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LambdaStation: A forwarding and admission control service to interface production network facilities with advanced research network paths

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Advanced optical-based networks have the capacity and capability to meet the extremely large data movement requirements of particle physics collaborations. To date, research efforts in the advanced network area have been primarily focused on provisioning, dynamically configuring, and monitoring the wide area optical network infrastructure itself. Application use of these facilities has been largely limited to demonstrations using prototype high performance computing systems. Fermilab has initiated a project to enable our production network facilities to exploit these advanced research networks. Our objective is to selectively forward designated data transfers, on a per-flow basis, between capacious production-use storage systems on local campus networks, using a dynamically provisioned alternate path on a wide area advanced research network. To accomplish this, it is necessary to develop the capability to dynamically reconfigure forwarding of specific flows within our local production-use routers, provide an interface that enables applications to utilize the service, and dynamically implement appropriate access control on the alternate network path. Our project involves developing that infrastructure. We call it LambdaStation. If one envisions wide area optical network paths as high bandwidth data railways, then LambdaStation would functionally be the railroad terminal that regulates which flows at the local site get directed onto the high bandwidth data railways. LambdaStation is in a very early stage of development. Our paper will discuss its design, early deployment experiences, and future directions for the project.

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