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DeNoVo malloc:
A <u>D</u>ependable <u>N</u>on-<u>V</u>olatile <u>M</u>emory <u>A</u>llocator

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Abstract

Recent advances in non-volatile RAM (NVRAM) enable fast, byte addressable main memory that maintains its state across power cycling. However, due to the longevity of data stored in NVRAM, this data is also more susceptible to soft errors such as bit flips. Furthermore, because being already persistent this data might not be additionally stored on secondary storage. As a consequence, data corruptions in main memory cannot be any longer resolved by simply restarting a system. The latter however limits the usability of NVRAM and poses a high risk to result in a permanent inconsistent system state.

In this talk we present DeNoVo malloc, a soft-error and power outage resilient memory allocator that is specifically designed for novel NVRAM. With DeNoVo malloc a user can create any kind of persistent data structures at minimal overhead, using the familiar interface of malloc(). To secure allocated data against single and multi-bit faults as well as power outages, our memory allocator supports atomic transactions and a transparent fault tolerance mechanism. The main focus of this talk will be our fault tolerance mechanism and the challenges in designing a fully transactional memory allocator.