NEW PERSIST PROJECT INVESTIGATES NON-VOLATILE MEMORY AND RECOVERY STRATEGIES

Next-generation computer systems will rely on emerging memory technologies, such as non-volatile Memory (NVM), to address the high computational demands of modern applications and provide persistence. NVM is solid-state byte-addressable memory which achieves better performance and higher density than the dynamic random-access memory (DRAM) on which current computers rely.

NVM attempts to combine the better characteristics of DRAM and secondary storage. It is fast and inexpensive and can simultaneously serve both as a working memory and a non-volatile store. It thus entails a re-shaping of the traditional memory hierarchy.

The PERSIST project, funded by the Hellenic Foundation for Research and Innovation (HFRI), aims to have significant impact in the following directions:

1. the proper understanding of the functioning of current and future NVM settings and techniques, and the capability to formally assess them, and
2. the harnessing of the performance challenges of NVM-based recoverable computing and better conceptualization of its performance characteristics and boundaries.

Objectives

The project's objectives are as follows:

1. Build the theoretical underpinning of NVM computing. The goal is to understand properly NVM platforms, as well as to be able to assess them and improve them using a common theoretical and experimental framework, developed during the project.
2. Recoverable computing at no significant cost. To design efficient recoverable concurrent algorithms, data structures, and synchronization and communication primitives in order to facilitate the development of correct and efficient application code that will permit fast execution recovery after a power, system or software failure. The building blocks produced will be used to come up with efficient and recoverable versions of indexing data structures for data series and other modern big-data applications.

Impact

NVM technologies are expected to play a crucial role in the design of a wide range of future architectures, including not only commodity computers, but also storage servers, mobile devices, and the internet of things (IoT). They are also expected to result in improvements on a wide spectrum of applications, including the future internet, data centres, cloud, high-performance and exascale computing, e-commerce, smart cities, cyber-physical systems, transaction-oriented systems, and many others. Thus, the proposed research project has the potential of great economic and social impact in Europe.

PROJECT NAME: PERSIST: How to Compute in Persistent Memory Systems
START/END DATE: 15/05/2023 - 14/05/2025
KEY THEMES: non-volatile memory, recoverable computing
COORDINATOR: Foundation for Research and Technology – Hellas (FORTH), Institute of Computer Science (ICS) (Greece)
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PERSIST is funded by the Hellenic Foundation for Research and Innovation (HFRI) under grant agreement no. 03684.