GENI Instrumentation and Measurement Capabilities

Item	Project /Service PI/Organization	Title Summary	3) Configuration of I&M services	4) Info's/protocs/schema for measurement data	5) Ownership of measurement data and privacy of owners	6) Info's/protocols/APIs for using I&M services	7) Basic GENI use case	8) Measurement data transport via Measurement Plane	9) Discover/authorize/assign/bind I&M services	10) Measurement Orchestration (MO) service	11) Measurement Point (MP) service	12) Time-stamping measurement data	13) Measurement Collection (MC) service	14) Measurement Analysis and Presentation (MAP) service	15) Measurement Data Archive (MDA) service	16) Additional GENI use cases	Notes	Status	(B) PlanetLab CF	(C) ProtoGENI CF	(D) ORCA CF	(E) OMF (ORBIT) CF	Internet2	GMOC Operations	Shared (e.g., virtualized)	One site	Multiple sites	Status	Research	Students	Applications	Slice Integrity	Forensics	Traffic	Statistics	Operations
			Architecture components addressed or implemented (none, low, med, high)															Implementation in GENI, or elsewhere (no, yes)										Use in GENI, or elsewhere (no, yes)								
1	GENI Project 1660 http://groups.geni.net/geni/wiki/ORBIT Max Ott/NICTA Ivan Seskar, Marco Gruteser/Rutgers WINLAB	OML (ORBIT Measurement Library) http://omf.mytestbed.net/projects/show/oml in OMF (ORBIT Management Framework) http://omf.mytestbed.net/ Package of infrastructure and tools for monitoring wireless experiments, including mobile experiments, in ORBIT testbed	H	L	-	H	-	H	M	H	H	L	H	-	L	-	MPs code scripted by researcher	Complete	-	-	-	Y	-	-	Y	Y	-	Complete	Y	Y	-	-	-	-	-	-
2.1	GENI Project 1642 http://groups.geni.net/geni/wiki/InstrumentationTools Jim Griffioen/Univ Kentucky	Instrumentation Tools Package of I&M tools for monitoring student experiments in Edulab, p/o ProtoGENI	H	H	L	M	-	L	M	L	M	L	H	M	M	-	MP includes SNMP daemon in user's node	Complete	-	Y	-	-	-	-	Y	Y	-	Complete	-	Y	-	-	-	-	-	-
2.2	GENI Project 1752 http://groups.geni.net/geni/wiki/Shadow Jim Griffioen/Univ Kentucky Jacobus van der Merwe/AT&T Research	ShadowNet Installation of virtualized Juniper routers in ProtoGENI I2 backbone, and monitoring via SNMP daemon	-	L	-	L	-	-	-	-	H	-	-	-	-	-	MP gathers data from Juniper router using SNMP daemon	Started	-	Y	-	-	Y	-	Y	-	Y	-	Y	-	-	-	Y	Y	Y
2.3	GENI Project 1628 http://groups.geni.net/geni/wiki/MeasurementSystem Paul Barford/Univ Wisconsin	Measurement System Design of packet capture system based on PC with DAG card, for use in ProtoGENI backbone	-	L	-	L	-	-	L	-	H	-	-	-	-	-	MP includes packet capture system based on PC with DAG card	Started	-	Y	-	-	-	-	Y	-	-	-	Y	-	-	-	Y	Y	-
3.1	perfSONAR Performance Monitoring Framework for Internet2 Matt Zekauskas/Internet2	perfSONAR Performance Monitoring Framework for Internet2 GENI I&M Workshop Talk An architecture and a set of protocols, collaboration of production network operators, tools to provide monitoring and diagnostic capabilities, several interoperable software implementations, and a federated set of deployed measurement infrastructures	H	H	M	M	-	M	-	-	H	H	H	H	H	-	Internet2 provides backbone transport services to GENI See: Open Grid Forum (OGF) Network Measurement (NM) Working Group http://nmwg.internet2.edu/ See: "An Extensible Schema for Network Measurement and Performance Data", February, 2008 http://anonsvn.internet2.edu/svn/nmwg/trunk/nmwg/doc/nm-schema-base/nm-schema-base.pdf MPs pull data from network entities	Complete	-	-	-	-	Y	-	Y	-	Y	Complete	-	-	-	Y	Y	Y	Y	Y
3.2	GENI Project 1788 http://groups.geni.net/geni/wiki/LAMP Martin Swany/Univ Delaware	PerfSONAR for network measurements I&M system, with emphasis on providing a common but extensible format for data storage and exchange	H	H	M	M	-	M	-	-	H	H	H	H	H	-	Based on perfSONAR system MPs pull data from network entities	-	-	Y	-	-	-	-	Y	-	-	-	Y	-	-	Y	Y	Y	Y	Y
4.1	Scalable Sensing Service (S3) Sonia Fahmy/Purdue Puneet Sharma/HP Labs	Scalable Sensing Service (S3) Includes sensor pods; sensing information mangement backplane; and scalable inference engines.	H	H	M	H	-	M	-	M	H	H	H	H	H	-	One of several PlanetLab tools. MP comprises sensor pods.	Complete	Y	-	-	-	-	-	Y	-	Y	Complete	Y	-	-	Y	Y	Y	Y	Y
4.2	GENI Project 1723 http://groups.geni.net/geni/wiki/ScalableMonitoring Sonia Fahmy/Purdue Puneet Sharma/HP Labs	Scalable, Extensible and Safe Monitoring of GENI Clusters Develop a prototype shared measurement service based on the existing S3 service, integrate it with ProtoGENI and deploy it for GENI experimenter's use.	H	H	M	H	-	M	-	M	H	H	H	H	H	-	Based on current Scalable Sensing Service	-	-	Y	-	-	-	-	Y	-	Y	-	Y	-	-	Y	Y	Y	Y	Y
4.3	GENI Project 1764 http://groups.geni.net/geni/wiki/OnTimeMeasure Prasad Calyam/Ohio Supercomputing Ctr	OnTimeMeasure for network measurements I&M system uses active probes to make network measurements	H	M	M	H	-	M	M	H	H	H	H	H	H	-	Based on software developed at OSC/OARnetMPs are active probes	-	-	Y	-	-	-	-	Y	-	-	-	Y	-	-	Y	Y	Y	Y	Y
4.4	PlanetFlow2 http://www.cs.princeton.edu/~sapanb/planetflow2/ Sapan Bhatia, Stephen Soltesz/Princeton Univ	PlanetFlow2: Flow logging and query system for Planet-Lab PlanetFlow2 is a system that continuously logs PlanetLab's traffic, periodically transfers it to a central location and allows users, administrators and third parties to query the data. Supports an advanced querying mechanism that allows traffic logs to be aggregated based on one or more header fields, and is fast and scalable. Collects about 1TB of data every month, and accounting for about 120TB of data at any given time.	-	M	M	L	-	H	-	L	H	H	H	H	H	-	One of several PlanetLab tools.	Complete	Y	-	-	-	-	-	Y	-	Y	Complete	Y	Y	-	-	Y	Y	Y	Y
5	GENI Project 1631 http://groups.geni.net/geni/wiki/Embedded%20Real-Time%20Measurements Keren Bergman/Columbia Univ	Embedded Real-Time Measurements Hardware and software to gather real-time measurements from networking equipment, typically using SNMP, and formats from LEARN project	-	M	-	-	-	-	-	-	H	-	-	-	-	-	Utilizes formats from GENI Project 1733, Deniz Gurkan/Univ Houston MPs pull date from network entities using SNMP	-	-	-	Y	-	-	-	-	-	-	-	Y	-	-	-	-	-	-	-
6	GENI Project 1718 http://groups.geni.net/geni/wiki/IMF Rudra Dutta/NCSU Ilia Baldine/RENCI	Integrated Measurement Framework (IMF) and Tools for Cross Layer Experimentation Focus is on architecture to permit measurements to influence experiment, i.e., by adjusting a protocol parameter	M	M	-	M	-	-	L	M	M	-	-	-	-	-	Utilizes MP from Project 1631, Keren Bergman/Columbia Univ	-	-	-	Y	-	-	-	-	-	-	-	Y	-	-	-	-	-	-	-
7	CoMon PlanetLab Status http://comon.cs.princeton.edu/status/	CoMon PlanetLab Status Sortable status page (with various views) of all PlanetLab nodes. Values updated every 5 minutes, with 2-day histories. Shows major resource consumers.	-	M	M	L	-	-	-	-	H	H	M	L	M	-	One of several PlanetLab tools. Other apparently related tools: CoVisualize: Provides visualizations of PlanetLab usage. CoTop: Top-like display of slices on a node along with their resource consumption. PLC_Monitor: Monitor of current PLC nodes. Trumpet: Open repository of data about nodes.	Complete	Y	-	-	-	-	-	Y	-	Y	Complete	Y	Y	-	Y	Y	Y	Y	Y
8	GENI Project 1604 http://groups.geni.net/geni/wiki/GENIMetaOps Jon-Paul Herron/Indiana Univ	GENI Meta-Operations Center System to use a well-defined protocol to generalize the operational details of GENI prototypes and send those details to an operational data repository	-	H	H	-	-	-	-	-	-	-	H	H	H	-		Started	-	-	-	-	-	Y	-	-	Y	-	-	-	-	Y	Y	Y	Y	Y
9	GENI Project 1773 http://groups.geni.net/geni/wiki/VMI-FED Kara Nance/Univ Alaska	Virtual Machine Introspection (VMI) Focus on secure monitoring mechanisms for virtual machines in GENI slices.	-	-	-	-	-	-	-	-	H	-	-	-	-	-	MP for certain types of VMs	-	Y	-	-	-	-	-	-	-	-	-	Y	-	-	-	-	-	-	-
10	DatCat Project http://www.datcat.org/ Kim Claffy, et. al./CAIDA	DatCat Project http://www.datcat.org Provides a catalog that indexes Internet measurement data, which you can then find, annotate, and cite	-	H	H	-	-	-	-	-	-	-	-	-	H	-		Complete	-	-	-	-	-	-	Y	-	-	Complete	Y	-	-	-	-	Y	Y	-
11	Crawdad Project http://groups.geni.net/geni/wiki/CRAWDAD_Experience David Kotz/Dartmouth	Crawdad Project http://groups.geni.net/geni/wiki/CRAWDAD_Experience Provides a catalog that indexes network (e.g., campus wifi access) measurement data, which you can then find, annotate, and cite	-	H	H	-	-	-	-	-	-	-	-	-	H	-		Complete	-	-	-	-	-	-	Y	-	-	Complete	Y	-	-	-	-	Y	Y	-
12	Amazon Web Services http://aws.amazon.com/products/	Amazon Simple Storage Service http://aws.amazon.com/s3/ Amazon Simple DB http://aws.amazon.com/simpledb/ Web service providing the core database functions of data indexing and querying in the cloud. Indexing Amazon S3 Object Metadata http://aws.amazon.com/simpledb/usecases_metadata_indexing/	-	H	H	H	-	H	H	-	-	-	-	-	H	-		Complete	-	-	-	-	-	-	-	-	-	Complete	-	-	-	-	-	-	-	-
13	GENI Project 1709 http://groups.geni.net/geni/wiki/DICLOUD Michael Zink, Emmanuel Cecchet/UMass Amherst	Data-Intensive Cloud Control for GENI Complete environment for researchers to conduct data-intensive experiments in GENI from start (the data collection point) to finish (processing and archiving). It will incorporate commercial cloud computing services , including storage services(Amazon Simple Storage Service), as GENI substrates available for researchers.	M	M	-	M	-	H	M	-	M	M	-	-	H	-	MP is radar system from GENI ViSE project	Started	-	-	Y	-	-	-	Y	Y	-	-	Y	-	-	-	-	-	-	-
14	GENI Project 1663 Digital Object Registry Larry Lannom, Giridhar Manepallii/CNRI	Experiment Management Service http://groups.geni.net/geni/attachment/wiki/DigitalObjectRegistry/GENI-ExptMngmntSvc.pdf Experiments have and result in various resources which are related to each other (e.g. specs, logs, software, etc.), which need to be arcived. A unified service that establishes the relationship between various resources and that integrates with heterogeneous repositories.	-	M	M	-	-	-	-	L	-	-	-	-	M	-	Does this use Amazon Simple Storage Service?	Started	-	-	-	-	-	-	Y	-	Y	-	-	-	-	Y	Y	-	-	-
15	GENI Project 1706 http://groups.geni.net/geni/wiki/netKarma Beth Pale, Chris Small/Indiana Univ	netKarma: GENI Provenance Registry Collect provenance of the data generated by GENI. Develop a GENI Provenance Registry (netKarma) that will capture the workflow of GENI slice creation, topology of the slice, operational status and other measurement statistics and correlate it with the experimental data.	-	H	H	-	-	-	-	-	-	-	-	-	L	-	Uses Karma provenance architecture.	Started	Y	-	-	-	-	-	Y	-	Y	-	-	-	-	Y	Y	-	-	-
16	European research organizatios, including Intel Research, Cambridge, UK Project Lead: Gianluca Iannaccone/Intel Research	CoMo (Continuous Monitoring) http://como.sourceforge.net/ A passive monitoring system, designed to be the basic building block of an open network monitoring infrastructure that would allow researchers and network operators to easily process and share network traffic statistics over multiple sites.	M	L	M	-	-	M	-	-	M	M	M	L	M	-	Last updated 2008 May be useful reference for GENI I&M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Salzburg (Austria) Research http://www.salzburgresearch.at/company/index.php Christof Brandauer/Salzburg Research	Measurement Infrastructure for NEtwork Research (MINER) http://miner.salzburgresearch.at/index.php?option=com_content&task=view&id=1&Itemid=2 A programmable measurement infrastructure that integrates existing tools and provides its users higher-level services on top of them. It enables users to specify measurement scenarios, schedule (repeated) scenario executions and retrieve their results. The services are accessible via a tool-agnostic and unified programming interface on top of which measurement applications can be developed.	L	L	-	L	-	-	-	L	L	-	L	L	L	-	Used in the European ICT project NETQOS for automated policy monitoring / SLA validation May be useful reference for GENI I&M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-