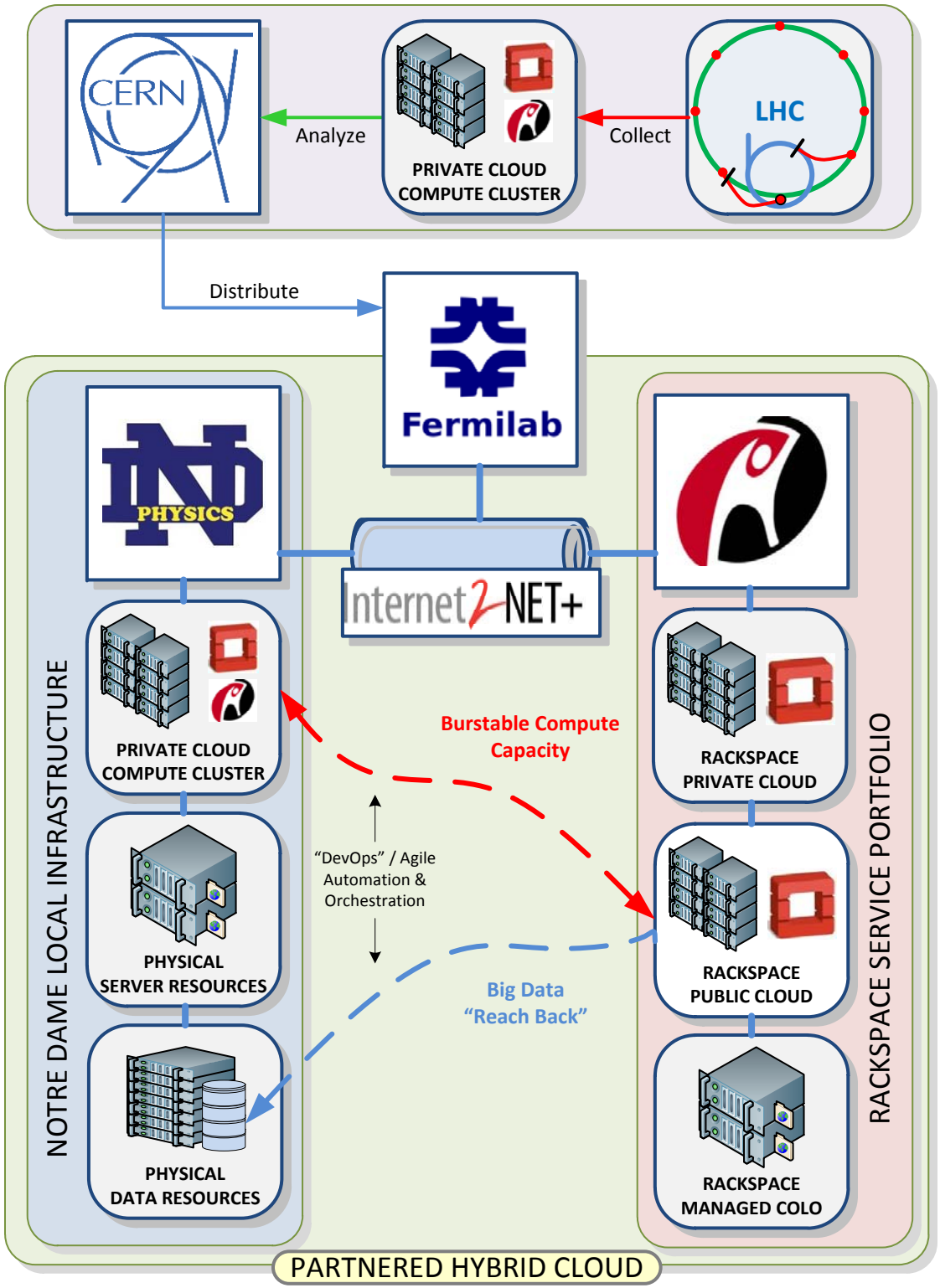

The power of relationship, innovative thought, and technology has rarely been so evident as when one considers what has been accomplished with this partnered effort. Notre Dame, Rackspace and Internet2 have leveraged both new technology and combined effort to drastically extend compute-based research activities for Notre Dame.

Briefly described here, High-Energy Physics Data is made available through (shared partners) CERN and Fermilab. Notre Dame processes this data in its data facilities via physical server and private cloud compute and orchestration resources along with local data resources. Through a combination of monitoring and metering functions (Ceilometer) within the local Rackspace (OpenStack) Private Cloud, exceeded thresholds will trigger an "AutoScale" (Heat) event which bursts compute capacity into Rackspace's Public Cloud facilities. Through Internet 2 Net+'s very robust connectivity services, this bursting event can continuously and incrementally extend or contract (parallelized if needed) compute instance resources in a matter of minutes. The compute resources that become active on the hosted (Rackspace) side retrieve compute source data from the same data location that local Notre Dame compute resources are utilizing. The term coined for this function is Big Data "Reach back" and is much preferred to attempting to split feed or synchronize multiple data sources. This is made possible due to the "LAN like" performance provided by Internet 2 services which otherwise would prove to be a daunting challenge.

When compute requirements "cool down" compute instances both hosted and local will spin down, saving both cost and capacity. In addition to the programmatic bursting described here both manual and scheduled capacity changes are also available.

This accomplishment is a "perfect storm" of need, vision, and capability; each partner contributes their expertise and assets – open source cloud experience and facilities, network knowledge and capabilities, infrastructure, research and the HPC mission.

This is the beginning of a new, flexible and hybrid method for complex data processing; it is an exponential "game changer".