PMU

Metrics List & Dependencies:

Technology / Category	Metric/ Feature/Input	Name	Date Type	Format Example	Collectd Release	Collectd Plugin	Description	Dependencies	Limitations	Barometer Verified (Yes/No)	Comments
PMU	Metric	L1-dcache-loads	Integer	23734	5.8	intel_pmu	Level 1 cache for data (L1d) read accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-dcache-load-misses	Integer	23734	5.8	intel_pmu	Level 1 cache for data (L1d) read misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-dcache-stores	Integer	23734	5.8	intel_pmu	Level 1 cache for data (L1d) writes by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-dcache-store-misses	Integer	23734	5.8	intel_pmu	Level 1 cache for data (L1d) write misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-dcache-prefetches	Integer	23734	5.8	intel_pmu	Level 1 cache for data (L1d) prefetch accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-dcache-prefetch-misses	Integer	23734	5.8	intel_pmu	Level 1 cache for data (L1d) prefetch misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value

PMU	Metric	L1-icache-loads	Integer	23734	5.8	intel_pmu	Level 1 cache for instructions (L1i) read accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-icache-load-misses	Integer	23734	5.8	intel_pmu	Level 1 cache for instructions (L1i) read misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-icache-prefetches	Integer	23734	5.8	intel_pmu	Level 1 cache for instructions (L1i) prefetch accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	L1-icache-prefetch-misses	Integer	23734	5.8	intel_pmu	Level 1 cache for instructions (L1i) prefetch misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	LLC-loads	Integer	23734	5.8	intel_pmu	Last level cache (LLC) read accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	LLC-load-misses	Integer	23734	5.8	intel_pmu	Last level cache (LLC) read misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	LLC-stores	Integer	23734	5.8	intel_pmu	Last level cache (LLC) writes by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	LLC-store-misses	Integer	23734	5.8	intel_pmu	Last level cache (LLC) write misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value

PMU	Metric	LLC-prefetches	Integer	23734	5.8	intel_pmu	Last level cache (LLC) prefetch accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	LLC-prefetch-misses	Integer	23734	5.8	intel_pmu	Last level cache (LLC) prefetch misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	dTLB-loads	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for data (dTLB) read accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	dTLB-load-misses	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for data (dTLB) read misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	dTLB-stores	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for data (dTLB) writes by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	dTLB-store-misses	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for data (dTLB) write misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	dTLB-prefetches	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for data (dTLB) prefetch accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	dTLB-prefetch-misses	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for data (dTLB) prefetch misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value

PMU	Metric	iTLB-loads	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for instructions (iTLB) read accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	iTLB-load-misses	Integer	23734	5.8	intel_pmu	Translation lookaside buffer for instructions (iTLB) read misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	branch-loads	Integer	23734	5.8	intel_pmu	Branch prediction unit read accesses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	branch-load-misses	Integer	23734	5.8	intel_pmu	Branch prediction unit read misses by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	cpu-cycles	Integer	23734	5.8	intel_pmu	Total CPU cycles by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	instructions	Integer	23734	5.8	intel_pmu	Retired instructions by a CPU core	jevents from pmu-tools	Note: these can be affected by various issues, most notably hardware interrupt counts.	yes	Dependent on jevents library to read the metric value
PMU	Metric	cache-references	Integer	23734	5.8	intel_pmu	Cache accesses per CPU core. Usually this indicates Last Level Cache accesses but this may vary depending on CPU type.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	cache-misses	Integer	23734	5.8	intel_pmu	Cache read misses by a CPU core. Usually this indicates Last Level Cache misses.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value

PMU	Metric	branches	Integer	23734	5.8	intel_pmu	Retired branch instructions by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	branch-misses	Integer	23734	5.8	intel_pmu	Mispredicted branch instructions by a CPU core	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	bus-cycles	Integer	23734	5.8	intel_pmu	Bus cycles per CPU core, which can be different from total cycles.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	cpu-clock	Integer	23734	5.8	intel_pmu	Reports the CPU clock, a high-resolution per-CPU timer, by a CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	task-clock	Integer	23734	5.8	intel_pmu	Reports a clock count specific to the task that is running, by a CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	context-switches	Integer	23734	5.8	intel_pmu	Number of context switches per CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	cpu-migrations	Integer	23734	5.8	intel_pmu	Number of times the process has migrated to a new CPU, by a CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	page-faults	Integer	23734	5.8	intel_pmu	Number of page faults by a CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value

PMU	Metric	minor-faults	Integer	23734	5.8	intel_pmu	Number of minor page faults by a CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	major-faults	Integer	23734	5.8	intel_pmu	Number of major page faults by a CPU core. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	alignment-faults	Integer	23734	5.8	intel_pmu	Number of alignment faults by a CPU core. These happen when unaligned memory accesses happen. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Metric	emulation-faults	Integer	23734	5.8	intel_pmu	Number of emulation faults by a CPU core. The kernel sometimes traps on unimplemented instructions and emulates them for user space. Software event provided by the kernel.	jevents from pmu-tools		yes	Dependent on jevents library to read the metric value
PMU	Input	Cores	Integer Array as String	"[0-12]" or "1,2,3"	5.8.1	intel_pmu	The list of CPU core(s) to be provided as input by the user for which the corresponding metrics are required	None			Configuration input in the plugin .conf file
PMU	Input	Configuration Interval	Integer	1 or 10	5.8	intel_pmu	The interval in seconds at which the metrics need to be collectd	None			Configuration input in the plugin .conf file
PMU	Input	Report Hardware Cache Events	Boolean	true/false	5.8	intel_pmu	Report hardware CPU cache events, list in comments	None			L1-dcache-loads, L1-dcache-load-misses, L1-dcache-stores, L1-dcache-store-misses, L1-dcache-prefetches, L1-dcache-prefetch-misses, L1-icache-loads, L1-icache-load-misses, L1-icache-prefetches, L1-icache-prefetch-misses, LLC-loads, LLC-load-misses, LLC-stores, LLC-store-misses, LLC-prefetches, LLC-prefetch-misses, dTLB-loads, dTLB-load-misses, dTLB-stores, dTLB-store-misses, dTLB-prefetches, dTLB-prefetch-misses, iTLB-loads, iTLB-load-misses, branch-loads, branch-load-misses
PMU	Input	Report Kernel PMU Events	Boolean	true/false	5.8	intel_pmu	Report generalized hardware CPU events. Not all of these are available on all platforms. List in comments.	None			cpu-cycles, instructions, cache-references, cache-misses, branches, branch-misses, bus-cycles
PMU	Input	Report Software Events	Boolean	true/false	5.8	intel_pmu	Software events provided by the kernel. List in comments.	None			cpu-clock, task-clock, context-switches, cpu-migrations, page-faults, minor-faults, major-faults, alignment-faults, emulation-faults
PMU	Input	Event List	String	"pmu-events/GenuineIntel-6-55-core.json"	5.8	intel_pmu	Path to file with custom hardware events. The should containt description and definition for events available for given CPU type.	None	File should be valid for supported CPU type.		Valid file for current CPU type can be obtained with use of event_download tool: https://raw.githubusercontent.com/andikleen/pmu-tools/master/event_download.py

PMU	Input	Hardware Events	String Array	L2_RQSTS.CODE_RD_HIT, L2_RQSTS.CODE_RD_MISS	5.8	intel_pmu	Custom hardware events for given CPU type. Names of events must be available in "Event List" json file.	event_download.pytool	No		If there are more events than counters, the kernel uses time multiplexing. With multiplexing, at the end of the run, the counter is scaled basing on total time enabled vs time running.

Sub-sections:

PMU plugin High Level Design

Intel PMU Executed Tests

Intel PMU Performance considerations