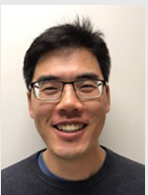# A Versatile NDP Server Architecture and Its Impact on Data Center Applications

Existing near-data processing (NDP) techniques have demonstrated their strength for some specific data-intensive applications. However, they may be inadequate for a data center server that needs to perform a diverse range of applications from data-intensive to compute-intensive. How to develop a versatile NDP-powered server to support various data center applications remains an open question. Further, a good understanding of the impact of NDP on data center applications is still missing. For example, can a compute-intensive application also benefit from NDP? Which type of NDP engine is a better choice, an FPGA-based engine or an ARM-based engine? To address these issues, we first propose a new NDP server architecture that is equipped with a parallel NDP engine array. Based on the architecture, two NDP servers ANS (ARM-based NDP Server) and FNS (FPGA-based NDP Server) are introduced. Next, we implement a single-engine prototype for each of them. Finally, we measure performance, energy efficiency, and cost/performance ratio of six typical data center applications running on the two prototypes. Some new findings have been observed.

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(a)

(b)

(c)