Description of the EDG network monitoring schema for R-GMA

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1 Version history

11 March 2003 Initial version

12 March 2003 More detail

2 Introduction

This document describes the schema used to publish network monitoring information using R-GMA. The first section describes the ideas behind the schema and the second describes the schema themselves.

3 Information model

3.1 Network monitoring information

Network monitoring information is split into tables according to the metric being measured. Every table has the following columns: source, destination and timestamp. The source and destination are the hostnames of the source and destination of a measurement, and the tool used to make the measurement. Most tables also contain either a value column or minimum, maximum and average columns, depending on the measurement: a throughput just has a value, while RTT has a min, max and average.

Each table also has columns containing the values of parameters of each measurement. Parameters include such things as the packet sizes used, buffer sizes and so on.

3.2 Linking information

There are two additional tables used to link Storage Elements and Computing Elements to the network monitoring information. These tables just contain a SE or CE identifier and the name of a network monitoring host nearby. The network

monitoring host(s) is chosen in the expectation that measurements made to or from it will closely match a similar measurement made to the SE or CE.

4 Schema definitions

4.1 Metric and parameters tables

The EDG uses three main tools to measure connections – Iperf, UDPMon and Ping – plus information gleaned from working file transfers. For this reason, the parameters chosen for each metric may not include every conceivable parameter.

Iperf is used to measure TCP throughput; Ping, ICMP packet loss and round-trip time; UDPMon, UDP packet loss and throughput and one-way inter-packet delay variation.

The following sections describe the tables used to publish metrics. The "types" shown are MySQL types – VARCHAR(n) and CHAR(n) being strings of length n, REAL indicating a real number and INT indicating an integer.

4.1.1 NetworkTCPThroughput

Achieved TCP throughput (table 1).

4.2 NetworkICMPPacketLoss

Percentage loss of ICMP packets (table 2).

4.3 NetworkRTT

Round-trip-time of packets (table 3).

4.4 NetworkUDPThroughput

Achieved UDP throughput (table 4).

4.4.1 NetworkUDPPacketLoss

The percentage loss experienced by UDP packets (table 5).

4.4.2 NetworkOneWayIPDV

The one-way inter-packet delay variation experienced by UDP packets (table 6).

4.4.3 NetworkFileTransferThroughput

This table contains information about the throughput achieved using file-transfer tools like FTP or GridFTP (table 7). The source, destination and server names are therefore true hostnames, rather than network monitor node identifiers.

Field	Type	Description
NMIdSource	VARCHAR(100)	The source of the measurement
NMIdDestination	VARCHAR(100)	The destination of the measurement
tool	VARCHAR(100)	The tool used in making the measurement
bufferSize	INT	The buffer size
streams	INT	The number of parallel streams used
duration	INT	The duration of the transfer
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
value	INT	The achieved throughput

Table 1: NetworkTCPThroughput

Field	Type	Description
NMIdSource	VARCHAR(100)	The source of the measurement
NMIdDestination	VARCHAR(100)	The destination of the measurement
tool	VARCHAR(100)	The tool used in making the measurement
packetSize	INT	The total size in bytes of the packets transferred
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
value	REAL	The packet loss experienced

Table 2: NetworkICMPPacketLoss

Field	Type	Description
NMIdSource	VARCHAR(100)	The source of the measurement
NMIdDestination	VARCHAR(100)	The destination of the measurement
tool	VARCHAR(100)	The tool used in making the measurement
packetSize	INT	The total size in bytes of the packets transferred
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
minimum	REAL	The minimum RTT experienced
maximum	REAL	The maximum RTT experienced
average	REAL	The average RTT experienced

Table 3: NetworkRTT

Field	Type	Description
NMIdSource	VARCHAR(100)	The source of the measurement
NMIdDestination	VARCHAR(100)	The destination of the measurement
tool	VARCHAR(100)	The tool used in making the measurement
packetSize	INT	The size of packets transferred
packets	INT	The number of packets
packetGap	INT	The gap between successive packets (in microseconds)
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
userRate	REAL	The transfer rate of useful information experienced by a user
wireRate	REAL	The total transfer rate including UDP packet headers

Table 4: NetworkUDPThroughput

Field	Type	Description
NMIdSource	VARCHAR(100)	The source of the measurement
NMIdDestination	VARCHAR(100)	The destination of the measurement
tool	VARCHAR(100)	The tool used in making the measurement
packetSize	INT	The size of packets transferred
packets	INT	The number of packets
packetGap	INT	The gap between successive packets (in microseconds)
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
value	REAL	The percentage packet loss experienced

Table 5: NetworkUDPPacketLoss

Field	Type	Description
NMIdSource	VARCHAR(100)	The source of the measurement
NMIdDestination	VARCHAR(100)	The destination of the measurement
tool	VARCHAR(100)	The tool used in making the measurement
packetSize	INT	The size of packets transferred
packets	INT	The number of packets
packetGap	INT	The gap between successive packets (in microseconds)
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
value	REAL	The inter-packet delay variation experienced

Table 6: NetworkOneWayIPDV

Field	Type	Description
hostIdServer	VARCHAR(100)	The hostname of the server
hostIdSource	VARCHAR(100)	The name of the source of the transfer
hostIdDestination	VARCHAR(100)	The name of the destination of the transfer
tool	VARCHAR(100)	The tool used
fileSize	INT	The size of the file in bytes
bufferSize	INT	The buffer size used in bytes
streams	INT	The number of parallel streams used
stripes	INT	The number of stripes used in the transfer
time	CHAR(15)	Timestamp of the form yyyymmddHHMMSSZ
value	REAL	The transfer rate achieved in bytes/s

Table 7: NetworkFileTransferThroughput

4.5   Linking tables

There are two tables, shown in tables 8 and 9, that are used to publish the mappings between network monitoring hosts and CEs and SEs. These tables allow many-to-many mappings.

Figure 1 shows how the measurements from a monitoring host can be linked to a grid edge node (an SE or CE). One CE is associated with the source of a measurement identified by NMIdSource via the NetworkCE table. A second CE would also be associated with the NMIdDestination.

Field	Type	Description
NMId	VARCHAR(100)	The ID of a network monitoring host
SEId	VARCHAR(100)	The ID of a Storage Element

Table 8: NetworkSE

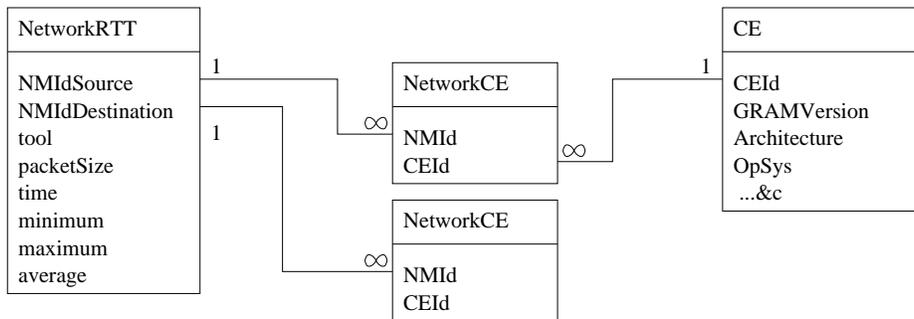| Field	Type	Description
NMId	VARCHAR(100)	The ID of a network monitoring host
CEId	VARCHAR(100)	The ID of a Computing Element

Table 9: NetworkCE

Figure 1: The linking between network monitor nodes and other grid edge nodes