Towards Transparent and Seamless Storage-As-You-Go with Persistent Memory

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ABSTRACT

In traditional computer systems, memory and storage are statically divide and separately allocated. In such a strictly dichotomized system, resource usage becomes unbalanced; more memory is always in need, yet large portions of storage remains unused. The goal of this paper is to break this strict division of memory and storage, and present a system that can dynamically move the boundary between memory and storage as need be. Commercial Persistent Memory (PM) is now in the horizon.   PM products based on the DIMM interface are expected to be available soon as well. In this paper, we assume a hybrid memory system composed of DRAM and DIMM interface PM, where the intention is to use PM as storage space. For such a system, we propose Storage-As-You-Go (SAY-Go), a system that transparently adjusts the use of PM such that PM can be used as memory as well as storage as need be. To this end, we present the design and implementation of Persistent Memory Buddy (PMB), a memory allocation service that can freely grow and shrink memory it is managing.

BIOGRAPHY

Sam H. (Hyuk) Noh (盧三赫) received the BS degree in computer engineering from the Seoul National University, Seoul, Korea, in 1986, and the PhD degree from the Department of Computer Science, University of Maryland, College Park, MD, in 1993. He held a visiting faculty position at the George Washington University, Washington, DC, from 1993 to 1994 before joining HongIk University in Seoul, Korea, where he was a professor in the School of Computer and Information Engineering until the Spring of 2015. Starting from the Fall of 2015 he joined UNIST (Ulsan National Institute of Science and Technology), a young Science and Tech focussed national university, where he is a Professor at the School of Electrical and Computer Engineering and where he served as Dean until June of 2018. From August 2001 to August 2002, he was also a visiting associate professor with the University of Maryland Institute of Advanced Computer Studies (UMIACS), College Park, MD.

He has served as General Chair, Program Chair, and Program Committee Member on a number of technical conferences and workshops including the ACM/USENIX Eurosys (2018), ACM SYSTOR (2018), ACM EMSOFT (2018), NVMW (2018), APSys (2018), NVMSA (2018), IEEE MASCOTS (2017), ACM OSDI (2016), ACM ASPLOS (2018, 2016), USENIX HotStorage (2018, 2016, 2015), USENIX FAST (2013~2020), ACM SIGPLAN LCTES (2015), and IEEE ICPADS (2013). He has also been serving as Editor-in-Chief of the ACM Transactions on Storage since the summer of 2016.

His current research interests include operating system issues pertaining to embedded/computer systems with a focus on the use of new memory technologies such as flash memory and persistent memory. He was named an ACM Distinguished Member in 2017, is a Senior Member of the IEEE, and a member of USENIX and KIISE. (E-mail: samhnoh at unist dot ac dot kr)

All are welcome!