대학원 인공지능학과 & BK21 Ajou DREAM 인공지능 혁신인재 양성사업단

Artificial Intelligence Colloquium

Title : Perforated Page : Supporting Fragmented Memory Allocation for Large Pages

When : 2021.2.25 (Thu.) 17:00 ~

Where : Zoom 링크 https://zoom.us/j/95564587545?pwd=NFFONEhLN2pkWkJRL2k3cHlBT0d5dz09

회의 ID: 955 6458 7545, 암호: 3898

Speaker : Professor, Chang Hyun Park (Uppsala University, Sweden)

Abstract :

The availability of large pages has dramatically improved the efficiency of address translation for applications that use large contiguous regions of memory. However, large pages can be difficult to allocate due to fragmented memory, non-movable pages, or the need to split a large page into regular pages when part of the large page is forced to have a different permission status from the rest of the page. Furthermore, they can also be expensive due to memory bloating caused by sparse accesses to application data. In this work, we enable the allocation of large 2MB pages even in the presence of fragmented physical memory via perforated pages. Perforated pages permit the OS to punch 4KB page-sized holes in the physical address range allocated to a large page and re-map them to other addresses as needed. This not only enables the system to benefit from large pages in the presence of fragmentation, but also allows for different permissions to exist within a large page, enhancing sharing flexibility. In addition, it allows unused parts of a large page to be used elsewhere, mitigating memory bloating. To minimize changes to the system, perforated pages reuse the 4KB-level page table entries to store the hole locations and translates holes into regular 4KB pages.

By enabling large pages in the presence of physical memory fragmentation, perforated pages increase the applicability and resulting benefits of large pages with only minor changes to the hardware and OS. In this work, we evaluate the effectiveness of perforated pages with timing simulations under diverse and realistic fragmentation scenarios.

Bio :

Dr. Chang Hyun Park, received his doctoral degree from KAIST in 2019. He has been appointed as an assistant professor in the Department of Information Technology of Uppsala University, Sweden as of January 2021. Dr. Park's main research field is computer architecture and systems. He has published in top international venues including IEEE/ACM ISCA, MICRO, and ACM EuroSys. In recognition of his research achievements during his Ph.D., he received Ph.D. fellowship awards from Naver and Microsoft Research Asia. Dr. Park has worked as a postdoctoral researcher at Uppsala University after obtaining his doctoral degree at KAIST in August 2019 and will continue his research as an assistant professor.

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