

CS622 : Assignment 2

Group 7

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PART I : Collection of traces

PIN tool addrtrace.cpp produces a text file which contain machine accesses recorded in trace of each of the four programs, namely prog1, prog2, prog3 and prog4. By default prog1addrtrace.txt file is mentioned in PIN tool, so to generate text files for other programs, name of text file need to be changed in PIN tool.

The total number of machine accesses recorded in the trace for each of the four programs are as follows :

Program	Total number of machine accesses
prog1.c	140525708
prog2.c	2510645
prog3.c	9473117
prog4.c	1065090

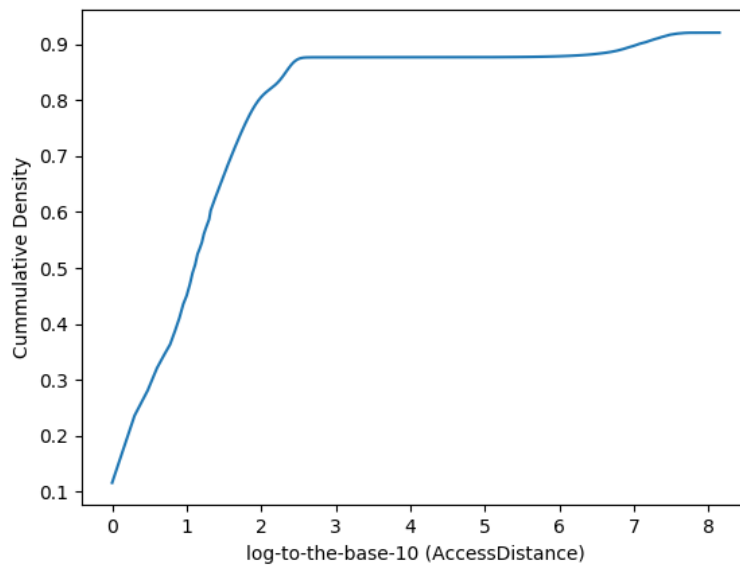
Table 1: Number of machine accesses for each program

PART II : Access distance analysis

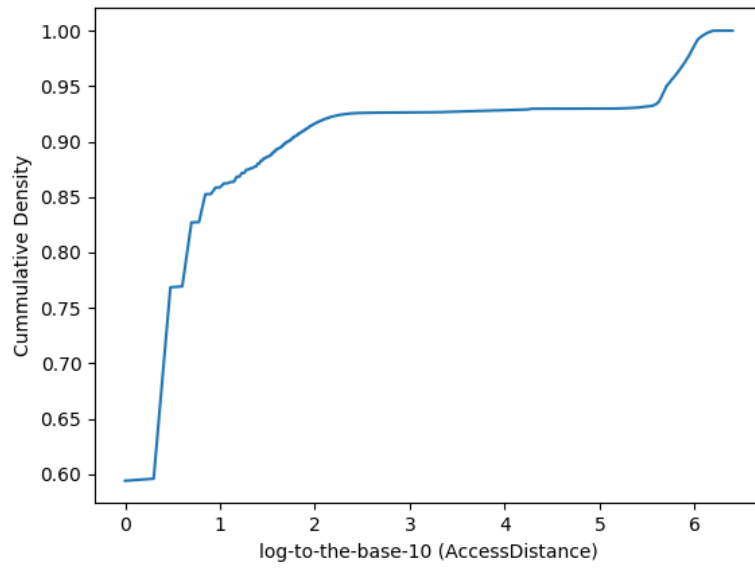
Que2.cpp is the required program to compute the cumulative density function of access distances from the traces. Program takes trace txt file generated in part 1, calculate cumulative density function of access distances and write it to another text file (by default distFrequency1.txt is mentioned in Program). Python program plotCDF.py is used to generate plots.

Cumulative density function plots for each trace

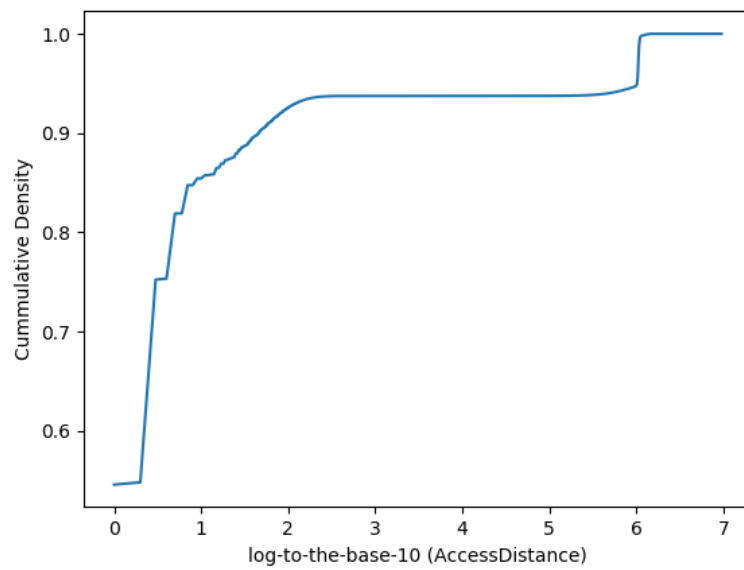
For trace of prog1.c,



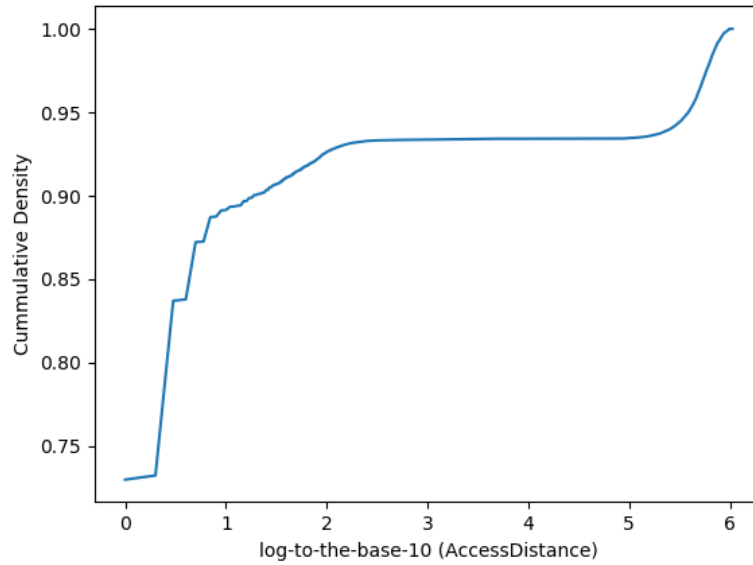
For trace of prog2.c,



For trace of prog3.c,



For trace of prog4.c,



PART III: Access distance filtered by LRU cache

Program Que3.cpp models a 16-way set associative cache and generate the trace of accesses that miss in the cache. To calculate cumulative density function of the miss trace for each of the programs, we used program Que2.cpp proposed in part 2.

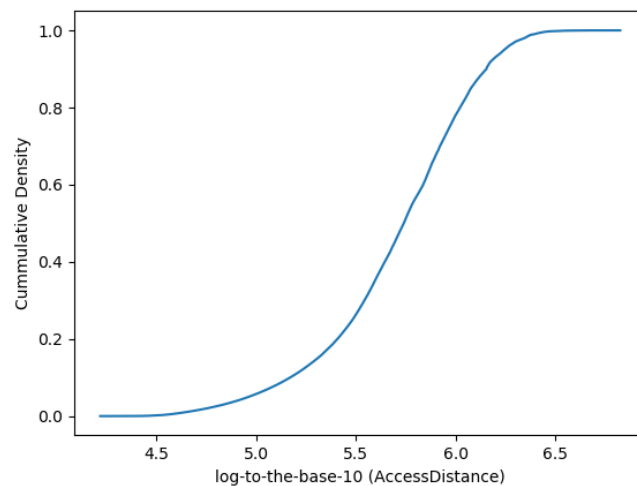
The number of hits and misses for each trace are as follows :

Program	Number of hits	Number of misses
prog1.c	133829330	6696378
prog2.c	2278329	232316
prog3.c	8834935	638182
prog4.c	939425	125665

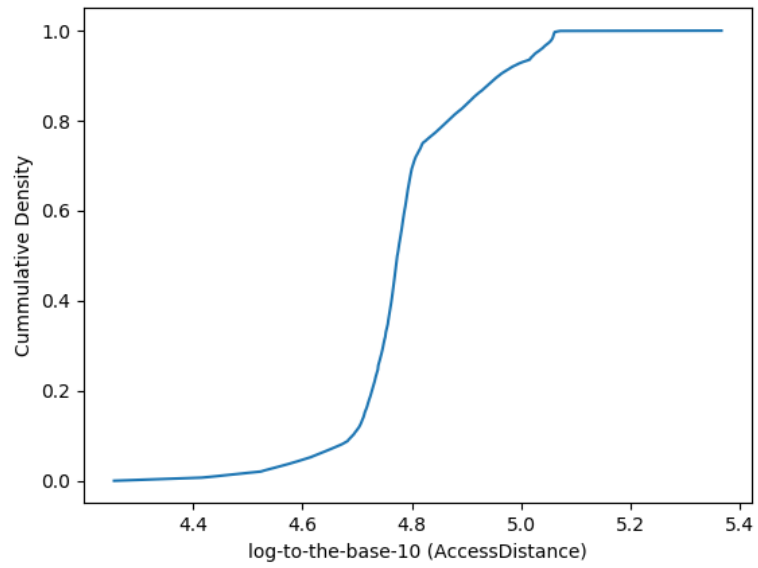
Table 2: Number of hits and misses

Cumulative density function plots for each misstrace

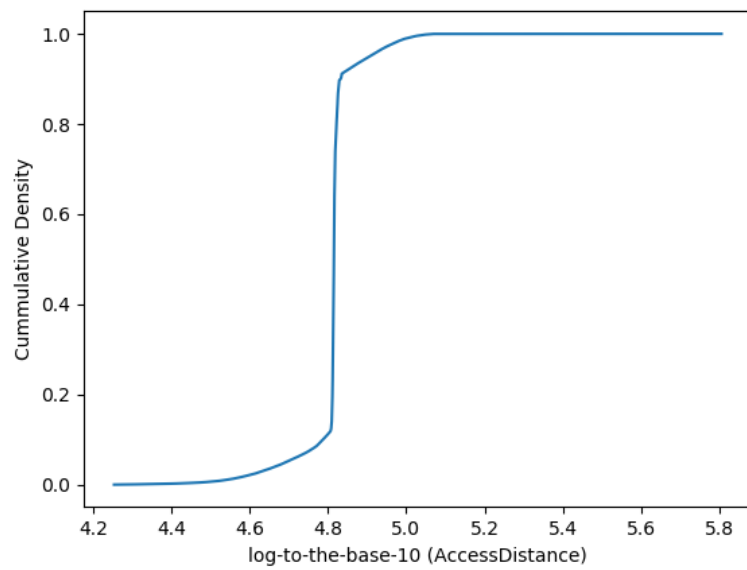
For miss trace of prog1.c,



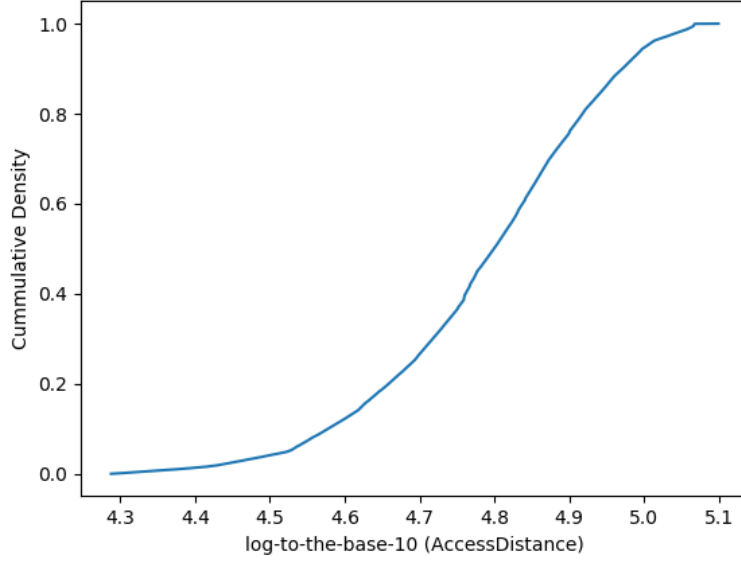
For miss trace of prog2.c,



For miss trace of prog3.c,



For miss trace of prog4.c,



The shape and nature of cumulative density function before and after the cache differ in a particular way. We were getting the peak in cumulative density function before cache at small access distances, whereas after cache, we are getting it at large access distances. If we are getting a miss, it means access distance is more than that of cache size. So, the machine accesses of small access distances will be hit and hence will not be counted in miss trace. Due to this, peak in cumulative density function after cache are at large access distance rather than at small access distance.

As we can also see that most of misses are due to large access distance, and misses due to large access distance are Capacity misses. Hence most of the misses are Capacity misses.

PART IV: Sharing profile

Program Que4.cpp is the required program to compute the number of memory blocks that are private, or shared by two threads, or shared by three threads, ..., or shared by eight threads.

Memory Blocks	prog1.c	prog2.c	prog3.c	prog4.c
Private	436	436	445	8625
Shared by 2 threads	70	8262	63	57409
Shared by 3 threads	1872	16384	0	6
Shared by 4 threads	32455	40957	0	0
Shared by 5 threads	143250	4	0	0
Shared by 6 threads	244970	0	0	1
Shared by 7 threads	173832	1	1	1
Shared by 8 threads	124529	12	65547	12
Total	721414	66056	66056	66054

Table 3: Number of memory blocks for each trace