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Instructor: Dr. Gülay Yalçın Alkan Student Id: 110510202
Homework 3
Due Date: 17th January 2021 – 23:59

Binary Instrumentation with PIN

Steps should be followed to run the codes for this assignment:

1) Install and set up PIN. Linux system was preferred for this assignment.
2) Open terminal and run following commands:
   set /pin-3.15-98253-gb56e429b1-gcc-linux/intel64/lib/libpinjitprofiling.so
   cd pin-3.15-98253-gb56e429b1-gcc-linux/source/tools/ManualExamples
   You need to write your own path of folder.
3) Compile iterative.c and recursive.c files and get output files like a.out
4) Copy those output files to ManualExamples folder
5) Run following commands:
   make homework.test
   ../../../pin -t obj-intel64/homework.so -- ./a.out
6) Enter input and then check file called as outputFile.out to see output.

TASK 1

For task 1, total number of macroinstructions and microinstructions was counted by getting help from inscount0.cpp example file. Docount method and Instruction method was implemented to get total count. Totalcount variable is increased for every instruction. INS_InsertCal was used. For details, homework.cpp file can be checked.

TASK 2

For task 2, if conditions are added to check types of instructions. INS_IsMemoryRead, INS_IsMemoryWrite functions were used to check if an instruction is memory instruction or not and INS_IsBranch was used to check branch instructions. Other instructions were counted as arithmetic and logic instructions. For each type, variables were increased according to type. Then, ratio of these three types was calculated. Homework.cpp file includes code for both two tasks. For more information, it can be checked.

Iterative and recursive versions of factorial function were used to test.

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Example outputs for iterative version of factorial function:

For 6! :

Total Count of Macroinstructions and Microinstructions: 183851

Count of Memory Instructions: 54492

Ratio of Memory Instructions: 29.6392%

Count of Branch Instructions: 39714

Ratio of Branch Instructions: 21.6012%

Count of Arithmetic and Logic Instructions: 89645

Ratio of Arithmetic and Logic Instructions: 48.7596%

For 12! :

Total Count of Macroinstructions and Microinstructions: 184056

Count of Memory Instructions: 54559

Ratio of Memory Instructions: 29.6426%

Count of Branch Instructions: 39751

Ratio of Branch Instructions: 21.5972%

Count of Arithmetic and Logic Instructions: 89746

Ratio of Arithmetic and Logic Instructions: 48.7602%

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Example outputs for recursive version of factorial function:

For 6! :

Total Count of Macroinstructions and Microinstructions: 184012

Count of Memory Instructions: 54535

Ratio of Memory Instructions: 29.6367%

Count of Branch Instructions: 39732

Ratio of Branch Instructions: 21.5921%

Count of Arithmetic and Logic Instructions: 89745

Ratio of Arithmetic and Logic Instructions: 48.7713%

For 12! :

Total Count of Macroinstructions and Microinstructions: 184283

Count of Memory Instructions: 54626

Ratio of Memory Instructions: 29.6425%

Count of Branch Instructions: 39769

Ratio of Branch Instructions: 21.5804%

Count of Arithmetic and Logic Instructions: 89888

Ratio of Arithmetic and Logic Instructions: 48.7772%