Hewlett Packard Enterprise

ActualTech MEDIA

Leading-Edge Energy Efficiency Boosts Data Center Capability, Profitability, and Reach

Delivering More Capability for Less Cost

Ed Tittel

IN THIS PAPER

The HPE ProLiant RL300 Gen11 server delivers next-gen compute performance and power efficiency in a compact 1U single CPU package built around cloud-native silicon via ARM Ampere Altra and Altra Max processors.

Highlights include:

- Delivers up to 3.2x (319%) web serving performance gain and 73% less energy consumed over x86

- Delivers up to 2.2x performance and 59% less energy consumption vs x86 for x.264 video streaming services

- Provides up to 1.9x throughput (requests/sec) with higher performance/watt for in-memory caching applications

CONTENTS

Modern service providers and technology-forward enterprises are experiencing massive growth and constant change. Thus, these organizations are always on the lookout for ways to transform their businesses, accelerate innovation, and offer outstanding end-user experiences for those who consume the resources that their data centers provide.

Key challenges that these organizations must overcome include:

- **Delivering excellent performance** for cloud-native applications and services from their data centers within their budgeted limits on space, energy, and equipment

- **Meeting SLAs at scale** for large end-user populations

- **Scaling resources** (compute, storage, networking and so forth) within cost constraints

- **Ensuring availability, security and reliability** for entire cloud infrastructures

- **Boosting cloud infrastructure utilization** and performance

- **Supporting ESG goals** through reduced data center space, cooling, and power consumption

In an upcoming section, we explore how HPE ProLiant RL300 Gen11 servers can help organizations meet these challenges, and prepare them to handle future growth and ever-increasing scale. First, we review the special needs that service providers and digital-first enterprises seek to address in general with their data center infrastructures and services.

What Service Providers and Digital-First Enterprises Need

Given pressing needs to meet energy and space efficiency goals while accommodating ever-increasing requirements for scale and capability, organizations that operate data centers in droves have special, focused needs. These include the following requirements:

- **Support for modern, cloud-native infrastructure** to handle current needs, and anticipate future growth

- **Environments explicitly designed to handle increasing velocity of scale** and change or evolution, thanks to flexible, efficient, and open-ended technologies

- **A completely cloud-native approach** to application development and delivery, which simplifies and streamlines entire infrastructures

- **Use of inherently cloud-native technologies**, built on highly distributed computing architectures to support high elasticity, flexibility, and improved economies of scale

Overall, deploying the right cloud-native tools and platforms enables service providers and savvy enterprises to deliver improved digital experiences to their customers or end users, while driving operational agility, resiliency, and flexibility. Not coincidentally, this lets organizations leverage the inherent power of data to create and exploit business insights and acumen.

HPE designed its latest generation of high-volume, high-efficiency data center servers to deliver maximum compute density with the smallest physical footprint and greatest energy efficiency.

Today, Cloud Infrastructure Reigns Supreme

In December 2020, David Cappucio of Gartner Inc. held an "Everywhere Enterprise" Q&A. Among the more startling predictions in the promotional article: "Gartner predicts that by 2025, 85% of infrastructure strategies will integrate on-premises, colocation, cloud, and edge delivery options, compared with 20% in 2020." In early 2024, that prediction looks optimistic but essentially correct (more current Gartner estimates put that number somewhere north of 65% for 2024).

Introducing HPE ProLiant RL300 Gen11

HPE designed its latest generation of high-volume, high-efficiency data center servers to deliver maximum compute density with the smallest physical footprint and greatest energy efficiency. This makes the HPE ProLiant RL300 Gen11 server an ideal solution for intense and demanding cloud-native workloads. This server comes packaged in a 1U, ARM Ampere-based form factor that delivers amazing price-performance per watt, built around an optimized cloud-native processor architecture. This design enables consolidation of rack space in data centers, but also works in power- and space-constrained edge deployments as well. As always, HPE's servers also support flexible management options that include HPE's own Integrated Lights Out (iLO) platform as well as support for OpenBMC management. **FIGURE 1** summarizes key advantages for these servers around a front view of the 1U chassis.

High power efficiency means organizations can concentrate more capability and capacity in fewer racks.

✓ More cores, less wattage

Consumes less wattage with compute that scales up to 128 cores per socket

✓ Predictable performance

Single-threaded cores with constant clock speeds

✓ Flexible management

Built on the legendary HPE ProLiant foundation, with flexibility to pursue and expand your open-source strategy

FIGURE 1: Key features for HPE ProLiant RL300 Gen11 servers

Key elements, speeds, and feeds for the HPE ProLiant RL300 Gen11 server include the following:

- **80 or 128 cores per socket** with Ampere Altra or Ampere Altra Max models delivering high performance and power efficiency (depending upon model)

- **Cache:** 64KB L1-cache, 64K L1 D-cache per core, 1MB L2-cache per core (Processor speed: 3.0 GHz)

- **Expansion slots:** 2 PCIe Gen4 slots per 1U chassis

- **Network controllers:** 2 OCP 3.0 PCIe Gen4 slots

- **Maximum memory:** 4.0TB using 256 GB ECC DDR4 modules (16 memory slots)

- **Predictable performance for cloud-native workloads** with single-threaded cores and constant clock speeds

- **Built-in storage capacity:** 10 SFF NVMe SSDs, 8 SFF NVMe SSDs, and 2 M.2 SSDs, depending on specific model

- **Available ports** include VGA, Serial (optional), iLO management, 3x USB 3.2 Gen 1 ports, and UID (Unique USB identifier-based front-panel port with integrated LED indicator)

For details on various HPE ProLiant RL300 Gen11 models, please see the HPE ProLiant RL300 product page or the HPE ProLiant RL300 Gen11 QuickSpecs page.

The HPE ProLiant RL300 Gen11 server delivers more capability in a smaller, more capable but less power-hungry package.

Benefits of the Energy- and Space-Efficient HPE ProLiant RL300 Gen11

High power efficiency means organizations can concentrate more capability and capacity in fewer racks. This eliminates underutilized or unneeded rack space. At the same time, these servers' ARM Ampere Altra processors deliver outstanding performance while consuming less energy. "How much less?" is the inevitable follow on to such an assertion. Here are some specifics, as measured in HPE's own testing, as compared to generations of industry standard x86 servers: [2] [3]

1

Delivers up to 3.2x (319%) web serving performance gain and 73% less energy consumed over x86[1]

2

Delivers up to 2.2x performance and 59% less energy consumption vs x86 for x.264 video streaming services[2]

3

Provides up to 1.9x throughput (request/sec) with higher performance/watt for in-memory caching applications [3]

By using these new, more energy-efficient HPE ProLiant RL300 Gen11 servers, organizations achieve increased efficiency. Performance gains and greater power efficiency translate into substantial energy savings and a proportional reduction in use-phase carbon footprint. A 3.2x advantage in web server performance (NGINX) translates into a 73% consumed energy savings per CPU. Fewer CPUs and fewer systems lead to substantially lower use-phase carbon production. With REDIS, using approximately half the number of processors effectively halves energy use for memory cached database access, while still meeting critical performance SLAs. A two-thirds reduction in CPU requirements for streaming applications (x.264) means only one HPE ProLiant RL300 Gen11 server would be required to achieve the performance of three x86 systems. **FIGURE 2** summarizes the notion that HPE ProLiant RL300

Gen11 servers deliver more cores for less wattage. But there's more to be gained beyond reduced power use: reducing overall rack space pays a double dividend in lowering costs. Why? Because a reduced physical footprint drops the numbers of racks needed for servers. In turn, that means lower costs for cubic volume, cooling, and floor space plus build-out costs (raised flooring, network and power cabling, and more). Finally, fewer racks and devices require fewer people to take care of them. That can deliver significant savings, too.

In this case, less is clearly more for the organizations that operate data centers. The HPE ProLiant RL300 Gen11 server delivers more capability in a smaller, more capable but less power-hungry package. What's not to like about that?

[1] NGINX (amperecomputing.com)

[2] x264 (amperecomputing.com)

[3] Redis (amperecomputing.com)

More cores, less wattage

Industry-leading 128 cores per socket

Ampere processors leverage power- and space-efficient architecture to deliver best-in-class core density

2.8x less power consumption

using Ampere Altra Max cloud-native processors

Scale from core to edge

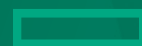with infrastructure choices that balance performance, price, and power

Using Ampere Altra cloud-native processors for one year, a 100,000 square foot data center serving 1.8 billion requests per second could realize **$31.5M in energy savings** based on average U.S. electricity costs.

FIGURE 2: More cores with less power consumption means fewer racks and less floor space (Source: Ampere Triple Your Data Center Efficiency [April 2023])

LEARN MORE

For more information see the paper, "Building a Smart Foundation for a Successful Hybrid Transformation." Other HPE ProLiant RL300 Gen11-specific resources include various solutions guides, datasheets, quick specs, and more, all available through the HPE ProLiant RL300 Gen11 product page (especially under the "Featured resources" heading at mid-page).

Hewlett Packard Enterprise