

Compute Node Design

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Still the Performance Issue

Performance is always a hot topic and to be improved.

Old results:	Protocol	Direction	Throughput (Mbps)
	TCP	Board -> PC	213.80
	TCP	PC -> Board	276.95
	UDP	Board -> PC	349.02
	UDP	PC -> Board	N/A



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	UDP	PC -> Board	N/A
New records:	Protocol	Direction	Throughput (Mbps)
	TCP	Board -> PC	284.59
	TCP	PC -> Board	348.93
	TCP	Board -> PC (sendfile)	487.33
	UDP	Board -> PC	394.46

Results from Own Applications



Protocol	Direction	Throughput (Mbps)
UDP	Board -> PC	~340

- The results are reasonable but not decent enough.
- We need to find out the criminal which limits the performance.

Bottleneck

Mem: 14568K used, 44824K free, OK shrd, OK buff, 2360K cached

Load average: 0.14 0.03 0.01 (Status: S=sleeping R=running, W=waiting)

PID	USER	STATUS	RSS	PPID	%CPU	%MEM	COMMAND
50	root	R	728	32	95.3	1.2	netperf
51	root	R	816	32	4.5	1.3	top
32	root	S	724	1	0.0	1.2	sh
31	root	S	644	1	0.0	1.0	inetd
1	root	S	612	0	0.0	1.0	init
27	root	S	596	1	0.0	0.9	syslogd
29	root	S	584	1	0.0	0.9	klogd
47	root	S	564	1	0.0	0.9	netserver

Mem: 14852K used, 44540K free, OK shrd, OK buff, 2360K cached

Load average: 0.52 0.17 0.05 (Status: S=sleeping R=running, W=waiting)

PID	USER	STATUS	RSS	PPID	%CPU	%MEM	COMMAND
47	root	S	564	1	96.0	0.9	netserver
54	root	R	816	32	0.2	1.3	top
32	root	S	724	1	0.0	1.2	sh
31	root	S	644	1	0.0	1.0	inetd
1	root	S	612	0	0.0	1.0	init
56	root	S	600	47	0.0	1.0	netserver
27	root	S	596	1	0.0	0.9	syslogd
29	root	S	584	1	0.0	0.9	klogd

- Several overheads to limit the performance
 - Data buffer copies (CPU is not an efficient data mover.)
 - Checksum calculation (already offloaded into HW in our design.)
 - Interrupt overhead
 - Protocol processing
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- The ethernet device driver (from Xilinx) could be looked into and modified to remove unnecessary operations, such as moving data frequently, and then improve the performance.



Future work

- Ring recognition algorithm design and implementation
 - Literature study and understanding of the algorithm
 - New algorithm proposal in a fully parallel fashion
 - Simulation and implementation
- Systematic speed measurement
 - Event-selector module design from Shuo for master thesis
 - Connected to PLB bus
 - Driver needed to fit it into Linux OS
 - Speed measurement