軟體分析與最佳化 HW3

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Execution environments

- CPU information

- Memory

- OS version

- GCC version

- ICC version

Compile nsieve.c

Vtune profiler

1. **gcc -DUNIX -g –O0 nsieve.c**

- CPU time: 1.760 s

- Instructions retired: 9,566,100,000

- CPI: 0.673

⊙ **Elapsed Time** ⊚**: 1.787s**
  ⊙ **CPU Time** ⊚:   **1.760s**
     Instructions Retired: 9,566,100,000
  ⊙ **Microarchitecture Usage** ⊚:   **41.8%** ▶ **of Pipeline Slots**
     Total Thread Count: 2
     Paused Time ⊚:   0s

⊙ **Top Hotspots**
This section lists the most active functions in your application. Optimizing these hotspot functions typically results in improving overall application performance.

Function	Module	CPU Time ⊚	% of CPU Time ⊚
SIEVE	nsieve_O0_gcc ▶	1.727s	98.1%
native_sched_clock	vmlinux	0.003s	0.2%
native_irq_return_iret	vmlinux	0.003s	0.2%
__mod_memcg_lruvec_state	vmlinux	0.002s	0.1%
clear_page_erms	vmlinux	0.002s	0.1%
[Others]	N/A*	0.023s	1.3%

*N/A is applied to non-summable metrics.

2. **gcc –DUNIX –g –O3 nsieve.c**

- CPU time: 1.174 s

- Instructions retired: 5,983,200,000

- CPI: 0.770

Elapsed Time ⊚: 1.239s

CPU Time ⊚:	1.174s
Instructions Retired:	5,983,200,000
Microarchitecture Usage ⊚:	38.3% ⚑ of Pipeline Slots
CPI Rate ⊚:	0.770
Total Thread Count:	2
Paused Time ⊚:	0s

Top Hotspots 📋

This section lists the most active functions in your application. Optimizing these hotspot functions typically results in improving overall application performance.

Function	Module	CPU Time ⊚	% of CPU Time ⊚
SIEVE	nsieve_O3_gcc	1.142s	97.3%
__memset_evex_unaligned_erms	libc.so.6	0.007s	0.6%
sync_regs	vmlinux	0.003s	0.3%
__mod_lruvec_page_state	vmlinux	0.002s	0.2%
__handle_mm_fault	vmlinux	0.002s	0.2%
[Others]	N/A*	0.018s	1.5%

N/A is applied to non-summable metrics.

3. **icc -DUNIX -g -O0 nsieve.c**

- CPU time: 2.307 s

- Instructions Retired: 18,098,100,000

- CPI Rate: 0.561

Elapsed Time ⊚: 2.363s

CPU Time ⊚:	2.307s
Instructions Retired:	18,098,100,000
Microarchitecture Usage ⊚:	46.7% ⚑ of Pipeline Slots
CPI Rate ⊚:	0.561
Total Thread Count:	2
Paused Time ⊚:	0s

Top Hotspots

This section lists the most active functions in your application. Optimizing these hotspot functions typically results in improving overall application performance.

Function	Module	CPU Time ⊚	% of CPU Time ⊚
SIEVE	nsieve_O0_icc ⚑	2.270s	98.4%
native_irq_return_iret	vmlinux	0.005s	0.2%
native_write_msr	vmlinux	0.005s	0.2%
rmqueue_bulk	vmlinux	0.003s	0.1%
native_sched_clock	vmlinux	0.002s	0.1%
[Others]	N/A*	0.022s	0.9%

N/A is applied to non-summable metrics.

4. **icc -DUNIX -g -Ofast nsieve.c**

- CPU Time: 1.221s

- Instructions Retired: 5,305,500,000

- CPI Rate: 1.117

Elapsed Time ⊚: 1.320s

CPU Time ⊚:	1.221s
Instructions Retired:	5,305,500,000
Microarchitecture Usage ⊚:	29.0% ⚑ of Pipeline Slots
CPI Rate ⊚:	1.117 ⚑
Total Thread Count:	2
Paused Time ⊚:	0s

Top Hotspots

This section lists the most active functions in your application. Optimizing these hotspot functions typically results in improving overall application performance.

Function	Module	CPU Time ⊚	% of CPU Time ⊚
SIEVE	nsieve_Ofast_icc	1.195s	97.9%
__intel_avx_rep_memset	nsieve_Ofast_icc	0.003s	0.2%
__rcu_read_unlock	vmlinux	0.003s	0.2%
exc_page_fault	vmlinux	0.002s	0.2%
sync_regs	vmlinux	0.001s	0.1%
[Others]	N/A*	0.017s	1.4%

N/A is applied to non-summable metrics.

5. **icx –DUNIX –g –O0 nsieve.c**

- CPU Time: 2.009s

- Instructions Retired: 16,497,000,000

- CPI Rate: 0.601

Elapsed Time ⊘: 2.240s

⊙ **CPU Time** ⊘:	**2.009s**
Instructions Retired:	16,497,000,000
⊙ **Microarchitecture Usage** ⊘:	**36.1%** ⚑ of Pipeline Slots
CPI Rate ⊘:	0.601
Total Thread Count:	2
Paused Time ⊘:	0s

Top Hotspots

This section lists the most active functions in your application. Optimizing these hotspot functions typically results in improving overall application performance.

Function	Module	CPU Time ⊘	% of CPU Time ⊘
SIEVE	nsieve_O0_icx	1.971s	98.1%
irqentry_nmi_enter	vmlinux	0.003s	0.1%
sync_regs	vmlinux	0.003s	0.1%
native_irq_return_iret	vmlinux	0.003s	0.1%
native_write_msr	vmlinux	0.003s	0.1%
[Others]	N/A*	0.026s	1.3%

N/A is applied to non-summable metrics.

6. **icx –DUNIX –g –Ofast nsieve.c**

- CPU Time: 1.392s

- Instructions Retired: 10,276,200,000

- CPI Rate: 0.478

Elapsed Time ⊘: 1.477s

⊙ **CPU Time** ⊘:	**1.392s**
Instructions Retired:	10,276,200,000
⊙ **Microarchitecture Usage** ⊘:	**64.3%** of Pipeline Slots
CPI Rate ⊘:	0.478
Total Thread Count:	2
Paused Time ⊘:	0s

Top Hotspots 📋

This section lists the most active functions in your application. Optimizing these hotspot functions typically results in improving overall application performance.

Function	Module	CPU Time ⊘	% of CPU Time ⊘
SIEVE	nsieve_Ofast_icx	1.357s	97.5%
__intel_avx_rep_memset	nsieve_Ofast_icx	0.009s	0.6%
charge_memcg	vmlinux	0.004s	0.3%
try_charge_memcg	vmlinux	0.002s	0.1%
_raw_spin_trylock	vmlinux	0.002s	0.1%
[Others]	N/A*	0.018s	1.3%

N/A is applied to non-summable metrics.