Experimental Demonstration of Heterogeneous Cross Stratum Broker for Scientific Applications

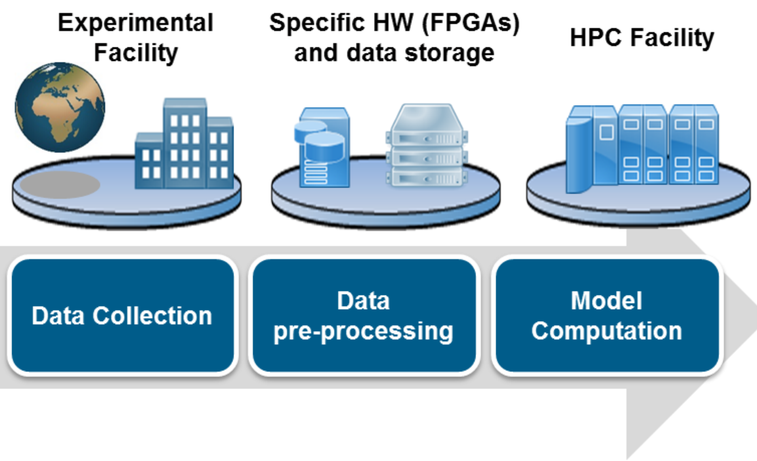
A. Castro[(1)], A. P. Vela[(2)], Ll. Gifre[(2)], R. Proietti[(1)], C. Chen[(3)], J. Yin[(3)], X. Chen[(3)], Z. Cao[(4)], Z. Zhu[(3)], V. Mishra[(5)], L. Velasco[(2)], and S. J. B. Yoo[(1)]

[(1)] *University of California (UC Davis), Davis, CA, USA,* ***albcastro@ucdavis.edu***
[(2)] *Universitat Politècnica de Catalunya (UPC), Barcelona, Spain*
[(3)] *University of Science and Technology of China (USTC), Hefei, China*
[(4)] *Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China*
[(5)] *Army Research Laboratory, Aberdeen, MD, USA*

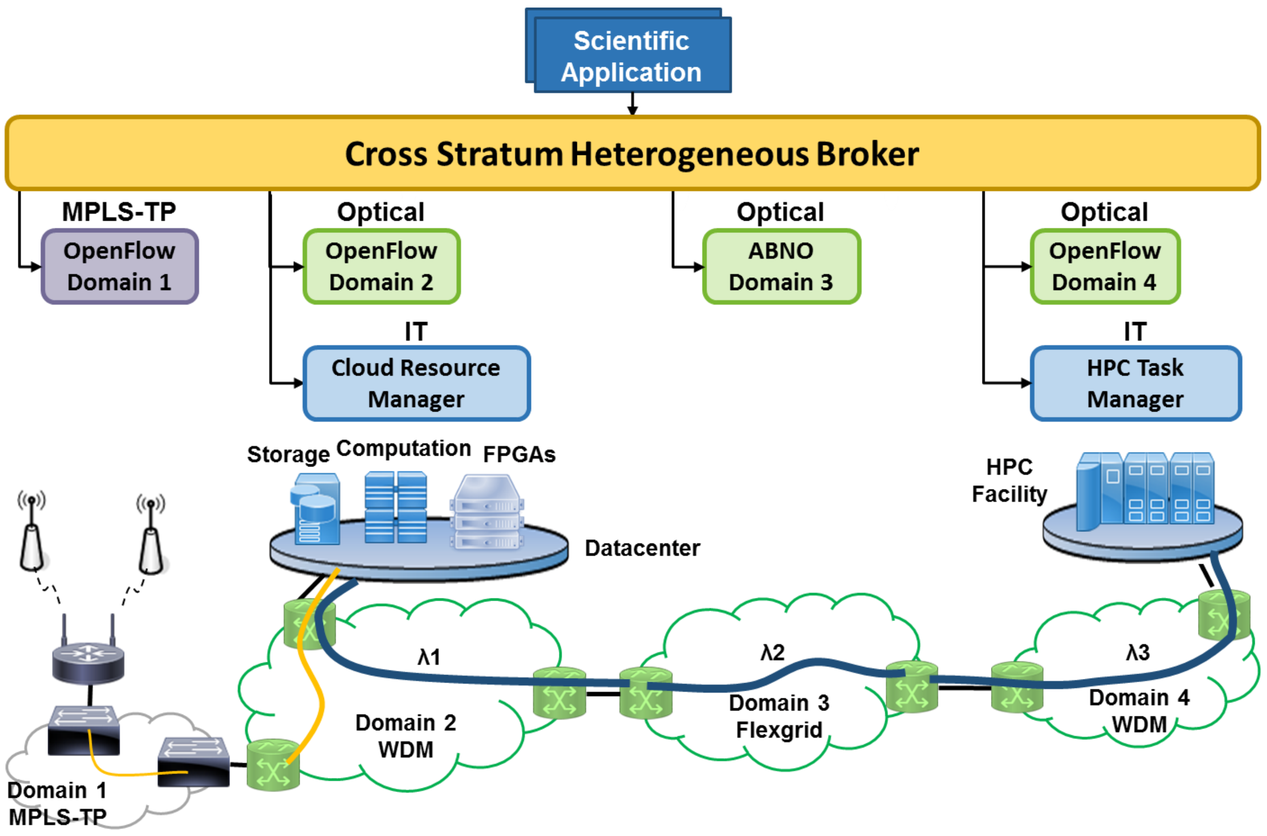
Abstract

We propose and demonstrate cross-stratum Broker orchestration for scientific applications and heterogeneous resources reservation in Datacenters, HPC facilities and networks belonging to different operators. Experiments were performed in a distributed set-up spanning across 3 continents.

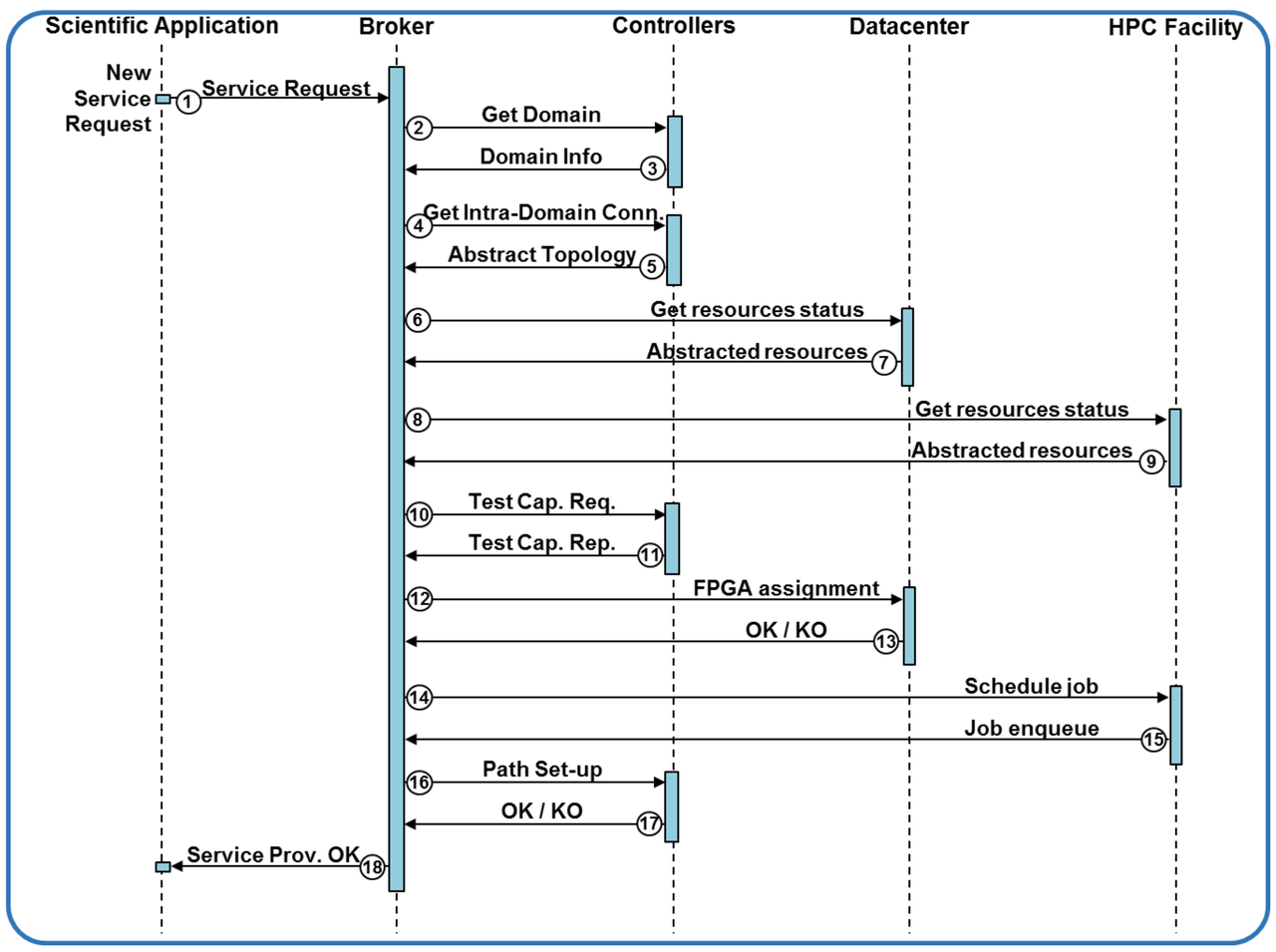
Extreme-scale scientific applications model



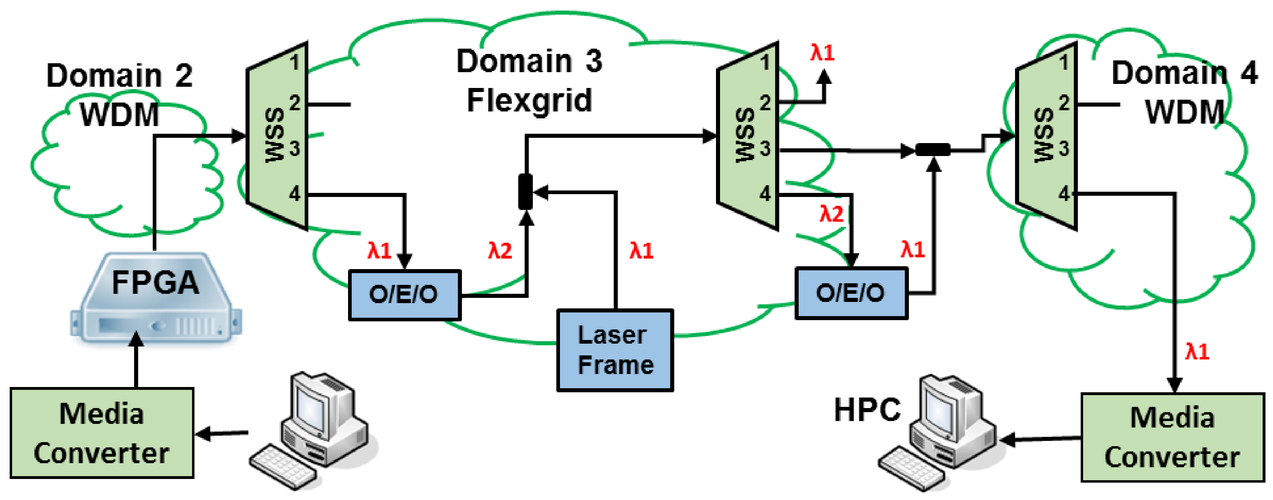
Proposed Architecture



Proposed Workflow

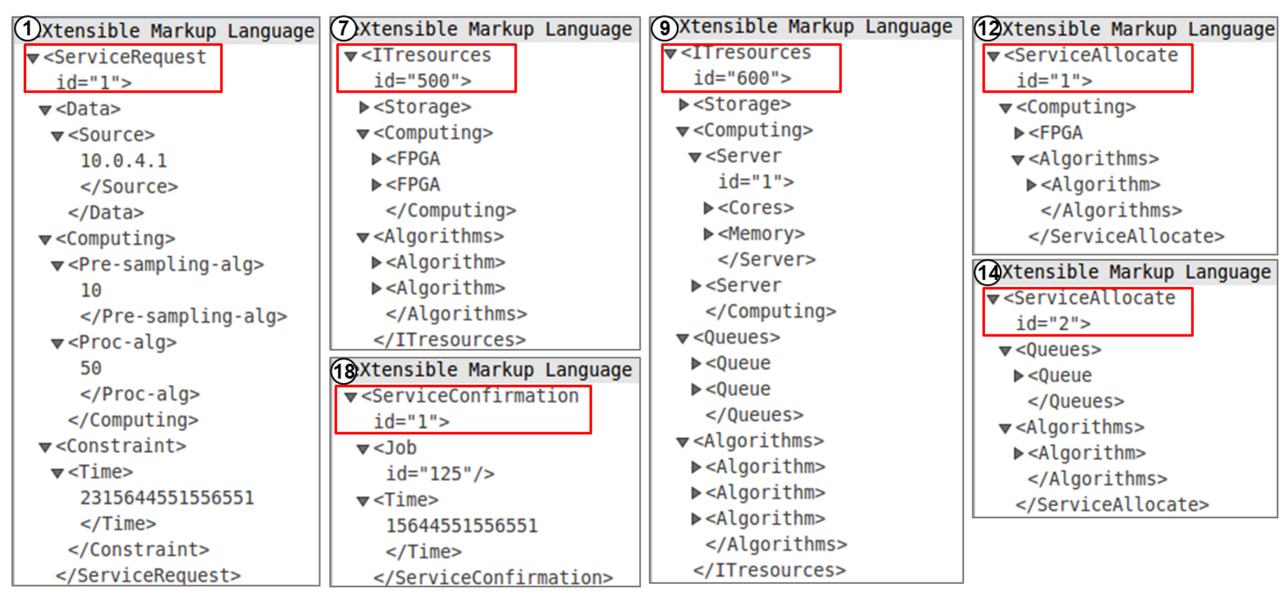


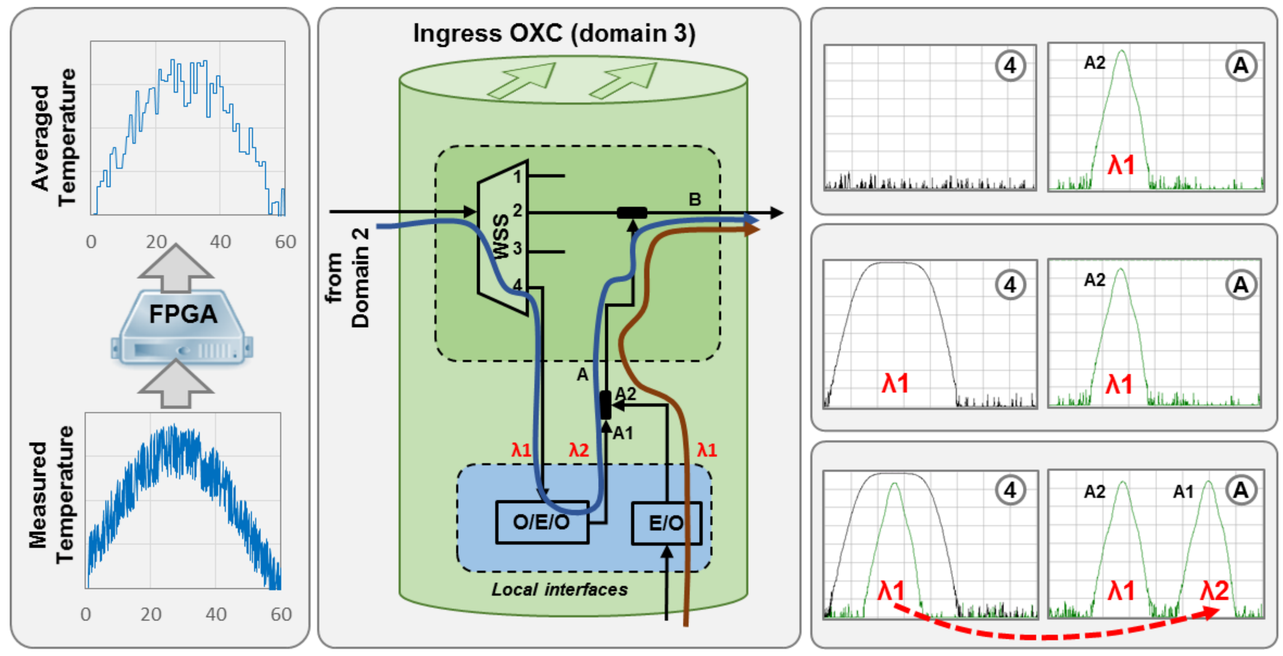
Experiment Setup



Experiment Results

		Source	Destination	Info
	1	127.0.0.1	127.0.0.1	GET /ctrl/REQSERVICE HTTP/1.1
		127.0.0.1	127.0.0.1	HTTP/1.0 200 OK
ASes	2-5	168.150.101.134	147.83.42.198	GET /ctrl/GETINTRADOMCONN HTTP/1.1
ASes	2-5	147.83.42.198	168.150.101.134	HTTP/1.0 200 OK
		⋮		
Data Center	6-7	127.0.0.1	127.0.0.1	POST /ctrl/GETITINFO_FPGA HTTP/1.1
Data Center	6-7	127.0.0.1	127.0.0.1	HTTP/1.0 200 OK
HPC Facility	8-9	127.0.0.1	127.0.0.1	POST /ctrl/GETITINFO_HPC HTTP/1.1
HPC Facility	8-9	127.0.0.1	127.0.0.1	HTTP/1.0 200 OK
	10-11	168.150.101.134	147.83.42.198	GET /ctrl/TCREQUEST HTTP/1.1
	10-11	147.83.42.198	168.150.101.134	HTTP/1.0 200 OK
	12-13	127.0.0.1	127.0.0.1	POST /ctrl/ALLOCATE_FPGA HTTP/1.1
	12-13	127.0.0.1	127.0.0.1	HTTP/1.0 200 OK
	14-15	127.0.0.1	127.0.0.1	POST /ctrl/ALLOCATE_HPC HTTP/1.1
	14-15	127.0.0.1	127.0.0.1	HTTP/1.0 200 OK
	16-17	168.150.101.134	147.83.42.198	POST /ctrl/PATHSETUP HTTP/1.1
	16-17	147.83.42.198	168.150.101.134	HTTP/1.0 200 OK
		⋮		
	18	127.0.0.1	127.0.0.1	GET /ctrl/REQSERVICECONF HTTP/1.1
	18	127.0.0.1	127.0.0.1	HTTP/1.0 200 OK





Conclusions

An architecture for sharing geographically distributed computational facilities among several scientific experiments has been proposed and assessed.

Acknowledgements

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