

Last month we provided [launch-day benchmarks of the AMD EPYC 7502 and 7742](#) under Linux in both 1P and 2P configurations for these exciting "Rome" Zen 2 server processors. For your viewing pleasure today is a fresh look at not only the EPYC 7502 and 7742 processors under the latest Linux 5.3 kernel but we've also expanded it to looking at the EPYC 7302 and EPYC 7402 processors as well with those processors recently being sent over by AMD. Under Ubuntu 19.04 with Linux 5.3, these four different AMD EPYC 7002 series SKUs were benchmarked along with some of the older AMD Naples processors and Intel Xeon Gold/Platinum processors for a fresh look at the Linux server performance.



The AMD EPYC 7302 is a sixteen core part plus with SMT yields 32 threads. The EPYC 7302 has a base clock frequency of 3GHz with a maximum boost clock of 3.3GHz while having a 128MB cache and a 155 Watt TDP. This AMD EPYC 7002 series offering retails for just about \$1025 USD. The AMD EPYC 7402 meanwhile is a 24-core / 48-thread part with 2.8GHz base clock and 3.35GHz boost clock frequency while having a 180 Watt TDP. This 24c/48t EPYC processor retails for around \$1933 USD, which is another example of AMD's competitive pricing with the Intel Xeon Platinum 8280 at 28c/56t and 2.7GHz base frequency (4.0GHz turbo) retails for around \$10k USD.



As a refresher, the EPYC 7502 is the 32-core / 64-thread part at 2.5GHz with a 3.35GHz maximum boost frequency and 180 Watt TDP. The EPYC 7742 is the current flagship Rome processor with 64 cores / 128 threads, 2.25GHz base clock, and 3.4GHz maximum boost clock while having a 225 Watt TDP.



The entire AMD EPYC Rome line-up has 128 PCI Express 4.0 lanes, eight memory channels at DDR4-3200, and other common features as outlined in [our EPYC 7002 series overview](#).

The processor configurations tested for this article include:

- EPYC 7251
- EPYC 7401P
- EPYC 7601
- EPYC 7601 2P
- EPYC 7302
- EPYC 7302 2P
- EPYC 7402
- EPYC 7402 2P
- EPYC 7502
- EPYC 7502 2P
- EPYC 7742
- EPYC 7742 2P
- Xeon Gold 6138
- 2 x Xeon Gold 6138
- Xeon Platinum 8280
- 2 x Xeon Platinum 8280

The selection of processors tested were based upon those I had available. Also in the days ahead we will have Linux benchmark results from the EPYC 7642 processor as well. Thanks to AMD for providing the EPYC CPU samples as well as the Daytona reference server platform while Intel supplied the Xeon Platinum 8280 and Tyan the Xeon Gold 6138s.

Each processor was tested with system memory at its maximum supported number of memory channels and optimal frequency, Intel Optane 900p 280GB NVMe SSD storage was used on each server, and Ubuntu 19.04 x86_64 was running on each server with the Linux 5.3 Git kernel as of 7 September. All of the benchmarks were run via the [Phoronix Test Suite](#).

Written by [Michael Larabel](#) in [Processors](#) on 17 September 2019. **Page 2 of 9.** [17 Comments](#)

Kicking things off with the NAMD performance, the EPYC 7742 performance continues to blow past the Xeon Platinum 8280 as shown back on launch day. But it's interesting to note as well the EPYC 7402 2P and EPYC 7302 2P even outperforming a lone Xeon Platinum 8280 while costing less than that ~\$10k Intel CPU. The lone EPYC 7302 processor's performance was comparable to the Xeon Gold 6138. The Xeon Gold 6138 is available through retail channels for still around \$2600 USD while the EPYC 7302 goes for just over one grand; all the performance-per-dollar metrics are towards the end of this article.

The performance on all of the EPYC 7002 series processors continue showing incredible multi-threaded performance with the EPYC 7402 2P edging just past the Xeon Platinum 8280 2P.

MKL-DNN is an Intel benchmark and makes use of their Math Kernel Library (MKL) but for this deep learning benchmark it's fascinating to see the EPYC 7002 series performance still generally leading.

But even in the cases of where Intel's Xeon Scalable processors are offering better performance than the EPYC 7002 series in Intel's benchmark, it is notable to see the improvement with EPYC going from Zen to Zen 2.

When it comes to value, the EPYC 7002 series easily continues beating the Xeon Scalable line-up. Even in the single-threaded tests where the EPYC processors did not perform as well, they still easily offer much better value than Intel's current Xeon retail pricing.

Lastly, going back to the raw performance, here is the geometric mean for the three dozen benchmarks carried out on all of the tested processors. The dual Xeon Gold 6138 that combined retail for more than \$5k USD or the lone Xeon Platinum 8280 at around \$10k USD were just faintly ahead of the EPYC 7402. The EPYC 7402 can be bought today on NewEgg for less than \$2k USD. The EPYC 7302 meanwhile at just over one thousand dollars had delivered better performance than the Xeon Gold 6138 that is more than twice the cost.

For those wanting to see how your own Linux systems/servers compare to this array of AMD EPYC and Intel Xeon Linux benchmarks, simply install the [Phoronix Test Suite](#) and run **phoronix-test-suite benchmark 1909170-AS-NEWROME3816** for your own fully-automated, side-by-side benchmark comparison.

Since the [AMD EPYC 7002 series "Rome" launch](#) at the beginning of August, it's been known how AMD's top-end (aside from the newly-announced [EPYC 7H12](#)) [EPYC 7742 easily outperforms the Intel Xeon Platinum 8280](#) in most real-world benchmarks. The EPYC 7742 not only outperforms the Xeon Platinum 8280 in raw performance but also at a significantly lower cost and it gets even better with the EPYC 7642. We have been testing the EPYC 7642 48-core processors and even there the performance is generally ahead of a Xeon Platinum 8280 while being about half the cost of that flagship non-AP Intel Xeon Scalable Cascadelake processor.



Complementing our recent [EPYC 7302 and EPYC 7402 benchmarks](#), today we are focused on the EPYC 7642 as the Rome 48-core / 96-thread processor. This 48 core processor has a 2.3GHz base clock and 3.3GHz boost clock while having 256MB of L3 cache, eight DDR4-3200 memory channels, 128 PCIe 4.0 lanes, and other features in common with the EPYC 7742 and other Rome processors. The EPYC 7642 carries a 50MHz base clock speed advantage over the 64 core EPYC 7742 but a 100MHz lower boost clock speed as the principal differences aside from the core/thread count. Both of these CPUs carry a 225 Watt TDP.

Compared to the EPYC 7742, the EPYC 7642 costs around two thousand dollars less with a list price of \$4775 USD. However, as of writing I haven't been able to find any Internet retailer offering the CPU at that price. NewEgg currently lists the EPYC 7642 in stock for \$5886 USD but even at that price is just under half the cost of the Xeon Platinum 8280. The Xeon Platinum 8280 meanwhile at around its \$10k list price has 28 cores / 56 threads, 2.7GHz base frequency, 4.0GHz turbo frequency, and a 205 Watt TDP as the principal specs.



The processors tested for today's Linux benchmarking comparison based upon the CPUs I had available included:

- EPYC 7401P
- EPYC 7601
- EPYC 7601 2P
- EPYC 7302
- EPYC 7302 2P
- EPYC 7402
- EPYC 7402 2P
- EPYC 7502
- EPYC 7502 2P
- EPYC 7642
- EPYC 7642 2P
- EPYC 7742
- EPYC 7742 2P
- Xeon Gold 6138
- 2 x Xeon Gold 6138
- Xeon Platinum 8280
- 2 x Xeon Platinum 8280

Thanks go out to AMD for providing the EPYC CPUs under test and Daytona reference server, Intel to the Xeon Scalable 2nd Gen samples, and Gigabyte for the Xeon Scalable 2nd Gen server being used.

All of these Xeon and EPYC processors were tested with RAM at their optimal channel/frequency configurations, each server using Intel Optane 900p 280GB NVMe storage, and Ubuntu 19.04 running on each server. Ubuntu 19.04 was upgraded to running the Linux 5.3 kernel throughout for offering the very latest Intel/AMD Linux experience. Onwards with this latest round of [Phoronix Test Suite](#) server CPU benchmarking.

COURTESY:

<https://www.phoronix.com/scan.php?page=article&item=amd-epyc-7302-7402&num=1>

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