

DDLab Project 12

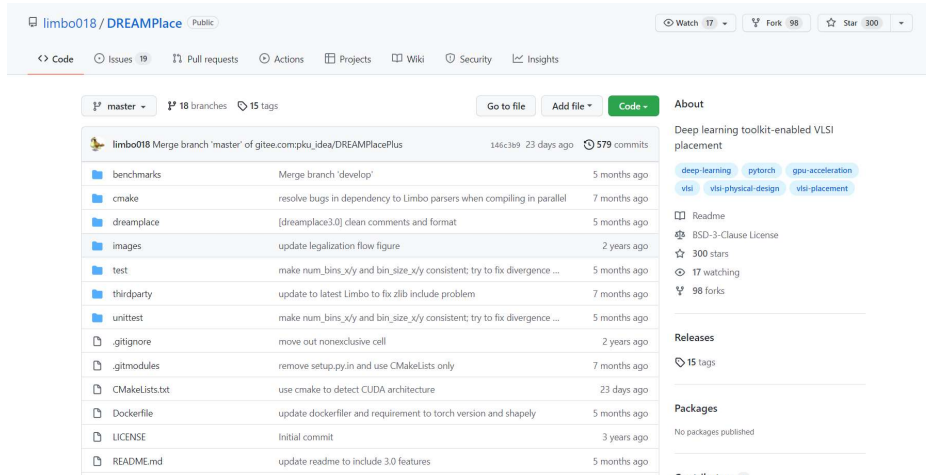
A. Group ID, EDA tool name, group member names, and student IDs

- Group ID: 22
- EDA tool name: DREAMPlace
- Group members' names & student ID
 - 蔡湘瑩 B10930002
 - 李喬安 B10915019
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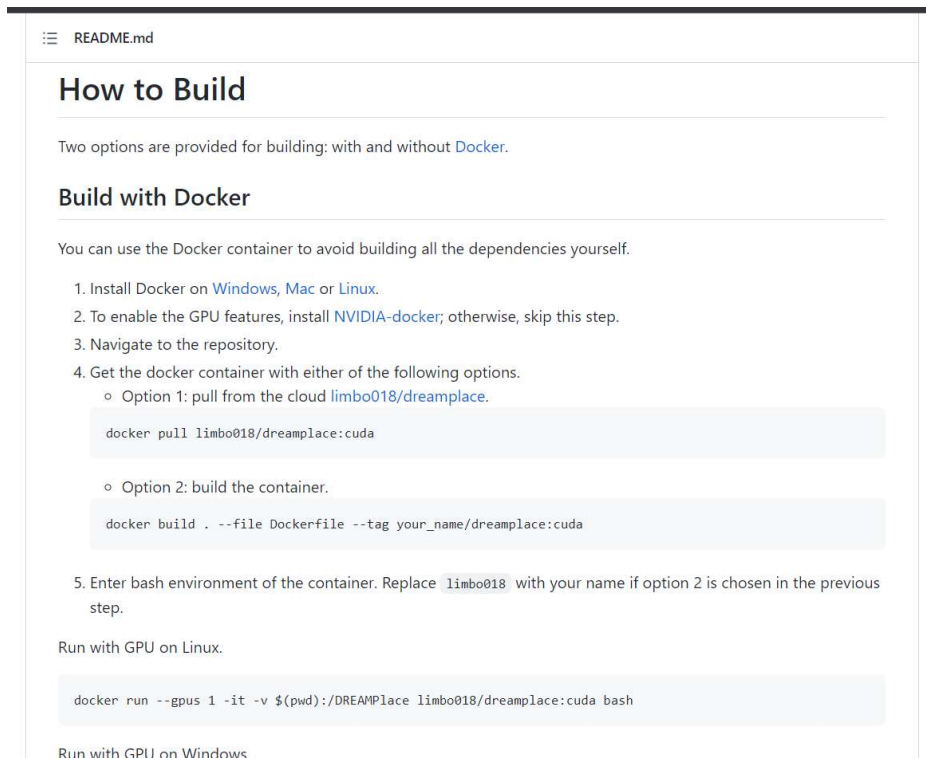
B. Detailed description about the tool with at least five screenshots.

Deep learning toolkit-enabled VLSI placement. With the analogy between nonlinear VLSI placement and deep learning training problem, this tool is developed with deep learning toolkit for flexibility and efficiency. The tool runs on both CPU and GPU. Over 30X speedup over the CPU implementation (RePlAce) is achieved in global placement and legalization on ISPD 2005 contest benchmarks with a Nvidia Tesla V100 GPU. DREAMPlace also integrates a GPU-accelerated detailed placer, ABCDPlace, which can achieve around 16X speedup on million-size benchmarks over the widely-adopted sequential placer NTUPlace3 on CPU. DREAMPlace runs on both CPU and GPU. If it is installed on a machine without GPU, only CPU support will be enabled with multi-threading.

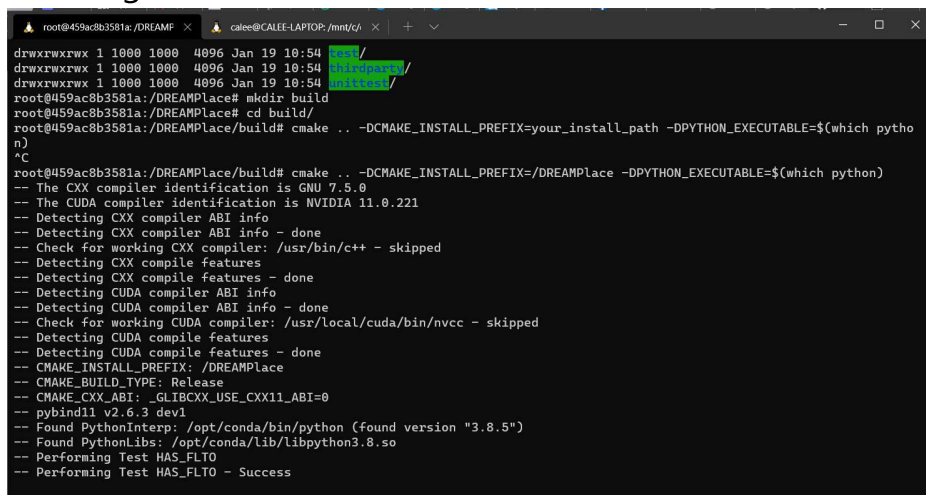
• GitHub Page



• Part of README.md



• Building DREAMPlace



- Running Placer.py

```
[INFO] DREAMPlace - full step 114.218 ms
[INFO] DREAMPlace - optimizer step 82.663 ms
[INFO] DREAMPlace - iteration 28, ( 38, 0, 0), Obj 2.228814E+05, DensityWeight 1.957848E-11, HPWL 1.295819E+06, Overflow 9.544479E-01, MaxDe
nsity 3.696E+04, gamma 2.7649997E+02, time 24.812ms
[INFO] DREAMPlace - full step 110.096 ms
[INFO] DREAMPlace - optimizer step 85.974 ms
[INFO] DREAMPlace - iteration 29, ( 38, 0, 0), Obj 2.217607E+05, DensityWeight 2.049788E-11, HPWL 1.293627E+06, Overflow 9.533488E-01, MaxDe
nsity 3.658E+04, gamma 2.750604E+02, time 24.530ms
[INFO] DREAMPlace - full step 112.967 ms
[INFO] DREAMPlace - optimizer step 84.583 ms
[INFO] DREAMPlace - iteration 30, ( 38, 0, 0), Obj 2.207311E+05, DensityWeight 2.145830E-11, HPWL 1.291992E+06, Overflow 9.524358E-01, MaxDe
nsity 3.618E+04, gamma 2.7351097E+02, time 21.160ms
[INFO] DREAMPlace - full step 107.755 ms
[INFO] DREAMPlace - optimizer step 189.453 ms
[INFO] DREAMPlace - iteration 31, ( 31, 0, 0), Obj 2.198823E+05, DensityWeight 2.246147E-11, HPWL 1.291838E+06, Overflow 9.512531E-01, MaxDe
nsity 3.574E+04, gamma 2.722462E+02, time 19.979ms
[INFO] DREAMPlace - full step 131.409 ms
[INFO] DREAMPlace - optimizer step 59.542 ms
[INFO] DREAMPlace - iteration 32, ( 32, 0, 0), Obj 2.189131E+05, DensityWeight 2.358919E-11, HPWL 1.290514E+06, Overflow 9.502927E-01, MaxDe
nsity 3.529E+04, gamma 2.7866047E+02, time 19.974ms
[INFO] DREAMPlace - full step 82.413 ms
[INFO] DREAMPlace - optimizer step 62.613 ms
[INFO] DREAMPlace - iteration 33, ( 33, 0, 0), Obj 2.182098E+05, DensityWeight 2.460332E-11, HPWL 1.289846E+06, Overflow 9.495142E-01, MaxDe
nsity 3.482E+04, gamma 2.692781E+02, time 14.985ms
[INFO] DREAMPlace - full step 80.365 ms
[INFO] DREAMPlace - optimizer step 67.137 ms
[INFO] DREAMPlace - iteration 34, ( 34, 0, 0), Obj 2.173537E+05, DensityWeight 2.570579E-11, HPWL 1.289498E+06, Overflow 9.484185E-01, MaxDe
nsity 3.436E+04, gamma 2.682076E+02, time 12.222ms
[INFO] DREAMPlace - full step 94.373 ms
[INFO] DREAMPlace - optimizer step 69.114 ms
[INFO] DREAMPlace - iteration 35, ( 35, 0, 0), Obj 2.163998E+05, DensityWeight 2.693863E-11, HPWL 1.289538E+06, Overflow 9.475656E-01, MaxDe
nsity 3.387E+04, gamma 2.665697E+02, time 21.525ms
[INFO] DREAMPlace - full step 93.364 ms
[INFO] DREAMPlace - optimizer step 117.332 ms
[INFO] DREAMPlace - iteration 36, ( 36, 0, 0), Obj 2.157994E+05, DensityWeight 2.828549E-11, HPWL 1.298135E+06, Overflow 9.462875E-01, MaxDe
nsity 3.340E+04, gamma 2.655466E+02, time 23.512ms
[INFO] DREAMPlace - full step 102.364 ms
[INFO] DREAMPlace - optimizer step 153.225 ms
[INFO] DREAMPlace - iteration 37, ( 37, 0, 0), Obj 2.150506E+05, DensityWeight 2.969720E-11, HPWL 1.291381E+06, Overflow 9.456968E-01, MaxDe
nsity 3.289E+04, gamma 2.638158E+02, time 39.451ms
[INFO] DREAMPlace - full step 262.683 ms
```

- Config file

[illegible]

C. Overall discussion and comments about the EDA tool.

使用 Deep Learning 做 placement 是一個很有趣的解決方案。整個工具設計上對使用者十分友善，在 README 內有詳盡的建置及使用教學，也附有多個測試用專案。官方有提供建置好環境的 docker image，使用者不用自己建立環境，十分方便。

D. A list of references if applicable.

- <https://github.com/limbo018/DREAMPlace>

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E. Suggestions to this course.

No.