Hewlett Packard Enterprise

HPE SPACEBORNE COMPUTER

HPE's validated solution for rigorous and harsh environments that performs computing at teraflop speeds, at the Edge

New technology is foundational to the way our planet advances and how we live and work. It is the very DNA of Hewlett Packard Enterprise (HPE) and now HPE is pushing the technology envelope still further. In space.

It started in the 1960s with navigational tracking systems that monitored early Mercury and Apollo missions. It continued with diodes and pin switches that were part of the suits Armstrong and Aldrin wore when they walked on the Moon. HP-65 calculators were chosen to act as rendezvous and navigational computers for the Apollo-Soyuz mission directly leading to the first handshake in space between nations.

Today, space exploration and its associated advanced experiments, at the very Edge, create vast amounts of data. To enable scientists to analyze it all and provide insight, artificial intelligence and considerable computational power is needed. Helping NASA and the International Space Station (ISS) through the use of advanced technologies in an integrated format which is capable of surviving the rigors of space is key to the future of human travel to the Moon, Mars … and beyond.

SPACEBORNE COMPUTER'S JOURNEY

HPE and NASA collaborated to test if affordable, off-the-shelf servers could withstand the harsh conditions of space and provide reliable computing aboard the ISS.

Highlights of this collaborative journey include:

2017
SBC-1 successfully reaches and powers up in space

2018
SBC-1 open for supercomputing use on the ISS

2019
SBC-1 returns to Earth

2020
SBC-2 handed over to NASA

2021
SBC-2 scheduled for launch

THE JOURNEY BEGINS: 2017 AND HPE SPACEBORNE COMPUTER-1 (SBC-1)

In 2017, HPE and NASA launched the first-ever, commercial, off-the-shelf (COTS) computer system to space. Dubbed the Spaceborne Computer or SBC, the system was part of a one-year experiment to test if COTS computer systems could withstand the harsh environment of space. Once installed on the ISS, could this system successfully and seamlessly run scientific workloads in the harsh conditions of space?

Yes, it could. The SBC survived the "shake, rattle, roll" of rocket launch. It was fully operational during its entire time aboard the ISS. And it survived scheduled and unscheduled power outages, as well as other harsh conditions of space like zero gravity and unpredicted levels of radiation. Not only did it successfully perform more than 1 trillion—or one teraflop—of calculations per second for 207 days, it did so without requiring one reset. The first achievement of its kind in space!

What were the benefits of this achievement? It laid the groundwork for performing compute-intensive experiments without aid from Mission Control, which will be necessary to advance deep space exploration on journeys millions of miles away from planet Earth. This achievement also removes the burden of developing proprietary computer systems for space exploration while delivering results that are technically advanced, fiscally prudent, and flight-schedule friendly. Last, but certainly not least, the learnings from this experiment can be applied to systems on Earth that are, by design, remotely situated, be it large lights-out data centers or "at-the-Edge" systems monitoring Earth's oceans and climate.

THE JOURNEY CONTINUES: 2021 AND HPE SPACEBORNE COMPUTER-2 (SBC-2)

Planned for launch on Northrop Grumman's CRS-15 mission scheduled for February 2021, the HPE SBC-2 builds upon the successes of this first study to bring a significantly advanced computing system that the ISS has never seen before. It dives deeper into finding ways in which space exploration can be accelerated through the use of the commercial off-the-shelf computer systems we use here on Earth without expensive, time-consuming, or bulky radiation shielding.

While the mission will test additional techniques for recovering or mitigating errors in the extreme environment of space, HPE and the ISS National Laboratory (ISS NL) plan to show that current Earth-based data processing of this experimental data can be performed aboard the ISS during the mission of the SBC-2. Stated differently, the SBC-2 is allowing astronauts, for the first time ever, to process the data and gain insights instantaneously at the Edge, in real-time.

SOLUTION COMPONENTS

The HPE Spaceborne Computer-2 will not only simulate computational loads during actual space travel via data and image-intensive applications, but will also process these workloads at the Edge.

The following components serve as the foundation to simulate these loads.

HPE Edgeline Converged Edge System

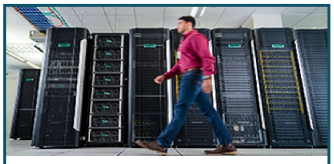
Bringing GPU-enabled artificial intelligence (AI) and machine learning (ML) capabilities to space explorers in a ruggedized system designed for harsh operating environments found at the Edge.

HPE ProLiant Server

Powering the next wave of digital transformation into space with the unmatched performance, security, and intelligent automation of HPE's most versatile industry-standard, rack-optimized server.

HPE HPC Solutions

Accelerating discoveries and solving complex problems in space by bringing together modeling, simulation, artificial intelligence (AI) and analytics capabilities to process large amounts of compute and data-intensive workloads.



HPE Serviceguard for Linux®

Ensuring 24x7 application availability through a fully automated, proven high availability (HA) and disaster recovery (DR) solution that protects against faults and enables downtime-free maintenance and upgrades, both of which increase the productivity of our efforts in space.

USE THE INTERNATIONAL SPACE STATION AS YOUR OWN RESEARCH LAB!

For 20 years, students have designed, built, launched, and operated their own experiments on the ISS doing such things as controlling robots, analyzing space imagery, and conducting cutting-edge genetic research.

HPE is continuing that tradition. During its operation on the ISS, the SBC-2 will be available to users to conduct experiments that demonstrate the computer's capabilities. Interested in participating? Send an email to spaceborne@hpe.com with your name, your organization's name, and a short explanation of your proposed experiment and why you are proposing it.

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