

# HW3 Report

108062533 洪翎恩

(1) How to compile and execute your program and give an execution example.

command:

```
cd HW3/src/ make test $#_hardblocks
```

```
($#_hardblocks = 100 or 200 or 300)
```

example:

```
[g108062533@ic23 src]$ make test 100
g++ -std=c++11 -O3 -Wall -Wextra -c main.cpp -o main.o
main.cpp:515:5: warning: unused parameter 'argc' [-Wunused-parameter]
    int main(int argc, char *argv[])
        ^
g++ -o ../bin/hw3 main.o -lrt
test on case100
time ./../bin/hw3 ../testcase/n100.hardblocks ../testcase/n100.nets ../testcase/n100.pl ../output/n100.floorplan 0.1
0.27.91user 0.00system 0:27.01elapsed 99%CPU (0avgtext+0avgdata 6288maxresident)k
0inputs+0outputs (0major+430minor)pagefaults 0swaps
../verifier/verify ../testcase/n100.hardblocks ../testcase/n100.nets ../testcase/n100.pl ../output/n100.floorplan 0.1
Total block area: 179501
Width/Height of the floorplan region: 444
Wirelength: 231150
Checking fixed-outline and non-overlapping constraints of the blocks locating ...
WL computed by verifier: 231150 <---> WL reported in .floorplan: 231150
OK!! Your output file satisfies our basic requirements.
time ./../bin/hw3 ../testcase/n100.hardblocks ../testcase/n100.nets ../testcase/n100.pl ../output/n100.floorplan 0.15
0.27.69user 0.00system 0:27.69elapsed 99%CPU (0avgtext+0avgdata 6304maxresident)k
0inputs+0outputs (0major+431minor)pagefaults 0swaps
../verifier/verify ../testcase/n100.hardblocks ../testcase/n100.nets ../testcase/n100.pl ../output/n100.floorplan 0.15
Total block area: 179501
Width/Height of the floorplan region: 454
Wirelength: 213151
Checking fixed-outline and non-overlapping constraints of the blocks locating ...
WL computed by verifier: 213151 <---> WL reported in .floorplan: 213151
OK!! Your output file satisfies our basic requirements.
```

(2) The wirelength and the runtime of each testcase with the dead space ratios 0.1 and 0.15, respectively.

```
[g108062533@ic23 HW3_grading]$ bash HW3_grading.sh

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This script is used for PDA HW3 grading.
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grading on 108062533:
find: cannot delete ./HW3/.vscode: Directory not empty
main.cpp:515:5: warning: unused parameter 'argc' [-Wunused-parameter]
    int main(int argc, char *argv[])
        ^

testcase | ratio | wirelength | runtime | status
n100     | 0.15 | 213151     | 27.71   | success
n200     | 0.15 | 396371     | 98.40   | success
n300     | 0.15 | 523632     | 209.64  | success
n100     | 0.1  | 231150     | 27.82   | success
n200     | 0.1  | 400569     | 96.62   | success
n300     | 0.1  | 588704     | 208.19  | success

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Successfully generate grades to HW3_grade.csv
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```

	N100 0.1	N100 0.15	N200 0.1	N200 0.15
IO Time	0.002106	0.003822	0.00385	0.006651
Initial Floorplan Time	2.2e-05	4.1e-05	3.6e-05	6.7e-05
SA Time	28.1442	27.8231	97.3676	98.8363
Run Time	28.1477	27.828	97.3768	98.8443

	N300 0.1	N300 0.15
IO Time	0.008063	0.008601
Initial Floorplan Time	9.7e-05	9.6e-05
SA Time	211.039	211.067
Run Time	211.049	211.077

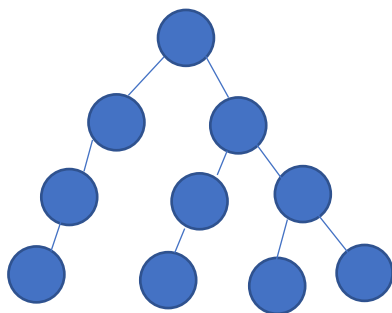
(3) Please show that how small the dead space ratio could be for your program to produce a legal result in 20 minutes.

目前測試dead space ratio可以到 0.06

```
[gl08062533@ic23 src]$ make test 100
g++ -std=c++11 -O3 -Wall -Wextra -c main.cpp -o main.o
main.cpp:536:5: warning: unused parameter 'argc' [-Wunused-parameter]
    int main(int argc, char *argv[])
        ^
g++ -o ../bin/hw3 main.o -lrt
test on case100
time ./../bin/hw3 ../testcase/n100.hardblocks ../testcase/n100.nets ../testcase/n100.pl ../output/n100.floorplan 0.06
IO Time: 0.004191
Initial Floorplan Time: 4.1e-05
SA Time: 198.222
Run Time: 198.232
198.22user 0.00system 3:18.23elapsed 99%CPU (0avgtext+0avgdata 6640maxresident)k
0inputs+0outputs (0major+453minor)pagefaults 0swaps
../verifier/verify ../testcase/n100.hardblocks ../testcase/n100.nets ../testcase/n100.pl ../output/n100.floorplan 0.06
Total block area: 179501
Width/Height of the floorplan region: 436
Wirelength: 230772
Checking fixed-outline and non-overlapping constraints of the blocks locating ...
WL computed by verifier: 230772 <--> WL reported in .floorplan: 230772
OK!! Your output file satisfies our basic requirements.
```

(4) The details of your algorithm. You could use flow chart(s) and/or pseudo code to help elaborate your algorithm. If your method is similar to some previous work/papers, please cite the papers and reveal your difference(s).

我的方法是用授課中教的B\* Tree, initial floorplan 是一row一row 的擺上去, 如果在這一個row 擺不下了, 就會擺下一層, 所以initial b\* tree 會長如下圖。SA的perturbation 有3種 swap move 跟 rotate.



(5) What tricks did you do to speed up your program or to enhance your solution quality? Perturbation中的swap 跟 rotate 都只要O(1) 完成 而move 只要O(n) 完成, 因為我的tree結構是有parent link的且我有一個vector 紀錄每一個 node的位子.

(6) Please compare your results with the top 5 students' results last year for the case where the dead space ratio is set to 0.15, and show your advantage either in runtime or in solution quality. Are your results better than theirs?

雖然我的結果沒很好,都在 3.4.5 名左右, SA 就是有點靠運氣, 我有設定 seed 所以可以跑得結果算還可以.

(7) What have you learned from this homework? What problem(s) have you encountered in this homework?

實作了 SA 的架構, 了解調整參數的重要性, 跟 SA 的起始位子好壞對整個 quality 有很大的影響.

繪圖:

