 2579(we added the number of machines) and target function from our local search is 2579"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 19))

```
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 89 from 130-----"
"-----START 90 from 130-----"
"input file number 90: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_10_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_0500_9.txt"
"***Data from file U_1_0500_10_9.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_10_0500_9.txt: machinesNum=10 jobsNum=500 lowerBound=2544 upperBound=2544
isOptimal=1"
Content of machines summed (2543, 2544, 2543, 2543, 2544, 2544, 2544, 2543, 2543, 2542)
input selected: size 500 sum 25433
```

----Our Results-----

best from Our local search found:

target function = 2554, num of machines=10, square root lms=0

machines content(number of jobs=500):

```
bucket1 sum:2544, content= (99, 97, 96, 92, 91, 89, 87, 85, 82, 80, 79, 76, 74, 73, 70, 67, 65, 63, 61, 60, 60, 58, 57, 55, 52, 50, 48, 46, 44, 42,
42, 40, 38, 36, 35, 33, 30, 28, 26, 25, 20, 20, 17, 14, 12, 9, 9, 6, 4, 2)
bucket2 sum:2544, content= (99, 97, 95, 93, 91, 89, 87, 85, 82, 80, 79, 76, 74, 73, 70, 66, 66, 62, 61, 61, 60, 58, 57, 55, 52, 50, 47, 47, 43, 43,
42, 40, 38, 36, 35, 33, 30, 28, 26, 24, 21, 19, 18, 14, 12, 9, 9, 6, 4, 2)
bucket3 sum:2544, content= (99, 97, 95, 93, 91, 89, 87, 84, 83, 80, 78, 77, 74, 73, 70, 66, 65, 63, 61, 61, 60, 58, 57, 55, 52, 50, 47, 47, 43, 43,
41, 41, 37, 37, 34, 34, 30, 28, 26, 24, 20, 20, 18, 14, 11, 10, 9, 6, 4, 1, 1)
bucket4 sum:2544, content= (99, 97, 95, 93, 90, 90, 86, 85, 82, 81, 78, 77, 74, 73, 70, 66, 65, 63, 61, 61, 59, 59, 56, 56, 52, 49, 48, 46, 44, 43,
41, 40, 38, 36, 35, 33, 31, 28, 26, 24, 20, 20, 17, 15, 11, 10, 8, 6, 5, 1, 1)
bucket5 sum:2544, content= (99, 97, 94, 94, 90, 89, 88, 84, 82, 81, 78, 77, 74, 73, 70, 66, 64, 63, 62, 61, 59, 59, 56, 56, 51, 51, 47, 46, 44, 43,
41, 40, 38, 36, 35, 33, 31, 27, 27, 23, 22, 19, 17, 15, 11, 10, 8, 6, 4, 3)
bucket6 sum:2544, content= (99, 97, 94, 93, 91, 89, 88, 83, 83, 81, 78, 76, 75, 73, 69, 67, 64, 63, 62, 60, 60, 59, 56, 56, 51, 51, 47, 45, 45, 43,
41, 40, 38, 36, 35, 33, 29, 29, 27, 23, 22, 19, 17, 14, 12, 10, 8, 6, 4, 3)
bucket7 sum:2544, content= (99, 97, 94, 93, 91, 89, 86, 86, 82, 81, 78, 76, 75, 72, 71, 66, 64, 63, 62, 60, 60, 59, 56, 55, 53, 49, 48, 45, 45, 42,
42, 40, 38, 36, 35, 33, 29, 29, 27, 23, 22, 19, 17, 14, 12, 10, 8, 6, 4, 3)
bucket8 sum:2543, content= (98, 98, 94, 92, 92, 88, 88, 85, 82, 80, 79, 76, 75, 72, 69, 68, 64, 63, 61, 61, 60, 58, 57, 54, 53, 49, 49, 45, 44, 43,
42, 39, 38, 37, 35, 32, 31, 28, 27, 23, 22, 19, 16, 16, 11, 10, 7, 7, 3, 3)
```


bucket7 sum:1015, content= (99, 92, 87, 87, 76, 66, 65, 55, 51, 48, 43, 39, 34, 29, 24, 20, 14, 8, 4, 74)
bucket8 sum:1016, content= (99, 87, 87, 76, 74, 69, 61, 57, 51, 48, 43, 39, 34, 29, 24, 20, 14, 8, 4, 92)
bucket9 sum:1016, content= (98, 93, 87, 87, 76, 74, 69, 61, 57, 51, 43, 37, 35, 30, 24, 20, 13, 10, 4, 47)
bucket10 sum:1016, content= (98, 93, 87, 84, 80, 74, 66, 65, 55, 51, 48, 43, 37, 35, 30, 23, 21, 13, 10, 3)
bucket11 sum:1016, content= (97, 94, 87, 84, 80, 74, 66, 65, 55, 51, 48, 43, 37, 35, 30, 23, 21, 13, 10, 3)
bucket12 sum:1016, content= (97, 93, 84, 79, 74, 66, 61, 59, 51, 46, 44, 40, 34, 28, 27, 17, 15, 7, 6, 88)
bucket13 sum:1014, content= (97, 92, 90, 84, 79, 74, 65, 65, 56, 51, 46, 44, 40, 34, 28, 27, 17, 15, 7, 3)
bucket14 sum:1014, content= (97, 91, 91, 84, 79, 73, 69, 61, 57, 50, 49, 42, 40, 34, 28, 27, 17, 15, 7, 3)
bucket15 sum:1014, content= (97, 91, 91, 84, 79, 73, 69, 61, 56, 52, 46, 44, 40, 33, 30, 23, 20, 15, 7, 2, 1)
bucket16 sum:1014, content= (97, 91, 90, 84, 80, 73, 69, 61, 56, 52, 45, 44, 40, 35, 28, 27, 17, 13, 11, 1)
bucket17 sum:1015, content= (97, 91, 90, 83, 81, 73, 69, 61, 53, 49, 42, 40, 32, 31, 23, 19, 16, 7, 3, 55)
bucket18 sum:1014, content= (96, 94, 89, 82, 81, 72, 70, 61, 54, 53, 49, 42, 36, 36, 31, 23, 19, 16, 7, 3)
bucket19 sum:1016, content= (96, 94, 89, 82, 81, 72, 70, 61, 54, 52, 50, 42, 36, 36, 31, 23, 19, 13, 11, 4)
bucket20 sum:1014, content= (96, 94, 89, 82, 78, 75, 70, 60, 58, 50, 49, 42, 36, 35, 32, 23, 17, 16, 6, 6)
bucket21 sum:1015, content= (96, 94, 89, 82, 75, 69, 60, 59, 50, 49, 42, 36, 35, 32, 22, 21, 12, 11, 4, 77)
bucket22 sum:1016, content= (96, 94, 89, 82, 76, 76, 71, 60, 58, 50, 49, 42, 36, 35, 31, 27, 17, 12, 11, 4)
bucket23 sum:1016, content= (95, 95, 89, 82, 76, 76, 71, 60, 54, 53, 45, 44, 41, 35, 30, 21, 21, 11, 11, 6)
bucket24 sum:1016, content= (95, 94, 90, 81, 81, 72, 71, 60, 54, 53, 45, 44, 41, 35, 30, 21, 21, 11, 11, 6)
bucket25 sum:1015, content= (95, 94, 90, 81, 81, 71, 71, 59, 59, 52, 44, 44, 41, 35, 27, 27, 16, 16, 6, 6)
"----Comparison for the 90 example----"
"****tf from benchmark was 1041(we added the number of machines) and target function from our local search is 1041"
***RESULT IS THE SAME
Run time: 227.898 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 21))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 91 from 130-----"
"-----START 92 from 130-----"
"input file number 92: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_1.txt"
"****Data from file U_1_0500_25_1.txt: machinesNum=25 jobsNum=500"
"****SOLUTION Data from file SOL_U_1_25_0500_1.txt: machinesNum=25 jobsNum=500 lowerBound=951 upperBound=951 isOptimal=1"

Content of machines summed (951, 951, 951, 950, 950, 950, 949, 949, 949, 951, 951, 951, 951, 951, 951, 949, 949, 950, 951, 949, 950, 949, 950, 950, 950)

input selected: size 500 sum 23753

----Our Results-----

best from Our local search found:

target function = 976, num of machines=25, square root lms=0

machines content(number of jobs=500):

bucket1 sum:951, content= (99, 90, 87, 80, 75, 69, 63, 56, 53, 46, 43, 39, 33, 30, 27, 22, 17, 12, 7, 3)
bucket2 sum:951, content= (99, 90, 87, 80, 75, 69, 63, 56, 53, 46, 43, 39, 33, 30, 26, 23, 17, 12, 7, 3)
bucket3 sum:951, content= (99, 90, 87, 79, 76, 69, 63, 56, 53, 46, 43, 39, 33, 30, 26, 23, 17, 12, 7, 3)
bucket4 sum:951, content= (99, 90, 86, 81, 75, 68, 64, 56, 52, 47, 43, 39, 33, 29, 27, 23, 16, 13, 7, 3)
bucket5 sum:951, content= (98, 91, 86, 79, 77, 68, 63, 57, 52, 47, 43, 39, 33, 29, 27, 23, 16, 12, 8, 3)
bucket6 sum:951, content= (98, 91, 85, 81, 76, 68, 63, 57, 52, 47, 42, 40, 33, 29, 27, 23, 16, 12, 8, 3)
bucket7 sum:951, content= (98, 90, 88, 79, 76, 68, 62, 58, 52, 47, 42, 40, 32, 31, 26, 22, 18, 12, 6, 4)
bucket8 sum:951, content= (98, 90, 88, 79, 76, 68, 62, 58, 51, 48, 42, 40, 32, 31, 26, 21, 18, 12, 8, 2, 1)
bucket9 sum:951, content= (98, 90, 88, 79, 76, 68, 62, 58, 51, 48, 42, 40, 32, 31, 26, 21, 18, 12, 8, 2, 1)
bucket10 sum:951, content= (98, 90, 88, 78, 77, 68, 62, 58, 51, 48, 41, 41, 32, 31, 26, 21, 18, 11, 9, 1, 1, 1)
bucket11 sum:951, content= (97, 92, 85, 81, 76, 67, 64, 57, 51, 48, 41, 41, 32, 31, 26, 20, 19, 11, 9, 1, 1, 1)
bucket12 sum:951, content= (97, 92, 85, 81, 76, 67, 64, 57, 51, 48, 41, 40, 33, 31, 26, 20, 18, 14, 6, 4)
bucket13 sum:951, content= (97, 92, 84, 82, 75, 70, 61, 58, 51, 47, 44, 39, 32, 31, 26, 20, 18, 14, 6, 4)
bucket14 sum:951, content= (96, 93, 84, 82, 74, 70, 61, 59, 50, 49, 41, 38, 35, 31, 26, 20, 18, 14, 6, 4)
bucket15 sum:951, content= (96, 93, 84, 82, 74, 70, 61, 59, 50, 49, 41, 38, 35, 31, 26, 20, 18, 14, 6, 4)
bucket16 sum:948, content= (95, 94, 84, 82, 74, 70, 60, 60, 50, 47, 44, 38, 34, 29, 27, 24, 16, 11, 9)
bucket17 sum:948, content= (95, 94, 84, 82, 74, 70, 60, 60, 50, 46, 45, 37, 35, 28, 27, 25, 15, 11, 10)
bucket18 sum:951, content= (95, 94, 84, 82, 73, 70, 64, 57, 50, 46, 45, 37, 34, 32, 26, 20, 18, 11, 9, 4)
bucket19 sum:951, content= (95, 93, 88, 78, 72, 71, 65, 57, 50, 46, 44, 37, 36, 28, 27, 25, 15, 10, 10, 4)
bucket20 sum:948, content= (95, 93, 83, 82, 77, 67, 65, 56, 54, 45, 44, 37, 34, 28, 27, 24, 15, 14, 8)
bucket21 sum:948, content= (95, 93, 83, 82, 77, 67, 65, 56, 54, 45, 44, 37, 34, 28, 27, 24, 15, 14, 8)
bucket22 sum:947, content= (95, 89, 89, 81, 72, 71, 65, 55, 54, 45, 44, 37, 34, 32, 25, 24, 15, 10, 10)
bucket23 sum:950, content= (95, 89, 89, 81, 72, 70, 66, 55, 54, 45, 44, 36, 36, 28, 27, 20, 19, 14, 5, 5)
bucket24 sum:949, content= (95, 89, 88, 82, 71, 71, 64, 58, 54, 45, 44, 36, 34, 28, 28, 20, 19, 14, 5, 4)

bucket25 sum:948, content= (94, 94, 83, 82, 77, 66, 64, 58, 50, 49, 44, 36, 34, 28, 28, 19, 19, 14, 9)

"----Comparison for the 91 example----"

***tf from benchmark was 976(we added the number of machines) and target function from our local search is 976"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 22))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 92 from 130-----"

"-----START 93 from 130-----"

"input file number 93: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_2.txt and

```
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_2.txt"
```

***Data from file U_1_0500_25_2.txt: machinesNum=25 jobsNum=500

***SOLUTION Data from file SOL_U_1_25_0500_2.txt: machinesNum=25 jobsNum=500 lowerBound=998 upperBound=998 isOptimal=1"

[illegible]

input selected: size 500 sum 24934

----Our Results-----

best from Our local search found:

target function = 1023, num of machines=25, square root lms=0

machines content(number of jobs=500):

bucket1 sum:998, content= (99, 89, 85, 82, 77, 72, 69, 61, 55, 53, 47, 44, 41, 34, 30, 23, 16, 11, 8, 2)

bucket2 sum:998, content= (99, 89, 85, 82, 77, 72, 69, 61, 55, 53, 47, 44, 41, 34, 30, 23, 16, 11, 8, 2)

bucket3 sum:998, content= (99, 88, 86, 82, 77, 72, 69, 61, 55, 53, 47, 44, 41, 34, 30, 22, 16, 12, 8, 2)

bucket4 sum:998, content= (99, 88, 86, 82, 77, 72, 69, 61, 55, 52, 48, 44, 40, 35, 30, 22, 16, 12, 8, 2)

bucket5 sum:998, content= (98, 89, 86, 81, 78, 72, 68, 62, 55, 52, 48, 44, 40, 35, 29, 24, 16, 11, 8, 1, 1)

bucket6 sum:998, content= (98, 89, 86, 81, 78, 72, 68, 62, 55, 52, 48, 44, 40, 35, 29, 24, 15, 11, 9, 1, 1)

bucket7 sum:998, content= (98, 89, 86, 81, 77, 73, 68, 61, 56, 52, 48, 44, 40, 35, 29, 24, 15, 11, 8, 3)

bucket8 sum:998, content= (98, 89, 86, 81, 77, 73, 68, 60, 56, 54, 47, 44, 39, 36, 29, 22, 17, 11, 7, 4)

bucket9 sum:998, content=(98, 89, 86, 80, 79, 72, 68, 60, 56, 54, 47, 44, 39, 36, 29, 22, 16, 13, 7, 3)

bucket10 sum:998, content= (97, 90, 86, 80, 76, 73, 71, 60, 55, 52, 49, 44, 39, 36, 28, 22, 17, 13, 7, 3)

[illegible]

----Our Results-----

best from Our local search found:

target function = 1020, num of machines=25, square root lms=0

machines content(number of jobs=500):

bucket1 sum:995, content= (99, 89, 87, 79, 76, 70, 67, 62, 58, 52, 49, 44, 39, 34, 26, 24, 17, 13, 9, 1)
bucket2 sum:995, content= (99, 89, 87, 79, 76, 70, 67, 62, 58, 52, 48, 45, 38, 35, 26, 23, 18, 13, 9, 1)
bucket3 sum:995, content= (99, 89, 87, 79, 76, 70, 67, 62, 58, 52, 48, 45, 38, 35, 26, 23, 18, 13, 9, 1)
bucket4 sum:995, content= (98, 90, 87, 78, 77, 70, 67, 62, 58, 52, 48, 45, 38, 35, 26, 23, 18, 13, 9, 1)
bucket5 sum:995, content= (98, 90, 86, 79, 77, 70, 67, 61, 59, 51, 50, 44, 38, 34, 27, 22, 19, 13, 9, 1)
bucket6 sum:995, content= (98, 90, 86, 79, 77, 69, 68, 61, 59, 51, 50, 44, 38, 34, 27, 22, 19, 12, 10, 1)
bucket7 sum:995, content= (98, 89, 88, 78, 75, 71, 68, 61, 59, 51, 50, 44, 38, 34, 27, 22, 19, 12, 9, 2)
bucket8 sum:995, content= (98, 88, 88, 79, 75, 71, 68, 61, 58, 53, 48, 45, 38, 34, 27, 22, 19, 12, 8, 3)
bucket9 sum:995, content= (98, 88, 88, 79, 75, 71, 68, 61, 57, 54, 48, 45, 37, 36, 26, 22, 19, 12, 8, 3)
bucket10 sum:995, content= (97, 91, 86, 79, 75, 71, 68, 60, 60, 51, 50, 44, 37, 34, 28, 22, 18, 14, 7, 3)
bucket11 sum:995, content= (97, 91, 86, 79, 74, 72, 67, 62, 57, 54, 48, 43, 41, 33, 26, 25, 17, 12, 7, 4)
bucket12 sum:995, content= (97, 91, 85, 80, 74, 72, 67, 62, 57, 54, 48, 43, 41, 33, 26, 22, 20, 12, 7, 4)
bucket13 sum:995, content= (97, 91, 84, 80, 78, 69, 66, 63, 57, 54, 48, 43, 40, 33, 28, 22, 18, 14, 7, 3)
bucket14 sum:995, content= (97, 88, 88, 80, 74, 72, 66, 63, 57, 54, 48, 43, 40, 33, 28, 21, 20, 12, 7, 4)
bucket15 sum:995, content= (97, 88, 88, 80, 74, 72, 66, 63, 57, 54, 48, 43, 40, 32, 29, 21, 20, 11, 10, 2)
bucket16 sum:995, content= (96, 92, 84, 80, 74, 73, 66, 63, 57, 53, 50, 43, 40, 32, 28, 21, 17, 16, 6, 4)
bucket17 sum:995, content= (96, 92, 84, 80, 74, 72, 69, 60, 56, 55, 50, 42, 40, 32, 29, 21, 17, 16, 6, 4)
bucket18 sum:995, content= (96, 92, 83, 81, 74, 72, 69, 60, 56, 55, 50, 42, 40, 32, 29, 21, 17, 15, 6, 5)
bucket19 sum:994, content= (96, 92, 83, 81, 73, 73, 69, 60, 56, 55, 47, 47, 37, 31, 29, 25, 16, 15, 6, 3)
bucket20 sum:995, content= (95, 92, 83, 82, 73, 73, 69, 60, 56, 55, 47, 46, 40, 31, 28, 21, 20, 14, 6, 2, 2)
bucket21 sum:995, content= (95, 92, 83, 81, 78, 70, 66, 62, 55, 55, 51, 42, 40, 30, 29, 25, 16, 15, 5, 5)
bucket22 sum:995, content= (95, 92, 83, 81, 78, 70, 65, 63, 55, 55, 47, 47, 40, 30, 29, 21, 20, 14, 5, 5)
bucket23 sum:994, content= (94, 94, 83, 81, 73, 73, 65, 63, 60, 53, 47, 42, 41, 30, 30, 25, 16, 15, 5, 2, 2)
bucket24 sum:992, content= (94, 94, 82, 80, 78, 70, 64, 64, 60, 53, 47, 42, 41, 30, 30, 25, 16, 11, 11)
bucket25 sum:991, content= (94, 94, 82, 80, 78, 70, 64, 64, 60, 51, 47, 47, 36, 36, 26, 25, 16, 11, 10)

"----Comparison for the 93 example----

****tf from benchmark was 1020(we added the number of machines) and target function from our local search is 1020"

***RESULT IS THE SAME

Run time: 0.015 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 24))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 94 from 130-----"

"-----START 95 from 130-----"

"input file number 95: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_4.txt and solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_4.txt"

***Data from file U_1_0500_25_4.txt: machinesNum=25 jobsNum=500"

***SOLUTION Data from file SOL_U_1_25_0500_4.txt: machinesNum=25 jobsNum=500 lowerBound=1012 upperBound=1012 isOptimal=1"

[illegible]

input selected: size 500 sum 25300

----Our Results-----

best from Our local search found:

target function = 1037, num of machines=25, square root lms=0

machines content(number of jobs=500):

bucket1 sum:1012, content= (84, 64, 55, 33, 27, 24, 18, 12, 7, 4, 98, 91, 91, 76, 58, 72, 49, 68, 45, 36)

bucket2 sum:1012, content= (99, 90, 84, 77, 73, 69, 63, 55, 48, 44, 37, 32, 28, 24, 18, 12, 7, 4, 57, 91)

bucket3 sum:1012, content= (99, 90, 84, 77, 73, 69, 63, 58, 54, 44, 37, 32, 28, 24, 18, 12, 7, 4, 48, 91)

bucket4 sum:1012, content=(92, 90, 83, 78, 73, 69, 63, 58, 54, 49, 44, 37, 32, 28, 24, 17, 13, 7, 4, 97)

bucket5 sum:1012, content=(99, 90, 83, 78, 73, 69, 63, 58, 54, 48, 37, 32, 28, 24, 17, 13, 7, 4, 44, 91)

bucket6 sum:1012, content=(99, 91, 78, 72, 70, 63, 58, 54, 48, 45, 37, 32, 27, 25, 17, 13, 6, 5, 90, 82)

bucket7 sum:1012, content= (99, 90, 85, 77, 72, 70, 62, 59, 54, 48, 44, 38, 32, 27, 25, 17, 13, 6, 2, 92)

bucket8 sum:1012, content=(99, 91, 89, 86, 77, 70, 62, 59, 54, 48, 44, 36, 35, 27, 23, 19, 12, 6, 2, 73)

bucket9 sum:1012, content=(92, 89, 86, 77, 72, 70, 62, 59, 53, 50, 44, 36, 34, 27, 22, 20, 12, 6, 2, 99)

```
bucket9 sum:1012, content= (92, 89, 88, 77, 72, 70, 62, 59, 53, 50, 43, 36, 35, 27, 22, 20, 12, 6, 2)
```

```
bucket10 sum:1012, content=(55, 52, 85, 85, 78, 72, 78, 62, 55, 55, 58, 45, 58, 55, 27, 22, 28, 12, 8, 2)
```

bucket12 sum:1012, content= (98, 92, 89, 85, 76, 75, 65, 57, 53, 48, 43, 39, 34, 26, 22, 20, 11, 9, 1, 69)

bucket13 sum:1012, content=(97, 93, 88, 85, 76, 75, 68, 62, 60, 53, 48, 42, 40, 31, 29, 21, 20, 14, 5, 5)

bucket15 sum:1012, count=(97, 95, 88, 85, 70, 75, 68, 62, 60, 55, 48, 42, 40, 31, 29, 21, 20, 14, 5, 5)

```

bucket14 sum:1012, content= (93, 88, 87, 76, 74, 68, 62, 60, 52, 51, 42, 38, 31, 29, 21, 20, 11, 10, 1, 98)
bucket15 sum:1012, content= (97, 93, 88, 87, 76, 74, 68, 61, 60, 56, 48, 42, 38, 31, 29, 21, 20, 11, 9, 3)
bucket16 sum:1012, content= (96, 94, 88, 85, 78, 74, 68, 61, 60, 52, 51, 41, 40, 31, 29, 21, 20, 11, 9, 3)
bucket17 sum:1012, content= (96, 94, 88, 83, 79, 75, 67, 65, 58, 52, 51, 41, 39, 31, 28, 25, 19, 10, 8, 3)
bucket18 sum:1012, content= (96, 94, 88, 82, 80, 72, 72, 61, 60, 52, 48, 46, 35, 26, 21, 20, 10, 10, 2, 37)
bucket19 sum:1012, content= (95, 95, 88, 79, 75, 70, 61, 58, 56, 48, 41, 40, 31, 28, 25, 19, 10, 8, 2, 83)
bucket20 sum:1012, content= (95, 95, 89, 82, 79, 75, 70, 61, 58, 56, 48, 41, 38, 36, 26, 20, 20, 14, 8, 1)
bucket21 sum:1012, content= (95, 94, 81, 79, 72, 71, 60, 60, 56, 47, 41, 40, 35, 25, 25, 16, 14, 8, 1, 92)
bucket22 sum:1012, content= (95, 93, 81, 79, 75, 67, 66, 58, 52, 47, 46, 38, 30, 29, 25, 16, 14, 8, 1, 92)
bucket23 sum:1012, content= (95, 93, 81, 79, 75, 67, 66, 57, 52, 51, 41, 38, 36, 25, 25, 16, 14, 8, 1, 92)
bucket24 sum:1012, content= (95, 92, 91, 80, 80, 76, 67, 65, 57, 56, 47, 41, 40, 30, 29, 25, 16, 15, 5, 5)
bucket25 sum:1012, content= (95, 92, 91, 80, 80, 75, 66, 66, 57, 57, 47, 40, 40, 30, 30, 25, 16, 15, 5, 5)
"----Comparison for the 94 example----"
****tf from benchmark was 1037(we added the number of machines) and target function from our local search is 1037"
***RESULT IS THE SAME
Run time: 1516.39 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 25))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 95 from 130-----"
"-----START 96 from 130-----"
"input file number 96: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_5.txt"
****Data from file U_1_0500_25_5.txt: machinesNum=25 jobsNum=500"
****SOLUTION Data from file SOL_U_1_25_0500_5.txt: machinesNum=25 jobsNum=500 lowerBound=975 upperBound=975 isOptimal=1"
Content of machines summed (975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975, 975,
975, 975, 965)
input selected: size 500 sum 24365

----Our Results-----
best from Our local search found:
target function = 1000, num of machines=25, square root lms=0

```

machines content(number of jobs=500):

bucket1 sum:975, content= (55, 49, 44, 38, 30, 27, 24, 14, 8, 93, 87, 81, 98, 78, 71, 33, 69, 15, 61)
bucket2 sum:975, content= (99, 92, 80, 72, 68, 60, 54, 50, 44, 38, 34, 30, 25, 16, 14, 8, 88, 25, 78)
bucket3 sum:975, content= (99, 92, 81, 77, 69, 60, 54, 50, 44, 38, 34, 30, 26, 25, 16, 13, 9, 72, 86)
bucket4 sum:975, content= (99, 92, 85, 77, 71, 60, 54, 50, 43, 39, 34, 30, 26, 25, 15, 15, 7, 5, 80, 68)
bucket5 sum:975, content= (99, 91, 80, 77, 70, 70, 60, 54, 50, 43, 39, 34, 30, 26, 25, 15, 15, 7, 5, 85)
bucket6 sum:975, content= (91, 86, 80, 76, 72, 69, 59, 56, 49, 43, 39, 34, 30, 26, 24, 17, 13, 7, 6, 98)
bucket7 sum:975, content= (98, 91, 87, 79, 70, 70, 59, 56, 48, 45, 38, 34, 30, 26, 24, 17, 13, 7, 6, 77)
bucket8 sum:975, content= (99, 91, 87, 79, 78, 70, 69, 53, 51, 42, 39, 35, 30, 26, 24, 17, 13, 7, 5, 60)
bucket9 sum:974, content= (99, 89, 87, 82, 76, 72, 68, 61, 53, 50, 45, 38, 33, 31, 26, 23, 18, 13, 7, 3)
bucket10 sum:975, content= (93, 85, 81, 76, 72, 68, 59, 56, 50, 42, 39, 35, 29, 27, 23, 18, 13, 7, 3, 99)
bucket11 sum:975, content= (98, 85, 81, 76, 72, 67, 62, 53, 50, 45, 38, 33, 29, 28, 23, 18, 13, 6, 6, 92)
bucket12 sum:975, content= (89, 88, 82, 75, 73, 67, 62, 53, 50, 45, 37, 35, 29, 27, 23, 17, 12, 10, 2, 99)
bucket13 sum:975, content= (99, 89, 87, 83, 75, 73, 67, 62, 53, 50, 45, 37, 35, 29, 27, 23, 17, 12, 10, 1, 1)
bucket14 sum:974, content= (97, 94, 85, 81, 75, 73, 66, 63, 53, 50, 42, 40, 35, 29, 27, 22, 19, 12, 9, 1, 1)
bucket15 sum:974, content= (97, 94, 85, 81, 75, 73, 66, 62, 56, 48, 42, 39, 36, 29, 27, 22, 19, 12, 9, 2)
bucket16 sum:975, content= (97, 89, 83, 75, 73, 66, 62, 56, 47, 46, 37, 35, 29, 27, 21, 20, 12, 9, 4, 87)
bucket17 sum:975, content= (97, 89, 88, 82, 70, 66, 64, 52, 51, 42, 39, 35, 29, 28, 21, 20, 12, 9, 4, 77)
bucket18 sum:974, content= (97, 88, 88, 84, 74, 74, 66, 62, 56, 47, 46, 37, 35, 28, 28, 21, 20, 12, 9, 1, 1)
bucket19 sum:974, content= (96, 94, 87, 79, 78, 70, 66, 58, 58, 51, 42, 39, 32, 27, 21, 20, 11, 10, 1, 34)
bucket20 sum:974, content= (96, 94, 87, 79, 74, 74, 65, 64, 56, 47, 46, 36, 33, 31, 28, 21, 19, 11, 10, 3)
bucket21 sum:974, content= (96, 94, 84, 82, 74, 74, 65, 64, 56, 46, 46, 36, 36, 28, 28, 17, 11, 10, 1, 26)
bucket22 sum:974, content= (96, 94, 84, 79, 78, 74, 65, 58, 57, 51, 41, 41, 32, 32, 28, 21, 17, 9, 1, 16)
bucket23 sum:974, content= (95, 95, 84, 79, 78, 74, 65, 58, 57, 51, 41, 41, 32, 32, 28, 20, 20, 11, 10, 3)
bucket24 sum:974, content= (95, 94, 87, 79, 78, 72, 65, 58, 57, 51, 41, 41, 32, 32, 28, 20, 20, 11, 10, 3)
bucket25 sum:975, content= (95, 94, 87, 78, 78, 73, 64, 64, 52, 51, 41, 40, 36, 28, 28, 25, 17, 11, 9, 4)

"----Comparison for the 95 example----"

****tf from benchmark was 1000(we added the number of machines) and target function from our local search is 1000"

***RESULT IS THE SAME

Run time: 1126.98 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 26))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))


```
"Avegare error: 0"
"-----END 96 from 130-----"
"-----START 97 from 130-----"
"input file number 97: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_6.txt"
"***Data from file U_1_0500_25_6.txt: machinesNum=25 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_25_0500_6.txt: machinesNum=25 jobsNum=500 lowerBound=991 upperBound=991 isOptimal=1"
Content of machines summed (990, 991, 990, 990, 990, 990, 991, 990, 989, 991, 991, 991, 991, 990, 991, 991, 991, 989, 990, 991, 991,
991, 990, 989)
input selected: size 500 sum 24760
```

----Our Results-----

best from Our local search found:

target function = 1016, num of machines=25, square root lms=0

machines content(number of jobs=500):

```
bucket1 sum:991, content= (78, 61, 35, 31, 29, 22, 19, 14, 9, 99, 91, 88, 73, 82, 68, 54, 47, 49, 42)
bucket2 sum:991, content= (98, 91, 88, 82, 79, 72, 67, 60, 56, 50, 46, 41, 35, 31, 29, 22, 19, 14, 9, 1, 1)
bucket3 sum:990, content= (98, 90, 88, 79, 72, 67, 60, 56, 50, 46, 41, 35, 31, 29, 22, 19, 14, 9, 1, 83)
bucket4 sum:991, content= (98, 90, 82, 78, 73, 67, 60, 56, 50, 46, 40, 36, 31, 29, 22, 19, 14, 9, 4, 87)
bucket5 sum:991, content= (98, 90, 88, 82, 77, 74, 66, 61, 56, 49, 40, 36, 31, 29, 22, 19, 14, 8, 5, 46)
bucket6 sum:991, content= (98, 90, 87, 82, 77, 74, 66, 61, 56, 49, 47, 40, 36, 31, 28, 23, 19, 14, 8, 5)
bucket7 sum:991, content= (97, 88, 82, 77, 74, 66, 61, 56, 49, 45, 42, 35, 32, 28, 23, 18, 15, 8, 5, 90)
bucket8 sum:991, content= (97, 91, 88, 82, 77, 74, 66, 61, 54, 52, 45, 35, 31, 28, 23, 18, 15, 8, 5, 41)
bucket9 sum:991, content= (97, 91, 88, 82, 77, 68, 60, 54, 52, 45, 42, 35, 31, 28, 23, 18, 15, 8, 5, 72)
bucket10 sum:991, content= (97, 91, 88, 82, 77, 73, 60, 54, 51, 44, 43, 35, 32, 27, 24, 18, 14, 10, 4, 67)
bucket11 sum:990, content= (97, 91, 87, 84, 76, 73, 68, 59, 57, 44, 43, 34, 33, 27, 23, 20, 14, 8, 2, 50)
bucket12 sum:989, content= (97, 91, 87, 84, 76, 72, 69, 59, 57, 49, 44, 43, 34, 33, 27, 22, 21, 14, 8, 2)
bucket13 sum:989, content= (96, 92, 87, 84, 76, 72, 69, 59, 57, 49, 44, 43, 34, 32, 30, 21, 20, 13, 10, 1)
bucket14 sum:990, content= (96, 92, 87, 81, 80, 71, 69, 59, 57, 48, 47, 40, 37, 31, 27, 21, 21, 13, 11, 2)
bucket15 sum:989, content= (96, 91, 89, 81, 80, 71, 68, 58, 58, 48, 47, 40, 37, 31, 26, 24, 20, 12, 11, 1)
bucket16 sum:990, content= (96, 91, 89, 81, 76, 74, 69, 58, 57, 51, 44, 42, 34, 32, 26, 25, 20, 12, 10, 3)
bucket17 sum:990, content= (95, 92, 89, 81, 76, 74, 68, 61, 54, 51, 44, 42, 37, 31, 26, 24, 18, 16, 8, 3)
```



```

bucket18 sum:990, content= (95, 92, 89, 81, 75, 75, 65, 63, 57, 48, 47, 40, 37, 31, 26, 24, 18, 16, 8, 3)
bucket19 sum:990, content= (94, 93, 86, 84, 75, 75, 65, 62, 52, 47, 40, 34, 33, 26, 25, 18, 12, 12, 2, 55)
bucket20 sum:991, content= (94, 93, 86, 84, 75, 74, 70, 58, 53, 53, 47, 39, 38, 31, 26, 24, 18, 12, 11, 5)
bucket21 sum:991, content= (94, 92, 90, 81, 75, 74, 70, 58, 53, 52, 48, 39, 38, 31, 26, 24, 17, 17, 7, 5)
bucket22 sum:991, content= (94, 92, 90, 80, 80, 71, 65, 62, 53, 52, 48, 39, 34, 34, 25, 25, 21, 12, 10, 4)
bucket23 sum:991, content= (94, 92, 90, 80, 80, 71, 64, 63, 53, 52, 48, 38, 38, 30, 30, 21, 21, 12, 10, 4)
bucket24 sum:989, content= (93, 93, 90, 80, 80, 71, 64, 63, 53, 52, 48, 38, 38, 30, 30, 21, 21, 12, 7, 5)
bucket25 sum:991, content= (93, 93, 85, 85, 80, 71, 63, 63, 58, 51, 44, 42, 34, 30, 30, 21, 21, 12, 11, 4)
"----Comparison for the 96 example----"
"***tf from benchmark was 1016(we added the number of machines) and target function from our local search is 1016"
***RESULT IS THE SAME
Run time: 287.133 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 27))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 97 from 130-----"
"-----START 98 from 130-----"
"input file number 98: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_7.txt"
"***Data from file U_1_0500_25_7.txt: machinesNum=25 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_25_0500_7.txt: machinesNum=25 jobsNum=500 lowerBound=1000 upperBound=1000
isOptimal=1"
Content of machines summed (999, 999, 999, 999, 999, 999, 999, 999, 1000, 1000, 999, 999, 999, 1000, 999, 999, 998, 999, 999, 999, 999, 1000,
999, 998, 999, 998)
input selected: size 500 sum 24976

----Our Results-----
best from Our local search found:
target function = 1025, num of machines=25, square root lms=0
machines content(number of jobs=500):
bucket1 sum:1000, content= (99, 88, 84, 81, 77, 72, 70, 63, 59, 54, 49, 42, 37, 31, 29, 23, 17, 15, 8, 2)
bucket2 sum:1000, content= (99, 88, 84, 81, 77, 72, 69, 64, 59, 54, 48, 43, 36, 32, 29, 23, 17, 14, 9, 2)

```

```

bucket3 sum:1000, content= (99, 87, 85, 81, 77, 72, 69, 64, 59, 54, 48, 43, 36, 32, 29, 23, 17, 14, 9, 2)
bucket4 sum:1000, content= (99, 87, 85, 81, 77, 72, 69, 64, 59, 54, 48, 43, 36, 32, 29, 23, 17, 14, 8, 3)
bucket5 sum:1000, content= (98, 88, 85, 80, 78, 71, 71, 63, 59, 54, 47, 44, 36, 32, 29, 22, 18, 14, 8, 3)
bucket6 sum:1000, content= (97, 89, 85, 80, 77, 73, 69, 63, 60, 54, 47, 44, 36, 32, 29, 21, 19, 13, 10, 2)
bucket7 sum:1000, content= (96, 90, 85, 80, 77, 73, 68, 65, 59, 54, 46, 45, 36, 31, 30, 21, 19, 13, 10, 2)
bucket8 sum:1000, content= (96, 90, 85, 80, 76, 74, 68, 65, 59, 53, 49, 42, 37, 31, 30, 21, 19, 13, 10, 2)
bucket9 sum:1000, content= (96, 90, 84, 82, 76, 73, 68, 65, 58, 55, 46, 45, 35, 33, 28, 24, 17, 13, 10, 1, 1)
bucket10 sum:1000, content= (96, 90, 84, 80, 78, 73, 68, 63, 60, 55, 46, 45, 35, 33, 28, 24, 17, 13, 10, 1, 1)
bucket11 sum:1000, content= (96, 90, 84, 80, 78, 73, 67, 66, 58, 55, 46, 45, 34, 34, 28, 24, 17, 13, 7, 4, 1)
bucket12 sum:1000, content= (95, 90, 86, 80, 76, 74, 67, 66, 58, 53, 50, 42, 37, 31, 28, 25, 16, 16, 7, 3)
bucket13 sum:1000, content= (95, 88, 86, 82, 76, 74, 67, 66, 57, 56, 46, 45, 34, 34, 28, 24, 16, 16, 7, 3)
bucket14 sum:1000, content= (95, 88, 86, 82, 76, 74, 67, 66, 57, 56, 46, 42, 38, 33, 28, 21, 20, 13, 7, 4, 1)
bucket15 sum:1000, content= (95, 88, 86, 82, 76, 74, 67, 66, 57, 56, 46, 41, 39, 33, 27, 21, 20, 16, 7, 3)
bucket16 sum:997, content= (95, 88, 86, 82, 76, 74, 67, 63, 61, 52, 50, 41, 38, 33, 27, 21, 20, 12, 11)
bucket17 sum:998, content= (94, 92, 84, 79, 78, 73, 71, 63, 57, 56, 46, 41, 39, 33, 26, 25, 18, 12, 11)
bucket18 sum:999, content= (94, 88, 87, 82, 75, 74, 71, 63, 57, 52, 51, 40, 38, 33, 26, 26, 18, 12, 6, 6)
bucket19 sum:998, content= (94, 88, 86, 83, 75, 74, 71, 62, 60, 52, 50, 40, 38, 31, 30, 21, 20, 12, 6, 5)
bucket20 sum:998, content= (93, 92, 86, 79, 78, 73, 67, 62, 62, 52, 50, 40, 38, 31, 31, 21, 20, 12, 6, 5)
bucket21 sum:998, content= (93, 92, 86, 79, 78, 73, 66, 66, 60, 52, 50, 40, 38, 31, 30, 21, 20, 12, 6, 5)
bucket22 sum:997, content= (93, 92, 86, 79, 78, 71, 71, 62, 60, 51, 51, 40, 37, 34, 26, 25, 19, 12, 6, 4)
bucket23 sum:997, content= (93, 92, 84, 82, 75, 74, 71, 62, 56, 56, 50, 40, 37, 31, 31, 20, 20, 12, 11)
bucket24 sum:997, content= (93, 92, 83, 83, 75, 74, 66, 66, 60, 51, 50, 39, 39, 34, 26, 25, 19, 11, 11)
bucket25 sum:997, content= (92, 92, 86, 79, 78, 71, 71, 62, 61, 51, 50, 39, 39, 34, 26, 25, 16, 16, 6, 3)
"----Comparison for the 97 example----"
"***tf from benchmark was 1025(we added the number of machines) and target function from our local search is 1025"
***RESULT IS THE SAME
Run time: 0.015 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 28))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 98 from 130-----"
"-----START 99 from 130-----"

```

"input file number 99: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_8.txt"
"***Data from file U_1_0500_25_8.txt: machinesNum=25 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_25_0500_8.txt: machinesNum=25 jobsNum=500 lowerBound=953 upperBound=953 isOptimal=1"
Content of machines summed (953, 952, 952, 953, 952, 951, 953, 953, 953, 953, 951, 951, 953, 953, 953, 952, 952, 952, 952, 951, 951,
951, 952, 952)
input selected: size 500 sum 23803

----Our Results-----

best from Our local search found:

target function = 978, num of machines=25, square root lms=0

machines content(number of jobs=500):

bucket1 sum:953, content= (99, 89, 86, 82, 75, 72, 66, 60, 59, 48, 43, 38, 32, 28, 23, 19, 14, 10, 7, 3)
bucket2 sum:953, content= (99, 89, 86, 82, 75, 71, 67, 60, 59, 47, 44, 38, 32, 28, 23, 19, 14, 10, 7, 3)
bucket3 sum:953, content= (99, 89, 86, 82, 75, 71, 67, 60, 59, 47, 44, 38, 32, 28, 23, 19, 14, 10, 7, 3)
bucket4 sum:953, content= (99, 89, 86, 82, 75, 70, 68, 60, 58, 49, 42, 39, 31, 29, 23, 19, 14, 10, 7, 3)
bucket5 sum:953, content= (99, 89, 86, 82, 75, 70, 68, 60, 58, 49, 42, 39, 31, 29, 23, 19, 14, 10, 7, 3)
bucket6 sum:953, content= (98, 90, 85, 83, 75, 70, 68, 60, 58, 49, 42, 39, 31, 29, 23, 19, 14, 10, 7, 2, 1)
bucket7 sum:953, content= (98, 90, 85, 83, 75, 70, 67, 61, 57, 50, 42, 38, 33, 28, 22, 20, 13, 11, 7, 2, 1)
bucket8 sum:953, content= (97, 91, 85, 83, 75, 70, 67, 61, 57, 50, 42, 38, 33, 28, 22, 20, 13, 11, 7, 2, 1)
bucket9 sum:953, content= (96, 92, 84, 84, 75, 70, 67, 61, 57, 50, 42, 38, 33, 28, 22, 20, 13, 11, 7, 1, 1, 1)
bucket10 sum:950, content= (96, 92, 84, 82, 77, 70, 66, 62, 56, 51, 42, 37, 34, 27, 24, 19, 13, 11, 7)
bucket11 sum:953, content= (96, 92, 84, 82, 77, 70, 66, 62, 56, 51, 41, 40, 31, 29, 22, 18, 16, 10, 6, 4)
bucket12 sum:950, content= (96, 91, 87, 81, 76, 69, 69, 59, 59, 49, 41, 40, 31, 27, 24, 18, 16, 9, 8)
bucket13 sum:953, content= (96, 91, 87, 81, 76, 69, 66, 63, 56, 49, 45, 37, 33, 27, 21, 21, 15, 9, 6, 5)
bucket14 sum:953, content= (96, 91, 87, 81, 76, 69, 66, 63, 55, 51, 44, 37, 33, 27, 21, 20, 16, 9, 6, 5)
bucket15 sum:952, content= (95, 93, 84, 81, 78, 69, 66, 63, 54, 52, 44, 37, 31, 29, 21, 20, 16, 9, 6, 4)
bucket16 sum:953, content= (95, 93, 84, 81, 76, 73, 65, 62, 54, 52, 44, 36, 34, 27, 21, 20, 15, 11, 6, 4)
bucket17 sum:953, content= (95, 91, 88, 80, 75, 73, 65, 62, 54, 52, 41, 40, 30, 30, 21, 20, 15, 11, 6, 4)
bucket18 sum:952, content= (95, 91, 88, 80, 74, 73, 65, 63, 54, 51, 45, 36, 34, 26, 24, 18, 15, 11, 5, 4)
bucket19 sum:953, content= (95, 91, 88, 80, 74, 73, 64, 64, 53, 53, 41, 40, 30, 30, 21, 20, 15, 9, 8, 4)
bucket20 sum:953, content= (95, 91, 84, 84, 74, 73, 64, 64, 53, 53, 41, 40, 30, 30, 21, 20, 15, 9, 8, 4)

```

bucket21 sum:952, content= (94, 94, 84, 80, 78, 72, 64, 63, 53, 53, 41, 40, 30, 29, 24, 17, 17, 9, 5, 5)
bucket22 sum:952, content= (94, 90, 88, 80, 78, 72, 64, 62, 59, 47, 45, 36, 34, 26, 24, 17, 15, 12, 5, 4)
bucket23 sum:949, content= (94, 90, 88, 79, 79, 72, 64, 62, 59, 47, 45, 35, 34, 26, 25, 17, 15, 9, 9)
bucket24 sum:949, content= (94, 90, 88, 79, 78, 72, 64, 64, 53, 51, 45, 35, 35, 26, 25, 17, 12, 12, 9)
bucket25 sum:949, content= (94, 89, 88, 84, 74, 72, 64, 61, 59, 47, 46, 35, 35, 26, 25, 17, 12, 12, 9)
"----Comparison for the 98 example----"
"***tf from benchmark was 978(we added the number of machines) and target function from our local search is 978"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 29))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 99 from 130-----"
"-----START 100 from 130-----"
"input file number 100: inputName=C:/algo/h/docs/benchMark/all/U_1_0500_25_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_0500_9.txt"
"***Data from file U_1_0500_25_9.txt: machinesNum=25 jobsNum=500"
"***SOLUTION Data from file SOL_U_1_25_0500_9.txt: machinesNum=25 jobsNum=500 lowerBound=988 upperBound=988 isOptimal=1"
Content of machines summed (988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988, 988,
988, 988, 981)
input selected: size 500 sum 24693

```

----Our Results-----

best from Our local search found:

target function = 1013, num of machines=25, square root lms=0

machines content(number of jobs=500):

```

bucket1 sum:988, content= (70, 62, 51, 43, 39, 35, 27, 23, 14, 11, 7, 5, 98, 87, 81, 87, 74, 69, 57, 48)
bucket2 sum:988, content= (99, 89, 81, 75, 70, 67, 63, 58, 51, 46, 44, 39, 35, 27, 23, 14, 11, 7, 89)
bucket3 sum:988, content= (99, 89, 80, 70, 67, 63, 58, 51, 46, 44, 39, 35, 27, 22, 15, 11, 7, 1, 88, 76)
bucket4 sum:988, content= (99, 89, 80, 74, 71, 67, 63, 58, 51, 46, 44, 39, 34, 28, 22, 14, 12, 7, 1, 1, 88)
bucket5 sum:988, content= (99, 89, 86, 71, 67, 63, 57, 52, 46, 44, 39, 34, 28, 22, 14, 12, 7, 1, 75, 82)
bucket6 sum:988, content= (99, 89, 86, 81, 74, 71, 67, 63, 52, 47, 44, 39, 34, 28, 22, 14, 12, 7, 1, 58)

```

```

bucket7 sum:988, content= (98, 91, 86, 79, 70, 67, 62, 59, 51, 45, 45, 38, 36, 27, 21, 15, 12, 7, 4, 75)
bucket8 sum:988, content= (98, 91, 86, 79, 76, 70, 67, 62, 59, 50, 46, 44, 38, 36, 27, 21, 15, 12, 7, 4)
bucket9 sum:988, content= (91, 86, 79, 76, 69, 68, 62, 57, 52, 47, 44, 38, 34, 28, 24, 14, 11, 7, 2, 99)
bucket10 sum:987, content= (98, 91, 85, 78, 77, 71, 66, 64, 57, 52, 45, 45, 38, 33, 29, 21, 16, 12, 7, 2)
bucket11 sum:987, content= (98, 88, 88, 78, 77, 71, 66, 64, 57, 50, 48, 43, 40, 32, 29, 20, 17, 11, 8, 2)
bucket12 sum:987, content= (97, 92, 85, 77, 77, 72, 66, 62, 60, 50, 47, 43, 40, 32, 29, 20, 17, 11, 8, 2)
bucket13 sum:988, content= (97, 92, 84, 81, 76, 69, 68, 62, 56, 52, 48, 43, 40, 32, 29, 20, 17, 11, 8, 3)
bucket14 sum:988, content= (97, 92, 84, 81, 76, 69, 68, 62, 55, 52, 49, 43, 40, 32, 29, 20, 17, 10, 9, 3)
bucket15 sum:988, content= (97, 92, 84, 81, 76, 68, 62, 55, 52, 48, 45, 38, 31, 30, 24, 13, 13, 7, 4, 68)
bucket16 sum:988, content= (97, 92, 84, 74, 72, 65, 64, 54, 53, 48, 43, 40, 31, 29, 25, 13, 13, 6, 6, 79)
bucket17 sum:988, content= (96, 93, 84, 80, 74, 72, 65, 64, 54, 53, 43, 40, 31, 29, 25, 13, 13, 6, 6, 47)
bucket18 sum:987, content= (96, 93, 84, 81, 74, 72, 65, 64, 54, 53, 48, 42, 40, 37, 27, 19, 16, 10, 9, 3)
bucket19 sum:987, content= (96, 93, 84, 81, 74, 71, 68, 62, 54, 53, 47, 45, 38, 30, 30, 26, 13, 10, 9, 3)
bucket20 sum:987, content= (96, 93, 84, 81, 74, 71, 68, 61, 60, 49, 47, 42, 40, 30, 30, 26, 13, 10, 9, 3)
bucket21 sum:988, content= (96, 92, 84, 74, 69, 69, 61, 61, 49, 47, 41, 41, 30, 30, 25, 15, 10, 9, 4, 81)
bucket22 sum:987, content= (95, 94, 83, 82, 73, 73, 65, 64, 54, 53, 47, 45, 38, 30, 30, 24, 16, 10, 8, 3)
bucket23 sum:988, content= (95, 94, 83, 82, 73, 73, 65, 64, 54, 52, 49, 41, 40, 37, 28, 18, 18, 10, 8, 4)
bucket24 sum:988, content= (95, 88, 83, 73, 69, 69, 64, 53, 53, 49, 41, 40, 37, 28, 18, 16, 13, 8, 4, 87)
bucket25 sum:988, content= (95, 88, 88, 81, 77, 69, 68, 61, 61, 49, 47, 41, 40, 37, 27, 18, 18, 10, 9, 4)
"----Comparison for the 99 example----"
"***tf from benchmark was 1013(we added the number of machines) and target function from our local search is 1013"
***RESULT IS THE SAME
Run time: 917.92 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 100 from 130-----"
"-----START 101 from 130-----"

"***Data from file U_1_1000_05_0.txt: machinesNum=5 jobsNum=1000"

```

***SOLUTION Data from file SOL_U_1_05_1000_0.txt: machinesNum=5 jobsNum=1000 lowerBound=9990 upperBound=9990
isOptimal=1"

Content of machines summed (9990, 9990, 9989, 9989, 9989)
input selected: size 1000 sum 49947

----Our Results-----

best from Our local search found:

target function = 9995, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:9990, content=(99, 99, 99, 97, 97, 97, 96, 96, 95, 95, 93, 93, 92, 92, 92, 91, 91, 90, 90, 89, 89, 87, 87, 87, 87, 86, 86, 85, 84, 84, 84, 84, 82, 82, 82, 81, 81, 81, 80, 80, 79, 78, 78, 78, 77, 76, 76, 75, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 71, 70, 70, 69, 69, 68, 67, 67, 67, 66, 66, 66, 65, 64, 63, 63, 63, 62, 61, 60, 60, 60, 58, 58, 58, 58, 57, 56, 56, 55, 55, 55, 54, 54, 53, 53, 53, 52, 52, 51, 51, 51, 51, 51, 50, 49, 49, 48, 47, 47, 47, 46, 46, 44, 44, 44, 44, 43, 42, 42, 42, 41, 40, 40, 40, 38, 38, 37, 36, 36, 35, 35, 35, 34, 34, 33, 33, 32, 31, 31, 30, 30, 30, 29, 29, 28, 28, 28, 27, 26, 26, 26, 26, 25, 25, 23, 23, 23, 23, 22, 21, 21, 20, 20, 20, 20, 18, 18, 18, 18, 17, 16, 16, 16, 15, 14, 14, 13, 12, 11, 11, 10, 10, 10, 9, 8, 8, 8, 8, 7, 7, 7, 5, 5, 4, 4, 3, 3, 3, 2, 1, 1)

bucket2 sum:9990, content=(99, 99, 99, 97, 97, 96, 96, 96, 96, 94, 94, 93, 92, 92, 92, 91, 91, 90, 90, 89, 88, 88, 87, 87, 86, 86, 86, 85, 85, 84, 84, 83, 83, 82, 82, 81, 81, 81, 80, 80, 79, 78, 78, 78, 77, 76, 76, 75, 75, 75, 74, 73, 73, 73, 73, 72, 71, 71, 70, 70, 70, 70, 69, 68, 67, 67, 67, 66, 66, 66, 64, 64, 64, 63, 63, 62, 61, 60, 60, 59, 59, 58, 58, 57, 57, 56, 56, 56, 55, 55, 54, 54, 53, 53, 52, 52, 52, 52, 51, 51, 51, 50, 50, 50, 49, 48, 47, 47, 47, 46, 45, 45, 44, 44, 43, 43, 43, 42, 42, 41, 40, 40, 39, 39, 37, 37, 37, 36, 35, 35, 35, 34, 34, 33, 32, 32, 32, 31, 30, 30, 29, 29, 29, 29, 28, 28, 27, 26, 26, 26, 26, 25, 24, 24, 23, 23, 22, 22, 21, 21, 21, 20, 20, 20, 18, 18, 18, 17, 17, 17, 16, 15, 15, 14, 14, 13, 13, 11, 11, 10, 10, 9, 9, 9, 8, 8, 8, 7, 7, 6, 6, 5, 4, 4, 3, 3, 3, 2, 1, 1)

bucket3 sum:9989, content=(99, 99, 98, 98, 97, 96, 96, 96, 95, 95, 94, 93, 92, 92, 91, 91, 91, 91, 90, 89, 88, 88, 87, 87, 86, 86, 86, 85, 85, 84, 84, 83, 83, 82, 81, 81, 81, 81, 81, 80, 79, 78, 78, 78, 77, 76, 76, 75, 75, 74, 74, 74, 73, 73, 73, 71, 71, 71, 71, 70, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 65, 64, 64, 63, 63, 61, 61, 61, 60, 59, 59, 58, 58, 57, 57, 56, 56, 56, 55, 55, 54, 54, 53, 53, 52, 52, 52, 52, 51, 51, 51, 50, 50, 50, 48, 48, 48, 47, 47, 46, 45, 45, 44, 44, 43, 43, 43, 42, 42, 41, 40, 40, 39, 39, 37, 37, 37, 36, 35, 35, 35, 34, 34, 33, 32, 32, 31, 31, 31, 30, 29, 29, 29, 28, 28, 28, 27, 27, 26, 26, 26, 25, 24, 24, 23, 23, 22, 22, 21, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 17, 16, 15, 15, 14, 14, 13, 12, 12, 11, 10, 10, 9, 9, 9, 8, 8, 8, 7, 7, 6, 6, 5, 4, 4, 3, 3, 3, 1, 1, 1)

bucket4 sum:9989, content=(99, 99, 98, 98, 97, 96, 96, 96, 95, 95, 94, 93, 92, 92, 91, 91, 91, 91, 90, 89, 88, 88, 87, 87, 86, 86, 86, 85, 85, 84, 84, 83, 82, 82, 82, 81, 81, 81, 81, 80, 79, 78, 78, 77, 77, 77, 75, 75, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 71, 70, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 65, 64, 64, 63, 63, 61, 61, 61, 60, 59, 59, 58, 58, 57, 57, 56, 56, 56, 55, 55, 54, 54, 53, 53, 52, 52, 52, 51, 51, 51, 51, 51, 50, 50, 48, 48, 48, 47, 46, 46, 46, 45, 44, 44, 43, 43, 43, 42, 41, 41, 41, 40, 39, 38, 38, 37, 36, 36, 36, 35, 35, 34, 33, 33, 33, 32, 31, 31, 31, 30, 29, 29, 29, 28,

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28, 28, 27, 27, 26, 26, 25, 25, 25, 24, 23, 23, 22, 22, 21, 21, 21, 20, 20, 19, 18, 18, 18, 18, 17, 17, 16, 15, 15, 14, 14, 13, 12, 12, 11, 10, 10, 9, 9,
9, 8, 8, 7, 7, 7, 7, 6, 5, 4, 4, 3, 3, 2, 2, 1, 1)
bucket5 sum:9989, content= (99, 99, 98, 98, 97, 96, 96, 96, 95, 95, 93, 93, 93, 92, 91, 91, 91, 91, 90, 89, 88, 88, 87, 87, 86, 86, 86, 85, 85, 84,
84, 83, 82, 82, 82, 81, 81, 81, 80, 80, 80, 78, 78, 77, 77, 76, 76, 75, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 71, 70, 70, 69, 69, 68, 68, 67, 66, 66,
66, 66, 65, 64, 64, 63, 62, 62, 61, 60, 60, 60, 59, 58, 58, 57, 57, 56, 56, 56, 55, 54, 54, 54, 53, 53, 53, 52, 52, 51, 51, 51, 51, 51, 50, 49, 49, 48,
48, 47, 46, 46, 46, 45, 44, 44, 43, 43, 42, 42, 42, 41, 41, 40, 39, 38, 38, 37, 36, 36, 35, 35, 35, 34, 34, 33, 33, 32, 31, 31, 30, 30, 30, 29, 29, 28,
28, 28, 27, 26, 26, 26, 26, 25, 25, 24, 23, 23, 22, 22, 21, 21, 20, 20, 20, 20, 18, 18, 18, 18, 17, 17, 16, 15, 15, 14, 14, 13, 12, 12, 11, 10, 10, 9, 9,
8, 8, 8, 8, 7, 7, 7, 6, 5, 4, 3, 3, 3, 3, 2, 1, 1)
"----Comparison for the 100 example----"
"***tf from benchmark was 9995(we added the number of machines) and target function from our local search is 9995"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 1))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 101 from 130-----"
"-----START 102 from 130-----"
"input file number 102: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_1.txt"
"***Data from file U_1_1000_05_1.txt: machinesNum=5 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_05_1000_1.txt: machinesNum=5 jobsNum=1000 lowerBound=10263 upperBound=10263
isOptimal=1"
Content of machines summed (10263, 10263, 10263, 10262, 10262)
input selected: size 1000 sum 51313

```

----Our Results-----

best from Our local search found:

target function = 10268, num of machines=5, square root lms=0

machines content(number of jobs=1000):

```

bucket1 sum:10263, content= (99, 99, 98, 98, 98, 97, 96, 96, 96, 95, 95, 94, 94, 93, 93, 93, 92, 91, 91, 90, 90, 90, 88, 88, 88, 87, 87, 86, 86, 85,
85, 84, 83, 83, 83, 83, 82, 81, 81, 80, 79, 79, 78, 78, 78, 77, 77, 77, 76, 76, 75, 74, 74, 74, 73, 72, 72, 72, 71, 71, 71, 70, 69, 69, 69, 68, 68, 68,
67, 66, 65, 65, 65, 64, 64, 63, 63, 62, 62, 61, 61, 60, 59, 59, 59, 57, 57, 57, 56, 56, 55, 55, 55, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 49, 49, 49,

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47, 47, 47, 47, 46, 46, 45, 45, 45, 43, 43, 43, 42, 42, 41, 41, 41, 40, 40, 39, 39, 39, 38, 38, 37, 37, 37, 36, 35, 35, 35, 34, 34, 33, 32, 32, 32, 32, 31, 30, 30, 29, 29, 29, 29, 28, 28, 27, 26, 26, 26, 24, 24, 24, 23, 23, 22, 22, 22, 21, 20, 20, 19, 18, 17, 17, 17, 15, 15, 15, 15, 14, 13, 13, 12, 12, 11, 11, 9, 9, 9, 7, 6, 6, 6, 5, 4, 4, 4, 3, 2, 2, 2, 1)
bucket2 sum:10263, content= (99, 99, 98, 98, 97, 97, 97, 96, 96, 95, 95, 94, 93, 93, 93, 93, 92, 92, 91, 90, 90, 90, 88, 88, 88, 87, 87, 86, 86, 85, 84, 84, 84, 83, 83, 83, 82, 81, 81, 80, 79, 79, 78, 78, 78, 77, 77, 77, 76, 76, 75, 74, 74, 74, 73, 72, 72, 72, 71, 71, 71, 70, 69, 69, 69, 68, 68, 67, 67, 67, 65, 65, 65, 64, 64, 63, 62, 62, 62, 62, 60, 60, 60, 59, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 49, 49, 48, 48, 47, 47, 47, 46, 46, 45, 45, 45, 43, 43, 42, 42, 42, 42, 41, 41, 40, 40, 39, 39, 39, 38, 38, 37, 37, 37, 36, 35, 35, 34, 34, 34, 33, 33, 32, 32, 31, 31, 31, 30, 29, 29, 29, 29, 28, 28, 27, 26, 26, 25, 25, 24, 24, 23, 23, 22, 22, 22, 21, 20, 20, 19, 18, 17, 17, 17, 15, 15, 15, 15, 14, 13, 13, 12, 12, 11, 11, 9, 9, 9, 7, 6, 6, 6, 5, 4, 4, 4, 3, 2, 2, 2, 1)
bucket3 sum:10263, content= (99, 99, 98, 98, 97, 97, 96, 96, 96, 95, 95, 95, 93, 93, 93, 93, 92, 91, 91, 91, 90, 89, 89, 88, 87, 87, 87, 86, 86, 86, 84, 84, 84, 83, 83, 82, 82, 82, 80, 80, 80, 79, 78, 78, 78, 77, 77, 77, 76, 76, 75, 74, 74, 73, 73, 73, 72, 72, 71, 71, 71, 70, 69, 69, 69, 68, 68, 67, 67, 67, 65, 65, 64, 64, 64, 64, 62, 62, 62, 61, 61, 60, 60, 59, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 49, 49, 48, 48, 47, 47, 47, 46, 46, 45, 45, 44, 44, 43, 42, 42, 42, 42, 41, 41, 40, 40, 39, 39, 39, 38, 38, 37, 37, 37, 36, 35, 35, 34, 34, 34, 33, 33, 32, 32, 31, 31, 30, 30, 30, 29, 29, 28, 28, 28, 28, 26, 26, 25, 25, 24, 23, 23, 23, 23, 22, 21, 21, 21, 19, 19, 19, 17, 17, 16, 16, 15, 15, 15, 14, 13, 13, 12, 12, 11, 10, 10, 9, 8, 8, 6, 6, 5, 5, 5, 4, 3, 3, 3, 2, 2, 1)
bucket4 sum:10262, content= (99, 99, 98, 98, 97, 97, 96, 96, 96, 95, 95, 94, 94, 93, 93, 93, 92, 91, 91, 91, 90, 89, 89, 88, 87, 87, 87, 86, 86, 85, 85, 84, 84, 83, 83, 82, 82, 81, 81, 80, 80, 79, 78, 78, 78, 77, 77, 77, 76, 75, 75, 75, 74, 73, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 69, 68, 68, 68, 67, 67, 67, 65, 65, 64, 64, 64, 63, 63, 62, 62, 61, 61, 60, 60, 59, 58, 58, 57, 57, 56, 56, 55, 55, 54, 54, 54, 53, 53, 52, 51, 51, 51, 50, 50, 49, 49, 49, 48, 47, 47, 47, 46, 46, 45, 45, 44, 44, 43, 42, 42, 42, 42, 41, 41, 40, 40, 39, 39, 39, 38, 38, 37, 37, 36, 36, 36, 35, 34, 34, 34, 33, 33, 32, 32, 31, 31, 30, 30, 30, 29, 29, 28, 28, 28, 28, 26, 26, 25, 25, 24, 23, 23, 23, 23, 22, 21, 21, 21, 19, 19, 18, 18, 17, 16, 16, 15, 15, 14, 14, 14, 13, 12, 12, 11, 10, 10, 9, 8, 7, 7, 6, 5, 5, 5, 4, 3, 3, 3, 2, 1, 1)
bucket5 sum:10262, content= (99, 98, 98, 98, 98, 97, 96, 96, 96, 95, 95, 94, 94, 93, 93, 93, 92, 91, 91, 91, 90, 89, 88, 88, 88, 87, 87, 86, 86, 85, 85, 84, 84, 83, 83, 82, 82, 81, 81, 80, 80, 78, 78, 78, 78, 77, 77, 77, 76, 76, 75, 74, 74, 74, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 69, 68, 68, 68, 67, 66, 66, 65, 64, 64, 64, 63, 63, 62, 62, 61, 61, 60, 59, 59, 59, 57, 57, 57, 56, 56, 56, 55, 54, 54, 54, 53, 52, 52, 52, 51, 51, 50, 50, 49, 49, 49, 48, 47, 47, 46, 46, 46, 45, 45, 45, 44, 43, 42, 42, 42, 41, 41, 41, 40, 40, 39, 39, 39, 38, 38, 38, 37, 36, 36, 35, 35, 35, 34, 34, 33, 33, 32, 32, 31, 31, 30, 30, 29, 29, 29, 29, 28, 28, 27, 27, 26, 25, 24, 24, 24, 23, 23, 23, 22, 21, 21, 20, 20, 19, 18, 17, 17, 17, 16, 15, 15, 14, 14, 13, 13, 13, 12, 11, 10, 9, 9, 9, 7, 6, 6, 6, 5, 5, 4, 3, 3, 2, 2, 2, 1)
"----Comparison for the 101 example----"
"***tf from benchmark was 10268(we added the number of machines) and target function from our local search is 10268"
***RESULT IS THE SAME
Run time: 0 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 2))


```
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 102 from 130-----"
"-----START 103 from 130-----"
"input file number 103: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_2.txt"
"***Data from file U_1_1000_05_2.txt: machinesNum=5 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_05_1000_2.txt: machinesNum=5 jobsNum=1000 lowerBound=10073 upperBound=10073
isOptimal=1"
Content of machines summed (10073, 10073, 10073, 10072, 10072)
input selected: size 1000 sum 50363
```

----Our Results-----

best from Our local search found:

target function = 10078, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:10073, content= (99, 99, 98, 98, 97, 97, 96, 96, 95, 95, 94, 94, 93, 92, 92, 92, 91, 90, 89, 89, 89, 87, 87, 87, 86, 86, 86, 85, 85, 84, 84, 84, 83, 83, 83, 82, 82, 82, 81, 81, 81, 80, 80, 79, 79, 79, 77, 77, 76, 76, 75, 75, 74, 74, 74, 73, 73, 73, 72, 72, 71, 70, 69, 69, 69, 68, 68, 67, 66, 66, 66, 66, 65, 64, 64, 64, 63, 62, 62, 62, 61, 60, 60, 60, 59, 58, 58, 57, 57, 56, 56, 56, 55, 55, 55, 54, 54, 53, 53, 53, 53, 52, 51, 50, 50, 49, 49, 48, 48, 46, 46, 46, 45, 44, 44, 43, 42, 42, 42, 41, 40, 39, 39, 39, 37, 37, 37, 36, 35, 35, 35, 34, 33, 33, 32, 31, 31, 31, 30, 30, 29, 29, 29, 28, 28, 27, 27, 26, 25, 25, 25, 24, 24, 23, 22, 22, 21, 21, 20, 20, 20, 19, 19, 18, 18, 17, 17, 17, 17, 16, 15, 14, 14, 14, 13, 13, 12, 12, 12, 11, 10, 10, 9, 8, 8, 7, 6, 6, 6, 5, 5, 4, 4, 3, 3, 2, 2, 2, 1, 1)

bucket2 sum:10073, content= (99, 99, 98, 97, 97, 97, 97, 96, 95, 95, 94, 93, 93, 92, 92, 92, 91, 91, 89, 89, 88, 88, 87, 86, 86, 86, 86, 86, 85, 84, 84, 84, 83, 83, 83, 82, 82, 82, 81, 81, 81, 80, 80, 79, 79, 78, 78, 77, 76, 76, 75, 75, 74, 74, 74, 73, 73, 73, 72, 72, 71, 70, 69, 69, 69, 68, 67, 67, 67, 66, 66, 66, 65, 64, 64, 64, 63, 62, 62, 62, 61, 60, 60, 60, 58, 58, 58, 58, 57, 56, 56, 56, 55, 55, 55, 54, 54, 53, 53, 53, 52, 52, 52, 50, 49, 49, 49, 49, 47, 47, 46, 46, 45, 44, 43, 43, 43, 42, 41, 41, 41, 39, 39, 38, 38, 37, 36, 36, 36, 35, 35, 34, 33, 33, 32, 31, 31, 31, 30, 30, 29, 29, 29, 28, 28, 27, 27, 26, 25, 25, 25, 24, 23, 23, 22, 22, 22, 21, 20, 20, 20, 19, 19, 18, 18, 17, 17, 17, 16, 16, 16, 14, 14, 14, 13, 13, 12, 12, 12, 11, 10, 10, 9, 8, 8, 7, 6, 6, 6, 5, 5, 4, 3, 3, 3, 3, 2, 2, 1, 1)

bucket3 sum:10073, content= (99, 99, 98, 97, 97, 97, 97, 96, 95, 95, 94, 93, 93, 92, 92, 92, 91, 90, 90, 89, 88, 88, 87, 86, 86, 86, 86, 85, 85, 85, 84, 84, 83, 83, 83, 82, 82, 81, 81, 81, 81, 80, 80, 80, 79, 78, 78, 77, 76, 76, 75, 75, 74, 74, 74, 73, 73, 73, 72, 71, 71, 71, 69, 69, 68, 68, 68, 67, 67, 66, 66, 66, 65, 64, 64, 64, 63, 62, 62, 61, 61, 61, 60, 59, 59, 58, 58, 57, 57, 57, 56, 56, 55, 55, 55, 54, 54, 53, 53, 53, 52, 52, 51, 50, 50, 49, 49, 49, 47, 47, 46, 46, 45, 44, 43, 43, 43, 42, 41, 41, 40, 40, 39, 38, 38, 37, 36, 36, 36, 35, 35, 34, 33, 32, 32, 32, 31, 31, 30, 30, 29, 29, 29, 28,

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28, 27, 26, 26, 26, 25, 25, 24, 23, 23, 22, 22, 21, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 17, 16, 16, 15, 15, 14, 13, 13, 13, 13, 12, 12, 11, 10, 9, 9,
9, 8, 7, 6, 6, 6, 5, 4, 4, 4, 3, 3, 3, 2, 2, 1, 1)
bucket4 sum:10072, content= (99, 99, 98, 97, 97, 97, 97, 96, 95, 95, 94, 93, 93, 92, 92, 92, 91, 90, 90, 89, 88, 88, 87, 86, 86, 86, 86, 85, 85, 84,
84, 84, 84, 83, 83, 82, 82, 81, 81, 81, 81, 80, 80, 80, 79, 78, 78, 77, 76, 76, 75, 75, 74, 74, 74, 73, 73, 72, 72, 72, 71, 70, 70, 69, 68, 68, 68, 67,
67, 66, 66, 66, 65, 64, 64, 63, 63, 63, 62, 61, 61, 61, 60, 59, 59, 58, 58, 57, 57, 57, 56, 56, 55, 55, 54, 54, 54, 54, 53, 53, 52, 52, 51, 50, 50, 49,
49, 48, 48, 47, 46, 46, 45, 44, 43, 43, 42, 42, 42, 41, 40, 40, 39, 38, 38, 37, 36, 36, 36, 35, 34, 34, 33, 33, 32, 32, 31, 30, 30, 30, 30, 29, 29, 28,
27, 27, 27, 26, 26, 25, 25, 24, 23, 23, 22, 22, 21, 21, 21, 20, 19, 19, 19, 19, 18, 17, 17, 17, 16, 16, 15, 15, 14, 13, 13, 13, 13, 12, 12, 11, 10, 9, 9,
9, 8, 7, 6, 6, 5, 5, 5, 4, 4, 3, 3, 2, 2, 2, 1, 1)
bucket5 sum:10072, content= (99, 99, 98, 97, 97, 97, 96, 96, 96, 94, 94, 94, 93, 92, 92, 92, 91, 90, 90, 89, 88, 87, 87, 87, 86, 86, 86, 85, 85, 84,
84, 84, 83, 83, 83, 82, 82, 82, 81, 81, 81, 80, 80, 80, 79, 78, 77, 77, 76, 76, 76, 75, 74, 74, 74, 73, 73, 72, 72, 72, 71, 70, 70, 69, 68, 68, 68, 67,
67, 66, 66, 65, 65, 65, 64, 63, 63, 63, 62, 61, 61, 61, 60, 59, 59, 58, 58, 57, 57, 56, 56, 56, 56, 55, 54, 54, 54, 53, 53, 53, 53, 52, 51, 50, 50, 49,
49, 48, 48, 47, 46, 46, 44, 44, 44, 43, 42, 42, 42, 41, 40, 40, 39, 38, 38, 37, 36, 36, 36, 35, 34, 34, 33, 33, 32, 32, 31, 30, 30, 30, 30, 29, 28, 28,
28, 27, 27, 26, 26, 25, 24, 24, 24, 23, 22, 22, 21, 21, 20, 20, 20, 19, 19, 18, 18, 18, 17, 17, 16, 16, 15, 15, 14, 13, 13, 13, 13, 12, 11, 11, 10, 10, 9,
8, 8, 7, 7, 6, 5, 5, 5, 4, 4, 3, 3, 2, 2, 2, 1, 1)
"----Comparison for the 102 example----"
"***tf from benchmark was 10078(we added the number of machines) and target function from our local search is 10078"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 3))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 103 from 130-----"
"-----START 104 from 130-----"
"input file number 104: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_3.txt"
"***Data from file U_1_1000_05_3.txt: machinesNum=5 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_05_1000_3.txt: machinesNum=5 jobsNum=1000 lowerBound=10106 upperBound=10106
isOptimal=1"
Content of machines summed (10106, 10106, 10105, 10105, 10105)
input selected: size 1000 sum 50527

----Our Results-----

```

best from Our local search found:

target function = 10111, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:10106, content= (99, 99, 99, 99, 98, 98, 98, 97, 97, 95, 95, 95, 94, 93, 93, 92, 92, 92, 91, 91, 90, 89, 89, 88, 87, 86, 86, 85, 84, 84, 83, 83, 82, 82, 81, 81, 81, 80, 80, 80, 79, 78, 78, 77, 77, 77, 76, 76, 75, 75, 75, 75, 74, 73, 72, 72, 72, 71, 70, 70, 69, 69, 68, 68, 67, 67, 67, 66, 66, 65, 65, 65, 65, 65, 64, 64, 63, 62, 62, 61, 61, 60, 60, 60, 59, 59, 58, 58, 58, 57, 56, 56, 55, 54, 54, 53, 53, 53, 53, 51, 51, 50, 50, 49, 49, 48, 47, 47, 46, 45, 45, 44, 44, 43, 43, 42, 42, 41, 41, 41, 41, 40, 40, 40, 39, 38, 38, 37, 37, 36, 36, 35, 35, 35, 34, 34, 33, 33, 33, 32, 31, 31, 30, 29, 29, 29, 28, 27, 27, 26, 26, 25, 24, 24, 24, 23, 23, 22, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 16, 16, 16, 15, 14, 14, 14, 13, 13, 13, 12, 12, 11, 11, 10, 10, 9, 9, 7, 7, 7, 6, 6, 5, 5, 4, 3, 3, 3, 2, 1, 1)

bucket2 sum:10106, content= (99, 99, 99, 99, 98, 98, 98, 97, 96, 96, 95, 94, 94, 94, 93, 92, 92, 92, 91, 91, 90, 89, 89, 87, 87, 87, 85, 85, 85, 84, 83, 83, 82, 82, 81, 81, 81, 80, 80, 80, 79, 78, 78, 77, 77, 77, 76, 76, 75, 75, 75, 74, 74, 73, 73, 72, 72, 71, 70, 69, 69, 69, 69, 67, 67, 67, 67, 67, 66, 65, 65, 65, 65, 65, 64, 63, 63, 63, 62, 61, 61, 60, 60, 60, 59, 59, 58, 58, 58, 57, 56, 55, 55, 55, 54, 53, 53, 53, 52, 52, 51, 50, 50, 49, 48, 48, 48, 46, 46, 46, 45, 44, 44, 43, 43, 42, 42, 41, 41, 41, 40, 40, 40, 40, 39, 39, 38, 37, 36, 36, 36, 35, 35, 35, 34, 34, 34, 33, 32, 32, 32, 31, 30, 29, 29, 29, 28, 27, 27, 26, 25, 25, 25, 24, 23, 23, 23, 22, 21, 21, 20, 20, 20, 19, 18, 17, 17, 17, 17, 16, 15, 15, 15, 14, 14, 13, 13, 13, 12, 12, 11, 11, 10, 10, 9, 8, 8, 7, 7, 6, 6, 5, 5, 4, 3, 3, 3, 2, 1, 1)

bucket3 sum:10105, content= (99, 99, 99, 99, 98, 98, 97, 97, 97, 96, 95, 94, 94, 93, 93, 93, 92, 92, 91, 90, 90, 90, 88, 88, 87, 87, 85, 85, 85, 84, 83, 83, 82, 82, 81, 81, 81, 80, 80, 79, 79, 79, 78, 77, 77, 77, 76, 75, 75, 75, 75, 75, 74, 73, 73, 72, 72, 71, 70, 69, 69, 69, 68, 68, 67, 67, 67, 67, 66, 65, 65, 65, 65, 64, 64, 64, 63, 63, 62, 61, 61, 60, 60, 59, 59, 59, 59, 58, 57, 57, 56, 56, 55, 55, 54, 53, 53, 53, 52, 52, 51, 50, 50, 49, 48, 48, 47, 47, 46, 45, 45, 45, 43, 43, 43, 43, 42, 41, 41, 41, 40, 40, 40, 40, 39, 39, 38, 37, 36, 36, 36, 35, 35, 35, 34, 34, 34, 33, 32, 32, 32, 30, 30, 30, 29, 28, 28, 28, 27, 26, 25, 25, 25, 24, 23, 23, 23, 22, 21, 21, 20, 20, 19, 19, 19, 17, 17, 17, 17, 16, 15, 15, 14, 14, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 9, 8, 8, 7, 7, 6, 6, 5, 4, 4, 4, 3, 3, 1, 1, 1)

bucket4 sum:10105, content= (99, 99, 99, 99, 98, 98, 97, 97, 97, 96, 95, 94, 94, 93, 93, 93, 92, 92, 91, 90, 90, 90, 88, 88, 87, 87, 85, 85, 85, 84, 83, 82, 82, 82, 81, 81, 81, 80, 80, 80, 79, 78, 78, 78, 77, 76, 76, 76, 75, 75, 75, 75, 74, 73, 73, 72, 71, 71, 70, 70, 69, 69, 68, 68, 67, 67, 67, 66, 66, 66, 65, 65, 65, 64, 64, 64, 63, 63, 61, 61, 61, 60, 60, 60, 59, 59, 59, 58, 57, 57, 56, 56, 55, 55, 54, 53, 53, 53, 52, 52, 51, 50, 49, 49, 49, 48, 47, 47, 46, 45, 45, 44, 44, 43, 43, 43, 42, 41, 41, 41, 40, 40, 40, 40, 39, 39, 38, 37, 36, 36, 36, 35, 35, 35, 34, 34, 33, 33, 33, 32, 31, 31, 30, 29, 29, 29, 28, 28, 26, 26, 26, 25, 24, 24, 24, 23, 23, 22, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 16, 16, 16, 15, 14, 14, 14, 13, 13, 13, 12, 12, 11, 11, 10, 10, 10, 8, 7, 7, 7, 6, 6, 5, 5, 4, 4, 3, 2, 2, 1, 1)

bucket5 sum:10105, content= (99, 99, 99, 98, 98, 98, 98, 97, 97, 96, 95, 94, 94, 93, 93, 93, 92, 92, 91, 90, 90, 90, 88, 88, 87, 86, 86, 85, 85, 84, 83, 82, 82, 82, 81, 81, 81, 80, 80, 80, 79, 78, 78, 77, 77, 77, 76, 76, 75, 75, 75, 75, 74, 73, 73, 72, 71, 71, 70, 70, 69, 69, 68, 68, 67, 67, 67, 66, 66, 66, 65, 65, 65, 64, 64, 64, 63, 63, 61, 61, 61, 60, 60, 60, 59, 59, 58, 58, 58, 57, 56, 56, 55, 54, 54, 54, 53, 53, 52, 52, 51, 50, 49, 49, 49, 48, 47, 47, 46, 45, 45, 44, 44, 43, 43, 42, 42, 42, 41, 41, 40, 40, 40, 40, 39, 38, 38, 37, 37, 36, 36, 35, 35, 35, 34, 34, 33, 33, 33, 32, 31, 31, 30, 29,

29, 29, 28, 27, 27, 26, 26, 25, 24, 24, 24, 23, 23, 22, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 16, 16, 16, 15, 14, 14, 14, 13, 13, 13, 12, 12, 11, 11, 10, 10, 10, 8, 7, 7, 7, 6, 6, 5, 5, 4, 4, 3, 2, 2, 1, 1)

"----Comparison for the 103 example----

****tf from benchmark was 10111(we added the number of machines) and target function from our local search is 10111"

***RESULT IS THE SAME

Run time: 0.015 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 4))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 104 from 130-----"

"-----START 105 from 130-----"

"input file number 105: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_4.txt"

****Data from file U_1_1000_05_4.txt: machinesNum=5 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_05_1000_4.txt: machinesNum=5 jobsNum=1000 lowerBound=9904 upperBound=9904
isOptimal=1"

Content of machines summed (9904, 9903, 9903, 9903, 9903)

input selected: size 1000 sum 49516

----Our Results-----

best from Our local search found:

target function = 9909, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:9904, content= (99, 99, 98, 98, 97, 97, 96, 96, 95, 95, 95, 94, 94, 93, 93, 93, 92, 91, 91, 91, 90, 90, 88, 88, 87, 87, 86, 86, 86, 85, 85, 84, 84, 83, 83, 82, 82, 81, 81, 81, 80, 80, 78, 77, 77, 76, 76, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 68, 67, 67, 66, 66, 65, 65, 64, 64, 63, 63, 62, 61, 61, 61, 60, 60, 60, 59, 59, 59, 58, 58, 57, 57, 57, 57, 56, 55, 55, 55, 54, 54, 54, 53, 53, 52, 52, 51, 51, 50, 50, 49, 48, 48, 48, 47, 47, 46, 46, 45, 44, 44, 44, 43, 43, 43, 42, 40, 40, 39, 38, 37, 37, 37, 36, 36, 35, 35, 35, 34, 33, 32, 32, 31, 30, 30, 30, 28, 28, 27, 27, 26, 26, 24, 24, 24, 24, 23, 22, 22, 21, 21, 21, 20, 19, 19, 18, 18, 17, 16, 16, 16, 15, 15, 15, 14, 14, 14, 13, 13, 13, 12, 12, 11, 11, 11, 10, 9, 9, 9, 8, 8, 8, 7, 6, 6, 6, 5, 5, 4, 4, 3, 3, 3, 2, 1, 1)

bucket2 sum:9903, content= (99, 98, 98, 98, 98, 97, 96, 96, 95, 95, 95, 94, 94, 93, 93, 93, 92, 91, 91, 91, 90, 90, 88, 88, 87, 87, 86, 86, 86, 85, 85, 84, 84, 83, 83, 82, 82, 81, 81, 81, 80, 79, 79, 77, 77, 76, 76, 75, 75, 74, 74, 73, 72, 72, 72, 72, 70, 70, 70, 70, 69, 68, 67, 66, 66, 66, 66, 65, 64, 64, 63, 63, 62, 61, 61, 61, 60, 60, 59, 59, 59, 59, 59, 58, 57, 57, 57, 57, 56, 55, 55, 55, 54, 54, 54, 53, 53, 52, 52, 51, 51, 50, 49, 49, 49, 48,

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47, 47, 47, 46, 46, 46, 44, 44, 44, 43, 43, 43, 41, 41, 40, 39, 38, 37, 37, 36, 36, 36, 36, 35, 35, 34, 33, 32, 32, 31, 30, 30, 30, 28, 28, 27, 27, 26,
26, 25, 25, 24, 24, 23, 23, 22, 22, 22, 21, 20, 20, 20, 18, 18, 18, 17, 17, 16, 16, 15, 15, 15, 14, 14, 14, 13, 13, 13, 12, 12, 11, 11, 10, 10, 10, 9, 9,
8, 8, 7, 7, 7, 6, 6, 5, 5, 4, 4, 3, 3, 2, 2, 1, 1)
bucket3 sum:9903, content=(99, 98, 98, 98, 97, 97, 96, 96, 96, 95, 94, 94, 94, 94, 93, 93, 92, 91, 91, 91, 90, 89, 89, 88, 87, 87, 86, 86, 86, 85,
85, 84, 84, 83, 83, 82, 82, 81, 81, 81, 80, 79, 78, 78, 76, 76, 76, 75, 75, 75, 73, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 68, 68, 66, 66, 66, 65, 65,
65, 64, 63, 62, 62, 62, 61, 61, 60, 60, 59, 59, 59, 59, 58, 58, 58, 57, 57, 57, 56, 55, 55, 55, 54, 54, 53, 53, 53, 53, 52, 51, 50, 50, 50, 49, 49, 48,
47, 47, 47, 46, 46, 45, 45, 44, 44, 43, 43, 43, 41, 41, 40, 39, 37, 37, 37, 37, 36, 36, 36, 35, 35, 34, 33, 32, 31, 31, 31, 30, 30, 28, 28, 27, 27, 26,
26, 25, 25, 24, 24, 23, 23, 22, 22, 22, 21, 20, 20, 19, 19, 18, 18, 17, 17, 16, 16, 15, 15, 14, 14, 14, 14, 14, 13, 13, 12, 11, 11, 11, 11, 10, 10, 9, 9,
8, 8, 7, 7, 7, 6, 6, 5, 5, 4, 4, 3, 3, 2, 2, 1, 1)
bucket4 sum:9903, content=(99, 98, 98, 98, 97, 97, 96, 96, 96, 95, 94, 94, 94, 94, 93, 92, 92, 92, 91, 91, 90, 89, 89, 88, 87, 87, 86, 86, 86, 85,
85, 84, 84, 83, 83, 82, 82, 81, 81, 81, 80, 79, 78, 78, 76, 76, 76, 75, 75, 75, 73, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 68, 67, 67, 66, 66, 65, 65,
65, 63, 63, 63, 62, 62, 61, 61, 60, 60, 59, 59, 59, 59, 58, 58, 58, 57, 57, 56, 56, 56, 55, 54, 54, 54, 54, 53, 53, 52, 52, 51, 51, 50, 50, 49, 48, 48,
48, 47, 47, 46, 46, 45, 45, 44, 44, 43, 43, 42, 42, 41, 40, 39, 37, 37, 37, 37, 36, 36, 36, 35, 34, 34, 34, 32, 31, 31, 31, 30, 29, 29, 28, 27, 26, 26,
26, 26, 25, 24, 24, 23, 23, 22, 22, 21, 21, 21, 20, 19, 19, 18, 18, 17, 17, 16, 16, 15, 15, 14, 14, 14, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 10, 9, 9,
8, 8, 7, 7, 7, 6, 6, 5, 5, 4, 4, 3, 3, 2, 2, 1, 1)
bucket5 sum:9903, content=(99, 98, 98, 98, 97, 97, 96, 96, 96, 95, 94, 94, 94, 93, 93, 93, 92, 91, 91, 91, 90, 90, 88, 88, 87, 87, 86, 86, 86, 85,
85, 85, 84, 83, 82, 82, 82, 82, 81, 80, 80, 80, 78, 78, 76, 76, 76, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 68, 67, 67, 66, 66, 65, 65,
64, 64, 63, 63, 62, 62, 61, 60, 60, 60, 60, 59, 59, 59, 58, 58, 57, 57, 57, 57, 56, 55, 55, 55, 54, 54, 54, 53, 53, 52, 52, 51, 51, 50, 50, 49, 48, 48,
48, 47, 47, 46, 46, 45, 45, 44, 44, 43, 43, 42, 42, 41, 39, 39, 38, 37, 37, 37, 36, 36, 35, 35, 35, 34, 33, 32, 32, 31, 31, 30, 29, 28, 28, 27, 27, 26,
26, 26, 24, 24, 24, 24, 23, 22, 22, 21, 21, 21, 20, 19, 19, 18, 18, 17, 17, 16, 15, 15, 15, 15, 14, 14, 14, 13, 13, 13, 12, 12, 11, 11, 11, 10, 10, 9, 8,
8, 8, 8, 7, 6, 6, 6, 5, 5, 4, 4, 4, 3, 2, 2, 1, 1)
"----Comparison for the 104 example----"
"***tf from benchmark was 9909(we added the number of machines) and target function from our local search is 9909"
***RESULT IS THE SAME
Run time: 0 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 5))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 105 from 130-----"
"-----START 106 from 130-----"


```

***Data from file U_1_1000_05_5.txt: machinesNum=5 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_05_1000_5.txt: machinesNum=5 jobsNum=1000 lowerBound=9783 upperBound=9783
isOptimal=1"

Content of machines summed (9783, 9783, 9782, 9782, 9782)

input selected: size 1000 sum 48912

----Our Results-----

best from Our local search found:

target function = 9788, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:9783, content=(99, 99, 98, 97, 97, 96, 96, 95, 95, 94, 93, 93, 92, 92, 91, 91, 90, 90, 89, 89, 88, 87, 87, 87, 86, 86, 85, 85, 84, 84, 83, 83, 82, 81, 80, 80, 79, 79, 79, 79, 78, 78, 76, 76, 76, 75, 74, 74, 73, 73, 73, 72, 72, 71, 70, 70, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 65, 63, 63, 63, 62, 61, 61, 61, 61, 60, 59, 59, 58, 58, 58, 58, 57, 56, 55, 55, 54, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 50, 49, 48, 48, 47, 47, 46, 46, 45, 45, 45, 44, 43, 43, 43, 42, 41, 41, 40, 40, 39, 38, 38, 38, 38, 36, 36, 36, 35, 35, 35, 34, 34, 33, 33, 32, 32, 31, 31, 31, 30, 30, 29, 28, 28, 28, 28, 27, 27, 26, 26, 26, 25, 25, 25, 24, 24, 23, 23, 22, 22, 21, 21, 20, 19, 18, 17, 17, 17, 16, 15, 15, 14, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 9, 9, 9, 8, 7, 7, 7, 7, 6, 5, 4, 4, 3, 3, 2, 2, 2, 1, 1)

bucket2 sum:9783, content=(99, 99, 98, 97, 97, 96, 96, 95, 95, 94, 93, 93, 92, 92, 91, 91, 90, 90, 89, 89, 88, 87, 87, 86, 86, 86, 86, 85, 84, 84, 83, 83, 82, 81, 80, 80, 79, 79, 79, 79, 78, 77, 77, 76, 75, 75, 75, 74, 73, 73, 73, 72, 72, 71, 70, 70, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 64, 64, 63, 63, 62, 61, 61, 61, 60, 60, 60, 59, 58, 58, 58, 57, 57, 57, 55, 55, 54, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 49, 49, 49, 47, 47, 47, 47, 46, 45, 45, 45, 44, 43, 43, 42, 42, 41, 41, 41, 40, 39, 38, 38, 38, 37, 37, 36, 36, 35, 35, 35, 34, 34, 33, 33, 32, 32, 31, 31, 31, 30, 29, 29, 29, 28, 28, 28, 27, 27, 26, 26, 26, 25, 25, 25, 24, 24, 23, 23, 22, 22, 21, 20, 20, 19, 19, 17, 17, 16, 16, 16, 15, 14, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 9, 9, 9, 8, 7, 7, 7, 6, 6, 5, 5, 4, 3, 3, 2, 2, 2, 1, 1)

bucket3 sum:9782, content=(99, 99, 98, 97, 97, 96, 96, 95, 94, 94, 94, 93, 92, 92, 91, 91, 90, 89, 89, 89, 88, 88, 87, 86, 86, 86, 86, 85, 84, 84, 83, 82, 82, 81, 81, 80, 79, 79, 79, 79, 78, 77, 76, 76, 76, 75, 75, 73, 73, 73, 73, 72, 72, 71, 71, 70, 69, 69, 69, 69, 68, 67, 67, 66, 66, 65, 64, 64, 63, 62, 62, 62, 61, 61, 61, 60, 60, 60, 59, 58, 58, 58, 57, 57, 57, 55, 55, 54, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 49, 49, 49, 47, 47, 47, 46, 46, 46, 45, 45, 45, 44, 43, 43, 42, 42, 41, 41, 40, 40, 40, 38, 38, 38, 37, 37, 36, 36, 35, 35, 35, 34, 33, 33, 33, 33, 32, 31, 31, 31, 30, 29, 29, 29, 28, 28, 28, 27, 26, 26, 26, 26, 26, 25, 24, 24, 24, 23, 23, 23, 22, 21, 20, 20, 19, 18, 18, 17, 16, 16, 16, 15, 14, 14, 13, 13, 13, 12, 12, 11, 11, 10, 10, 10, 9, 9, 8, 7, 7, 7, 6, 6, 5, 5, 4, 3, 3, 2, 2, 1, 1, 1)

bucket4 sum:9782, content=(99, 98, 98, 98, 97, 96, 96, 95, 94, 94, 93, 93, 93, 92, 91, 91, 90, 89, 89, 89, 88, 88, 87, 86, 86, 86, 85, 85, 85, 84, 83, 82, 82, 81, 81, 80, 79, 79, 79, 78, 78, 78, 76, 76, 76, 75, 74, 74, 73, 73, 73, 72, 72, 71, 71, 70, 69, 69, 69, 69, 67, 67, 67, 67, 65, 65, 65, 64, 63, 62, 62, 62, 61, 61, 61, 60, 60, 59, 59, 59, 58, 58, 57, 57, 57, 55, 55, 54, 53, 53, 53, 53, 52, 52, 51, 51, 51, 50, 49, 49, 48, 48, 47, 47, 46, 46, 45, 45, 45, 44, 44, 43, 42, 42, 41, 41, 40, 40, 40, 38, 38, 38, 37, 37, 36, 36, 35, 35, 34, 34, 34, 33, 33, 33, 32, 31, 31, 30, 30, 30, 29, 28, 28, 28,

28, 28, 26, 26, 26, 26, 26, 25, 24, 24, 24, 23, 23, 22, 22, 22, 20, 20, 19, 18, 18, 17, 16, 16, 15, 15, 15, 14, 13, 13, 12, 12, 12, 12, 11, 10, 10, 9, 9, 9, 8, 8, 7, 7, 6, 6, 5, 5, 3, 3, 3, 2, 2, 2, 1, 1)

bucket5 sum:9782, content= (99, 98, 98, 97, 97, 97, 95, 95, 95, 94, 93, 93, 92, 92, 92, 90, 90, 90, 89, 89, 88, 88, 87, 86, 86, 86, 85, 85, 85, 84, 83, 82, 82, 81, 80, 80, 79, 79, 79, 79, 78, 78, 76, 76, 76, 75, 74, 74, 73, 73, 73, 72, 72, 71, 71, 70, 69, 69, 69, 69, 67, 67, 67, 66, 66, 65, 65, 64, 63, 62, 62, 62, 61, 61, 61, 60, 60, 59, 59, 59, 58, 58, 57, 57, 56, 56, 54, 54, 54, 53, 53, 53, 52, 52, 51, 51, 50, 50, 50, 49, 48, 48, 47, 47, 46, 46, 45, 45, 45, 44, 43, 43, 43, 42, 41, 41, 40, 40, 39, 38, 38, 38, 38, 37, 36, 36, 35, 35, 34, 34, 34, 33, 33, 32, 32, 32, 31, 30, 30, 30, 29, 28, 28, 28, 28, 27, 27, 26, 26, 26, 25, 25, 25, 24, 24, 23, 23, 22, 22, 21, 21, 20, 19, 18, 18, 17, 16, 16, 15, 15, 15, 14, 13, 13, 12, 12, 12, 12, 11, 10, 10, 9, 9, 9, 8, 8, 7, 7, 6, 6, 5, 5, 3, 3, 3, 2, 2, 2, 1, 1)

"---Comparison for the 105 example---"

***tf from benchmark was 9788(we added the number of machines) and target function from our local search is 9788"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 6))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 106 from 130-----"

"-----START 107 from 130-----"

"input file number 107: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_6.txt"

***Data from file U_1_1000_05_6.txt: machinesNum=5 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_05_1000_6.txt: machinesNum=5 jobsNum=1000 lowerBound=10049 upperBound=10049
isOptimal=1"

Content of machines summed (10049, 10049, 10048, 10048, 10048)

input selected: size 1000 sum 50242

----Our Results-----

best from Our local search found:

target function = 10054, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:10049, content= (99, 99, 98, 97, 97, 96, 95, 95, 94, 94, 93, 93, 93, 92, 92, 92, 91, 91, 90, 90, 89, 89, 88, 88, 87, 87, 86, 86, 85, 85, 84, 84, 83, 82, 82, 82, 81, 81, 80, 79, 79, 78, 78, 78, 77, 76, 76, 76, 75, 75, 75, 73, 73, 72, 72, 72, 72, 71, 70, 70, 70, 69, 68, 68, 68, 67, 66, 66, 65, 65, 64, 64, 64, 63, 63, 63, 63, 62, 62, 61, 61, 60, 59, 59, 58, 57, 56, 56, 56, 56, 55, 54, 54, 53, 53, 52, 52, 51, 51, 51, 51, 50, 50, 50, 49, 49,

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49, 48, 48, 47, 46, 46, 46, 45, 45, 45, 44, 44, 43, 43, 42, 41, 41, 40, 40, 39, 39, 38, 38, 38, 37, 36, 36, 35, 35, 34, 34, 32, 32, 32, 31, 31, 30, 29,
28, 28, 27, 27, 26, 25, 25, 24, 24, 24, 24, 23, 23, 22, 22, 21, 21, 20, 20, 19, 18, 18, 17, 17, 16, 16, 15, 15, 14, 13, 12, 11, 11, 11, 11, 9, 9, 8, 8, 8,
7, 6, 6, 5, 5, 5, 4, 4, 3, 3, 3, 2, 2, 2, 1, 1)
bucket2 sum:10049, content= (99, 99, 98, 97, 96, 96, 96, 95, 94, 94, 93, 93, 93, 92, 92, 91, 91, 91, 91, 90, 89, 89, 88, 88, 87, 86, 86, 86, 86, 85,
84, 84, 83, 82, 82, 82, 81, 80, 80, 80, 79, 78, 78, 78, 77, 76, 76, 76, 75, 75, 74, 74, 73, 72, 72, 72, 71, 71, 70, 70, 70, 69, 69, 68, 67, 67, 67, 66,
65, 65, 64, 64, 64, 63, 63, 63, 62, 62, 62, 61, 61, 60, 60, 59, 58, 57, 56, 56, 56, 56, 54, 54, 54, 53, 53, 53, 52, 51, 51, 51, 51, 50, 50, 50, 49, 49,
48, 48, 48, 47, 47, 46, 46, 45, 45, 45, 44, 44, 43, 43, 42, 41, 41, 40, 40, 39, 39, 38, 38, 37, 37, 37, 36, 35, 35, 34, 33, 33, 32, 32, 31, 31, 30, 29,
28, 28, 27, 27, 26, 25, 25, 24, 24, 24, 24, 23, 23, 22, 21, 21, 21, 21, 19, 19, 19, 18, 17, 17, 16, 16, 15, 14, 14, 13, 12, 12, 11, 11, 11, 9, 9, 8, 8, 7,
7, 7, 6, 5, 5, 5, 4, 4, 3, 3, 3, 2, 2, 2, 1, 1)
bucket3 sum:10048, content= (99, 99, 98, 97, 96, 96, 95, 95, 94, 94, 93, 93, 93, 93, 92, 91, 91, 91, 90, 90, 90, 88, 88, 88, 87, 87, 86, 86, 86, 84,
84, 84, 83, 83, 82, 82, 81, 80, 80, 79, 79, 79, 78, 78, 77, 76, 76, 76, 75, 75, 74, 74, 73, 72, 72, 72, 71, 71, 70, 70, 70, 69, 69, 68, 67, 67, 66, 66,
65, 65, 65, 64, 64, 63, 63, 63, 62, 62, 62, 61, 61, 60, 60, 58, 58, 57, 57, 56, 56, 55, 55, 54, 54, 53, 53, 53, 52, 51, 51, 51, 51, 50, 50, 50, 49, 49,
48, 48, 48, 47, 47, 46, 46, 45, 45, 45, 44, 44, 43, 43, 41, 41, 41, 41, 40, 39, 39, 38, 38, 37, 37, 36, 36, 36, 35, 34, 33, 33, 32, 32, 31, 30, 30, 29,
29, 27, 27, 27, 26, 26, 25, 24, 24, 24, 24, 23, 23, 22, 21, 21, 21, 20, 20, 19, 18, 18, 18, 16, 16, 16, 16, 14, 14, 13, 12, 12, 11, 11, 10, 10, 9, 8, 8, 7,
7, 7, 6, 5, 5, 4, 4, 4, 4, 3, 3, 2, 2, 1, 1, 1)
bucket4 sum:10048, content= (99, 98, 98, 97, 97, 96, 95, 95, 94, 94, 93, 93, 93, 92, 92, 92, 91, 91, 90, 90, 89, 89, 88, 88, 87, 87, 86, 86, 85, 85,
84, 84, 83, 83, 82, 81, 81, 81, 80, 79, 79, 78, 78, 78, 77, 77, 76, 76, 75, 75, 74, 74, 73, 72, 72, 72, 71, 71, 70, 70, 70, 69, 69, 68, 67, 67, 66, 66,
65, 65, 64, 64, 64, 64, 63, 63, 62, 62, 62, 61, 61, 60, 59, 59, 58, 57, 57, 56, 56, 55, 55, 54, 54, 53, 53, 53, 52, 51, 51, 51, 51, 50, 50, 49, 49, 49,
49, 48, 48, 47, 47, 46, 46, 45, 45, 45, 44, 44, 43, 42, 42, 41, 41, 41, 39, 39, 39, 39, 38, 37, 37, 36, 36, 35, 35, 35, 33, 33, 32, 31, 31, 31, 30, 29,
29, 27, 27, 27, 26, 26, 25, 24, 24, 24, 23, 23, 23, 22, 22, 21, 21, 20, 20, 19, 18, 18, 17, 17, 16, 16, 15, 15, 14, 13, 12, 12, 11, 11, 10, 10, 9, 8, 8, 7,
7, 7, 6, 5, 5, 4, 4, 4, 4, 3, 2, 2, 2, 2, 1, 1)
bucket5 sum:10048, content= (99, 98, 98, 97, 97, 96, 95, 95, 94, 94, 93, 93, 93, 92, 92, 92, 91, 91, 90, 90, 89, 89, 88, 88, 87, 87, 86, 86, 85, 85,
84, 84, 83, 83, 82, 81, 81, 81, 80, 79, 79, 78, 78, 78, 77, 76, 76, 76, 76, 75, 74, 73, 73, 73, 72, 72, 71, 71, 70, 70, 70, 69, 69, 68, 67, 67, 66, 66,
65, 65, 64, 64, 64, 63, 63, 63, 63, 62, 62, 61, 61, 60, 59, 59, 58, 57, 57, 56, 56, 55, 55, 54, 54, 53, 53, 52, 52, 52, 51, 51, 51, 50, 50, 49, 49, 49,
49, 48, 48, 47, 46, 46, 46, 46, 45, 45, 44, 44, 43, 42, 42, 41, 41, 40, 40, 39, 39, 38, 38, 38, 37, 36, 36, 35, 35, 34, 34, 33, 32, 31, 31, 31, 30, 29,
28, 28, 27, 27, 26, 25, 25, 25, 24, 24, 23, 23, 23, 22, 22, 21, 21, 20, 20, 19, 18, 18, 17, 17, 16, 16, 15, 15, 14, 13, 12, 12, 11, 11, 10, 9, 9, 9, 8, 7,
7, 6, 6, 6, 5, 4, 4, 4, 4, 3, 2, 2, 2, 2, 1, 1)
"----Comparison for the 106 example----"
"***tf from benchmark was 10054(we added the number of machines) and target function from our local search is 10054"
***RESULT IS THE SAME
Run time: 0 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 7))
```



```
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 107 from 130-----"
"-----START 108 from 130-----"
"input file number 108: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_7.txt"
"***Data from file U_1_1000_05_7.txt: machinesNum=5 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_05_1000_7.txt: machinesNum=5 jobsNum=1000 lowerBound=9861 upperBound=9861
isOptimal=1"
Content of machines summed (9861, 9861, 9861, 9861, 9860)
input selected: size 1000 sum 49304
```

----Our Results-----

best from Our local search found:

target function = 9866, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:9861, content=(99, 99, 98, 97, 97, 97, 96, 96, 95, 95, 95, 93, 93, 93, 93, 92, 92, 91, 91, 90, 90, 89, 89, 89, 88, 88, 87, 87, 86, 86, 85, 84, 83, 83, 83, 82, 81, 81, 80, 80, 79, 79, 79, 78, 78, 77, 76, 75, 74, 74, 73, 72, 71, 71, 71, 71, 69, 69, 69, 68, 68, 68, 66, 66, 66, 65, 64, 64, 64, 63, 63, 63, 62, 62, 62, 61, 60, 60, 60, 59, 59, 59, 58, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 53, 52, 51, 51, 51, 50, 49, 49, 48, 48, 47, 47, 46, 46, 45, 45, 44, 44, 44, 44, 43, 42, 42, 42, 42, 41, 41, 40, 40, 39, 39, 38, 38, 36, 36, 35, 35, 33, 33, 32, 32, 32, 31, 31, 29, 28, 28, 27, 27, 26, 26, 26, 25, 25, 24, 24, 24, 23, 22, 22, 21, 20, 19, 19, 19, 18, 18, 18, 17, 17, 16, 16, 15, 15, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 10, 10, 9, 9, 8, 8, 7, 7, 7, 6, 6, 6, 5, 4, 4, 3, 2, 2, 2, 1, 1, 1)

bucket2 sum:9861, content=(99, 99, 98, 97, 97, 97, 96, 96, 95, 95, 94, 94, 93, 93, 93, 92, 92, 91, 91, 90, 90, 89, 89, 89, 88, 88, 87, 87, 86, 86, 85, 84, 83, 83, 82, 82, 81, 81, 80, 80, 80, 79, 79, 78, 78, 77, 76, 75, 74, 74, 72, 72, 72, 71, 71, 70, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 64, 64, 64, 63, 63, 63, 62, 62, 62, 61, 60, 60, 60, 59, 59, 59, 58, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 52, 52, 52, 51, 51, 50, 49, 49, 48, 48, 47, 47, 46, 46, 45, 45, 44, 44, 44, 44, 43, 42, 42, 42, 42, 41, 41, 40, 39, 39, 39, 39, 37, 37, 35, 35, 35, 34, 33, 32, 32, 32, 31, 31, 29, 28, 28, 27, 27, 26, 26, 25, 25, 25, 25, 24, 24, 23, 22, 21, 21, 20, 20, 19, 19, 18, 18, 18, 17, 17, 16, 16, 15, 15, 14, 13, 13, 13, 12, 12, 11, 11, 11, 10, 10, 10, 9, 9, 8, 8, 7, 7, 7, 6, 6, 5, 5, 5, 4, 3, 2, 2, 2, 1, 1, 1)

bucket3 sum:9861, content=(99, 98, 98, 98, 97, 97, 96, 96, 95, 95, 94, 94, 93, 93, 93, 92, 92, 91, 90, 90, 90, 90, 89, 89, 88, 88, 87, 87, 86, 86, 84, 84, 84, 83, 82, 82, 81, 81, 80, 80, 80, 79, 79, 78, 78, 77, 75, 75, 75, 74, 72, 72, 72, 71, 71, 70, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 64, 64, 64, 63, 63, 63, 62, 62, 61, 61, 61, 60, 60, 59, 59, 59, 58, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 52, 52, 52, 51, 51, 50, 49, 48, 48, 48, 47, 47, 47, 45, 45, 45, 45, 44, 44, 44, 43, 42, 42, 42, 41, 41, 41, 40, 40, 39, 39, 39, 37, 37, 35, 35, 35, 34, 33, 32, 32, 32, 31, 31, 29, 28, 27, 27, 27, 27,

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26, 25, 25, 25, 25, 24, 23, 23, 23, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 17, 17, 15, 15, 15, 14, 14, 13, 13, 12, 12, 11, 11, 11, 10, 10, 10, 9, 9, 8, 8,
7, 7, 7, 6, 6, 5, 5, 5, 4, 3, 2, 2, 2, 1, 1, 1)
bucket4 sum:9861, content= (99, 98, 98, 98, 97, 97, 96, 96, 95, 95, 94, 94, 93, 93, 93, 92, 91, 91, 91, 90, 90, 90, 89, 89, 88, 87, 87, 87, 87, 85,
85, 84, 84, 83, 82, 82, 81, 81, 80, 80, 80, 79, 79, 78, 77, 77, 76, 75, 75, 73, 73, 72, 71, 71, 71, 71, 70, 69, 69, 68, 68, 67, 67, 66, 65, 65, 65, 64,
64, 63, 63, 63, 62, 62, 61, 61, 61, 60, 60, 59, 59, 59, 58, 58, 57, 57, 57, 57, 56, 55, 55, 55, 54, 53, 52, 52, 52, 51, 51, 50, 49, 48, 48, 48, 47, 47,
46, 46, 45, 45, 45, 44, 44, 43, 43, 43, 42, 42, 41, 41, 41, 40, 40, 39, 39, 38, 38, 37, 35, 35, 35, 34, 33, 32, 32, 32, 31, 31, 29, 28, 27, 27, 27, 27,
26, 25, 25, 25, 25, 24, 23, 23, 23, 21, 21, 20, 20, 19, 19, 18, 18, 17, 17, 17, 16, 16, 15, 15, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 10, 10, 10, 9, 8,
8, 7, 7, 6, 6, 6, 6, 5, 5, 3, 3, 3, 2, 2, 1, 1, 1)
bucket5 sum:9860, content= (99, 98, 98, 97, 97, 97, 97, 96, 95, 95, 94, 94, 93, 93, 92, 92, 92, 91, 91, 90, 90, 90, 89, 88, 88, 88, 87, 87, 86, 86,
85, 84, 84, 83, 82, 82, 81, 81, 80, 80, 80, 79, 79, 78, 77, 77, 76, 75, 74, 74, 73, 72, 71, 71, 71, 71, 70, 69, 69, 68, 68, 67, 66, 66, 66, 65, 65, 64,
64, 63, 63, 63, 62, 62, 61, 61, 60, 60, 60, 60, 59, 59, 58, 58, 57, 57, 57, 57, 55, 55, 55, 55, 54, 54, 52, 52, 52, 51, 50, 50, 49, 49, 48, 48, 47, 47,
46, 46, 45, 45, 45, 44, 44, 43, 43, 43, 42, 42, 41, 41, 41, 40, 40, 39, 39, 38, 38, 36, 36, 35, 35, 33, 33, 33, 32, 32, 31, 30, 30, 28, 27, 27, 27, 26,
26, 26, 25, 25, 25, 24, 23, 23, 22, 22, 21, 20, 20, 19, 18, 18, 18, 18, 17, 17, 16, 16, 15, 15, 14, 14, 13, 12, 12, 12, 11, 11, 11, 10, 10, 10, 9, 9, 8, 8,
7, 7, 7, 6, 6, 6, 5, 4, 4, 3, 2, 2, 2, 1, 1, 1)
"----Comparison for the 107 example----"
"***tf from benchmark was 9866(we added the number of machines) and target function from our local search is 9866"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 8))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 108 from 130-----"
"-----START 109 from 130-----"
"input file number 109: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_8.txt"
"***Data from file U_1_1000_05_8.txt: machinesNum=5 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_05_1000_8.txt: machinesNum=5 jobsNum=1000 lowerBound=10064 upperBound=10064
isOptimal=1"
Content of machines summed (10064, 10064, 10064, 10064, 10064)
input selected: size 1000 sum 50320

----Our Results-----

```

best from Our local search found:

target function = 10069, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:10064, content= (99, 99, 99, 98, 97, 97, 96, 96, 95, 95, 94, 93, 93, 92, 92, 91, 91, 91, 90, 90, 89, 89, 89, 88, 87, 87, 86, 86, 86, 85, 84, 84, 84, 83, 83, 82, 82, 82, 82, 80, 80, 79, 78, 78, 77, 77, 76, 76, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 71, 71, 70, 69, 69, 69, 68, 67, 67, 67, 66, 65, 65, 65, 65, 64, 63, 63, 62, 62, 61, 61, 61, 59, 58, 58, 58, 57, 57, 56, 56, 56, 55, 55, 54, 54, 53, 53, 52, 52, 51, 51, 51, 50, 50, 49, 49, 48, 47, 47, 46, 46, 46, 45, 45, 44, 43, 42, 42, 42, 41, 41, 41, 40, 39, 39, 39, 38, 38, 37, 36, 36, 36, 36, 35, 34, 33, 33, 33, 33, 32, 32, 31, 31, 31, 30, 30, 28, 28, 28, 27, 26, 25, 25, 25, 24, 23, 23, 22, 22, 22, 21, 20, 20, 19, 18, 18, 18, 17, 16, 15, 15, 14, 14, 14, 13, 13, 12, 12, 12, 11, 11, 10, 10, 10, 9, 8, 8, 8, 7, 7, 6, 6, 5, 4, 4, 3, 3, 2, 1, 1, 1)

bucket2 sum:10064, content= (99, 99, 99, 98, 97, 97, 96, 96, 95, 94, 94, 94, 93, 92, 92, 91, 91, 90, 90, 90, 90, 89, 88, 88, 87, 87, 87, 86, 85, 85, 85, 84, 84, 83, 83, 82, 82, 82, 81, 81, 80, 79, 78, 78, 77, 77, 76, 76, 75, 75, 74, 74, 73, 73, 72, 72, 71, 71, 71, 71, 70, 69, 69, 69, 68, 67, 67, 66, 66, 66, 65, 65, 64, 64, 64, 63, 62, 62, 61, 61, 60, 59, 59, 58, 58, 57, 57, 56, 56, 56, 55, 55, 54, 54, 53, 52, 52, 52, 52, 51, 51, 50, 50, 49, 49, 48, 47, 47, 46, 46, 45, 45, 45, 44, 43, 43, 42, 42, 41, 41, 41, 40, 39, 39, 38, 38, 38, 38, 36, 36, 36, 35, 35, 34, 34, 33, 33, 33, 32, 32, 31, 31, 31, 30, 30, 28, 28, 27, 27, 27, 25, 25, 25, 24, 23, 23, 22, 22, 21, 21, 21, 20, 19, 18, 18, 18, 17, 16, 15, 15, 14, 14, 14, 13, 12, 12, 12, 12, 12, 11, 10, 10, 9, 9, 9, 8, 8, 7, 7, 6, 6, 5, 4, 4, 3, 3, 2, 1, 1, 1)

bucket3 sum:10064, content= (99, 99, 99, 98, 97, 97, 96, 96, 95, 94, 94, 94, 92, 92, 92, 92, 91, 90, 90, 90, 90, 89, 88, 88, 87, 87, 87, 86, 85, 85, 85, 84, 84, 83, 83, 82, 82, 82, 81, 81, 79, 79, 78, 78, 78, 76, 76, 76, 76, 75, 74, 74, 73, 73, 72, 72, 71, 71, 71, 70, 70, 70, 69, 69, 68, 67, 67, 66, 66, 66, 65, 65, 64, 64, 64, 63, 62, 62, 61, 61, 60, 59, 59, 58, 58, 57, 57, 56, 56, 56, 55, 55, 54, 54, 53, 52, 52, 52, 51, 51, 51, 51, 50, 49, 48, 48, 47, 47, 47, 46, 45, 45, 45, 44, 43, 43, 42, 42, 41, 41, 41, 40, 39, 39, 38, 38, 38, 37, 37, 36, 36, 35, 35, 34, 34, 33, 33, 33, 32, 32, 31, 31, 31, 30, 29, 29, 28, 27, 27, 26, 26, 25, 25, 24, 23, 23, 22, 22, 21, 21, 21, 20, 19, 18, 18, 18, 17, 16, 15, 14, 14, 14, 14, 13, 13, 12, 12, 12, 11, 11, 11, 10, 9, 9, 9, 8, 8, 7, 7, 6, 6, 5, 4, 4, 3, 3, 2, 1, 1, 1)

bucket4 sum:10064, content= (99, 99, 98, 98, 98, 97, 96, 96, 95, 94, 94, 93, 93, 92, 92, 91, 91, 91, 90, 90, 90, 89, 88, 88, 87, 87, 86, 86, 86, 85, 84, 84, 84, 83, 83, 83, 82, 82, 81, 80, 80, 79, 78, 78, 77, 77, 76, 76, 76, 75, 74, 74, 73, 73, 72, 71, 71, 71, 71, 71, 70, 70, 69, 68, 68, 68, 67, 66, 66, 65, 65, 65, 65, 64, 64, 63, 62, 62, 61, 61, 60, 59, 59, 58, 58, 57, 57, 56, 56, 55, 55, 55, 55, 53, 53, 53, 52, 52, 51, 51, 51, 51, 50, 49, 48, 48, 47, 47, 47, 46, 45, 45, 45, 44, 43, 43, 42, 42, 41, 41, 40, 40, 40, 39, 38, 38, 38, 37, 37, 36, 36, 35, 35, 34, 34, 33, 33, 33, 32, 32, 31, 31, 31, 30, 29, 29, 28, 27, 27, 26, 26, 25, 24, 24, 24, 23, 22, 22, 21, 21, 20, 20, 19, 19, 18, 17, 17, 16, 15, 15, 14, 14, 14, 13, 13, 12, 12, 12, 11, 11, 10, 10, 10, 9, 9, 8, 8, 7, 7, 6, 6, 4, 4, 4, 4, 3, 2, 1, 1, 1)

bucket5 sum:10064, content= (99, 99, 98, 98, 98, 97, 96, 95, 95, 95, 94, 93, 93, 92, 92, 91, 91, 91, 90, 90, 89, 89, 89, 88, 87, 87, 86, 86, 86, 85, 84, 84, 84, 83, 83, 83, 82, 82, 81, 80, 80, 79, 78, 78, 77, 77, 76, 76, 76, 75, 74, 73, 73, 73, 73, 71, 71, 71, 71, 71, 70, 70, 69, 68, 68, 68, 67, 66, 66, 65, 65, 65, 65, 64, 64, 62, 62, 62, 62, 61, 60, 59, 58, 58, 58, 57, 57, 57, 56, 55, 55, 55, 54, 54, 53, 53, 52, 52, 51, 51, 51, 51, 50, 49, 48, 48, 47, 47, 47, 46, 45, 45, 45, 44, 43, 43, 42, 42, 41, 41, 40, 40, 39, 39, 39, 38, 38, 37, 37, 36, 36, 35, 35, 34, 33, 33, 33, 33, 32, 32, 32, 31, 30, 30,

30, 29, 28, 27, 27, 26, 26, 25, 24, 24, 23, 23, 23, 22, 21, 21, 20, 20, 19, 19, 18, 17, 17, 16, 15, 15, 14, 14, 14, 13, 13, 12, 12, 12, 11, 11, 10, 10, 10, 9, 8, 8, 8, 8, 6, 6, 6, 5, 4, 4, 4, 2, 2, 2, 1, 1)

"----Comparison for the 108 example----

****tf from benchmark was 10069(we added the number of machines) and target function from our local search is 10069"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 9))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 109 from 130-----"

"-----START 110 from 130-----"

"input file number 110: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_05_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_05_1000_9.txt"

****Data from file U_1_1000_05_9.txt: machinesNum=5 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_05_1000_9.txt: machinesNum=5 jobsNum=1000 lowerBound=9827 upperBound=9827
isOptimal=1"

Content of machines summed (9827, 9827, 9827, 9826, 9826)

input selected: size 1000 sum 49133

----Our Results-----

best from Our local search found:

target function = 9832, num of machines=5, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:9827, content= (99, 99, 99, 98, 98, 97, 96, 96, 96, 95, 94, 93, 93, 93, 91, 91, 90, 89, 89, 88, 88, 88, 87, 86, 86, 85, 85, 84, 84, 84, 83, 82, 82, 81, 81, 80, 79, 79, 79, 78, 77, 76, 76, 76, 75, 74, 74, 73, 73, 73, 72, 72, 71, 71, 71, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 65, 64, 64, 63, 63, 62, 62, 61, 61, 60, 60, 59, 59, 59, 58, 58, 57, 56, 56, 56, 56, 55, 55, 53, 53, 53, 53, 51, 51, 50, 50, 50, 50, 49, 49, 48, 48, 48, 48, 46, 46, 45, 45, 44, 44, 43, 43, 43, 42, 41, 41, 40, 40, 40, 39, 39, 39, 39, 38, 38, 37, 36, 36, 36, 35, 35, 34, 34, 34, 33, 33, 33, 32, 31, 30, 30, 29, 29, 28, 28, 27, 27, 27, 26, 26, 25, 24, 24, 24, 23, 22, 22, 22, 21, 20, 20, 19, 19, 18, 18, 17, 17, 16, 15, 15, 15, 15, 14, 14, 13, 13, 12, 12, 11, 10, 9, 9, 8, 8, 7, 6, 6, 5, 5, 5, 4, 4, 3, 2, 2, 2, 1, 1)

bucket2 sum:9827, content= (99, 99, 99, 98, 98, 97, 96, 96, 96, 94, 94, 94, 93, 92, 92, 91, 90, 89, 89, 88, 88, 88, 86, 86, 86, 86, 85, 84, 84, 83, 83, 83, 82, 81, 81, 80, 79, 79, 78, 78, 78, 76, 76, 75, 75, 75, 74, 73, 73, 73, 72, 72, 71, 71, 71, 70, 69, 69, 68, 68, 67, 67, 66, 66, 65, 65, 64, 64, 63, 63, 62, 62, 61, 60, 60, 60, 60, 59, 59, 58, 58, 57, 56, 56, 56, 56, 55, 54, 54, 53, 53, 53, 51, 51, 50, 50, 50, 50, 49, 49, 48, 48, 48, 47, 47, 46,

```

45, 45, 44, 44, 43, 43, 42, 42, 42, 41, 40, 40, 40, 39, 39, 39, 39, 38, 37, 37, 36, 36, 36, 35, 35, 35, 34, 34, 33, 33, 32, 32, 32, 30, 30, 29, 29, 28,
28, 28, 27, 27, 26, 26, 26, 25, 25, 24, 24, 23, 23, 23, 22, 21, 21, 21, 20, 19, 19, 18, 18, 17, 16, 16, 16, 15, 15, 15, 14, 14, 13, 13, 12, 12, 11, 10, 9,
9, 8, 7, 7, 7, 6, 5, 5, 5, 4, 3, 3, 3, 2, 2, 1, 1)
bucket3 sum:9827, content=(99, 99, 99, 98, 98, 97, 96, 96, 95, 95, 94, 94, 93, 92, 91, 91, 90, 90, 89, 88, 88, 88, 86, 86, 86, 86, 85, 84, 84, 83,
83, 82, 82, 82, 81, 80, 79, 79, 78, 78, 78, 76, 76, 75, 75, 75, 74, 73, 73, 73, 72, 72, 71, 71, 70, 70, 69, 69, 69, 68, 67, 67, 66, 66, 65, 65, 64, 64,
63, 63, 62, 62, 61, 60, 60, 60, 60, 59, 58, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 53, 52, 52, 51, 50, 50, 50, 50, 49, 49, 48, 48, 48, 47, 47, 46,
45, 45, 44, 44, 43, 43, 42, 42, 41, 41, 41, 40, 40, 39, 39, 39, 39, 38, 37, 37, 36, 36, 36, 35, 35, 35, 34, 33, 33, 33, 33, 32, 31, 30, 30, 30, 29, 28,
28, 28, 27, 27, 26, 26, 26, 25, 25, 24, 24, 23, 23, 23, 22, 21, 21, 21, 20, 19, 19, 18, 18, 17, 16, 16, 16, 15, 15, 15, 14, 14, 13, 13, 12, 12, 10, 10,
10, 9, 8, 7, 7, 7, 6, 5, 5, 4, 4, 4, 3, 3, 2, 2, 1, 1)
bucket4 sum:9826, content=(99, 99, 98, 98, 98, 97, 96, 96, 96, 95, 94, 94, 93, 92, 91, 91, 90, 90, 89, 88, 88, 87, 87, 86, 86, 86, 85, 84, 84, 83,
83, 82, 82, 82, 80, 80, 80, 79, 78, 78, 77, 77, 76, 75, 75, 75, 74, 73, 73, 72, 72, 72, 71, 71, 71, 70, 69, 69, 69, 68, 67, 67, 66, 65, 65, 65, 65, 64,
63, 63, 62, 61, 61, 61, 60, 60, 59, 59, 59, 58, 58, 57, 57, 56, 56, 55, 55, 55, 54, 53, 53, 52, 51, 51, 50, 50, 50, 50, 49, 49, 49, 48, 48, 47, 47, 46,
45, 45, 44, 43, 43, 43, 43, 42, 41, 41, 41, 40, 40, 39, 39, 39, 38, 38, 38, 37, 36, 36, 36, 35, 35, 34, 34, 34, 33, 33, 33, 32, 31, 30, 30, 30, 29, 28,
28, 27, 27, 27, 27, 26, 26, 25, 25, 24, 24, 23, 23, 23, 22, 21, 21, 21, 20, 19, 19, 18, 18, 17, 16, 16, 16, 15, 15, 15, 14, 14, 13, 13, 12, 11, 11, 10,
10, 9, 8, 7, 7, 7, 5, 5, 5, 5, 4, 4, 3, 3, 2, 1, 1, 1)
bucket5 sum:9826, content=(99, 99, 98, 98, 98, 97, 96, 96, 96, 95, 94, 94, 93, 92, 91, 91, 90, 89, 89, 89, 88, 87, 87, 86, 86, 85, 85, 85, 84, 83,
83, 82, 82, 81, 81, 80, 79, 79, 79, 78, 77, 77, 76, 75, 75, 75, 74, 73, 73, 72, 72, 72, 71, 71, 71, 70, 69, 69, 69, 68, 67, 67, 66, 65, 65, 65, 65, 64,
63, 63, 62, 61, 61, 61, 60, 60, 59, 59, 59, 58, 58, 57, 56, 56, 56, 56, 55, 55, 54, 53, 53, 52, 51, 51, 50, 50, 50, 50, 49, 49, 48, 48, 48, 48, 46, 46,
46, 44, 44, 44, 43, 43, 43, 42, 41, 41, 40, 40, 40, 39, 39, 39, 39, 38, 38, 37, 36, 36, 36, 35, 35, 34, 34, 34, 33, 33, 33, 32, 31, 30, 30, 29, 29, 28,
28, 28, 27, 27, 27, 26, 26, 25, 24, 24, 24, 24, 23, 22, 22, 22, 21, 21, 20, 19, 19, 18, 18, 17, 16, 16, 16, 15, 15, 14, 14, 14, 13, 13, 13, 11, 11, 10, 9,
9, 8, 8, 7, 6, 6, 5, 5, 5, 4, 4, 3, 3, 2, 1, 1, 1)
"----Comparison for the 109 example----"
"***tf from benchmark was 9832(we added the number of machines) and target function from our local search is 9832"
***RESULT IS THE SAME
Run time: 0.015 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 10))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 110 from 130-----"
"-----START 111 from 130-----"


```

***Data from file U_1_1000_10_0.txt: machinesNum=10 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_10_1000_0.txt: machinesNum=10 jobsNum=1000 lowerBound=4837 upperBound=4837
isOptimal=1"

Content of machines summed (4837, 4837, 4837, 4836, 4836, 4836, 4836, 4836, 4836, 4836)

input selected: size 1000 sum 48363

----Our Results-----

best from Our local search found:

target function = 4847, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:4837, content= (99, 99, 97, 96, 94, 94, 93, 91, 90, 89, 89, 87, 86, 86, 83, 83, 81, 81, 79, 79, 78, 77, 76, 75, 74, 72, 72, 71, 69, 69, 66, 66, 65, 64, 62, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 52, 50, 49, 49, 47, 47, 47, 45, 44, 43, 41, 41, 40, 39, 39, 37, 37, 36, 34, 34, 33, 31, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 16, 15, 14, 13, 12, 11, 11, 9, 9, 9, 7, 7, 5, 4, 3, 2, 1)

bucket2 sum:4837, content= (99, 99, 97, 96, 94, 94, 93, 91, 90, 89, 88, 88, 86, 86, 83, 83, 81, 81, 79, 79, 78, 77, 76, 75, 73, 73, 72, 71, 69, 68, 67, 66, 65, 64, 62, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 52, 50, 49, 48, 48, 47, 46, 46, 44, 43, 41, 41, 40, 39, 38, 38, 37, 36, 34, 34, 33, 31, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 16, 14, 14, 14, 11, 11, 11, 10, 9, 9, 7, 7, 5, 4, 3, 2, 1)

bucket3 sum:4837, content= (99, 99, 97, 95, 95, 94, 92, 92, 90, 89, 88, 88, 86, 85, 84, 83, 81, 81, 79, 79, 77, 77, 77, 75, 73, 73, 72, 70, 70, 68, 67, 66, 65, 64, 62, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 51, 51, 49, 48, 48, 47, 46, 46, 44, 42, 42, 41, 40, 39, 38, 38, 37, 35, 35, 34, 33, 31, 31, 30, 29, 28, 27, 25, 25, 25, 23, 22, 21, 20, 19, 18, 17, 16, 15, 15, 14, 13, 12, 11, 11, 10, 9, 9, 7, 7, 5, 4, 3, 2, 1)

bucket4 sum:4836, content= (99, 98, 98, 95, 95, 94, 92, 92, 90, 89, 88, 88, 86, 85, 84, 83, 81, 81, 79, 79, 77, 77, 76, 76, 73, 73, 72, 70, 70, 68, 67, 66, 65, 63, 63, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 51, 50, 50, 48, 48, 47, 46, 46, 44, 42, 42, 41, 40, 39, 38, 38, 37, 35, 35, 34, 33, 31, 31, 30, 29, 28, 27, 25, 25, 24, 24, 22, 21, 20, 18, 18, 18, 16, 15, 15, 14, 13, 12, 11, 11, 10, 9, 9, 7, 7, 5, 4, 2, 2, 1)

bucket5 sum:4836, content= (99, 98, 97, 96, 95, 94, 92, 92, 90, 89, 88, 88, 86, 85, 84, 83, 81, 80, 80, 79, 77, 77, 76, 75, 74, 73, 72, 70, 70, 68, 67, 66, 65, 63, 63, 61, 60, 59, 58, 57, 56, 56, 54, 53, 52, 51, 50, 50, 48, 48, 47, 46, 45, 44, 43, 42, 40, 40, 40, 38, 38, 36, 36, 35, 34, 32, 32, 31, 30, 29, 28, 27, 25, 25, 24, 24, 22, 21, 20, 18, 18, 17, 17, 15, 15, 14, 13, 12, 11, 11, 10, 9, 9, 7, 6, 5, 4, 3, 2, 1)

bucket6 sum:4836, content= (99, 98, 97, 96, 95, 93, 93, 91, 90, 90, 88, 88, 86, 85, 84, 82, 82, 80, 80, 79, 77, 77, 76, 75, 74, 73, 72, 70, 70, 68, 67, 66, 65, 63, 63, 61, 60, 59, 58, 57, 56, 56, 54, 53, 52, 51, 50, 50, 48, 48, 47, 46, 45, 44, 43, 42, 40, 40, 40, 38, 38, 36, 36, 35, 34, 32, 32, 31, 30, 29, 27, 27, 26, 25, 24, 24, 22, 21, 20, 18, 18, 17, 17, 15, 15, 14, 13, 12, 11, 11, 10, 9, 8, 8, 6, 5, 4, 3, 2, 1)

bucket7 sum:4836, content= (99, 98, 97, 96, 95, 93, 93, 91, 90, 90, 88, 87, 87, 85, 84, 82, 82, 80, 80, 78, 78, 77, 76, 75, 74, 73, 71, 71, 70, 68, 67, 66, 64, 64, 63, 61, 60, 59, 58, 57, 56, 56, 54, 53, 52, 51, 50, 49, 49, 48, 47, 46, 45, 44, 43, 41, 41, 40, 40, 38, 38, 36, 36, 35, 34, 32, 32, 31, 30, 29, 27, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 16, 15, 14, 13, 12, 11, 11, 10, 9, 8, 8, 6, 5, 4, 3, 2, 1)

```

bucket8 sum:4836, content= (99, 98, 97, 96, 94, 94, 93, 91, 90, 90, 88, 87, 86, 86, 84, 82, 82, 80, 80, 78, 78, 77, 76, 75, 74, 72, 72, 71, 69, 69,
66, 66, 66, 63, 63, 60, 60, 59, 59, 57, 56, 56, 54, 53, 52, 51, 50, 49, 49, 48, 47, 46, 44, 44, 43, 42, 41, 40, 39, 39, 37, 37, 36, 35, 34, 32, 32, 31,
30, 29, 27, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 16, 15, 14, 13, 12, 11, 11, 10, 9, 8, 8, 6, 5, 4, 3, 2, 1)
bucket9 sum:4836, content= (99, 98, 97, 96, 94, 94, 93, 91, 90, 89, 89, 87, 86, 86, 83, 83, 82, 80, 80, 78, 78, 77, 76, 75, 74, 72, 72, 71, 69, 69,
66, 66, 64, 64, 63, 62, 60, 59, 58, 57, 56, 55, 54, 53, 53, 51, 50, 49, 49, 48, 47, 46, 44, 44, 43, 42, 41, 40, 39, 39, 37, 37, 36, 35, 33, 33, 32, 31,
30, 28, 28, 27, 26, 25, 24, 22, 22, 21, 21, 19, 18, 17, 16, 16, 15, 14, 13, 12, 11, 11, 9, 9, 9, 8, 6, 5, 4, 3, 2, 1)
bucket10 sum:4836, content= (99, 98, 96, 96, 95, 94, 93, 91, 90, 89, 89, 87, 86, 86, 83, 83, 81, 81, 79, 79, 78, 77, 76, 74, 74, 73, 72, 71, 69, 69,
66, 66, 64, 64, 63, 62, 59, 59, 59, 57, 56, 55, 54, 53, 52, 52, 50, 49, 49, 48, 47, 46, 44, 44, 43, 42, 41, 40, 39, 39, 37, 37, 36, 34, 34, 33, 32, 31,
30, 28, 28, 27, 26, 25, 24, 22, 22, 21, 20, 19, 18, 18, 16, 16, 15, 14, 12, 12, 11, 11, 11, 9, 8, 8, 5, 5, 4, 3, 2, 2)
"----Comparison for the 110 example----"
"***tf from benchmark was 4847(we added the number of machines) and target function from our local search is 4847"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 11))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 111 from 130-----"
"-----START 112 from 130-----"
"input file number 112: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_1.txt"
"***Data from file U_1_1000_10_1.txt: machinesNum=10 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_10_1000_1.txt: machinesNum=10 jobsNum=1000 lowerBound=5021 upperBound=5021
isOptimal=1"
Content of machines summed (5021, 5021, 5020, 5020, 5020, 5020, 5020, 5020, 5020, 5020)
input selected: size 1000 sum 50202

----Our Results-----
best from Our local search found:
target function = 5031, num of machines=10, square root lms=0
machines content(number of jobs=1000):

```

bucket1 sum:5021, content= (99, 99, 97, 97, 96, 95, 93, 93, 92, 91, 90, 89, 89, 88, 87, 86, 85, 84, 82, 81, 80, 80, 78, 78, 76, 75, 74, 73, 72, 70, 70, 68, 67, 67, 64, 63, 63, 62, 61, 60, 59, 58, 57, 56, 54, 54, 53, 52, 51, 51, 49, 48, 47, 46, 45, 45, 44, 43, 42, 41, 40, 40, 38, 37, 37, 35, 34, 32, 32, 31, 31, 29, 28, 27, 26, 24, 23, 22, 21, 20, 19, 18, 18, 16, 16, 14, 14, 12, 12, 11, 9, 9, 7, 7, 6, 5, 5, 3, 2, 2)
 bucket2 sum:5021, content= (99, 99, 97, 97, 96, 95, 93, 93, 92, 91, 90, 89, 88, 88, 88, 86, 85, 83, 82, 82, 80, 80, 78, 78, 76, 75, 74, 73, 72, 70, 70, 68, 67, 67, 64, 63, 63, 62, 61, 59, 59, 59, 56, 56, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 45, 44, 43, 42, 41, 40, 39, 39, 37, 37, 35, 33, 33, 32, 31, 31, 29, 28, 27, 25, 25, 23, 22, 21, 20, 19, 18, 18, 16, 16, 14, 14, 12, 12, 11, 9, 8, 8, 7, 6, 5, 4, 4, 2, 2)
 bucket3 sum:5021, content= (99, 98, 98, 97, 95, 95, 94, 93, 92, 91, 90, 89, 88, 88, 88, 86, 85, 83, 82, 82, 80, 80, 78, 78, 76, 75, 74, 73, 71, 71, 70, 68, 67, 66, 65, 63, 63, 62, 61, 59, 59, 59, 56, 56, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 45, 44, 43, 42, 41, 40, 39, 39, 37, 36, 36, 33, 33, 32, 31, 30, 30, 28, 27, 25, 24, 23, 23, 20, 20, 20, 18, 18, 16, 15, 15, 14, 12, 12, 10, 10, 8, 8, 7, 6, 5, 4, 4, 2, 1, 1)
 bucket4 sum:5021, content= (99, 98, 98, 97, 95, 95, 94, 93, 92, 91, 90, 89, 88, 88, 87, 87, 85, 83, 82, 82, 80, 79, 79, 77, 77, 75, 74, 73, 71, 71, 69, 69, 67, 66, 65, 63, 63, 62, 61, 59, 59, 58, 57, 56, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 45, 44, 43, 42, 41, 40, 39, 39, 37, 36, 35, 34, 33, 32, 31, 30, 30, 28, 27, 25, 24, 23, 22, 21, 20, 20, 18, 18, 16, 15, 15, 14, 12, 12, 10, 10, 8, 8, 7, 6, 5, 4, 4, 2, 1, 1)
 bucket5 sum:5021, content= (99, 98, 98, 96, 96, 95, 94, 93, 92, 91, 90, 89, 88, 88, 87, 86, 86, 83, 82, 81, 81, 79, 79, 77, 77, 75, 74, 73, 71, 71, 69, 69, 67, 66, 65, 63, 63, 62, 61, 59, 59, 58, 57, 56, 55, 53, 53, 52, 52, 50, 50, 48, 47, 46, 45, 45, 44, 43, 41, 41, 41, 39, 39, 37, 36, 35, 34, 33, 32, 31, 30, 30, 28, 27, 25, 24, 23, 22, 21, 20, 20, 18, 17, 17, 15, 15, 13, 13, 12, 10, 10, 8, 8, 7, 6, 5, 4, 4, 2, 1, 1)
 bucket6 sum:5019, content= (99, 98, 97, 97, 96, 95, 94, 93, 92, 90, 90, 90, 88, 88, 87, 86, 85, 84, 82, 81, 81, 79, 79, 77, 77, 75, 74, 72, 72, 71, 69, 69, 67, 66, 65, 63, 63, 62, 61, 59, 59, 58, 57, 56, 55, 53, 53, 52, 52, 50, 49, 49, 47, 46, 45, 45, 44, 42, 42, 41, 41, 39, 38, 38, 36, 35, 34, 33, 32, 31, 30, 29, 29, 26, 26, 24, 23, 22, 21, 20, 19, 19, 17, 17, 15, 15, 13, 13, 12, 10, 10, 8, 8, 7, 6, 5, 4, 3, 3)
 bucket7 sum:5019, content= (99, 98, 97, 97, 96, 95, 94, 93, 91, 91, 90, 89, 89, 88, 87, 86, 84, 84, 83, 81, 81, 79, 79, 77, 76, 76, 74, 72, 72, 71, 69, 69, 67, 66, 65, 63, 63, 62, 61, 59, 59, 58, 57, 56, 55, 53, 53, 52, 52, 50, 49, 48, 47, 46, 46, 44, 44, 43, 42, 41, 41, 39, 38, 38, 36, 35, 34, 33, 32, 31, 30, 29, 29, 26, 26, 24, 23, 22, 21, 20, 19, 19, 17, 17, 15, 15, 13, 13, 12, 10, 10, 8, 8, 6, 6, 6, 4, 3, 3)
 bucket8 sum:5019, content= (99, 98, 97, 97, 96, 95, 94, 93, 91, 91, 90, 89, 89, 88, 87, 86, 84, 84, 83, 81, 80, 80, 79, 77, 76, 76, 73, 73, 72, 70, 70, 68, 68, 66, 64, 64, 63, 62, 60, 60, 59, 58, 57, 56, 55, 53, 53, 52, 51, 51, 49, 48, 47, 46, 46, 44, 44, 43, 42, 41, 40, 40, 38, 38, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 24, 23, 22, 21, 20, 19, 19, 17, 16, 16, 15, 13, 13, 11, 11, 9, 9, 7, 7, 6, 6, 4, 3, 3)
 bucket9 sum:5020, content= (99, 98, 97, 97, 96, 95, 93, 93, 92, 91, 90, 89, 89, 88, 87, 86, 84, 84, 83, 81, 80, 80, 79, 77, 76, 76, 73, 73, 72, 70, 70, 68, 68, 66, 64, 64, 63, 62, 60, 60, 59, 57, 57, 56, 55, 54, 53, 52, 51, 51, 49, 48, 47, 46, 46, 44, 44, 43, 42, 41, 40, 40, 38, 38, 36, 35, 34, 33, 31, 31, 31, 29, 28, 27, 26, 23, 23, 23, 21, 20, 19, 19, 17, 16, 16, 14, 14, 13, 11, 11, 9, 9, 7, 7, 6, 5, 5, 3, 2, 2)
 bucket10 sum:5020, content= (99, 98, 97, 97, 96, 95, 93, 93, 92, 91, 90, 89, 89, 88, 87, 86, 84, 84, 82, 82, 80, 80, 78, 78, 76, 75, 74, 73, 72, 70, 70, 68, 68, 66, 64, 64, 62, 62, 61, 60, 59, 57, 57, 56, 55, 54, 53, 52, 51, 51, 49, 47, 47, 47, 46, 44, 44, 43, 42, 41, 40, 40, 38, 38, 36, 35, 34, 32, 32, 31, 31, 29, 27, 27, 26, 25, 23, 22, 21, 20, 19, 18, 18, 16, 16, 14, 14, 13, 11, 11, 9, 9, 7, 7, 6, 5, 5, 3, 2, 2)

----Comparison for the 111 example----

***tf from benchmark was 5031(we added the number of machines) and target function from our local search is 5031"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 12))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 112 from 130-----"

"-----START 113 from 130-----"

"input file number 113: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_2.txt"

***Data from file U_1_1000_10_2.txt: machinesNum=10 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_10_1000_2.txt: machinesNum=10 jobsNum=1000 lowerBound=5110 upperBound=5110
isOptimal=1"

Content of machines summed (5110, 5110, 5110, 5110, 5110, 5110, 5110, 5109, 5109, 5109)

input selected: size 1000 sum 51097

----Our Results-----

best from Our local search found:

target function = 5120, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:5110, content=(99, 98, 96, 96, 94, 94, 92, 91, 90, 90, 88, 87, 87, 85, 85, 84, 83, 83, 82, 80, 80, 79, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 66, 66, 65, 64, 62, 61, 60, 59, 58, 57, 57, 55, 54, 53, 53, 52, 51, 50, 50, 49, 48, 48, 46, 45, 45, 43, 43, 42, 40, 40, 38, 38, 36, 36, 34, 34, 33, 31, 30, 29, 27, 27, 26, 24, 22, 22, 20, 20, 18, 18, 17, 15, 15, 14, 12, 12, 11, 9, 8, 8, 6, 5, 4, 2, 2, 1)

bucket2 sum:5110, content=(99, 98, 96, 96, 94, 94, 92, 91, 90, 89, 88, 88, 86, 86, 85, 84, 83, 83, 81, 81, 80, 79, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 68, 68, 67, 66, 65, 64, 62, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 52, 52, 50, 50, 49, 48, 48, 46, 45, 45, 43, 43, 42, 40, 40, 38, 38, 36, 36, 34, 34, 33, 31, 30, 29, 27, 27, 26, 24, 22, 22, 20, 20, 18, 18, 16, 16, 15, 14, 12, 12, 11, 9, 8, 7, 7, 5, 3, 3, 2, 1)

bucket3 sum:5110, content=(99, 98, 96, 96, 94, 94, 92, 91, 90, 89, 88, 88, 86, 86, 85, 84, 83, 83, 81, 81, 80, 79, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 68, 68, 67, 66, 65, 63, 63, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 52, 52, 50, 50, 49, 48, 48, 46, 45, 45, 43, 43, 42, 40, 40, 38, 38, 36, 36, 34, 34, 33, 31, 30, 29, 27, 27, 26, 24, 22, 21, 21, 20, 18, 18, 16, 16, 15, 14, 12, 12, 11, 9, 8, 7, 7, 5, 3, 3, 2, 1)

bucket4 sum:5110, content=(99, 98, 96, 96, 94, 94, 92, 91, 90, 89, 88, 88, 86, 86, 85, 84, 83, 82, 82, 81, 80, 79, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 68, 68, 67, 66, 65, 63, 63, 61, 60, 59, 58, 57, 57, 55, 54, 53, 52, 52, 51, 51, 50, 49, 48, 47, 47, 45, 45, 43, 42, 42, 41, 40, 38, 38, 36, 36, 34, 34, 32, 32, 30, 29, 27, 27, 25, 25, 22, 21, 21, 19, 19, 17, 17, 16, 15, 13, 13, 12, 11, 9, 8, 7, 7, 4, 4, 3, 2, 1)

```

bucket5 sum:5110, content= (99, 98, 96, 96, 94, 93, 93, 91, 90, 89, 88, 87, 87, 86, 85, 84, 83, 82, 82, 81, 80, 79, 78, 78, 77, 76, 75, 73, 73, 73,
71, 69, 69, 68, 67, 66, 65, 63, 63, 61, 60, 59, 58, 57, 56, 56, 54, 53, 52, 52, 51, 51, 50, 49, 48, 47, 47, 45, 45, 43, 42, 42, 41, 39, 39, 38, 36, 35,
35, 34, 32, 31, 31, 29, 27, 27, 25, 24, 22, 22, 21, 19, 19, 17, 17, 16, 15, 13, 13, 12, 10, 10, 8, 7, 7, 4, 4, 3, 2, 1)
bucket6 sum:5110, content= (99, 98, 96, 96, 94, 93, 93, 91, 90, 89, 88, 87, 87, 86, 85, 84, 83, 82, 82, 81, 80, 79, 78, 78, 77, 76, 75, 73, 73, 73,
70, 70, 69, 68, 67, 66, 65, 63, 62, 62, 60, 59, 58, 57, 56, 56, 54, 53, 52, 52, 51, 51, 50, 49, 48, 47, 47, 45, 45, 43, 42, 42, 41, 39, 39, 37, 37, 35,
35, 34, 32, 31, 31, 28, 28, 27, 25, 24, 22, 22, 21, 19, 19, 17, 17, 16, 15, 13, 13, 12, 10, 10, 8, 7, 7, 4, 4, 3, 2, 1)
bucket7 sum:5110, content= (99, 97, 97, 95, 95, 93, 93, 91, 90, 89, 88, 87, 87, 86, 85, 84, 83, 82, 82, 81, 80, 79, 78, 78, 77, 76, 75, 73, 73, 72,
71, 70, 69, 68, 67, 66, 65, 63, 62, 62, 60, 58, 58, 58, 56, 56, 54, 53, 52, 52, 51, 51, 50, 49, 48, 47, 46, 46, 45, 43, 42, 42, 41, 39, 39, 37, 37, 35,
35, 34, 32, 31, 31, 28, 28, 27, 25, 24, 22, 22, 21, 19, 19, 17, 17, 16, 15, 13, 13, 12, 10, 9, 9, 7, 7, 4, 4, 3, 2, 1)
bucket8 sum:5109, content= (99, 97, 97, 95, 95, 93, 93, 91, 90, 89, 88, 87, 87, 85, 85, 85, 83, 82, 82, 81, 80, 79, 78, 78, 77, 76, 74, 74, 73, 72,
71, 70, 69, 68, 67, 66, 65, 63, 62, 62, 59, 59, 58, 58, 56, 55, 55, 53, 52, 52, 51, 51, 50, 49, 48, 47, 46, 46, 45, 43, 42, 42, 41, 39, 39, 37, 37, 35,
35, 33, 33, 31, 31, 28, 28, 27, 25, 23, 23, 22, 20, 20, 18, 18, 17, 16, 15, 13, 13, 11, 11, 9, 9, 7, 6, 6, 3, 3, 1, 1)
bucket9 sum:5109, content= (99, 97, 97, 95, 95, 93, 92, 92, 90, 88, 88, 88, 87, 85, 85, 84, 84, 82, 82, 81, 80, 79, 78, 78, 76, 76, 75, 74, 73, 72,
71, 70, 69, 68, 67, 66, 65, 63, 62, 61, 61, 58, 58, 58, 56, 55, 55, 53, 52, 52, 51, 50, 50, 50, 48, 47, 46, 46, 44, 44, 42, 42, 41, 39, 39, 37, 36, 36,
35, 33, 33, 31, 30, 29, 28, 27, 25, 23, 23, 22, 20, 20, 18, 18, 17, 16, 14, 14, 13, 11, 11, 9, 8, 8, 6, 6, 3, 3, 1, 1)
bucket10 sum:5109, content= (98, 98, 97, 95, 94, 94, 92, 92, 90, 88, 88, 88, 87, 85, 85, 84, 83, 83, 82, 81, 80, 79, 78, 78, 76, 76, 75, 74, 73, 72,
71, 70, 69, 68, 66, 66, 65, 64, 62, 61, 59, 59, 58, 58, 57, 55, 54, 53, 53, 52, 51, 50, 50, 49, 49, 47, 46, 46, 44, 44, 42, 42, 41, 39, 39, 37, 36, 36,
35, 33, 33, 31, 30, 29, 28, 26, 26, 23, 22, 22, 21, 20, 18, 18, 17, 15, 15, 14, 13, 11, 11, 9, 8, 8, 6, 4, 4, 3, 2, 1)
"----Comparison for the 112 example----"
"***tf from benchmark was 5120(we added the number of machines) and target function from our local search is 5120"
***RESULT IS THE SAME
Run time: 0.015 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 13))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 113 from 130-----"
"-----START 114 from 130-----"
"input file number 114: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_3.txt"
"***Data from file U_1_1000_10_3.txt: machinesNum=10 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_10_1000_3.txt: machinesNum=10 jobsNum=1000 lowerBound=4926 upperBound=4926
isOptimal=1"

```

Content of machines summed (4926, 4926, 4926, 4926, 4926, 4925, 4925, 4925, 4925, 4925)

input selected: size 1000 sum 49255

----Our Results-----

best from Our local search found:

target function = 4936, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:4926, content= (99, 99, 96, 95, 95, 93, 93, 91, 90, 89, 88, 88, 86, 86, 85, 84, 83, 83, 82, 81, 80, 78, 78, 77, 76, 75, 73, 73, 71, 70, 69, 68, 67, 66, 65, 65, 63, 62, 61, 60, 60, 57, 57, 55, 54, 53, 53, 52, 50, 49, 48, 47, 46, 45, 44, 43, 42, 41, 39, 39, 37, 37, 37, 37, 35, 34, 33, 33, 33, 31, 30, 29, 28, 25, 24, 24, 22, 22, 20, 20, 19, 17, 17, 16, 16, 15, 14, 14, 13, 11, 11, 10, 8, 8, 7, 5, 5, 4, 2, 2, 1)

bucket2 sum:4926, content= (99, 98, 97, 95, 95, 93, 93, 91, 90, 89, 88, 87, 87, 86, 84, 84, 84, 83, 82, 81, 79, 79, 78, 77, 76, 75, 73, 73, 71, 70, 69, 68, 67, 66, 65, 65, 63, 62, 61, 60, 60, 57, 57, 55, 54, 53, 53, 52, 50, 49, 48, 47, 46, 45, 44, 43, 42, 41, 39, 39, 37, 37, 37, 37, 35, 34, 33, 33, 32, 32, 30, 29, 28, 25, 24, 24, 22, 21, 21, 20, 19, 17, 17, 16, 16, 15, 14, 14, 13, 11, 11, 10, 8, 8, 7, 5, 5, 3, 3, 2, 1)

bucket3 sum:4926, content= (99, 98, 96, 96, 95, 93, 92, 92, 90, 89, 88, 87, 87, 86, 84, 84, 84, 83, 82, 81, 79, 79, 78, 77, 76, 75, 73, 73, 71, 70, 69, 68, 67, 66, 65, 65, 63, 62, 61, 60, 59, 58, 57, 55, 54, 53, 53, 51, 51, 49, 48, 47, 46, 45, 44, 43, 42, 40, 40, 38, 38, 37, 36, 35, 35, 33, 33, 32, 32, 30, 29, 28, 25, 24, 24, 22, 21, 21, 20, 19, 17, 17, 16, 16, 15, 14, 14, 13, 11, 11, 9, 9, 8, 6, 6, 5, 3, 3, 2, 1)

bucket4 sum:4926, content= (99, 98, 96, 96, 94, 94, 92, 92, 90, 89, 88, 87, 87, 85, 85, 84, 84, 82, 82, 82, 79, 79, 78, 77, 76, 74, 74, 72, 72, 70, 69, 67, 67, 67, 65, 65, 63, 62, 61, 60, 59, 58, 56, 56, 54, 53, 53, 51, 51, 49, 48, 47, 46, 45, 44, 43, 41, 41, 40, 38, 38, 37, 36, 35, 35, 33, 33, 32, 31, 31, 29, 27, 26, 24, 23, 23, 21, 21, 20, 18, 18, 17, 16, 16, 15, 14, 14, 13, 11, 11, 9, 9, 8, 6, 6, 4, 4, 3, 2, 1)

bucket5 sum:4926, content= (99, 98, 96, 96, 94, 94, 92, 92, 90, 89, 88, 87, 87, 85, 85, 84, 84, 82, 82, 81, 80, 78, 78, 78, 76, 74, 74, 72, 72, 70, 69, 67, 67, 67, 65, 64, 64, 62, 61, 60, 59, 58, 56, 56, 54, 53, 53, 51, 51, 49, 48, 46, 46, 45, 44, 44, 41, 41, 40, 38, 38, 37, 36, 35, 34, 34, 33, 32, 31, 31, 29, 27, 26, 24, 23, 22, 22, 21, 20, 18, 18, 17, 16, 15, 15, 15, 14, 12, 12, 11, 9, 9, 8, 6, 6, 4, 4, 3, 2, 1)

bucket6 sum:4925, content= (99, 98, 96, 96, 94, 94, 92, 91, 91, 89, 88, 87, 86, 86, 85, 84, 84, 82, 82, 81, 80, 78, 78, 78, 76, 74, 74, 72, 72, 70, 69, 67, 67, 66, 66, 64, 64, 62, 61, 60, 58, 58, 57, 56, 54, 53, 53, 51, 50, 50, 48, 46, 46, 45, 44, 43, 42, 41, 40, 38, 38, 37, 36, 35, 34, 34, 33, 32, 31, 31, 29, 27, 26, 24, 23, 22, 22, 21, 20, 18, 18, 17, 16, 15, 15, 15, 14, 12, 12, 10, 10, 9, 8, 6, 6, 4, 4, 3, 1, 1)

bucket7 sum:4925, content= (99, 98, 96, 96, 94, 94, 92, 91, 91, 89, 88, 87, 86, 86, 85, 84, 83, 83, 82, 81, 80, 78, 78, 77, 76, 75, 74, 72, 71, 70, 69, 68, 67, 66, 66, 64, 63, 62, 61, 61, 58, 58, 57, 55, 54, 54, 52, 52, 50, 50, 47, 47, 46, 45, 44, 43, 42, 41, 40, 38, 38, 37, 36, 35, 34, 34, 33, 32, 31, 31, 29, 27, 26, 24, 23, 22, 22, 21, 19, 19, 18, 17, 16, 15, 15, 15, 14, 12, 12, 10, 10, 9, 7, 7, 6, 4, 4, 3, 1, 1)

bucket8 sum:4925, content= (99, 98, 96, 96, 94, 94, 92, 91, 91, 88, 88, 88, 86, 86, 85, 84, 83, 83, 82, 81, 80, 78, 78, 76, 76, 76, 73, 73, 71, 70, 69, 68, 67, 66, 66, 64, 63, 62, 61, 61, 58, 58, 57, 55, 54, 54, 52, 52, 50, 49, 48, 47, 46, 45, 44, 43, 42, 41, 39, 39, 38, 37, 36, 35, 34, 34, 33, 32, 31, 31, 28, 28, 25, 25, 23, 22, 22, 21, 19, 19, 18, 17, 16, 15, 15, 14, 14, 13, 12, 10, 10, 8, 8, 7, 5, 5, 4, 2, 2, 1)

bucket9 sum:4925, content= (99, 97, 97, 95, 95, 93, 93, 91, 90, 90, 88, 87, 86, 86, 85, 84, 83, 83, 82, 80, 80, 79, 78, 76, 76, 75, 74, 73, 71, 70, 69, 68, 67, 66, 66, 64, 63, 62, 61, 60, 60, 58, 56, 55, 54, 54, 52, 52, 50, 49, 48, 47, 46, 45, 44, 42, 42, 41, 40, 39, 38, 37, 36, 35, 34, 34, 33, 32, 31, 30, 30, 27, 25, 25, 23, 22, 22, 20, 20, 19, 18, 16, 16, 16, 15, 14, 14, 13, 11, 11, 10, 8, 8, 7, 5, 5, 4, 2, 2, 1)
bucket10 sum:4925, content= (99, 97, 97, 95, 95, 93, 93, 91, 90, 88, 88, 88, 87, 86, 85, 84, 83, 83, 82, 80, 80, 79, 78, 76, 76, 75, 74, 73, 71, 70, 69, 68, 67, 66, 65, 65, 63, 62, 61, 60, 60, 58, 56, 55, 54, 54, 52, 52, 50, 49, 48, 47, 46, 45, 44, 42, 42, 41, 40, 39, 38, 37, 35, 35, 35, 33, 33, 33, 31, 30, 30, 26, 26, 25, 23, 22, 22, 20, 20, 19, 17, 17, 16, 16, 15, 14, 14, 13, 11, 11, 10, 8, 8, 7, 5, 5, 4, 2, 2, 1)

"----Comparison for the 113 example----

****tf from benchmark was 4936(we added the number of machines) and target function from our local search is 4936"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 14))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 114 from 130-----"

"-----START 115 from 130-----"

"input file number 115: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_4.txt"

****Data from file U_1_1000_10_4.txt: machinesNum=10 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_10_1000_4.txt: machinesNum=10 jobsNum=1000 lowerBound=5119 upperBound=5119
isOptimal=1"

Content of machines summed (5119, 5119, 5119, 5119, 5119, 5119, 5118, 5118, 5118, 5118)

input selected: size 1000 sum 51186

----Our Results-----

best from Our local search found:

target function = 5129, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:5119, content= (99, 98, 97, 96, 96, 95, 94, 93, 92, 91, 91, 90, 89, 89, 86, 86, 86, 85, 83, 82, 80, 80, 78, 76, 76, 74, 73, 72, 72, 71, 70, 70, 68, 67, 67, 65, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 56, 55, 55, 52, 51, 50, 49, 49, 47, 46, 45, 43, 42, 42, 40, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 27, 26, 24, 24, 22, 21, 20, 19, 18, 18, 17, 15, 14, 12, 12, 11, 9, 9, 7, 6, 4, 3, 3, 2, 1)

bucket2 sum:5119, content= (99, 98, 97, 96, 96, 95, 94, 93, 92, 91, 91, 90, 89, 88, 87, 86, 86, 85, 83, 82, 80, 80, 78, 76, 76, 74, 73, 72, 72, 71, 70, 70, 68, 67, 67, 65, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 56, 55, 54, 52, 52, 50, 49, 49, 46, 46, 46, 43, 42, 42, 40, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 27, 26, 24, 24, 22, 21, 20, 19, 18, 18, 16, 16, 13, 13, 12, 11, 9, 8, 8, 6, 4, 3, 3, 2, 1)

bucket3 sum:5119, content= (99, 98, 97, 96, 96, 95, 94, 93, 92, 91, 91, 90, 89, 88, 87, 86, 86, 84, 84, 82, 80, 79, 79, 76, 76, 74, 73, 72, 72, 71, 70, 70, 68, 67, 67, 65, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 56, 55, 54, 52, 51, 50, 50, 48, 47, 46, 45, 44, 42, 42, 40, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 27, 25, 25, 24, 22, 21, 20, 19, 18, 18, 16, 15, 14, 13, 12, 11, 9, 8, 8, 5, 5, 3, 3, 2, 1)

bucket4 sum:5119, content= (99, 98, 97, 96, 96, 95, 94, 93, 92, 91, 91, 90, 89, 88, 87, 86, 86, 84, 84, 82, 80, 79, 78, 77, 75, 74, 73, 73, 72, 71, 70, 70, 68, 67, 66, 66, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 56, 55, 54, 52, 51, 50, 50, 48, 47, 46, 45, 44, 42, 42, 40, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 27, 25, 25, 24, 22, 21, 20, 19, 18, 18, 16, 15, 14, 13, 12, 11, 9, 8, 7, 6, 5, 3, 3, 2, 1)

bucket5 sum:5119, content= (99, 98, 97, 96, 96, 95, 93, 93, 92, 92, 91, 90, 89, 88, 87, 86, 85, 85, 84, 81, 81, 79, 78, 77, 75, 74, 73, 73, 72, 71, 70, 69, 69, 67, 66, 66, 65, 64, 62, 62, 61, 60, 60, 58, 57, 57, 57, 55, 54, 52, 51, 50, 50, 48, 47, 46, 45, 44, 42, 42, 40, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 26, 25, 24, 22, 21, 20, 19, 18, 18, 16, 15, 14, 13, 12, 10, 10, 8, 7, 6, 5, 3, 3, 2, 1)

bucket6 sum:5119, content= (99, 98, 97, 96, 96, 95, 93, 93, 92, 92, 91, 90, 89, 88, 87, 86, 85, 85, 83, 82, 81, 79, 78, 77, 75, 74, 73, 73, 72, 71, 70, 69, 69, 67, 66, 66, 65, 63, 63, 62, 61, 60, 60, 58, 57, 57, 57, 55, 54, 52, 51, 50, 50, 48, 47, 46, 45, 44, 42, 41, 41, 39, 39, 39, 36, 36, 36, 34, 33, 31, 31, 31, 28, 28, 27, 27, 26, 25, 23, 23, 21, 20, 19, 18, 18, 16, 15, 14, 13, 12, 10, 10, 8, 7, 6, 5, 3, 3, 2, 1)

bucket7 sum:5118, content= (99, 98, 97, 96, 96, 95, 93, 93, 92, 92, 91, 90, 89, 88, 87, 86, 85, 85, 83, 82, 81, 79, 78, 77, 75, 74, 73, 72, 72, 72, 70, 69, 69, 67, 66, 66, 65, 63, 63, 62, 61, 60, 59, 59, 57, 57, 57, 55, 53, 53, 51, 50, 49, 49, 47, 46, 45, 44, 42, 41, 41, 39, 39, 39, 36, 36, 36, 34, 32, 32, 31, 31, 28, 28, 27, 27, 26, 25, 23, 22, 21, 21, 19, 18, 17, 17, 15, 14, 13, 11, 11, 10, 8, 7, 6, 4, 4, 3, 1, 1)

bucket8 sum:5118, content= (99, 98, 97, 96, 96, 94, 94, 93, 92, 92, 91, 90, 89, 88, 87, 86, 85, 85, 83, 82, 81, 79, 78, 77, 75, 74, 73, 72, 72, 72, 70, 69, 69, 67, 66, 66, 64, 64, 63, 62, 61, 60, 59, 59, 57, 57, 57, 55, 53, 52, 52, 50, 49, 49, 47, 46, 45, 43, 43, 41, 41, 39, 39, 38, 37, 36, 35, 35, 32, 32, 31, 30, 30, 28, 27, 26, 26, 25, 23, 22, 21, 21, 19, 18, 17, 17, 15, 14, 13, 11, 11, 10, 8, 7, 6, 4, 4, 2, 2, 1)

bucket9 sum:5118, content= (99, 97, 97, 96, 96, 96, 93, 93, 92, 92, 90, 90, 90, 88, 87, 86, 85, 85, 83, 82, 81, 79, 78, 77, 74, 74, 74, 72, 72, 71, 71, 69, 68, 68, 66, 65, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 56, 56, 53, 52, 52, 50, 49, 49, 47, 46, 45, 43, 43, 41, 40, 40, 39, 38, 37, 36, 35, 35, 32, 32, 31, 30, 28, 28, 28, 27, 26, 25, 23, 22, 21, 20, 19, 19, 17, 17, 15, 14, 12, 12, 11, 10, 8, 6, 6, 5, 4, 2, 2, 1)

bucket10 sum:5118, content= (98, 98, 97, 96, 96, 94, 94, 93, 92, 92, 91, 90, 89, 89, 87, 86, 85, 85, 83, 82, 80, 80, 77, 77, 76, 74, 73, 72, 72, 71, 71, 69, 68, 67, 67, 65, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 56, 55, 55, 52, 50, 50, 50, 49, 47, 46, 45, 43, 43, 41, 40, 40, 39, 37, 37, 36, 36, 34, 33, 32, 31, 30, 28, 28, 28, 27, 26, 25, 23, 22, 21, 19, 19, 19, 18, 17, 14, 14, 13, 12, 11, 10, 8, 6, 6, 5, 3, 3, 2, 1)

"---Comparison for the 114 example---"

****tf from benchmark was 5129(we added the number of machines) and target function from our local search is 5129"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 15))

```
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 115 from 130-----"
"-----START 116 from 130-----"
"input file number 116: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_5.txt"
"***Data from file U_1_1000_10_5.txt: machinesNum=10 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_10_1000_5.txt: machinesNum=10 jobsNum=1000 lowerBound=4885 upperBound=4885
isOptimal=1"
Content of machines summed (4885, 4885, 4884, 4884, 4884, 4884, 4884, 4884, 4884, 4884)
input selected: size 1000 sum 48842
```

----Our Results-----

best from Our local search found:

target function = 4895, num of machines=10, square root lms=0

machines content(number of jobs=1000):

```
bucket1 sum:4885, content=(99, 97, 96, 93, 93, 92, 90, 90, 89, 88, 88, 86, 85, 84, 83, 83, 81, 80, 79, 79, 77, 75, 75, 74, 73, 72, 71, 69, 69, 68,
67, 66, 65, 63, 62, 62, 61, 60, 59, 59, 57, 56, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 44, 44, 42, 42, 41, 41, 40, 39, 38, 37, 36, 35, 35, 33, 32,
32, 30, 30, 30, 28, 27, 27, 26, 25, 25, 22, 22, 20, 18, 18, 17, 16, 16, 14, 13, 13, 12, 11, 11, 9, 7, 7, 5, 4, 2, 2, 1)
bucket2 sum:4885, content=(99, 97, 96, 93, 93, 91, 91, 90, 89, 88, 87, 87, 85, 84, 83, 82, 82, 80, 79, 79, 77, 75, 75, 74, 73, 72, 71, 69, 69, 68,
67, 66, 65, 63, 62, 62, 61, 60, 59, 59, 57, 56, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 44, 43, 43, 42, 41, 41, 40, 39, 37, 37, 37, 35, 34, 34, 32,
32, 30, 30, 29, 29, 27, 27, 26, 25, 24, 23, 21, 21, 18, 18, 17, 16, 16, 14, 13, 13, 12, 11, 11, 8, 8, 6, 6, 4, 2, 2, 1)
bucket3 sum:4884, content=(99, 97, 95, 94, 93, 91, 91, 90, 89, 88, 87, 87, 85, 84, 83, 82, 82, 80, 79, 79, 76, 76, 75, 74, 73, 72, 70, 70, 69, 68,
67, 66, 65, 63, 62, 62, 61, 60, 59, 59, 57, 56, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 44, 43, 43, 42, 41, 41, 40, 39, 37, 37, 36, 36, 34, 34, 32,
32, 30, 30, 29, 29, 27, 27, 26, 25, 24, 23, 21, 21, 18, 18, 17, 16, 15, 15, 13, 13, 12, 11, 11, 8, 8, 6, 6, 3, 3, 1, 1)
bucket4 sum:4884, content=(99, 97, 95, 94, 93, 91, 91, 90, 89, 88, 87, 86, 85, 85, 83, 82, 81, 81, 79, 79, 76, 76, 75, 74, 73, 72, 70, 70, 69, 68,
67, 66, 65, 63, 62, 62, 61, 60, 59, 59, 57, 56, 55, 54, 53, 52, 51, 50, 49, 49, 47, 46, 45, 44, 43, 43, 42, 41, 41, 40, 38, 38, 37, 36, 36, 34, 34, 32,
32, 30, 30, 29, 29, 27, 27, 26, 25, 24, 23, 21, 20, 19, 18, 17, 16, 15, 15, 13, 13, 12, 11, 11, 8, 8, 6, 6, 3, 3, 1, 1)
bucket5 sum:4884, content=(98, 98, 95, 94, 92, 92, 91, 90, 89, 88, 87, 86, 85, 85, 83, 82, 81, 81, 79, 78, 77, 76, 74, 74, 74, 71, 71, 70, 69, 68,
67, 65, 65, 64, 62, 62, 61, 60, 59, 59, 57, 56, 55, 54, 53, 51, 51, 51, 49, 49, 47, 46, 45, 44, 43, 43, 42, 41, 41, 39, 39, 38, 37, 36, 36, 34, 34, 32,
32, 30, 30, 29, 28, 28, 27, 26, 25, 24, 23, 21, 20, 19, 18, 17, 16, 15, 14, 14, 13, 12, 11, 11, 8, 8, 6, 5, 4, 2, 2, 1)
```

```

bucket6 sum:4884, content= (98, 98, 95, 94, 92, 92, 91, 90, 89, 88, 87, 86, 85, 84, 84, 82, 81, 80, 80, 78, 77, 76, 74, 74, 74, 71, 71, 70, 69, 68,
67, 65, 65, 64, 62, 62, 61, 60, 59, 59, 57, 56, 55, 54, 53, 51, 51, 51, 49, 48, 48, 46, 45, 44, 43, 43, 42, 41, 41, 39, 39, 38, 37, 36, 36, 34, 34, 32,
32, 30, 30, 29, 28, 28, 27, 26, 25, 24, 23, 21, 20, 19, 17, 17, 16, 16, 14, 14, 12, 12, 12, 10, 9, 8, 6, 5, 4, 2, 2, 1)
bucket7 sum:4884, content= (98, 97, 96, 94, 92, 92, 91, 90, 89, 88, 87, 86, 85, 84, 84, 82, 81, 80, 80, 78, 77, 76, 74, 74, 73, 72, 71, 70, 69, 68,
66, 66, 65, 64, 62, 62, 61, 60, 59, 58, 58, 56, 54, 54, 53, 52, 51, 51, 49, 48, 48, 46, 44, 44, 44, 43, 42, 41, 41, 39, 39, 38, 37, 36, 36, 34, 33, 33,
31, 31, 30, 29, 28, 28, 27, 26, 25, 24, 22, 22, 20, 19, 17, 17, 16, 16, 14, 13, 13, 12, 12, 10, 9, 8, 6, 5, 4, 2, 2, 1)
bucket8 sum:4884, content= (98, 97, 96, 93, 93, 92, 90, 90, 89, 89, 87, 86, 85, 84, 84, 82, 81, 80, 80, 78, 77, 75, 75, 74, 73, 72, 71, 70, 68, 68,
68, 65, 65, 63, 63, 62, 60, 60, 60, 58, 58, 56, 54, 54, 53, 52, 51, 51, 49, 48, 47, 46, 45, 44, 44, 43, 42, 41, 40, 40, 39, 38, 37, 36, 36, 34, 33, 33,
31, 31, 30, 29, 28, 27, 27, 25, 23, 23, 22, 20, 19, 17, 17, 16, 16, 14, 13, 13, 12, 12, 10, 9, 7, 7, 5, 4, 2, 2, 1)
bucket9 sum:4884, content= (98, 97, 96, 93, 93, 92, 90, 90, 89, 89, 87, 86, 85, 84, 84, 82, 81, 80, 80, 78, 77, 75, 75, 74, 72, 72, 71, 70, 69, 68,
66, 66, 65, 64, 63, 61, 61, 60, 60, 58, 57, 56, 55, 54, 53, 52, 51, 51, 49, 48, 46, 46, 45, 44, 44, 43, 42, 42, 40, 40, 39, 38, 37, 36, 35, 35, 33, 33,
31, 31, 30, 29, 28, 27, 27, 26, 26, 23, 23, 22, 20, 19, 17, 17, 16, 16, 14, 13, 13, 12, 12, 10, 9, 7, 7, 5, 4, 2, 2, 1)
bucket10 sum:4884, content= (98, 96, 96, 94, 93, 92, 90, 90, 89, 88, 88, 86, 85, 84, 83, 83, 81, 80, 80, 78, 77, 75, 75, 74, 72, 72, 71, 70, 69, 68,
66, 66, 65, 64, 63, 61, 61, 60, 59, 59, 56, 56, 55, 54, 54, 52, 51, 50, 50, 48, 46, 46, 45, 44, 44, 43, 42, 42, 40, 40, 39, 38, 37, 36, 35, 35, 33, 33,
31, 30, 30, 30, 28, 27, 27, 26, 26, 23, 23, 22, 20, 19, 17, 17, 16, 16, 14, 13, 13, 12, 12, 10, 9, 7, 7, 4, 4, 3, 2, 1)
"----Comparison for the 115 example----"
"***tf from benchmark was 4895(we added the number of machines) and target function from our local search is 4895"
***RESULT IS THE SAME
Run time: 0.015 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 16))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 116 from 130-----"
"-----START 117 from 130-----"
"input file number 117: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_6.txt"
"***Data from file U_1_1000_10_6.txt: machinesNum=10 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_10_1000_6.txt: machinesNum=10 jobsNum=1000 lowerBound=4954 upperBound=4954
isOptimal=1"
Content of machines summed (4954, 4954, 4954, 4954, 4954, 4954, 4954, 4954, 4954, 4954)
input selected: size 1000 sum 49540

```

----Our Results-----

best from Our local search found:

target function = 4964, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:4954, content= (99, 99, 97, 96, 96, 94, 94, 93, 92, 91, 90, 89, 88, 87, 86, 85, 84, 83, 82, 82, 80, 79, 78, 77, 77, 75, 75, 74, 72, 71, 70, 69, 68, 67, 67, 64, 64, 61, 61, 59, 58, 57, 57, 56, 54, 54, 53, 52, 50, 49, 48, 47, 46, 46, 46, 44, 44, 42, 41, 40, 38, 37, 36, 35, 35, 33, 33, 32, 30, 29, 27, 27, 25, 25, 24, 23, 21, 20, 19, 19, 17, 16, 16, 16, 14, 14, 13, 12, 11, 9, 9, 8, 7, 6, 6, 4, 4, 2, 2, 1)

bucket2 sum:4954, content= (99, 98, 98, 96, 96, 94, 94, 93, 92, 91, 90, 89, 88, 86, 86, 86, 84, 83, 82, 81, 81, 79, 78, 77, 77, 75, 75, 74, 72, 71, 70, 69, 68, 67, 66, 65, 63, 62, 61, 59, 58, 57, 57, 55, 55, 54, 53, 51, 51, 49, 48, 47, 46, 46, 45, 45, 43, 43, 41, 40, 38, 37, 36, 35, 35, 33, 33, 32, 30, 28, 28, 27, 25, 25, 24, 23, 21, 20, 19, 18, 18, 16, 16, 16, 14, 14, 13, 12, 11, 9, 9, 8, 7, 6, 6, 4, 4, 2, 2, 1)

bucket3 sum:4954, content= (99, 98, 97, 97, 95, 95, 94, 93, 91, 91, 91, 89, 88, 86, 86, 86, 84, 83, 82, 81, 81, 79, 78, 77, 76, 76, 75, 73, 72, 71, 71, 69, 68, 67, 66, 65, 63, 62, 61, 59, 58, 57, 57, 55, 55, 54, 53, 51, 51, 49, 48, 47, 46, 46, 45, 45, 43, 43, 41, 40, 38, 37, 36, 35, 35, 33, 33, 31, 31, 28, 28, 27, 25, 25, 24, 22, 22, 20, 19, 18, 18, 16, 16, 15, 15, 14, 13, 12, 10, 10, 9, 8, 7, 6, 5, 5, 3, 3, 2, 1)

bucket4 sum:4954, content= (99, 98, 97, 97, 95, 95, 94, 93, 91, 91, 91, 89, 88, 86, 86, 85, 85, 83, 82, 81, 81, 79, 78, 77, 76, 76, 75, 73, 72, 71, 71, 69, 68, 67, 66, 65, 63, 62, 61, 59, 58, 57, 57, 55, 55, 54, 52, 52, 51, 49, 48, 47, 46, 46, 45, 45, 43, 43, 41, 40, 37, 37, 37, 35, 35, 33, 33, 31, 30, 29, 28, 26, 26, 25, 24, 22, 22, 20, 19, 18, 18, 16, 16, 15, 15, 14, 13, 12, 10, 10, 9, 7, 7, 7, 5, 5, 3, 3, 2, 1)

bucket5 sum:4954, content= (99, 98, 97, 97, 95, 95, 94, 93, 91, 91, 90, 90, 87, 87, 86, 85, 85, 83, 82, 81, 80, 79, 79, 77, 76, 76, 75, 73, 72, 71, 70, 70, 68, 67, 66, 65, 63, 62, 60, 60, 58, 57, 57, 55, 55, 54, 52, 52, 51, 49, 48, 47, 46, 46, 45, 44, 44, 43, 41, 40, 37, 37, 37, 35, 34, 34, 33, 31, 30, 29, 28, 26, 26, 25, 24, 22, 22, 20, 19, 18, 17, 17, 16, 15, 15, 14, 13, 12, 10, 10, 8, 8, 7, 7, 5, 5, 3, 3, 2, 1)

bucket6 sum:4954, content= (99, 98, 97, 97, 95, 95, 94, 92, 92, 91, 90, 90, 87, 87, 86, 85, 85, 83, 82, 81, 80, 79, 79, 77, 76, 76, 75, 73, 72, 71, 70, 70, 68, 67, 66, 65, 63, 62, 60, 60, 58, 57, 57, 55, 55, 54, 52, 52, 50, 50, 48, 47, 46, 46, 45, 44, 44, 42, 42, 39, 38, 37, 36, 36, 34, 34, 32, 32, 30, 29, 28, 26, 26, 25, 24, 22, 22, 20, 19, 18, 17, 17, 16, 15, 15, 13, 13, 13, 10, 10, 8, 8, 7, 7, 5, 4, 4, 3, 2, 1)

bucket7 sum:4954, content= (99, 98, 97, 97, 95, 95, 94, 92, 92, 91, 90, 89, 88, 87, 86, 85, 84, 84, 82, 81, 80, 79, 79, 77, 76, 76, 75, 73, 72, 71, 70, 70, 68, 67, 66, 65, 63, 62, 60, 59, 58, 58, 56, 56, 55, 54, 52, 52, 50, 50, 48, 47, 46, 46, 45, 44, 44, 42, 42, 39, 38, 37, 36, 36, 34, 33, 33, 32, 30, 29, 28, 26, 26, 25, 24, 22, 22, 20, 19, 18, 17, 17, 16, 15, 15, 13, 13, 12, 11, 9, 9, 8, 7, 7, 5, 4, 4, 3, 2, 1)

bucket8 sum:4954, content= (99, 98, 97, 97, 95, 95, 94, 92, 92, 91, 90, 89, 88, 87, 86, 85, 84, 84, 82, 81, 80, 79, 78, 78, 76, 76, 75, 73, 72, 71, 70, 70, 67, 67, 67, 64, 64, 62, 60, 58, 58, 58, 57, 56, 55, 54, 52, 52, 50, 49, 48, 47, 47, 46, 45, 44, 44, 42, 41, 40, 38, 37, 36, 36, 34, 33, 33, 32, 30, 29, 28, 26, 26, 25, 24, 22, 22, 19, 19, 19, 17, 17, 16, 15, 15, 13, 13, 12, 11, 9, 9, 8, 7, 7, 5, 4, 4, 3, 2, 1)

bucket9 sum:4954, content= (99, 98, 97, 96, 96, 94, 94, 93, 92, 91, 90, 89, 88, 87, 86, 85, 84, 83, 82, 82, 80, 79, 78, 78, 76, 76, 75, 72, 72, 72, 70, 69, 69, 67, 65, 65, 64, 61, 61, 58, 58, 58, 57, 56, 55, 53, 53, 52, 50, 49, 48, 47, 47, 46, 45, 44, 44, 42, 40, 40, 39, 37, 36, 36, 34, 33, 33, 32, 30, 29, 27, 27, 26, 25, 23, 23, 21, 21, 19, 18, 17, 17, 16, 15, 15, 13, 13, 11, 11, 10, 9, 8, 7, 6, 6, 4, 4, 3, 2, 1)

bucket10 sum:4954, content=(99, 98, 97, 96, 96, 94, 94, 93, 92, 91, 90, 88, 88, 87, 86, 86, 84, 83, 82, 82, 79, 79, 79, 78, 76, 76, 74, 74, 72, 71, 70, 69, 69, 67, 65, 65, 64, 61, 61, 58, 58, 58, 57, 56, 55, 53, 53, 52, 50, 49, 48, 47, 47, 46, 45, 44, 44, 42, 40, 40, 39, 37, 36, 36, 34, 33, 33, 32, 30, 29, 27, 27, 26, 25, 23, 23, 21, 19, 19, 19, 18, 16, 16, 16, 14, 14, 13, 11, 11, 10, 9, 8, 7, 6, 6, 4, 4, 2, 2, 2)

"----Comparison for the 116 example----

****tf from benchmark was 4964(we added the number of machines) and target function from our local search is 4964"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 17))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 117 from 130-----"

"-----START 118 from 130-----"

"input file number 118: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_7.txt"

****Data from file U_1_1000_10_7.txt: machinesNum=10 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_10_1000_7.txt: machinesNum=10 jobsNum=1000 lowerBound=5153 upperBound=5153
isOptimal=1"

Content of machines summed (5153, 5153, 5153, 5153, 5152, 5152, 5152, 5152, 5152, 5152)

input selected: size 1000 sum 51524

----Our Results-----

best from Our local search found:

target function = 5163, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:5153, content=(99, 98, 97, 95, 95, 94, 93, 93, 91, 91, 90, 89, 88, 87, 86, 85, 85, 83, 83, 82, 80, 80, 79, 78, 77, 76, 74, 74, 73, 73, 71, 70, 69, 68, 67, 67, 66, 64, 64, 62, 62, 61, 60, 59, 58, 57, 57, 55, 55, 54, 53, 52, 51, 50, 49, 49, 47, 46, 45, 44, 43, 41, 40, 39, 37, 37, 36, 34, 32, 32, 30, 29, 28, 26, 25, 25, 24, 23, 22, 21, 21, 19, 18, 17, 16, 16, 15, 13, 13, 12, 11, 10, 9, 9, 8, 7, 7, 4, 3, 1)

bucket2 sum:5153, content=(99, 98, 96, 96, 95, 94, 93, 93, 91, 91, 90, 89, 88, 87, 86, 85, 85, 83, 83, 82, 80, 80, 79, 78, 77, 76, 74, 74, 73, 72, 72, 70, 69, 68, 67, 67, 65, 65, 64, 62, 62, 61, 60, 59, 58, 57, 56, 56, 55, 54, 53, 52, 51, 50, 49, 49, 47, 46, 45, 44, 42, 42, 40, 39, 37, 37, 36, 34, 32, 32, 30, 29, 27, 26, 26, 24, 24, 23, 23, 21, 21, 19, 18, 17, 16, 16, 15, 13, 13, 12, 11, 10, 9, 9, 8, 7, 6, 4, 4, 1)

```

bucket3 sum:5153, content= (99, 98, 96, 96, 95, 94, 93, 93, 91, 91, 90, 89, 87, 87, 87, 85, 84, 84, 83, 82, 80, 80, 79, 78, 77, 76, 74, 74, 73, 72,
72, 70, 69, 68, 67, 67, 65, 65, 64, 62, 62, 60, 60, 59, 59, 57, 56, 56, 54, 54, 53, 53, 51, 50, 49, 49, 47, 46, 45, 44, 42, 42, 40, 38, 38, 37, 35, 35,
32, 32, 30, 29, 27, 26, 26, 24, 24, 23, 23, 21, 20, 20, 18, 17, 16, 16, 14, 14, 13, 12, 11, 10, 9, 9, 8, 7, 6, 4, 3, 2)
bucket4 sum:5153, content= (99, 97, 97, 96, 95, 94, 93, 93, 91, 91, 89, 89, 88, 87, 87, 85, 84, 84, 83, 82, 80, 80, 79, 78, 77, 75, 75, 74, 73, 72,
72, 70, 69, 68, 67, 67, 65, 65, 64, 62, 61, 61, 60, 59, 58, 58, 56, 56, 54, 54, 53, 53, 51, 50, 49, 49, 47, 46, 45, 44, 42, 42, 40, 38, 38, 37, 35, 35,
32, 31, 31, 29, 27, 26, 26, 24, 24, 23, 23, 21, 20, 19, 19, 17, 16, 16, 14, 14, 13, 11, 11, 11, 9, 9, 8, 7, 6, 4, 3, 2)
bucket5 sum:5153, content= (99, 97, 97, 96, 95, 94, 93, 93, 91, 90, 90, 89, 88, 87, 87, 85, 84, 84, 83, 82, 80, 80, 79, 78, 77, 75, 75, 74, 73, 72,
72, 70, 69, 68, 67, 66, 66, 65, 64, 62, 61, 61, 60, 59, 58, 58, 56, 55, 55, 54, 53, 52, 51, 51, 49, 49, 47, 46, 45, 43, 43, 42, 40, 38, 38, 37, 35, 35,
32, 31, 31, 29, 27, 26, 26, 24, 24, 23, 22, 22, 20, 19, 19, 17, 16, 16, 14, 14, 13, 11, 11, 10, 10, 9, 8, 7, 6, 4, 3, 1, 1)
bucket6 sum:5153, content= (99, 97, 97, 96, 95, 94, 93, 92, 92, 90, 90, 89, 88, 87, 86, 86, 84, 84, 83, 81, 81, 80, 79, 78, 76, 76, 75, 74, 73, 72,
71, 70, 69, 68, 68, 66, 66, 65, 64, 62, 61, 61, 60, 59, 58, 58, 56, 55, 55, 54, 53, 52, 51, 50, 50, 48, 48, 46, 45, 43, 43, 41, 40, 39, 38, 37, 35, 34,
33, 31, 30, 30, 27, 26, 25, 25, 24, 23, 22, 22, 20, 19, 19, 17, 16, 16, 14, 14, 13, 11, 11, 10, 10, 9, 8, 7, 5, 5, 3, 1, 1)
bucket7 sum:5151, content= (99, 97, 97, 96, 95, 94, 93, 92, 92, 90, 90, 89, 88, 87, 86, 86, 84, 84, 82, 82, 81, 80, 79, 78, 76, 76, 75, 74, 73, 72,
71, 70, 69, 68, 68, 66, 66, 65, 64, 62, 61, 61, 60, 59, 58, 58, 56, 55, 55, 54, 53, 52, 51, 50, 50, 48, 48, 46, 45, 43, 43, 41, 40, 39, 38, 36, 36, 34,
33, 31, 30, 30, 27, 26, 25, 25, 24, 23, 22, 22, 20, 19, 19, 17, 16, 15, 15, 14, 12, 12, 11, 10, 10, 9, 8, 7, 5, 5, 3)
bucket8 sum:5151, content= (98, 98, 97, 96, 94, 94, 94, 92, 92, 90, 90, 89, 88, 87, 86, 86, 84, 84, 82, 82, 81, 79, 79, 79, 76, 76, 75, 74, 73, 72,
71, 70, 69, 68, 67, 67, 66, 65, 63, 63, 61, 61, 60, 59, 58, 58, 56, 55, 55, 54, 53, 52, 51, 50, 50, 48, 48, 46, 45, 43, 43, 41, 40, 39, 38, 36, 36, 34,
33, 31, 30, 29, 28, 26, 25, 25, 24, 23, 22, 22, 20, 19, 19, 16, 16, 16, 15, 14, 12, 12, 11, 10, 10, 9, 8, 7, 5, 5, 3)
bucket9 sum:5152, content= (98, 98, 97, 95, 95, 94, 93, 93, 92, 90, 90, 89, 88, 87, 86, 85, 85, 83, 83, 82, 81, 79, 79, 79, 76, 76, 75, 74, 73, 72,
71, 70, 69, 68, 67, 67, 66, 65, 63, 63, 61, 61, 60, 59, 58, 57, 57, 55, 55, 54, 53, 52, 51, 50, 50, 48, 47, 46, 45, 44, 43, 41, 40, 39, 38, 36, 36, 33,
33, 32, 30, 28, 28, 27, 25, 25, 24, 23, 22, 21, 21, 19, 18, 18, 16, 15, 15, 13, 13, 12, 11, 10, 9, 9, 8, 7, 7, 4, 2, 2)
bucket10 sum:5152, content= (98, 98, 97, 95, 95, 94, 93, 93, 92, 90, 90, 89, 88, 87, 86, 85, 85, 83, 83, 82, 80, 80, 79, 78, 77, 76, 75, 73, 73, 73,
71, 70, 69, 68, 67, 67, 66, 64, 64, 63, 61, 61, 60, 59, 58, 57, 57, 55, 55, 54, 53, 51, 51, 51, 50, 48, 47, 46, 45, 44, 43, 40, 40, 39, 38, 37, 36, 33,
33, 32, 30, 28, 28, 27, 25, 25, 24, 23, 22, 21, 21, 19, 18, 18, 16, 15, 15, 13, 13, 12, 11, 10, 9, 9, 8, 7, 7, 4, 2, 2)
"----Comparison for the 117 example----"
****tf from benchmark was 5163(we added the number of machines) and target function from our local search is 5163"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 18))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 118 from 130-----"

```

"-----START 119 from 130-----"

"input file number 119: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_8.txt"

***Data from file U_1_1000_10_8.txt: machinesNum=10 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_10_1000_8.txt: machinesNum=10 jobsNum=1000 lowerBound=4855 upperBound=4855
isOptimal=1"

Content of machines summed (4855, 4855, 4855, 4855, 4855, 4855, 4854, 4854, 4854, 4854)

input selected: size 1000 sum 48546

----Our Results-----

best from Our local search found:

target function = 4865, num of machines=10, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:4855, content=(99, 98, 96, 95, 95, 93, 92, 91, 90, 89, 89, 88, 87, 86, 85, 84, 83, 82, 81, 79, 78, 77, 77, 75, 74, 74, 71, 70, 69, 69,
68, 67, 66, 65, 64, 62, 61, 60, 60, 58, 58, 57, 56, 55, 54, 53, 52, 50, 49, 48, 48, 47, 46, 45, 44, 43, 42, 41, 40, 39, 39, 38, 37, 36, 35, 33, 31, 30,
29, 29, 28, 26, 26, 24, 23, 22, 22, 20, 19, 19, 16, 16, 16, 14, 14, 13, 12, 11, 9, 9, 8, 7, 7, 5, 5, 4, 3, 3, 2, 1)

bucket2 sum:4855, content=(99, 97, 97, 95, 94, 94, 92, 91, 90, 89, 89, 88, 87, 86, 85, 84, 83, 82, 80, 80, 78, 77, 76, 76, 74, 73, 72, 70, 69, 69,
68, 67, 66, 65, 63, 63, 61, 60, 60, 58, 58, 57, 56, 55, 54, 53, 51, 50, 50, 48, 48, 47, 46, 44, 44, 44, 42, 41, 40, 39, 39, 38, 37, 36, 35, 33, 31, 30,
29, 29, 28, 26, 26, 24, 23, 22, 22, 20, 19, 19, 16, 16, 15, 15, 14, 13, 12, 11, 9, 9, 8, 7, 7, 5, 5, 4, 3, 3, 2, 1)

bucket3 sum:4855, content=(99, 97, 97, 95, 94, 94, 92, 91, 90, 89, 89, 88, 87, 86, 85, 84, 83, 82, 80, 80, 78, 77, 76, 76, 74, 73, 72, 70, 69, 69,
67, 67, 67, 65, 63, 63, 61, 60, 59, 59, 58, 57, 56, 55, 54, 53, 51, 50, 50, 48, 48, 47, 46, 44, 44, 44, 42, 41, 40, 39, 39, 37, 37, 36, 36, 32, 32, 30,
29, 29, 28, 26, 25, 25, 23, 22, 22, 20, 19, 19, 16, 16, 15, 15, 14, 13, 12, 10, 10, 9, 8, 7, 7, 5, 4, 4, 4, 3, 2, 1)

bucket4 sum:4855, content=(99, 97, 96, 96, 94, 94, 91, 91, 91, 89, 89, 88, 87, 86, 85, 84, 83, 82, 80, 80, 78, 77, 76, 75, 75, 73, 72, 70, 69, 69,
67, 67, 66, 66, 63, 63, 61, 60, 59, 59, 58, 57, 56, 55, 54, 53, 51, 50, 50, 48, 48, 47, 46, 44, 44, 43, 43, 41, 40, 39, 38, 38, 37, 36, 35, 33, 31, 31,
29, 29, 27, 27, 25, 25, 23, 22, 22, 20, 19, 18, 17, 16, 15, 15, 14, 13, 12, 10, 10, 9, 8, 7, 7, 5, 4, 4, 4, 3, 2, 1)

bucket5 sum:4855, content=(99, 97, 96, 96, 94, 93, 92, 91, 90, 90, 89, 88, 87, 85, 85, 85, 82, 82, 81, 79, 79, 77, 76, 75, 75, 73, 72, 70, 69, 69,
67, 67, 66, 66, 63, 62, 62, 60, 59, 59, 58, 57, 56, 55, 54, 53, 51, 50, 50, 48, 48, 47, 45, 45, 44, 43, 43, 40, 40, 40, 38, 38, 37, 36, 35, 33, 31, 30,
30, 29, 27, 27, 25, 24, 24, 22, 21, 21, 19, 18, 17, 16, 15, 15, 14, 13, 12, 10, 10, 9, 8, 7, 6, 6, 4, 4, 4, 3, 2, 1)

bucket6 sum:4855, content=(99, 97, 96, 96, 94, 93, 92, 91, 90, 90, 89, 88, 87, 85, 85, 85, 82, 82, 81, 79, 79, 77, 76, 75, 75, 73, 71, 71, 69, 68,
68, 67, 66, 66, 63, 62, 62, 60, 59, 59, 58, 57, 56, 55, 54, 52, 52, 50, 50, 48, 47, 47, 46, 45, 44, 43, 42, 41, 40, 40, 38, 38, 37, 36, 35, 33, 31, 30,
30, 28, 28, 27, 25, 24, 23, 23, 21, 21, 19, 18, 17, 16, 15, 15, 14, 13, 12, 10, 10, 8, 8, 8, 6, 6, 4, 4, 4, 3, 2, 1)

```

bucket7 sum:4854, content= (99, 97, 96, 95, 95, 93, 92, 91, 90, 90, 89, 88, 86, 86, 85, 84, 83, 82, 81, 79, 78, 78, 76, 75, 75, 72, 72, 71, 69, 68,
68, 67, 66, 65, 64, 62, 61, 61, 59, 59, 58, 57, 56, 55, 54, 52, 52, 50, 49, 49, 47, 47, 46, 45, 44, 43, 42, 41, 40, 40, 38, 38, 37, 36, 34, 33, 32, 30,
30, 28, 28, 27, 25, 24, 23, 23, 21, 20, 20, 18, 17, 16, 15, 15, 14, 13, 12, 10, 10, 8, 8, 8, 6, 6, 4, 4, 3, 3, 3)
bucket8 sum:4854, content= (98, 98, 96, 95, 95, 93, 92, 91, 90, 90, 89, 88, 86, 86, 85, 84, 83, 82, 81, 79, 78, 78, 76, 75, 75, 72, 72, 71, 69, 68,
68, 67, 66, 65, 64, 62, 61, 60, 60, 59, 58, 57, 56, 55, 53, 53, 52, 50, 49, 49, 47, 47, 46, 45, 44, 43, 42, 41, 40, 39, 39, 38, 37, 36, 34, 33, 32, 30,
30, 28, 28, 26, 26, 24, 23, 23, 21, 20, 20, 18, 17, 16, 15, 15, 14, 13, 11, 11, 9, 9, 8, 8, 6, 6, 4, 4, 3, 3, 2, 1)
bucket9 sum:4854, content= (98, 98, 96, 95, 95, 92, 92, 91, 91, 90, 89, 88, 86, 86, 85, 83, 83, 82, 81, 80, 78, 78, 76, 75, 74, 74, 71, 71, 69, 68,
68, 67, 66, 65, 64, 62, 61, 60, 60, 59, 58, 56, 56, 56, 53, 53, 52, 50, 49, 49, 47, 47, 46, 45, 44, 43, 42, 41, 40, 39, 39, 38, 37, 36, 34, 33, 32, 30,
30, 28, 28, 26, 26, 24, 23, 23, 21, 20, 20, 18, 17, 16, 15, 14, 14, 14, 11, 11, 9, 9, 8, 8, 6, 5, 5, 4, 3, 3, 2, 1)
bucket10 sum:4854, content= (98, 98, 96, 95, 95, 92, 92, 91, 91, 90, 89, 87, 87, 86, 85, 83, 83, 82, 81, 80, 78, 77, 77, 75, 74, 74, 71, 70, 70, 68,
68, 67, 66, 64, 64, 63, 61, 60, 60, 58, 58, 57, 56, 55, 54, 53, 52, 50, 49, 48, 48, 47, 46, 45, 44, 43, 41, 41, 40, 40, 39, 38, 37, 36, 33, 33, 32, 31,
30, 28, 28, 26, 26, 24, 23, 22, 22, 20, 20, 18, 17, 16, 15, 14, 14, 13, 12, 11, 9, 9, 8, 7, 7, 5, 5, 4, 3, 3, 1, 1, 1)
"----Comparison for the 118 example----"
"***tf from benchmark was 4865(we added the number of machines) and target function from our local search is 4865"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 19))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 119 from 130-----"
"-----START 120 from 130-----"
"input file number 120: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_10_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_10_1000_9.txt"
"***Data from file U_1_1000_10_9.txt: machinesNum=10 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_10_1000_9.txt: machinesNum=10 jobsNum=1000 lowerBound=4886 upperBound=4886
isOptimal=1"
Content of machines summed (4886, 4886, 4886, 4886, 4886, 4886, 4886, 4886, 4885, 4885)
input selected: size 1000 sum 48858

----Our Results-----
best from Our local search found:
target function = 4896, num of machines=10, square root lms=0

```

machines content(number of jobs=1000):

bucket1 sum:4886, content= (99, 98, 96, 95, 94, 93, 93, 90, 89, 89, 88, 86, 84, 83, 82, 82, 80, 79, 79, 78, 76, 76, 75, 74, 73, 72, 71, 70, 70, 68, 68, 67, 65, 64, 63, 62, 61, 60, 59, 58, 57, 57, 56, 55, 54, 52, 52, 52, 50, 49, 47, 47, 46, 45, 43, 43, 41, 41, 40, 39, 39, 37, 36, 35, 35, 33, 33, 32, 31, 30, 29, 29, 28, 27, 26, 26, 25, 23, 22, 21, 20, 19, 19, 17, 17, 16, 15, 13, 12, 11, 10, 9, 9, 7, 5, 5, 4, 3, 2, 1)

bucket2 sum:4886, content= (99, 98, 96, 95, 94, 93, 93, 90, 89, 89, 87, 87, 84, 83, 82, 82, 80, 79, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 69, 69, 68, 66, 66, 64, 63, 62, 61, 60, 59, 58, 57, 57, 56, 55, 53, 53, 52, 51, 51, 49, 47, 47, 46, 45, 43, 43, 41, 41, 40, 39, 39, 37, 36, 35, 35, 33, 33, 32, 31, 30, 29, 29, 28, 27, 26, 26, 25, 23, 22, 21, 20, 19, 19, 17, 17, 16, 15, 13, 12, 11, 10, 9, 8, 8, 5, 5, 4, 3, 2, 1)

bucket3 sum:4886, content= (99, 97, 97, 95, 94, 93, 93, 90, 89, 89, 87, 87, 84, 83, 82, 81, 81, 79, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 69, 69, 68, 66, 66, 64, 63, 62, 61, 60, 59, 58, 57, 57, 56, 55, 53, 53, 52, 51, 51, 49, 47, 47, 46, 44, 44, 43, 41, 41, 40, 39, 39, 37, 36, 35, 35, 33, 33, 31, 31, 31, 29, 29, 28, 27, 26, 26, 24, 24, 22, 21, 20, 19, 19, 17, 17, 16, 14, 14, 12, 11, 10, 9, 8, 7, 5, 5, 5, 3, 2, 1)

bucket4 sum:4886, content= (99, 97, 97, 95, 94, 93, 92, 91, 89, 88, 88, 86, 84, 84, 82, 81, 80, 80, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 69, 69, 67, 67, 66, 64, 63, 62, 61, 59, 59, 59, 57, 57, 56, 54, 54, 53, 52, 51, 51, 49, 47, 47, 45, 45, 44, 42, 42, 41, 40, 39, 38, 38, 36, 35, 34, 34, 32, 32, 31, 30, 30, 28, 28, 27, 27, 26, 24, 24, 22, 21, 20, 19, 18, 18, 17, 15, 15, 14, 12, 11, 10, 9, 8, 7, 5, 5, 5, 3, 2, 1)

bucket5 sum:4886, content= (99, 97, 97, 95, 94, 93, 92, 91, 89, 88, 88, 86, 84, 84, 82, 81, 80, 80, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 69, 69, 67, 67, 65, 65, 63, 62, 61, 59, 59, 59, 57, 57, 55, 55, 54, 53, 52, 51, 50, 50, 47, 46, 46, 45, 44, 42, 42, 41, 40, 39, 38, 38, 36, 35, 34, 34, 32, 32, 31, 30, 30, 28, 28, 27, 27, 25, 25, 23, 23, 21, 20, 19, 18, 18, 17, 15, 15, 14, 12, 11, 10, 9, 8, 7, 5, 5, 4, 4, 2, 1)

bucket6 sum:4886, content= (99, 97, 96, 96, 94, 93, 92, 90, 90, 88, 88, 86, 84, 84, 82, 81, 80, 80, 79, 77, 77, 76, 75, 74, 73, 72, 71, 70, 69, 69, 67, 67, 65, 64, 63, 62, 61, 60, 59, 59, 57, 57, 55, 55, 54, 53, 52, 51, 50, 50, 47, 46, 46, 45, 44, 42, 42, 41, 40, 39, 38, 37, 37, 35, 34, 34, 32, 32, 31, 30, 29, 29, 28, 27, 27, 25, 25, 23, 22, 22, 20, 19, 18, 18, 17, 15, 15, 14, 12, 11, 10, 9, 8, 6, 6, 5, 4, 4, 2, 1)

bucket7 sum:4886, content= (98, 98, 96, 96, 94, 93, 92, 90, 90, 88, 88, 86, 84, 84, 82, 81, 80, 80, 78, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 69, 67, 67, 65, 64, 63, 62, 61, 60, 59, 58, 58, 57, 55, 55, 54, 53, 52, 51, 50, 49, 48, 46, 46, 45, 44, 42, 42, 41, 40, 39, 38, 37, 37, 35, 34, 33, 33, 32, 31, 30, 29, 29, 28, 27, 27, 25, 25, 23, 22, 21, 20, 20, 18, 18, 17, 15, 15, 13, 13, 11, 10, 9, 8, 6, 6, 5, 4, 4, 2, 1)

bucket8 sum:4886, content= (98, 98, 96, 96, 94, 93, 92, 90, 89, 89, 88, 85, 85, 83, 83, 81, 80, 80, 78, 78, 77, 76, 75, 74, 73, 72, 70, 70, 70, 68, 68, 67, 65, 64, 63, 62, 61, 60, 59, 58, 58, 56, 56, 55, 54, 52, 52, 52, 50, 49, 47, 47, 46, 45, 44, 42, 42, 41, 40, 39, 38, 37, 37, 35, 34, 33, 33, 32, 31, 30, 29, 29, 28, 27, 27, 25, 25, 23, 22, 21, 20, 20, 18, 18, 16, 16, 15, 13, 13, 11, 10, 9, 8, 6, 6, 5, 4, 4, 2, 1)

bucket9 sum:4885, content= (98, 98, 96, 95, 95, 93, 92, 90, 89, 89, 88, 85, 85, 83, 83, 81, 80, 79, 79, 78, 76, 76, 75, 75, 73, 71, 71, 70, 70, 68, 68, 67, 65, 64, 63, 62, 61, 60, 59, 58, 57, 57, 56, 55, 54, 52, 52, 52, 50, 48, 48, 47, 46, 45, 44, 42, 41, 41, 41, 39, 38, 37, 36, 36, 34, 33, 33, 32, 31, 30, 29, 29, 28, 27, 27, 25, 25, 23, 22, 21, 20, 19, 19, 18, 16, 16, 15, 13, 12, 12, 9, 9, 9, 6, 6, 5, 4, 2, 2, 2)

bucket10 sum:4885, content= (98, 98, 96, 95, 94, 94, 91, 91, 89, 89, 88, 85, 85, 83, 83, 81, 80, 79, 79, 78, 76, 76, 75, 74, 73, 72, 71, 70, 70, 68, 68, 67, 65, 63, 63, 62, 61, 60, 59, 59, 57, 57, 56, 55, 54, 52, 52, 52, 50, 48, 48, 47, 46, 45, 43, 43, 41, 41, 40, 40, 38, 37, 36, 36, 34, 33, 33, 32, 31, 30, 29, 29, 28, 27, 26, 26, 25, 23, 22, 20, 20, 20, 19, 18, 16, 16, 15, 13, 12, 11, 11, 9, 8, 6, 6, 5, 4, 2, 2, 2)

"----Comparison for the 119 example----"

****tf from benchmark was 4896(we added the number of machines) and target function from our local search is 4896"

***RESULT IS THE SAME

Run time: 0 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 20))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 120 from 130-----"

"-----START 121 from 130-----"

"input file number 121: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_0.txt"

****Data from file U_1_1000_25_0.txt: machinesNum=25 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_25_1000_0.txt: machinesNum=25 jobsNum=1000 lowerBound=2025 upperBound=2025
isOptimal=1"

Content of machines summed (2025, 2025, 2025, 2025, 2025, 2025, 2025, 2025, 2025, 2025, 2025, 2025, 2025, 2024, 2024, 2025, 2025, 2024, 2024,
2024, 2024, 2024, 2024, 2024, 2024, 2024)

input selected: size 1000 sum 50614

----Our Results-----

best from Our local search found:

target function = 2050, num of machines=25, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:2025, content= (99, 95, 93, 91, 89, 87, 84, 82, 80, 76, 75, 72, 70, 66, 65, 61, 58, 57, 54, 51, 50, 46, 44, 43, 40, 37, 36, 33, 29, 27,
26, 22, 20, 18, 14, 12, 10, 7, 4, 2)

bucket2 sum:2025, content= (99, 95, 93, 91, 89, 87, 84, 82, 80, 76, 75, 72, 70, 66, 65, 61, 58, 57, 54, 51, 50, 46, 44, 43, 40, 37, 35, 34, 29, 27,
26, 22, 20, 18, 14, 12, 10, 7, 4, 2)

bucket3 sum:2025, content= (99, 95, 93, 91, 89, 87, 84, 82, 80, 76, 75, 72, 70, 66, 65, 61, 58, 56, 55, 51, 50, 46, 44, 43, 40, 37, 35, 34, 29, 27,
26, 22, 20, 18, 14, 12, 10, 7, 4, 2)

bucket4 sum:2025, content= (99, 95, 93, 91, 89, 87, 84, 82, 79, 77, 75, 72, 69, 67, 64, 62, 58, 56, 55, 51, 49, 47, 44, 43, 40, 37, 35, 33, 30, 27,
25, 23, 20, 18, 14, 12, 10, 7, 4, 2)

bucket5 sum:2025, content= (99, 95, 93, 91, 89, 87, 84, 82, 79, 77, 75, 72, 69, 67, 64, 62, 58, 56, 55, 51, 49, 47, 44, 43, 40, 37, 35, 33, 30, 27,
25, 23, 20, 18, 14, 12, 10, 7, 4, 2)

bucket6 sum:2025, content= (99, 95, 93, 91, 89, 86, 85, 82, 79, 77, 75, 72, 69, 67, 64, 62, 58, 56, 54, 52, 49, 47, 44, 43, 40, 37, 35, 33, 30, 27, 25, 23, 20, 18, 14, 12, 9, 8, 4, 2)

bucket7 sum:2025, content= (99, 94, 94, 91, 89, 86, 85, 82, 79, 77, 75, 72, 69, 67, 64, 62, 58, 56, 54, 52, 49, 47, 44, 43, 40, 37, 35, 33, 30, 27, 25, 23, 20, 18, 14, 12, 9, 8, 4, 2)

bucket8 sum:2025, content= (99, 94, 94, 91, 89, 86, 85, 82, 79, 77, 75, 72, 69, 67, 64, 62, 58, 56, 54, 52, 49, 47, 44, 43, 39, 38, 35, 33, 30, 27, 25, 23, 20, 18, 14, 12, 9, 8, 4, 2)

bucket9 sum:2025, content= (99, 94, 94, 90, 90, 86, 85, 82, 79, 77, 75, 72, 69, 67, 64, 61, 59, 56, 54, 52, 49, 47, 44, 43, 39, 38, 35, 33, 30, 27, 25, 23, 20, 17, 15, 12, 9, 8, 4, 2)

bucket10 sum:2025, content= (99, 94, 94, 90, 90, 86, 85, 82, 79, 77, 74, 73, 69, 67, 64, 61, 59, 56, 54, 52, 49, 47, 44, 42, 41, 37, 35, 32, 31, 27, 25, 23, 20, 17, 15, 12, 9, 8, 4, 2)

bucket11 sum:2025, content= (98, 95, 94, 90, 90, 86, 85, 82, 79, 77, 74, 73, 69, 67, 63, 63, 58, 56, 54, 52, 49, 47, 44, 42, 39, 39, 35, 32, 31, 26, 26, 23, 20, 17, 15, 12, 9, 7, 5, 2)

bucket12 sum:2025, content= (98, 95, 94, 90, 90, 86, 85, 81, 80, 77, 74, 73, 69, 67, 63, 63, 57, 57, 54, 52, 48, 48, 44, 42, 39, 39, 35, 32, 31, 26, 26, 23, 20, 17, 15, 12, 9, 7, 5, 2)

bucket13 sum:2025, content= (98, 95, 94, 90, 90, 86, 85, 81, 80, 77, 74, 73, 69, 67, 63, 61, 60, 56, 54, 52, 48, 47, 45, 42, 39, 39, 35, 32, 31, 26, 26, 23, 19, 19, 13, 13, 9, 6, 6, 2)

bucket14 sum:2025, content= (98, 95, 94, 90, 89, 87, 85, 81, 80, 77, 74, 73, 69, 66, 65, 61, 59, 56, 54, 52, 48, 47, 45, 42, 39, 39, 35, 32, 30, 28, 25, 23, 19, 19, 13, 13, 9, 6, 6, 2)

bucket15 sum:2025, content= (98, 95, 94, 90, 89, 87, 85, 81, 80, 77, 74, 73, 68, 68, 63, 61, 60, 56, 54, 52, 48, 47, 45, 42, 39, 39, 35, 32, 30, 28, 25, 23, 19, 19, 13, 13, 9, 6, 6, 2)

bucket16 sum:2025, content= (98, 95, 93, 92, 89, 86, 85, 81, 80, 77, 74, 72, 70, 66, 65, 61, 59, 56, 54, 52, 48, 47, 45, 42, 39, 38, 36, 32, 30, 28, 24, 24, 19, 17, 16, 12, 8, 8, 5, 1, 1)

bucket17 sum:2025, content= (97, 96, 93, 92, 89, 86, 85, 81, 80, 76, 76, 71, 70, 66, 65, 61, 59, 56, 53, 53, 48, 47, 45, 42, 39, 38, 36, 32, 30, 28, 24, 23, 21, 17, 15, 11, 10, 6, 6, 1, 1)

bucket18 sum:2025, content= (97, 96, 93, 92, 88, 87, 84, 83, 78, 78, 74, 71, 70, 68, 63, 61, 60, 56, 53, 53, 48, 46, 45, 44, 39, 38, 35, 31, 31, 28, 24, 23, 21, 17, 15, 11, 10, 6, 5, 3)

bucket19 sum:2025, content= (97, 96, 93, 92, 88, 87, 84, 83, 78, 78, 74, 71, 70, 68, 63, 61, 60, 55, 55, 52, 48, 46, 45, 42, 41, 38, 34, 34, 30, 26, 26, 23, 19, 17, 15, 13, 8, 8, 5, 1, 1)

bucket20 sum:2023, content= (97, 96, 93, 92, 88, 87, 84, 83, 78, 78, 74, 71, 70, 66, 66, 61, 57, 57, 55, 52, 48, 46, 45, 42, 41, 38, 34, 34, 29, 28, 24, 22, 21, 17, 15, 13, 8, 8, 5)

bucket21 sum:2025, content= (97, 96, 92, 92, 88, 88, 84, 83, 78, 78, 74, 71, 70, 66, 66, 61, 57, 57, 55, 51, 50, 46, 45, 42, 39, 38, 36, 31, 31, 28, 24, 22, 21, 17, 15, 13, 8, 8, 4, 3)

```

bucket22 sum:2022, content= (97, 96, 92, 92, 88, 88, 84, 83, 78, 78, 74, 71, 70, 66, 65, 60, 60, 57, 53, 53, 48, 46, 45, 41, 41, 38, 36, 31, 31, 28,
24, 22, 21, 17, 15, 13, 8, 8, 4)
bucket23 sum:2022, content= (97, 96, 92, 92, 88, 88, 83, 83, 80, 76, 76, 71, 70, 66, 65, 60, 60, 55, 55, 51, 50, 46, 45, 41, 41, 38, 34, 34, 29, 28,
24, 22, 21, 16, 16, 11, 10, 8, 4)
bucket24 sum:2024, content= (97, 96, 92, 92, 88, 87, 86, 81, 80, 76, 76, 70, 70, 66, 65, 60, 60, 57, 53, 51, 51, 45, 45, 41, 41, 36, 36, 34, 29, 28,
26, 22, 21, 16, 15, 11, 10, 8, 3, 3)
bucket25 sum:2023, content= (96, 96, 94, 92, 88, 87, 83, 83, 80, 76, 73, 73, 70, 66, 65, 60, 60, 57, 53, 51, 50, 45, 45, 44, 39, 36, 36, 34, 29, 28,
26, 21, 21, 16, 16, 10, 10, 8, 3, 3)
"----Comparison for the 120 example----"
"***tf from benchmark was 2050(we added the number of machines) and target function from our local search is 2050"
***RESULT IS THE SAME
Run time: 0.031 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 21))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 121 from 130-----"
"-----START 122 from 130-----"
"input file number 122: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_1.txt"
"***Data from file U_1_1000_25_1.txt: machinesNum=25 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_25_1000_1.txt: machinesNum=25 jobsNum=1000 lowerBound=1931 upperBound=1931
isOptimal=1"
Content of machines summed (1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1931, 1930, 1930, 1930, 1930)
input selected: size 1000 sum 48271

----Our Results-----
best from Our local search found:
target function = 1956, num of machines=25, square root lms=0
machines content(number of jobs=1000):
bucket1 sum:1931, content= (99, 95, 93, 89, 88, 83, 82, 80, 77, 74, 72, 68, 67, 63, 61, 60, 56, 55, 51, 50, 47, 44, 42, 40, 37, 35, 31, 28, 27, 23,
22, 19, 16, 15, 12, 10, 9, 5, 5, 1)

```


bucket2 sum:1931, content= (99, 95, 93, 89, 88, 83, 82, 80, 77, 74, 72, 68, 67, 63, 61, 60, 56, 55, 51, 50, 46, 45, 42, 40, 37, 35, 31, 28, 27, 23, 22, 19, 16, 15, 12, 10, 9, 5, 5, 1)

bucket3 sum:1931, content= (99, 95, 93, 89, 88, 83, 82, 80, 77, 74, 71, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 37, 35, 31, 28, 27, 23, 22, 19, 16, 15, 12, 10, 9, 5, 5, 1)

bucket4 sum:1931, content= (99, 95, 93, 89, 88, 83, 82, 80, 77, 74, 71, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 37, 35, 31, 28, 27, 23, 22, 19, 16, 15, 12, 10, 9, 5, 5, 1)

bucket5 sum:1931, content= (99, 95, 93, 89, 87, 84, 82, 80, 77, 73, 72, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 37, 35, 31, 28, 27, 23, 21, 20, 16, 15, 12, 10, 9, 5, 5, 1)

bucket6 sum:1931, content= (99, 95, 93, 89, 87, 84, 82, 80, 76, 75, 71, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 37, 35, 31, 28, 26, 24, 21, 20, 16, 15, 12, 10, 8, 6, 5, 1)

bucket7 sum:1931, content= (98, 96, 92, 90, 87, 84, 82, 80, 76, 75, 71, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 37, 34, 32, 28, 26, 24, 21, 19, 17, 14, 13, 10, 8, 6, 4, 2)

bucket8 sum:1931, content= (98, 96, 92, 90, 87, 84, 82, 80, 76, 75, 71, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 36, 36, 31, 28, 26, 24, 21, 19, 17, 14, 13, 10, 8, 6, 4, 2)

bucket9 sum:1931, content= (98, 96, 92, 90, 87, 84, 82, 80, 76, 75, 71, 69, 66, 64, 61, 60, 56, 54, 52, 50, 46, 45, 42, 40, 36, 36, 30, 29, 26, 24, 21, 19, 17, 14, 13, 10, 8, 6, 4, 2)

bucket10 sum:1931, content= (98, 96, 92, 90, 87, 84, 82, 80, 76, 75, 71, 68, 67, 64, 61, 60, 56, 54, 51, 51, 46, 45, 41, 41, 36, 36, 30, 29, 26, 24, 21, 19, 17, 14, 13, 10, 8, 6, 4, 2)

bucket11 sum:1931, content= (98, 96, 92, 90, 87, 83, 83, 79, 77, 75, 71, 68, 67, 64, 61, 60, 56, 54, 51, 49, 47, 46, 41, 41, 36, 36, 30, 29, 26, 24, 21, 19, 17, 14, 13, 10, 8, 6, 4, 2)

bucket12 sum:1931, content= (98, 96, 92, 90, 86, 85, 82, 79, 77, 75, 71, 68, 67, 64, 61, 59, 57, 53, 52, 49, 47, 46, 41, 41, 36, 34, 33, 28, 26, 24, 21, 19, 17, 14, 13, 10, 8, 6, 4, 2)

bucket13 sum:1931, content= (98, 96, 92, 90, 86, 85, 82, 79, 77, 75, 70, 70, 66, 63, 62, 59, 57, 53, 52, 49, 47, 46, 41, 40, 38, 34, 32, 28, 26, 24, 21, 18, 18, 14, 12, 11, 8, 6, 4, 2)

bucket14 sum:1931, content= (98, 96, 92, 90, 86, 85, 82, 79, 77, 75, 70, 70, 66, 63, 62, 59, 57, 53, 52, 49, 47, 46, 41, 40, 38, 34, 32, 28, 25, 25, 21, 18, 18, 14, 12, 11, 8, 6, 4, 2)

bucket15 sum:1931, content= (98, 96, 92, 90, 86, 85, 82, 79, 77, 75, 70, 70, 66, 63, 62, 59, 57, 53, 52, 49, 47, 46, 41, 40, 38, 34, 32, 27, 27, 23, 22, 18, 18, 14, 12, 11, 8, 6, 4, 2)

bucket16 sum:1931, content= (97, 97, 91, 91, 86, 85, 82, 79, 77, 75, 70, 70, 66, 63, 62, 59, 57, 53, 52, 49, 47, 45, 43, 40, 36, 34, 32, 29, 25, 25, 20, 20, 17, 14, 12, 11, 8, 6, 3, 3)

bucket17 sum:1931, content= (97, 96, 93, 90, 86, 85, 81, 81, 76, 73, 73, 68, 67, 63, 62, 59, 57, 53, 52, 49, 47, 45, 43, 40, 36, 34, 32, 29, 25, 25, 20, 20, 17, 14, 12, 11, 7, 7, 3, 3)

bucket18 sum:1931, content= (97, 96, 93, 90, 86, 85, 81, 81, 76, 73, 72, 70, 65, 65, 61, 59, 57, 53, 52, 48, 48, 45, 43, 39, 38, 34, 32, 27, 27, 23, 22, 18, 18, 14, 12, 11, 7, 7, 3, 3)

bucket19 sum:1931, content= (97, 94, 94, 91, 85, 85, 83, 79, 77, 73, 72, 70, 65, 65, 61, 59, 57, 53, 52, 48, 48, 44, 44, 39, 38, 33, 30, 30, 27, 23, 22, 18, 17, 15, 12, 11, 7, 7, 3, 3)

bucket20 sum:1931, content= (97, 94, 94, 90, 88, 83, 83, 78, 77, 76, 70, 70, 65, 65, 61, 59, 56, 55, 51, 48, 48, 44, 43, 39, 39, 33, 30, 29, 27, 25, 20, 20, 17, 13, 13, 11, 7, 6, 5, 2)

bucket21 sum:1931, content= (97, 94, 94, 89, 89, 83, 83, 78, 77, 76, 70, 70, 65, 63, 63, 59, 56, 55, 51, 48, 48, 44, 43, 39, 39, 33, 30, 29, 27, 25, 20, 20, 17, 13, 13, 10, 9, 6, 3, 3)

bucket22 sum:1931, content= (97, 94, 94, 89, 88, 85, 81, 81, 76, 73, 72, 68, 67, 63, 63, 58, 58, 53, 52, 48, 48, 44, 43, 39, 38, 33, 33, 29, 25, 25, 20, 20, 17, 13, 13, 10, 9, 6, 3, 2, 1)

bucket23 sum:1931, content= (97, 94, 94, 89, 88, 85, 81, 78, 78, 73, 73, 67, 67, 65, 62, 58, 58, 52, 52, 51, 47, 44, 43, 39, 38, 33, 30, 29, 27, 23, 23, 18, 17, 15, 12, 9, 9, 6, 5, 2)

bucket24 sum:1929, content= (97, 94, 93, 91, 88, 83, 81, 81, 77, 73, 72, 67, 67, 65, 62, 58, 56, 55, 52, 48, 48, 44, 43, 39, 38, 33, 33, 27, 27, 23, 23, 18, 17, 15, 11, 11, 9, 6, 3, 1)

bucket25 sum:1929, content= (97, 94, 93, 91, 88, 83, 81, 81, 77, 73, 72, 67, 67, 65, 60, 60, 55, 55, 52, 51, 47, 44, 43, 39, 36, 36, 30, 29, 27, 23, 22, 18, 16, 16, 11, 11, 9, 5, 5)

"----Comparison for the 121 example----"

****tf from benchmark was 1956(we added the number of machines) and target function from our local search is 1956"

***RESULT IS THE SAME

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 22))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 122 from 130-----"

"-----START 123 from 130-----"

"input file number 123: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_2.txt"

****Data from file U_1_1000_25_2.txt: machinesNum=25 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_25_1000_2.txt: machinesNum=25 jobsNum=1000 lowerBound=2027 upperBound=2027
isOptimal=1"

Content of machines summed (2027, 2027, 2027, 2027, 2027, 2027, 2026, 2026, 2026, 2027, 2026, 2026, 2026, 2026, 2026, 2026, 2026, 2025, 2025, 2025, 2025, 2025, 2025, 2026, 2026)

input selected: size 1000 sum 50651

----Our Results-----

best from Our local search found:

target function = 2052, num of machines=25, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:2027, content= (99, 96, 94, 91, 88, 86, 84, 82, 81, 78, 75, 74, 70, 68, 64, 62, 59, 58, 54, 51, 49, 45, 44, 40, 38, 35, 33, 31, 28, 27, 24, 23, 20, 18, 16, 13, 11, 9, 7, 2)

bucket2 sum:2027, content= (99, 96, 93, 92, 88, 86, 84, 82, 81, 78, 75, 74, 70, 68, 63, 63, 59, 58, 54, 51, 48, 46, 44, 40, 38, 35, 33, 31, 28, 27, 24, 23, 20, 18, 16, 13, 11, 9, 7, 2)

bucket3 sum:2027, content= (99, 96, 93, 91, 88, 87, 84, 82, 81, 78, 75, 74, 70, 68, 63, 63, 59, 57, 55, 51, 48, 46, 43, 40, 39, 35, 33, 31, 28, 27, 24, 23, 20, 18, 16, 13, 11, 9, 7, 2)

bucket4 sum:2027, content= (99, 96, 93, 91, 88, 87, 84, 82, 81, 78, 75, 74, 70, 68, 63, 62, 60, 57, 55, 51, 48, 46, 43, 40, 38, 36, 33, 31, 28, 26, 25, 23, 20, 18, 16, 13, 11, 9, 7, 2)

bucket5 sum:2027, content= (99, 96, 93, 91, 88, 87, 84, 82, 80, 79, 75, 74, 70, 67, 64, 62, 60, 57, 55, 51, 48, 46, 43, 40, 38, 36, 33, 31, 28, 26, 25, 23, 20, 18, 16, 13, 11, 9, 6, 3)

bucket6 sum:2027, content= (99, 96, 93, 91, 88, 87, 84, 82, 80, 79, 75, 74, 70, 67, 64, 62, 60, 57, 54, 52, 48, 46, 42, 41, 37, 37, 33, 31, 28, 26, 25, 23, 20, 18, 16, 13, 11, 9, 6, 3)

bucket7 sum:2027, content= (99, 95, 94, 91, 88, 87, 84, 82, 80, 79, 75, 74, 70, 67, 64, 62, 60, 57, 54, 52, 48, 46, 42, 41, 37, 37, 33, 31, 28, 26, 25, 23, 20, 18, 16, 12, 12, 9, 6, 3)

bucket8 sum:2027, content= (99, 95, 94, 91, 88, 87, 84, 82, 80, 79, 75, 73, 70, 69, 63, 62, 60, 56, 55, 52, 48, 46, 42, 41, 37, 37, 33, 31, 27, 27, 25, 23, 20, 18, 16, 12, 12, 9, 6, 3)

bucket9 sum:2027, content= (99, 95, 94, 91, 88, 87, 84, 82, 80, 79, 75, 73, 70, 67, 65, 62, 60, 56, 55, 52, 48, 45, 44, 40, 37, 36, 34, 31, 27, 27, 25, 23, 20, 18, 15, 14, 11, 9, 6, 3)

bucket10 sum:2027, content= (98, 97, 93, 90, 89, 87, 84, 82, 80, 78, 76, 73, 70, 67, 65, 62, 60, 56, 55, 52, 48, 45, 44, 40, 37, 36, 34, 30, 29, 26, 25, 23, 20, 18, 15, 14, 11, 9, 6, 3)

bucket11 sum:2027, content= (98, 97, 93, 90, 89, 87, 83, 83, 80, 78, 76, 73, 70, 67, 65, 61, 61, 56, 55, 52, 48, 45, 44, 40, 37, 36, 34, 30, 29, 26, 25, 23, 20, 17, 17, 12, 12, 9, 5, 4)

bucket12 sum:2027, content= (98, 97, 93, 90, 89, 87, 83, 83, 80, 78, 76, 73, 70, 67, 65, 61, 61, 56, 55, 52, 48, 45, 44, 40, 37, 36, 34, 30, 29, 26, 24, 24, 19, 19, 15, 14, 11, 9, 5, 4)

bucket13 sum:2027, content= (98, 97, 93, 90, 89, 87, 83, 83, 80, 78, 76, 73, 70, 67, 65, 61, 61, 56, 55, 50, 49, 47, 42, 41, 37, 36, 34, 30, 29, 26, 24, 24, 19, 19, 15, 14, 11, 9, 5, 3, 1)

bucket14 sum:2027, content= (98, 97, 93, 90, 89, 87, 83, 83, 80, 77, 77, 72, 71, 67, 65, 61, 60, 58, 54, 50, 49, 47, 42, 41, 37, 36, 34, 30, 29, 26, 24, 23, 21, 17, 17, 12, 12, 9, 4, 4, 1)

bucket15 sum:2027, content= (98, 97, 92, 92, 88, 87, 83, 83, 79, 79, 76, 72, 71, 67, 65, 61, 60, 58, 54, 50, 49, 47, 42, 41, 37, 36, 34, 30, 29, 26, 24, 23, 21, 17, 17, 12, 11, 10, 4, 4, 1)

bucket16 sum:2027, content= (98, 97, 92, 92, 88, 86, 85, 82, 79, 79, 76, 72, 71, 67, 65, 61, 60, 58, 54, 50, 49, 47, 42, 40, 39, 35, 34, 30, 29, 26, 24, 23, 21, 17, 15, 14, 11, 10, 4, 4, 1)

bucket17 sum:2027, content= (98, 95, 95, 90, 89, 86, 85, 82, 79, 79, 76, 72, 71, 66, 65, 63, 59, 58, 54, 50, 49, 47, 42, 40, 39, 35, 34, 30, 29, 26, 24, 22, 22, 17, 15, 14, 11, 9, 7, 3)

bucket18 sum:2027, content= (98, 95, 95, 90, 89, 86, 85, 81, 81, 77, 77, 72, 71, 66, 65, 63, 59, 58, 54, 50, 49, 47, 42, 40, 39, 35, 34, 30, 29, 26, 24, 22, 21, 19, 15, 14, 11, 8, 7, 1, 1, 1)

bucket19 sum:2025, content= (98, 95, 94, 92, 88, 86, 85, 81, 81, 77, 77, 72, 71, 66, 65, 63, 59, 58, 54, 50, 49, 47, 41, 41, 39, 35, 33, 32, 27, 27, 24, 22, 21, 19, 15, 14, 10, 8, 8, 1)

bucket20 sum:2024, content= (98, 95, 94, 92, 88, 86, 85, 81, 81, 77, 76, 75, 69, 66, 65, 63, 59, 58, 53, 53, 47, 47, 41, 41, 39, 35, 33, 30, 30, 26, 24, 22, 21, 19, 15, 14, 10, 8, 8)

bucket21 sum:2023, content= (98, 95, 94, 92, 88, 86, 83, 83, 81, 77, 76, 72, 72, 66, 65, 63, 59, 58, 53, 53, 47, 47, 41, 41, 39, 35, 33, 30, 29, 27, 24, 22, 21, 19, 15, 14, 10, 8, 7)

bucket22 sum:2024, content= (97, 97, 94, 90, 89, 86, 83, 83, 81, 77, 76, 72, 71, 69, 64, 61, 59, 59, 53, 53, 47, 45, 44, 40, 39, 35, 32, 32, 29, 26, 24, 22, 21, 19, 14, 14, 10, 10, 7)

bucket23 sum:2023, content= (97, 97, 94, 90, 88, 88, 83, 83, 79, 79, 76, 72, 71, 66, 65, 63, 59, 58, 53, 53, 47, 44, 44, 41, 39, 35, 32, 32, 29, 26, 24, 22, 21, 17, 17, 14, 10, 8, 7)

bucket24 sum:2023, content= (97, 97, 94, 90, 88, 85, 85, 83, 81, 77, 76, 72, 71, 69, 64, 61, 59, 58, 55, 50, 49, 44, 44, 41, 39, 35, 32, 32, 29, 25, 25, 22, 21, 17, 17, 14, 10, 8, 7)

bucket25 sum:2023, content= (97, 97, 94, 89, 89, 85, 85, 83, 81, 77, 76, 72, 70, 69, 64, 63, 59, 58, 53, 49, 49, 47, 44, 40, 39, 35, 32, 32, 27, 27, 25, 22, 19, 19, 17, 14, 10, 8, 7)

"----Comparison for the 122 example----"

****tf from benchmark was 2052(we added the number of machines) and target function from our local search is 2052"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 23))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 123 from 130-----"

"-----START 124 from 130-----"

"input file number 124: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_3.txt"

***Data from file U_1_1000_25_3.txt: machinesNum=25 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_25_1000_3.txt: machinesNum=25 jobsNum=1000 lowerBound=2024 upperBound=2024
isOptimal=1"

Content of machines summed (2024, 2023, 2023, 2023, 2023, 2023, 2024, 2024, 2024, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2022, 2024, 2024, 2024, 2024, 2023, 2023)

input selected: size 1000 sum 50582

----Our Results-----

best from Our local search found:

target function = 2049, num of machines=25, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:2024, content= (99, 96, 94, 93, 90, 88, 84, 82, 79, 77, 74, 73, 71, 68, 66, 62, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 29, 25, 24, 23, 19, 18, 15, 12, 11, 7, 5, 2)

bucket2 sum:2024, content= (99, 96, 94, 93, 90, 87, 85, 82, 79, 77, 74, 73, 71, 68, 66, 62, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 29, 25, 24, 23, 19, 18, 15, 12, 11, 7, 5, 2)

bucket3 sum:2024, content= (99, 96, 94, 93, 90, 87, 85, 81, 80, 76, 75, 73, 71, 68, 66, 62, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 28, 26, 24, 23, 19, 18, 15, 12, 11, 7, 5, 2)

bucket4 sum:2024, content= (99, 96, 94, 93, 90, 87, 85, 81, 80, 76, 75, 73, 71, 68, 66, 62, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 28, 26, 24, 23, 19, 18, 15, 12, 10, 8, 5, 2)

bucket5 sum:2024, content= (99, 96, 94, 92, 91, 87, 84, 82, 80, 76, 75, 73, 71, 68, 65, 63, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 28, 26, 24, 23, 19, 18, 15, 12, 10, 8, 5, 2)

bucket6 sum:2024, content= (99, 96, 94, 92, 91, 87, 84, 82, 80, 76, 75, 73, 71, 68, 65, 63, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 28, 26, 24, 22, 20, 18, 15, 12, 10, 8, 5, 2)

bucket7 sum:2024, content= (98, 97, 94, 92, 91, 87, 84, 82, 80, 76, 75, 73, 71, 68, 65, 63, 60, 57, 53, 50, 49, 46, 43, 41, 39, 37, 33, 30, 28, 26, 24, 22, 20, 18, 15, 12, 10, 8, 4, 3)

bucket8 sum:2024, content= (98, 97, 94, 92, 91, 87, 84, 82, 80, 76, 74, 74, 70, 69, 65, 63, 60, 56, 54, 50, 49, 45, 43, 42, 39, 37, 33, 29, 29, 26, 24, 22, 20, 18, 15, 12, 10, 8, 4, 3)

bucket9 sum:2024, content= (98, 97, 94, 92, 91, 87, 84, 82, 80, 76, 74, 74, 70, 69, 65, 63, 59, 58, 52, 51, 49, 45, 43, 42, 38, 38, 32, 31, 28, 26, 24, 22, 20, 18, 14, 13, 10, 8, 4, 3)

bucket10 sum:2024, content= (98, 96, 95, 92, 91, 87, 84, 82, 80, 76, 74, 74, 70, 69, 65, 63, 59, 56, 55, 50, 49, 45, 43, 42, 38, 38, 32, 31, 28, 26, 24, 22, 20, 18, 14, 13, 10, 8, 4, 3)

bucket11 sum:2024, content= (98, 96, 95, 92, 91, 87, 84, 82, 80, 76, 74, 74, 70, 69, 65, 63, 59, 56, 55, 50, 49, 45, 43, 42, 38, 37, 33, 31, 28, 26, 24, 22, 20, 18, 14, 13, 10, 7, 6, 2)

bucket12 sum:2024, content= (98, 96, 95, 92, 91, 87, 84, 82, 80, 76, 74, 74, 70, 69, 64, 64, 59, 56, 54, 51, 48, 47, 43, 41, 38, 37, 33, 31, 28, 26, 24, 22, 20, 17, 16, 12, 10, 7, 6, 2)

bucket13 sum:2024, content= (98, 96, 95, 92, 91, 86, 86, 81, 79, 77, 74, 73, 71, 69, 64, 64, 59, 56, 54, 51, 48, 47, 43, 41, 38, 36, 34, 31, 27, 27, 24, 22, 20, 17, 16, 11, 11, 7, 4, 4)

bucket14 sum:2024, content= (98, 96, 95, 92, 91, 86, 86, 81, 79, 77, 74, 73, 71, 69, 64, 64, 59, 56, 54, 51, 48, 47, 43, 40, 39, 36, 34, 31, 27, 27, 24, 21, 21, 17, 14, 14, 10, 7, 4, 4)

bucket15 sum:2024, content= (98, 96, 95, 92, 91, 86, 86, 81, 79, 77, 74, 73, 71, 68, 66, 63, 59, 56, 54, 51, 48, 47, 43, 40, 39, 35, 35, 31, 27, 26, 25, 21, 21, 17, 14, 14, 10, 7, 4, 4)

bucket16 sum:2024, content= (98, 96, 95, 92, 90, 88, 84, 82, 78, 77, 75, 72, 72, 67, 66, 64, 58, 58, 54, 50, 48, 45, 44, 42, 38, 35, 34, 32, 27, 26, 25, 21, 21, 17, 14, 14, 9, 9, 4, 3)

bucket17 sum:2024, content= (98, 96, 95, 92, 90, 88, 84, 82, 78, 77, 75, 72, 72, 67, 66, 64, 58, 58, 52, 52, 48, 45, 44, 42, 38, 35, 34, 32, 27, 26, 25, 21, 20, 19, 14, 13, 9, 7, 6, 3)

bucket18 sum:2024, content= (98, 95, 95, 93, 90, 88, 83, 83, 78, 77, 75, 72, 72, 67, 66, 64, 58, 58, 52, 52, 48, 45, 44, 42, 38, 35, 34, 32, 27, 26, 25, 21, 20, 19, 14, 13, 9, 7, 6, 2, 1)

bucket19 sum:2024, content= (98, 95, 95, 93, 89, 89, 83, 83, 78, 77, 75, 72, 72, 67, 66, 63, 60, 56, 52, 52, 50, 45, 43, 42, 38, 35, 34, 32, 27, 26, 25, 21, 20, 17, 16, 13, 9, 7, 6, 1, 1, 1)

bucket20 sum:2024, content= (98, 95, 95, 93, 89, 89, 83, 83, 78, 77, 75, 72, 72, 67, 66, 62, 61, 55, 55, 51, 48, 45, 44, 42, 38, 35, 34, 32, 27, 26, 25, 21, 20, 17, 16, 13, 9, 6, 6, 4)

bucket21 sum:2022, content= (97, 97, 95, 91, 91, 88, 83, 82, 81, 76, 74, 72, 72, 67, 66, 62, 61, 55, 55, 51, 48, 45, 44, 42, 38, 35, 34, 32, 27, 26, 25, 21, 20, 17, 16, 11, 11, 6, 6, 1, 1)

bucket22 sum:2020, content= (97, 97, 94, 93, 89, 89, 83, 82, 78, 78, 75, 72, 72, 67, 66, 62, 61, 55, 55, 51, 48, 45, 44, 42, 38, 35, 33, 32, 29, 25, 25, 21, 20, 17, 16, 11, 11, 6, 6)

bucket23 sum:2020, content= (97, 97, 94, 93, 89, 88, 83, 83, 78, 77, 76, 72, 72, 67, 66, 61, 61, 58, 52, 51, 50, 44, 44, 40, 40, 35, 33, 32, 29, 25, 25, 21, 19, 19, 14, 14, 9, 6, 6)

bucket24 sum:2020, content= (97, 97, 94, 93, 89, 88, 83, 83, 78, 77, 76, 72, 71, 69, 66, 61, 60, 58, 52, 51, 48, 47, 43, 40, 40, 35, 33, 32, 29, 25, 24, 23, 19, 16, 16, 14, 9, 6, 6)

bucket25 sum:2020, content= (97, 97, 94, 93, 89, 88, 83, 83, 78, 77, 76, 72, 71, 69, 66, 61, 60, 58, 52, 51, 47, 47, 44, 40, 40, 35, 33, 32, 29, 25, 23, 23, 19, 19, 14, 11, 11, 9, 4)

bucket5 sum:2008, content=(99, 95, 95, 91, 89, 87, 83, 81, 79, 76, 74, 73, 70, 67, 64, 62, 59, 58, 54, 53, 50, 47, 45, 42, 38, 36, 33, 29, 28, 24, 23, 22, 19, 17, 15, 11, 9, 7, 3, 1)

bucket6 sum:2008, content= (99, 95, 95, 91, 89, 87, 83, 81, 79, 76, 74, 73, 70, 67, 64, 62, 59, 57, 55, 53, 50, 47, 45, 41, 39, 36, 33, 29, 28, 24, 23, 22, 19, 17, 15, 11, 9, 7, 3, 1)

bucket7 sum:2008, content= (99, 95, 95, 91, 89, 87, 83, 81, 78, 77, 74, 73, 70, 67, 64, 62, 59, 57, 55, 53, 50, 47, 45, 41, 39, 36, 32, 30, 28, 24, 23, 22, 19, 17, 15, 11, 9, 7, 2, 2)

bucket8 sum:2008, content= (99, 95, 94, 92, 89, 87, 83, 81, 78, 77, 74, 73, 70, 67, 64, 62, 59, 57, 55, 52, 51, 47, 44, 43, 38, 36, 32, 30, 28, 24, 23, 22, 19, 16, 16, 11, 9, 7, 2, 2)

bucket9 sum:2008, content= (98, 96, 94, 92, 89, 87, 82, 82, 78, 77, 74, 73, 70, 66, 65, 62, 59, 57, 55, 52, 51, 47, 44, 43, 38, 36, 32, 30, 28, 24, 23, 22, 19, 16, 15, 12, 8, 8, 2, 2)

bucket10 sum:2008, content= (98, 96, 94, 92, 89, 87, 82, 82, 78, 77, 74, 72, 71, 66, 65, 62, 59, 57, 55, 52, 51, 47, 44, 41, 40, 36, 32, 30, 28, 24, 23, 22, 19, 16, 15, 12, 8, 7, 4, 1)

bucket11 sum:2008, content= (98, 96, 94, 92, 89, 87, 82, 82, 78, 77, 74, 72, 71, 66, 65, 62, 59, 57, 55, 52, 51, 47, 44, 41, 40, 36, 32, 30, 28, 24, 23, 22, 18, 17, 14, 13, 8, 7, 4, 1)

bucket12 sum:2008, content= (98, 96, 94, 92, 89, 87, 82, 82, 78, 77, 74, 72, 71, 66, 65, 61, 60, 57, 55, 52, 51, 47, 44, 41, 40, 36, 32, 30, 28, 24, 23, 21, 20, 16, 14, 13, 8, 7, 4, 1)

bucket13 sum:2008, content= (98, 96, 93, 93, 88, 88, 82, 82, 78, 77, 74, 72, 71, 65, 65, 63, 59, 57, 55, 52, 51, 47, 44, 41, 40, 35, 34, 29, 27, 25, 23, 21, 20, 16, 14, 13, 8, 6, 4, 2)

bucket14 sum:2008, content= (98, 96, 93, 93, 88, 88, 82, 82, 78, 77, 74, 72, 70, 68, 64, 61, 60, 57, 55, 52, 51, 47, 44, 41, 39, 37, 31, 31, 27, 25, 23, 21, 20, 16, 14, 12, 10, 6, 4, 1)

bucket15 sum:2008, content= (97, 97, 93, 93, 88, 88, 82, 81, 79, 77, 73, 73, 70, 68, 64, 61, 60, 56, 56, 52, 50, 48, 44, 41, 39, 37, 31, 31, 27, 25, 23, 21, 20, 16, 14, 12, 10, 6, 4, 1)

bucket16 sum:2008, content= (97, 97, 93, 93, 88, 86, 84, 81, 79, 76, 75, 72, 70, 68, 63, 63, 59, 56, 56, 52, 50, 48, 44, 41, 39, 37, 31, 30, 29, 24, 23, 21, 20, 16, 14, 12, 10, 6, 4, 1)

bucket17 sum:2008, content= (97, 97, 93, 92, 90, 86, 83, 81, 79, 76, 75, 72, 69, 69, 63, 63, 58, 58, 55, 52, 49, 48, 46, 41, 39, 35, 34, 29, 27, 25, 23, 21, 20, 16, 14, 12, 10, 6, 4, 1)

bucket18 sum:2008, content= (97, 97, 93, 92, 90, 86, 83, 81, 79, 76, 75, 72, 69, 69, 63, 63, 58, 58, 55, 52, 49, 48, 46, 41, 39, 35, 34, 29, 27, 25, 23, 21, 20, 16, 14, 11, 10, 5, 5, 2)

bucket19 sum:2008, content= (97, 96, 95, 92, 88, 86, 84, 81, 79, 76, 75, 72, 69, 69, 63, 63, 58, 58, 54, 53, 49, 48, 46, 41, 38, 35, 35, 29, 26, 26, 23, 21, 20, 16, 14, 11, 10, 5, 5, 2)

bucket20 sum:2008, content= (97, 96, 95, 92, 88, 85, 85, 80, 80, 76, 75, 72, 69, 68, 65, 61, 60, 56, 54, 54, 49, 48, 46, 40, 38, 37, 34, 29, 26, 26, 23, 21, 20, 16, 13, 13, 10, 5, 4, 2)

bucket21 sum:2008, content= (97, 96, 95, 92, 88, 85, 85, 80, 80, 76, 75, 72, 69, 68, 65, 61, 60, 56, 54, 54, 49, 48, 44, 43, 38, 35, 34, 30, 26, 26, 22, 22, 20, 16, 13, 13, 10, 5, 4, 2)


```

bucket22 sum:2008, content= (97, 96, 95, 91, 90, 85, 84, 80, 80, 76, 75, 71, 71, 68, 63, 61, 61, 56, 54, 54, 49, 48, 44, 43, 38, 35, 34, 30, 26, 25,
24, 21, 18, 18, 13, 13, 10, 5, 4, 2)
bucket23 sum:2008, content= (97, 96, 95, 91, 90, 85, 84, 80, 80, 76, 75, 71, 71, 68, 63, 61, 61, 56, 54, 54, 49, 48, 44, 43, 37, 37, 34, 29, 26, 25,
24, 21, 18, 17, 16, 10, 10, 5, 5, 2)
bucket24 sum:2007, content= (97, 96, 95, 90, 90, 85, 83, 82, 80, 76, 75, 71, 71, 68, 63, 61, 61, 56, 54, 53, 52, 46, 44, 43, 37, 37, 31, 31, 29, 24,
22, 22, 18, 17, 16, 10, 10, 5, 4, 2)
bucket25 sum:2007, content= (97, 96, 95, 90, 90, 85, 83, 82, 80, 75, 75, 73, 69, 65, 65, 63, 60, 58, 54, 53, 49, 48, 44, 43, 37, 37, 31, 31, 29, 24,
22, 22, 18, 17, 16, 10, 10, 5, 4, 2)
"----Comparison for the 124 example----"
"***tf from benchmark was 2033(we added the number of machines) and target function from our local search is 2033"
***RESULT IS THE SAME
Run time: 0.016 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 25))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 125 from 130-----"
"-----START 126 from 130-----"
"input file number 126: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_5.txt"
"***Data from file U_1_1000_25_5.txt: machinesNum=25 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_25_1000_5.txt: machinesNum=25 jobsNum=1000 lowerBound=1959 upperBound=1959
isOptimal=1"
Content of machines summed (1958, 1958, 1958, 1958, 1958, 1958, 1958, 1959, 1959, 1959, 1959, 1959, 1959, 1959, 1958, 1958, 1958, 1958,
1958, 1958, 1958, 1958, 1959, 1959)
input selected: size 1000 sum 48959

----Our Results-----
best from Our local search found:
target function = 1984, num of machines=25, square root lms=0
machines content(number of jobs=1000):
bucket1 sum:1959, content= (99, 95, 92, 89, 87, 84, 83, 81, 78, 75, 72, 71, 68, 65, 62, 59, 58, 54, 52, 49, 47, 45, 42, 39, 37, 34, 31, 29, 27, 26,
22, 21, 19, 16, 13, 13, 10, 8, 5, 2)

```

bucket2 sum:1959, content= (99, 95, 92, 89, 87, 84, 83, 81, 78, 75, 72, 71, 67, 66, 62, 59, 58, 54, 52, 49, 47, 45, 42, 39, 37, 34, 31, 29, 27, 26, 22, 21, 18, 17, 13, 13, 10, 8, 5, 2)

bucket3 sum:1959, content= (99, 95, 92, 89, 87, 84, 83, 81, 78, 75, 72, 71, 67, 65, 63, 59, 58, 54, 52, 49, 47, 45, 42, 39, 37, 34, 31, 29, 27, 25, 23, 21, 18, 17, 13, 13, 10, 8, 5, 2)

bucket4 sum:1959, content= (99, 95, 92, 89, 87, 84, 83, 81, 78, 75, 72, 71, 67, 65, 63, 59, 58, 54, 52, 49, 47, 44, 43, 39, 37, 34, 31, 29, 27, 25, 23, 21, 18, 16, 14, 13, 10, 8, 5, 2)

bucket5 sum:1959, content= (99, 95, 92, 89, 87, 84, 83, 81, 78, 75, 72, 71, 67, 65, 63, 59, 57, 55, 52, 49, 47, 44, 43, 39, 37, 34, 31, 29, 27, 25, 23, 21, 18, 16, 14, 13, 10, 8, 5, 2)

bucket6 sum:1959, content= (99, 95, 92, 89, 87, 84, 83, 81, 77, 76, 72, 71, 67, 65, 63, 59, 57, 55, 52, 49, 47, 44, 43, 39, 37, 34, 31, 29, 27, 25, 23, 21, 18, 16, 14, 13, 10, 8, 5, 2)

bucket7 sum:1959, content= (98, 96, 92, 89, 87, 84, 83, 81, 77, 76, 72, 71, 67, 65, 62, 60, 57, 55, 51, 50, 47, 44, 43, 39, 37, 34, 31, 29, 27, 25, 23, 21, 18, 16, 14, 13, 10, 8, 5, 2)

bucket8 sum:1959, content= (98, 96, 92, 89, 87, 84, 83, 81, 77, 75, 73, 71, 67, 65, 62, 60, 57, 55, 51, 50, 46, 45, 43, 39, 37, 33, 32, 29, 27, 25, 23, 21, 18, 16, 14, 13, 9, 9, 5, 1, 1)

bucket9 sum:1959, content= (98, 96, 92, 89, 86, 85, 83, 81, 77, 75, 73, 71, 67, 65, 62, 60, 57, 54, 53, 49, 46, 45, 43, 39, 37, 33, 32, 29, 27, 25, 23, 21, 18, 16, 14, 13, 9, 9, 5, 1, 1)

bucket10 sum:1959, content= (98, 96, 91, 90, 86, 85, 82, 82, 77, 74, 73, 72, 67, 64, 64, 59, 57, 54, 51, 50, 48, 44, 43, 39, 37, 33, 32, 29, 27, 25, 23, 21, 18, 16, 14, 13, 9, 9, 5, 1, 1)

bucket11 sum:1959, content= (98, 96, 91, 90, 86, 85, 82, 82, 77, 74, 73, 71, 68, 64, 64, 59, 57, 54, 51, 50, 48, 44, 42, 40, 36, 35, 31, 29, 27, 25, 23, 21, 18, 16, 14, 13, 9, 9, 4, 3)

bucket12 sum:1959, content= (98, 96, 91, 90, 86, 85, 82, 81, 79, 74, 73, 71, 67, 64, 64, 59, 57, 54, 51, 50, 48, 44, 41, 40, 38, 33, 32, 29, 27, 25, 23, 20, 19, 16, 14, 12, 10, 9, 4, 3)

bucket13 sum:1959, content= (98, 96, 91, 90, 86, 85, 82, 81, 79, 74, 73, 71, 67, 64, 64, 59, 57, 54, 51, 50, 46, 46, 41, 40, 38, 33, 32, 29, 26, 26, 23, 20, 19, 16, 14, 12, 10, 8, 6, 1, 1)

bucket14 sum:1958, content= (98, 96, 91, 90, 86, 85, 82, 81, 79, 74, 73, 71, 67, 64, 64, 59, 56, 56, 51, 50, 46, 45, 41, 40, 38, 33, 32, 29, 26, 26, 22, 22, 18, 16, 14, 12, 10, 7, 7, 1)

bucket15 sum:1957, content= (97, 97, 91, 90, 86, 85, 82, 80, 80, 74, 73, 70, 68, 64, 64, 59, 56, 56, 51, 49, 46, 46, 41, 40, 38, 33, 32, 29, 26, 26, 22, 22, 17, 17, 14, 12, 10, 7, 7)

bucket16 sum:1959, content= (97, 97, 91, 90, 86, 85, 82, 80, 80, 74, 73, 70, 68, 64, 64, 58, 58, 54, 51, 50, 46, 46, 41, 40, 38, 33, 32, 28, 28, 25, 22, 22, 17, 17, 14, 12, 10, 7, 6, 3)

bucket17 sum:1959, content= (97, 97, 91, 90, 86, 85, 82, 80, 79, 74, 73, 70, 69, 64, 62, 61, 56, 56, 51, 49, 46, 45, 43, 40, 36, 35, 31, 28, 28, 25, 22, 22, 17, 17, 14, 11, 11, 7, 6, 3)

bucket18 sum:1959, content= (97, 95, 93, 90, 86, 84, 83, 80, 79, 74, 73, 70, 69, 64, 62, 61, 56, 54, 53, 49, 46, 45, 43, 39, 36, 35, 31, 30, 26, 26, 22, 20, 19, 17, 14, 11, 11, 7, 6, 3)

bucket19 sum:1959, content= (97, 95, 93, 90, 86, 84, 83, 80, 79, 74, 73, 69, 69, 66, 61, 61, 56, 53, 53, 50, 46, 45, 43, 38, 38, 33, 32, 28, 28, 26, 22, 20, 19, 17, 14, 11, 11, 7, 6, 3)

bucket20 sum:1959, content= (97, 95, 93, 89, 88, 84, 82, 80, 79, 74, 73, 69, 69, 66, 61, 60, 58, 53, 53, 48, 48, 45, 41, 40, 36, 35, 30, 30, 28, 24, 24, 20, 19, 15, 15, 11, 11, 7, 6, 3)

bucket21 sum:1958, content= (97, 95, 93, 88, 88, 83, 83, 82, 79, 74, 73, 69, 68, 66, 61, 60, 58, 53, 53, 48, 48, 45, 41, 40, 36, 35, 30, 30, 28, 24, 24, 20, 19, 15, 15, 11, 11, 7, 4, 4)

bucket22 sum:1959, content= (97, 94, 94, 88, 88, 83, 83, 82, 77, 76, 73, 69, 68, 66, 61, 60, 58, 53, 53, 48, 48, 45, 41, 40, 35, 35, 32, 28, 28, 26, 22, 20, 19, 17, 14, 11, 10, 9, 4, 4)

bucket23 sum:1955, content= (97, 94, 93, 91, 86, 83, 83, 82, 76, 76, 73, 69, 69, 66, 61, 60, 58, 53, 53, 48, 48, 45, 40, 40, 38, 32, 32, 30, 28, 24, 24, 20, 19, 15, 15, 11, 10, 9, 4)

bucket24 sum:1955, content= (97, 94, 93, 91, 85, 85, 83, 80, 76, 76, 73, 72, 68, 64, 61, 61, 58, 53, 53, 48, 48, 45, 40, 40, 38, 32, 32, 30, 28, 24, 24, 20, 19, 15, 15, 11, 10, 9, 4)

bucket25 sum:1955, content= (97, 94, 92, 91, 85, 85, 83, 82, 76, 76, 73, 69, 69, 66, 61, 58, 58, 56, 51, 50, 46, 45, 43, 38, 38, 32, 32, 30, 26, 26, 22, 22, 19, 15, 15, 11, 10, 9, 4)

"----Comparison for the 125 example----"

****tf from benchmark was 1984(we added the number of machines) and target function from our local search is 1984"

***RESULT IS THE SAME

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 26))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 126 from 130-----"

"-----START 127 from 130-----"

"input file number 127: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_6.txt"

****Data from file U_1_1000_25_6.txt: machinesNum=25 jobsNum=1000"

****SOLUTION Data from file SOL_U_1_25_1000_6.txt: machinesNum=25 jobsNum=1000 lowerBound=2033 upperBound=2033
isOptimal=1"

Content of machines summed (2033, 2033, 2033, 2033, 2033, 2033, 2033, 2033, 2033, 2033, 2033, 2032, 2032, 2032, 2032, 2032, 2032, 2033, 2032, 2032, 2032, 2032, 2032, 2032, 2032)

input selected: size 1000 sum 50812

----Our Results-----

best from Our local search found:

target function = 2058, num of machines=25, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:2033, content= (99, 96, 93, 91, 88, 85, 83, 82, 79, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 52, 48, 46, 43, 40, 38, 35, 33, 28, 27, 24, 23, 19, 17, 15, 12, 10, 7, 4, 1)

bucket2 sum:2033, content= (99, 96, 93, 91, 88, 85, 83, 82, 79, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 52, 48, 46, 43, 40, 38, 35, 33, 28, 27, 24, 23, 19, 17, 15, 12, 9, 8, 4, 1)

bucket3 sum:2033, content= (99, 96, 93, 91, 88, 85, 83, 81, 80, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 51, 49, 46, 43, 40, 38, 35, 33, 28, 27, 24, 23, 19, 17, 15, 12, 9, 8, 4, 1)

bucket4 sum:2033, content= (99, 96, 93, 91, 88, 85, 83, 81, 80, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 51, 49, 46, 43, 40, 38, 35, 33, 28, 27, 24, 22, 20, 17, 15, 12, 9, 8, 4, 1)

bucket5 sum:2033, content= (99, 96, 93, 90, 89, 85, 83, 81, 80, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 51, 49, 46, 43, 40, 38, 35, 32, 29, 27, 24, 22, 20, 17, 15, 12, 9, 8, 4, 1)

bucket6 sum:2033, content= (99, 96, 93, 90, 89, 85, 83, 81, 80, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 51, 49, 45, 44, 40, 38, 35, 32, 29, 27, 24, 22, 20, 17, 15, 12, 9, 7, 5, 1)

bucket7 sum:2033, content= (99, 96, 93, 90, 89, 85, 83, 81, 80, 77, 74, 73, 70, 67, 65, 62, 60, 58, 56, 53, 51, 49, 45, 44, 40, 38, 35, 32, 29, 27, 24, 22, 20, 17, 15, 12, 9, 7, 5, 1)

bucket8 sum:2033, content= (99, 96, 93, 90, 89, 85, 83, 81, 80, 76, 75, 73, 70, 67, 64, 63, 60, 58, 56, 53, 51, 49, 45, 42, 41, 39, 35, 32, 29, 27, 24, 22, 20, 17, 15, 12, 9, 7, 5, 1)

bucket9 sum:2033, content= (99, 96, 93, 90, 89, 85, 83, 81, 79, 78, 74, 73, 70, 66, 66, 62, 60, 58, 56, 53, 51, 49, 45, 42, 41, 39, 35, 32, 29, 27, 24, 22, 20, 17, 15, 12, 9, 7, 5, 1)

bucket10 sum:2033, content= (98, 97, 93, 90, 88, 86, 83, 81, 79, 76, 76, 72, 71, 66, 66, 62, 60, 58, 56, 53, 51, 49, 45, 42, 41, 39, 34, 33, 29, 26, 25, 22, 20, 17, 15, 11, 10, 7, 5, 1)

bucket11 sum:2033, content= (98, 96, 94, 90, 88, 86, 83, 81, 79, 76, 76, 72, 71, 66, 66, 62, 60, 58, 56, 53, 51, 49, 45, 42, 41, 38, 36, 32, 29, 26, 25, 22, 20, 17, 15, 11, 10, 7, 5, 1)

bucket12 sum:2033, content= (98, 96, 94, 90, 88, 86, 83, 81, 79, 76, 76, 72, 71, 66, 64, 63, 61, 58, 56, 53, 51, 48, 46, 42, 41, 38, 36, 32, 29, 26, 25, 22, 19, 18, 14, 13, 9, 6, 6, 1)

bucket13 sum:2032, content= (98, 96, 94, 90, 88, 86, 83, 81, 79, 76, 76, 72, 71, 66, 64, 63, 61, 58, 56, 53, 51, 48, 46, 42, 41, 38, 36, 31, 30, 26, 25, 22, 19, 18, 14, 13, 9, 6, 6)

bucket14 sum:2032, content= (98, 96, 93, 91, 88, 86, 83, 81, 79, 76, 76, 72, 70, 68, 64, 63, 59, 59, 55, 54, 50, 50, 45, 42, 40, 39, 36, 31, 30, 26, 25, 22, 19, 17, 16, 11, 10, 6, 4, 2)

bucket15 sum:2032, content= (98, 96, 92, 92, 87, 87, 82, 82, 79, 76, 75, 74, 70, 66, 64, 63, 61, 57, 57, 53, 50, 50, 44, 44, 40, 38, 36, 31, 30, 26, 25, 21, 21, 16, 14, 14, 8, 8, 4, 1)

bucket16 sum:2032, content= (98, 95, 94, 91, 87, 86, 84, 81, 79, 76, 75, 72, 71, 68, 64, 63, 59, 59, 55, 54, 50, 48, 47, 42, 40, 39, 36, 31, 28, 28, 25, 21, 21, 16, 14, 14, 8, 8, 4, 1)

bucket17 sum:2032, content= (98, 95, 94, 91, 87, 86, 84, 81, 78, 78, 75, 72, 70, 68, 64, 62, 59, 59, 57, 53, 50, 48, 47, 41, 41, 39, 36, 31, 28, 28, 25, 21, 19, 18, 14, 13, 10, 6, 4, 2)

bucket18 sum:2032, content= (98, 95, 94, 91, 87, 86, 84, 81, 78, 78, 75, 72, 70, 68, 64, 62, 59, 59, 55, 55, 50, 48, 47, 41, 41, 39, 34, 33, 28, 28, 25, 21, 19, 18, 14, 13, 10, 6, 4, 2)

bucket19 sum:2032, content= (98, 95, 94, 91, 87, 85, 84, 82, 78, 78, 75, 72, 70, 68, 64, 62, 59, 59, 55, 54, 52, 48, 46, 41, 41, 39, 34, 33, 28, 28, 24, 23, 19, 16, 16, 13, 8, 8, 3, 2)

bucket20 sum:2032, content= (98, 95, 94, 91, 87, 85, 84, 82, 78, 78, 75, 72, 69, 69, 64, 61, 61, 59, 55, 52, 52, 48, 47, 41, 41, 39, 34, 33, 28, 27, 25, 23, 19, 16, 16, 13, 8, 8, 3, 2)

bucket21 sum:2032, content= (98, 94, 94, 91, 90, 85, 82, 82, 78, 78, 75, 72, 69, 69, 64, 61, 61, 59, 55, 52, 52, 48, 46, 44, 40, 37, 37, 31, 28, 27, 25, 23, 19, 16, 16, 13, 8, 8, 3, 2)

bucket22 sum:2032, content= (97, 97, 92, 91, 90, 84, 84, 81, 78, 78, 75, 72, 69, 69, 64, 61, 61, 59, 55, 52, 52, 48, 46, 44, 40, 37, 34, 34, 28, 27, 25, 23, 19, 16, 16, 13, 8, 8, 3, 2)

bucket23 sum:2032, content= (97, 97, 92, 91, 90, 84, 84, 81, 78, 78, 75, 72, 69, 68, 63, 63, 61, 59, 55, 52, 52, 47, 47, 44, 40, 37, 34, 33, 31, 26, 24, 23, 18, 18, 14, 13, 10, 6, 3, 3)

bucket24 sum:2032, content= (97, 97, 92, 91, 87, 87, 82, 82, 80, 76, 75, 71, 71, 68, 63, 63, 61, 57, 57, 52, 52, 47, 47, 44, 40, 37, 34, 33, 31, 26, 23, 23, 18, 18, 16, 11, 11, 6, 3, 3)

bucket25 sum:2032, content= (97, 97, 92, 91, 87, 87, 82, 82, 80, 76, 74, 74, 69, 68, 63, 63, 61, 57, 57, 52, 52, 47, 47, 44, 40, 37, 34, 33, 31, 26, 23, 23, 18, 18, 16, 11, 11, 6, 2, 2, 2)

"----Comparison for the 126 example----"

****tf from benchmark was 2058(we added the number of machines) and target function from our local search is 2058"

***RESULT IS THE SAME

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 27))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 127 from 130-----"

"input file number 128: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_7.txt and solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_7.txt"

```

***SOLUTION Data from file SOL_U_1_25_1000_7.txt: machinesNum=25 jobsNum=1000 lowerBound=1966 upperBound=1966
isOptimal=1"

```

input selected: size 1000 sum 49132

best from Our local search found:

`machines content(number of jobs=1000):`

```
bucket2 sum:1966, content= (99, 93, 92, 89, 87, 84, 81, 80, 77, 75, 71, 68, 67, 64, 62, 60, 56, 55, 53, 51, 48, 46, 44, 42, 39, 36, 34, 32, 29, 26, 24, 22, 19, 16, 14, 11, 8, 7, 3, 2)
```

bucket4 sum:1966, content=(99, 93, 92, 89, 87, 84, 81, 80, 77, 75, 71, 68, 66, 65, 62, 60, 56, 55, 53, 51, 48, 46, 44, 42, 39, 36, 34, 32, 28, 27, 24, 22, 19, 16, 14, 11, 8, 7, 3, 2)

bucket6 sum:1966, content=(99, 93, 92, 89, 87, 84, 81, 80, 77, 75, 71, 68, 66, 64, 63, 60, 56, 55, 53, 50, 49, 46, 44, 42, 39, 36, 34, 32, 28, 27, 24, 22, 19, 16, 14, 11, 8, 7, 3, 2)

bucket8 sum:1966, content=(98, 93, 93, 89, 87, 83, 82, 79, 78, 74, 72, 68, 66, 64, 63, 59, 57, 55, 53, 50, 49, 46, 44, 41, 40, 36, 34, 31, 29, 26, 25, 22, 19, 16, 13, 12, 8, 6, 4, 1, 1)

bucket9 sum:1966, content=(98, 93, 93, 89, 87, 83, 82, 79, 78, 74, 71, 69, 66, 64, 63, 59, 57, 55, 53, 50, 49, 46, 44, 41, 40, 36, 34, 31, 29, 26, 25, 22, 19, 16, 13, 11, 9, 6, 4, 1, 1)

bucket10 sum:1966, content= (97, 94, 93, 89, 87, 83, 82, 79, 78, 74, 71, 69, 66, 64, 62, 61, 56, 55, 53, 50, 49, 46, 44, 41, 40, 36, 34, 31, 29, 26, 25, 21, 20, 16, 13, 11, 9, 6, 4, 1, 1)

bucket11 sum:1966, content= (97, 94, 93, 88, 88, 83, 82, 79, 78, 74, 71, 69, 66, 64, 62, 59, 58, 55, 53, 50, 48, 47, 44, 41, 39, 37, 34, 31, 29, 26, 25, 21, 20, 15, 15, 10, 9, 6, 4, 1, 1)

bucket12 sum:1966, content= (97, 94, 92, 90, 87, 83, 82, 79, 78, 73, 72, 69, 66, 64, 62, 59, 58, 55, 53, 50, 48, 47, 44, 41, 39, 37, 34, 31, 29, 26, 25, 21, 20, 15, 13, 12, 9, 6, 4, 1, 1)

bucket13 sum:1964, content= (97, 94, 92, 90, 86, 85, 81, 79, 78, 73, 72, 69, 66, 64, 62, 59, 58, 55, 53, 50, 48, 47, 44, 41, 39, 37, 34, 31, 29, 26, 24, 23, 19, 15, 13, 12, 9, 6, 4)

bucket14 sum:1964, content= (97, 94, 92, 90, 86, 85, 81, 79, 78, 73, 72, 69, 66, 64, 62, 59, 58, 55, 53, 49, 49, 47, 44, 41, 38, 38, 34, 31, 29, 26, 24, 23, 19, 15, 13, 12, 9, 6, 4)

bucket15 sum:1965, content= (97, 94, 92, 88, 88, 85, 81, 79, 78, 73, 72, 69, 66, 64, 61, 61, 57, 55, 53, 49, 49, 47, 44, 41, 38, 38, 33, 33, 28, 26, 24, 23, 18, 17, 13, 10, 10, 6, 3, 2)

bucket16 sum:1965, content= (97, 93, 93, 88, 88, 85, 81, 79, 78, 73, 72, 69, 65, 65, 61, 61, 57, 55, 52, 51, 48, 47, 44, 41, 38, 38, 33, 33, 28, 26, 24, 23, 18, 17, 13, 10, 10, 6, 3, 2)

bucket17 sum:1965, content= (97, 93, 93, 88, 88, 83, 83, 79, 77, 76, 70, 68, 67, 64, 61, 61, 57, 54, 54, 49, 49, 47, 43, 43, 38, 37, 33, 33, 28, 26, 24, 23, 18, 17, 13, 10, 10, 6, 3, 2)

bucket18 sum:1964, content= (96, 95, 92, 88, 88, 83, 83, 79, 77, 73, 73, 68, 67, 63, 63, 59, 57, 56, 52, 51, 48, 47, 43, 43, 38, 37, 33, 33, 28, 25, 25, 23, 18, 17, 13, 10, 9, 8, 3)

bucket19 sum:1965, content= (96, 95, 91, 90, 86, 85, 82, 79, 76, 76, 70, 70, 65, 65, 61, 61, 57, 54, 52, 52, 48, 47, 43, 43, 38, 37, 33, 31, 30, 25, 25, 23, 18, 17, 13, 10, 9, 8, 2, 2)

bucket20 sum:1965, content= (96, 95, 91, 90, 86, 85, 82, 78, 78, 73, 73, 68, 67, 63, 63, 59, 57, 56, 52, 51, 48, 46, 45, 41, 38, 38, 33, 31, 30, 25, 25, 21, 20, 17, 13, 10, 9, 5, 5, 2)

bucket21 sum:1965, content= (96, 95, 91, 90, 86, 85, 82, 78, 78, 73, 73, 68, 67, 63, 63, 58, 58, 56, 52, 51, 48, 46, 45, 41, 38, 37, 34, 31, 29, 28, 24, 21, 18, 18, 13, 10, 9, 5, 5, 2)

bucket22 sum:1965, content= (96, 95, 91, 90, 86, 85, 81, 80, 76, 76, 70, 70, 65, 65, 61, 61, 57, 54, 52, 51, 49, 46, 45, 40, 40, 35, 35, 31, 29, 28, 24, 21, 18, 17, 12, 12, 9, 5, 5, 2)

bucket23 sum:1964, content= (96, 95, 91, 90, 86, 85, 81, 80, 76, 76, 70, 70, 65, 65, 61, 61, 57, 54, 52, 51, 49, 46, 45, 40, 40, 35, 35, 30, 30, 28, 23, 20, 20, 15, 15, 12, 9, 5, 5)

bucket24 sum:1964, content= (96, 95, 91, 90, 85, 85, 80, 80, 78, 76, 70, 70, 65, 65, 61, 61, 57, 54, 52, 51, 49, 46, 45, 40, 40, 35, 35, 30, 30, 28, 23, 20, 20, 15, 15, 12, 9, 5, 5)

bucket25 sum:1965, content= (96, 93, 93, 90, 85, 85, 80, 80, 78, 76, 70, 67, 67, 65, 63, 58, 58, 54, 54, 51, 47, 47, 45, 40, 40, 35, 35, 30, 30, 28, 23, 20, 20, 15, 15, 12, 8, 5, 5, 2)

"---Comparison for the 127 example---

***tf from benchmark was 1991(we added the number of machines) and target function from our local search is 1991"

***RESULT IS THE SAME

Run time: 0.016 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 28))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 128 from 130-----"

"-----START 129 from 130-----"

"input file number 129: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_8.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_8.txt"

***Data from file U_1_1000_25_8.txt: machinesNum=25 jobsNum=1000"

***SOLUTION Data from file SOL_U_1_25_1000_8.txt: machinesNum=25 jobsNum=1000 lowerBound=2025 upperBound=2025

```
isOptimal=1"
```

[illegible]

input selected: size 1000 sum 50602

----Our Results-----

best from Our local search found:

target function = 2050, num of machines=25, square root lms=0

machines content(number of jobs=1000):

bucket1 sum:2025, content=(99, 96, 94, 90, 88, 85, 84, 81, 79, 76, 75, 72, 69, 66, 64, 62, 60, 57, 56, 52, 50, 47, 45, 43, 40, 38, 35, 32, 29, 28, 24, 23, 20, 16, 16, 11, 10, 7, 4, 2)

bucket2 sum:2025, content=(99, 96, 94, 90, 88, 85, 84, 81, 79, 76, 75, 72, 69, 66, 64, 62, 60, 57, 56, 52, 50, 47, 45, 43, 40, 38, 35, 32, 29, 28, 24, 23, 20, 16, 15, 12, 10, 7, 4, 2)

bucket3 sum:2025, content=(99, 95, 95, 90, 88, 85, 84, 81, 79, 76, 75, 72, 69, 66, 64, 62, 60, 57, 56, 52, 50, 47, 45, 43, 40, 38, 35, 31, 30, 28, 24, 23, 20, 16, 15, 12, 10, 7, 4, 2)

bucket4 sum:2025, content=(99, 95, 94, 90, 89, 85, 84, 81, 79, 76, 75, 72, 69, 66, 64, 62, 60, 57, 56, 52, 50, 47, 45, 43, 40, 38, 35, 31, 30, 27, 25, 23, 20, 16, 15, 12, 10, 7, 4, 2)

bucket5 sum:2025, content=(99, 95, 94, 90, 88, 86, 83, 82, 79, 76, 75, 72, 69, 66, 64, 62, 60, 57, 56, 52, 50, 47, 45, 43, 40, 38, 35, 31, 30, 27, 25, 22, 21, 16, 15, 12, 10, 6, 5, 2)

bucket6 sum:2025, content= (99, 95, 94, 90, 88, 86, 83, 81, 80, 76, 75, 72, 69, 66, 64, 62, 60, 57, 56, 52, 50, 47, 45, 43, 40, 38, 35, 31, 30, 27, 25, 22, 21, 16, 15, 12, 10, 6, 5, 2)

bucket7 sum:2025, content= (99, 95, 93, 91, 88, 86, 83, 81, 79, 77, 75, 72, 68, 67, 64, 62, 60, 56, 56, 53, 50, 47, 45, 43, 39, 38, 36, 31, 30, 27, 25, 22, 20, 17, 15, 12, 10, 6, 5, 1, 1)

bucket8 sum:2025, content= (99, 95, 93, 91, 88, 86, 83, 81, 79, 77, 75, 71, 70, 66, 64, 62, 60, 56, 56, 53, 50, 46, 46, 43, 39, 38, 36, 31, 30, 27, 25, 22, 20, 17, 14, 13, 10, 6, 5, 1, 1)

bucket9 sum:2025, content= (99, 95, 93, 91, 88, 86, 83, 81, 79, 77, 75, 71, 70, 66, 64, 62, 60, 56, 56, 52, 51, 46, 46, 42, 41, 37, 36, 31, 30, 27, 25, 22, 20, 17, 14, 13, 9, 7, 5, 1, 1)

bucket10 sum:2025, content= (98, 96, 93, 91, 88, 86, 83, 81, 78, 78, 74, 73, 68, 67, 64, 61, 60, 58, 55, 52, 51, 46, 46, 42, 41, 37, 35, 32, 30, 27, 25, 22, 20, 17, 14, 12, 11, 6, 5, 1, 1)

bucket11 sum:2023, content= (98, 96, 93, 91, 87, 87, 83, 81, 78, 78, 74, 73, 68, 67, 64, 61, 60, 58, 55, 52, 51, 46, 46, 42, 41, 37, 35, 32, 30, 27, 24, 23, 20, 17, 14, 12, 11, 6, 5)

bucket12 sum:2023, content= (98, 96, 93, 91, 87, 87, 83, 81, 78, 77, 76, 71, 70, 66, 64, 61, 60, 58, 55, 52, 51, 46, 46, 42, 41, 37, 35, 32, 30, 27, 24, 23, 20, 17, 14, 12, 9, 7, 6)

bucket13 sum:2023, content= (98, 96, 93, 91, 87, 87, 83, 81, 78, 77, 76, 71, 70, 66, 63, 63, 59, 58, 55, 52, 50, 48, 45, 42, 41, 37, 35, 32, 30, 27, 24, 23, 19, 18, 14, 12, 9, 7, 6)

bucket14 sum:2023, content= (98, 96, 93, 91, 87, 87, 83, 80, 80, 77, 74, 73, 68, 67, 63, 63, 59, 58, 55, 52, 50, 48, 45, 42, 41, 37, 34, 33, 30, 27, 24, 23, 19, 18, 14, 11, 11, 7, 5)

bucket15 sum:2024, content= (98, 96, 92, 92, 87, 87, 83, 80, 80, 77, 74, 73, 68, 67, 63, 63, 59, 58, 55, 52, 50, 48, 45, 42, 41, 37, 34, 33, 30, 26, 26, 22, 19, 18, 14, 11, 11, 7, 4, 2)

bucket16 sum:2024, content= (98, 96, 92, 91, 89, 86, 82, 82, 78, 77, 76, 71, 70, 66, 63, 63, 59, 58, 55, 51, 51, 48, 45, 42, 41, 37, 34, 33, 30, 26, 26, 22, 19, 18, 14, 11, 11, 7, 4, 2)

bucket17 sum:2024, content= (98, 96, 92, 91, 89, 86, 82, 82, 78, 77, 76, 71, 70, 65, 64, 63, 59, 58, 55, 51, 51, 48, 45, 42, 41, 37, 34, 33, 30, 26, 26, 22, 19, 18, 14, 11, 11, 7, 4, 2)

bucket18 sum:2024, content= (98, 96, 92, 91, 89, 86, 82, 82, 78, 77, 74, 74, 68, 65, 65, 63, 59, 58, 55, 51, 51, 48, 44, 44, 39, 38, 34, 32, 31, 26, 26, 22, 19, 18, 13, 13, 9, 7, 4, 3)

bucket19 sum:2024, content= (98, 96, 92, 91, 89, 86, 82, 82, 78, 77, 74, 73, 67, 67, 65, 63, 59, 58, 54, 53, 50, 48, 44, 42, 41, 38, 34, 32, 29, 29, 24, 23, 19, 18, 13, 13, 9, 7, 4, 3)

bucket20 sum:2024, content= (97, 97, 92, 90, 89, 86, 84, 80, 80, 77, 74, 73, 67, 67, 64, 63, 59, 58, 54, 53, 49, 49, 44, 42, 41, 38, 34, 32, 29, 29, 23, 23, 21, 17, 13, 13, 9, 7, 4, 3)

bucket21 sum:2024, content= (97, 97, 92, 90, 89, 85, 85, 80, 80, 77, 74, 73, 67, 67, 64, 63, 59, 58, 54, 53, 49, 48, 46, 42, 41, 36, 36, 32, 29, 28, 23, 23, 21, 17, 13, 13, 9, 7, 4, 3)

```

bucket22 sum:2023, content= (97, 97, 92, 90, 89, 85, 84, 82, 78, 77, 74, 73, 67, 67, 65, 61, 61, 58, 54, 53, 49, 48, 46, 41, 41, 38, 33, 33, 29, 28,
26, 22, 19, 17, 16, 11, 9, 7, 4, 2)
bucket23 sum:2023, content= (97, 97, 92, 90, 89, 85, 84, 82, 78, 76, 76, 71, 70, 65, 65, 61, 61, 58, 54, 53, 49, 48, 44, 44, 39, 39, 33, 33, 29, 28,
26, 22, 18, 18, 16, 11, 8, 8, 3, 3)
bucket24 sum:2023, content= (97, 97, 92, 90, 89, 85, 84, 82, 78, 76, 76, 71, 70, 65, 65, 61, 61, 56, 56, 53, 49, 48, 44, 44, 39, 39, 33, 33, 29, 28,
26, 21, 21, 17, 13, 13, 8, 8, 3, 3)
bucket25 sum:2023, content= (97, 97, 92, 90, 89, 85, 84, 82, 78, 76, 76, 71, 70, 65, 65, 61, 60, 59, 54, 53, 49, 48, 44, 44, 39, 38, 36, 32, 29, 28,
23, 23, 21, 17, 13, 13, 8, 8, 3, 3)
"----Comparison for the 128 example----"
"***tf from benchmark was 2050(we added the number of machines) and target function from our local search is 2050"
***RESULT IS THE SAME
Run time: 0.031 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 29))
"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))
"Avegare error: 0"
"-----END 129 from 130-----"
"-----START 130 from 130-----"
"input file number 130: inputName=C:/algo/h/docs/benchMark/all/U_1_1000_25_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_U_1_25_1000_9.txt"
"***Data from file U_1_1000_25_9.txt: machinesNum=25 jobsNum=1000"
"***SOLUTION Data from file SOL_U_1_25_1000_9.txt: machinesNum=25 jobsNum=1000 lowerBound=2048 upperBound=2048
isOptimal=1"
Content of machines summed (2048, 2048, 2048, 2048, 2048, 2048, 2048, 2048, 2048, 2048, 2047, 2047, 2047, 2047, 2047, 2047, 2047, 2047,
2047, 2047, 2047, 2047, 2047, 2047, 2047)
input selected: size 1000 sum 51185

----Our Results-----
best from Our local search found:
target function = 2073, num of machines=25, square root lms=0
machines content(number of jobs=1000):
bucket1 sum:2048, content= (99, 97, 96, 93, 91, 88, 85, 84, 81, 79, 76, 73, 71, 67, 64, 61, 60, 56, 54, 51, 49, 46, 44, 42, 40, 37, 36, 34, 30, 28,
25, 24, 21, 18, 15, 12, 9, 8, 3, 1)

```

bucket2 sum:2048, content= (99, 97, 96, 93, 91, 88, 85, 84, 81, 79, 76, 73, 71, 67, 64, 61, 60, 56, 54, 51, 49, 46, 44, 42, 40, 37, 36, 34, 30, 28, 25, 24, 21, 18, 14, 13, 9, 8, 3, 1)

bucket3 sum:2048, content= (99, 97, 96, 93, 90, 89, 85, 84, 81, 79, 76, 73, 71, 67, 64, 61, 60, 56, 54, 51, 49, 46, 44, 42, 40, 37, 36, 34, 30, 27, 26, 24, 21, 18, 14, 13, 9, 7, 4, 1)

bucket4 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 79, 76, 73, 71, 67, 64, 61, 60, 56, 54, 51, 49, 46, 44, 42, 40, 37, 36, 34, 30, 27, 26, 24, 21, 18, 14, 13, 9, 7, 4, 1)

bucket5 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 79, 76, 72, 72, 67, 64, 61, 59, 57, 54, 51, 48, 47, 44, 42, 40, 37, 36, 34, 30, 27, 26, 24, 21, 18, 14, 13, 9, 7, 4, 1)

bucket6 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 79, 76, 72, 72, 67, 64, 61, 59, 57, 54, 51, 48, 47, 44, 42, 40, 37, 36, 34, 29, 28, 26, 24, 21, 18, 13, 13, 10, 7, 4, 1)

bucket7 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 79, 76, 72, 71, 68, 64, 61, 59, 57, 53, 52, 48, 47, 44, 42, 40, 37, 36, 34, 29, 28, 26, 24, 21, 18, 13, 13, 10, 7, 4, 1)

bucket8 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 79, 76, 72, 71, 68, 64, 61, 59, 56, 55, 51, 48, 47, 44, 42, 40, 37, 36, 33, 31, 27, 26, 24, 21, 18, 13, 13, 10, 6, 5, 1)

bucket9 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 78, 77, 72, 71, 68, 63, 62, 59, 56, 55, 51, 48, 47, 44, 42, 40, 37, 36, 33, 31, 27, 26, 23, 22, 17, 15, 12, 10, 6, 5, 1)

bucket10 sum:2048, content= (99, 97, 96, 93, 90, 88, 86, 84, 81, 78, 77, 72, 71, 68, 63, 62, 59, 56, 55, 50, 49, 47, 44, 42, 39, 38, 35, 35, 29, 28, 26, 23, 22, 17, 15, 12, 10, 6, 5, 1)

bucket11 sum:2047, content= (99, 97, 96, 92, 91, 87, 86, 85, 81, 78, 77, 72, 71, 68, 63, 62, 59, 56, 55, 50, 49, 47, 44, 42, 39, 38, 35, 33, 32, 27, 26, 23, 22, 17, 15, 12, 10, 6, 5)

bucket12 sum:2047, content= (99, 97, 95, 94, 89, 89, 86, 83, 82, 78, 76, 74, 70, 68, 63, 62, 59, 56, 55, 50, 49, 47, 44, 42, 39, 38, 35, 33, 32, 27, 26, 23, 21, 19, 13, 13, 10, 6, 4, 1)

bucket13 sum:2047, content= (99, 97, 95, 94, 89, 89, 86, 83, 82, 78, 76, 74, 70, 68, 63, 62, 59, 56, 55, 50, 49, 47, 44, 42, 39, 38, 35, 33, 32, 27, 26, 23, 21, 17, 16, 12, 10, 6, 3, 2)

bucket14 sum:2047, content= (99, 97, 95, 94, 89, 89, 85, 85, 81, 78, 76, 74, 70, 68, 63, 62, 59, 55, 55, 52, 48, 46, 45, 42, 39, 38, 35, 33, 32, 27, 26, 23, 20, 19, 15, 12, 10, 6, 3, 2)

bucket15 sum:2047, content= (99, 96, 96, 94, 89, 89, 85, 85, 80, 79, 76, 74, 70, 67, 65, 61, 59, 55, 55, 52, 48, 46, 45, 41, 41, 37, 35, 33, 32, 27, 26, 23, 20, 19, 15, 12, 10, 6, 3, 2)

bucket16 sum:2047, content= (98, 98, 95, 94, 89, 89, 85, 83, 83, 78, 75, 75, 70, 67, 65, 60, 60, 55, 55, 50, 49, 48, 43, 43, 39, 38, 35, 33, 32, 27, 26, 23, 20, 19, 15, 12, 10, 5, 5, 1)

bucket17 sum:2047, content= (98, 98, 95, 92, 92, 87, 86, 83, 82, 79, 75, 75, 70, 67, 63, 63, 58, 58, 53, 50, 49, 48, 43, 43, 39, 38, 35, 33, 32, 27, 25, 25, 20, 17, 16, 11, 11, 5, 5, 1)

bucket18 sum:2047, content= (98, 98, 95, 92, 92, 87, 86, 83, 82, 79, 75, 75, 70, 66, 65, 62, 58, 58, 53, 50, 49, 46, 45, 43, 39, 38, 35, 33, 32, 27, 25, 25, 20, 17, 16, 11, 10, 8, 3, 1)

bucket19 sum:2047, content= (98, 98, 95, 92, 92, 87, 86, 83, 82, 79, 75, 75, 70, 66, 65, 62, 58, 58, 53, 50, 49, 46, 45, 41, 41, 38, 35, 33, 32, 27, 25, 25, 20, 17, 16, 11, 9, 8, 3, 2)

bucket20 sum:2047, content= (98, 98, 95, 92, 92, 87, 86, 83, 80, 80, 77, 74, 70, 66, 65, 62, 58, 58, 53, 50, 49, 46, 45, 41, 41, 38, 35, 33, 31, 28, 25, 25, 19, 19, 15, 11, 9, 8, 3, 2)

bucket21 sum:2047, content= (98, 98, 95, 92, 92, 87, 86, 83, 80, 80, 77, 74, 69, 69, 63, 62, 58, 58, 52, 52, 49, 46, 45, 41, 41, 37, 35, 33, 31, 28, 25, 23, 22, 17, 16, 11, 9, 8, 3, 2)

bucket22 sum:2047, content= (98, 98, 95, 92, 91, 89, 85, 83, 80, 79, 78, 74, 69, 69, 63, 60, 60, 58, 52, 52, 49, 46, 45, 41, 39, 38, 37, 32, 31, 28, 25, 23, 22, 17, 16, 11, 9, 8, 3, 2)

bucket23 sum:2047, content= (98, 96, 96, 94, 91, 87, 86, 83, 80, 79, 78, 74, 69, 66, 65, 60, 60, 58, 55, 50, 49, 46, 43, 43, 39, 38, 37, 32, 31, 28, 25, 23, 22, 17, 16, 11, 9, 8, 3, 2)

bucket24 sum:2047, content= (98, 96, 96, 94, 91, 87, 86, 83, 80, 79, 78, 74, 69, 66, 65, 60, 60, 58, 55, 50, 49, 46, 43, 43, 39, 38, 37, 32, 29, 29, 26, 23, 22, 17, 15, 13, 9, 8, 2, 2)

bucket25 sum:2047, content= (98, 96, 96, 94, 91, 87, 86, 83, 80, 79, 77, 75, 69, 66, 65, 60, 60, 58, 52, 52, 49, 46, 45, 41, 41, 37, 35, 35, 29, 29, 25, 22, 22, 19, 15, 11, 9, 8, 2, 2, 1)

"----Comparison for the 129 example----"

***tf from benchmark was 2073(we added the number of machines) and target function from our local search is 2073"

***RESULT IS THE SAME

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 30))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Avegare error: 0"

"-----END 130 from 130-----"

"Correct (size-numberCorrect):" QMap((10, 10)(50, 29)(100, 29)(500, 30)(1000, 30))

"Mistakes(size-numberMistakes):" QMap((50, 1)(100, 1))

"Total Avegare error: 0"

"Total time: 15851.7 seconds"

"number of input=130. distribution=NU. range=[1, 100] #jobs=all. #machines=all"

"-----START 1 from 130-----"

"input file number 1: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_0.txt"

***Data from file NU_1_0010_05_0.txt: machinesNum=5 jobsNum=10"
***SOLUTION Data from file SOL_NU_1_05_0010_0.txt: machinesNum=5 jobsNum=10 lowerBound=193 upperBound=193 isOptimal=1"
Content of machines summed (100, 193, 188, 192, 192)
input selected: size 10 sum 865

----Our Results-----

best from Our local search found:

target function = 198, num of machines=5, square root lms=395.374506006647

machines content(number of jobs=10):

bucket1 sum:100, content= (99, 1)

bucket2 sum:193, content= (98, 95)

bucket3 sum:188, content= (98, 90)

bucket4 sum:192, content= (97, 95)

bucket5 sum:192, content= (96, 96)

"----Comparison for the 0 example----

***tf from benchmark was 198(we added the number of machines) and target function from our local search is 198"

***RESULT IS THE SAME

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 1))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: nan"

"-----END 1 from 130-----"

"-----START 2 from 130-----"

"input file number 2: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_1.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_1.txt"

***Data from file NU_1_0010_05_1.txt: machinesNum=5 jobsNum=10"

***SOLUTION Data from file SOL_NU_1_05_0010_1.txt: machinesNum=5 jobsNum=10 lowerBound=189 upperBound=189 isOptimal=1"

Content of machines summed (115, 189, 188, 188, 187)

input selected: size 10 sum 867

----Our Results-----

best from Our local search found:

target function = 194, num of machines=5, square root lms=393.195879937723
machines content(number of jobs=10):
bucket1 sum:115, content= (100, 15)
bucket2 sum:189, content= (99, 90)
bucket3 sum:188, content= (98, 90)
bucket4 sum:188, content= (97, 91)
bucket5 sum:187, content= (94, 93)
"----Comparison for the 1 example----"
"***tf from benchmark was 194(we added the number of machines) and target function from our local search is 194"
***RESULT IS THE SAME
Run time: 0.032 seconds
"Correct (size-numberCorrect):" QMap((10, 2))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 2 from 130-----"
"-----START 3 from 130-----"
"input file number 3: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_2.txt"
"***Data from file NU_1_0010_05_2.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_NU_1_05_0010_2.txt: machinesNum=5 jobsNum=10 lowerBound=186 upperBound=186 isOptimal=1"
Content of machines summed (103, 185, 186, 185, 185)
input selected: size 10 sum 844

----Our Results-----

best from Our local search found:
target function = 191, num of machines=5, square root lms=384.551687033096
machines content(number of jobs=10):
bucket1 sum:103, content= (100, 3)
bucket2 sum:185, content= (91, 94)
bucket3 sum:186, content= (94, 92)
bucket4 sum:185, content= (90, 95)
bucket5 sum:185, content= (93, 92)

```

"----Comparison for the 2 example----"
"***tf from benchmark was 191(we added the number of machines) and target function from our local search is 191"
***RESULT IS THE SAME
Run time: 0.031 seconds
"Correct (size-numberCorrect):" QMap((10, 3))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 3 from 130-----"
"-----START 4 from 130-----"
"input file number 4: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_3.txt"
"***Data from file NU_1_0010_05_3.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_NU_1_05_0010_3.txt: machinesNum=5 jobsNum=10 lowerBound=188 upperBound=188 isOptimal=1"
Content of machines summed (188, 187, 104, 184, 183)
input selected: size 10 sum 846

```

----Our Results-----

```

best from Our local search found:
target function = 193, num of machines=5, square root lms=385.323240928963
machines content(number of jobs=10):
bucket1 sum:188, content= (97, 91)
bucket2 sum:187, content= (97, 90)
bucket3 sum:104, content= (97, 7)
bucket4 sum:184, content= (93, 91)
bucket5 sum:183, content= (92, 91)
"----Comparison for the 3 example----"
"***tf from benchmark was 193(we added the number of machines) and target function from our local search is 193"
***RESULT IS THE SAME
Run time: 0.031 seconds
"Correct (size-numberCorrect):" QMap((10, 4))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"

```

```

"-----END 4 from 130-----"
"-----START 5 from 130-----"
"input file number 5: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_4.txt"
"***Data from file NU_1_0010_05_4.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_NU_1_05_0010_4.txt: machinesNum=5 jobsNum=10 lowerBound=191 upperBound=191 isOptimal=1"
Content of machines summed (110, 189, 191, 190, 190)
input selected: size 10 sum 870

----Our Results-----
best from Our local search found:
target function = 196, num of machines=5, square root lms=395.60333668967
machines content(number of jobs=10):
bucket1 sum:190, content= (97, 93)
bucket2 sum:189, content= (98, 91)
bucket3 sum:191, content= (97, 94)
bucket4 sum:110, content= (10, 100)
bucket5 sum:190, content= (95, 95)
"----Comparison for the 4 example----"
"***tf from benchmark was 196(we added the number of machines) and target function from our local search is 196"
***RESULT IS THE SAME
Run time: 0.031 seconds
"Correct (size-numberCorrect):" QMap((10, 5))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 5 from 130-----"
"-----START 6 from 130-----"
"input file number 6: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_5.txt"
"***Data from file NU_1_0010_05_5.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_NU_1_05_0010_5.txt: machinesNum=5 jobsNum=10 lowerBound=189 upperBound=189 isOptimal=1"
Content of machines summed (113, 189, 188, 187, 187)

```


input selected: size 10 sum 864

----Our Results-----

best from Our local search found:

target function = 194, num of machines=5, square root lms=392.137730905864

machines content(number of jobs=10):

bucket1 sum:113, content= (100, 13)

bucket2 sum:189, content= (97, 92)

bucket3 sum:188, content= (96, 92)

bucket4 sum:187, content= (94, 93)

bucket5 sum:187, content= (94, 93)

"----Comparison for the 5 example----

***tf from benchmark was 194(we added the number of machines) and target function from our local search is 194"

***RESULT IS THE SAME

Run time: 0.032 seconds

"Correct (size-numberCorrect):" QMap((10, 6))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 6 from 130-----"

"-----START 7 from 130-----"

"input file number 7: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_6.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_6.txt"

***Data from file NU_1_0010_05_6.txt: machinesNum=5 jobsNum=10"

***SOLUTION Data from file SOL_NU_1_05_0010_6.txt: machinesNum=5 jobsNum=10 lowerBound=188 upperBound=188 isOptimal=1"

Content of machines summed (102, 188, 188, 188, 187)

input selected: size 10 sum 853

----Our Results-----

best from Our local search found:

target function = 193, num of machines=5, square root lms=389.107954172104

machines content(number of jobs=10):

bucket1 sum:102, content= (99, 3)

```
bucket2 sum:188, content= (98, 90)
bucket3 sum:188, content= (96, 92)
bucket4 sum:188, content= (95, 93)
bucket5 sum:187, content= (95, 92)
"----Comparison for the 6 example----"
"***tf from benchmark was 193(we added the number of machines) and target function from our local search is 193"
***RESULT IS THE SAME
Run time: 0.031 seconds
"Correct (size-numberCorrect):" QMap((10, 7))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 7 from 130-----"
"-----START 8 from 130-----"
"input file number 8: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_7.txt"
"***Data from file NU_1_0010_05_7.txt: machinesNum=5 jobsNum=10"
"***SOLUTION Data from file SOL_NU_1_05_0010_7.txt: machinesNum=5 jobsNum=10 lowerBound=190 upperBound=190 isOptimal=1"
Content of machines summed (119, 189, 188, 190, 189)
input selected: size 10 sum 875

----Our Results-----
best from Our local search found:
target function = 195, num of machines=5, square root lms=396.291559334791
machines content(number of jobs=10):
bucket1 sum:188, content= (91, 97)
bucket2 sum:189, content= (97, 92)
bucket3 sum:119, content= (20, 99)
bucket4 sum:190, content= (96, 94)
bucket5 sum:189, content= (95, 94)
"----Comparison for the 7 example----"
"***tf from benchmark was 195(we added the number of machines) and target function from our local search is 195"
***RESULT IS THE SAME
```

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 8))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 8 from 130-----"

"-----START 9 from 130-----"

"input file number 9: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_8.txt"

****Data from file NU_1_0010_05_8.txt: machinesNum=5 jobsNum=10"

****SOLUTION Data from file SOL_NU_1_05_0010_8.txt: machinesNum=5 jobsNum=10 lowerBound=190 upperBound=190 isOptimal=1"

Content of machines summed (190, 113, 189, 189, 189)

input selected: size 10 sum 870

----Our Results-----

best from Our local search found:

target function = 195, num of machines=5, square root lms=395.008860660112

machines content(number of jobs=10):

bucket1 sum:190, content= (100, 90)

bucket2 sum:113, content= (100, 13)

bucket3 sum:189, content= (98, 91)

bucket4 sum:189, content= (95, 94)

bucket5 sum:189, content= (95, 94)

"----Comparison for the 8 example----"

****tf from benchmark was 195(we added the number of machines) and target function from our local search is 195"

***RESULT IS THE SAME

Run time: 0.031 seconds

"Correct (size-numberCorrect):" QMap((10, 9))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 9 from 130-----"

"-----START 10 from 130-----"

```
"input file number 10: inputName=C:/algo/h/docs/benchMark/all/NU_1_0010_05_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0010_9.txt"
****Data from file NU_1_0010_05_9.txt: machinesNum=5 jobsNum=10"
****SOLUTION Data from file SOL_NU_1_05_0010_9.txt: machinesNum=5 jobsNum=10 lowerBound=190 upperBound=190 isOptimal=1"
Content of machines summed (189, 107, 190, 188, 190)
input selected: size 10 sum 864
```

----Our Results-----

best from Our local search found:

target function = 195, num of machines=5, square root lms=393.337005632575

machines content(number of jobs=10):

bucket1 sum:188, content= (92, 96)

bucket2 sum:189, content= (98, 91)

bucket3 sum:190, content= (96, 94)

bucket4 sum:107, content= (9, 98)

bucket5 sum:190, content= (95, 95)

"----Comparison for the 9 example----

****tf from benchmark was 195(we added the number of machines) and target function from our local search is 195"

***RESULT IS THE SAME

Run time: 0.032 seconds

"Correct (size-numberCorrect):" QMap((10, 10))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 10 from 130-----"

"-----START 11 from 130-----"

```
"input file number 11: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_0.txt"
```

```
****Data from file NU_1_0050_05_0.txt: machinesNum=5 jobsNum=50"
```

```
****SOLUTION Data from file SOL_NU_1_05_0050_0.txt: machinesNum=5 jobsNum=50 lowerBound=945 upperBound=945 isOptimal=1"
Content of machines summed (945, 945, 945, 942, 902)
```

```
input selected: size 50 sum 4679
```

----Our Results-----

best from Our local search found:

target function = 950, num of machines=5, square root lms=2092.85379326889

machines content(number of jobs=50):

bucket1 sum:945, content= (93, 95, 91, 96, 95, 96, 94, 95, 96, 94)

bucket2 sum:944, content= (98, 91, 98, 92, 91, 95, 92, 92, 97, 98)

bucket3 sum:944, content= (97, 96, 92, 91, 91, 95, 96, 92, 96, 98)

bucket4 sum:944, content= (95, 96, 97, 96, 96, 96, 93, 93, 92, 90)

bucket5 sum:902, content= (99, 11, 100, 99, 99, 100, 98, 98, 99, 99)

"----Comparison for the 10 example----

***tf from benchmark was 950(we added the number of machines) and target function from our local search is 950"

***RESULT IS THE SAME

Run time: 1.452 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 1))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 11 from 130-----"

"-----START 12 from 130-----"

"input file number 12: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_1.txt"

***Data from file NU_1_0050_05_1.txt: machinesNum=5 jobsNum=50"

***SOLUTION Data from file SOL_NU_1_05_0050_1.txt: machinesNum=5 jobsNum=50 lowerBound=937 upperBound=937 isOptimal=1"

Content of machines summed (937, 937, 937, 934, 912)

input selected: size 50 sum 4657

----Our Results-----

best from Our local search found:

target function = 942, num of machines=5, square root lms=2082.78683498816

machines content(number of jobs=50):

bucket1 sum:936, content= (94, 95, 93, 96, 93, 96, 92, 90, 95, 92)

bucket2 sum:936, content= (91, 93, 91, 93, 97, 93, 97, 91, 97, 93)

bucket3 sum:936, content= (98, 90, 90, 98, 92, 91, 94, 91, 94, 98)

bucket4 sum:937, content= (96, 97, 95, 95, 93, 93, 92, 90, 90, 96)
bucket5 sum:912, content= (100, 17, 100, 99, 100, 100, 99, 99, 99, 99)
"----Comparison for the 11 example----"
"***tf from benchmark was 942(we added the number of machines) and target function from our local search is 942"
***RESULT IS THE SAME
Run time: 2.422 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 2))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 12 from 130-----"
"-----START 13 from 130-----"
"input file number 13: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_2.txt"
"***Data from file NU_1_0050_05_2.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_05_0050_2.txt: machinesNum=5 jobsNum=50 lowerBound=938 upperBound=938 isOptimal=1"
Content of machines summed (938, 938, 938, 938, 905)
input selected: size 50 sum 4657

----Our Results-----

best from Our local search found:

target function = 943, num of machines=5, square root lms=2082.88285796393

machines content(number of jobs=50):

bucket1 sum:938, content= (94, 94, 94, 90, 95, 95, 97, 92, 93, 94)

bucket2 sum:938, content= (90, 90, 90, 98, 91, 90, 99, 98, 97, 95)

bucket3 sum:938, content= (99, 94, 90, 90, 94, 91, 96, 96, 91, 97)

bucket4 sum:938, content= (93, 97, 95, 97, 96, 94, 92, 92, 91, 91)

bucket5 sum:905, content= (100, 7, 100, 100, 100, 100, 100, 99, 100, 99)

"----Comparison for the 12 example----"

"***tf from benchmark was 943(we added the number of machines) and target function from our local search is 943"

***RESULT IS THE SAME

Run time: 1.395 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 3))

```

"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 13 from 130-----"
"-----START 14 from 130-----"
"input file number 14: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_3.txt"
"***Data from file NU_1_0050_05_3.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_05_0050_3.txt: machinesNum=5 jobsNum=50 lowerBound=936 upperBound=936 isOptimal=1"
Content of machines summed (892, 936, 936, 936, 936)
input selected: size 50 sum 4636

----Our Results-----
best from Our local search found:
target function = 941, num of machines=5, square root lms=2073.63497269891
machines content(number of jobs=50):
bucket1 sum:936, content= (90, 96, 96, 93, 93, 93, 92, 95, 96, 92)
bucket2 sum:936, content= (91, 90, 91, 93, 97, 96, 96, 93, 97, 92)
bucket3 sum:893, content= (99, 99, 99, 3, 100, 99, 99, 98, 98, 99)
bucket4 sum:936, content= (98, 98, 95, 90, 90, 91, 91, 95, 91, 97)
bucket5 sum:935, content= (96, 93, 96, 96, 96, 95, 91, 92, 90, 90)
"----Comparison for the 13 example----"
"***tf from benchmark was 941(we added the number of machines) and target function from our local search is 941"
***RESULT IS THE SAME
Run time: 1.517 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 4))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 14 from 130-----"
"-----START 15 from 130-----"
"input file number 15: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_4.txt"
"***Data from file NU_1_0050_05_4.txt: machinesNum=5 jobsNum=50"

```

****SOLUTION Data from file SOL_NU_1_05_0050_4.txt: machinesNum=5 jobsNum=50 lowerBound=933 upperBound=933 isOptimal=1 "
Content of machines summed (933, 933, 933, 932, 898)
input selected: size 50 sum 4629

----Our Results-----

best from Our local search found:

target function = 938, num of machines=5, square root lms=2070.38522985458

machines content(number of jobs=50):

bucket1 sum:933, content= (93, 93, 94, 92, 91, 95, 95, 95, 94, 91)

bucket2 sum:932, content= (91, 92, 93, 93, 90, 97, 96, 92, 91, 97)

bucket3 sum:933, content= (98, 98, 92, 93, 94, 90, 91, 94, 93, 90)

bucket4 sum:933, content= (97, 93, 93, 92, 90, 90, 95, 91, 98, 94)

bucket5 sum:898, content= (100, 4, 100, 99, 99, 100, 100, 99, 99, 98)

"----Comparison for the 14 example----

****tf from benchmark was 938(we added the number of machines) and target function from our local search is 938"

***RESULT IS THE SAME

Run time: 2.062 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 5))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 15 from 130-----"

"-----START 16 from 130-----"

"input file number 16: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_5.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_5.txt"

****Data from file NU_1_0050_05_5.txt: machinesNum=5 jobsNum=50"

****SOLUTION Data from file SOL_NU_1_05_0050_5.txt: machinesNum=5 jobsNum=50 lowerBound=941 upperBound=941 isOptimal=1 "

Content of machines summed (941, 941, 941, 939, 901)

input selected: size 50 sum 4663

----Our Results-----

best from Our local search found:

target function = 946, num of machines=5, square root lms=2085.65649137148


```

machines content(number of jobs=50):
bucket1 sum:940, content= (95, 93, 93, 90, 92, 92, 97, 98, 98, 92)
bucket2 sum:940, content= (93, 91, 90, 97, 94, 91, 97, 99, 97, 91)
bucket3 sum:901, content= (100, 100, 100, 5, 100, 99, 99, 99, 100, 99)
bucket4 sum:941, content= (99, 98, 97, 95, 93, 92, 90, 92, 92, 93)
bucket5 sum:941, content= (96, 98, 98, 96, 95, 95, 90, 92, 91, 90)
"----Comparison for the 15 example----"
"***tf from benchmark was 946(we added the number of machines) and target function from our local search is 946"
***RESULT IS THE SAME
Run time: 1.547 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 6))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 16 from 130-----"
"-----START 17 from 130-----"
"input file number 17: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_6.txt"
"***Data from file NU_1_0050_05_6.txt: machinesNum=5 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_05_0050_6.txt: machinesNum=5 jobsNum=50 lowerBound=943 upperBound=943 isOptimal=1"
Content of machines summed (943, 943, 943, 943, 906)
input selected: size 50 sum 4678

----Our Results-----
best from Our local search found:
target function = 948, num of machines=5, square root lms=2092.32693430066
machines content(number of jobs=50):
bucket1 sum:906, content= (100, 13, 100, 99, 99, 100, 99, 99, 99, 98)
bucket2 sum:943, content= (98, 90, 98, 96, 93, 92, 92, 94, 94, 96)
bucket3 sum:943, content= (91, 98, 94, 94, 92, 91, 90, 98, 97, 98)
bucket4 sum:943, content= (92, 98, 98, 95, 95, 93, 93, 91, 90, 98)
bucket5 sum:943, content= (95, 96, 97, 97, 94, 93, 93, 90, 90, 98)
"----Comparison for the 16 example----"

```

****tf from benchmark was 948(we added the number of machines) and target function from our local search is 948"

***RESULT IS THE SAME

Run time: 1.14 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 7))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 17 from 130-----"

"-----START 18 from 130-----"

"input file number 18: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0050_7.txt"

****Data from file NU_1_0050_05_7.txt: machinesNum=5 jobsNum=50"

****SOLUTION Data from file SOL_NU_1_05_0050_7.txt: machinesNum=5 jobsNum=50 lowerBound=940 upperBound=940 isOptimal=1"

Content of machines summed (940, 940, 940, 940, 899)

input selected: size 50 sum 4659

----Our Results-----

best from Our local search found:

target function = 945, num of machines=5, square root lms=2083.85292187333

machines content(number of jobs=50):

bucket1 sum:939, content= (90, 96, 92, 94, 93, 97, 93, 97, 92, 95)

bucket2 sum:901, content= (100, 100, 100, 2, 100, 100, 100, 99, 100)

bucket3 sum:939, content= (97, 95, 91, 92, 91, 94, 94, 91, 98, 96)

bucket4 sum:940, content= (98, 99, 99, 96, 93, 92, 91, 90, 90, 92)

bucket5 sum:940, content= (98, 99, 95, 94, 94, 93, 92, 92, 90, 93)

"----Comparison for the 17 example----

****tf from benchmark was 945(we added the number of machines) and target function from our local search is 945"

***RESULT IS THE SAME

Run time: 1.109 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 8))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 18 from 130-----"

```

"-----START 19 from 130-----"


```

----Our Results-----

best from Our local search found:

target function = 941, num of machines=5, square root lms=2083.21386324112

machines content(number of jobs=50):

bucket1 sum:936, content= (90, 95, 94, 95, 96, 93, 91, 96, 92, 94)

bucket2 sum:936, content= (93, 91, 93, 90, 91, 90, 97, 95, 98, 98)

bucket3 sum:936, content= (91, 96, 94, 91, 91, 91, 93, 94, 97, 98)

bucket4 sum:914, content= (100, 100, 100, 19, 100, 99, 98, 100, 99, 99)

bucket5 sum:936, content= (95, 95, 98, 96, 94, 94, 93, 90, 90, 91)

"----Comparison for the 19 example----"

****tf from benchmark was 941(we added the number of machines) and target function from our local search is 941"

***RESULT IS THE SAME

Run time: 1.64 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 10))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 20 from 130-----"

"-----START 21 from 130-----"

"input file number 21: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_0.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_0.txt"

****Data from file NU_1_0050_10_0.txt: machinesNum=10 jobsNum=50"

****SOLUTION Data from file SOL_NU_1_10_0050_0.txt: machinesNum=10 jobsNum=50 lowerBound=474 upperBound=474 isOptimal=1 "

Content of machines summed (474, 474, 474, 474, 474, 474, 474, 474, 474, 397)

input selected: size 50 sum 4663

----Our Results-----

best from Our local search found:

target function = 484, num of machines=10, square root lms=1476.32686082724

machines content(number of jobs=50):

bucket1 sum:474, content= (95, 92, 98, 93, 96)

bucket2 sum:474, content= (90, 95, 98, 94, 97)

```

bucket3 sum:474, content= (97, 93, 95, 98, 91)
bucket4 sum:473, content= (96, 93, 90, 96, 98)
bucket5 sum:474, content= (99, 97, 97, 91, 90)
bucket6 sum:474, content= (99, 97, 96, 92, 90)
bucket7 sum:474, content= (99, 96, 96, 92, 91)
bucket8 sum:474, content= (97, 95, 95, 90, 97)
bucket9 sum:398, content= (1, 100, 99, 99, 99)
bucket10 sum:474, content= (98, 97, 97, 92, 90)
"----Comparison for the 20 example----"
"***tf from benchmark was 484(we added the number of machines) and target function from our local search is 484"
***RESULT IS THE SAME
Run time: 8.498 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 11))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 21 from 130-----"
"-----START 22 from 130-----"
"input file number 22: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_1.txt"
"***Data from file NU_1_0050_10_1.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_1.txt: machinesNum=10 jobsNum=50 lowerBound=472 upperBound=472 isOptimal=1"
Content of machines summed (472, 472, 472, 472, 472, 472, 472, 472, 470, 413)
input selected: size 50 sum 4659

----Our Results-----
best from Our local search found:
target function = 482, num of machines=10, square root lms=1474.36053935257
machines content(number of jobs=50):
bucket1 sum:472, content= (94, 94, 95, 92, 97)
bucket2 sum:472, content= (97, 92, 98, 94, 91)
bucket3 sum:471, content= (97, 92, 91, 93, 98)
bucket4 sum:471, content= (92, 91, 93, 96, 99)

```

```

bucket5 sum:472, content= (99, 94, 92, 97, 90)
bucket6 sum:472, content= (96, 96, 91, 91, 98)
bucket7 sum:472, content= (99, 95, 96, 91, 91)
bucket8 sum:472, content= (99, 96, 93, 90, 94)
bucket9 sum:472, content= (99, 96, 93, 90, 94)
bucket10 sum:413, content= (13, 100, 100, 100, 100)
"----Comparison for the 21 example----"
"***tf from benchmark was 482(we added the number of machines) and target function from our local search is 482"
***RESULT IS THE SAME
Run time: 12.434 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 12))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 22 from 130-----"
"-----START 23 from 130-----"
"input file number 23: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_2.txt"
"***Data from file NU_1_0050_10_2.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_2.txt: machinesNum=10 jobsNum=50 lowerBound=475 upperBound=475 isOptimal=1"
Content of machines summed (475, 475, 475, 475, 475, 475, 475, 475, 471, 410)
input selected: size 50 sum 4681

```

----Our Results-----

best from Our local search found:

target function = 485, num of machines=10, square root lms=1481.52927746974

machines content(number of jobs=50):

```

bucket1 sum:474, content= (98, 95, 96, 95, 90)
bucket2 sum:474, content= (93, 94, 98, 91, 98)
bucket3 sum:474, content= (98, 95, 94, 90, 97)
bucket4 sum:410, content= (100, 10, 100, 100, 100)
bucket5 sum:475, content= (100, 98, 93, 90, 94)
bucket6 sum:474, content= (100, 97, 92, 90, 95)

```

```
bucket7 sum:475, content= (99, 99, 95, 92, 90)
bucket8 sum:475, content= (99, 97, 97, 92, 90)
bucket9 sum:475, content= (99, 97, 97, 91, 91)
bucket10 sum:475, content= (99, 96, 96, 94, 90)
"----Comparison for the 22 example----"
"***tf from benchmark was 485(we added the number of machines) and target function from our local search is 485"
***RESULT IS THE SAME
Run time: 7.858 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 13))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 23 from 130-----"
"-----START 24 from 130-----"
"input file number 24: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_3.txt"
"***Data from file NU_1_0050_10_3.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_3.txt: machinesNum=10 jobsNum=50 lowerBound=475 upperBound=475 isOptimal=1"
Content of machines summed (475, 475, 475, 475, 475, 475, 475, 471, 472, 412)
input selected: size 50 sum 4680

----Our Results-----
best from Our local search found:
target function = 485, num of machines=10, square root lms=1481.12322242277
machines content(number of jobs=50):
bucket1 sum:475, content= (92, 95, 95, 95, 98)
bucket2 sum:474, content= (93, 90, 98, 94, 99)
bucket3 sum:474, content= (93, 90, 93, 99, 99)
bucket4 sum:474, content= (100, 98, 93, 90, 93)
bucket5 sum:474, content= (100, 95, 90, 95, 94)
bucket6 sum:474, content= (98, 98, 94, 94, 90)
bucket7 sum:412, content= (100, 12, 100, 100, 100)
bucket8 sum:474, content= (97, 97, 91, 91, 98)
```

bucket9 sum:475, content= (99, 97, 96, 92, 91)
bucket10 sum:474, content= (99, 97, 96, 91, 91)
"----Comparison for the 23 example----"
"***tf from benchmark was 485(we added the number of machines) and target function from our local search is 485"
***RESULT IS THE SAME
Run time: 8.404 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 14))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 24 from 130-----"
"-----START 25 from 130-----"
"input file number 25: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_4.txt"
"***Data from file NU_1_0050_10_4.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_4.txt: machinesNum=10 jobsNum=50 lowerBound=471 upperBound=471 isOptimal=1"
Content of machines summed (471, 471, 471, 471, 471, 471, 469, 471, 419)
input selected: size 50 sum 4656

----Our Results-----

best from Our local search found:

target function = 481, num of machines=10, square root lms=1473.17616054564

machines content(number of jobs=50):

bucket1 sum:470, content= (95, 95, 90, 97, 93)

bucket2 sum:471, content= (95, 90, 95, 97, 94)

bucket3 sum:471, content= (95, 93, 97, 92, 94)

bucket4 sum:470, content= (95, 90, 93, 98, 94)

bucket5 sum:471, content= (100, 93, 95, 93, 90)

bucket6 sum:471, content= (100, 95, 95, 91, 90)

bucket7 sum:471, content= (99, 94, 92, 91, 95)

bucket8 sum:471, content= (99, 94, 92, 90, 96)

bucket9 sum:419, content= (19, 100, 100, 100, 100)

bucket10 sum:471, content= (98, 97, 94, 91, 91)


```

"----Comparison for the 24 example----"
"***tf from benchmark was 481(we added the number of machines) and target function from our local search is 481"
***RESULT IS THE SAME
Run time: 11.248 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 15))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 25 from 130-----"
"-----START 26 from 130-----"
"input file number 26: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_5.txt"
"***Data from file NU_1_0050_10_5.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_5.txt: machinesNum=10 jobsNum=50 lowerBound=471 upperBound=471 isOptimal=1"
Content of machines summed (471, 471, 471, 471, 471, 471, 471, 471, 471, 398)
input selected: size 50 sum 4637

```

----Our Results-----

```

best from Our local search found:
target function = 481, num of machines=10, square root lms=1467.65356947748
machines content(number of jobs=50):
bucket1 sum:470, content= (96, 93, 94, 95, 92)
bucket2 sum:470, content= (93, 92, 93, 96, 96)
bucket3 sum:470, content= (91, 94, 97, 96, 92)
bucket4 sum:470, content= (90, 91, 95, 99, 95)
bucket5 sum:470, content= (99, 99, 91, 90, 91)
bucket6 sum:470, content= (99, 94, 93, 90, 94)
bucket7 sum:405, content= (5, 100, 100, 100, 100)
bucket8 sum:471, content= (99, 95, 95, 91, 91)
bucket9 sum:471, content= (99, 94, 93, 91, 94)
bucket10 sum:470, content= (99, 95, 94, 91, 91)

```

"----Comparison for the 25 example----"

"***tf from benchmark was 481(we added the number of machines) and target function from our local search is 481"

***RESULT IS THE SAME

Run time: 11.232 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 16))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 26 from 130-----"

"-----START 27 from 130-----"

"input file number 27: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_6.txt"

***Data from file NU_1_0050_10_6.txt: machinesNum=10 jobsNum=50"

***SOLUTION Data from file SOL_NU_1_10_0050_6.txt: machinesNum=10 jobsNum=50 lowerBound=476 upperBound=476 isOptimal=1"

Content of machines summed (476, 476, 476, 476, 476, 476, 476, 476, 474, 414)

input selected: size 50 sum 4696

----Our Results-----

best from Our local search found:

target function = 486, num of machines=10, square root lms=1486.16217150081

machines content(number of jobs=50):

bucket1 sum:476, content= (100, 98, 92, 93, 93)

bucket2 sum:476, content= (96, 96, 93, 97, 94)

bucket3 sum:476, content= (99, 97, 90, 99, 91)

bucket4 sum:475, content= (98, 97, 90, 99, 91)

bucket5 sum:475, content= (100, 98, 91, 90, 96)

bucket6 sum:476, content= (100, 98, 96, 90, 92)

bucket7 sum:414, content= (100, 14, 100, 100, 100)

bucket8 sum:476, content= (100, 98, 95, 91, 92)

bucket9 sum:476, content= (99, 99, 94, 91, 93)

bucket10 sum:476, content= (98, 99, 94, 94, 91)

"----Comparison for the 26 example----

***tf from benchmark was 486(we added the number of machines) and target function from our local search is 486"

***RESULT IS THE SAME

Run time: 7.889 seconds

```
"Correct (size-numberCorrect):" QMap((10, 10)(50, 17))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 27 from 130-----"
"-----START 28 from 130-----"
"input file number 28: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_7.txt"
"***Data from file NU_1_0050_10_7.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_7.txt: machinesNum=10 jobsNum=50 lowerBound=472 upperBound=472 isOptimal=1"
Content of machines summed (410, 472, 472, 472, 472, 472, 472, 472, 471)
input selected: size 50 sum 4657
```

----Our Results-----

best from Our local search found:

target function = 482, num of machines=10, square root lms=1473.84293600098

machines content(number of jobs=50):

bucket1 sum:472, content= (99, 92, 92, 97, 92)

bucket2 sum:472, content= (95, 94, 98, 93, 92)

bucket3 sum:472, content= (96, 92, 90, 97, 97)

bucket4 sum:472, content= (95, 90, 95, 93, 99)

bucket5 sum:471, content= (99, 97, 95, 90, 90)

bucket6 sum:472, content= (99, 95, 91, 91, 96)

bucket7 sum:472, content= (97, 95, 92, 90, 98)

bucket8 sum:472, content= (93, 97, 95, 97, 90)

bucket9 sum:410, content= (11, 100, 100, 100, 99)

bucket10 sum:472, content= (98, 98, 93, 91, 92)

"----Comparison for the 27 example----

***tf from benchmark was 482(we added the number of machines) and target function from our local search is 482"

***RESULT IS THE SAME

Run time: 11.292 seconds

```
"Correct (size-numberCorrect):" QMap((10, 10)(50, 18))
```

```
"Mistakes(size-numberMistakes):" QMap()
```

```

"Avegare error: 0"
"-----END 28 from 130-----"
"-----START 29 from 130-----"
"input file number 29: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0050_8.txt"
"***Data from file NU_1_0050_10_8.txt: machinesNum=10 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_10_0050_8.txt: machinesNum=10 jobsNum=50 lowerBound=471 upperBound=471 isOptimal=1"
Content of machines summed (471, 471, 471, 471, 410, 471, 471, 471, 471, 471)
input selected: size 50 sum 4649

----Our Results-----
best from Our local search found:
target function = 481, num of machines=10, square root lms=1471.28141427804
machines content(number of jobs=50):
bucket1 sum:471, content= (97, 93, 91, 97, 93)
bucket2 sum:471, content= (94, 92, 92, 98, 95)
bucket3 sum:410, content= (100, 11, 100, 100, 99)
bucket4 sum:471, content= (99, 98, 90, 90, 94)
bucket5 sum:471, content= (99, 95, 92, 93, 92)
bucket6 sum:471, content= (99, 96, 91, 91, 94)
bucket7 sum:471, content= (99, 96, 94, 91, 91)
bucket8 sum:471, content= (99, 96, 93, 91, 92)
bucket9 sum:471, content= (97, 95, 95, 93, 91)
bucket10 sum:471, content= (98, 94, 91, 91, 97)
"----Comparison for the 28 example----"
"***tf from benchmark was 481(we added the number of machines) and target function from our local search is 481"
***RESULT IS THE SAME
Run time: 8.81 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 19))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 29 from 130-----"

```

```

"-----START 30 from 130-----"


```

"input file number 31: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_0.txt"
"***Data from file NU_1_0050_25_0.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_0.txt: machinesNum=25 jobsNum=50 lowerBound=191 upperBound=191 isOptimal=1"
Content of machines summed (191, 191, 190, 104, 191, 191, 191, 190, 190, 191, 191, 191, 190, 190, 191, 190, 190, 190, 190, 190,
190, 190, 190)
input selected: size 50 sum 4674

----Our Results-----

best from Our local search found:

target function = 216, num of machines=25, square root lms=938.629852497778

machines content(number of jobs=50):

bucket1 sum:190, content= (91, 99)

bucket2 sum:190, content= (91, 99)

bucket3 sum:191, content= (100, 91)

bucket4 sum:191, content= (100, 91)

bucket5 sum:191, content= (99, 92)

bucket6 sum:191, content= (99, 92)

bucket7 sum:191, content= (99, 92)

bucket8 sum:190, content= (90, 100)

bucket9 sum:104, content= (4, 100)

bucket10 sum:191, content= (98, 93)

bucket11 sum:191, content= (98, 93)

bucket12 sum:191, content= (98, 93)

bucket13 sum:190, content= (94, 96)

bucket14 sum:190, content= (94, 96)

bucket15 sum:191, content= (97, 94)

bucket16 sum:191, content= (96, 95)

bucket17 sum:190, content= (96, 94)

bucket18 sum:190, content= (96, 94)

bucket19 sum:190, content= (96, 94)

bucket20 sum:190, content= (96, 94)

```
bucket21 sum:190, content= (96, 94)
bucket22 sum:190, content= (96, 94)
bucket23 sum:190, content= (93, 97)
bucket24 sum:190, content= (93, 97)
bucket25 sum:190, content= (95, 95)
"----Comparison for the 30 example----"
"***tf from benchmark was 216(we added the number of machines) and target function from our local search is 216"
***RESULT IS THE SAME
Run time: 165.279 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 21))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 31 from 130-----"
"-----START 32 from 130-----"
"input file number 32: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_1.txt"
"***Data from file NU_1_0050_25_1.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_1.txt: machinesNum=25 jobsNum=50 lowerBound=191 upperBound=191 isOptimal=1"
Content of machines summed (190, 190, 117, 190, 190, 190, 189, 190, 190, 189, 189, 190, 190, 190, 190, 191, 191, 191, 190, 190, 190, 190,
189, 189, 189)
input selected: size 50 sum 4674

----Our Results-----
best from Our local search found:
target function = 216, num of machines=25, square root lms=937.52759959374
machines content(number of jobs=50):
bucket1 sum:117, content= (100, 17)
bucket2 sum:190, content= (90, 100)
bucket3 sum:189, content= (91, 98)
bucket4 sum:189, content= (91, 98)
bucket5 sum:190, content= (99, 91)
bucket6 sum:190, content= (99, 91)
```

```
bucket7 sum:190, content= (99, 91)
bucket8 sum:190, content= (96, 94)
bucket9 sum:190, content= (98, 92)
bucket10 sum:190, content= (92, 98)
bucket11 sum:190, content= (93, 97)
bucket12 sum:190, content= (94, 96)
bucket13 sum:190, content= (97, 93)
bucket14 sum:190, content= (94, 96)
bucket15 sum:190, content= (94, 96)
bucket16 sum:191, content= (96, 95)
bucket17 sum:191, content= (96, 95)
bucket18 sum:191, content= (96, 95)
bucket19 sum:190, content= (93, 97)
bucket20 sum:190, content= (93, 97)
bucket21 sum:189, content= (96, 93)
bucket22 sum:190, content= (90, 100)
bucket23 sum:189, content= (96, 93)
bucket24 sum:189, content= (90, 99)
bucket25 sum:189, content= (96, 93)
"----Comparison for the 31 example----"
"***tf from benchmark was 216(we added the number of machines) and target function from our local search is 216"
***RESULT IS THE SAME
Run time: 161.14 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 22))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 32 from 130-----"
"-----START 33 from 130-----"
"input file number 33: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_2.txt"
"***Data from file NU_1_0050_25_2.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_2.txt: machinesNum=25 jobsNum=50 lowerBound=192 upperBound=192 isOptimal=1"
```


Content of machines summed (192, 191, 191, 191, 190, 190, 105, 191, 191, 191, 190, 190, 190, 190, 191, 191, 191, 190, 190, 190, 190, 190, 190, 189, 189)

input selected: size 50 sum 4674

----Our Results-----

best from Our local search found:

target function = 217, num of machines=25, square root lms=938.541421568595

machines content(number of jobs=50):

bucket1 sum:192, content= (100, 92)

bucket2 sum:191, content= (100, 91)

bucket3 sum:191, content= (100, 91)

bucket4 sum:191, content= (100, 91)

bucket5 sum:190, content= (100, 90)

bucket6 sum:190, content= (100, 90)

bucket7 sum:105, content= (100, 5)

bucket8 sum:191, content= (99, 92)

bucket9 sum:191, content= (99, 92)

bucket10 sum:190, content= (93, 97)

bucket11 sum:190, content= (93, 97)

bucket12 sum:190, content= (93, 97)

bucket13 sum:191, content= (98, 93)

bucket14 sum:190, content= (98, 92)

bucket15 sum:191, content= (97, 94)

bucket16 sum:191, content= (97, 94)

bucket17 sum:191, content= (97, 94)

bucket18 sum:190, content= (92, 98)

bucket19 sum:190, content= (92, 98)

bucket20 sum:190, content= (92, 98)

bucket21 sum:190, content= (96, 94)

bucket22 sum:190, content= (96, 94)

bucket23 sum:190, content= (95, 95)

bucket24 sum:189, content= (95, 94)

```
bucket25 sum:189, content= (95, 94)
"----Comparison for the 32 example----"
"***tf from benchmark was 217(we added the number of machines) and target function from our local search is 217"
***RESULT IS THE SAME
Run time: 239.162 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 23))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 33 from 130-----"
"-----START 34 from 130-----"
"input file number 34: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_3.txt"
"***Data from file NU_1_0050_25_3.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_3.txt: machinesNum=25 jobsNum=50 lowerBound=190 upperBound=190 isOptimal=1"
Content of machines summed (190, 190, 190, 190, 190, 190, 190, 108, 189, 189, 188, 188, 188, 190, 189, 188, 188, 188, 189, 188, 188,
188, 187, 187)
input selected: size 50 sum 4639

----Our Results-----
best from Our local search found:
target function = 215, num of machines=25, square root lms=931.183655354839
machines content(number of jobs=50):
bucket1 sum:188, content= (98, 90)
bucket2 sum:190, content= (100, 90)
bucket3 sum:190, content= (100, 90)
bucket4 sum:190, content= (100, 90)
bucket5 sum:190, content= (100, 90)
bucket6 sum:190, content= (100, 90)
bucket7 sum:190, content= (100, 90)
bucket8 sum:190, content= (100, 90)
bucket9 sum:189, content= (99, 90)
bucket10 sum:189, content= (92, 97)
```

```
bucket11 sum:188, content= (91, 97)
bucket12 sum:188, content= (91, 97)
bucket13 sum:189, content= (98, 91)
bucket14 sum:190, content= (97, 93)
bucket15 sum:188, content= (97, 91)
bucket16 sum:188, content= (90, 98)
bucket17 sum:188, content= (90, 98)
bucket18 sum:108, content= (8, 100)
bucket19 sum:189, content= (96, 93)
bucket20 sum:189, content= (96, 93)
bucket21 sum:188, content= (95, 93)
bucket22 sum:188, content= (95, 93)
bucket23 sum:188, content= (94, 94)
bucket24 sum:187, content= (94, 93)
bucket25 sum:187, content= (94, 93)
"----Comparison for the 33 example----"
"***tf from benchmark was 215(we added the number of machines) and target function from our local search is 215"
***RESULT IS THE SAME
Run time: 216.795 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 24))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 34 from 130-----"
"-----START 35 from 130-----"
"input file number 35: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_4.txt"
"***Data from file NU_1_0050_25_4.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_4.txt: machinesNum=25 jobsNum=50 lowerBound=191 upperBound=191 isOptimal=1"
Content of machines summed (190, 190, 101, 189, 189, 189, 189, 189, 189, 191, 191, 190, 190, 189, 189, 189, 189, 191, 191, 191, 191,
190, 190, 190)
input selected: size 50 sum 4656
```

----Our Results-----

best from Our local search found:

target function = 216, num of machines=25, square root lms=935.263599206128

machines content(number of jobs=50):

bucket1 sum:101, content= (100, 1)

bucket2 sum:190, content= (90, 100)

bucket3 sum:190, content= (96, 94)

bucket4 sum:189, content= (90, 99)

bucket5 sum:189, content= (97, 92)

bucket6 sum:189, content= (91, 98)

bucket7 sum:189, content= (97, 92)

bucket8 sum:189, content= (98, 91)

bucket9 sum:189, content= (92, 97)

bucket10 sum:189, content= (98, 91)

bucket11 sum:190, content= (97, 93)

bucket12 sum:190, content= (94, 96)

bucket13 sum:190, content= (94, 96)

bucket14 sum:191, content= (97, 94)

bucket15 sum:191, content= (97, 94)

bucket16 sum:190, content= (90, 100)

bucket17 sum:189, content= (97, 92)

bucket18 sum:189, content= (90, 99)

bucket19 sum:191, content= (96, 95)

bucket20 sum:191, content= (96, 95)

bucket21 sum:191, content= (96, 95)

bucket22 sum:191, content= (96, 95)

bucket23 sum:189, content= (90, 99)

bucket24 sum:190, content= (93, 97)

bucket25 sum:189, content= (91, 98)

"----Comparison for the 34 example----

***tf from benchmark was 216(we added the number of machines) and target function from our local search is 216"

***RESULT IS THE SAME

Run time: 315.468 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 25))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 35 from 130-----"

"-----START 36 from 130-----"

"input file number 36: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_5.txt"

****Data from file NU_1_0050_25_5.txt: machinesNum=25 jobsNum=50"

****SOLUTION Data from file SOL_NU_1_25_0050_5.txt: machinesNum=25 jobsNum=50 lowerBound=194 upperBound=194 isOptimal=1"

Content of machines summed (191, 191, 190, 190, 190, 103, 191, 191, 191, 190, 190, 192, 191, 191, 191, 191, 190, 194, 193, 192, 192,
192, 192, 192)

input selected: size 50 sum 4692

----Our Results-----

best from Our local search found:

target function = 219, num of machines=25, square root lms=942.384210394041

machines content(number of jobs=50):

bucket1 sum:193, content= (97, 96)

bucket2 sum:192, content= (95, 97)

bucket3 sum:190, content= (100, 90)

bucket4 sum:191, content= (100, 91)

bucket5 sum:192, content= (97, 95)

bucket6 sum:192, content= (97, 95)

bucket7 sum:191, content= (99, 92)

bucket8 sum:192, content= (95, 97)

bucket9 sum:191, content= (99, 92)

bucket10 sum:192, content= (95, 97)

bucket11 sum:191, content= (98, 93)

bucket12 sum:191, content= (98, 93)

bucket13 sum:103, content= (3, 100)

bucket14 sum:191, content= (100, 91)

```
bucket15 sum:192, content= (98, 94)
bucket16 sum:191, content= (98, 93)
bucket17 sum:191, content= (98, 93)
bucket18 sum:191, content= (98, 93)
bucket19 sum:194, content= (97, 97)
bucket20 sum:191, content= (99, 92)
bucket21 sum:190, content= (91, 99)
bucket22 sum:190, content= (90, 100)
bucket23 sum:190, content= (91, 99)
bucket24 sum:190, content= (90, 100)
bucket25 sum:190, content= (92, 98)
"----Comparison for the 35 example----"
"***tf from benchmark was 219(we added the number of machines) and target function from our local search is 219"
***RESULT IS THE SAME
Run time: 367.592 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 26))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 36 from 130-----"
"-----START 37 from 130-----"
"input file number 37: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_6.txt"
"***Data from file NU_1_0050_25_6.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_6.txt: machinesNum=25 jobsNum=50 lowerBound=190 upperBound=190 isOptimal=1"
Content of machines summed (190, 109, 189, 189, 189, 189, 189, 189, 188, 188, 189, 189, 189, 189, 189, 188, 188, 188, 188, 188, 187,
187, 187, 187)
input selected: size 50 sum 4630

----Our Results-----
best from Our local search found:
target function = 215, num of machines=25, square root lms=929.268529543533
machines content(number of jobs=50):
```

```
bucket1 sum:190, content= (100, 90)
bucket2 sum:109, content= (100, 9)
bucket3 sum:189, content= (99, 90)
bucket4 sum:189, content= (99, 90)
bucket5 sum:189, content= (99, 90)
bucket6 sum:189, content= (99, 90)
bucket7 sum:188, content= (91, 97)
bucket8 sum:188, content= (91, 97)
bucket9 sum:189, content= (98, 91)
bucket10 sum:189, content= (98, 91)
bucket11 sum:189, content= (97, 92)
bucket12 sum:189, content= (97, 92)
bucket13 sum:189, content= (97, 92)
bucket14 sum:189, content= (97, 92)
bucket15 sum:189, content= (97, 92)
bucket16 sum:188, content= (90, 98)
bucket17 sum:188, content= (90, 98)
bucket18 sum:188, content= (95, 93)
bucket19 sum:188, content= (95, 93)
bucket20 sum:188, content= (95, 93)
bucket21 sum:188, content= (94, 94)
bucket22 sum:187, content= (94, 93)
bucket23 sum:187, content= (94, 93)
bucket24 sum:187, content= (94, 93)
bucket25 sum:187, content= (94, 93)
"----Comparison for the 36 example----"
"***tf from benchmark was 215(we added the number of machines) and target function from our local search is 215"
***RESULT IS THE SAME
Run time: 182.935 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 27))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
```

"-----END 37 from 130-----"

"-----START 38 from 130-----"

"input file number 38: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_7.txt"

****Data from file NU_1_0050_25_7.txt: machinesNum=25 jobsNum=50"

****SOLUTION Data from file SOL_NU_1_25_0050_7.txt: machinesNum=25 jobsNum=50 lowerBound=190 upperBound=190 isOptimal=1"

Content of machines summed (190, 190, 113, 189, 189, 189, 189, 188, 188, 189, 189, 188, 188, 189, 189, 189, 189, 189, 189, 188, 189,
189, 189, 188)

input selected: size 50 sum 4645

----Our Results-----

best from Our local search found:

target function = 215, num of machines=25, square root lms=931.970493095141

machines content(number of jobs=50):

bucket1 sum:190, content= (100, 90)

bucket2 sum:190, content= (100, 90)

bucket3 sum:113, content= (100, 13)

bucket4 sum:189, content= (99, 90)

bucket5 sum:189, content= (99, 90)

bucket6 sum:188, content= (90, 98)

bucket7 sum:188, content= (91, 97)

bucket8 sum:189, content= (98, 91)

bucket9 sum:189, content= (98, 91)

bucket10 sum:188, content= (92, 96)

bucket11 sum:189, content= (97, 92)

bucket12 sum:189, content= (97, 92)

bucket13 sum:188, content= (90, 98)

bucket14 sum:189, content= (96, 93)

bucket15 sum:189, content= (96, 93)

bucket16 sum:189, content= (96, 93)

bucket17 sum:189, content= (96, 93)

bucket18 sum:189, content= (96, 93)


```
bucket19 sum:189, content= (96, 93)
bucket20 sum:189, content= (96, 93)
bucket21 sum:188, content= (91, 97)
bucket22 sum:189, content= (95, 94)
bucket23 sum:189, content= (95, 94)
bucket24 sum:189, content= (95, 94)
bucket25 sum:188, content= (94, 94)
"----Comparison for the 37 example----"
"***tf from benchmark was 215(we added the number of machines) and target function from our local search is 215"
***RESULT IS THE SAME
Run time: 270.57 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 28))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 38 from 130-----"
"-----START 39 from 130-----"
"input file number 39: inputName=C:/algo/h/docs/benchMark/all/NU_1_0050_25_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0050_8.txt"
"***Data from file NU_1_0050_25_8.txt: machinesNum=25 jobsNum=50"
"***SOLUTION Data from file SOL_NU_1_25_0050_8.txt: machinesNum=25 jobsNum=50 lowerBound=191 upperBound=191 isOptimal=1"
Content of machines summed (190, 190, 118, 191, 191, 191, 190, 190, 189, 189, 191, 191, 190, 191, 191, 191, 191, 190, 190, 191, 191, 190,
190, 190, 190)
input selected: size 50 sum 4687

----Our Results-----
best from Our local search found:
target function = 216, num of machines=25, square root lms=940.083506929039
machines content(number of jobs=50):
bucket1 sum:118, content= (18, 100)
bucket2 sum:190, content= (91, 99)
bucket3 sum:190, content= (100, 90)
bucket4 sum:190, content= (93, 97)
```

```
bucket5 sum:191, content= (99, 92)
bucket6 sum:191, content= (99, 92)
bucket7 sum:191, content= (99, 92)
bucket8 sum:190, content= (90, 100)
bucket9 sum:189, content= (99, 90)
bucket10 sum:189, content= (99, 90)
bucket11 sum:190, content= (98, 92)
bucket12 sum:191, content= (98, 93)
bucket13 sum:191, content= (98, 93)
bucket14 sum:190, content= (94, 96)
bucket15 sum:190, content= (94, 96)
bucket16 sum:191, content= (97, 94)
bucket17 sum:191, content= (97, 94)
bucket18 sum:191, content= (97, 94)
bucket19 sum:191, content= (97, 94)
bucket20 sum:191, content= (96, 95)
bucket21 sum:191, content= (96, 95)
bucket22 sum:190, content= (96, 94)
bucket23 sum:190, content= (93, 97)
bucket24 sum:190, content= (91, 99)
bucket25 sum:190, content= (95, 95)
"----Comparison for the 38 example----"
"***tf from benchmark was 216(we added the number of machines) and target function from our local search is 216"
***RESULT IS THE SAME
Run time: 274.102 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 29))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 39 from 130-----"
"-----START 40 from 130-----"

```

***Data from file NU_1_0050_25_9.txt: machinesNum=25 jobsNum=50"

***SOLUTION Data from file SOL_NU_1_25_0050_9.txt: machinesNum=25 jobsNum=50 lowerBound=194 upperBound=194 isOptimal=1"

Content of machines summed (190, 190, 190, 190, 190, 190, 119, 192, 192, 191, 191, 190, 190, 189, 189, 194, 194, 193, 192, 192, 192, 194, 193, 193, 193)

input selected: size 50 sum 4713

----Our Results-----

best from Our local search found:

target function = 219, num of machines=25, square root lms=945.29836559681

machines content(number of jobs=50):

bucket1 sum:119, content= (100, 19)

bucket2 sum:190, content= (90, 100)

bucket3 sum:190, content= (90, 100)

bucket4 sum:190, content= (90, 100)

bucket5 sum:192, content= (93, 99)

bucket6 sum:191, content= (92, 99)

bucket7 sum:191, content= (92, 99)

bucket8 sum:193, content= (97, 96)

bucket9 sum:190, content= (100, 90)

bucket10 sum:190, content= (100, 90)

bucket11 sum:190, content= (90, 100)

bucket12 sum:190, content= (99, 91)

bucket13 sum:190, content= (99, 91)

bucket14 sum:189, content= (99, 90)

bucket15 sum:189, content= (99, 90)

bucket16 sum:192, content= (98, 94)

bucket17 sum:193, content= (96, 97)

bucket18 sum:193, content= (96, 97)

bucket19 sum:194, content= (98, 96)

bucket20 sum:194, content= (98, 96)

bucket21 sum:192, content= (99, 93)

bucket22 sum:194, content= (97, 97)

```

bucket23 sum:193, content= (95, 98)
bucket24 sum:192, content= (94, 98)
bucket25 sum:192, content= (98, 94)
"----Comparison for the 39 example----"
"***tf from benchmark was 219(we added the number of machines) and target function from our local search is 219"
***RESULT IS THE SAME
Run time: 266.88 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 40 from 130-----"
"-----START 41 from 130-----"
"input file number 41: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_0.txt"
"***Data from file NU_1_0100_05_0.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_05_0100_0.txt: machinesNum=5 jobsNum=100 lowerBound=1874 upperBound=1874
isOptimal=1"
Content of machines summed (1874, 1874, 1874, 1874, 1871)
input selected: size 100 sum 9367

```

----Our Results-----

best from Our local search found:

target function = 1879, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1873, content= (98, 98, 98, 99, 98, 98, 98, 98, 99, 98, 98, 98, 100, 98, 98, 100, 100, 99, 100)

bucket2 sum:1874, content= (92, 90, 94, 94, 94, 93, 93, 97, 97, 97, 94, 97, 96, 96, 93, 92, 91, 92, 90, 92)

bucket3 sum:1874, content= (91, 95, 95, 94, 94, 90, 90, 90, 97, 96, 96, 95, 97, 97, 96, 95, 91, 94, 90, 91)

bucket4 sum:1874, content= (90, 90, 96, 96, 95, 97, 96, 96, 95, 95, 94, 94, 93, 91, 91, 91, 90, 90, 97, 97)

bucket5 sum:1872, content= (94, 93, 95, 14, 7, 100, 100, 100, 100, 99, 99, 100, 99, 99, 99, 93, 99, 93, 98, 93, 98)

"----Comparison for the 40 example----"

"***tf from benchmark was 1879(we added the number of machines) and target function from our local search is 1879"

***RESULT IS THE SAME

Run time: 6.116 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 1))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 41 from 130-----"

"-----START 42 from 130-----"

"input file number 42: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_1.txt"

****Data from file NU_1_0100_05_1.txt: machinesNum=5 jobsNum=100"

****SOLUTION Data from file SOL_NU_1_05_0100_1.txt: machinesNum=5 jobsNum=100 lowerBound=1862 upperBound=1862
isOptimal=1"

Content of machines summed (1862, 1862, 1862, 1862, 1860)

input selected: size 100 sum 9308

----Our Results-----

best from Our local search found:

target function = 1867, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1862, content= (92, 91, 91, 91, 92, 92, 91, 91, 93, 93, 98, 96, 95, 93, 93, 93, 92, 93, 98, 94)

bucket2 sum:1861, content= (94, 100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 99, 95, 100, 98, 98, 98, 95, 91)

bucket3 sum:1861, content= (100, 100, 100, 99, 98, 99, 18, 2, 96, 95, 94, 93, 93, 100, 99, 97, 96, 96, 93, 94, 99)

bucket4 sum:1862, content= (97, 98, 98, 98, 98, 96, 96, 95, 90, 90, 90, 90, 90, 91, 90, 90, 90, 91, 91, 93)

bucket5 sum:1862, content= (92, 90, 91, 97, 97, 98, 97, 97, 95, 95, 94, 94, 91, 91, 91, 90, 90, 90, 91, 91)

"----Comparison for the 41 example----"

****tf from benchmark was 1867(we added the number of machines) and target function from our local search is 1867"

***RESULT IS THE SAME

Run time: 4.433 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 2))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 42 from 130-----"

"-----START 43 from 130-----"

"input file number 43: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_2.txt"
"***Data from file NU_1_0100_05_2.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_05_0100_2.txt: machinesNum=5 jobsNum=100 lowerBound=1864 upperBound=1864
isOptimal=1"
Content of machines summed (1864, 1864, 1864, 1863, 1862)
input selected: size 100 sum 9317

----Our Results-----

best from Our local search found:

target function = 1869, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1862, content= (98, 98, 98, 99, 100, 97, 97, 97, 97, 97, 97, 97, 100, 100, 98, 97, 99, 98, 98)

bucket2 sum:1864, content= (97, 15, 97, 93, 91, 10, 94, 96, 95, 100, 99, 99, 98, 98, 97, 99, 98, 98, 97, 97, 96)

bucket3 sum:1863, content= (94, 93, 93, 91, 91, 90, 90, 90, 94, 92, 91, 91, 90, 90, 95, 93, 99, 99, 98, 99)

bucket4 sum:1864, content= (91, 91, 93, 95, 94, 94, 94, 93, 92, 92, 91, 90, 90, 90, 96, 96, 95, 96, 96, 95)

bucket5 sum:1864, content= (91, 93, 93, 94, 95, 96, 96, 95, 96, 95, 94, 94, 94, 93, 92, 91, 91, 91, 90, 90)

"----Comparison for the 42 example----"

"***tf from benchmark was 1869(we added the number of machines) and target function from our local search is 1869"

***RESULT IS THE SAME

Run time: 6.296 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 3))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 43 from 130-----"

"-----START 44 from 130-----"

"input file number 44: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_3.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_3.txt"

"***Data from file NU_1_0100_05_3.txt: machinesNum=5 jobsNum=100"

"***SOLUTION Data from file SOL_NU_1_05_0100_3.txt: machinesNum=5 jobsNum=100 lowerBound=1865 upperBound=1865
isOptimal=1"

Content of machines summed (1865, 1865, 1865, 1864, 1865)

input selected: size 100 sum 9324

----Our Results-----

best from Our local search found:

target function = 1870, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1865, content= (99, 99, 99, 99, 99, 97, 98, 97, 97, 97, 97, 98, 99, 99, 99, 98, 98, 99, 97)

bucket2 sum:1865, content= (96, 90, 90, 95, 93, 93, 92, 92, 91, 91, 90, 94, 94, 93, 93, 94, 92, 98, 97, 97)

bucket3 sum:1865, content= (93, 94, 94, 93, 92, 92, 92, 92, 90, 90, 90, 96, 95, 95, 94, 96, 96, 91, 94, 96)

bucket4 sum:1865, content= (90, 94, 95, 95, 95, 96, 96, 96, 95, 95, 95, 92, 93, 92, 92, 92, 92, 90, 90, 90)

bucket5 sum:1864, content= (100, 92, 92, 92, 91, 91, 90, 17, 100, 100, 100, 100, 100, 100, 100, 100, 99, 99, 1, 100)

"----Comparison for the 43 example----

***tf from benchmark was 1870(we added the number of machines) and target function from our local search is 1870"

***RESULT IS THE SAME

Run time: 5.641 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 4))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 44 from 130-----"

"-----START 45 from 130-----"

"input file number 45: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_4.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_4.txt"

***Data from file NU_1_0100_05_4.txt: machinesNum=5 jobsNum=100"

***SOLUTION Data from file SOL_NU_1_05_0100_4.txt: machinesNum=5 jobsNum=100 lowerBound=1874 upperBound=1874

isOptimal=1"

Content of machines summed (1874, 1874, 1874, 1874, 1872)

input selected: size 100 sum 9368

----Our Results-----

best from Our local search found:

target function = 1879, num of machines=5, square root lms=0

machines content(number of jobs=100):

```

bucket1 sum:1872, content= (98, 98, 98, 99, 98, 98, 99, 98, 99, 98, 98, 99, 99, 98, 99, 98, 99, 99, 100)
bucket2 sum:1874, content= (93, 92, 92, 91, 90, 96, 94, 94, 93, 93, 93, 96, 95, 97, 97, 95, 96, 93, 93, 91)
bucket3 sum:1874, content= (95, 94, 93, 93, 93, 91, 90, 90, 96, 96, 97, 96, 95, 97, 95, 95, 91, 90, 97, 90)
bucket4 sum:1874, content= (90, 91, 96, 96, 96, 96, 96, 96, 94, 95, 94, 93, 93, 92, 92, 91, 90, 90, 96, 97)
bucket5 sum:1874, content= (95, 92, 92, 94, 91, 14, 13, 100, 100, 100, 100, 100, 100, 99, 99, 100, 100, 98, 94, 99, 94)
"----Comparison for the 44 example----"
"***tf from benchmark was 1879(we added the number of machines) and target function from our local search is 1879"
***RESULT IS THE SAME
Run time: 6.654 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 5))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 45 from 130-----"
"-----START 46 from 130-----"
"input file number 46: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_5.txt"
"***Data from file NU_1_0100_05_5.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_05_0100_5.txt: machinesNum=5 jobsNum=100 lowerBound=1871 upperBound=1871
isOptimal=1"
Content of machines summed (1871, 1871, 1871, 1871, 1869)
input selected: size 100 sum 9353

```

----Our Results-----

best from Our local search found:

target function = 1876, num of machines=5, square root lms=0

machines content(number of jobs=100):

```

bucket1 sum:1871, content= (94, 93, 94, 94, 94, 92, 94, 93, 90, 93, 93, 94, 93, 94, 95, 93, 94, 94, 95, 95)
bucket2 sum:1871, content= (97, 91, 90, 90, 99, 96, 91, 98, 90, 97, 97, 91, 91, 96, 91, 91, 92, 92, 92, 99)
bucket3 sum:1871, content= (97, 100, 100, 100, 100, 100, 99, 99, 99, 98, 100, 98, 98, 98, 96, 99, 97, 93, 100)
bucket4 sum:1869, content= (100, 100, 100, 99, 98, 8, 1, 98, 99, 98, 96, 98, 100, 97, 96, 96, 99, 96, 95, 98, 97)
bucket5 sum:1871, content= (95, 97, 96, 96, 96, 96, 95, 94, 94, 94, 92, 92, 90, 90, 93, 92, 93, 91, 92, 93)

```

"----Comparison for the 45 example----"


```
****tf from benchmark was 1876(we added the number of machines) and target function from our local search is 1876"
***RESULT IS THE SAME
Run time: 6.969 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 6))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 46 from 130-----"
"-----START 47 from 130-----"
"input file number 47: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_6.txt"
****Data from file NU_1_0100_05_6.txt: machinesNum=5 jobsNum=100"
****SOLUTION Data from file SOL_NU_1_05_0100_6.txt: machinesNum=5 jobsNum=100 lowerBound=1862 upperBound=1862
isOptimal=1"
Content of machines summed (1862, 1862, 1862, 1862, 1862)
input selected: size 100 sum 9310
```

----Our Results-----

best from Our local search found:

target function = 1867, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1862, content= (91, 93, 92, 93, 92, 93, 93, 93, 95, 96, 91, 93, 93, 96, 94, 93, 93, 92, 93, 93)

bucket2 sum:1862, content= (91, 96, 90, 90, 99, 94, 90, 90, 100, 96, 98, 95, 92, 90, 92, 92, 91, 93, 92, 91)

bucket3 sum:1862, content= (90, 92, 96, 95, 95, 95, 94, 94, 92, 92, 91, 91, 97, 94, 99, 91, 90, 92, 90, 92)

bucket4 sum:1862, content= (97, 100, 99, 99, 99, 100, 100, 98, 99, 95, 96, 98, 99, 97, 99, 96, 96, 97, 98)

bucket5 sum:1862, content= (100, 100, 99, 99, 98, 19, 16, 93, 93, 96, 98, 94, 94, 95, 96, 98, 95, 97, 94, 94, 94)

"----Comparison for the 46 example----

****tf from benchmark was 1867(we added the number of machines) and target function from our local search is 1867"

***RESULT IS THE SAME

Run time: 7.683 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 7))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

```

"-----END 47 from 130-----"
"-----START 48 from 130-----"
"input file number 48: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_7.txt"
"***Data from file NU_1_0100_05_7.txt: machinesNum=5 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_05_0100_7.txt: machinesNum=5 jobsNum=100 lowerBound=1869 upperBound=1869
isOptimal=1"
Content of machines summed (1869, 1869, 1869, 1869, 1869)
input selected: size 100 sum 9345

----Our Results-----
best from Our local search found:
target function = 1874, num of machines=5, square root lms=0
machines content(number of jobs=100):
bucket1 sum:1869, content= (92, 95, 91, 92, 90, 90, 91, 94, 91, 93, 93, 98, 91, 92, 92, 93, 95, 99, 97, 100)
bucket2 sum:1869, content= (99, 99, 90, 90, 90, 90, 99, 99, 98, 94, 90, 93, 90, 90, 94, 90, 91, 91, 92, 100)
bucket3 sum:1869, content= (99, 99, 100, 100, 100, 100, 100, 100, 100, 100, 91, 99, 99, 97, 100, 96, 94, 96, 99)
bucket4 sum:1869, content= (100, 100, 100, 100, 99, 98, 98, 94, 20, 16, 100, 99, 96, 91, 91, 95, 93, 95, 93, 93, 98)
bucket5 sum:1869, content= (92, 93, 96, 96, 97, 98, 98, 97, 95, 95, 94, 93, 93, 90, 92, 90, 90, 90, 90, 90)
"----Comparison for the 47 example----"
"***tf from benchmark was 1874(we added the number of machines) and target function from our local search is 1874"
***RESULT IS THE SAME
Run time: 3.52 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 8))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 48 from 130-----"
"-----START 49 from 130-----"
"input file number 49: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_8.txt"
"***Data from file NU_1_0100_05_8.txt: machinesNum=5 jobsNum=100"

```

***SOLUTION Data from file SOL_NU_1_05_0100_8.txt: machinesNum=5 jobsNum=100 lowerBound=1868 upperBound=1868 isOptimal=1"

Content of machines summed (1868, 1868, 1868, 1867, 1867)

input selected: size 100 sum 9338

----Our Results-----

best from Our local search found:

target function = 1873, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1868, content= (93, 92, 92, 93, 92, 93, 93, 93, 93, 94, 90, 95, 94, 94, 94, 94, 95, 95, 95, 94)

bucket2 sum:1868, content= (90, 99, 96, 90, 98, 100, 90, 97, 91, 96, 91, 93, 91, 90, 92, 92, 92, 93, 96, 91)

bucket3 sum:1868, content= (96, 100, 100, 100, 99, 100, 100, 100, 100, 99, 98, 98, 98, 99, 98, 98, 98, 97, 90)

bucket4 sum:1867, content= (100, 100, 100, 99, 99, 5, 4, 98, 99, 100, 98, 97, 98, 95, 99, 95, 95, 95, 97, 97, 97)

bucket5 sum:1867, content= (90, 96, 96, 96, 98, 96, 97, 96, 95, 94, 92, 90, 90, 90, 90, 92, 92, 91, 93, 93)

"----Comparison for the 48 example----

***tf from benchmark was 1873(we added the number of machines) and target function from our local search is 1873"

***RESULT IS THE SAME

Run time: 7.061 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 9))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 49 from 130-----"

"-----START 50 from 130-----"

"input file number 50: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_05_9.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0100_9.txt"

***Data from file NU_1_0100_05_9.txt: machinesNum=5 jobsNum=100"

***SOLUTION Data from file SOL_NU_1_05_0100_9.txt: machinesNum=5 jobsNum=100 lowerBound=1866 upperBound=1866 isOptimal=1"

Content of machines summed (1866, 1866, 1866, 1866, 1866)

input selected: size 100 sum 9330

----Our Results-----

best from Our local search found:

target function = 1871, num of machines=5, square root lms=0

machines content(number of jobs=100):

bucket1 sum:1866, content= (91, 93, 91, 94, 91, 94, 93, 91, 93, 93, 93, 94, 94, 94, 93, 96, 94, 94, 97, 93)

bucket2 sum:1866, content= (97, 98, 98, 96, 96, 95, 92, 92, 98, 92, 91, 90, 90, 91, 94, 90, 90, 90, 93, 93)

bucket3 sum:1866, content= (90, 90, 91, 91, 96, 97, 97, 96, 95, 95, 95, 94, 91, 93, 93, 90, 96, 92, 92, 92)

bucket4 sum:1866, content= (97, 99, 93, 100, 99, 99, 99, 99, 99, 98, 99, 98, 98, 100, 98, 97, 97, 99, 98)

bucket5 sum:1866, content= (100, 100, 99, 99, 98, 98, 98, 97, 95, 12, 11, 96, 95, 99, 95, 94, 95, 95, 97, 95, 98)

"----Comparison for the 49 example----

***tf from benchmark was 1871(we added the number of machines) and target function from our local search is 1871"

***RESULT IS THE SAME

Run time: 12.519 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 10))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 50 from 130-----"

"-----START 51 from 130-----"

"input file number 51: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_0.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_0.txt"

***Data from file NU_1_0100_10_0.txt: machinesNum=10 jobsNum=100"

***SOLUTION Data from file SOL_NU_1_10_0100_0.txt: machinesNum=10 jobsNum=100 lowerBound=941 upperBound=941

isOptimal=1"

Content of machines summed (931, 941, 941, 941, 941, 941, 941, 941, 938, 892)

input selected: size 100 sum 9348

----Our Results-----

best from Our local search found:

target function = 951, num of machines=10, square root lms=2956.32711315916

machines content(number of jobs=100):

bucket1 sum:940, content= (95, 95, 93, 94, 93, 95, 93, 94, 95, 93)

bucket2 sum:941, content= (91, 94, 96, 92, 96, 93, 96, 94, 95, 94)

bucket3 sum:941, content= (90, 90, 93, 96, 95, 96, 96, 97, 94, 94)

```

bucket4 sum:941, content= (97, 91, 90, 91, 92, 97, 97, 94, 97, 95)
bucket5 sum:941, content= (91, 90, 95, 95, 93, 93, 98, 97, 95, 94)
bucket6 sum:911, content= (100, 100, 100, 13, 100, 99, 100, 100, 99, 100)
bucket7 sum:912, content= (18, 99, 99, 100, 100, 100, 99, 99, 99, 99)
bucket8 sum:940, content= (97, 96, 91, 90, 91, 91, 94, 98, 98, 94)
bucket9 sum:940, content= (98, 96, 95, 91, 90, 91, 90, 94, 97, 98)
bucket10 sum:941, content= (96, 95, 98, 96, 95, 95, 92, 91, 90, 93)
"----Comparison for the 50 example----"
"***tf from benchmark was 951(we added the number of machines) and target function from our local search is 951"
***RESULT IS THE SAME
Run time: 103.355 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 11))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 51 from 130-----"
"-----START 52 from 130-----"
"input file number 52: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_1.txt"
"***Data from file NU_1_0100_10_1.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_1.txt: machinesNum=10 jobsNum=100 lowerBound=942 upperBound=942
isOptimal=1"
Content of machines summed (942, 942, 942, 942, 942, 942, 941, 940, 916, 887)
input selected: size 100 sum 9336

----Our Results-----
best from Our local search found:
target function = 952, num of machines=10, square root lms=2952.71908585968
machines content(number of jobs=100):
bucket1 sum:898, content= (100, 99, 99, 99, 99, 2, 100, 100, 100, 100)
bucket2 sum:941, content= (94, 94, 95, 94, 93, 95, 92, 97, 95, 92)
bucket3 sum:941, content= (96, 92, 92, 92, 95, 92, 95, 96, 94, 97)
bucket4 sum:941, content= (95, 91, 97, 95, 95, 96, 90, 92, 97, 93)

```

```

bucket5 sum:941, content= (95, 91, 90, 97, 90, 94, 92, 97, 97, 98)
bucket6 sum:941, content= (96, 96, 93, 91, 90, 92, 97, 92, 97, 97)
bucket7 sum:942, content= (95, 95, 96, 95, 93, 91, 90, 98, 98, 91)
bucket8 sum:942, content= (94, 97, 96, 96, 93, 93, 91, 90, 98, 94)
bucket9 sum:907, content= (20, 99, 99, 99, 99, 99, 98, 98, 98, 98)
bucket10 sum:942, content= (95, 96, 97, 96, 96, 94, 94, 92, 92, 90)
"----Comparison for the 51 example----"
"***tf from benchmark was 952(we added the number of machines) and target function from our local search is 952"
***RESULT IS THE SAME
Run time: 65.055 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 12))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 52 from 130-----"
"-----START 53 from 130-----"
"input file number 53: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_2.txt"
"***Data from file NU_1_0100_10_2.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_2.txt: machinesNum=10 jobsNum=100 lowerBound=944 upperBound=944
isOptimal=1"
Content of machines summed (944, 944, 944, 944, 944, 944, 944, 939, 922, 894)
input selected: size 100 sum 9363

----Our Results-----
best from Our local search found:
target function = 954, num of machines=10, square root lms=2961.17898817346
machines content(number of jobs=100):
bucket1 sum:943, content= (94, 94, 94, 94, 94, 97, 93, 93, 96, 94)
bucket2 sum:944, content= (95, 95, 95, 95, 94, 94, 94, 93, 95, 94)
bucket3 sum:944, content= (91, 91, 96, 95, 91, 96, 95, 97, 97, 95)
bucket4 sum:943, content= (92, 90, 91, 92, 92, 98, 97, 98, 98, 95)
bucket5 sum:943, content= (98, 92, 92, 90, 97, 98, 92, 93, 93, 98)

```

bucket6 sum:943, content= (99, 98, 97, 92, 90, 90, 92, 92, 95, 98)
bucket7 sum:943, content= (99, 97, 92, 90, 93, 93, 93, 90, 97, 99)
bucket8 sum:944, content= (97, 99, 98, 97, 93, 92, 92, 90, 93, 93)
bucket9 sum:908, content= (100, 100, 100, 100, 100, 100, 100, 100, 9, 99)
bucket10 sum:908, content= (100, 13, 99, 99, 100, 99, 99, 99, 100, 100)
"----Comparison for the 52 example----"
"***tf from benchmark was 954(we added the number of machines) and target function from our local search is 954"
***RESULT IS THE SAME
Run time: 105.297 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 13))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 53 from 130-----"
"-----START 54 from 130-----"
"input file number 54: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_3.txt"
"***Data from file NU_1_0100_10_3.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_3.txt: machinesNum=10 jobsNum=100 lowerBound=937 upperBound=937
isOptimal=1"
Content of machines summed (924, 937, 937, 937, 937, 937, 937, 937, 936, 884)
input selected: size 100 sum 9303

----Our Results-----

best from Our local search found:

target function = 947, num of machines=10, square root lms=2942.16094053334

machines content(number of jobs=100):

bucket1 sum:937, content= (94, 95, 94, 94, 95, 95, 93, 95, 92, 90)
bucket2 sum:937, content= (90, 94, 93, 96, 97, 96, 92, 96, 92, 91)
bucket3 sum:937, content= (90, 95, 94, 90, 92, 92, 96, 97, 94, 97)
bucket4 sum:937, content= (93, 93, 90, 96, 90, 96, 94, 96, 97, 92)
bucket5 sum:937, content= (94, 90, 90, 93, 91, 94, 93, 97, 97, 98)
bucket6 sum:937, content= (98, 98, 94, 94, 91, 91, 90, 94, 93, 94)

```

bucket7 sum:904, content= (100, 100, 100, 100, 100, 100, 99, 8, 99, 98)
bucket8 sum:904, content= (100, 17, 98, 98, 98, 98, 98, 98, 100, 99)
bucket9 sum:936, content= (97, 95, 90, 90, 91, 92, 95, 91, 97, 98)
bucket10 sum:937, content= (97, 98, 98, 91, 95, 94, 92, 91, 90, 91)
"----Comparison for the 53 example----"
"***tf from benchmark was 947(we added the number of machines) and target function from our local search is 947"
***RESULT IS THE SAME
Run time: 77.825 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 14))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 54 from 130-----"
"-----START 55 from 130-----"
"input file number 55: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_4.txt"
"***Data from file NU_1_0100_10_4.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_4.txt: machinesNum=10 jobsNum=100 lowerBound=941 upperBound=941
isOptimal=1"
Content of machines summed (928, 941, 941, 941, 941, 941, 941, 939, 940, 893)
input selected: size 100 sum 9346

----Our Results-----
best from Our local search found:
target function = 951, num of machines=10, square root lms=2955.71074362834
machines content(number of jobs=100):
bucket1 sum:940, content= (95, 95, 93, 93, 94, 94, 96, 92, 95, 93)
bucket2 sum:941, content= (92, 91, 93, 95, 95, 95, 92, 96, 95, 97)
bucket3 sum:940, content= (91, 92, 91, 97, 97, 91, 98, 91, 98, 94)
bucket4 sum:940, content= (90, 94, 92, 91, 93, 92, 97, 94, 99, 98)
bucket5 sum:941, content= (98, 98, 90, 90, 98, 99, 94, 91, 93, 90)
bucket6 sum:941, content= (99, 98, 93, 91, 90, 98, 93, 91, 94, 94)
bucket7 sum:910, content= (100, 100, 100, 100, 100, 100, 100, 100, 10, 100)

```


bucket8 sum:911, content= (100, 18, 99, 99, 99, 99, 99, 100, 99, 99)
bucket9 sum:941, content= (99, 98, 97, 97, 91, 90, 91, 92, 96, 90)
bucket10 sum:941, content= (98, 99, 98, 97, 91, 91, 90, 93, 93, 91)
"----Comparison for the 54 example----"
"***tf from benchmark was 951(we added the number of machines) and target function from our local search is 951"
***RESULT IS THE SAME
Run time: 87.548 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 15))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 55 from 130-----"
"-----START 56 from 130-----"
"input file number 56: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_5.txt"
"***Data from file NU_1_0100_10_5.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_5.txt: machinesNum=10 jobsNum=100 lowerBound=942 upperBound=942
isOptimal=1"
Content of machines summed (913, 942, 942, 942, 942, 942, 942, 938, 940, 892)
input selected: size 100 sum 9335

----Our Results-----

best from Our local search found:
target function = 952, num of machines=10, square root lms=2952.39411325792
machines content(number of jobs=100):
bucket1 sum:941, content= (95, 95, 95, 93, 95, 90, 94, 93, 97, 94)
bucket2 sum:901, content= (100, 100, 100, 100, 100, 100, 100, 1, 100, 100)
bucket3 sum:904, content= (12, 99, 99, 100, 99, 99, 99, 99, 99, 99)
bucket4 sum:941, content= (96, 93, 92, 93, 92, 95, 96, 94, 96, 94)
bucket5 sum:941, content= (91, 93, 90, 96, 91, 96, 98, 95, 97, 94)
bucket6 sum:941, content= (97, 97, 94, 94, 93, 91, 90, 93, 94, 98)
bucket7 sum:941, content= (97, 93, 90, 90, 92, 93, 93, 99, 96, 98)
bucket8 sum:941, content= (96, 99, 97, 97, 92, 92, 90, 90, 95, 93)

bucket9 sum:942, content= (97, 97, 94, 92, 92, 90, 94, 94, 99, 93)
bucket10 sum:942, content= (97, 97, 97, 94, 94, 92, 92, 90, 94, 95)
"----Comparison for the 55 example----"
"***tf from benchmark was 952(we added the number of machines) and target function from our local search is 952"
***RESULT IS THE SAME
Run time: 58.809 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 16))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 56 from 130-----"
"-----START 57 from 130-----"
"input file number 57: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_6.txt"
"***Data from file NU_1_0100_10_6.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_6.txt: machinesNum=10 jobsNum=100 lowerBound=950 upperBound=950
isOptimal=1"
Content of machines summed (897, 950, 950, 899, 950, 950, 950, 950, 950, 950)
input selected: size 100 sum 9396

----Our Results-----

best from Our local search found:
target function = 960, num of machines=10, square root lms=2971.98687749458
machines content(number of jobs=100):
bucket1 sum:898, content= (100, 100, 100, 100, 99, 99, 99, 1, 100, 100)
bucket2 sum:950, content= (92, 92, 95, 94, 95, 98, 97, 93, 97, 97)
bucket3 sum:949, content= (92, 93, 93, 93, 98, 92, 97, 98, 95, 98)
bucket4 sum:950, content= (94, 91, 98, 94, 94, 98, 99, 91, 99, 92)
bucket5 sum:950, content= (98, 94, 94, 91, 90, 99, 98, 93, 97, 96)
bucket6 sum:950, content= (99, 98, 95, 94, 93, 92, 90, 99, 91, 99)
bucket7 sum:899, content= (100, 100, 100, 100, 100, 3, 99, 99, 99, 99)
bucket8 sum:950, content= (99, 98, 95, 94, 93, 90, 99, 96, 90, 96)
bucket9 sum:950, content= (96, 99, 98, 97, 94, 92, 91, 99, 90, 94)

bucket10 sum:950, content= (97, 97, 97, 98, 97, 96, 94, 91, 92, 91)
"----Comparison for the 56 example----"
"***tf from benchmark was 960(we added the number of machines) and target function from our local search is 960"
***RESULT IS THE SAME
Run time: 79.213 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 17))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 57 from 130-----"
"-----START 58 from 130-----"
"input file number 58: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_7.txt"
"***Data from file NU_1_0100_10_7.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_7.txt: machinesNum=10 jobsNum=100 lowerBound=944 upperBound=944
isOptimal=1"
Content of machines summed (919, 944, 944, 944, 944, 944, 944, 943, 943, 892)
input selected: size 100 sum 9361

----Our Results-----

best from Our local search found:
target function = 954, num of machines=10, square root lms=2960.60382354681
machines content(number of jobs=100):
bucket1 sum:944, content= (94, 94, 95, 94, 96, 95, 96, 90, 96, 94)
bucket2 sum:943, content= (92, 90, 93, 97, 92, 98, 97, 93, 95, 96)
bucket3 sum:944, content= (94, 93, 98, 91, 93, 91, 98, 98, 91, 97)
bucket4 sum:905, content= (100, 6, 100, 100, 100, 100, 100, 99, 100, 100)
bucket5 sum:944, content= (98, 93, 93, 90, 90, 93, 98, 95, 98, 96)
bucket6 sum:944, content= (93, 90, 90, 94, 92, 94, 97, 98, 98, 98)
bucket7 sum:906, content= (13, 100, 100, 99, 99, 99, 99, 99, 99, 99)
bucket8 sum:943, content= (98, 98, 92, 90, 90, 90, 92, 98, 98, 97)
bucket9 sum:944, content= (99, 98, 95, 93, 92, 90, 90, 93, 95, 99)
bucket10 sum:944, content= (98, 98, 98, 97, 97, 91, 93, 92, 90, 90)

```

"----Comparison for the 57 example----"
"***tf from benchmark was 954(we added the number of machines) and target function from our local search is 954"
***RESULT IS THE SAME
Run time: 91.334 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 18))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 58 from 130-----"
"-----START 59 from 130-----"
"input file number 59: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_8.txt"
"***Data from file NU_1_0100_10_8.txt: machinesNum=10 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_10_0100_8.txt: machinesNum=10 jobsNum=100 lowerBound=939 upperBound=939
isOptimal=1"
Content of machines summed (939, 903, 889, 939, 939, 939, 939, 939, 939, 939)
input selected: size 100 sum 9304

```

```

----Our Results-----
best from Our local search found:
target function = 949, num of machines=10, square root lms=2942.67157528665
machines content(number of jobs=100):
bucket1 sum:939, content= (95, 94, 94, 95, 93, 94, 93, 94, 91, 96)
bucket2 sum:939, content= (96, 91, 92, 96, 95, 91, 96, 96, 95, 91)
bucket3 sum:896, content= (100, 100, 100, 100, 99, 99, 99, 99, 100)
bucket4 sum:897, content= (8, 2, 98, 98, 98, 98, 98, 100, 99, 99, 99)
bucket5 sum:939, content= (98, 96, 96, 90, 90, 92, 90, 98, 97, 92)
bucket6 sum:939, content= (97, 97, 96, 91, 90, 90, 93, 93, 98, 94)
bucket7 sum:939, content= (97, 97, 96, 91, 90, 93, 94, 90, 93, 98)
bucket8 sum:939, content= (97, 93, 90, 90, 94, 91, 96, 98, 98, 92)
bucket9 sum:938, content= (97, 97, 93, 91, 90, 94, 90, 94, 94, 98)
bucket10 sum:939, content= (96, 97, 98, 97, 95, 90, 91, 91, 90, 94)
"----Comparison for the 58 example----"

```

```

****tf from benchmark was 949(we added the number of machines) and target function from our local search is 949"
***RESULT IS THE SAME
Run time: 59.322 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 19))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 59 from 130-----"
"-----START 60 from 130-----"
"input file number 60: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_10_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0100_9.txt"
****Data from file NU_1_0100_10_9.txt: machinesNum=10 jobsNum=100"
****SOLUTION Data from file SOL_NU_1_10_0100_9.txt: machinesNum=10 jobsNum=100 lowerBound=944 upperBound=944
isOptimal=1"
Content of machines summed (944, 944, 944, 944, 944, 942, 944, 941, 902, 886)
input selected: size 100 sum 9335

```

----Our Results-----

```

best from Our local search found:
target function = 954, num of machines=10, square root lms=2952.61392667582
machines content(number of jobs=100):
bucket1 sum:895, content= (99, 99, 99, 99, 99, 98, 98, 98, 6, 98, 2)
bucket2 sum:943, content= (98, 90, 93, 91, 93, 95, 93, 96, 97, 97)
bucket3 sum:943, content= (94, 94, 98, 93, 98, 92, 96, 92, 94, 92)
bucket4 sum:943, content= (91, 98, 94, 92, 91, 93, 95, 98, 94, 97)
bucket5 sum:943, content= (93, 92, 92, 98, 96, 91, 91, 96, 98, 96)
bucket6 sum:943, content= (95, 95, 92, 90, 98, 98, 90, 90, 97, 98)
bucket7 sum:943, content= (97, 96, 94, 94, 92, 91, 91, 98, 97, 93)
bucket8 sum:943, content= (97, 94, 94, 91, 90, 98, 98, 90, 96, 95)
bucket9 sum:895, content= (100, 100, 100, 100, 99, 100, 99, 99, 98)
bucket10 sum:944, content= (95, 97, 98, 98, 95, 95, 93, 92, 91, 90)
"----Comparison for the 59 example----"
****tf from benchmark was 954(we added the number of machines) and target function from our local search is 954"

```

Run time: 61.734 seconds

"Mistakes(size-numberMistakes):" QMap()

"-----END 60 from 130-----"

"-----START 61 from 130-----"

***Data from file NU_1_0100_25_0.txt: machinesNum=25 jobsNum=100

[illegible]

input selected: size 100 sum 9327

best from Our local search found:

machines content(number of jobs=100):

bucket1 sum:304, content= (100, 100, 4, 100)

bucket2 sum:378, content= (94, 95, 94, 95)

bucket3 sum:378, content= (97, 90, 98, 93)

bucket4 sum:379, content= (94, 91, 97, 97)

bucket5 sum:379, content= (95, 95, 91, 98)

bucket6 sum:378, content= (96, 90, 98, 94)

bucket7 sum:379, content= (99, 98, 91, 91)

bucket8 sum:379, content= (99, 93, 91, 96)

bucket9 sum:379, content= (99, 97, 93, 90)

bucket10 sum:379, content= (99, 93, 91, 96)

bucket11 sum:379, content= (99, 93, 91, 96)

bucket12 sum:379, content= (99, 97, 93, 90)

```

bucket13 sum:379, content= (99, 97, 93, 90)
bucket14 sum:379, content= (99, 92, 92, 96)
bucket15 sum:379, content= (99, 92, 92, 96)
bucket16 sum:379, content= (98, 92, 92, 97)
bucket17 sum:379, content= (98, 92, 92, 97)
bucket18 sum:379, content= (97, 98, 92, 92)
bucket19 sum:379, content= (98, 96, 91, 94)
bucket20 sum:378, content= (98, 96, 90, 94)
bucket21 sum:378, content= (98, 96, 94, 90)
bucket22 sum:378, content= (98, 96, 94, 90)
bucket23 sum:378, content= (98, 95, 95, 90)
bucket24 sum:314, content= (14, 100, 100, 100)
bucket25 sum:378, content= (98, 95, 95, 90)
"----Comparison for the 60 example----"
"****tf from benchmark was 404(we added the number of machines) and target function from our local search is 404"
***RESULT IS THE SAME
Run time: 750.601 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 21))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 61 from 130-----"
"-----START 62 from 130-----"
"input file number 62: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_25_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0100_1.txt"
"***Data from file NU_1_0100_25_1.txt: machinesNum=25 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_25_0100_1.txt: machinesNum=25 jobsNum=100 lowerBound=379 upperBound=379
isOptimal=1"
Content of machines summed (379, 379, 379, 324, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379, 379,
379, 379, 294)
input selected: size 100 sum 9335

----Our Results-----

```

best from Our local search found:

target function = 404, num of machines=25, square root lms=1869.1947464082

machines content(number of jobs=100):

bucket1 sum:312, content= (12, 100, 100, 100)

bucket2 sum:379, content= (96, 92, 94, 97)

bucket3 sum:379, content= (94, 94, 96, 95)

bucket4 sum:379, content= (95, 97, 90, 97)

bucket5 sum:379, content= (94, 90, 98, 97)

bucket6 sum:379, content= (100, 90, 97, 92)

bucket7 sum:379, content= (95, 90, 99, 95)

bucket8 sum:379, content= (100, 96, 90, 93)

bucket9 sum:378, content= (100, 94, 90, 94)

bucket10 sum:378, content= (97, 91, 96, 94)

bucket11 sum:378, content= (99, 93, 90, 96)

bucket12 sum:379, content= (99, 97, 93, 90)

bucket13 sum:379, content= (99, 93, 91, 96)

bucket14 sum:379, content= (99, 93, 91, 96)

bucket15 sum:379, content= (99, 93, 91, 96)

bucket16 sum:379, content= (99, 93, 91, 96)

bucket17 sum:379, content= (99, 97, 92, 91)

bucket18 sum:379, content= (99, 97, 92, 91)

bucket19 sum:379, content= (99, 94, 92, 94)

bucket20 sum:379, content= (99, 94, 94, 92)

bucket21 sum:378, content= (98, 98, 92, 90)

bucket22 sum:378, content= (98, 95, 95, 90)

bucket23 sum:312, content= (12, 100, 100, 100)

bucket24 sum:378, content= (98, 95, 95, 90)

bucket25 sum:379, content= (98, 95, 94, 92)

"----Comparison for the 61 example----"

****tf from benchmark was 404(we added the number of machines) and target function from our local search is 404"

***RESULT IS THE SAME

Run time: 691.706 seconds


```
bucket14 sum:377, content=(98, 93, 91, 95)
```

[illegible]

```
machines content(number of jobs=100):
bucket1 sum:379, content= (90, 97, 95, 97)
bucket2 sum:379, content= (96, 94, 94, 95)
bucket3 sum:379, content= (95, 97, 91, 96)
bucket4 sum:379, content= (95, 97, 96, 91)
bucket5 sum:379, content= (90, 95, 99, 95)
bucket6 sum:379, content= (91, 97, 99, 92)
bucket7 sum:380, content= (100, 96, 94, 90)
bucket8 sum:379, content= (99, 94, 90, 96)
bucket9 sum:379, content= (99, 94, 90, 96)
bucket10 sum:312, content= (12, 100, 100, 100)
bucket11 sum:318, content= (18, 100, 100, 100)
bucket12 sum:379, content= (99, 93, 91, 96)
bucket13 sum:379, content= (99, 97, 93, 90)
bucket14 sum:380, content= (99, 97, 93, 91)
bucket15 sum:380, content= (99, 97, 93, 91)
bucket16 sum:379, content= (99, 97, 92, 91)
bucket17 sum:380, content= (99, 97, 92, 92)
bucket18 sum:380, content= (99, 97, 92, 92)
bucket19 sum:380, content= (99, 97, 92, 92)
bucket20 sum:379, content= (99, 95, 91, 94)
bucket21 sum:379, content= (99, 95, 91, 94)
bucket22 sum:379, content= (98, 98, 92, 91)
bucket23 sum:379, content= (98, 98, 92, 91)
bucket24 sum:379, content= (98, 98, 92, 91)
bucket25 sum:379, content= (98, 98, 92, 91)
```

"----Comparison for the 63 example----"

****tf from benchmark was 405(we added the number of machines) and target function from our local search is 405"

***RESULT IS THE SAME

Run time: 753.642 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 24))

"Mistakes(size-numberMistakes):" QMap()

```
"Avegare error: 0"
"-----END 64 from 130-----"
"-----START 65 from 130-----"
"input file number 65: inputName=C:/algo/h/docs/benchMark/all/NU_1_0100_25_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0100_4.txt"
"***Data from file NU_1_0100_25_4.txt: machinesNum=25 jobsNum=100"
"***SOLUTION Data from file SOL_NU_1_25_0100_4.txt: machinesNum=25 jobsNum=100 lowerBound=378 upperBound=378
isOptimal=1"
Content of machines summed (378, 378, 378, 378, 378, 378, 378, 378, 378, 378, 378, 378, 378, 378, 378, 377, 376, 378, 378, 378, 375,
375, 317, 297)
input selected: size 100 sum 9299
```

----Our Results-----

```
best from Our local search found:
target function = 403, num of machines=25, square root lms=1861.9911385396
machines content(number of jobs=100):
bucket1 sum:377, content= (94, 93, 95, 95)
bucket2 sum:377, content= (95, 96, 95, 91)
bucket3 sum:377, content= (94, 96, 96, 91)
bucket4 sum:377, content= (99, 93, 90, 95)
bucket5 sum:377, content= (99, 93, 90, 95)
bucket6 sum:377, content= (99, 93, 90, 95)
bucket7 sum:377, content= (99, 93, 90, 95)
bucket8 sum:377, content= (95, 95, 90, 97)
bucket9 sum:305, content= (5, 100, 100, 100)
bucket10 sum:317, content= (99, 20, 99, 99)
bucket11 sum:377, content= (99, 95, 93, 90)
bucket12 sum:377, content= (99, 95, 93, 90)
bucket13 sum:377, content= (99, 95, 91, 92)
bucket14 sum:377, content= (99, 93, 91, 94)
bucket15 sum:377, content= (98, 96, 93, 90)
bucket16 sum:377, content= (96, 93, 91, 97)
```

[illegible]

```
bucket2 sum:374, content= (91, 95, 92, 96)
bucket3 sum:374, content= (94, 96, 94, 90)
bucket4 sum:374, content= (90, 93, 97, 94)
bucket5 sum:374, content= (90, 94, 97, 93)
bucket6 sum:375, content= (99, 92, 90, 94)
bucket7 sum:375, content= (99, 92, 90, 94)
bucket8 sum:375, content= (99, 92, 90, 94)
bucket9 sum:375, content= (99, 95, 91, 90)
bucket10 sum:375, content= (99, 95, 91, 90)
bucket11 sum:374, content= (97, 95, 91, 91)
bucket12 sum:375, content= (99, 94, 90, 92)
bucket13 sum:375, content= (98, 91, 91, 95)
bucket14 sum:374, content= (98, 94, 90, 92)
bucket15 sum:375, content= (98, 94, 90, 93)
bucket16 sum:375, content= (98, 94, 90, 93)
bucket17 sum:375, content= (98, 94, 91, 92)
bucket18 sum:375, content= (98, 94, 93, 90)
bucket19 sum:375, content= (98, 94, 93, 90)
bucket20 sum:375, content= (96, 93, 90, 96)
bucket21 sum:375, content= (97, 93, 90, 95)
bucket22 sum:318, content= (19, 100, 100, 99)
bucket23 sum:318, content= (19, 100, 99, 100)
bucket24 sum:375, content= (97, 96, 91, 91)
bucket25 sum:374, content= (96, 96, 91, 91)
"----Comparison for the 65 example----"
"***tf from benchmark was 400(we added the number of machines) and target function from our local search is 400"
***RESULT IS THE SAME
Run time: 760.345 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 26))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 66 from 130-----"
```


[illegible]

bucket4 sum:379, content= (94, 90, 97, 98)
bucket5 sum:379, content= (94, 96, 97, 92)
bucket6 sum:379, content= (100, 94, 90, 95)
bucket7 sum:379, content= (100, 94, 90, 95)
bucket8 sum:379, content= (100, 94, 90, 95)
bucket9 sum:380, content= (100, 96, 94, 90)
bucket10 sum:380, content= (100, 96, 94, 90)
bucket11 sum:380, content= (100, 96, 94, 90)
bucket12 sum:306, content= (100, 6, 100, 100)
bucket13 sum:379, content= (99, 93, 91, 96)
bucket14 sum:379, content= (99, 97, 93, 90)
bucket15 sum:379, content= (99, 93, 91, 96)
bucket16 sum:379, content= (99, 93, 91, 96)
bucket17 sum:380, content= (99, 97, 93, 91)
bucket18 sum:380, content= (99, 97, 93, 91)
bucket19 sum:379, content= (99, 97, 92, 91)
bucket20 sum:379, content= (98, 92, 92, 97)
bucket21 sum:379, content= (98, 98, 92, 91)
bucket22 sum:380, content= (98, 98, 92, 92)
bucket23 sum:380, content= (98, 98, 92, 92)
bucket24 sum:379, content= (98, 98, 92, 91)
bucket25 sum:379, content= (98, 97, 90, 94)

"----Comparison for the 67 example----"

"***tf from benchmark was 405(we added the number of machines) and target function from our local search is 405"

***RESULT IS THE SAME

Run time: 654.176 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 28))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 68 from 130-----"

"-----START 69 from 130-----"

[illegible]

```
bucket5 sum:376, content= (96, 95, 94, 91)
bucket6 sum:376, content= (99, 94, 90, 93)
bucket7 sum:376, content= (99, 90, 94, 93)
bucket8 sum:377, content= (99, 95, 90, 93)
bucket9 sum:377, content= (99, 95, 93, 90)
bucket10 sum:312, content= (14, 100, 99, 99)
bucket11 sum:377, content= (99, 95, 93, 90)
bucket12 sum:376, content= (99, 95, 92, 90)
bucket13 sum:376, content= (98, 92, 91, 95)
bucket14 sum:376, content= (98, 96, 92, 90)
bucket15 sum:376, content= (98, 92, 91, 95)
bucket16 sum:376, content= (98, 96, 91, 91)
bucket17 sum:376, content= (98, 92, 91, 95)
bucket18 sum:376, content= (98, 96, 92, 90)
bucket19 sum:377, content= (98, 95, 94, 90)
bucket20 sum:377, content= (97, 97, 92, 91)
bucket21 sum:377, content= (97, 97, 92, 91)
bucket22 sum:377, content= (97, 97, 92, 91)
bucket23 sum:377, content= (97, 97, 92, 91)
bucket24 sum:377, content= (97, 97, 92, 91)
bucket25 sum:377, content= (97, 95, 94, 91)
"----Comparison for the 69 example----"
"***tf from benchmark was 402(we added the number of machines) and target function from our local search is 402"
***RESULT IS THE SAME
Run time: 578.686 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 70 from 130-----"
"-----START 71 from 130-----"

```

****Data from file NU_1_0500_05_0.txt: machinesNum=5 jobsNum=500"

****SOLUTION Data from file SOL_NU_1_05_0500_0.txt: machinesNum=5 jobsNum=500 lowerBound=9407 upperBound=9407
isOptimal=1"

Content of machines summed (9407, 9407, 9407, 9407, 9404)

input selected: size 500 sum 47032

----Our Results-----

best from Our local search found:

target function = 9412, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:9407, content= (97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 100, 98, 100, 100, 100, 100, 100, 100, 100, 97, 99, 97, 97, 99, 100, 99, 97, 97, 100, 98, 96, 96, 99)

bucket2 sum:9407, content= (100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 99, 99, 98, 98, 100, 98, 99)

bucket3 sum:9405, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 19, 15, 13, 6, 4, 2, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 98, 98, 97, 97)

bucket4 sum:9406, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 98, 98, 97)

bucket5 sum:9407, content= (98, 99, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 97, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90)

"----Comparison for the 70 example----

****tf from benchmark was 9412(we added the number of machines) and target function from our local search is 9412"

***RESULT IS THE SAME

Run time: 27.287 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 1))

"Mistakes(size-numberMistakes):" QMap()


```

bucket3 sum:9401, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 97, 97, 97,
97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93,
93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 98, 98, 97, 97, 96)
bucket4 sum:9401, content= (95, 98, 100, 100, 100, 100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98,
98, 98, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93,
93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90)
bucket5 sum:9398, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 96, 95, 95,
95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91,
91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 16, 10, 10, 7, 6, 3, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 98, 97, 97,
97, 97, 97)
"----Comparison for the 73 example----"
"***tf from benchmark was 9406(we added the number of machines) and target function from our local search is 9406"
***RESULT IS THE SAME
Run time: 28.59 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 4))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 74 from 130-----"
"-----START 75 from 130-----"
"input file number 75: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_05_4.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0500_4.txt"
"***Data from file NU_1_0500_05_4.txt: machinesNum=5 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_05_0500_4.txt: machinesNum=5 jobsNum=500 lowerBound=9381 upperBound=9381
isOptimal=1"
Content of machines summed (9381, 9381, 9381, 9381, 9378)
input selected: size 500 sum 46902

----Our Results-----
best from Our local search found:
target function = 9386, num of machines=5, square root lms=0
machines content(number of jobs=500):

```

```

bucket1 sum:9381, content= (98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95,
95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91,
91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 99, 99, 100, 99, 100, 100, 100, 98, 100, 97, 97, 99, 97, 99)
bucket2 sum:9381, content= (100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96,
96, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93,
93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 98)
bucket3 sum:9381, content= (100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97,
96, 96, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93,
93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 98)
bucket4 sum:9378, content= (100, 100, 100, 100, 100, 100, 100, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 96,
96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92,
92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 18, 16, 15, 13, 4, 2, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98,
98, 98)
bucket5 sum:9381, content= (98, 99, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97,
97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93,
93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90)
"----Comparison for the 74 example----"
"***tf from benchmark was 9386(we added the number of machines) and target function from our local search is 9386"
***RESULT IS THE SAME
Run time: 13.817 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 5))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 75 from 130-----"
"-----START 76 from 130-----"
"input file number 76: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_05_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0500_5.txt"
"***Data from file NU_1_0500_05_5.txt: machinesNum=5 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_05_0500_5.txt: machinesNum=5 jobsNum=500 lowerBound=9408 upperBound=9408
isOptimal=1"
Content of machines summed (9408, 9408, 9408, 9408, 9404)
input selected: size 500 sum 47036

```

----Our Results-----

best from Our local search found:

target function = 9413, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:9408, content= (100, 100, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 99, 99, 99, 99, 100, 100, 100, 98, 100, 100, 98, 100)

bucket2 sum:9406, content= (99, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99)

bucket3 sum:9406, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 19, 18, 17, 10, 5, 4, 100, 100, 100, 100, 100, 100, 100, 100, 99)

bucket4 sum:9408, content= (100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99)

bucket5 sum:9408, content= (99, 99, 100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90)

"----Comparison for the 75 example----

***tf from benchmark was 9413(we added the number of machines) and target function from our local search is 9413"

***RESULT IS THE SAME

Run time: 12.35 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 6))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 76 from 130-----"

"-----START 77 from 130-----"

"input file number 77: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_05_6.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0500_6.txt"

***Data from file NU_1_0500_05_6.txt: machinesNum=5 jobsNum=500"

***SOLUTION Data from file SOL_NU_1_05_0500_6.txt: machinesNum=5 jobsNum=500 lowerBound=9381 upperBound=9381 isOptimal=1"

Content of machines summed (9381, 9381, 9381, 9381, 9379)

input selected: size 500 sum 46903

----Our Results-----

best from Our local search found:

target function = 9386, num of machines=5, square root lms=0

machines content(number of jobs=500):

bucket1 sum:9381, content=(95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 99, 99, 100, 100, 100, 100, 99, 100, 98, 98, 100, 98, 99, 97, 97, 99, 97, 99, 97, 97, 98, 96, 98, 96, 96, 98, 96, 98, 96, 96, 97, 95, 97, 95, 95, 97, 95, 97)

bucket2 sum:9381, content=(100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 98, 97, 97, 96, 96)

bucket3 sum:9381, content=(100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 98, 98, 97, 97, 96, 96)

bucket4 sum:9381, content=(93, 99, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97,
97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93,
93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90)

bucket5 sum:9379, content= (100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 97, 97, 97, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 15, 12, 10, 6, 4, 1, 100, 100, 100, 100, 100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96)

"---Comparison for the 76 example---

***tf from benchmark was 9386(we added the number of machines) and target function from our local search is 9386"

***RESULT IS THE SAME

Run time: 33.232 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 7))

"Mistakes(size-numberMistakes):" QMap()

```
"Avegare error: 0"
"-----END 77 from 130-----"
"-----START 78 from 130-----"
"input file number 78: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_05_7.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_05_0500_7.txt"
"***Data from file NU_1_0500_05_7.txt: machinesNum=5 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_05_0500_7.txt: machinesNum=5 jobsNum=500 lowerBound=9396 upperBound=9396
isOptimal=1"
Content of machines summed (9396, 9396, 9396, 9396, 9395)
input selected: size 500 sum 46979
```

----Our Results-----

best from Our local search found:

target function = 9401, num of machines=5, square root lms=0

machines content(number of jobs=500):

```
bucket1 sum:9396, content= (98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95,
94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90,
90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 99, 99, 99, 99, 100, 98, 100, 100, 100, 100, 100, 99, 97, 97, 99, 97, 99, 97, 99)
bucket2 sum:9396, content= (100, 100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96,
96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 92, 92, 92,
92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 100, 98, 98)
bucket3 sum:9396, content= (98, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97,
97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93,
93, 93, 93, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 99, 98)
bucket4 sum:9395, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 99, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96,
96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92,
91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 19, 18, 13, 7, 7, 1, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98,
98, 98, 98)
bucket5 sum:9396, content= (98, 98, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98, 98, 97,
97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93,
93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90)
```

"----Comparison for the 77 example----

[illegible]


```

bucket2 sum:9391, content= (100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 97, 97,
97, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92,
92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 99, 98, 97, 97, 96, 95)
bucket3 sum:9391, content= (100, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97,
97, 97, 97, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92,
92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 99, 99, 99, 98, 98, 97, 96, 96, 95)
bucket4 sum:9391, content= (100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 97, 97, 97, 97, 97, 96, 95, 95, 95, 94, 94,
94, 94, 93, 93, 93, 93, 93, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90,
90, 90, 90, 18, 9, 8, 3, 2, 1, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 99, 98, 98, 98, 98, 97, 97, 97, 97, 97, 97, 96, 96,
96, 95, 95, 95)
bucket5 sum:9391, content= (98, 98, 98, 98, 99, 100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 98, 98,
97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 93, 93, 93,
93, 93, 92, 92, 92, 92, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90)
"----Comparison for the 79 example----"
"***tf from benchmark was 9396(we added the number of machines) and target function from our local search is 9396"
***RESULT IS THE SAME
Run time: 42.194 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 10))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 80 from 130-----"
"-----START 81 from 130-----"
"input file number 81: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_0.txt"
"***Data from file NU_1_0500_10_0.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_10_0500_0.txt: machinesNum=10 jobsNum=500 lowerBound=4703 upperBound=4703
isOptimal=1"
Content of machines summed (4703, 4703, 4703, 4703, 4703, 4703, 4703, 4703, 4703, 4699)
input selected: size 500 sum 47026

----Our Results-----
best from Our local search found:

```


target function = 4713, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4703, content= (97, 99, 94, 97, 97, 91, 96, 93, 96, 96, 95, 93, 99, 94, 92, 98, 94, 94, 93, 94, 96, 98, 96, 97, 97, 95, 97, 93, 97, 93, 98, 98, 99, 96, 99, 95, 95, 99, 92, 95, 99, 100, 98, 98, 96, 99, 94, 95, 97)

bucket2 sum:4703, content= (91, 94, 94, 92, 92, 91, 91, 91, 100, 100, 100, 100, 99, 99, 99, 92, 92, 91, 100, 92, 100, 100, 99, 98, 98, 98, 94, 100, 92, 100, 100, 98, 99, 91, 99, 98, 94, 99, 92, 95, 98, 95, 95, 95, 95, 93, 96, 98, 94)

bucket3 sum:4703, content= (100, 100, 100, 91, 91, 91, 100, 100, 100, 93, 92, 92, 91, 91, 100, 99, 100, 99, 99, 93, 99, 91, 91, 97, 97, 99, 100, 99, 97, 94, 93, 92, 91, 100, 100, 100, 94, 97, 94, 94, 94, 93, 98, 94, 95, 98, 95, 96, 99)

bucket4 sum:4703, content= (95, 95, 95, 95, 93, 93, 92, 92, 92, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 90, 96, 96, 95, 94, 92, 92, 90, 90, 93, 91, 97, 95, 94, 100, 97, 97, 100, 100, 94, 100, 99, 97, 93, 96, 96, 99, 96, 93, 96, 95)

bucket5 sum:4703, content= (100, 100, 99, 99, 97, 97, 97, 96, 96, 96, 95, 94, 93, 93, 93, 92, 92, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 92, 90, 90, 91, 97, 96, 98, 96, 99, 99, 95, 92, 97, 95, 98, 94, 93, 97, 97)

bucket6 sum:4703, content= (99, 99, 99, 99, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 95, 95, 94, 94, 93, 93, 93, 92, 92, 92, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 96, 90, 95, 92, 95, 97, 96, 91, 97, 98, 93)

bucket7 sum:4703, content= (90, 90, 90, 99, 99, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 90, 91, 95, 93, 94, 94, 94, 94, 92, 93, 93, 92, 92, 92, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 98, 96)

bucket8 sum:4703, content= (99, 100, 100, 100, 100, 98, 92, 92, 92, 92, 92, 90, 90, 90, 90, 90, 90, 100, 100, 96, 97, 96, 99, 93, 97, 96, 96, 92, 100, 96, 98, 98, 97, 97, 96, 98, 100, 99, 97, 95, 97, 98, 100, 97, 92, 96, 94, 100, 99)

bucket9 sum:4702, content= (100, 100, 100, 100, 100, 100, 99, 99, 98, 98, 97, 97, 97, 97, 96, 96, 94, 94, 94, 94, 92, 92, 92, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 13, 11, 95, 94, 97, 97, 98, 96, 94, 94, 99, 97, 96, 96, 94, 100, 99, 100)

bucket10 sum:4700, content= (100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 96, 95, 94, 94, 94, 94, 94, 93, 93, 92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 16, 12, 9, 2, 96)

"----Comparison for the 80 example----

****tf from benchmark was 4713(we added the number of machines) and target function from our local search is 4713"

***RESULT IS THE SAME

Run time: 875.361 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 11))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 81 from 130-----"

"-----START 82 from 130-----"

"input file number 82: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_1.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_1.txt"
"***Data from file NU_1_0500_10_1.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_10_0500_1.txt: machinesNum=10 jobsNum=500 lowerBound=4699 upperBound=4699
isOptimal=1"
Content of machines summed (4699, 4699, 4699, 4699, 4699, 4699, 4699, 4699, 4699, 4692)
input selected: size 500 sum 46983

----Our Results-----

best from Our local search found:

target function = 4709, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4699, content= (92, 93, 91, 91, 91, 93, 93, 95, 92, 91, 92, 97, 98, 92, 97, 92, 96, 92, 94, 99, 99, 95, 99, 96, 100, 93, 100, 96, 92, 95, 93, 99, 91, 96, 95, 94, 93, 95, 93, 93, 93, 92, 91, 92, 94, 92, 91, 91, 93, 92)

bucket2 sum:4699, content= (100, 99, 97, 94, 94, 90, 90, 90, 90, 90, 99, 99, 99, 98, 94, 90, 90, 90, 99, 98, 99, 96, 94, 96, 94, 94, 94, 97, 94, 96, 96, 98, 95, 90, 90, 98, 94, 97, 93, 94, 90, 90, 93, 97, 91, 90, 91, 91, 92, 92, 92)

bucket3 sum:4699, content= (98, 98, 98, 98, 96, 96, 96, 94, 94, 94, 94, 90, 90, 90, 90, 90, 98, 96, 94, 90, 90, 99, 98, 98, 97, 96, 90, 97, 94, 91, 92, 90, 90, 96, 92, 92, 90, 96, 97, 96, 94, 91, 91, 98, 94, 94, 90, 91, 98, 93)

bucket4 sum:4699, content= (90, 99, 100, 100, 98, 98, 97, 97, 97, 96, 94, 94, 94, 91, 99, 99, 99, 99, 100, 100, 97, 100, 96, 98, 91, 90, 91, 99, 94, 99, 91, 91, 99, 99, 99, 94, 90, 91, 99, 99, 97, 91, 90, 99, 95, 91, 91, 98, 99)

bucket5 sum:4699, content= (100, 100, 98, 98, 98, 98, 98, 98, 95, 95, 94, 94, 93, 93, 97, 96, 95, 100, 100, 100, 100, 100, 99, 97, 99, 97, 93, 93, 96, 96, 93, 95, 97, 94, 100, 95, 90, 98, 97, 91, 90, 99, 92, 91, 92, 91, 99, 91)

bucket6 sum:4699, content= (100, 100, 100, 100, 100, 99, 98, 98, 93, 93, 99, 99, 99, 98, 95, 100, 98, 95, 98, 93, 93, 95, 95, 93, 93, 97, 96, 93, 100, 97, 98, 100, 100, 94, 99, 94, 95, 93, 96, 92, 92, 96, 90, 91, 91, 91, 94, 95, 91)

bucket7 sum:4699, content= (100, 100, 100, 100, 99, 99, 99, 98, 98, 97, 97, 97, 97, 97, 93, 93, 93, 92, 96, 95, 97, 92, 92, 99, 100, 99, 96, 99, 95, 98, 100, 98, 98, 93, 93, 98, 93, 95, 95, 92, 92, 92, 93, 92, 95, 94, 96, 92, 91)

bucket8 sum:4698, content= (100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 97, 97, 97, 97, 97, 94, 94, 94, 93, 93, 92, 92, 92, 92, 92, 92, 7, 91, 91, 91, 6, 92, 92, 98, 99, 98, 97, 95, 100, 100, 97, 94, 97, 97, 92, 97, 96, 94, 94, 92, 95, 92)

bucket9 sum:4693, content= (100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 97, 97, 96, 96, 96, 95, 95, 95, 95, 95, 94, 94, 94, 94, 93, 93, 93, 93, 93, 92, 92, 92, 92, 92, 91, 91, 91, 91, 16, 91, 91, 91, 5, 5, 5, 92)

bucket10 sum:4699, content= (94, 94, 94, 95, 96, 96, 96, 96, 96, 96, 97, 97, 97, 97, 97, 97, 97, 97, 95, 96, 96, 94, 95, 95, 95, 95, 94, 94, 94, 94, 93, 93, 93, 93, 93, 92, 92, 92, 92, 90, 91, 91, 90, 90, 90, 90, 90, 90, 91)

"----Comparison for the 81 example----"

****tf from benchmark was 4709(we added the number of machines) and target function from our local search is 4709"

***RESULT IS THE SAME

Run time: 1366.96 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 12))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 82 from 130-----"

"-----START 83 from 130-----"

"input file number 83: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_2.txt and

solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_2.txt"

****Data from file NU_1_0500_10_2.txt: machinesNum=10 jobsNum=500"

****SOLUTION Data from file SOL_NU_1_10_0500_2.txt: machinesNum=10 jobsNum=500 lowerBound=4686 upperBound=4686
isOptimal=1"

Content of machines summed (4686, 4686, 4686, 4686, 4686, 4686, 4686, 4686, 4685, 4683)

input selected: size 500 sum 46856

----Our Results-----

best from Our local search found:

target function = 4696, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4686, content= (93, 93, 99, 98, 92, 98, 96, 96, 91, 96, 94, 94, 95, 91, 98, 92, 93, 91, 95, 91, 95, 92, 91, 91, 92, 92, 93, 91, 93, 96, 91, 99, 96, 93, 92, 91, 91, 93, 97, 92, 94, 96, 92, 95, 95, 91, 92, 97, 95, 92)

bucket2 sum:4686, content= (98, 98, 91, 90, 98, 90, 99, 98, 95, 95, 90, 98, 96, 95, 95, 98, 90, 90, 95, 90, 98, 92, 96, 92, 99, 90, 96, 98, 93, 90, 90, 93, 97, 90, 98, 91, 91, 91, 91, 91, 91, 92, 92, 97, 92, 94, 91, 98, 92, 91)

bucket3 sum:4685, content= (99, 100, 100, 100, 100, 100, 100, 99, 99, 100, 100, 99, 97, 97, 97, 93, 93, 100, 97, 93, 97, 91, 92, 100, 97, 92, 96, 96, 91, 93, 91, 90, 99, 97, 97, 90, 96, 90, 91, 93, 94, 91, 91, 95, 93, 99, 94, 92, 94)

bucket4 sum:4686, content= (100, 100, 100, 99, 97, 96, 96, 94, 94, 96, 99, 95, 95, 94, 100, 100, 99, 95, 93, 96, 94, 94, 93, 93, 93, 96, 96, 100, 98, 96, 94, 96, 99, 100, 99, 98, 95, 93, 93, 94, 90, 98, 93, 93, 91, 90, 93, 95, 91)

bucket5 sum:4686, content= (100, 100, 100, 100, 100, 98, 98, 98, 98, 95, 95, 95, 91, 91, 94, 98, 94, 95, 95, 98, 95, 100, 98, 95, 95, 94, 94, 97, 97, 97, 95, 94, 92, 92, 93, 94, 92, 95, 100, 94, 94, 97, 98, 91, 91, 98, 94, 92, 95)

```

bucket6 sum:4686, content= (100, 100, 100, 100, 99, 99, 97, 96, 96, 94, 91, 91, 97, 96, 92, 100, 94, 93, 99, 94, 98, 96, 96, 94, 95, 92, 92, 94, 93,
98, 99, 98, 92, 93, 99, 96, 96, 95, 92, 99, 92, 94, 99, 93, 97, 92, 96, 94, 94)
bucket7 sum:4685, content= (100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 96, 96, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 93, 93,
93, 93, 92, 92, 92, 91, 13, 11, 92, 92, 92, 92, 93, 92, 97, 92, 97, 92, 92, 98, 95, 93)
bucket8 sum:4684, content= (100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94,
93, 93, 93, 93, 92, 92, 92, 92, 92, 91, 91, 91, 91, 91, 15, 91, 91, 13, 91, 4, 2, 96, 92, 98)
bucket9 sum:4686, content= (100, 100, 99, 99, 99, 98, 98, 98, 97, 97, 97, 97, 97, 96, 96, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94, 93, 93, 92, 92,
91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 91, 91, 91, 90, 91, 91, 91)
bucket10 sum:4686, content= (90, 93, 96, 90, 96, 97, 97, 98, 98, 98, 98, 98, 94, 97, 97, 97, 95, 96, 96, 95, 95, 95, 95, 95, 95, 94, 94, 94, 94, 94,
94, 90, 93, 93, 92, 92, 92, 92, 92, 92, 90, 90, 91, 90, 90, 90, 90, 90)
"----Comparison for the 82 example----"
"***tf from benchmark was 4696(we added the number of machines) and target function from our local search is 4696"
***RESULT IS THE SAME
Run time: 1319.15 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 13))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 83 from 130-----"
"-----START 84 from 130-----"
"input file number 84: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_3.txt"
"***Data from file NU_1_0500_10_3.txt: machinesNum=10 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_10_0500_3.txt: machinesNum=10 jobsNum=500 lowerBound=4701 upperBound=4701
isOptimal=1"
Content of machines summed (4701, 4701, 4701, 4701, 4701, 4701, 4701, 4701, 4701, 4698)
input selected: size 500 sum 47007

----Our Results-----
best from Our local search found:
target function = 4711, num of machines=10, square root lms=0
machines content(number of jobs=500):

```

bucket1 sum:4701, content= (95, 91, 97, 93, 95, 91, 97, 100, 97, 100, 96, 95, 96, 100, 100, 99, 100, 97, 96, 98, 94, 100, 94, 93, 100, 96, 100, 95, 96, 95, 99, 95, 93, 97, 94, 95, 97, 98, 99, 92, 92, 95, 93, 93, 96, 94, 98, 92, 93)
 bucket2 sum:4701, content= (93, 92, 92, 100, 100, 100, 100, 94, 93, 92, 92, 91, 92, 100, 98, 98, 95, 95, 94, 98, 95, 93, 92, 91, 92, 100, 100, 96, 98, 99, 96, 98, 98, 95, 93, 99, 95, 94, 96, 98, 90, 99, 99, 93, 98, 100, 98, 99, 98)
 bucket3 sum:4701, content= (100, 100, 93, 92, 92, 91, 91, 91, 90, 90, 90, 100, 100, 95, 91, 100, 96, 96, 95, 95, 99, 93, 100, 98, 97, 97, 97, 97, 100, 99, 97, 98, 100, 97, 100, 100, 99, 97, 98, 95, 96, 97, 93, 92, 92, 98, 97, 99, 91)
 bucket4 sum:4701, content= (100, 100, 99, 99, 99, 93, 91, 91, 95, 94, 93, 91, 91, 94, 94, 98, 93, 98, 93, 91, 96, 97, 91, 100, 100, 100, 99, 99, 99, 99, 96, 96, 95, 99, 96, 97, 97, 95, 99, 94, 92, 93, 99, 93, 98, 99, 99, 95, 92)
 bucket5 sum:4701, content= (95, 95, 95, 95, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 98, 98, 98, 98, 97, 97, 96, 95, 94, 94, 93, 92, 90, 90, 92, 91, 96, 94, 98, 94, 97, 100, 99, 100, 100, 95)
 bucket6 sum:4701, content= (99, 99, 98, 98, 98, 98, 98, 99, 97, 96, 96, 96, 96, 95, 95, 95, 94, 93, 93, 93, 93, 93, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 93, 94, 97, 95, 95, 94, 97, 96, 96, 96, 97)
 bucket7 sum:4701, content= (90, 90, 97, 99, 98, 98, 98, 98, 98, 98, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 95, 94, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 99, 90, 90, 97, 94, 92)
 bucket8 sum:4701, content= (90, 90, 92, 92, 96, 98, 97, 99, 94, 98, 98, 98, 98, 98, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 95, 94, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90)
 bucket9 sum:4701, content= (100, 100, 100, 100, 99, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 94, 94, 94, 94, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 16, 12, 6, 96, 94, 95, 98, 99, 93, 96, 94)
 bucket10 sum:4698, content= (100, 100, 100, 100, 99, 99, 99, 99, 98, 98, 98, 98, 98, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 95, 95, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 16, 12, 11, 95, 93)
 "----Comparison for the 83 example----"
 "****tf from benchmark was 4711(we added the number of machines) and target function from our local search is 4711"
 ***RESULT IS THE SAME
 Run time: 738.422 seconds
 "Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 14))
 "Mistakes(size-numberMistakes):" QMap()
 "Avegare error: 0"
 "-----END 84 from 130-----"
 "-----START 85 from 130-----"
 "input file number 85: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_4.txt and
 solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_4.txt"
 "***Data from file NU_1_0500_10_4.txt: machinesNum=10 jobsNum=500"

***SOLUTION Data from file SOL_NU_1_10_0500_4.txt: machinesNum=10 jobsNum=500 lowerBound=4696 upperBound=4696
isOptimal=1"

Content of machines summed (4696, 4696, 4696, 4696, 4696, 4696, 4696, 4696, 4696, 4693)
input selected: size 500 sum 46957

----Our Results-----

best from Our local search found:

target function = 4706, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4696, content= (99, 91, 92, 98, 99, 98, 99, 98, 98, 100, 98, 93, 100, 95, 96, 97, 96, 97, 99, 91, 94, 98, 98, 97, 98, 98, 98, 100, 99, 93, 100, 96, 91, 94, 94, 97, 90, 96, 92, 91, 91, 91, 95, 97, 99, 92, 93, 92, 98)

bucket2 sum:4696, content= (91, 90, 90, 92, 99, 91, 92, 93, 91, 99, 99, 92, 91, 99, 99, 99, 94, 91, 98, 100, 93, 99, 98, 99, 98, 100, 100, 100, 98, 98, 93, 98, 94, 91, 99, 99, 98, 99, 95, 90, 99, 99, 99, 99, 99, 90, 93, 95, 94)

bucket3 sum:4696, content= (100, 91, 91, 90, 90, 90, 20, 91, 91, 100, 95, 100, 95, 95, 96, 95, 91, 100, 100, 97, 97, 97, 96, 96, 95, 91, 100, 94, 98, 96, 98, 100, 95, 93, 93, 98, 93, 96, 97, 94, 100, 95, 91, 91, 91, 100, 98, 99, 98, 98)

bucket4 sum:4696, content= (100, 100, 100, 100, 98, 98, 97, 96, 96, 96, 94, 94, 94, 93, 93, 90, 90, 19, 96, 93, 100, 93, 92, 96, 96, 100, 100, 94, 96, 94, 97, 93, 100, 93, 96, 96, 92, 94, 93, 100, 94, 100, 91, 93, 91, 96, 99, 96, 92, 92)

bucket5 sum:4696, content= (100, 100, 100, 100, 100, 99, 97, 97, 96, 96, 96, 96, 96, 95, 93, 93, 92, 92, 92, 91, 90, 90, 95, 94, 20, 94, 100, 91, 95, 94, 92, 94, 99, 99, 95, 93, 100, 92, 100, 95, 100, 99, 92, 91, 93, 95, 99, 96, 91, 97)

bucket6 sum:4696, content= (100, 100, 100, 100, 100, 99, 97, 97, 96, 96, 96, 95, 95, 94, 94, 94, 93, 93, 93, 92, 91, 90, 90, 90, 90, 100, 100, 100, 100, 95, 94, 93, 92, 16, 93, 93, 97, 96, 98, 92, 92, 100, 97, 97, 100, 100, 94, 98, 92, 92)

bucket7 sum:4695, content= (99, 98, 97, 97, 96, 96, 96, 96, 96, 95, 95, 94, 94, 94, 93, 93, 93, 93, 93, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 94, 92, 90, 90, 90, 90, 90, 92, 95, 100, 96, 99, 99, 100, 2, 92, 99, 98, 98, 93)

bucket8 sum:4694, content= (99, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 96, 95, 95, 95, 94, 94, 94, 94, 93, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 90, 90, 90, 90, 97, 95, 4, 99, 99, 100, 99, 93)

bucket9 sum:4696, content= (98, 99, 97, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 93, 95, 95, 95, 94, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90, 93, 91, 94, 98, 95, 91, 97, 90)

bucket10 sum:4696, content= (90, 90, 91, 95, 97, 96, 96, 97, 99, 98, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 95, 95, 94, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 90, 90, 90)

"----Comparison for the 84 example----

***tf from benchmark was 4706(we added the number of machines) and target function from our local search is 4706"

***RESULT IS THE SAME

Run time: 1084.32 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 15))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 85 from 130-----"

"-----START 86 from 130-----"

"input file number 86: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_5.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_5.txt"

****Data from file NU_1_0500_10_5.txt: machinesNum=10 jobsNum=500"

****SOLUTION Data from file SOL_NU_1_10_0500_5.txt: machinesNum=10 jobsNum=500 lowerBound=4706 upperBound=4706
isOptimal=1"

Content of machines summed (4706, 4706, 4706, 4706, 4706, 4706, 4706, 4706, 4706, 4705)

input selected: size 500 sum 47059

----Our Results-----

best from Our local search found:

target function = 4716, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4706, content= (96, 94, 91, 92, 95, 91, 91, 96, 92, 92, 92, 98, 91, 94, 91, 91, 97, 93, 93, 92, 94, 92, 94, 92, 93, 91, 91, 97, 92, 99, 92, 97, 92, 96, 99, 99, 100, 93, 98, 98, 97, 96, 94, 95, 96, 91, 96, 92, 93, 95)

bucket2 sum:4706, content= (90, 90, 90, 90, 90, 97, 94, 90, 90, 90, 90, 98, 99, 96, 97, 98, 95, 97, 94, 90, 97, 93, 95, 96, 99, 95, 90, 96, 99, 99, 95, 94, 92, 90, 91, 97, 98, 98, 97, 90, 92, 95, 90, 98, 93, 96, 90, 91, 98, 97)

bucket3 sum:4706, content= (99, 97, 98, 97, 96, 95, 93, 93, 93, 93, 90, 90, 90, 90, 90, 98, 97, 96, 93, 90, 98, 98, 97, 94, 93, 94, 90, 99, 99, 97, 95, 93, 90, 96, 94, 97, 96, 94, 90, 91, 96, 95, 96, 90, 93, 98, 90, 90, 90, 95)

bucket4 sum:4706, content= (100, 100, 100, 100, 100, 100, 90, 90, 100, 100, 100, 100, 100, 100, 100, 97, 97, 93, 93, 99, 99, 98, 98, 98, 100, 100, 95, 93, 95, 98, 90, 90, 99, 99, 96, 90, 93, 93, 93, 96, 91, 90, 94, 99, 93, 91, 91, 91, 94)

bucket5 sum:4706, content= (100, 100, 100, 97, 95, 95, 100, 94, 95, 93, 94, 97, 97, 97, 93, 95, 93, 100, 100, 100, 100, 100, 100, 93, 93, 95, 93, 94, 93, 95, 93, 96, 93, 96, 94, 100, 95, 95, 97, 98, 99, 97, 98, 94, 97, 93, 91, 99, 90)

bucket6 sum:4706, content= (99, 100, 100, 100, 100, 100, 98, 98, 98, 98, 96, 95, 95, 95, 93, 100, 95, 98, 98, 99, 92, 92, 93, 95, 92, 93, 93, 95, 92, 97, 95, 95, 98, 100, 100, 100, 94, 100, 97, 98, 97, 94, 93, 99, 94, 90, 91, 91, 91)

bucket7 sum:4706, content= (100, 100, 100, 100, 100, 100, 100, 99, 97, 97, 97, 97, 96, 93, 92, 92, 92, 92, 92, 94, 92, 96, 92, 93, 92, 92, 96, 99, 99, 98, 99, 100, 98, 96, 98, 95, 97, 92, 96, 97, 93, 99, 95, 99, 94, 95, 95, 95, 94)

bucket8 sum:4706, content= (100, 100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 97, 97, 97, 97, 96, 96, 96, 95, 95, 95, 95, 95, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 16, 91, 91, 91, 91, 12, 92, 92, 92, 98, 100, 98, 97, 100, 94)
 bucket9 sum:4705, content= (100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 98, 97, 97, 97, 97, 96, 96, 96, 95, 95, 95, 95, 95, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 15, 91, 91, 7, 91, 6, 4, 99, 98, 95, 97, 97, 94)
 bucket10 sum:4706, content= (94, 95, 95, 95, 95, 96, 96, 96, 97, 97, 97, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 95, 95, 95, 94, 94, 94, 94, 91, 93, 93, 93, 93, 93, 92, 92, 91, 91, 90, 90, 90, 90, 90, 90, 90, 91)
 "----Comparison for the 85 example----"
 "****tf from benchmark was 4716(we added the number of machines) and target function from our local search is 4716"
 ***RESULT IS THE SAME
 Run time: 1231.93 seconds
 "Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 16))
 "Mistakes(size-numberMistakes):" QMap()
 "Avegare error: 0"
 "-----END 86 from 130-----"
 "-----START 87 from 130-----"
 "input file number 87: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_6.txt and
 solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_6.txt"
 "****Data from file NU_1_0500_10_6.txt: machinesNum=10 jobsNum=500"
 "****SOLUTION Data from file SOL_NU_1_10_0500_6.txt: machinesNum=10 jobsNum=500 lowerBound=4704 upperBound=4704
 isOptimal=1"
 Content of machines summed (4704, 4704, 4704, 4704, 4704, 4704, 4704, 4704, 4704, 4701)
 input selected: size 500 sum 47037

----Our Results-----

best from Our local search found:

target function = 4714, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4704, content= (91, 93, 92, 97, 95, 97, 97, 91, 99, 93, 97, 98, 94, 93, 96, 95, 92, 96, 93, 98, 91, 94, 96, 90, 97, 92, 95, 95, 96, 90, 90, 91, 91, 91, 92, 94, 99, 98, 94, 92, 94, 92, 94, 98, 96, 91, 91, 95, 95, 93)
 bucket2 sum:4704, content= (94, 90, 99, 99, 99, 90, 90, 90, 90, 99, 97, 97, 90, 96, 98, 95, 90, 91, 95, 91, 94, 96, 98, 96, 90, 98, 96, 92, 94, 98, 92, 95, 91, 90, 92, 100, 97, 90, 96, 95, 95, 96, 91, 94, 93, 92, 92, 90, 97, 94)

[illegible]

----Our Results-----

best from Our local search found:

target function = 4716, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4706, content= (95, 93, 93, 94, 92, 94, 93, 91, 92, 93, 92, 92, 92, 91, 95, 92, 96, 91, 91, 91, 91, 91, 91, 93, 93, 92, 97, 92, 92, 97, 92, 98, 92, 98, 100, 97, 98, 100, 99, 98, 98, 98, 96, 92, 96, 95, 95, 94, 94, 94)

bucket2 sum:4706, content= (95, 93, 90, 90, 90, 90, 90, 99, 96, 95, 93, 90, 90, 90, 99, 98, 99, 99, 98, 97, 96, 96, 96, 95, 90, 98, 93, 99, 97, 93, 93, 90, 90, 97, 96, 93, 90, 90, 98, 97, 94, 90, 90, 90, 98, 97, 94, 90, 98, 97)

bucket3 sum:4706, content= (99, 98, 98, 98, 98, 98, 98, 96, 96, 96, 95, 90, 90, 90, 90, 90, 98, 98, 90, 90, 99, 98, 97, 94, 93, 90, 97, 99, 95, 94, 91, 90, 96, 98, 95, 96, 91, 91, 93, 91, 93, 91, 93, 98, 94, 91, 90, 90, 91, 91)

bucket4 sum:4706, content= (98, 100, 100, 100, 100, 100, 100, 100, 100, 100, 98, 98, 97, 96, 91, 91, 99, 99, 99, 98, 100, 100, 96, 91, 90, 99, 99, 91, 90, 96, 93, 99, 99, 94, 92, 90, 94, 99, 99, 99, 93, 92, 95, 90, 96, 92, 90, 91, 99, 94)

bucket5 sum:4706, content= (98, 100, 100, 100, 99, 99, 98, 96, 100, 96, 95, 94, 93, 98, 94, 94, 100, 100, 100, 98, 100, 99, 93, 98, 95, 95, 96, 94, 93, 93, 92, 98, 95, 99, 92, 94, 94, 94, 98, 99, 96, 96, 98, 96, 91, 91, 91, 91, 93)

bucket6 sum:4706, content= (100, 100, 100, 100, 100, 100, 98, 98, 91, 91, 91, 100, 100, 99, 100, 99, 100, 92, 98, 96, 95, 92, 92, 93, 96, 97, 96, 94, 100, 99, 100, 98, 99, 97, 97, 94, 95, 95, 95, 94, 97, 90, 90, 93, 92, 90, 91, 99, 93)

bucket7 sum:4706, content= (100, 100, 100, 100, 99, 98, 98, 98, 98, 98, 97, 96, 96, 95, 95, 91, 91, 91, 95, 92, 95, 92, 95, 99, 94, 99, 100, 99, 100, 100, 100, 92, 98, 97, 94, 94, 94, 95, 95, 92, 94, 93, 93, 96, 97, 94, 94, 94, 99)

bucket8 sum:4706, content= (100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 96, 96, 96, 95, 95, 95, 94, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 91, 91, 91, 91, 91, 9, 91, 91, 91, 91, 17, 98, 93, 98, 99, 99, 98, 99, 99, 99, 97, 97, 100)

bucket9 sum:4706, content= (100, 100, 100, 100, 100, 99, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 97, 97, 96, 96, 96, 96, 95, 95, 95, 95, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 91, 91, 91, 91, 91, 17, 91, 91, 91, 91, 9, 8, 1, 96, 95)

bucket10 sum:4706, content= (93, 94, 95, 96, 96, 96, 97, 97, 97, 97, 97, 97, 97, 98, 98, 98, 97, 97, 97, 96, 96, 96, 96, 92, 95, 95, 95, 95, 93, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 90, 91, 91, 91, 90, 90, 90, 90, 90, 90)

"----Comparison for the 87 example----

****tf from benchmark was 4716(we added the number of machines) and target function from our local search is 4716"

***RESULT IS THE SAME

Run time: 1186.86 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 18))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 88 from 130-----"

"-----START 89 from 130-----"

"input file number 89: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_8.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_8.txt"

****Data from file NU_1_0500_10_8.txt: machinesNum=10 jobsNum=500"

****SOLUTION Data from file SOL_NU_1_10_0500_8.txt: machinesNum=10 jobsNum=500 lowerBound=4695 upperBound=4695
isOptimal=1"

Content of machines summed (4695, 4695, 4695, 4695, 4695, 4695, 4695, 4695, 4695, 4693)

input selected: size 500 sum 46948

----Our Results-----

best from Our local search found:

target function = 4705, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4695, content= (93, 98, 98, 92, 95, 93, 94, 94, 93, 94, 94, 92, 92, 98, 95, 91, 92, 91, 92, 91, 91, 92, 92, 91, 91, 95, 92, 95, 92, 91,
91, 98, 91, 96, 92, 91, 92, 92, 98, 92, 98, 92, 98, 92, 99, 97, 98, 100, 97, 97)

bucket2 sum:4695, content= (95, 90, 90, 90, 90, 90, 90, 99, 99, 99, 99, 90, 90, 90, 90, 98, 98, 99, 98, 98, 95, 93, 93, 92, 93, 95, 93, 94, 95, 90, 90,
98, 98, 97, 95, 95, 90, 94, 92, 93, 95, 93, 96, 90, 95, 98, 98, 93, 97, 91, 91)

bucket3 sum:4695, content= (98, 98, 98, 96, 96, 96, 95, 95, 95, 94, 94, 93, 90, 90, 90, 90, 90, 98, 97, 94, 92, 90, 90, 99, 99, 96, 98, 94, 93, 93,
90, 96, 97, 96, 94, 92, 92, 90, 98, 97, 90, 90, 97, 92, 95, 90, 96, 90, 91, 91)

bucket4 sum:4695, content= (90, 90, 100, 100, 100, 100, 100, 100, 98, 97, 96, 96, 95, 95, 94, 93, 99, 99, 99, 98, 100, 100, 95, 97, 95, 90, 91, 99,
99, 99, 96, 91, 90, 99, 99, 93, 93, 91, 99, 99, 99, 99, 91, 90, 99, 92, 90, 90, 91)

bucket5 sum:4695, content= (100, 100, 100, 100, 98, 98, 98, 98, 95, 100, 95, 95, 95, 96, 94, 93, 94, 100, 100, 100, 100, 100, 93, 97, 94, 95, 95,
94, 94, 94, 94, 96, 95, 93, 97, 92, 99, 97, 90, 99, 98, 90, 95, 90, 97, 92, 90, 90, 96)

bucket6 sum:4695, content= (100, 100, 100, 100, 98, 98, 98, 98, 97, 94, 93, 93, 93, 93, 94, 100, 98, 100, 100, 96, 93, 94, 93, 93, 95, 97, 96, 93,
95, 92, 92, 96, 92, 100, 100, 99, 98, 100, 98, 96, 96, 94, 94, 91, 91, 93, 91, 91, 99)

bucket7 sum:4695, content= (100, 100, 100, 100, 99, 98, 98, 98, 98, 98, 98, 96, 95, 95, 95, 95, 94, 94, 94, 93, 92, 92, 92, 92, 18, 91, 91, 91, 92,
94, 92, 94, 92, 92, 93, 100, 98, 94, 100, 100, 98, 100, 98, 99, 96, 94, 95, 90, 91, 96)

bucket8 sum:4695, content= (100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 98, 98, 98, 97, 97, 97, 97, 97, 95, 95, 94, 94, 94, 93, 93, 93, 93, 93,
20, 91, 91, 91, 91, 95, 93, 93, 96, 93, 93, 92, 93, 92, 96, 96, 92, 99, 97, 92, 93)

bucket9 sum:4693, content= (100, 100, 100, 100, 99, 99, 99, 99, 97, 97, 97, 97, 96, 96, 96, 95, 95, 95, 95, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93,
92, 92, 92, 92, 92, 92, 91, 91, 91, 91, 8, 14, 4, 91, 91, 91, 91, 5, 99, 99, 99, 100, 99, 98)

bucket10 sum:4695, content= (92, 93, 94, 96, 96, 96, 96, 96, 96, 96, 97, 97, 97, 97, 97, 97, 97, 96, 96, 96, 96, 96, 95, 95, 95, 94, 94, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 92, 92, 91, 91, 90, 90, 90, 90, 90, 90, 90)

"----Comparison for the 88 example----"

****tf from benchmark was 4705(we added the number of machines) and target function from our local search is 4705"

***RESULT IS THE SAME

Run time: 1155.14 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 19))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 89 from 130-----"

"-----START 90 from 130-----"

"input file number 90: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_10_9.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_10_0500_9.txt"

****Data from file NU_1_0500_10_9.txt: machinesNum=10 jobsNum=500"

****SOLUTION Data from file SOL_NU_1_10_0500_9.txt: machinesNum=10 jobsNum=500 lowerBound=4706 upperBound=4706
isOptimal=1"

Content of machines summed (4706, 4706, 4706, 4706, 4706, 4706, 4706, 4706, 4706, 4703)

input selected: size 500 sum 47057

----Our Results-----

best from Our local search found:

target function = 4716, num of machines=10, square root lms=0

machines content(number of jobs=500):

bucket1 sum:4706, content= (100, 96, 100, 98, 95, 91, 100, 93, 98, 100, 99, 95, 93, 91, 91, 98, 92, 96, 94, 95, 96, 97, 99, 99, 98, 92, 98, 92, 93, 96, 92, 97, 91, 94, 96, 96, 100, 93, 97, 97, 96, 96, 98, 98, 99, 99, 99, 96, 97)

bucket2 sum:4706, content= (100, 100, 100, 100, 94, 92, 91, 91, 100, 100, 100, 100, 100, 93, 93, 92, 92, 100, 97, 97, 92, 91, 91, 98, 98, 91, 96, 94, 97, 98, 100, 100, 96, 100, 93, 93, 97, 93, 92, 100, 94, 95, 99, 99, 90, 95, 95, 99, 98)

bucket3 sum:4706, content= (100, 100, 94, 94, 93, 91, 94, 93, 93, 92, 91, 91, 100, 96, 93, 93, 92, 92, 91, 97, 97, 98, 99, 100, 100, 100, 99, 100, 94, 94, 94, 99, 93, 94, 96, 100, 100, 99, 97, 99, 100, 100, 96, 94, 94, 99, 97, 98, 96)

bucket4 sum:4706, content= (95, 94, 94, 93, 92, 91, 91, 91, 91, 90, 90, 99, 99, 98, 98, 96, 95, 94, 94, 93, 92, 91, 90, 90, 96, 95, 98, 91, 92, 94, 97, 99, 98, 95, 94, 93, 97, 96, 100, 93, 97, 91, 93, 95, 92, 96, 94, 93, 91, 95)

```

bucket5 sum:4706, content= (97, 97, 97, 96, 95, 95, 95, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 92, 91, 91, 91, 91, 90, 90, 90, 90, 90, 99, 99,
96, 98, 98, 94, 92, 91, 90, 91, 96, 95, 97, 99, 96, 97, 92, 99, 99, 95, 96, 97)
bucket6 sum:4706, content= (90, 98, 98, 98, 97, 97, 96, 96, 96, 96, 95, 95, 95, 95, 95, 94, 94, 94, 94, 93, 93, 93, 93, 92, 92, 92, 92, 92, 91, 91,
91, 91, 91, 90, 90, 90, 90, 90, 90, 98, 98, 98, 97, 96, 96, 97, 98, 97, 93, 98)
bucket7 sum:4706, content= (90, 90, 90, 91, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 96, 97, 97, 96, 96, 96, 96, 95, 95, 95, 95, 94, 94, 94, 94, 94,
94, 93, 93, 93, 93, 93, 90, 92, 92, 92, 91, 91, 91, 91, 91, 91, 90, 90, 90, 90, 96)
bucket8 sum:4706, content= (100, 100, 100, 100, 100, 99, 99, 98, 96, 96, 95, 95, 93, 94, 94, 94, 94, 92, 92, 91, 91, 91, 91, 90, 90, 20, 94, 95, 94,
93, 98, 100, 95, 99, 98, 100, 99, 98, 97, 97, 99, 92, 94, 99, 96, 94, 92, 94, 96, 98)
bucket9 sum:4705, content= (100, 100, 100, 100, 100, 99, 99, 99, 98, 98, 98, 97, 97, 97, 96, 96, 95, 95, 95, 94, 94, 94, 94, 94, 94, 93, 93, 93,
92, 92, 92, 91, 91, 91, 90, 90, 90, 19, 14, 100, 99, 93, 94, 93, 92, 97, 97, 94, 98, 97)
bucket10 sum:4704, content= (100, 100, 100, 100, 99, 99, 99, 99, 99, 98, 98, 97, 97, 97, 97, 97, 96, 96, 96, 96, 95, 95, 95, 94, 94, 94, 94, 94, 94,
93, 93, 93, 93, 93, 92, 92, 92, 92, 91, 91, 91, 91, 91, 90, 90, 90, 18, 13, 10, 99, 100, 97)
"----Comparison for the 89 example----"
"***tf from benchmark was 4716(we added the number of machines) and target function from our local search is 4716"
***RESULT IS THE SAME
Run time: 814.135 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 20))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 90 from 130-----"
"-----START 91 from 130-----"
"input file number 91: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_25_0.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0500_0.txt"
"***Data from file NU_1_0500_25_0.txt: machinesNum=25 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_25_0500_0.txt: machinesNum=25 jobsNum=500 lowerBound=1878 upperBound=1878
isOptimal=1"
Content of machines summed (1878, 1871, 1875, 1878, 1878, 1878, 1878, 1878, 1871, 1878, 1878, 1878, 1878, 1878, 1878, 1878, 1878, 1878,
1878, 1878, 1878, 1878, 1878, 1878, 1878)
input selected: size 500 sum 46933

----Our Results-----
best from Our local search found:

```

target function = 1903, num of machines=25, square root lms=0

machines content(number of jobs=500):

bucket1 sum:1877, content= (98, 98, 98, 98, 100, 99, 99, 98, 98, 100, 100, 100, 98, 98, 98, 98, 100, 99, 100)

bucket2 sum:1876, content= (98, 98, 98, 98, 98, 98, 98, 98, 98, 98, 98, 6, 99, 99, 99, 99, 99, 99, 100, 98)

bucket3 sum:1876, content= (100, 100, 100, 99, 98, 98, 98, 99, 98, 98, 98, 98, 98, 99, 99, 99, 99, 99, 99, 99)

bucket4 sum:1876, content= (99, 99, 99, 100, 99, 99, 99, 99, 99, 98, 98, 98, 98, 98, 98, 99, 99, 99, 99, 99)

bucket5 sum:1878, content= (95, 96, 90, 93, 90, 97, 92, 96, 92, 96, 91, 94, 96, 98, 91, 91, 96, 98, 91, 95)

bucket6 sum:1878, content= (97, 94, 94, 94, 94, 94, 94, 94, 92, 92, 90, 92, 96, 96, 91, 98, 92, 90, 97, 97)

bucket7 sum:1878, content= (97, 90, 92, 95, 92, 94, 95, 93, 94, 93, 93, 94, 91, 98, 93, 90, 97, 97, 97, 93)

bucket8 sum:1878, content= (90, 94, 91, 94, 95, 95, 95, 94, 91, 92, 94, 98, 98, 93, 92, 91, 92, 98, 98, 93)

bucket9 sum:1878, content= (91, 90, 90, 93, 93, 95, 95, 95, 95, 95, 95, 91, 91, 93, 95, 95, 98, 98, 95, 95)

bucket10 sum:1878, content= (94, 93, 93, 92, 90, 90, 90, 96, 96, 95, 92, 92, 95, 90, 94, 92, 100, 98, 97, 99)

bucket11 sum:1877, content= (93, 93, 93, 92, 90, 90, 96, 96, 96, 96, 96, 93, 90, 92, 95, 98, 96, 91, 92, 99)

bucket12 sum:1877, content= (95, 94, 93, 93, 93, 91, 90, 95, 96, 91, 96, 94, 96, 95, 95, 95, 100, 93, 91, 91)

bucket13 sum:1877, content= (94, 93, 93, 93, 91, 91, 91, 90, 90, 96, 96, 96, 96, 94, 94, 94, 94, 94, 100, 97)

bucket14 sum:1877, content= (95, 94, 93, 93, 91, 91, 91, 90, 90, 96, 96, 96, 96, 95, 95, 95, 92, 92, 99, 97)

bucket15 sum:1877, content= (95, 95, 94, 93, 93, 91, 91, 91, 90, 90, 95, 93, 96, 96, 94, 96, 96, 92, 99, 97)

bucket16 sum:1877, content= (96, 96, 95, 95, 94, 93, 92, 92, 91, 91, 90, 90, 97, 96, 91, 96, 90, 96, 98, 98)

bucket17 sum:1877, content= (97, 96, 96, 95, 95, 94, 93, 93, 92, 91, 90, 90, 97, 97, 97, 97, 97, 90, 90, 90)

bucket18 sum:1878, content= (97, 96, 96, 95, 95, 94, 93, 93, 92, 91, 91, 90, 90, 97, 97, 97, 97, 97, 90, 90)

bucket19 sum:1878, content= (97, 96, 96, 95, 94, 93, 92, 92, 91, 91, 90, 90, 97, 97, 97, 97, 97, 90, 90, 96)

bucket20 sum:1878, content= (97, 96, 96, 95, 94, 93, 93, 92, 92, 91, 91, 90, 90, 97, 97, 97, 97, 97, 91, 92)

bucket21 sum:1878, content= (92, 97, 96, 96, 95, 95, 94, 93, 93, 92, 91, 91, 90, 90, 97, 97, 97, 97, 90, 95)

bucket22 sum:1878, content= (97, 97, 96, 96, 95, 94, 93, 93, 92, 92, 91, 90, 90, 97, 97, 97, 97, 90, 90, 94)

bucket23 sum:1878, content= (93, 93, 96, 97, 96, 96, 95, 95, 94, 93, 93, 92, 92, 91, 91, 90, 90, 97, 97, 97)

bucket24 sum:1877, content= (93, 92, 92, 91, 90, 20, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 9, 98, 92)

bucket25 sum:1876, content= (93, 93, 92, 92, 91, 91, 90, 14, 100, 7, 100, 100, 100, 100, 100, 100, 100, 13, 100, 100, 100, 100)

"---Comparison for the 90 example---

****tf from benchmark was 1903(we added the number of machines) and target function from our local search is 1903"

***RESULT IS THE SAME

Run time: 17814.5 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 21))


```

bucket16 sum:1878, content= (100, 97, 96, 92, 91, 90, 90, 96, 92, 91, 96, 92, 97, 98, 98, 93, 94, 91, 90, 94)
bucket17 sum:1878, content= (100, 99, 99, 98, 97, 92, 90, 90, 90, 99, 92, 90, 91, 91, 92, 94, 94, 94, 92)
bucket18 sum:1878, content= (100, 99, 98, 92, 92, 91, 90, 90, 98, 96, 96, 92, 92, 94, 93, 94, 92, 91, 90, 98)
bucket19 sum:1878, content= (100, 100, 98, 98, 96, 96, 92, 91, 90, 90, 93, 98, 92, 94, 94, 91, 94, 91, 90, 90)
bucket20 sum:1878, content= (99, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 93, 91, 95)
bucket21 sum:1878, content= (98, 100, 100, 98, 100, 100, 100, 98, 100, 100, 99, 98, 99, 99, 98, 99, 98, 98, 96)
bucket22 sum:1877, content= (98, 100, 100, 100, 99, 99, 99, 98, 98, 99, 99, 99, 98, 99, 98, 99, 98, 99, 98)
bucket23 sum:1877, content= (100, 100, 100, 97, 97, 100, 99, 98, 98, 98, 99, 100, 98, 99, 98, 99, 100, 98, 99)
bucket24 sum:1876, content= (100, 100, 99, 98, 98, 98, 97, 13, 96, 96, 96, 12, 97, 97, 97, 97, 97, 97, 97, 97)
bucket25 sum:1868, content= (100, 100, 99, 98, 98, 98, 97, 96, 96, 14, 7, 96, 96, 96, 96, 96, 96, 96, 96, 2, 3)
"----Comparison for the 91 example----"
"***tf from benchmark was 1903(we added the number of machines) and target function from our local search is 1903"
***RESULT IS THE SAME
Run time: 19237.9 seconds
"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 22))
"Mistakes(size-numberMistakes):" QMap()
"Avegare error: 0"
"-----END 92 from 130-----"
"-----START 93 from 130-----"
"input file number 93: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_25_2.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0500_2.txt"
"***Data from file NU_1_0500_25_2.txt: machinesNum=25 jobsNum=500"
"***SOLUTION Data from file SOL_NU_1_25_0500_2.txt: machinesNum=25 jobsNum=500 lowerBound=1876 upperBound=1876
isOptimal=1"
Content of machines summed (1876, 1876, 1876, 1876, 1875, 1870, 1876, 1875, 1875, 1875, 1875, 1875, 1875, 1875, 1875, 1875, 1876, 1875,
1875, 1875, 1875, 1875, 1875, 1875, 1876)
input selected: size 500 sum 46877

----Our Results-----
best from Our local search found:
target function = 1901, num of machines=25, square root lms=0
machines content(number of jobs=500):

```


bucket1 sum:1876, content= (94, 94, 94, 94, 94, 94, 93, 95, 95, 95, 93, 95, 93, 91, 94, 92, 95, 94, 93, 94)
bucket2 sum:1876, content= (94, 94, 94, 92, 95, 94, 94, 94, 95, 94, 94, 94, 92, 95, 94, 95, 94, 95, 90, 93)
bucket3 sum:1876, content= (94, 94, 93, 95, 95, 93, 94, 93, 95, 93, 93, 95, 93, 95, 95, 95, 92, 90, 94)
bucket4 sum:1876, content= (93, 95, 93, 95, 93, 95, 95, 93, 95, 91, 95, 95, 95, 92, 92, 93, 93, 95, 94, 94)
bucket5 sum:1876, content= (95, 95, 95, 91, 95, 91, 91, 92, 92, 96, 91, 96, 94, 92, 95, 96, 95, 96, 95, 93)
bucket6 sum:1876, content= (100, 98, 98, 92, 90, 90, 90, 92, 92, 96, 91, 98, 93, 93, 96, 94, 92, 92, 99, 90)
bucket7 sum:1876, content= (100, 98, 98, 93, 90, 90, 90, 93, 93, 98, 93, 96, 99, 91, 96, 93, 90, 94, 91, 90)
bucket8 sum:1876, content= (100, 96, 92, 90, 90, 90, 92, 96, 97, 97, 96, 97, 93, 93, 93, 99, 91, 92, 92, 90)
bucket9 sum:1876, content= (100, 100, 98, 98, 97, 93, 92, 90, 90, 90, 90, 98, 93, 93, 93, 93, 93, 90, 92, 93)
bucket10 sum:1876, content= (100, 100, 98, 98, 91, 90, 90, 90, 92, 90, 98, 96, 94, 92, 93, 93, 94, 94, 92, 91)
bucket11 sum:1876, content= (100, 97, 97, 96, 90, 90, 90, 97, 91, 97, 90, 90, 98, 98, 94, 93, 93, 92, 92, 91)
bucket12 sum:1876, content= (100, 99, 97, 97, 91, 91, 91, 90, 90, 97, 91, 92, 98, 98, 92, 94, 93, 92, 92, 91)
bucket13 sum:1876, content= (100, 99, 99, 97, 97, 92, 91, 91, 90, 90, 92, 97, 92, 92, 97, 92, 92, 93, 90, 93)
bucket14 sum:1876, content= (99, 99, 97, 97, 91, 91, 91, 90, 90, 91, 92, 99, 97, 91, 92, 98, 93, 92, 91, 95)
bucket15 sum:1876, content= (99, 99, 99, 97, 97, 91, 90, 90, 90, 91, 99, 97, 92, 93, 93, 94, 93, 91, 91, 90)
bucket16 sum:1876, content= (100, 99, 99, 99, 97, 91, 91, 91, 90, 90, 91, 97, 92, 92, 92, 92, 94, 94, 92, 93)
bucket17 sum:1876, content= (99, 99, 99, 97, 91, 91, 90, 90, 91, 92, 91, 98, 97, 93, 93, 94, 94, 94, 92, 91)
bucket18 sum:1876, content= (98, 100, 100, 100, 100, 100, 99, 100, 100, 99, 100, 98, 100, 98, 97, 97, 99, 99, 92)
bucket19 sum:1875, content= (96, 100, 100, 99, 99, 100, 99, 99, 97, 98, 100, 97, 99, 100, 98, 97, 100, 99, 98)
bucket20 sum:1876, content= (100, 100, 99, 100, 99, 99, 99, 98, 98, 99, 99, 97, 99, 98, 97, 100, 99, 98, 98)
bucket21 sum:1872, content= (100, 99, 99, 98, 12, 98, 97, 97, 97, 97, 97, 97, 98, 99, 99, 98, 97, 97, 98, 98)
bucket22 sum:1867, content= (100, 99, 99, 98, 98, 98, 97, 96, 18, 8, 96, 96, 96, 96, 96, 96, 96, 96, 96, 96)
bucket23 sum:1867, content= (100, 99, 99, 98, 98, 98, 97, 96, 11, 12, 95, 95, 95, 95, 95, 8, 96, 96, 96, 96, 96)
bucket24 sum:1876, content= (100, 99, 99, 98, 98, 98, 96, 90, 90, 90, 90, 90, 91, 91, 91, 93, 91, 92, 94, 95)
bucket25 sum:1876, content= (100, 99, 99, 98, 98, 98, 96, 90, 91, 92, 90, 90, 90, 90, 90, 91, 92, 93, 94, 95)

"----Comparison for the 92 example----

****tf from benchmark was 1901(we added the number of machines) and target function from our local search is 1901"

***RESULT IS THE SAME

Run time: 15434 seconds

"Correct (size-numberCorrect):" QMap((10, 10)(50, 30)(100, 30)(500, 23))

"Mistakes(size-numberMistakes):" QMap()

"Avegare error: 0"

"-----END 93 from 130-----"

"-----START 94 from 130-----"

"input file number 94: inputName=C:/algo/h/docs/benchMark/all/NU_1_0500_25_3.txt and
solutionName=C:/algo/h/docs/benchMark/all/SOL_NU_1_25_0500_3.txt"

"***Data from file NU_1_0500_25_3.txt: machinesNum=25 jobsNum=500"

"***SOLUTION Data from file SOL_NU_1_25_0500_3.txt: machinesNum=25 jobsNum=500 lowerBound=1879 upperBound=1879
isOptimal=1"

Content of machines summed (1873, 1878, 1879, 1874, 1879, 1879, 1879, 1879, 1879, 1879, 1879, 1879, 1879, 1879, 1879, 1879, 1878, 1878,
1878, 1879, 1878, 1878, 1878, 1878, 1879)
input selected: size 500 sum 46956