STORAGE // MEMORY

Micron Engineers Collaborate to Enable Science Researchers to Turn Data Into Insight.

By Jason Adlard - 11.27.18

Categories

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Curiosity and a hunger for knowledge are traits that define human characteristics that have driven us as a species and have driven us from prehistoric cave-dwellers to space-travelers. This journey has been arduous, full of challenges and risk, but innovation and creative thinking have persevered and continue to do so today. Modern science now enables us to gather and study data from our universe at a rate and in volumes that were hitherto impossible. This data will help us understand many of humanities unsolved mysteries, from the origin of the universe to the make-up of the physical world.

But gathering enormous amounts of data is one challenge, being able to work that data and turn it into something of scientific value, is quite another. This is where Micron's expertise and workforce of innovative thinkers will enable leaders in research and academia.

Two such big science leaders are CERN, the European Organization for Nuclear Research, and SKA, the Square Kilometer Array.

Image courtesy of CERN

CERN is famous for running the world's largest sub-atomic particle accelerator, the Large Hadron Collider (LHC), at its Geneva-based laboratory on the border between France and Switzerland. Here, counter-rotating beams of sub-atomic particles are accelerated to speeds close to that of light and are then collided with one another at certain experimentation points. This

process recreates conditions similar to those just after the Big Bang, the point at which we believe all matter in the universe was created. It is here that they demonstrated the existence of the Higgs boson particle. Oh and by the way, together, the LHC experiments produce around a Petabyte of data per second! Today's technology restricts them to being able to record only a fraction of this data. Particle collision events are hence filtered by the experiments, keeping only the most "interesting" ones.

Image courtesy of CERN

SKA has similar problems. The Square Kilometer Array is a multinational astronomical project, HQ in Manchester UK, tasked with collecting radio signals from deeper in space (and therefore further in time) than ever before attempted, in fact, to the point of the universe's creation! To enable this, they are designing and setting-up vast arrays of telescopes at sites in

South Africa and Australia that will be able to collect data from areas of space measuring 1km² (~0.4miles²). This is an enormous volume of data! Their preliminary system targets are to generate 300PB p/a per telescope, requiring 1TB/s of data processing, 200PB/s memory bandwidth, 100PFlop/s data streaming.

Both projects are chartered with turning this data into valuable scientific knowledge, openly available to all, for the betterment of humanity.

And Micron is working closely together with both of them.

At SKA, we already designed high-performance memory (and other Micron components) into an accelerator board used for signal distribution in prototype telescope designs. The success of this initial collaboration has helped to establish Micron as a key memory & storage technical partner for the overall project including assessing next-generation HPC solutions together.

At CERN, we are very proud to have recently joined CERN openlab research-and-development platform. CERN openlab is a unique public-private partnership, through which CERN collaborates with

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leading ICT companies and other research organizations to accelerate the development of cutting-edge technologies that can support their research community's computing and data-processing requirements. We jointly announced this collaboration at SC18 in Dallas, Nov 12-15. This included a press release and a presentation by CERN openlab CTO, Maria Girone, at the Micron booth. We also hosted CERN staff at our VIP reception, where they met with Micron leadership executives.

And now the real work begins with the launch of our first collaborative project, testing Micron advanced next-generation memory solutions as a way to potentially further machine learning capabilities at the CMS experiment (https://home.cern/science/experiments/cms) on the LHC and for the ProtoDUNE detectors (https://home.cern/news/press-release/experiments/first-particle-tracks-seen-prototype-international-neutrino), prototypes for a major new international neutrino experiment to be built in the U.S (http://www.dunescience.org/). Memory plays a vital role in accelerating intelligence by processing vast amounts of data, helping researchers gain valuable insights from data generated by

these high-energy physics experiments. Micron's memory solutions, that combine neural network capabilities, will be tested in the data-acquisition systems of these experiments. We had a functioning demonstration of this solution, running Machine Learning demonstration in collaboration with FWDNXT, at the SC18 booth.

Due to the shared data management challenges faced by CERN and SKA, there is already cooperation between the two endeavors (https://cerncourier.com/ska-and-cern-co-operate-on-extreme-computing/). This has led to them jointly hosting a 2-day workshop, at the Alan Turing Institute in London, on 17/18 Sep, focusing on how advancements in AI and Machine Learning technology can assist big science projects. Micron’s VP Advanced Computing Solutions, Steve Pawlowski, provided the keynote speech and participated in discussion panels. Steve’s talk addressed the need for more non-traditional computing approaches, their architecture and memory requirements and the importance of understanding application needs to improve the performance of such systems.

As evident, there is a lot of work to do in the collection and determination of good information verses peta bytes of data available. This means a great opportunity for collaboration between the research and data science leaders with the memory and storage solution experts.

Image courtesy of CERN

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Jason is Director of Business Development and Marketing for Micron's Compute & Networking Business Unit in EMEA. He is

responsible for the definition and execution of Micron's regional strategy, with a focus on opportunity identification and development within the Cloud, Enterprise & HPC server segments. Jason also represents Micron at European HPC industry consortia, such as ETP4HPC, and in research collaboration projects with European academic institutes.

Jason has been with Micron for 8 years and in the Memory business for nearly 20 years, having previously held various sales and marketing

management positions at Infineon and Qimonda. His experience within the semiconductor industry dates back to 1995 when he started his career at National Semiconductor.