

OMNeT++ Simulation Results

Data Model

Scave concepts:

Input	Datasets	Charts
Physical storage: file or database	a dataset comes from: the input or another dataset	input dataset, chart type, chart properties
Study –o Experiment –o Measurement –o Replication	selection, filter (processing)	
	dependent dataset	for reusability: “chart template”
	derived data	
	single filter, cascaded filters, data-flow network	
	for reusability: “selection template”, “custom filter”	

Definitions:

model – the executable (cc, h and msg files, external libs, etc) and NED files. (Ini files are considered to be part of the study and experiment rather than the model.) Model files are considered to be invariant for the the purposes of experimentation, meaning that if a C++ source or NED file gets modified, then it will count as a different model.

study – a series of experiments to study some phenomenon on one or more models; e.g. *“handover optimization for mobile IPv6”*. For a study (i.e. PhD research project) one usually performs a number of experiments from which conclusions can be drawn. One study may contain experiments on different models, but one experiment is always performed on one specific model.

experiment – exploration of a parameter space on a model, e.g. *“the adhocNetwork model’s behaviour with numhosts=5,10,20,50,100 and load=2.0 thru 5.0 step 0.1 settings (cartesian product)”*; consists of several measurements

measurement – a set of simulation runs on the same model with the same parameters (e.g. *“numhosts=10, load=3.8”*), but potentially different seeds. May consist of several replications of whose results get averaged to supply one data point for the experiment. A measurement can be characterized with (can be defined via) the parameter settings and simulation kernel settings in the ini file, minus the seeds.

replication – one repetition of a measurement. Very often, one would perform several replications, all with different seeds. A replication can be characterized by the seed values it uses.

run – or *actual run*: one instance of running the simulation; that is, a run can be characterized with an exact time/date and computer (e.g hostname).

file (result file) – a vector or scalar file, which may contain results from several actual runs. Ideally, the file should contain meta-info about each run, saying which experiment, measurement and replication it belongs to. Experiment is denoted with a string label (*“thruput vs load experiment”*); measurement with a label (*“measurement with load=3.8”*) and/or concrete parameter settings; replication with a label (*“replication 11”*) and/or seed values.

input – the input of the analysis can be thought of as a “database” of data items (scalars and vectors), each tagged with a (study, experiment, measurement, replication) tuple. Physically, this “database” may be a set of files, or an SQL database, or some other storage.

Necessary changes in the scalar/vector file format:

- runs should have the following attributes stored: timestamp, hostname, experiment label, measurement label, replication label¹
- along with the run should be stored: inifile contents relevant to the run (parameter settings, simkernel settings, seeds, etc)

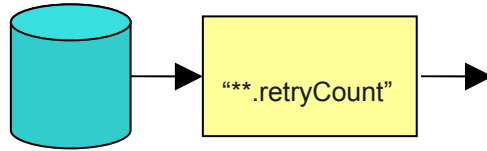
dataset – a set of data which logically belong together and are of interest together. Charts and graphs are drawn from datasets. A dataset comes from the input or other datasets, after selection and filtering. For example, *“all 802.11 retry counts of host[5..10] in experiment X, averaged over replications”*; or *“queue length vector in module ‘qnet.queue[1]’ in run X, after applying a window average filter”*.

dependent dataset – a dataset another dataset depends on, that is, uses as input data.

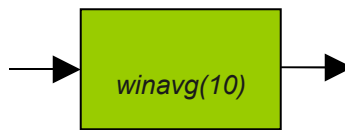
¹ These labels should be specified in the inifile prior to running the simulation:

```
experiment-label = "thruput vs load"
measurement-label = "numhosts=3 load=3.2"
replication-label = "3 of 10"
```

selection – selecting a subset of the input, with pattern matching or similar techniques. For example, *“total frames’ and ‘retransmitted frames’ in modules ‘net.host*.mac’ where experiment=‘thruput vs load’ and ‘net.load’>0.4”*



filtering – some numeric processing on a vector(s) and/or set of scalars. There are predefined filters for tasks such as calculating mean on (0,t) or window average on a vector; and it is possible to assemble others. The number and types (vector/scalar) of input and output may vary from filter to filter.



data-flow network – filters may be assembled into a data-flow network; editing it conveniently will probably require a graphical editor

cascaded filter – a simpler case of data-flow networks, where filters with one vector input and one vector output are applied one after another; this allows a simpler GUI, that is a simple list instead of a graphical editor

selection template – selection rules may be saved as a template, to make it reusable in other analysis projects

custom filter – filter data-flow networks or cascaded filters may be saved, to make them reusable in other analysis projects

chart – a chart is drawn from exactly one dataset as input