Datacenters have been using a "monolithic" server model for decades, where each server has a motherboard that hosts a set of hardware devices such as processors and memory chips. This monolithic architecture is easy to deploy but cannot fully support the growing hardware heterogeneity in datacenters or provide hardware elasticity, failure isolation, and efficient resource utilization. Going forward, we have to rethink the decade-long server-centric model.

Our answer is to break the monolithic server model into distributed, network-attached hardware components that can each manage its own resources and can fail independently. For the past three years, my lab has been working on such datacenter "resource disaggregation" at system software, networking, and hardware levels. In this talk, I will discuss our various efforts in building a disaggregated datacenter (or "DC-3.0"). Specifically, I will focus on two systems: LegoOS, a new distributed, disseminated OS designed for datacenter resource disaggregation (OSDI’18), and LITE, a Local Indirection TiEr in kernel to virtualize native RDMA into a flexible, high-level, easy-to-use abstraction (SOSP’17).

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