

**Assignment 3: ChampSim**

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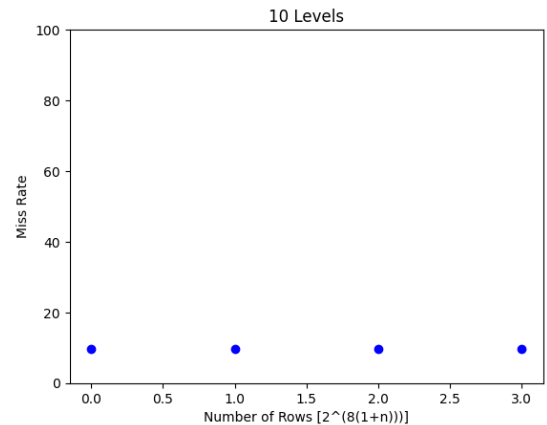
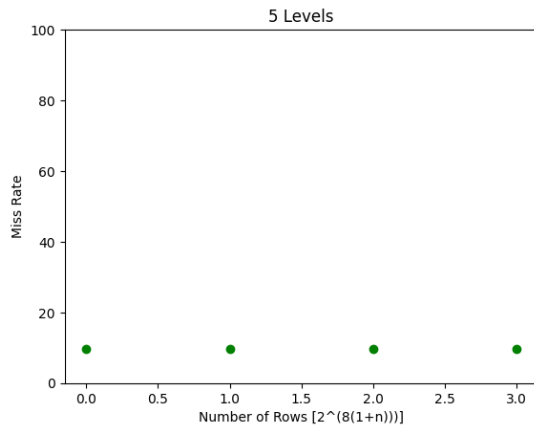
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*(P7) Plot the DTLB Miss Rate by varying the Physical Page size keeping the Virtual Memory size constant (at least 4 different sizes of rows). Also vary the number of levels of tables (at least 2 values including default). Analyze the result.*

**Tests**

Sr. No.	Levels	Rows	DTLB Access	DTLB Miss	DTLB Miss Rate
1	5	256 ( $2^8$ )	21307082	2060264	9.6694%
2	5	65536 ( $2^{16}$ )	21308911	2061138	9.6727%
3	5	16777216 ( $2^{24}$ )	21308911	2061138	9.6727%
4	5	4294967296 ( $2^{32}$ )	21308911	2061138	9.6727%
5	10	256 ( $2^8$ )	21307082	2060264	9.6694%
6	10	65536 ( $2^{16}$ )	21308911	2061138	9.6727%
7	10	16777216 ( $2^{24}$ )	21308911	2061138	9.6727%
8	10	4294967296 ( $2^{32}$ )	21308911	2061138	9.6727%

**DTLB Miss Rate**



## System Cache Configurations

Systems Cache Configurations obtained using the command `lscpu`:

```
arnavm2003@arnavm2003-Dell-G15-5510: ~/ChampSim$ lscpu
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 165
Model name: Intel(R) Core(TM) i7-10870H CPU @ 2.20GHz
Stepping: 2
CPU MHz: 2200.000
CPU max MHz: 5000.0000
CPU min MHz: 800.0000
BogoMIPS: 4399.99
Virtualization: VT-x
L1d cache: 256 KIB
L1i cache: 256 KIB
L2 cache: 2 MiB
L3 cache: 16 MiB
NUMA node0 CPU(s): 0-15
Vulnerability Gather data sampling: Mitigation; Microcode
Vulnerability Itlb multihit: KVM: Mitigation: VMX disabled
Vulnerability L1trf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Mitigation; Clear CPU buffers; SMT vulnerable
Vulnerability Retbleed: Mitigation; Enhanced IBRS
Vulnerability Spec rstack overflow: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBSRB-eIBRS SW sequence
Vulnerability Srbds: Mitigation; Microcode
Vulnerability Tsx async abort: Not affected
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp ln constant_tsc art a
rch perfmon pbs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 sbdb fma cx16 xtpr pdcm pcd sse4_1 sse
4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single ssbd ibrs ibpb stibp ibrs_enhanced tpr_sh
adow vmnt flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx rdseed adx snap clflushopt intel_pt xsaveopt xsavec xgetbv1 xsaves dther
m ida arat pln pts hwp hwp_notify hwp_act_window hwp_epp pku ospke md_clear flush_lld arch_capabilities
```