Multi-core and Multi-processor Architecture (CS423A), Spring 2023
Indian Institute of Technology Kanpur
Assignment 2

REPORT

2

Members: Manish (190477), Sarthak Rout (190772)
Group Number: 10
Date: March 22, 2023

Contents

1 Program 1

1.1 Number of Machine Accesses: 140 526 301
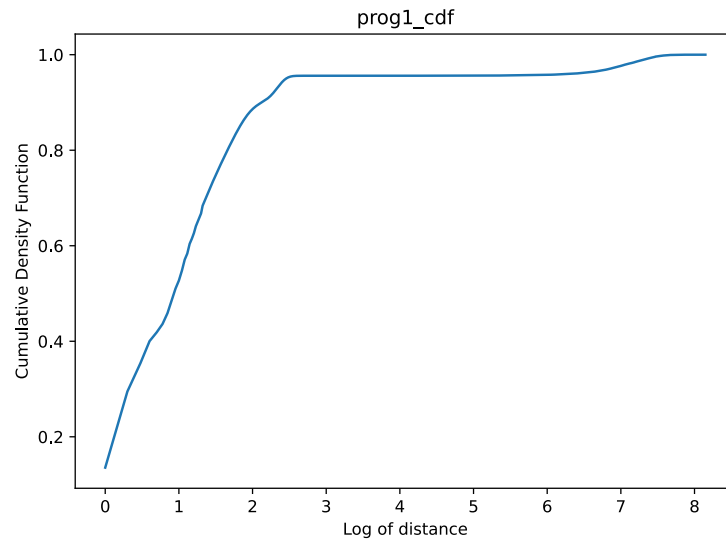
1.2 Access distance analytics

Figure 1: CDF vs Log of distance for Program 1
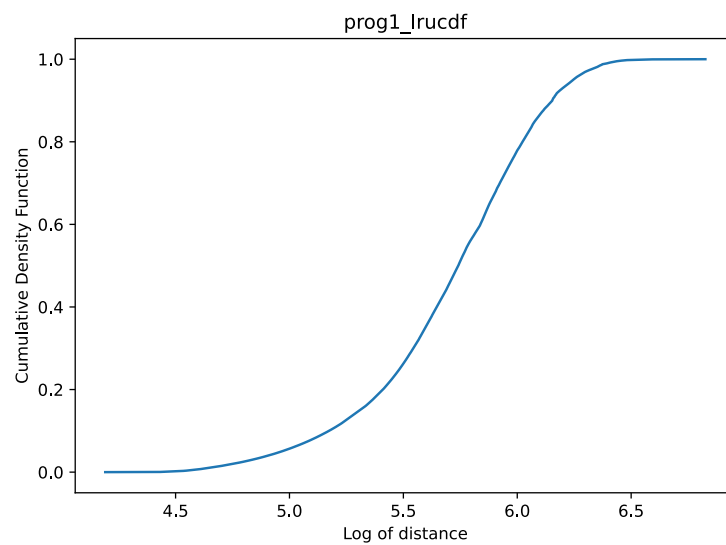
1.3 Access distance filtered by LRU cache

Figure 2: CDF vs Log of distance for Program 1 with LRU cache

1.4 Hits and Misses for each trace when passed on LRU Cache

- Hits: 133 827 577

- Misses: 6 698 724

1.5 Observations

- In the first plot, we observe that $F(2.5) \approx 0.9$. After $d = 2.5$, the CDF saturates and it increases later after $d = 5$. So, most of the machine accesses have a distance of around 300 and most of rest of accesses have a distance greater than 100000.

- After passing the trace through a layer of LRU Cache, we observe that machine accesses for small distances are filtered out. In essence, the second plot is a magnified version of the top right region of the first plot.

1.6 Sharing Profile

# Threads Shared	1	2	3	4	5	6	7	8
1	440	70	1872	32456	143251	244970	173832	124528

2 Program 2

2.1 Number of Machine Accesses: 2 511 043
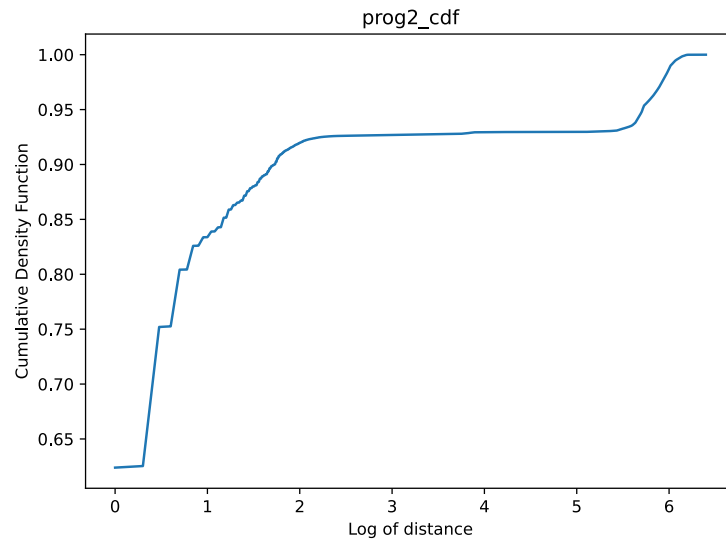
2.2 Access distance analytics

Figure 3: CDF vs Log of distance for Program 1
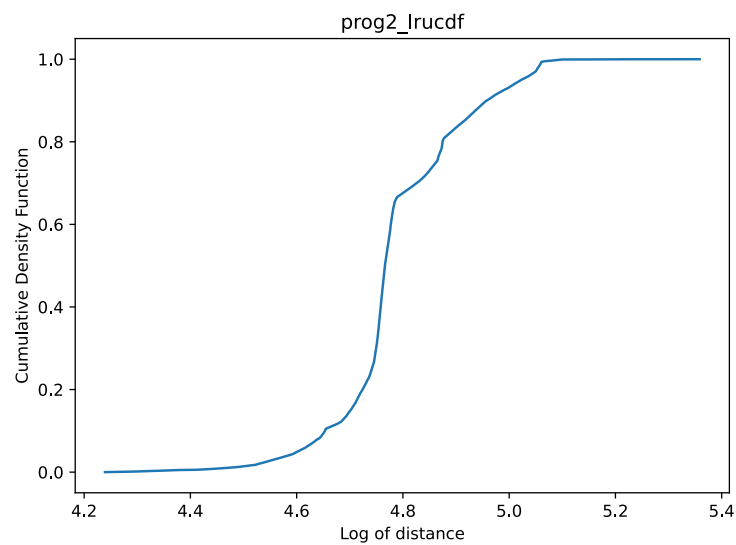
2.3 Access distance filtered by LRU cache

Figure 4: CDF vs Log of distance for Program 1 with LRU cache

2.4 Hits and Misses for each trace when passed on LRU Cache

- Hits: 2 282 709

- Misses: 228 334

2.5 Observations

- In the first plot, we observe that $F(2) \approx 0.9$. After $d = 2$, the CDF saturates and it increases later after $d = 5.5$. So, most of the machine accesses have a distance of around 100 and most of rest of accesses have a distance greater than 300000.

- After passing the trace through a layer of LRU Cache, we observe that machine accesses for small distances are filtered out. In essence, the second plot is a magnified version of the top right region of the first plot.

2.6 Sharing Profile

# Threads Shared	1	2	3	4	5	6	7	8
2	438	8262	16384	40958	5	0	1	11

3 Program 3

3.1 Number of Machine Accesses: 9 609 095
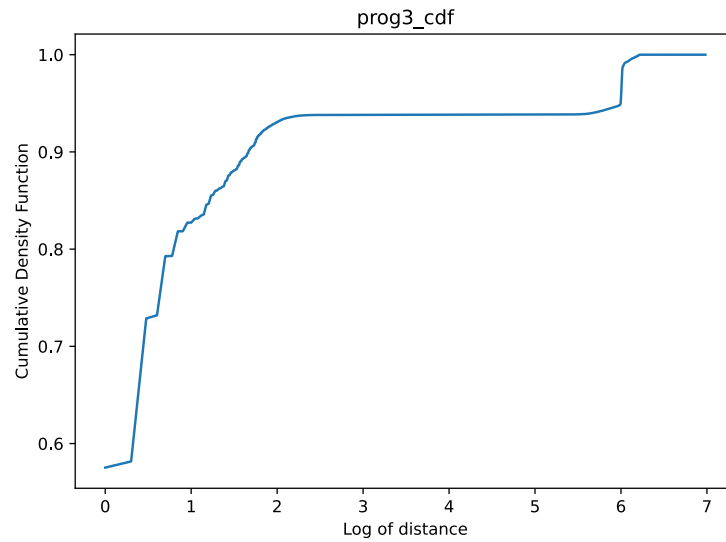
3.2 Access distance analytics

Figure 5: CDF vs Log of distance for Program 1
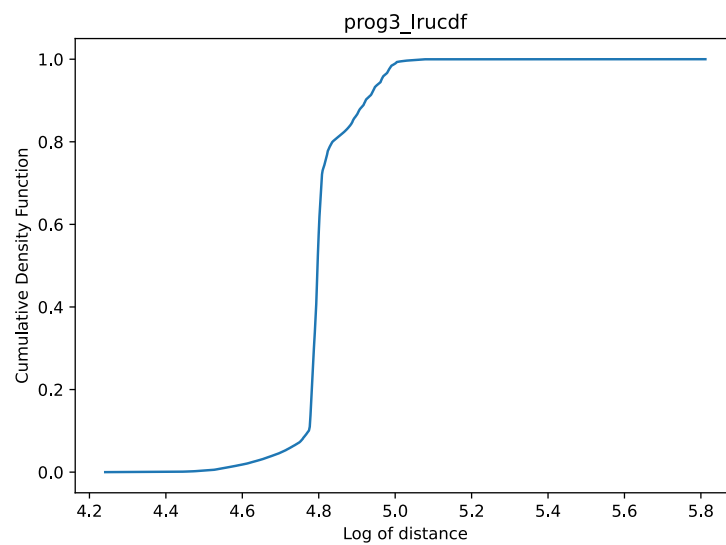
3.3 Access distance filtered by LRU cache

Figure 6: CDF vs Log of distance for Program 1 with LRU cache

3.4 Hits and Misses for each trace when passed on LRU Cache

- Hits: 8 960 747

- Misses: 648 348

3.5 Observations

- In the first plot, we observe that $F(2) \approx 0.9$. After $d = 2$, the CDF saturates and it increases sharply later after $d = 6$. So, most of the machine accesses have a distance of around 100 and most of rest of accesses have a distance greater than 1000000.

- After passing the trace through a layer of LRU Cache, we observe that machine accesses for small distances are filtered out. In essence, the second plot is a magnified version of the top right region of the first plot.

- For the second plot, there is a sharp increase at $d = 4.8$.

3.6 Sharing Profile

# Threads Shared	1	2	3	4	5	6	7	8
3	444	63	0	1	1	0	1	65546

4 Program 4

4.1 Number of Machine Accesses: 1 065 642
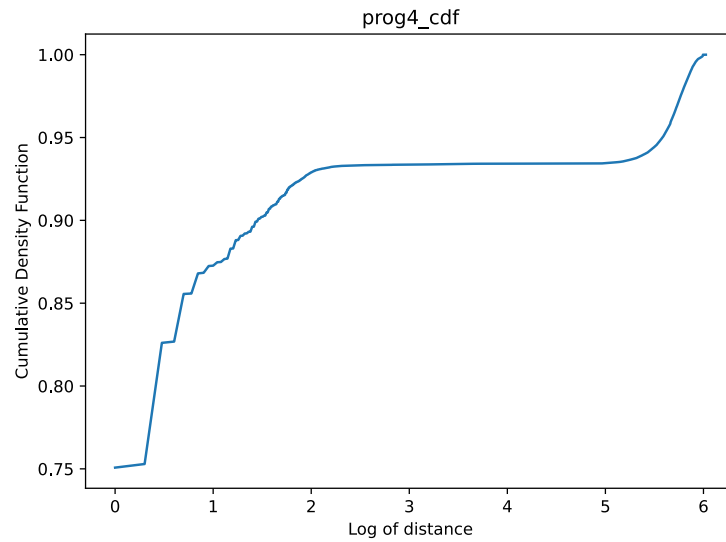
4.2 Access distance analytics

Figure 7: CDF vs Log of distance for Program 1
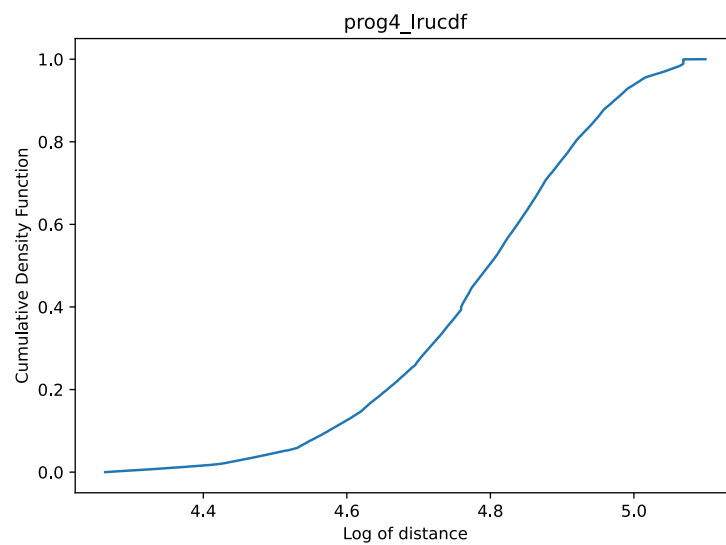
4.3 Access distance filtered by LRU cache

Figure 8: CDF vs Log of distance for Program 1 with LRU cache

4.4 Hits and Misses for each trace when passed on LRU Cache

- Hits: 939 845

- Misses: 125 797

4.5 Observations

- In the first plot, we observe that $F(2) \approx 0.93$. After $d = 2$, the CDF saturates and it increases later after $d = 5.5$. So, most of the machine accesses have a distance of around 100 and most of rest of accesses have a distance greater than 300000.

- After passing the trace through a layer of LRU Cache, we observe that machine accesses for small distances are filtered out. In essence, the second plot is a magnified version of the top right region of the first plot.

4.6 Sharing Profile

# Threads Shared	1	2	3	4	5	6	7	8
4	8628	57410	6	0	0	0	2	12