Computer Organization and Design: The Hardware/Software Interface by Patterson and Hennessy

Cache Simulator 과제

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1. 선택한 과제 수준(Challenge) - 10점

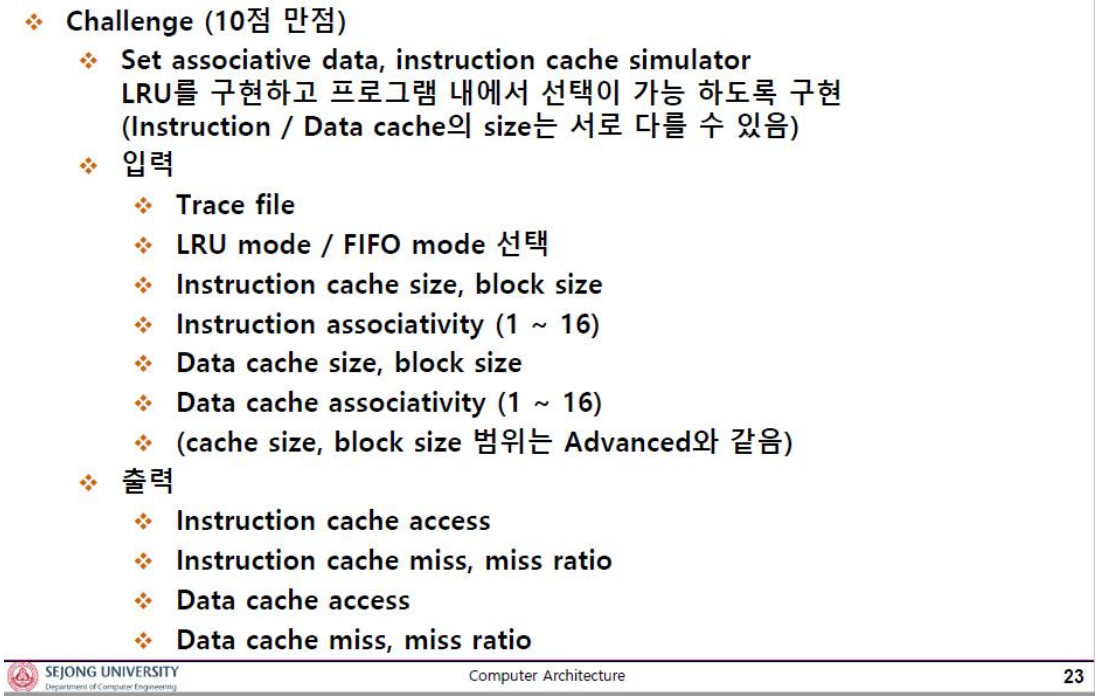
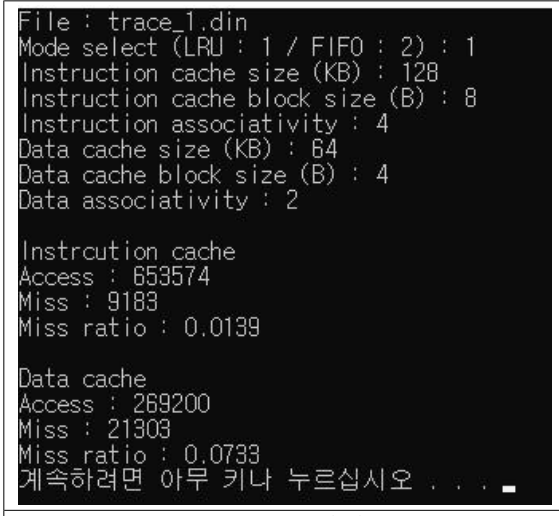


사진 1. 선택한 과제 수준

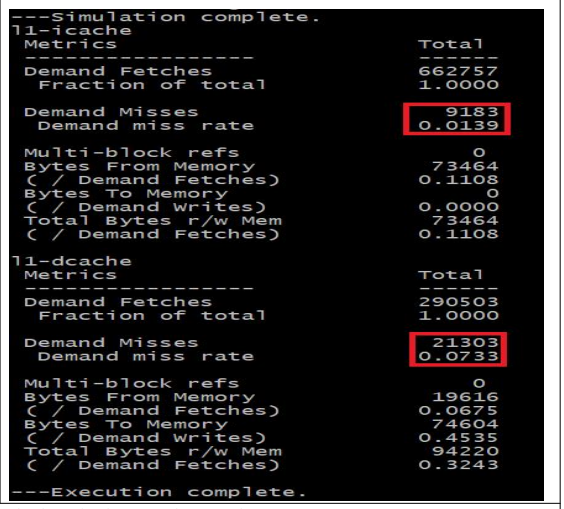
2. DineroIV 입력 정보

입력\파일	trace_1.din	trace_2.din
입력1	./dineroIV -l1-dsize 64k -l1-dbsize 4 -l1-dassoc 2 -l1-drepl l -l1-isize 128k -l1-ibsize 8 -l1-iassoc 4 -l1-irepl l -informat d < trace_1.din	./dineroIV -l1-dsize 64k -l1-dbsize 4 -l1-dassoc 2 -l1-drepl l -l1-isize 128k -l1-ibsize 8 -l1-iassoc 4 -l1-irepl l -informat d < trace_2.din
Data Size	Data cache size : 64KB Data block size : 4B Data cache associativity : 2 Instruction cache size : 128KB Instruction block size : 8B Instruction associativity : 4	Data cache size : 64KB Data block size : 4B Data cache associativity : 2 Instruction cache size : 128KB Instruction block size : 8B Instruction associativity : 4
입력2	./dineroIV -l1-dsize 32k -l1-dbsize 4 -l1-dassoc 1 -l1-drepl l -l1-isize 512k -l1-ibsize 64 -l1-iassoc 16 -l1-irepl l -informat d < trace_1.din	./dineroIV -l1-dsize 32k -l1-dbsize 4 -l1-dassoc 1 -l1-drepl l -l1-isize 512k -l1-ibsize 64 -l1-iassoc 16 -l1-irepl l -informat d < trace_2.din
Data Size	Data cache size : 32K Data block size : 4B Data cache associativity : 1 Instruction cache size : 512K Instruction block size : 64B Instruction associativity : 16	Data cache size : 32K Data block size : 4B Data cache associativity : 1 Instruction cache size : 512K Instruction block size : 64B Instruction associativity : 16

3. 수행한 화면

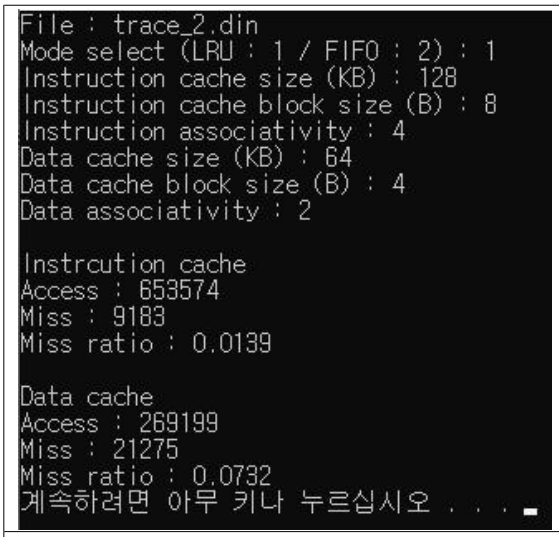


```
File : trace_1.din
Mode select (LRU : 1 / FIFO : 2) : 1
Instruction cache size (KB) : 128
Instruction cache block size (B) : 8
Instruction associativity : 4
Data cache size (KB) : 64
Data cache block size (B) : 4
Data associativity : 2

Instrcution cache
Access : 653574
Miss : 9183
Miss ratio : 0.0139

Data cache
Access : 269200
Miss : 21303
Miss ratio : 0.0733
계속하려면 아무 키나 누르십시오 . . .
```



```
---Simulation complete.
l1-icache
 Metrics                  Total
 -----------------        ------
 Demand Fetches           662757
  Fraction of total       1.0000

 Demand Misses              9183
  Demand miss rate          0.0139

 Multi-block refs              0
 Bytes From Memory         73464
 ( / Demand Fetches)       0.1108
 Bytes To Memory               0
 ( / Demand Writes)        0.0000
 Total Bytes r/w Mem       73464
 ( / Demand Fetches)       0.1108

l1-dcache
 Metrics                  Total
 -----------------        ------
 Demand Fetches           290503
  Fraction of total       1.0000

 Demand Misses              21303
  Demand miss rate          0.0733

 Multi-block refs              0
 Bytes From Memory         19616
 ( / Demand Fetches)       0.0675
 Bytes To Memory           74604
 ( / Demand Writes)        0.4535
 Total Bytes r/w Mem       94220
 ( / Demand Fetches)       0.3243

---Execution complete.
```

사진 2. trace_1.din에서 입력 1 했을 때



```
File : trace_2.din
Mode select (LRU : 1 / FIFO : 2) : 1
Instruction cache size (KB) : 128
Instruction cache block size (B) : 8
Instruction associativity : 4
Data cache size (KB) : 64
Data cache block size (B) : 4
Data associativity : 2

Instrcution cache
Access : 653574
Miss : 9183
Miss ratio : 0.0139

Data cache
Access : 269199
Miss : 21275
Miss ratio : 0.0732
계속하려면 아무 키나 누르십시오 . . .
```

```
---Simulation complete.
l1-icache
 Metrics                  Total
 -----------------        ------
 Demand Fetches           662757
  Fraction of total       1.0000

 Demand Misses              9183
  Demand miss rate          0.0139

 Multi-block refs              0
 Bytes From Memory         73464
 ( / Demand Fetches)       0.1108
 Bytes To Memory               0
 ( / Demand Writes)        0.0000
 Total Bytes r/w Mem       73464
 ( / Demand Fetches)       0.1108

l1-dcache
 Metrics                  Total
 -----------------        ------
 Demand Fetches           290474
  Fraction of total       1.0000

 Demand Misses              21275
  Demand miss rate          0.0732

 Multi-block refs              0
 Bytes From Memory         19504
 ( / Demand Fetches)       0.0671
 Bytes To Memory           74604
 ( / Demand Writes)        0.4535
 Total Bytes r/w Mem       94108
 ( / Demand Fetches)       0.3240
```

사진 3. trace_2.din에서 입력 1 했을 때

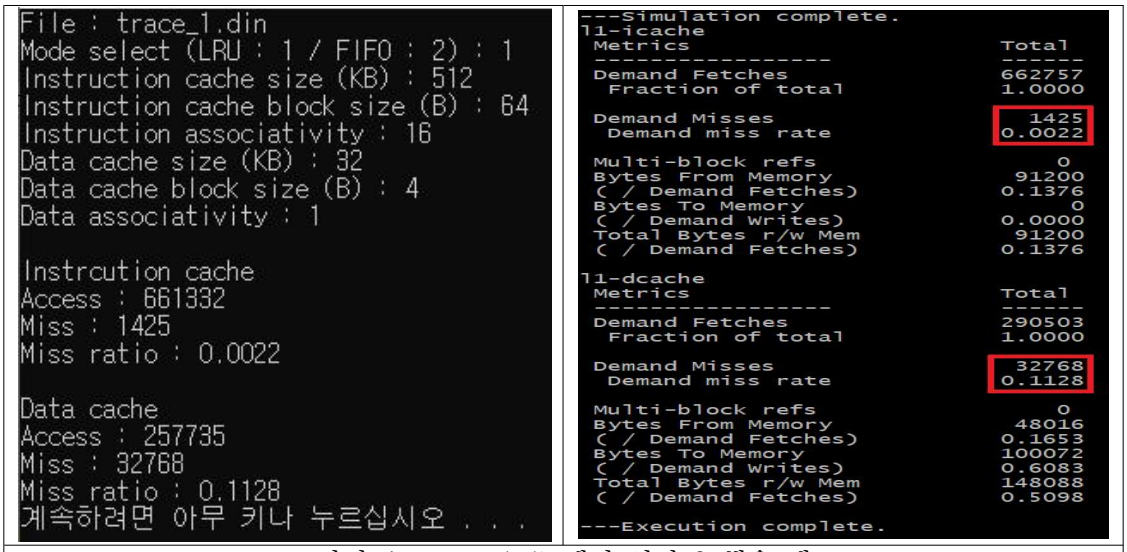


사진 4. trace_1.din에서 입력 2 했을 때

사진 5. trace_2.din에서 입력 2 했을 때

4. 느낀점

이번 과제를 받고 나서 정말 막막했다. 수업도 들었고 틈틈이 공부를 했지만 막상 Cache에 대해 잘 몰랐고 Cache Simulator를 구현하는 건 접근조차도 못했다. 구현하기 전 Cache의 Tag, Index, BlockOffset에 대한 정의를 공부하고 각각의 길이를 구하는 법을 한참 동안 인터넷 서칭도 하고 책도 보며 공부를 했다. 하루 정도 공부하고 C언어로 코드를 짜기 시작했다. 짜다 보니 LRU 방식을 하기 위해 리스트를 만들어야 하는데 귀찮아서 C++로 넘어가서 라이브러리를 사용했다.

과제를 통해 Cache의 전반적인 동작방법을 확실히 익혔으며 Cache Simulator를 구현하기는 힘들었지만 재미있었던 과제였다.