

Streaming State Kinematics and Flow Engineering

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Abstract

We speculate that computational exchanges will evolve from short-lived, intermittent transactions to long-lived flows—repeated transfers of information, constrained in space, time, and domain, from one network point to another. Flows whose lifespans are measured in hours to months will be common and their delivery and manipulation will rank, as elements of infrastructure, equal in importance to other vital goods and services. Flows are an enduring architectural abstraction with roles in software reliability, incremental change, traffic management and shaping, and quality of service, as well as adaptations such as load balancing, device and network mobility, or service distribution. In this context we introduce the concept of *flow engineering*, the design, implementation, and deployment of flows with predictable behaviors. We introduce *streaming state kinematics*, a consideration of state transfer in the service of flow, and demonstrate its role in solving the problem of flow mobility—transplanting the endpoints of a flow from one network location to another while minimizing flow disruption.