< Virtual Memory Management Simulator >

· Virtual Memory Systems의 one-level, two-level Page Table, Inverted Page Table system을 구현.

· /mtraces: 프로그램에서 접근한 메모리 주소(Virtual address)가 순차적으로 기록된 memory trace가 존재.

=trace file의 memory trace 포맷=

16진수로 표현한 32bit의 메모리 주소 Read | Write여부

· virtual address size 32bit (4GB)
· page size 12bit (4KB)

1) Virtual Memory Simulator 인자

memsim [-s] simType firstLevelBits PhysicalMemorySizeBits TraceFileNames……

- **[-s]** 가상주소에서 변환된 물리주소를 출력하는 옵션.

- **simType** 실행할 Simulation Type을 지정하는 옵션.

  -0 FIFO, LRU 방식의 One-level page table system이 실행.
  -1 Two-level page table system이 실행.
  -2 Inverted page table system이실행.
  -3 이상 One-level, Two-level, Inverted Page table system을 차례로 실행.

- **firstLevelBits** Two-level page table system을 수행할 때 사용되는 인자입니다.
  first level page table에 접근에 사용되는 메모리 주소의 bits 의 수.
  e.g) 인자 값이 8인 경우, 32bit 중 8bit가 first level page table로 사용됨.

- **PhysicalMemorySizeBits** Physical Memory의 크기를 나타내는 인자입니다.
  e.g) 인자 값이 n인 경우 Physical Memory의 크기는 2^nbytes.

- **TraceFileNames, ….** Trace File의 경로를 지정하는 가변 배열의 인자.

=수행 예=

```
$ ./memsim -s 1 10 32 ../mtraces/gcc.trace ../mtraces/bzip.trace process
0 opening ../mtraces/gcc.trace
process 1 opening ../mtraces/bzip.trace

Num of Frames 1048576 Physical Memory Size 4294967296 bytes
============================================================
The Two-Level Page Table Memory Simulation Starts .....
============================================================
Two-Level procID 0 traceNumber 1 virtual addr 2f8773d8 pysical addr 3d8
Two-Level procID 1 traceNumber 1 virtual addr 6645b58 pysical addr 1b58
Two-Level procID 0 traceNumber 2 virtual addr 3d729358 pysical addr 2358
Two-Level procID 1 traceNumber 2 virtual addr 6645b58 pysical addr 1b58
......
......
Two-Level procID 0 traceNumber 999999 virtual addr 2f8773e0 pysical addr 3ae3e0
Two-Level procID 1 traceNumber 999999 virtual addr 6645ba0 pysical addr 723ba0
Two-Level procID 0 traceNumber 1000000 virtual addr 3d729358 pysical addr 24358
Two-Level procID 1 traceNumber 1000000 virtual addr 5fe5180 pysical addr 2eb180
**** ../mtraces/gcc.trace ***** Proc 0
Num of traces 1000000
Proc 0 Num of second level page tables allocated 164 Proc 0
Num of Page Faults 2852
Proc 0 Num of Page Hit 997148
**** ../mtraces/bzip.trace ***** Proc 1
Num of traces 1000000
Proc 1 Num of second level page tables allocated 39 Proc 1
Num of Page Faults 317
Proc 1 Num of Page Hit 999683
```

=Test Case=

```
memsim -s 0 10 20 ../mtraces/gcc.trace ../mtraces/bzip.trace ../mtraces/random0.trace
memsim -s 1 10 32 ../mtraces/bzip.trace
memsim -s 2 10 32 ../mtraces/gcc.trace ../mtraces/bzip.trace
memsim -s 3 10 24 ../mtraces/gcc.trace ../mtraces/bzip.trace ../mtraces/bzip.trace
memsim 3 10 18 ../mtraces/bzip.trace ../mtraces/gcc.trace ../mtraces/sixpack.trace
../mtraces/swim.trace ../mtraces/random0.trace ../mtraces/random2.trace
memsim 3 10 22 ../mtraces/bzip.trace ../mtraces/gcc.trace ../mtraces/sixpack.trace
../mtraces/swim.trace ../mtraces/random0.trace ../mtraces/random2.trace
memsim 3 7 19 ../mtraces/bzip.trace ../mtraces/gcc.trace ../mtraces/sixpack.trace ../mtraces/swim.trace
```

../mtraces/random0.trace ../mtraces/random2.trace
memsim 3 9 20 ../mtraces/bzip.trace ../mtraces/gcc.trace ../mtraces/sixpack.trace
../mtraces/swim.trace
../mtraces/random0.trace ../mtraces/random2.trace ../mtraces/bzip.trace
../mtraces/gcc.trace
../mtraces/sixpack.trace ../mtraces/swim.trace ../mtraces/random0.trace
../mtraces/random2.trace memsim 3 8 21 ../mtraces/bzip.trace ../mtraces/gcc.trace
../mtraces/sixpack.trace ../mtraces/swim.trace
../mtraces/random0.trace ../mtraces/random2.trace ../mtraces/bzip.trace
../mtraces/gcc.trace
../mtraces/sixpack.trace ../mtraces/swim.trace ../mtraces/random0.trace ../mtraces/random2.trace