

Review of:
Speeding up TCP/IP:
Faster Processors are not Enough

- Paper by:
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- Published in:
 - IPCCC 2002
- Survey by:
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The Question

- Will future networked applications be able to capitalize on Moore's and Gilder's laws?
- Does interprocess communication performance improve at rates comparable to those suggested by Moore's and Gilder's laws?
- What are the most significant bottlenecks in the performance of TCP/IP-based interprocess communication?

Related Work

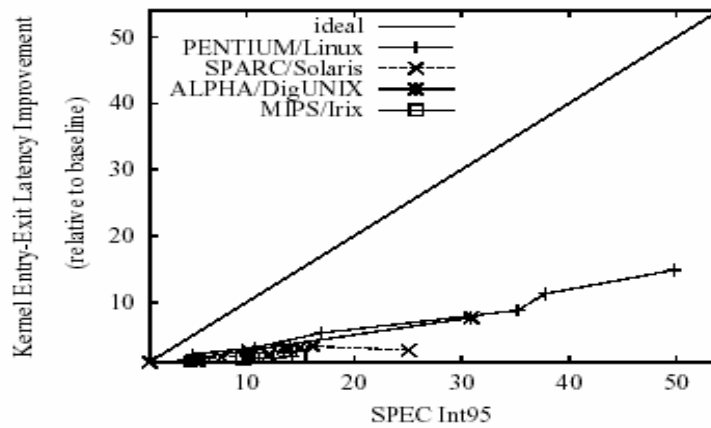
- Focus on studying and improving TCP/IP throughput and latency over limited bandwidth.
 - Trend: Bandwidth is not the limitation and precious commodity.
 - Gap between TCP/IP performance and processor speed continue to widen.
 - Network processors.
- This paper:
 - Studying TCP/IP performance on traditional general-purpose processors.

Benchmarks

- SPEC Int95: Standard Performance Evaluation Corporation INTeger benchmark 95 (software)
<http://www.specbench.org/osg/cpu95/news/cpu95qa.html>
- LMBench: A suite of simple, portable benchmarks that compares different systems performance: Latency and bandwidth <http://www.bitmover.com/lmbench/>
- TTCP: Test TCP is a command-line sockets-based benchmarking tool for measuring TCP and UDP performance between two systems
<http://www.pcausa.com/Utilities/pcattcp.htm>

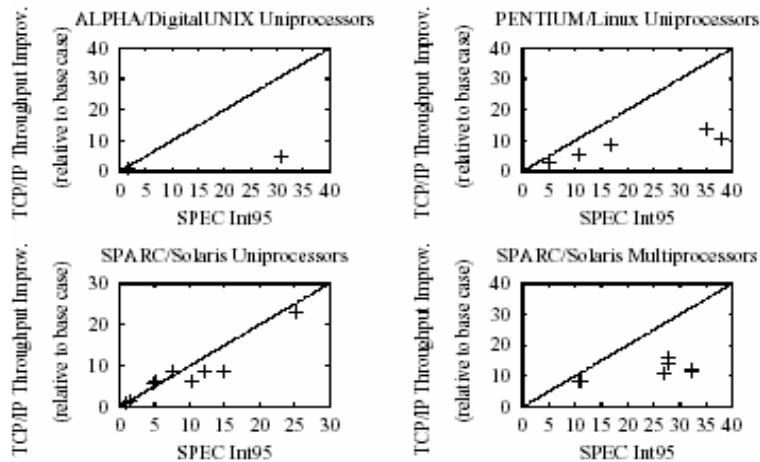
Kernel Entry-Exit Latency (Imbench)

- Empty system call
- In critical path of IPC



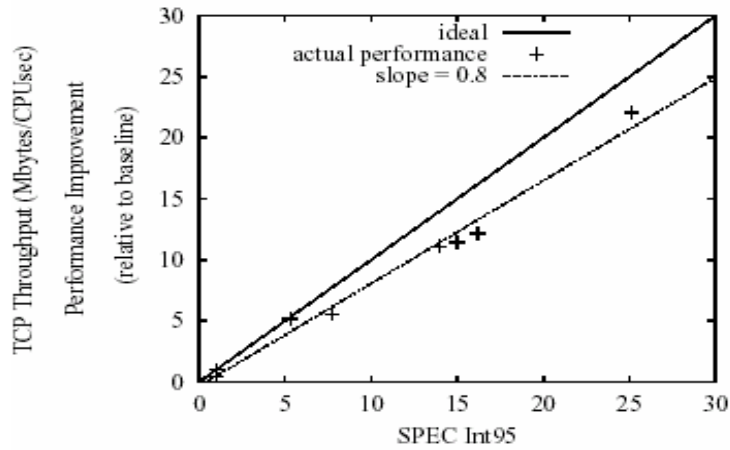
TCP/IP in local host (Imbench)

- TCP/IP on same computer
- Socket layer data in 64Kbyte chunk



TCP/IP Bandwidth in 100 Mbps LAN (ttcp)

- Metric: number of Mbytes per CPUsec

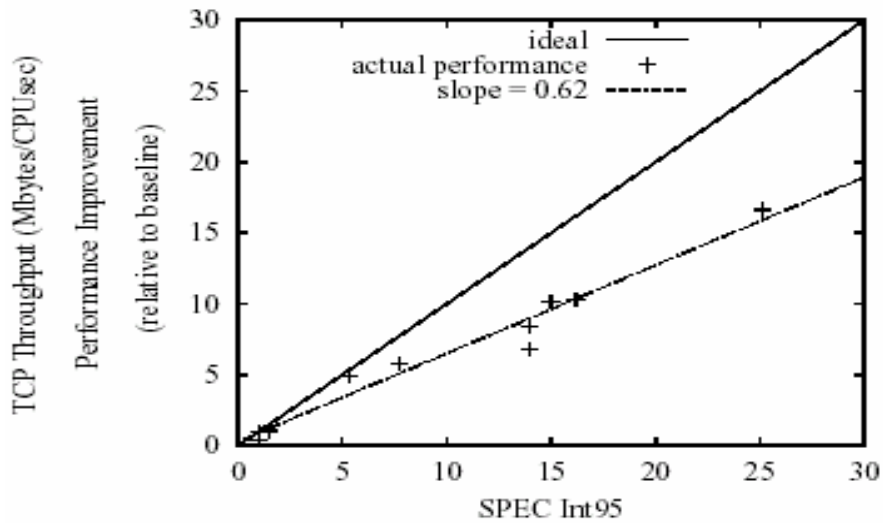


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TCP/IP Bandwidth in 10 Mbps LAN (ttcp)



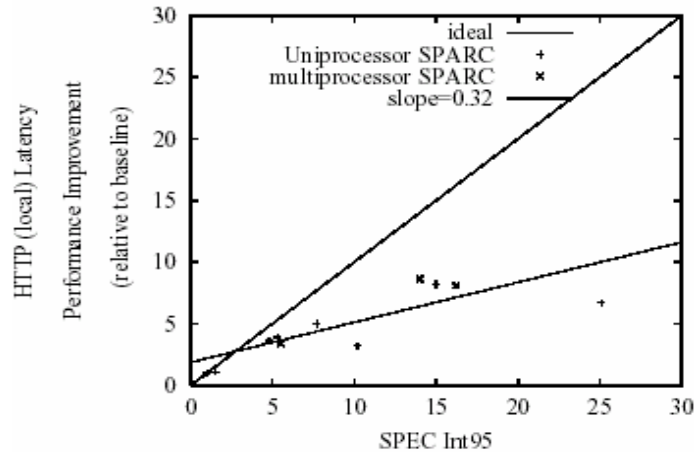
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HTTP latency in local host (lat_http)

- Poor TCP/IP scalability propagates to upper-level protocols



Why isn't TCP/IP getting as fast as hardware?

- Architectural innovations do not necessarily apply to protocol processing
- Operating system performance lags behind processor speed
- Memory bandwidth can be a limiting factor

Conclusion

- The disparity between processor speed and TCP/IP performance is large and will probably continue to widen.
- Call for new performance metrics
- To understand and optimize the execution of TCP/IP in particular on recent and future processors.