Project:

Write a Pintool in JIT mode and in Probe mode.

The pintool receives 2 possible knobs: "**-prof**" and "**-opt <max-loop-unroll num>**" that are to be applied as follows:

1. **<pindir>/pin –t project.so –prof -- ./bzip2 –k –f input.txt**
2. **<pindir>/pin –t project.so –opt <max-loop-unroll-num> - ./bzip2 –k –f input-long.txt**

When applied with the "**-prof**" knob the pintool should collect loop counting of every frequently executed loop and print it into the file "**loop-count.csv**" in any desired format.

When applied with the "**-opt <max-loop-unroll-num>**" knob the pintool should run in probe mode and apply loop unrolling of the specified **max-loop-unroll-num** unrolling number of the top 10 loops that meet your loop unrolling candidate pattern.

Note that in order to isolate 10 loops for unrolling may require to apply Function Inlining at frequently call sites.

For the exercise use the provided pintool source code "**rtn-translation-pin3.cpp**" located at:

https://moodle.technion.ac.il/mod/resource/view.php?id=461221

For the **–opt** option the pintool should show a reduction of at least 15% in the total number of branches compared to the same run of the **bzip2** on **input-long.txt** but without the project.so pintool, as measured by the 'perf stat' command.

Consider using Function Inlining or Basic Block reordering when failing to reach the 15% branch reduction goal.

Test your pintool:

In the moodle you'll find the input binary file called "**bzip2.gz**" along with 2 input files called "**input.txt.gz"** for the profiling stage and **"input-long.txt"** for the optimization stage**.**
Ftp the files to your Linux account and open them using the **gunzip** command.

To test your pintool on the above **bzip2** binary file, simply type:
$ time <pindir>/pin –t project.so <-prof/-opt> -- ./bzip2 –k –f input.txt

Submission requirements:
The submission of this exercise is **in pairs only**.
Submit 1 compressed file called **"project.zip"** into the moodle project link containing the following files:

1. The binary of your pintool **project.so** (compiled, and tested by you that it runs and gives the result).
2. A directory called: 'src' containing all the sources of your pintool along with the make files and a REDAME.txt file that includes the following:
    a. names + id numbers
    b. compilation command
    c. how to run the tool.
    d. Explain the output format of the profile file **loop-count.csv**
    e. Explain the pattern of the loop candidates which you were using to unroll.

Submission deadline: midnight Thursday August 29, 2019.