KPTI performance testing report

Summary

Recently we saw lot of articles to explain or prove the KPTI fix has caused performance issue, especially in some special hardware and some special workload.

In QA's experimental testing, we have several confirmations:

-The test presented very similar performance on microbenchmark testings on both SLE11SP4 and SLE12SP3. The decline mostly happens on those syscall testings 1)were quite frequently switching between userspace with kernel space, 2)when frequently access share memory area in kernel space, 3)when frequently acting in page cache

-In benchmarks with real workloads, 1)only Dbench4 has some decline happened on SLE11SP4 in high process. But didn't happen in SLE12SP3, which were running in machine with PCID feature enabled, perhaps as Intel introduced that PCID feature will reduce the performance issue; 2)We didn't catch up IO performance decline during 2xRAM file size, however, according to the above, we suspect the IO performance will have some decline by executing many small file size; 3)If real workload need do frequently memory mapping or switch page tables from userspace to kernel space, that will be impacted, otherwise, the decline can be ignored. That's say, normal user on their bare metal won't feeling the performance issue.

-However, the test presented significant decline on microbenchmarks on SLE12SP3 XEN Dom0, which were running on an old machine and without PCID feature. Hard to conclude whether XEN specify or HW specify, unless to rerun these tests on the same machine as SLE12SP3 default.

Testing Environment

Hardware resource

	NUMA	MD-RAID	SDD	HDD
Dell T410 `Intel(R) Xeon(R) CPU E5504`	X	X		
Dell 5810-1 `Intel(R) Xeon(R) CPU E5-1620 v3`				X
Dell 5810-2 (PCID) `Intel(R) Xeon(R) CPU E5-1620 v3`			X	

Software configure matrix:

	Bare-Metal	XEN(Dom0)
SLES11SP4	X	X
SLES12SP3	X	X

Filesystem:

	XFS	Btrfs
SLES11SP4	X	-
SLES12SP3	X	-

Network protocol:

	TCPv4	UDPv4	TCPv6	UDPv6
SLES11SP4	X	X	X	X
SLES12SP3	X	X	X	X

Benchmarks

Libmicro: almost all syscalls and library calls micro-benchmark.
Lmbench: Linux benchmark tool, include many scenarios.
Iozone: IO benchmark base on filesystem.
Dbench4: Multi-processes file read/write testing.
Bonnie++: Filesystem benchmark, add/delete files, sequence/random read/write file
Sysbench_sys: CPU, Memory, Mutex, thread testing.
Sysbench_oltp: MySQL OLTP READ-ONLYtestsuite.
Pgbench: Postgre SQL READ/WRITE testing.
Netperf: Network benchmark.
Siege: HTTP server stress testing.

Testing matrix

	Dell T410	Dell 5810-1	Dell 5810-2
	SLE12SP3 XEN Dom0	SLES11SP4 Bare-Metal	SLES12SP3 Bare-Metal
Libmicro	X	X	X
IOzone	X	X	X
Netperf	X	X	X
Dbench4	X	X	X
Bonnie++	X	X	X
Lmbench	X	X	X

Siege	X	X	X
sysbench_sys	X	X	X
sysbench_oltp	X	X	X
Pgbench	X	X	X

Testing Raw Data

The raw data is store at QADB the following could filter the records:
http://apac2-kvm.qa2.suse.asia/qadb/submission.php?host%5B%5D=126&host%5B%5D=125&host%5B%5D=124&testcase=&date_from=&date_to=&comment=&submission_id=&issuer_id=&issue_id=&md5sum=&patch_id=&status=&kernel_version=&kernel_branch=&kernel_flavor=&step=tcf&search=1

Comparing Result

SLES11SP4 Bare-Metal

Libmicro

Libmicro-socket

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
getsockname	0.05895	0.20112	-241.17 %
getpeername	0.05915	0.20415	-245.139 %
socket_u	0.55659	0.71664	-28.7555 %
socket_i	0.63861	0.78363	-22.7087 %
socketpair	1.10563	1.29157	-16.8176 %
setsockopt	0.08355	0.22614	-170.664 %
bind	0.27346	0.81341	-197.451 %
listen	0.08356	0.23193	-177.561 %
connection	8.20865	8.59579	-4.71624 %
conn_accept	0.68963	0.85263	-23.6359 %
poll_10	0.19717	0.40273	-104.255 %
poll_100	1.86154	3.03856	-63.2283 %
poll_w10	0.19545	0.41233	-110.964 %

poll_w100	1.88075	3.16274	-68.1638 %
select_10	0.32084	0.52594	-63.9259 %
select_100	1.95972	3.14564	-60.5148 %
select_w10	0.34303	0.57584	-67.8687 %
select_w100	2.00754	3.21742	-60.2668 %

Libmicro-process

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
semop	0.17724	0.41903	-136.42 %
sigaction	0.07684	0.19995	-160.216 %
signal	0.74894	1.00653	-34.3939 %
sigprocmask	0.06934	0.19524	-181.569 %
pthread_8	5.68313	6.80325	-19.7096 %
pthread_32	6.82928	8.04506	-17.8025 %
pthread_128	7.19119	8.57322	-19.2184 %
pthread_512	8.31130	9.88332	-18.9142 %
fork_10	27.56070	31.93960	-15.8882 %
fork_100	28.51490	33.51460	-17.5336 %
fork_1000	43.88449	47.42058	-8.05772 %
exit_10	37.55100	45.35860	-20.792 %
exit_100	14.05607	16.06560	-14.2965 %
exit_1000	21.69028	22.23329	-2.50347 %
exit_10_nolibc	24.64700	28.05270	-13.8179 %
exec	199.51690	213.24210	-6.87922 %
system	1800.76784	2068.93344	-14.8917 %

Libmicro-regular

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
isatty_no	0.04814	0.19245	-299.771 %
siglongjmp	0.06873	0.19166	-178.859 %
times	0.12495	0.25184	-101.553 %

isatty_yes	0.14312	0.28653	-100.203 %
getrusage	0.17553	0.30422	-73.3151 %
mktimeT2	2.11122	3.08154	-45.9602 %
mktime	0.75545	0.88015	-16.5067 %
log	0.00796	0.00803	-0.879397 %
gettimeofday	0.55423	0.55836	-0.745178 %
time	0.00363	0.00365	-0.550964 %
getpid	0.00193	0.00194	-0.518135 %
longjmp	0.00693	0.00696	-0.4329 %
lrand48	0.00475	0.00475	0 %
strtol	0.01535	0.01535	0 %
localtime_r	0.05675	0.05674	0.0176211 %
exp	0.00765	0.00764	0.130719 %
strftime	0.17625	0.17543	0.465248 %
getenv	0.07106	0.07045	0.858429 %
getenvT2	0.07185	0.07113	1.00209 %

Libmicro-file

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
close_bad	0.04344	0.17141	-294.59 %
close_tmp	0.16497	0.30247	-83.3485 %
close_usr	0.16516	0.29309	-77.4582 %
close_zero	0.16656	0.29319	-76.0267 %
chdir_tmp	0.54356	0.68553	-26.1186 %
chdir_usr	0.58736	0.71234	-21.2783 %
chgetwd_tmp	0.82974	1.08185	-30.3842 %
chgetwd_usr	0.86673	1.12124	-29.3644 %
realpath_tmp	4.69032	6.29424	-34.1964 %
realpath_usr	5.28882	6.99483	-32.2569 %
lseek_t8k	0.05495	0.20123	-266.206 %
lseek_u8k	0.05495	0.20003	-264.022 %
open_tmp	0.47060	0.59868	-27.2163 %

open_usr	0.50961	0.63064	-23.7495 %
open_zero	0.43966	0.58362	-32.7435 %
dup	0.07333	0.21532	-193.632 %
recurse	0.40891	0.41089	-0.484214 %
read_t1k	0.18915	0.32964	-74.2744 %
read_t10k	0.17133	0.31484	-83.7623 %
read_t100k	0.18375	0.32634	-77.6 %
read_u1k	0.18413	0.33725	-83.1586 %
read_u10k	0.16754	0.31513	-88.0924 %
read_u100k	0.17894	0.32726	-82.8881 %
read_z1k	0.11673	0.25934	-122.171 %
read_z10k	0.46304	0.60464	-30.5805 %
read_z100k	4.22384	4.40314	-4.24495 %
read_zw100k	4.43524	4.55415	-2.68103 %
write_t1k	0.52914	0.66923	-26.475 %
write_t10k	1.99623	2.06983	-3.68695 %
write_u1k	0.52653	0.67783	-28.7353 %
write_u10k	2.02214	2.07613	-2.66994 %
write_u100k	16.60405	16.40573	1.19441 %
write_n1k	0.09642	0.24132	-150.28 %
write_n10k	0.09642	0.24131	-150.27 %
write_n100k	0.09642	0.24157	-150.539 %
writev_t1k	2.40844	2.54343	-5.60487 %
writev_u1k	2.39525	2.56665	-7.15583 %
writev_u10k	17.31775	17.23655	0.468883 %
writev_u100k	2849.53794	2407.88415	15.4991 %
writev_n1k	0.19142	0.33036	-72.5838 %
writev_n10k	0.18832	0.32836	-74.3628 %
writev_n100k	0.18832	0.32861	-74.4955 %
pread_t1k	0.16476	0.31454	-90.908 %
pread_t10k	0.38184	0.51703	-35.4049 %
pread_t100k	5.00694	4.95554	1.02658 %
pread_u1k	0.16685	0.32214	-93.0716 %

pread_u10k	0.37313	0.54263	-45.4265 %
pread_u100k	4.66034	4.92535	-5.68649 %
pread_z1k	0.12016	0.25873	-115.321 %
pread_z10k	0.46384	0.60502	-30.4372 %
pread_z100k	4.22993	4.41722	-4.42773 %
pread_zw100k	4.40073	4.55426	-3.48874 %
pwrite_t1k	0.47694	0.62793	-31.6581 %
pwrite_t10k	1.19863	1.34965	-12.5994 %
pwrite_t100k	10.47505	10.57594	-0.963146 %
pwrite_u1k	0.47856	0.63605	-32.9091 %
pwrite_u10k	1.19654	1.39424	-16.5226 %
pwrite_u100k	10.55124	10.82692	-2.61277 %
pwrite_n1k	0.09804	0.24404	-148.919 %
pwrite_n10k	0.09804	0.24314	-148.001 %
pwrite_n100k	0.09804	0.24434	-149.225 %

Libmicro-memory

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
memset_10	0.00314	0.00314	0 %
memset_256	0.00634	0.00834	-31.5457 %
memset_256_u	0.00624	0.00893	-43.109 %
memset_1k	0.01893	0.01893	0 %
memset_4k	0.07254	0.07305	-0.70306 %
memset_4k_uc	0.41284	0.41392	-0.261603 %
memset_10k	0.18365	0.18365	0 %
memrand	0.01574	0.03053	-93.9644 %
malloc_10	0.02074	0.02072	0.096432 %
malloc_100	0.02121	0.02096	1.17869 %
malloc_1k	0.03346	0.03349	-0.0896593 %
malloc_10k	0.03253	0.03252	0.0307409 %
malloc_100k	0.85907	1.11027	-29.2409 %
mallocT2_10	0.05146	0.05605	-8.91955 %

mallocT2_100	0.05349	0.05643	-5.49635 %
mallocT2_1k	0.06494	0.09381	-44.4564 %
mallocT2_10k	0.07287	0.06290	13.6819 %
memcpy_10	0.00363	0.00363	0 %
memcpy_1k	0.03645	0.03734	-2.4417 %
memcpy_10k	0.10805	0.10805	0 %
strcpy_10	0.00307	0.00306	0.325733 %
strcpy_1k	0.03565	0.03565	0 %
strlen_10	0.00284	0.00284	0 %
strlen_1k	0.06855	0.06453	5.86433 %
strchr_10	0.00294	0.00294	0 %
strchr_1k	0.05434	0.05426	0.147221 %
strcmp_10	0.00243	0.00243	0 %
strcmp_1k	0.05534	0.05675	-2.54789 %
scasecmp_10	0.01054	0.01054	0 %
scasecmp_1k	0.64926	0.64944	-0.0277239 %
mmap_z8k	0.29982	0.46315	-54.476 %
mmap_z128k	0.31083	0.47213	-51.8933 %
mmap_t8k	0.31454	0.47454	-50.8679 %
mmap_t128k	0.31743	0.48294	-52.1406 %
mmap_u8k	0.31106	0.47082	-51.3599 %
mmap_u128k	0.31856	0.48025	-50.7565 %
mmap_a8k	0.12436	0.25164	-102.348 %
mmap_a128k	0.13193	0.26334	-99.6059 %
mmap_rz8k	1.02046	1.48633	-45.6529 %
mmap_rz128k	10.94573	15.45315	-41.1797 %
mmap_rt8k	1.12803	1.59254	-41.1789 %
mmap_rt128k	12.53534	17.11006	-36.4946 %
mmap_ru8k	1.12693	1.59295	-41.3531 %
mmap_ru128k	12.49284	17.05215	-36.4954 %
mmap_ra8k	0.79326	1.19223	-50.295 %
mmap_ra128k	10.72345	15.32794	-42.9385 %
mmap_wz8k	2.25725	2.69882	-19.5623 %

mmap_wt8k	2.40716	2.83982	-17.9739 %
mmap_wu8k	2.40944	2.83975	-17.8593 %
mmap_wu128k	32.09154	36.25123	-12.962 %
mmap_wa8k	1.88415	2.28164	-21.0965 %
unmap_z8k	0.24844	0.39876	-60.5056 %
unmap_z128k	0.25015	0.40055	-60.1239 %
unmap_t8k	0.25292	0.39674	-56.8638 %
unmap_t128k	0.25394	0.40386	-59.0376 %
unmap_u8k	0.24844	0.39822	-60.2882 %
unmap_u128k	0.25264	0.40035	-58.4666 %
unmap_a8k	0.24665	0.37964	-53.9185 %
unmap_a128k	0.24025	0.37605	-56.5245 %
unmap_rz8k	0.40004	0.84195	-110.466 %
unmap_rz128k	0.66306	1.09485	-65.1208 %
unmap_rt8k	0.45173	0.87646	-94.023 %
unmap_rt128k	1.43334	1.86623	-30.2015 %
unmap_ru8k	0.45483	0.87733	-92.8918 %
unmap_ru128k	1.46334	1.86262	-27.2855 %
unmap_ra8k	0.39405	0.79584	-101.964 %
unmap_ra128k	0.64913	1.03293	-59.1253 %
unmap_wz8k	0.89246	1.41344	-58.3757 %
unmap_wt8k	0.90743	1.38884	-53.052 %
unmap_wu8k	0.90134	1.41045	-56.4837 %
unmap_wu128k	5.22643	5.78874	-10.759 %
unmap_wa8k	0.76333	1.23184	-61.3771 %
mprot_z8k	0.43614	0.91445	-109.669 %
mprot_z128k	0.43376	0.90925	-109.621 %
mprot_wz8k	0.46914	0.96944	-106.642 %
mprot_wz128k	0.68215	1.16044	-70.1151 %
mprot_twz8k	0.52374	1.02973	-96.6109 %
mprot_tw128k	0.93373	1.42404	-52.5109 %
pipe_pst1	0.33116	0.61823	-86.6862 %
pipe_pmt1	9.20273	9.45013	-2.68833 %

pipe_pmp1	9.04954	9.39593	-3.82771 %
pipe_pst4k	0.46105	0.75424	-63.5918 %
pipe_pmt4k	10.95254	11.26356	-2.83971 %
pipe_pmp4k	10.33205	10.38883	-0.549552 %
pipe_sst1	0.55415	0.84154	-51.8614 %
pipe_smt1	7.82053	7.67203	1.89885 %
pipe_smp1	7.81114	7.33685	6.07197 %
pipe_sst4k	0.64194	0.93076	-44.9917 %
pipe_smt4k	8.77065	8.27266	5.67791 %
pipe_smp4k	8.67394	7.48402	13.7183 %
pipe_tst1	3.41086	3.64812	-6.95602 %
pipe_tmt1	12.99734	13.09795	-0.774081 %
pipe_tmp1	12.67345	12.99686	-2.55187 %
pipe_tst4k	2.77795	3.04683	-9.67908 %
pipe_tmt4k	14.66434	14.87354	-1.42659 %
pipe_tmp4k	14.40363	14.61093	-1.43922 %

Libmicro-contextswitch

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
getcontext	0.10034	0.22263	-121.876 %
setcontext	0.10465	0.22893	-118.758 %
mutex_st	0.01546	0.01546	0 %
mutex_mt	0.01553	0.01553	0 %
mutex_T2	0.15745	0.08583	45.4875 %
c_mutex_1	0.03844	0.03827	0.442248 %
c_cond_1	0.10306	0.10303	0.0291093 %
c_lockf_1	0.78962	1.40136	-77.4727 %
c_flock	0.58585	1.18955	-103.047 %
c_flock_10	8.28064	8.13503	1.75844 %
c_flock_200	178.75775	167.72756	6.17047 %
c_fcntl_1	0.92656	1.54094	-66.3076 %
file_lock	0.45286	0.75793	-67.3652 %

fcntl_tmp	0.05705	0.18905	-231.376 %
fcntl_usr	0.05705	0.18905	-231.376 %
fcntl_ndelay	0.05936	0.19534	-229.077 %

IOzone

IOzone-xfs-fsync

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
"Writer report" "33554432" "4"	133840	133082	-0.569574 %
"Writer report" "33554432" "8"	134156	134365	0.155546 %
"Re-writer report" "33554432" "4"	134004	133744	-0.194401 %
"Re-writer report" "33554432" "8"	133859	133815	-0.0328812 %
"Reader report" "33554432" "4"	146426	146612	0.126865 %
"Reader report" "33554432" "8"	146525	146452	-0.0498457 %
"Re-Reader report" "33554432" "4"	146660	146895	0.159978 %
"Re-Reader report" "33554432" "8"	146451	146309	-0.0970549 %

IOzone-xfs-async

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
"Writer report" "33554432" "4"	156406	156558	0.0970886 %
"Writer report" "33554432" "8"	159960	159837	-0.0769534 %
"Re-writer report" "33554432" "4"	159179	158894	-0.179365 %
"Re-writer report" "33554432" "8"	159405	159486	0.0507882 %

"Reader report" "33554432" "4"	146485	146485	0 %
"Reader report" "33554432" "8"	146358	146363	0.00341616 %
"Re-Reader report" "33554432" "4"	146745	146655	-0.0613685 %
"Re-Reader report" "33554432" "8"	146230	146124	-0.0725411 %

Netperf

loop-tcpv4

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
Throughput(10^6bits/sec)	30888.60	29998.80	-2.96612 %

loop-tcpv6

Throughput(10^6bits/sec)	19404.59	18948.21	-2.40857 %

loop-udpv4

Throughput(10^6bits/sec)	62781.67	61009.70	-2.90441 %

loop-udpv6

uThroughput(10^6bits/sec)	61166.03	62351.39	1.9011 %

Dbench4
fsync-xfs

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
1 procs Throughput (MB/sec)	2.20492	2.23888	1.51683 %
1 procs max_latency ms	330.999	286.580	13.4197 %
4 procs Throughput (MB/sec)	3.13271	3.11332	-0.622808 %

4 procs max_latency ms	544.164	532.620	2.12142 %
48 procs Throughput (MB/sec)	5.34298	5.49452	2.75802 %
48 procs max_latency ms	3344.025	4399.477	-31.5623 %
128 procs Throughput (MB/sec)	6.14693	6.15576	0.143443 %
128 procs max_latency ms	20096.821	18450.902	8.18995 %
192 procs Throughput (MB/sec)	6.76071	6.80231	0.611557 %
192 procs max_latency ms	123024.610	136023.572	-10.5661 %
256 procs Throughput (MB/sec)	7.98311	8.20331	2.68428 %
256 procs max_latency ms	61647.706	42645.518	30.8238 %
500 procs Throughput (MB/sec)	8.86892	4.47423	-98.2223 %
500 procs max_latency ms	274052.567	463097.488	-68.9813 %

async-xfs

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
1 procs Throughput (MB/sec)	15.2907	15.4644	1.12322 %
1 procs max_latency ms	241.152	232.285	3.67693 %
4 procs Throughput (MB/sec)	20.8547	23.2371	10.2526 %
4 procs max_latency ms	552.098	381.107	30.9711 %
48 procs Throughput (MB/sec)	42.9269	43.733	1.84323 %
48 procs max_latency ms	2228.504	2505.923	-12.4487 %
128 procs Throughput (MB/sec)	51.2814	51.8	1.00116 %

128 procs max_latency ms	20344.888	25171.703	-23.725 %
192 procs Throughput (MB/sec)	43.0909	44.4906	3.14606 %
192 procs max_latency ms	16001.241	33006.046	-106.272 %
256 procs Throughput (MB/sec)	40.0492	37.737	-6.12714 %
256 procs max_latency ms	28009.685	33007.253	-17.8423 %
500 procs Throughput (MB/sec)	32.1397	23.4628	-36.9815 %
500 procs max_latency ms	231304.193	263057.852	-13.7281 %

Bonnie++

bonnie++_fsync_xfs

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
Sequential_Output/Per_Chr(K/sec)	119804	119558	0.205335%
Sequential_Output/Block(K/sec)	107368	107105	0.244952%
Sequential_Output/Rewrite(K/sec)	59636	59719	-0.139178%
Sequential_Input/Per_Chr(K/sec)	130816	133677	-2.187041%
Sequential_Input/Block(K/sec)	181180	181029	0.083343%
Random/Seek(sec)	181180	181029	0.083343%
Sequential_Create/Create(sec)	119804	119558	0.205335%
Sequential_Create/Read(sec)	107368	107105	0.244952%
Sequential_Create/Delete(sec)	59636	59719	-0.139178%

Random_Create/Create(sec)	119804	119558	0.205335%
Random_Create/Read(sec)	107368	107105	0.244952%
Random_Create/Delete(sec)	59636	59719	-0.139178%

bonnie++_async_xfs

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
Sequential_Output/Per_Chr(K/sec)	119533	119652	-0.099554%
Sequential_Output/Block(K/sec)	125854	124706	0.912168%
Sequential_Output/Rewrite(K/sec)	58020	58204	-0.317132%
Sequential_Input/Per_Chr(K/sec)	111651	111150	0.448720%
Sequential_Input/Block(K/sec)	181992	181011	0.539035%
Random/Seek(sec)	181992	181011	0.539035%
Sequential_Create/Create(sec)	119533	119652	-0.099554%
Sequential_Create/Read(sec)	125854	124706	0.912168%
Sequential_Create/Delete(sec)	58020	58204	-0.317132%
Random_Create/Create(sec)	119533	119652	-0.099554%
Random_Create/Read(sec)	125854	124706	0.912168%
Random_Create/Delete(sec)	58020	58204	-0.317132%

Lmbench

lmbench-local

	SLES11SP4-MU	SLES11SP4-PTI	

	3.0.101-108.18-default	3.0.101-21.g1b24463-default	
PIPE(ms)	8.890	9.134	-2.74466 %
AF_UNIX(ms)	7.85	7.49	4.58599 %
UDP(ms)	10.2	9.591	5.97059 %
TCP(ms)	12.6	12.7	-0.793651 %
TCP_CONN(ms)	12.	14.	-16.6667 %

Siege

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
Transaction trans/sec	7928.94	7942.44	0.169973 %
Throughput MB/sec	7.7428	7.7552	0.159893 %

sysbench_sys

sysbench_mutex

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
1	0.0052s	0.0052s	0 %
2	0.0231s	0.0306s	-32.4675 %
4	0.0459s	0.0500s	-8.93246 %
8	0.1437s	0.1130s	21.364 %
16	0.2322s	0.1913s	17.6141 %
32	0.4593s	0.3790s	17.4831 %
64	0.9283s	0.7673s	17.3435 %
128	1.9049s	1.5894s	16.5625 %
256	3.5797s	3.0524s	14.7303 %

sysbench_thread

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	

1	0.0052s	0.0050s	3.84615 %
2	0.0306s	0.0232s	24.183 %
4	0.0500s	0.0512s	-2.4 %
8	0.1130s	0.1407s	-24.5133 %
16	0.1913s	0.2248s	-17.5118 %
32	0.3790s	0.4598s	-21.3193 %
64	0.7673s	0.9321s	-21.4779 %
128	1.5894s	1.8988s	-19.4665 %
256	3.0524s	3.6060s	-18.1365 %

sysbench_oltp

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
1	58.7216s	57.9512s	1.31195 %
5	13.7751s	13.5734s	1.46424 %
12	10.9638s	10.7234s	2.19267 %
21	10.8211s	10.6536s	1.5479 %
30	10.9421s	10.9530s	-0.0996152 %
32	10.4881s	10.6897s	-1.92218 %

Pgbench

pgbench-ro-xfs

	SLES11SP4-MU 3.0.101-108.18-default	SLES11SP4-PTI 3.0.101-21.g1b24463-default	
clients: 1	13450.919695	13087.488252	-2.77694
clients: 5	33794.556941	32250.472547	-4.78779
clients: 12	48422.635453	46582.670276	-3.94989
clients: 21	42415.708324	43147.988576	1.69714
clients: 30	36050.675137	35680.425110	-1.03768
clients: 32	34360.654835	34168.136768	-0.563443

SLES12SP3 Bare-Metal

Libmicro

libmicro_socket

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
getsockname	0.05514	0.19944	-261.697 %
getpeername	0.05493	0.19304	-251.429 %
socket_u	0.64641	0.77963	-20.6092 %
socket_i	0.73268	0.83779	-14.346 %
socketpair	1.32356	1.47142	-11.1714 %
setsockopt	0.08517	0.23014	-170.213 %
bind	0.25542	0.41390	-62.0468 %
listen	0.08333	0.22420	-169.051 %
connection	9.40366	9.77080	-3.90422 %
conn_accept	0.81374	0.89280	-9.71563 %
poll_10	0.23863	0.43983	-84.3146 %
poll_100	2.59816	3.71765	-43.0878 %
poll_w10	0.23664	0.43724	-84.7701 %
poll_w100	2.60164	3.52204	-35.3777 %
select_10	0.31636	0.52543	-66.0861 %
select_100	2.71633	3.49463	-28.6526 %
select_w10	0.30655	0.50606	-65.0824 %
select_w100	2.59438	3.58212	-38.0723 %

libmicro-process

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
semop	0.20974	0.46714	-122.723 %
sigaction	0.06684	0.18833	-181.762 %
signal	0.58482	0.84674	-44.7864 %
sigprocmask	0.06095	0.18444	-202.609 %
pthread_8	5.65412	6.20100	-9.67224 %

pthread_32	6.98234	7.60666	-8.94142 %
pthread_128	7.43359	8.14357	-9.55097 %
pthread_512	8.54393	9.41691	-10.2175 %
fork_10	43.56690	50.35080	-15.5712 %
fork_100	40.40403	47.70514	-18.0703 %
fork_1000	82.66262	86.22562	-4.31029 %
exit_10	18.42680	19.63050	-6.53233 %
exit_100	13.96435	14.51227	-3.92371 %
exit_1000	44.65046	42.69847	4.37171 %
exit_10_nolibc	15.25460	15.73860	-3.17281 %
exec	178.14580	197.82960	-11.0493 %
system	651.42586	716.04485	-9.91962 %

Libmicro-regular

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34- default	
getpid	0.00193	0.00193	0 %
getenv	0.05582	0.05483	1.77356 %
getenvT2	0.05733	0.05754	-0.3663 %
gettimeofday	0.56214	0.55114	1.95681 %
log	0.02114	0.02117	-0.141911 %
exp	0.01684	0.01694	-0.593824 %
lrand48	0.00465	0.00465	0 %
isatty_yes	0.09983	0.23154	-131.934 %
isatty_no	0.05334	0.18674	-250.094 %
strtol	0.01504	0.01504	0 %
longjmp	0.00624	0.00624	0 %
siglongjmp	0.04735	0.17194	-263.126 %
getrusage	0.19634	0.32744	-66.7719 %
times	0.13754	0.26334	-91.4643 %
time	0.00194	0.00194	0 %
localtime_r	0.05024	0.05025	-0.0199045 %
strftime	0.18992	0.19005	-0.0684499 %

mktime	0.95072	1.08505	-14.1293 %
mktimeT2	2.79874	2.66454	4.79501 %

Libmicro-file

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
close_bad	0.04456	0.17431	-291.18 %
close_tmp	0.19766	0.35806	-81.1494 %
close_usr	0.19841	0.35809	-80.4798 %
close_zero	0.20603	0.35750	-73.5184 %
chdir_tmp	0.54886	0.68405	-24.6311 %
chdir_usr	0.58244	0.71054	-21.9937 %
chgetwd_tmp	0.68774	0.95485	-38.8388 %
chgetwd_usr	0.72225	0.98744	-36.7172 %
realpath_tmp	5.07115	6.57233	-29.6024 %
realpath_usr	5.62035	7.26955	-29.3434 %
lseek_t8k	0.06194	0.19855	-220.552 %
lseek_u8k	0.06194	0.19854	-220.536 %
open_tmp	0.47477	0.60381	-27.1795 %
open_usr	0.50580	0.63446	-25.4369 %
open_zero	0.45870	0.59577	-29.8823 %
dup	0.07138	0.21379	-199.51 %
recurse	0.42088	0.41880	0.494203 %
read_t1k	0.16702	0.30755	-84.1396 %
read_t10k	0.16699	0.30533	-82.8433 %
read_t100k	0.17845	0.32022	-79.4452 %
read_u1k	0.16744	0.31298	-86.9207 %
read_u10k	0.16314	0.31065	-90.4193 %
read_u100k	0.18045	0.32074	-77.7445 %
read_z1k	0.13045	0.26895	-106.171 %
read_z10k	0.49202	0.62583	-27.196 %
read_z100k	4.36093	4.51514	-3.53617 %
read_zw100k	4.52684	4.66733	-3.10349 %

write_t1k	1.38375	1.53264	-10.7599 %
write_t10k	2.63684	2.78714	-5.7 %
write_u1k	1.38083	1.53284	-11.0086 %
write_u10k	2.60976	2.75785	-5.67447 %
write_u100k	14.69603	15.17345	-3.24863 %
write_n1k	0.06831	0.20752	-203.792 %
write_n10k	0.06445	0.20649	-220.388 %
write_n100k	0.06445	0.20444	-217.207 %
writev_t1k	3.02504	3.17086	-4.82043 %
writev_u1k	3.00392	3.17383	-5.65628 %
writev_u10k	15.38224	15.48884	-0.693007 %
writev_n1k	0.15551	0.30426	-95.653 %
writev_n10k	0.15555	0.30456	-95.7956 %
writev_n100k	0.15559	0.30427	-95.5588 %
pread_t1k	0.14824	0.29203	-96.9981 %
pread_t10k	0.34024	0.48184	-41.6177 %
pread_t100k	4.75453	4.99294	-5.01438 %
pread_u1k	0.15055	0.29234	-94.1813 %
pread_u10k	0.34544	0.47182	-36.5852 %
pread_u100k	4.82434	4.96975	-3.01409 %
pread_z1k	0.12873	0.27084	-110.394 %
pread_z10k	0.49366	0.62906	-27.4278 %
pread_z100k	4.35294	4.51153	-3.64328 %
pread_zw100k	4.52846	4.66413	-2.99594 %
pwrite_t1k	1.24774	1.39215	-11.5737 %
pwrite_t10k	1.87563	2.00145	-6.70815 %
pwrite_t100k	9.56774	9.64553	-0.813045 %
pwrite_u1k	1.26545	1.42246	-12.4074 %
pwrite_u10k	1.86784	2.02365	-8.34172 %
pwrite_u100k	9.60504	9.73775	-1.38167 %
pwrite_n1k	0.06635	0.20855	-214.318 %
pwrite_n10k	0.06336	0.20512	-223.737 %
pwrite_n100k	0.06335	0.20502	-223.631 %

Libmicro-memory

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
memset_10	0.00204	0.00204	0 %
memset_256	0.00335	0.00335	0 %
memset_256_u	0.00445	0.00445	0 %
memset_1k	0.01374	0.00954	30.5677 %
memset_4k	0.03655	0.03673	-0.492476 %
memset_4k_uc	0.41743	0.41896	-0.366529 %
memset_10k	0.09612	0.09612	0 %
memrand	0.02603	0.01942	25.3938 %
malloc_10	0.02379	0.02382	-0.126103 %
malloc_100	0.02379	0.02382	-0.126103 %
malloc_1k	0.03290	0.03325	-1.06383 %
malloc_10k	0.03178	0.03177	0.0314663 %
malloc_100k	0.83188	1.05126	-26.3716 %
mallocT2_10	0.08635	0.09154	-6.01042 %
mallocT2_100	0.09127	0.09023	1.13948 %
mallocT2_1k	0.08643	0.08982	-3.92225 %
mallocT2_10k	0.08940	0.08956	-0.178971 %
memcpy_10	0.00363	0.00363	0 %
memcpy_1k	0.01274	0.01282	-0.627943 %
memcpy_10k	0.10193	0.10195	-0.0196213 %
strcpy_10	0.00276	0.00276	0 %
strcpy_1k	0.02695	0.02695	0 %
strlen_10	0.00224	0.00224	0 %
strlen_1k	0.01714	0.01715	-0.0583431 %
strchr_10	0.00265	0.00265	0 %
strchr_1k	0.03063	0.03025	1.24061 %
strcmp_10	0.00255	0.00255	0 %
strcmp_1k	0.03814	0.03734	2.09754 %
scasecmp_10	0.00414	0.00424	-2.41546 %

scasecmp_1k	0.12006	0.12003	0.0249875 %
mmap_z8k	0.78033	0.93224	-19.4674 %
mmap_z128k	0.81267	0.97425	-19.8826 %
mmap_t8k	0.78384	0.95275	-21.549 %
mmap_t128k	0.82423	0.96634	-17.2415 %
mmap_u8k	0.71203	0.94975	-33.3862 %
mmap_u128k	0.83404	0.97866	-17.3397 %
mmap_a8k	0.19683	0.32795	-66.6159 %
mmap_a128k	0.19035	0.31984	-68.0273 %
mmap_rz8k	1.46465	1.93466	-32.0903 %
mmap_rz128k	11.70053	16.10224	-37.6197 %
mmap_rt8k	1.24986	1.56745	-25.41 %
mmap_rt128k	3.42053	3.99784	-16.8778 %
mmap_ru8k	1.24405	1.57314	-26.4531 %
mmap_ru128k	3.45484	3.99974	-15.7721 %
mmap_ra8k	0.88865	1.30234	-46.5526 %
mmap_ra128k	10.92344	15.45886	-41.5201 %
mmap_wz8k	2.61754	3.06585	-17.1271 %
mmap_wt8k	2.87165	3.31225	-15.3431 %
mmap_wu8k	2.86446	3.31993	-15.9007 %
mmap_wu128k	31.18642	35.38413	-13.4601 %
mmap_wa8k	1.86954	2.26055	-20.9148 %
unmap_z8k	0.28164	0.42275	-50.103 %
unmap_z128k	0.27225	0.41284	-51.64 %
unmap_t8k	0.27995	0.42403	-51.4663 %
unmap_t128k	0.27555	0.41225	-49.6099 %
unmap_u8k	0.27954	0.42544	-52.1929 %
unmap_u128k	0.27253	0.41973	-54.0124 %
unmap_a8k	0.23925	0.37724	-57.6761 %
unmap_a128k	0.22993	0.36605	-59.2006 %
unmap_rz8k	0.43893	0.88125	-100.772 %
unmap_rz128k	2.52625	7.52166	-197.74 %
unmap_rt8k	0.49474	0.94425	-90.8578 %

unmap_rt128k	3.32694	8.32652	-150.276 %
unmap_ru8k	0.50465	0.94033	-86.3331 %
unmap_ru128k	3.32774	8.32424	-150.147 %
unmap_ra8k	0.41983	0.85775	-104.309 %
unmap_ra128k	2.49994	7.49365	-199.753 %
unmap_wz8k	0.87034	1.29973	-49.3359 %
unmap_wt8k	0.87554	1.30193	-48.7002 %
unmap_wu8k	0.87846	1.30554	-48.6169 %
unmap_wu128k	5.46306	10.45992	-91.4663 %
unmap_wa8k	0.73315	1.17765	-60.6288 %
mprot_z8k	0.49835	0.66175	-32.7882 %
mprot_z128k	0.50004	0.65574	-31.1375 %
mprot_wz8k	1.43744	1.91973	-33.552 %
mprot_wz128k	3.50694	8.54704	-143.718 %
mprot_twz8k	1.49135	1.96613	-31.8356 %
mprot_tw128k	3.79954	8.77416	-130.927 %
pipe_pst1	0.27755	0.55155	-98.721 %
pipe_pmt1	6.77145	7.27595	-7.4504 %
pipe_pmp1	6.68533	7.14135	-6.8212 %
pipe_pst4k	0.37964	0.65326	-72.0735 %
pipe_pmt4k	8.83215	9.08006	-2.8069 %
pipe_pmp4k	8.24645	8.49564	-3.02179 %
pipe_sst1	0.48575	0.77634	-59.823 %
pipe_smt1	6.75284	6.79474	-0.62048 %
pipe_smp1	6.73016	6.77905	-0.726431 %
pipe_sst4k	0.67366	0.96954	-43.9213 %
pipe_smt4k	7.98983	8.04746	-0.721292 %
pipe_smp4k	7.44215	7.50612	-0.859563 %
pipe_tst1	2.93314	3.24963	-10.7901 %
pipe_tmt1	10.87462	11.40485	-4.87585 %
pipe_tmp1	10.82283	11.24083	-3.86221 %
pipe_tst4k	2.52433	2.84974	-12.8909 %
pipe_tmt4k	12.96483	13.25854	-2.26544 %

pipe_tmp4k	12.17425	12.60863	-3.56802 %

IOzone

fsync

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
"Writer report" "33554432" "4"	384916	379211	-1.50444 %
"Writer report" "33554432" "8"	388706	380951	-2.03569 %
"Re-writer report" "33554432" "4"	384240	375034	-2.45471 %
"Re-writer report" "33554432" "8"	387254	380120	-1.87678 %
"Reader report" "33554432" "4"	513216	512617	-0.116851 %
"Reader report" "33554432" "8"	503492	486586	-3.47441 %
"Re-Reader report" "33554432" "4"	517627	501148	-3.28825 %
"Re-Reader report" "33554432" "8"	501542	487020	-2.98181 %

Async

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
"Writer report" "33554432" "4"	417425	413782	-0.880415 %
"Writer report" "33554432" "8"	418404	410298	-1.97564 %
"Re-writer report" "33554432" "4"	421225	409847	-2.77616 %
"Re-writer report" "33554432" "8"	419855	411288	-2.08297 %
"Reader report" "33554432" "4"	510882	503601	-1.44579 %

"Reader report" "33554432" "8"	509193	499156	-2.01079 %
"Re-Reader report" "33554432" "4"	509196	515671	1.25565 %
"Re-Reader report" "33554432" "8"	508052	502707	-1.06324 %

Netperf

loop-tcpv4

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Throughput(10^6bits/sec)	55601.33	53348.86	-4.22215 %

loop-udpv4

Throughput(10^6bits/sec)	77279.67	74951.57	-3.10614 %

loop-tcpv6

Throughput(10^6bits/sec)	57028.87	52028.15	-9.61157 %

loop-udpv6

Throughput(10^6bits/sec)	68096.01	66308.37	-2.69595 %

Dbench4

fsync

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1 procs Throughput (MB/sec)	17.9175	17.6712	-1.39379 %
1 procs max_latency ms	311.569	311.552	0.00545626 %
4 procs Throughput (MB/sec)	45.3809	44.4267	-2.14781 %

4 procs max_latency ms	52.272	57.000	-9.045 %
48 procs Throughput (MB/sec)	225.164	222.758	-1.0801 %
48 procs max_latency ms	266.260	302.205	-13.5 %
128 procs Throughput (MB/sec)	270.166	268.288	-0.699994 %
128 procs max_latency ms	464.797	420.763	9.47381 %
192 procs Throughput (MB/sec)	283.537	280.742	-0.995576 %
192 procs max_latency ms	496.447	508.155	-2.35836 %
256 procs Throughput (MB/sec)	303.361	301.058	-0.764969 %
256 procs max_latency ms	778.339	638.375	17.9824 %
500 procs Throughput (MB/sec)	331.042	323.823	-2.2293 %
500 procs max_latency ms	1839.435	1998.617	-8.65385 %

Async

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1 procs Throughput (MB/sec)	98.1474	95.3983	-2.88171 %
1 procs max_latency ms	1381.052	742.769	46.2172 %
4 procs Throughput (MB/sec)	270.534	266.732	-1.4254 %
4 procs max_latency ms	236.181	281.652	-19.2526 %
48 procs Throughput (MB/sec)	1362.35	1334.84	-2.06092 %
48 procs max_latency ms	2170.420	3008.546	-38.6158 %
128 procs Throughput (MB/sec)	1397.1	1381.07	-1.16069 %
128 procs max_latency	2294.333	3303.710	-43.9944 %

ms			
192 procs Throughput (MB/sec)	1378.32	1345.33	-2.45219 %
192 procs max_latency ms	2621.194	4342.705	-65.6766 %
256 procs Throughput (MB/sec)	1333.24	1349.77	1.22465 %
256 procs max_latency ms	3537.950	4962.947	-40.2775 %
500 procs Throughput (MB/sec)	991.211	988.378	-0.286631 %
500 procs max_latency ms	7000.370	14994.762	-114.2 %

Bonnie++
fsync

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Sequential_Output/Per_Chr(K/sec)	138789	138185	0.435193%
Sequential_Output/Block(K/sec)	387408	384472	0.757857%
Sequential_Output/Rewrite(K/sec)	215879	212906	1.377160%
Sequential_Input/Per_Chr(K/sec)	143105	142399	0.493344%
Sequential_Input/Block(K/sec)	670865	670482	0.057090%
Random/Seek(sec)	670865	670482	0.057090%
Sequential_Create/Create(sec)	138789	138185	0.435193%
Sequential_Create/Read(sec)	387408	384472	0.757857%
Sequential_Create/Delete(sec)	215879	212906	1.377160%
Random_Create/Create(sec)	138789	138185	0.435193%

Random_Create/Read(sec)	387408	384472	0.757857%
Random_Create/Delete(sec)	215879	212906	1.377160%

Async

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Sequential_Output/Per_Chr(K/sec)	138310	138059	0.181476%
Sequential_Output/Block(K/sec)	424435	421500	0.691508%
Sequential_Output/Rewrite(K/sec)	207342	211188	-1.854906%
Sequential_Input/Per_Chr(K/sec)	140384	138777	1.144717%
Sequential_Input/Block(K/sec)	673259	671696	0.232154%
Random/Seek(sec)	673259	671696	0.232154%
Sequential_Create/Create(sec)	138310	138059	0.181476%
Sequential_Create/Read(sec)	424435	421500	0.691508%
Sequential_Create/Delete(sec)	207342	211188	-1.854906%
Random_Create/Create(sec)	138310	138059	0.181476%
Random_Create/Read(sec)	424435	421500	0.691508%
Random_Create/Delete(sec)	207342	211188	-1.854906%

Lmbench

lmbench-local

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	

PIPE(ms)	7.136	7.375	-3.34922 %
AF_UNIX(ms)	6.54	6.57	-0.458716 %
UDP(ms)	9.573	10.5	-9.68348 %
TCP(ms)	10.9	11.3	-3.66972 %
TCP_CONN(ms)	16.	19.	-18.75 %

Siege

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34- default	
Transaction trans/sec	13369.1	12555.9	-6.47616 %
Throughput MB/sec	13.0558	12.261	-6.48234 %

sysbench_sys

sysbench_mutex

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34- default	
1	0.0019s	0.0019s	0 %
2	0.0187s	0.0241s	-28.877 %
4	0.0542s	0.0477s	11.9926 %
8	0.1312s	0.0996s	24.0854 %
16	0.1967s	0.1851s	5.89731 %
32	0.3721s	0.3583s	3.70868 %
64	0.7476s	0.7161s	4.21348 %
128	1.4761s	1.4059s	4.75578 %
256	2.9618s	2.8243s	4.64245 %

sysbench_threads

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34- default	
1	0.0347s	0.0629s	-81.268 %
2	0.0256s	0.0313s	-22.2656 %

4	0.0249s	0.0382s	-53.4137 %
8	0.0264s	0.0404s	-53.0303 %
16	0.0419s	0.0563s	-34.3675 %
32	0.0539s	0.0646s	-19.8516 %
64	0.0559s	0.0630s	-12.7013 %
128	0.0534s	0.0630s	-17.9775 %
256	0.0562s	0.0641s	-14.0569 %

sysbench_oltp

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1	154.5846s	109.5206s	29.1517 %
5	98.8039s	99.8245s	-1.03296 %
12	103.1756s	132.2875s	-28.2159 %
21	98.6051s	102.6681s	-4.12048 %
30	112.8403s	99.7763s	11.5774 %
32	113.8462s	99.7645s	12.3691 %

Pgbench

rw-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
clients: 1	504.853648	491.092624	-2.80212
clients: 5	1543.536268	1514.376875	-1.9255
clients: 12	3364.179110	3369.856035	0.168462
clients: 21	4713.101186	4649.655534	-1.36452
clients: 30	6295.378272	6153.204680	-2.31056
clients: 32	6571.967593	6422.374690	-2.32925

ro-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
clients: 1	504.853648	491.092624	-2.80212

clients: 5	1543.536268	1514.376875	-1.9255
clients: 12	3364.179110	3369.856035	0.168462
clients: 21	4713.101186	4649.655534	-1.36452
clients: 30	6295.378272	6153.204680	-2.31056
clients: 32	6571.967593	6422.374690	-2.32925

SLES12SP3 Xen Dom0

Libmicro

libmicro-socket

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
getsockname	0.13038	1.03980	-697.515 %
getpeername	0.13140	1.03900	-690.715 %
socket_u	1.08200	2.85200	-163.586 %
socket_i	1.44900	3.30800	-128.295 %
socketpair	2.18000	4.34400	-99.2661 %
setsockopt	0.16028	1.16198	-624.969 %
bind	0.45056	1.96096	-335.227 %
listen	0.14080	1.10848	-687.273 %
connection	18.46500	29.43400	-59.4043 %
conn_accept	1.66800	3.75800	-125.3 %
poll_10	0.51528	1.66180	-222.504 %
poll_100	6.01769	9.91181	-64.7112 %
poll_w10	0.54871	1.57780	-187.547 %
poll_w100	5.70591	9.39919	-64.7273 %
select_10	0.69811	1.75660	-151.622 %
select_100	5.75982	9.60451	-66.7502 %
select_w10	0.73088	1.78708	-144.511 %
select_w100	5.11811	7.72009	-50.8387 %

Libmicro-regular

	SLES12SP3	SLES12SP3-PTI	

	4.4.103-6.33-default	4.4.103-17.g399eb34-default	
getpid	0.00451	0.00451	0 %
getenv	0.14239	0.14290	-0.358171 %
getenvT2	0.14459	0.14559	-0.691611 %
gettimeofday	0.03220	0.03220	0 %
log	0.05120	0.05120	0 %
exp	0.04270	0.04270	0 %
lrand48	0.01011	0.01011	0 %
isatty_yes	0.23380	1.24641	-433.109 %
isatty_no	0.10429	0.86241	-726.935 %
strtol	0.04549	0.04549	0 %
longjmp	0.01452	0.01452	0 %
siglongjmp	0.10780	0.69281	-542.681 %
getrusage	0.36040	1.51788	-321.165 %
times	0.25569	1.32229	-417.146 %
time	0.00430	0.00430	0 %
localtime_r	0.11520	0.11850	-2.86458 %
strftime	0.61780	0.62039	-0.41923 %
mktime	2.38131	4.62799	-94.3464 %
mktimeT2	10.05020	19.95589	-98.5621 %

Libmicro-process

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
semop	0.50481	2.37891	-371.249 %
sigaction	0.15542	0.79078	-408.802 %
signal	1.20760	3.92412	-224.952 %
sigprocmask	0.13960	0.86661	-520.781 %
pthread_8	11.74400	36.25600	-208.719 %
pthread_32	14.00000	61.93600	-342.4 %
pthread_128	15.75800	71.88400	-356.175 %
pthread_512	19.75750	62.97650	-218.747 %

fork_10	97.68960	408.90880	-318.58 %
fork_100	89.94048	377.97120	-320.246 %
fork_1000	228.88397	397.60589	-73.715 %
exit_10	55.60320	116.81280	-110.083 %
exit_100	29.10976	93.80096	-222.232 %
exit_1000	150.79706	79.67898	47.1614 %
exit_10_nolibc	49.40800	107.11040	-116.788 %
exec	378.80320	1653.70880	-336.561 %
system	1955.69500	4570.21030	-133.687 %

Libmicro-file

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
close_bad	0.09600	0.72000	-650 %
close_tmp	0.40000	1.84800	-362 %
close_usr	0.40000	1.87200	-368 %
close_zero	0.40800	1.90400	-366.667 %
chdir_tmp	1.16841	2.56251	-119.316 %
chdir_usr	1.23868	2.69358	-117.456 %
chgetwd_tmp	1.49560	3.75800	-151.27 %
chgetwd_usr	1.54509	3.82922	-147.832 %
realpath_tmp	10.65979	28.09690	-163.578 %
realpath_usr	11.96500	31.17629	-160.562 %
lseek_t8k	0.11379	0.82368	-623.86 %
lseek_u8k	0.11410	0.84099	-637.064 %
open_tmp	0.92200	2.81700	-205.531 %
open_usr	0.98800	2.90700	-194.231 %
open_zero	0.87900	2.94900	-235.495 %
dup	0.12900	0.87500	-578.295 %
recurse	0.66000	0.66000	0 %
read_t1k	0.41080	1.69441	-312.466 %
read_t10k	0.44621	1.63830	-267.159 %
read_t100k	0.42481	1.68351	-296.297 %

read_u1k	0.41091	1.68340	-309.676 %
read_u10k	0.43860	1.62191	-269.793 %
read_u100k	0.42900	1.68492	-292.755 %
read_z1k	0.32530	1.30020	-299.693 %
read_z10k	1.53969	2.50340	-62.5912 %
read_z100k	13.78061	14.84191	-7.7014 %
read_zw100k	14.08079	15.15540	-7.63175 %
write_t1k	3.48948	6.69140	-91.7592 %
write_t10k	6.55132	10.25070	-56.4677 %
write_u1k	3.47059	6.70180	-93.1026 %
write_u10k	6.60301	9.85469	-49.2454 %
write_u100k	34.66378	38.87060	-12.1361 %
write_n1k	0.14413	1.02093	-608.34 %
write_n10k	0.14899	1.01018	-578.019 %
write_n100k	0.14413	1.02298	-609.762 %
writev_t1k	8.01720	11.58930	-44.5555 %
writev_u1k	8.22779	10.94630	-33.0406 %
writev_u10k	41.58692	44.48699	-6.97351 %
writev_n1k	0.34099	1.47712	-333.186 %
writev_n10k	0.34406	1.45613	-323.22 %
writev_n100k	0.34406	1.43411	-316.82 %
pread_t1k	0.33480	1.65770	-395.131 %
pread_t10k	1.03708	2.53829	-144.754 %
pread_t100k	11.37390	13.18912	-15.9595 %
pread_u1k	0.33219	1.68878	-408.378 %
pread_u10k	1.04110	2.55340	-145.26 %
pread_u100k	11.42339	13.20509	-15.5969 %
pread_z1k	0.32481	1.29170	-297.679 %
pread_z10k	1.53370	2.53660	-65.3909 %
pread_z100k	13.77810	14.89439	-8.10192 %
pread_zw100k	14.07880	15.18380	-7.84868 %
pwrite_t1k	2.85839	6.29192	-120.121 %
pwrite_t10k	4.18079	8.04449	-92.4155 %

pwrite_t100k	18.49239	22.06420	-19.315 %
pwrite_u1k	2.89149	6.34929	-119.585 %
pwrite_u10k	4.12529	7.85060	-90.3042 %
pwrite_u100k	18.56520	22.09869	-19.0329 %
pwrite_n1k	0.14039	1.04540	-644.64 %
pwrite_n10k	0.13990	1.04722	-648.549 %
pwrite_n100k	0.14090	1.01210	-618.311 %

Libmicro-memory

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
memset_10	0.00602	0.00602	0 %
memset_256	0.01170	0.01170	0 %
memset_256_u	0.01260	0.01260	0 %
memset_1k	0.03510	0.03479	0.883191 %
memset_4k	0.13120	0.13117	0.0228659 %
memset_4k_uc	0.92180	0.92009	0.185507 %
memset_10k	0.33152	0.33190	-0.114624 %
memrand	0.09091	0.13622	-49.8405 %
malloc_10	0.05317	0.05322	-0.094038 %
malloc_100	0.05317	0.05321	-0.0752304 %
malloc_1k	0.07755	0.07378	4.86138 %
malloc_10k	0.07379	0.07343	0.487871 %
malloc_100k	1.61984	6.09352	-276.18 %
mallocT2_10	0.19154	0.13309	30.5158 %
mallocT2_100	0.17850	0.19199	-7.55742 %
mallocT2_1k	0.18548	0.20411	-10.0442 %
mallocT2_10k	0.18426	0.20205	-9.65484 %
memcpy_10	0.01101	0.01101	0 %
memcpy_1k	0.04460	0.04460	0 %
memcpy_10k	0.34360	0.34412	-0.151339 %
strcpy_10	0.00650	0.00650	0 %
strcpy_1k	0.05919	0.05880	0.658895 %

strlen_10	0.00509	0.00509	0 %
strlen_1k	0.04680	0.04680	0 %
strchr_10	0.00571	0.00571	0 %
strchr_1k	0.07980	0.07980	0 %
strcmp_10	0.00630	0.00630	0 %
strcmp_1k	0.08530	0.08589	-0.691676 %
scasecmp_10	0.01180	0.01180	0 %
scasecmp_1k	0.34381	0.34371	0.0290858 %
mmap_z8k	1.51570	3.58779	-136.708 %
mmap_z128k	1.57020	3.60020	-129.283 %
mmap_t8k	1.55131	3.66751	-136.414 %
mmap_t128k	1.57740	3.71451	-135.483 %
mmap_u8k	1.55410	3.71548	-139.076 %
mmap_u128k	1.60829	3.75419	-133.427 %
mmap_a8k	0.42849	1.62680	-279.659 %
mmap_a128k	0.39780	1.55919	-291.953 %
mmap_rz8k	3.09120	9.16500	-196.487 %
mmap_rz128k	23.79200	80.14999	-236.878 %
mmap_rt8k	2.64041	7.75828	-193.829 %
mmap_rt128k	6.03331	25.05341	-315.251 %
mmap_ru8k	2.65352	7.80029	-193.96 %
mmap_ru128k	6.60549	24.86170	-276.379 %
mmap_ra8k	1.80500	6.46428	-258.132 %
mmap_ra128k	21.71840	77.51621	-256.915 %
mmap_wz8k	5.68991	13.17202	-131.498 %
mmap_wt8k	6.14740	14.87780	-142.018 %
mmap_wu8k	6.19341	14.79250	-138.843 %
mmap_wu128k	65.63011	154.10230	-134.804 %
mmap_wa8k	4.10609	10.07322	-145.324 %
unmap_z8k	0.51502	2.00850	-289.985 %
unmap_z128k	0.48681	1.93272	-297.017 %
unmap_t8k	0.51451	2.03878	-296.257 %
unmap_t128k	0.48568	1.96690	-304.979 %

unmap_u8k	0.51871	2.08650	-302.248 %
unmap_u128k	0.48120	1.95640	-306.567 %
unmap_a8k	0.49951	1.90510	-281.394 %
unmap_a128k	0.49710	1.87310	-276.805 %
unmap_rz8k	0.89580	5.72979	-539.628 %
unmap_rz128k	4.77519	46.20480	-867.601 %
unmap_rt8k	0.98931	5.95251	-501.683 %
unmap_rt128k	6.26760	48.46579	-673.275 %
unmap_ru8k	0.98309	5.92241	-502.428 %
unmap_ru128k	6.28209	48.55260	-672.873 %
unmap_ra8k	0.85240	5.61042	-558.191 %
unmap_ra128k	4.68890	46.17359	-884.742 %
unmap_wz8k	1.63640	7.51329	-359.135 %
unmap_wt8k	1.63072	7.48708	-359.127 %
unmap_wu8k	1.65409	7.52118	-354.702 %
unmap_wu128k	10.84910	55.66280	-413.064 %
unmap_wa8k	1.44719	6.93660	-379.315 %
mprot_z8k	0.98470	2.66222	-170.358 %
mprot_z128k	0.95171	2.65628	-179.106 %
mprot_wz8k	2.86049	6.73080	-135.302 %
mprot_wz128k	6.89761	23.04310	-234.074 %
mprot_twz8k	2.91761	6.78610	-132.591 %
mprot_tw128k	7.42318	24.10721	-224.756 %
pipe_pst1	0.54390	3.05321	-461.355 %
pipe_pmt1	3.89681	39.12630	-904.06 %
pipe_pmp1	3.89550	38.67441	-892.797 %
pipe_pst4k	0.96591	3.48800	-261.11 %
pipe_pmt4k	7.05190	40.41400	-473.094 %
pipe_pmp4k	5.88360	40.03671	-580.48 %
pipe_sst1	0.92221	4.11238	-345.927 %
pipe_smt1	7.57960	29.19370	-285.161 %
pipe_smp1	7.66021	29.02469	-278.902 %
pipe_sst4k	1.56849	5.29631	-237.669 %

pipe_smt4k	10.77371	32.22600	-199.117 %
pipe_smp4k	9.63850	31.33509	-225.103 %
pipe_tst1	5.94540	13.00490	-118.739 %
pipe_tmt1	13.32831	64.82340	-386.359 %
pipe_tmp1	13.28182	63.17970	-375.686 %
pipe_tst4k	5.42060	11.56989	-113.443 %
pipe_tmt4k	16.63928	69.80559	-319.523 %
pipe_tmp4k	15.97990	67.43301	-321.986 %

Libmicro-contextswitch

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
getcontext	0.18760	0.77868	-315.075 %
setcontext	0.17101	0.74409	-335.115 %
mutex_st	0.04029	0.04091	-1.53884 %
mutex_mt	0.04029	0.04029	0 %
mutex_T2	0.22600	0.20521	9.19912 %
c_mutex_1	0.06930	0.06971	-0.591631 %
c_cond_1	0.17981	0.17992	-0.0611757 %
c_lockf_1	2.20250	6.81439	-209.393 %
c_flock	1.31100	5.94330	-353.341 %
c_flock_10	3.33381	10.09190	-202.714 %
c_flock_200	34.19768	154.89201	-352.931 %
c_fcntl_1	2.59789	7.16342	-175.74 %
file_lock	1.25650	3.58049	-184.957 %
fcntl_tmp	0.09180	0.80550	-777.451 %
fcntl_usr	0.09180	0.80561	-777.571 %
fcntl_ndelay	0.09810	0.83420	-750.357 %

IOzone

async-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-	

		default	
"Writer report" "33554432" "4"	120356	121366	0.832194 %
"Writer report" "33554432" "8"	118701	117608	-0.929359 %
"Re-writer report" "33554432" "4"	120826	120470	-0.295509 %
"Re-writer report" "33554432" "8"	113782	115066	1.11588 %
"Reader report" "33554432" "4"	145364	145352	-0.00825582 %
"Reader report" "33554432" "8"	145413	145388	-0.0171954 %
"Re-Reader report" "33554432" "4"	146575	146564	-0.00750525 %
"Re-Reader report" "33554432" "8"	146592	146595	0.00204645 %

fsync-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
"Writer report" "33554432" "4"	111648	111123	-0.472449 %
"Writer report" "33554432" "8"	109534	109646	0.102147 %
"Re-writer report" "33554432" "4"	111009	111377	0.330409 %
"Re-writer report" "33554432" "8"	104627	107030	2.24516 %
"Reader report" "33554432" "4"	145350	145414	0.0440123 %
"Reader report" "33554432" "8"	145278	145460	0.12512 %
"Re-Reader report" "33554432" "4"	146609	146598	-0.00750351 %
"Re-Reader report" "33554432" "8"	146594	146630	0.0245516 %

Netperf

loop-tcpv4

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Throughput(10^6bits/sec)	13228.19	14336.89	7.7332 %

Loop-udpv4

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Throughput(10^6bits/sec)	22505.72	24627.15	8.61419 %

Loop-tcpv6

Throughput(10^6bits/sec)	13439.63	13381.05	-0.437783 %

loop-udpv6

Throughput(10^6bits/sec)	20760.71	22503.76	7.74559 %

Dbench4

async-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1 procs Throughput (MB/sec)	9.49024	9.42607	-0.680772 %
1 procs max_latency ms	309.599	353.350	-14.1315 %
4 procs Throughput (MB/sec)	16.2234	16.6687	2.67147 %
4 procs max_latency ms	746.928	847.453	-13.4585 %
48 procs Throughput (MB/sec)	31.3944	31.8558	1.4484 %
48 procs max_latency ms	3602.938	3831.099	-6.33264 %
128 procs Throughput (MB/sec)	22.5896	23.0547	2.01738 %
128 procs max_latency ms	13606.232	12830.735	5.69957 %

192 procs Throughput (MB/sec)	22.2822	23.2278	4.07098 %
192 procs max_latency ms	18444.872	15485.791	16.0428 %
256 procs Throughput (MB/sec)	25.7598	23.6491	-8.92508 %
256 procs max_latency ms	18048.603	26726.835	-48.0826 %
500 procs Throughput (MB/sec)	27.2231	26.5282	-2.61948 %
500 procs max_latency ms	21551.199	20429.364	5.20544 %

fsync-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1 procs Throughput (MB/sec)	1.36297	1.35514	-0.5778 %
1 procs max_latency ms	294.876	259.868	11.8721 %
4 procs Throughput (MB/sec)	2.11795	2.10112	-0.801001 %
4 procs max_latency ms	625.426	660.630	-5.6288 %
48 procs Throughput (MB/sec)	4.42909	4.50687	1.72581 %
48 procs max_latency ms	4596.267	3982.587	13.3517 %
128 procs Throughput (MB/sec)	5.58352	5.57051	-0.233551 %
128 procs max_latency ms	8964.084	9001.471	-0.417076 %
192 procs Throughput (MB/sec)	6.11588	6.52607	6.28541 %
192 procs max_latency ms	9012.801	6041.326	32.9695 %
256 procs Throughput (MB/sec)	6.19501	6.48124	4.41628 %
256 procs max_latency	8014.489	11017.903	-37.4748 %

ms			
500 procs Throughput (MB/sec)	6.10225	6.21147	1.75836 %
500 procs max_latency ms	55022.357	55039.009	-0.0302641 %

Bonnie++

fsync-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Sequential_Output/Per_Chr(K/sec)	67046	66224	1.226024%
Sequential_Output/Block(K/sec)	105626	106325	-0.661769%
Sequential_Output/Rewrite(K/sec)	58195	58803	-1.044763%
Sequential_Input/Per_Chr(K/sec)	60063	60925	-1.435160%
Sequential_Input/Block(K/sec)	182249	182737	-0.267766%
Random/Seek(sec)	182249	182737	-0.267766%
Sequential_Create/Create(sec)	67046	66224	1.226024%
Sequential_Create/Read(sec)	105626	106325	-0.661769%
Sequential_Create/Delete(sec)	58195	58803	-1.044763%
Random_Create/Create(sec)	67046	66224	1.226024%
Random_Create/Read(sec)	105626	106325	-0.661769%
Random_Create/Delete(sec)	58195	58803	-1.044763%

Async-xfs

	SLES12SP3	SLES12SP3-PTI	

	4.4.103-6.33-default	4.4.103-17.g399eb34-default	
Sequential_Output/Per_Chr(K/sec)	66697	66477	0.329850%
Sequential_Output/Block(K/sec)	117424	117104	0.272517%
Sequential_Output/Rewrite(K/sec)	55744	56097	-0.633252%
Sequential_Input/Per_Chr(K/sec)	60532	60801	-0.444393%
Sequential_Input/Block(K/sec)	183017	182119	0.490665%
Random/Seek(sec)	183017	182119	0.490665%
Sequential_Create/Create(sec)	66697	66477	0.329850%
Sequential_Create/Read(sec)	117424	117104	0.272517%
Sequential_Create/Delete(sec)	55744	56097	-0.633252%
Random_Create/Create(sec)	66697	66477	0.329850%
Random_Create/Read(sec)	117424	117104	0.272517%
Random_Create/Delete(sec)	55744	56097	-0.633252%

Lmbench

lmbench-local

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
PIPE(ms)	33.5	39.1	-16.7164 %
AF_UNIX(ms)	20.4	22.5	-10.2941 %
UDP(ms)	41.0	43.6	-6.34146 %
TCP(ms)	49.3	62.6	-26.9777 %
TCP_CONN(ms)	46.	47.	-2.17391 %

Siege

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
Transaction trans/sec	6493.78	6344.7	-2.34975 %
Throughput MB/sec	6.3416	6.1952	-2.36312 %

sysbench_sys

sysbench-mutex

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1	0.0040s	0.0040s	0 %
2	0.0261s	0.0428s	-63.9847 %
4	0.0662s	0.0625s	5.58912 %
8	0.1949s	0.1898s	2.61673 %
16	0.4057s	0.4093s	-0.887355 %
32	0.8056s	0.8334s	-3.45084 %
64	1.6254s	1.6955s	-4.31278 %
128	3.2365s	3.3282s	-2.83331 %
256	6.5292s	6.6393s	-1.68627 %

sysbench-thread

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1	0.1228s	0.1363s	-10.9935 %
2	0.1385s	0.0873s	36.9675 %
4	0.1434s	0.1558s	-8.64714 %
8	0.1473s	0.1700s	-15.4107 %
16	0.4113s	0.5982s	-45.4413 %
32	0.4342s	0.6020s	-38.6458 %
64	0.4232s	0.6106s	-44.2817 %
128	0.4536s	0.5975s	-31.724 %

| 256 | 0.4606s | 0.6186s | -34.3031 % |

sysbench_oltp

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
1	115.4434s	117.1782s	-1.50273 %
5	34.0523s	34.2998s	-0.726823 %
12	28.2841s	28.0682s	0.763326 %
21	27.8675s	26.0651s	6.46775 %
30	27.8162s	28.9003s	-3.89737 %
32	27.0075s	25.3485s	6.14274 %

Pgbench

ro-xfs

	SLES12SP3 4.4.103-6.33-default	SLES12SP3-PTI 4.4.103-17.g399eb34-default	
clients: 1	5456.588947	5646.534298	3.36393
clients: 5	26594.798302	26308.284136	-1.08906
clients: 12	35402.137238	35492.339339	0.254145
clients: 21	37244.982604	36212.253061	-2.85188
clients: 30	35823.123708	35810.937263	-0.03403
clients: 32	35617.682672	35125.638719	-1.40081