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perf (paquete linux-tools) : Ejecuta las herramientas de análisis para linux

perf-list: Lista todos los tipos de eventos simbólicos

perf-stat: Ejecuta un comando y recopilar estadísticas de contador de rendimiento

perf-record : Ejecuta un comando y registra su perfil en perf.data

perf-report : Lee perf.data creado por perf.record y muestra el perfil

Cuenta de eventos:

```
perf stat -r 5 ./matrix (matrix1.c)
```

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

1412,557890 task-clock	#	0,980 CPUs utilized	(+- 0,92%)
86 context-switches	#	0,000 M/sec	(+- 26,68%)
0 CPU-migrations	#	0,000 M/sec	
3.880 page-faults	#	0,003 M/sec	(+- 0,01%)

<not supported> cycles
<not supported> stalled-cycles-frontend
<not supported> stalled-cycles-backend
<not supported> instructions
<not supported> branches
<not supported> branch-misses

1,441517814 seconds time elapsed (+- 1,22%)

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-loads -r 5 ./matrix
```

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

<not supported> L1-dcache-loads

1,377508377 seconds time elapsed

(+- 0,33%)

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-load-misses -r 5 ./matrix
```

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

<not supported> L1-dcache-load-misses

1,373937029 seconds time elapsed

(+- 0,92%)

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-stores -r 5 ./matrix
```

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

<not supported> L1-dcache-stores

1,366643675 seconds time elapsed

(+- 0,61%)

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-store-misses -r 5 ./matrix
```

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

<not supported> L1-dcache-store-misses

1,383386276 seconds time elapsed

(+- 0,59%)

```
usuario@debian:~/Escritorio$ gcc -o matrix matrix2.c
```

```
usuario@debian:~/Escritorio$ perf stat -r 5 ./matrix
```

Result: 127840000.000000

Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

```
1143,716641 task-clock          #    0,987 CPUs utilized      (+- 0,81%
)
    37 context-switches        #    0,000 M/sec              (+- 36,47%)
    0 CPU-migrations           #    0,000 M/sec
    5.130 page-faults          #    0,004 M/sec              (+- 0,00%)
<not supported> cycles
<not supported> stalled-cycles-frontend
<not supported> stalled-cycles-backend
<not supported> instructions
<not supported> branches
<not supported> branch-misses

1,158429859 seconds time elapsed      (+- 1,09%)
```

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-loads -r 5 ./matrixResult:
127840000.000000
Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000
```

Performance counter stats for './matrix' (5 runs):

```
<not supported> L1-dcache-loads

1,140113173 seconds time elapsed      (+- 0,11%)
```

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-load-misses -r 5 ./matrix
Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000
Result: 127840000.000000
```

Performance counter stats for './matrix' (5 runs):

```
<not supported> L1-dcache-load-misses
```

1,141824950 seconds time elapsed

(+- 0,07%)

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-stores -r 5 ./matrixResult:
```

127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

<not supported> L1-dcache-stores

1,145392110 seconds time elapsed

(+- 0,19%)

```
usuario@debian:~/Escritorio$ perf stat -e L1-dcache-store-misses -r 5 ./matrix
```

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Result: 127840000.000000

Performance counter stats for './matrix' (5 runs):

<not supported> L1-dcache-store-misses

1,161835400 seconds time elapsed

(+- 0,28%)

COMENTARIO

Como podemos observar, después de ejecutar todos los comandos, nos encontramos con que los medidores no están habilitados para las máquinas virtuales del laboratorio. Por eso no podemos ver los fallos de la caché, ni el resto de eventos.

Lo que sí que podemos suponer tras la ejecución de todos los comandos, es que es relativamente más rápido matrix2.c que matrix1.c

Muestreo basado en eventos:

```
usuario@debian:~/Escritorio$ perf script record ./edges img.pgm out.pgm
```

```
[ perf record: Woken up 1 times to write data ]
```

```
[ perf record: Captured and wrote 0.028 MB perf.data (~1240 samples) ]
```

```
usuario@debian:~/Escritorio$ perf report --stdio
```

```
# =====
```

```
# captured on: Mon Mar 11 17:03:08 2019
```

```
# hostname : debian
```

```
# os release : 3.2.0-4-amd64
```

```
# perf version : 3.2.101
```

```
# arch : x86_64
```

```
# nrcpus online : 1
```

```
# nrcpus avail : 1
```

```
# cpudesc : Intel(R) Core(TM) i7-7700 CPU @ 3.60GHz
```

```
# cpuid : GenuineIntel,6,158,9
```

```
# total memory : 1027008 kB
```

```
# cmdline : /usr/bin/perf_3.2 record ./edges img.pgm out.pgm
```

```
# event : name = cycles, type = 1, config = 0x0, config1 = 0x0, config2 =
```

```
# HEADER_CPU_TOPOLOGY info available, use -l to display
```

```
# HEADER_NUMA_TOPOLOGY info available, use -l to display
```

```
# =====
```

```
#
```

```
# Events: 522 cpu-clock
```

```
#
```

```
# Overhead Command Shared Object Symbol
```

```
# ..... .....
```

```
#
```

77.39%	edges	edges	[.] gaussian
19.35%	edges	edges	[.] laplacian
1.34%	edges	libc-2.13.so	[.] fputc
0.77%	edges	edges	[.] load_image_file
0.38%	edges	[kernel.kallsyms]	[k] arch_local_irq_restore
0.19%	edges	libc-2.13.so	[.] _IO_getc
0.19%	edges	[kernel.kallsyms]	[k] arch_local_irq_restore
0.19%	edges	[kernel.kallsyms]	[k] page_add_new_anon_rmap
0.19%	edges	[kernel.kallsyms]	[k] system_call_after_swapgs

```
#
```

```
# (For a higher level overview, try: perf report --sort comm,dso)
```

```
#
```

```
Conclusión: Tarda más la gaussiana que el resto.
```

```
usuario@debian:~/Escritorio$ perf script record -g ./edges img.pgm out.pgm
```

```
[ perf record: Woken up 1 times to write data ]
```

[perf record: Captured and wrote 0.052 MB perf.data (~2276 samples)]

usuario@debian:~/Escritorio\$ perf report --stdio# =====

captured on: Mon Mar 11 17:06:25 2019

hostname : debian

os release : 3.2.0-4-amd64

perf version : 3.2.101

arch : x86_64

nrcpus online : 1

nrcpus avail : 1

cpudesc : Intel(R) Core(TM) i7-7700 CPU @ 3.60GHz

cpuid : GenuineIntel,6,158,9

total memory : 1027008 kB

cmdline : /usr/bin/perf_3.2 record -g ./edges img.pgm out.pgm

event : name = cycles, type = 1, config = 0x0, config1 = 0x0, config2 =

HEADER_CPU_TOPOLOGY info available, use -l to display

HEADER_NUMA_TOPOLOGY info available, use -l to display

=====

#

Events: 521 cpu-clock

#

Overhead Command Shared Object Symbol

.....
#

77.35%edges edges [.] gaussian

|

-- gaussian

edges

main

__libc_start_main

19.58%edges edges [.] laplacian

|

-- laplacian

edges

main

__libc_start_main

0.77% edges libc-2.13.so [.] _IO_getc

|

-- _IO_getc

main

__libc_start_main

Conclusión, al usar -g escribe solamente sobre los Shared Object.

Sobre los objetos con la opción -e, al igual que anteriormente no podemos obtener ningún resultado interesante

Sobre la diferencia entre los tres comandos, tenemos que perf se diferencia de los otros dos en que no necesita ninguna información adicional durante la compilación. Y gprof se diferencia de pprof en las capacidades gráficas que tienen

valgrind:Conjunto de herramientas para los programas de depuración y perfilado

```
usuario@debian:~/Escritorio$ valgrind --tool=cachegrind ./matrix1
```

```
==5080== Cachegrind, a cache and branch-prediction profiler
==5080== Copyright (C) 2002-2011, and GNU GPL'd, by Nicholas Nethercote et al.
==5080== Using Valgrind-3.7.0 and LibVEX; rerun with -h for copyright info
==5080== Command: ./matrix1
==5080==
--5080-- warning: Unknown Intel cache config value (0x63), ignoring
--5080-- warning: L3 cache found, using its data for the LL simulation.
^C==5080==
==5080== I refs:      611,709,082
==5080== I1 misses:      672
==5080== L1i misses:     661
==5080== I1 miss rate:   0.00%
==5080== L1i miss rate:  0.00%
==5080==
==5080== D refs:   198,452,746 (178,037,124 rd + 20,415,622 wr)
==5080== D1 misses:   19,888,527 ( 19,704,233 rd +      184,294 wr)
==5080== LLd misses:   167,477 (    4,048 rd +    163,429 wr)
==5080== D1 miss rate:  10.0% (    11.0% +    0.9% )
==5080== LLd miss rate:  0.0% (    0.0%  +    0.8% )
==5080==
==5080== LL refs:   19,889,199 ( 19,704,905 rd +      184,294 wr)
==5080== LL misses:    168,138 (    4,709 rd +    163,429 wr)
==5080== LL miss rate:  0.0% (    0.0%  +    0.8% )
```

```
usuario@debian:~/Escritorio$ valgrind --tool=cachegrind ./matrix2
```

```
==5083== Cachegrind, a cache and branch-prediction profiler
==5083== Copyright (C) 2002-2011, and GNU GPL'd, by Nicholas Nethercote et al.
==5083== Using Valgrind-3.7.0 and LibVEX; rerun with -h for copyright info
```

```

==5083== Command: ./matrix2
==5083==
--5083-- warning: Unknown Intel cache config value (0x63), ignoring
--5083-- warning: L3 cache found, using its data for the LL simulation.
^X^C==5083==
==5083== I refs:      751,507,325
==5083== I1 misses:      675
==5083== LLi misses:     664
==5083== I1 miss rate:   0.00%
==5083== LLi miss rate:  0.00%
==5083==
==5083== D refs:   243,105,557 (218,085,806 rd + 25,019,751 wr)
==5083== D1 misses:   3,763,896 ( 2,959,820 rd + 804,076 wr)
==5083== LLd misses:   290,242 (   45,394 rd + 244,848 wr)
==5083== D1 miss rate:  1.5% (    1.3% +    3.2% )
==5083== LLd miss rate:  0.1% (    0.0% +    0.9% )
==5083==
==5083== LL refs:    3,764,571 ( 2,960,495 rd + 804,076 wr)
==5083== LL misses:    290,906 (   46,058 rd + 244,848 wr)
==5083== LL miss rate:  0.0% (    0.0% +    0.9% )

```

En el caso de matriz uno se equipara a matriz dos en cuanto a la caché L1, mientras que en todo lo demás matriz dos supera a la primera.