Preparation of the DINERO IV Trace-driven Uniprocessor Simulator

Note: This short description is adapted from the webpage of the simulator.

Dinero IV is a cache simulator for memory reference traces.

Some deep-seated limitations:

- Dinero IV is not a timing simulator. There is no notion of simulated time or cycles, only references.
- Dinero IV is not a functional simulator. Data & instructions do not move in and out of the caches; in fact they don't exist! **The primary result of simulation with Dinero IV is hit and miss information.**
- Dinero IV isn't multi-threaded. If you have a multiprocessor with enough memory, you can run multiple independent simulations concurrently.

The basic idea is to simulate a memory hierarchy consisting of various caches connected as one or more trees, with reference sources (the processors) at the leaves and a memory at each root. The various parameters of each cache can be set separately (architecture, policy, statistics). During initialization, the configuration to be simulated is built up, one cache at a time, starting with each memory as a special case. After initialization, each reference is fed to the appropriate top-level cache by a single simple function call. Lower levels of the hierarchy are handled automatically.

Preparation

Download and install Dinero IV. Take some time to browse its documentation and take a quick look at the source code (to just have an idea about how it was programmed). Installation Steps:

Step 1
Download Dinero IV (d4-7.tar.gz), inside the zip file, and place the file in a directory of choice:

Step 2
Unzip and untar the downloaded by running the following commands in the terminal window:
> gunzip d4-7.tar.gz
> tar -xvf d4-7.tar

Step 3
Inside a terminal window, cd to the d4-7 folder that was created in Step 2 and compile dinero with the following commands:
> cd d4-7
> ./configure
> make
This creates the executable dineroIV.

Step 4 (Traces)
You will run three benchmark traces provided for you. Trace1.din, Trace2.din and Trace3.din.

Step 5 (Testing)
Inside the d4-7/ folder is the dineroIV executable, which is the dinero program. The way it's run is like this:
> ./dineroIV (options) < trace_file_name

Here options can specify the cache size, cache block size, and cache layout options; trace_file_name is the name of the trace file.
To check out the available options:
> ./dineroIV -help

You should see something like this:

```
Usage: dineroIV [options]
Valid options:
 -help              Print this help message
 -copyright         Give details on copyright and lack of warranty
 -contact           Where to get the latest version or contact the authors
 -dineroIII         Explain replacements for Dinero III options
 -custom F          Generate and run custom simulator named F
 -lN-Tsize P        Size
 -lN-Tbsize P       Block size
 -lN-Tsbsize P      Sub-block size (default same as block size)
 -lN-Tassoc U       Associativity (default 1)
 -lN-Trepl C        Replacement policy
                    (l=LRU, f=FIFO, r=random) (default l)
 -lN-Tfetch C       Fetch policy
                    (d=demand, a=always, m=miss, t=tagged,
                     l=load forward, s=subblock) (default d)
 -lN-Tpfdist U      Prefetch distance (in sub-blocks) (default 1)
 -lN-Tpfabort U     Prefetch abort percentage (0-100) (default 0)
 -lN-Twalloc C      Write allocate policy
                    (a=always, n=never, f=nofetch) (default a)
 -lN-Twback C       Write back policy
                    (a=always, n=never, f=nofetch) (default a)
 -lN-Tccc           Compulsory/Capacity/Conflict miss statistics
 -skipcount U       Skip initial U references
 -flushcount U      Flush cache every U references
 -maxcount U        Stop simulation after U references
 -stat-interval U   Show statistics after every U references
 -informat C        Input trace format
                    (D=extended din, d=traditional din, p=pixie32, P=pixie64,
                    b=binary) (default D)
 -on-trigger A      Trigger address to start simulation
 -off-trigger A     Trigger address to stop simulation
 -stat-idcombine    Combine I&D cache stats
Key:
 U unsigned decimal integer
 S like U but with optional [kKmMgG] scaling suffix
 P like S but must be a power of 2
 C single character
 A hexadecimal address
 F string
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N cache level (1 <= N <= 5)
T cache type (u=unified, i=instruction, d=data)
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An example Dinero command is this:

> ./dineroIV -l1-isize 16K -l1-ibsize 32 -l1-isbsize 32 -l1-iassoc 8 -informat d < Trace1.din > outfile.txt

Note the re-directions utilized:
{-informat d < Trace1.din} This is the input to the command line which is a trace file, this trace file should be available in the same folder.
{Trace1.din > outfile.txt } This is the redirected output to be stored in a file called outfile.txt