



CE Linux Forum

Realtime BoF Session

Realtime Preempt Patch Adaptation Experience (including Commercial Product)

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- Realtime Preempt Patch
- Related Experience
- Todo of RTWG



Real-Time Preemption Patch

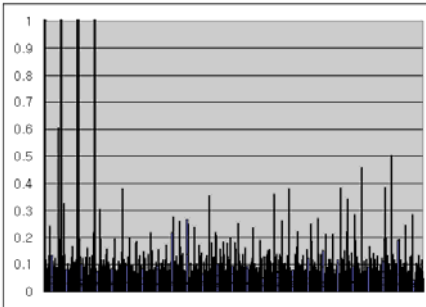
- Real-Time Preemption
 - Reimplemented and announced by Ingo Molnar in Linux 2.6.12-rc2
 - Downloadable site: <http://people.redhat.com/mingo/realtime-preempt>
 - Recommended for systems with 100usec preemption latency or less
 - Added as kernel option “Complete Preemption”
 - Preemptible kernel + voluntary preemption
 - Interrupt thread
 - Mutex based preemption
 - Priority inheritance mechanism



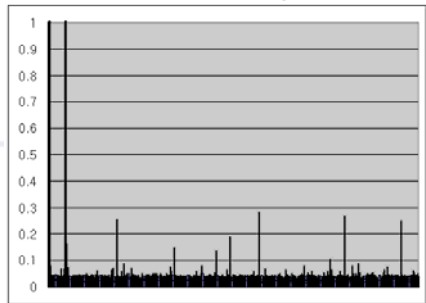
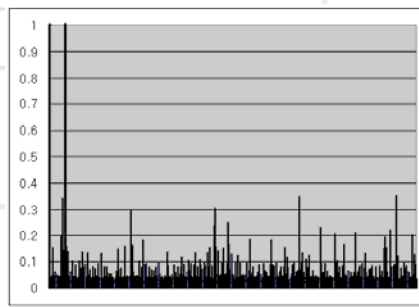
Related Experience - Test (1/2)

- System : Via Nehemiah 1GHz, 256Mbyte memory
- Kernel version : Linux 2.6.15.2
- Stress : find (per 5min), ping (per 1usec), hackbench 50 (per 5min)
- Test time : 10 hours

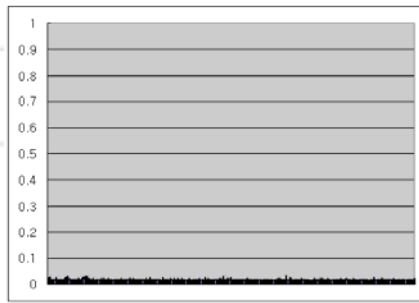
vanilla kernel



voluntary preemption kernel



preemptible kernel



real-time preemption kernel

	Max latency time (usec)	Min latency time (usec)	Ave latency time (usec)
Vanilla	17388	2.11627	7.8942
Voluntary	17972	2.13827	5.31433
Preemptible	5272.43	2.30229	5.956
Realtime-reempt	33.7593	5.5507	6.71805

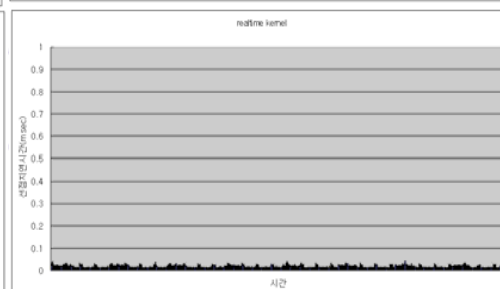
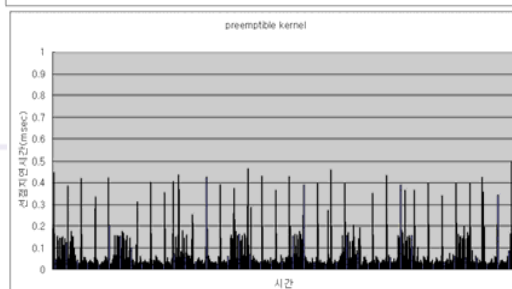
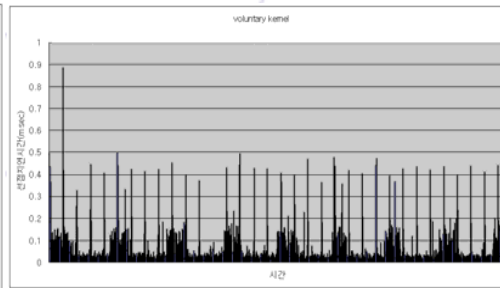
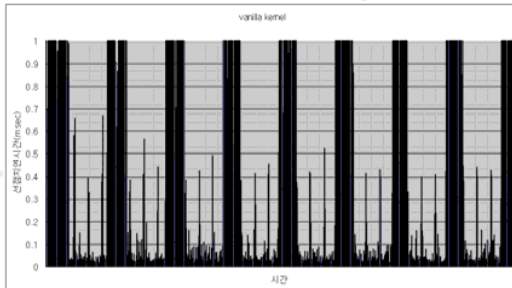


Related Experience - Test (2/2)

- System : Via Nehemiah 1GHz, 256Mbyte memory
- Kernel version : Linux 2.6.20
- Stress : find (per 5min), ping (per 1usec), hackbench 20 (per 5min)
- Test time : 1 hours

vanilla kernel

voluntary preemption kernel



preemptible kernel

real-time preemption kernel

	Max latency time (usec)	Min latency time (usec)	Ave latency time (usec)
Vanilla	4064.4	2.64133	4.16362
Voluntary	883.637	2.57732	3.6301
Preemptible	496.925	3.57145	4.49019
Realtime-reempt	41.0612	5.64371	6.63489



Related Experience - adaptation

- Adaptation on medical measurement equipment
 - Excellent!
- Adaptation on smartphone
 - Smartphone requires realtime feature for call processing, multimedia processing and so on.
 - Realtime requirement has satisfied but declined system throughput.



Related experience - adaptation Throughput test (1/2)

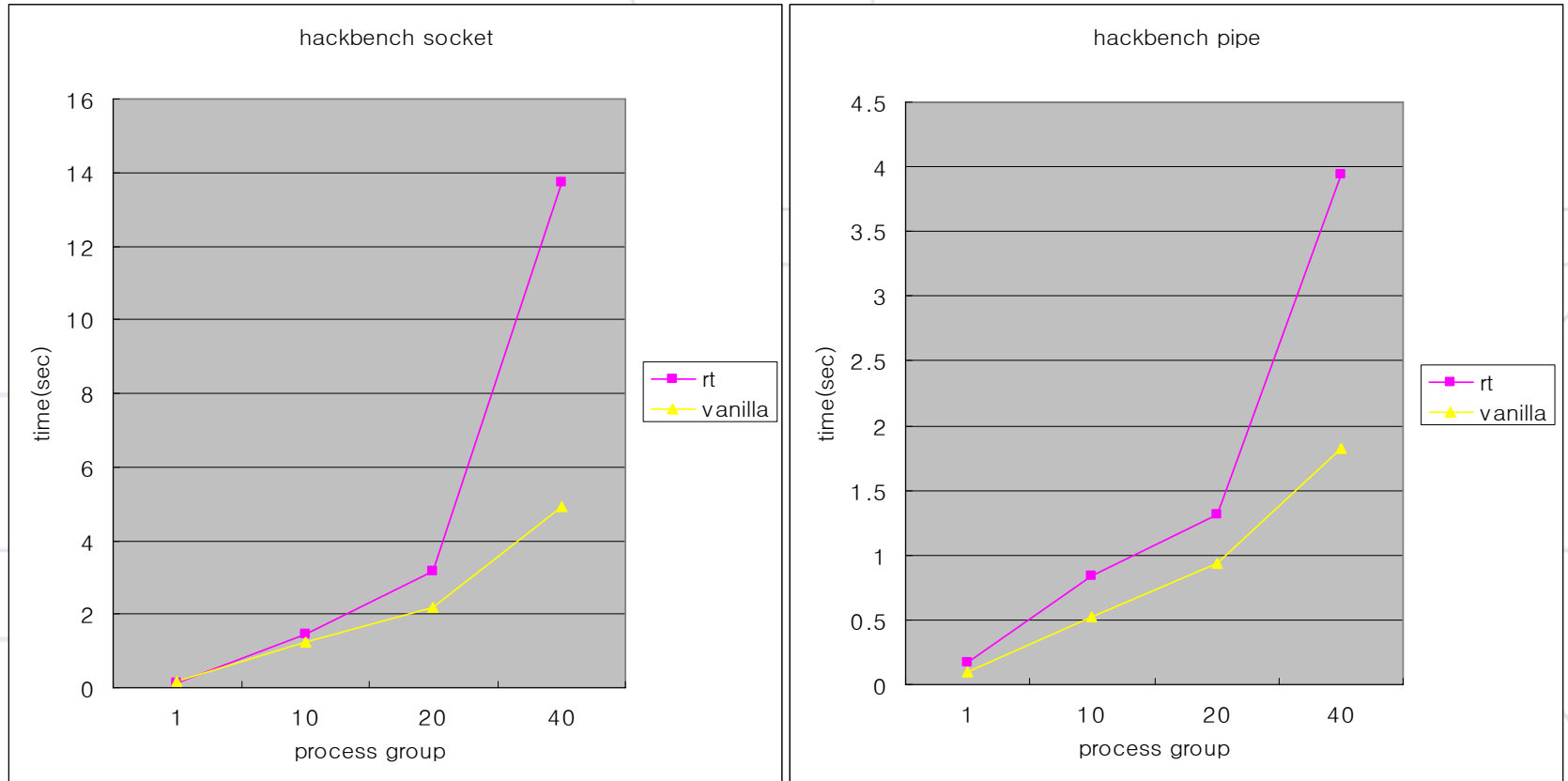
- Throughput test result (1/2)
 - System : 2.8 GHz CPU x86 architecture
 - Test method : hackbench
 - Conclusion : Realtime-preemption patch caused to decline kernel's throughput.

	hackbench 1		hackbench 10		hackbench 20		hackbench 40	
hackbench option	socket	pipe	socket	pipe	socket	pipe	socket	pipe
Vanilla kernel	0.1824	0.0918	1.2218	0.5224	2.18	0.935	4.9204	1.8242
Realtime-preemption kernel	0.1378	0.1672	1.443	0.834	3.1676	1.3106	13.713	3.9416

hackbench test result table



Related experience - adaptation Throughput test (2/2)





Related experience - adaptation

- Reduce the number of applications in smartphone to apply the realtime preempt patch.



Todo of RTWG

- Realtime performance Test
 - Various test methods
 - Various architectures
- Documentations
 - Technical documents on
 - Source code level description
 - Performance analysis
 - Realtime requirements
- What else?