Hewlett Packard Enterprise

Case Study

FIT Equipex: Testing the future before it arrives

HPE Moonshot gives IoT researchers a platform for innovation

Objective
Build a responsive, collaborative research environment to test IoT innovations

Approach
Engage with HPE and HPE Partner ITS Overlap to create a secure, high-performance testbed infrastructure to speed research innovation

IT Matters
- Eliminates the need for massive server rooms with small technology footprint
- Creates new opportunities for research environments to grow as needed
- Simplifies deployment with integrated servers, storage, and networking

Business Matters
- Delivers right-sized compute platform with industry-preferred ARM processors
- Saves between 80-90% on energy costs vs. traditional infrastructure
- Shrinks data center footprint by 80%, leaving room for future expansion

Yesterday's dreams, today's reality

When the human race dreamed of its future during the course of the last century, we imagined a world in which cars drove themselves, people communicated through wireless devices, and toasters could talk. Today, in the second decade of the 21st Century, we take some of that old science fiction lore for granted in our daily lives.

If there's a thread responsible for weaving technology ever deeper into the fabric of modern society, it has to be the Internet. And the way it moves into our homes, cars, and offices is called the Internet of Things.

Moving the Internet of Things beyond smart thermostats, app-controlled lamps, and connected home security systems is the job of university researchers at **FIT Equipex**. Coordinated by the UPMC Sorbonne Universités in Paris, France, UPMC is also a leader of the international testbeds federation known as **OneLab**.

A public utility for research

FIT is one of the few winning projects from the first wave of the French Ministry of Higher Education and Research's "Équipements d'Excellence" (Equipex) research grant program. The project benefited from a 5.8 million euro grant from the French government and is running over a nine-year period.

"To be able to provide this resource to the research and business community is incredibly important to us. And the economics of the power savings and data center savings are very appealing to the government agencies that fund us. It's all about delivering the greater public good, and with HPE Moonshot, it's easier to get these tools into the hands of researchers."

— Serge Fdida, Professor at UPMC Sorbonne, Chair of the OneLab consortium

FIT is offered by a consortium of five institutions of higher education and research that are devoted to making testbeds for network computer communications available to enterprise, scientific researchers, and educators: Université Pierre et Marie Curie (UPMC), INRIA, Université de Strasbourg, Institut Mines Télécom, and CNRS. FIT Equipex does this by offering large-scale, state-of-the-art wireless, sensing, and mobility infrastructures for the builders of tomorrow's systems and services.

The CloudLab HPE Moonshot solution was funded thanks to this grant. Developers who wish to try out, test and validate their solutions before implementing them in real-life rely on FIT for their research into the environment, factories, health, security and urban life. Using robots and other mobile data collectors, FIT is helping researchers and scientists design the world of tomorrow.

Funded by multiple public entities, the program's main objective is to have researchers, industry core, and verticals use the platform to innovate. "We've been recognized as a public service research infrastructure—you can think of it as a public utility for the scientific community," explains Serge Fdida, a professor at UPMC Sorbonne Universités and the chair of the OneLab consortium.

An open invitation

But it goes far beyond the scope of academic research. "There is enormous potential for the Internet of Things to bring benefits to the worlds of transportation and the environment," Fdida adds. "The purpose of our IoT lab is to encourage and accelerate research so industries can design and test their own solutions."

When FIT Equipex built its first infrastructure, it started with industry-standard servers configured as an OpenStack cloud. "At first, we were only providing virtual machines to our user base," explains Radomir Klacza, a research engineer at UPMC Sorbonne Universités responsible for software implementation. "Thanks to CloudLab software developed by University of Utah it became possible to deploy a whole cloud for each researcher with full bare metal control to let them not only process their data but also experiment in a mixed environment of cloud and IoT devices at the same time."

But as the IoT world quickly gained momentum, the scale of the whole proposition began to favor smaller processors for servers and a diversity of sensors. With more than 26 billion installed IoT units predicted by 2020, it's easy to see why.[1]

[1] "Forecast: The Internet of Things, Worldwide, 2013." The report is available on Gartner's website at **http://www.gartner.com**

The shift to ARM

With the industry leaning significantly toward ARM-based processors for sensors as well as servers, FIT Equipex began looking for a new infrastructure. It didn't have to look far. When their colleagues at the University of Utah CloudLab recently offered a new compute cluster for cloud research, they chose ARM-based servers from HPE.

"We were very interested in the kind of research environment offered by the University of Utah, Klacza relates. "So when they chose HPE Moonshot for their new CloudLab cluster, we started looking at what Moonshot could do for us."

FIT Equipex knew it needed a compute platform that could easily integrate into experimental, mobile technology that powers everything from shipping container tracking systems to road sensors and air quality monitoring. So the team auditioned three technology platforms before deciding to invest in the most efficient, highest compute density solution it could find.

The right fit

FIT was excited about the compute density and small footprint form factor of HPE Moonshot servers. The team also liked that the HPE ProLiant m400 server was based on ARM technology, which the university favors for its future-proof profile.

The team concluded that Moonshot simply offers a right-sized server architecture for IoT. "We don't really need a bunch of high powered servers that are good at everything—we need small form factor servers that are based on open, web-based standards," Klacza says. FIT Equipex deployed an HPE Moonshot 1500 chassis with 45 ProLiant m400 servers, each with 8-core ARM processors and 64 GB of RAM. Also inside the chassis is 120 TB of SATA flash storage and two 45XGc Switch Modules with OpenFlow networking support.

Fulfillment of the infrastructure came through ITS Overlap, an HPE Gold Partner and an approved vendor by the state. The team at FIT performed the installation themselves, integrating the servers with an existing network architecture at the university.

A platform for innovation

The team at FIT is excited to offer the Moonshot platform as a compute platform for its IoT testbeds to track, gather, and analyze data. "Many of the things we are enabling with this new platform are embedded communicating objects, or ECOs that interact with the outside world," Fdida explains. "These are small, low-power, and portable sensing devices that are attached to larger objects, such as vehicles, furniture, industrial machinery, or even articles of clothing."

The platform is already attracting many users with a broad set of design targets—ranging from the test of low-level protocols for IoT to the design of smart city services. The technology has also aided researchers in developing solutions for shops and showrooms, where thousands of tagged items carry various communications capabilities.

Benefits also extend outside office walls to wildlife preservation, sustainable agriculture practices, power plant health, and minimizing the impact of natural disasters. By monitoring temperature, humidity, movement, and other conditions, researchers can track and act on events in natural and man-made environments.

Case study
FIT Equipex

Industry
Research

Customer at a glance

Hardware
- HPE Moonshot 1500 Chassis
- HPE ProLiant m400 Servers
- HPE 45XGc Switch Modules

Software
- Operating System: Free BSD

HPE Partner
- ITS Overlap

Likewise, the platform assisted the design of a solution providing access to real-time road conditions via sensors embedded into roadways. It is also a playground for projects that want to explore the design space of their system. For instance, the platform has proven useful for the EU-funded (Celtic+) TILAs project that seeks an effective cloud-based solution for smart-cities, as well as the F-Interop H2020 project dealing with IoT interoperability, and the Armour H2020 project related to the support of IoT security solutions.

The greater good

The move to Moonshot means FIT can quickly deploy new testbeds by just adding a new chassis. “Previously, in order to offer new services to our community, we would have to build a huge server room with multiple racks,” Klacza recalls. “Now, we can just bring in a Moonshot chassis, which reduces our hardware footprint by about 80%, and gives us a great amount of compute density for research.”

Because the lab is publicly funded, it means FIT can get more density per euro while also cutting ongoing energy costs. An HPE Moonshot 1500 chassis loaded with 45 ProLiant m400 Servers consumes between 80-90% less energy than traditional hardware.

“The whole proposition of Moonshot is great for us,” Fdida relates. “To be able to provide this resource to the research and business community is incredibly important to us. And the economics of the power savings and data center savings are very appealing to the government agencies that fund us. It’s all about delivering the greater public good, and with HPE Moonshot, it’s easier to get these tools into the hands of researchers.”

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