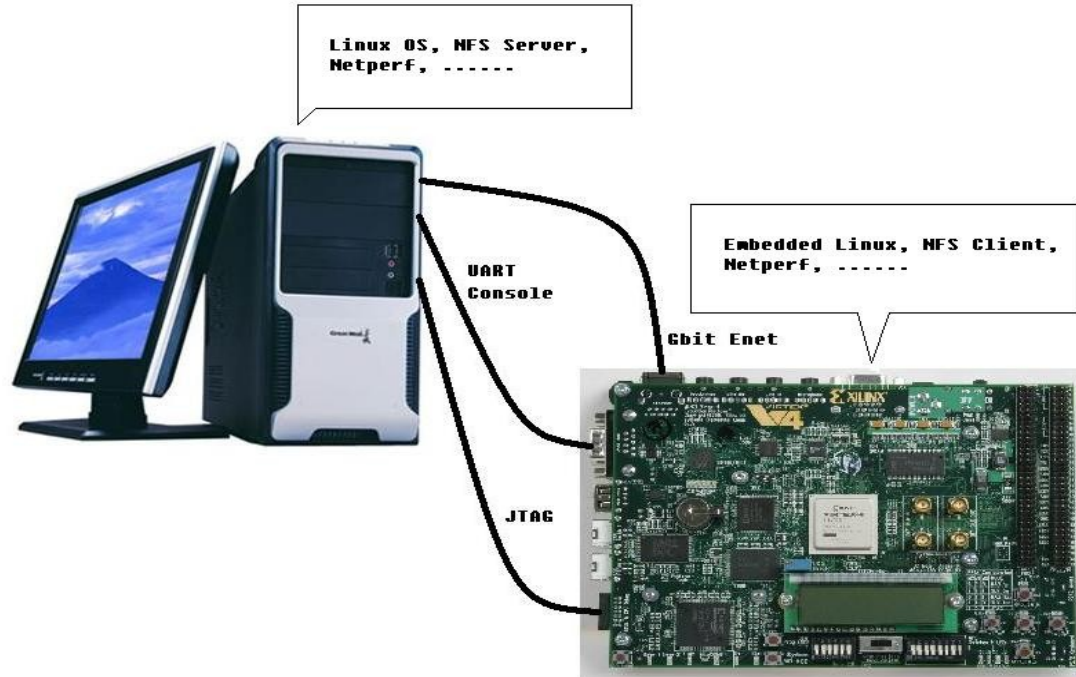


Progress on Gigabit Ethernet in Compute Node Design

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Network for Measurement





Performance Measurement

- Latency
 - Measured by 'Ping'
 - Pinging from board: 2.1 ms
 - Pinging from PC: 1.4 ms
- Throughput
 - Measured by 'Netperf'



Throughput Measurement

Software: Netperf

Netperf is a benchmark that can be used to measure various aspects of networking performance. Its primary focus is on bulk data transfer and request/response performance using either TCP or UDP.

www.netperf.org



Throughput

Gigabit Ethernet: Xilinx IP core (version 3.00)

Ethernet driver: from Xilinx

Embedded Linux: 2.6.10

Software for measurement: Netperf

Jumbo-frame: enabled (8500)

Protocol	Direction	Throughput (Mbits/s)
TCP	Board -> PC	213.80
TCP	PC -> Board	276.95
UDP	Board -> PC	349.02
UDP	PC -> Board	N/A

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
```



Summary and Future Work

- It seems that the CPU capability is the bottleneck which introduces a limited throughput.
- To find out the real criminal, some tools such as the profiler software may be needed.
- Much deeper research on the driver is needed to exploit the potential of Gigabit ethernet.