**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

& ECIT Global Research Institute

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| **Proposed Project Title: Durable Concurrent Data Structures for Non-Volatile Main Memory** |
| **Principal Supervisor: Hans Vandierendonck Second Supervisor: TBC** |
| **Project Description:**  This project explores the design of concurrent data structures for non-volatile memory (NVM). New generations of non-volatile memory (NVM) technology are quickly becoming available. These main memory technologies are byte-addressable like regular working memory and they are also non-volatile like disks and other storage media. As such, they are game-changing for computing: data structures held in working memory are automatically also made durable on storage. Moreover, an application’s data remains present on storage after rebooting the system, e.g., due to a crash. If we desire to reuse the content of the data structure after a crash, the data structures’ content must be guaranteed to be in a correct and meaningful state.  The goal of this project is to design durable concurrent data structures that can be correctly recovered. The main interest will be on data structures with high practical relevance, e.g., message queues (used in messaging and stream processing systems) and hash tables (used in key-value stores). In tandem with these data structures, the project will develop the theory underpinning durable concurrent data structures. Durability relates to visibility of store operations, e.g., as defined in the Java Memory Model, as well as linearisability. A key question is how to extend linearisability to a meaningful and useful concept to capture durable concurrent executions.  Prospective PhD students with an interest in this topic are welcome to contact dr Hans Vandierendonck at h.vandierendonck@qub.ac.uk, home page: http://www.eeecs.qub.ac.uk/~H.Vandierendonck/ |
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