Wide-spreading performance testing at Orange with OW2 CLIF: an SOA use case

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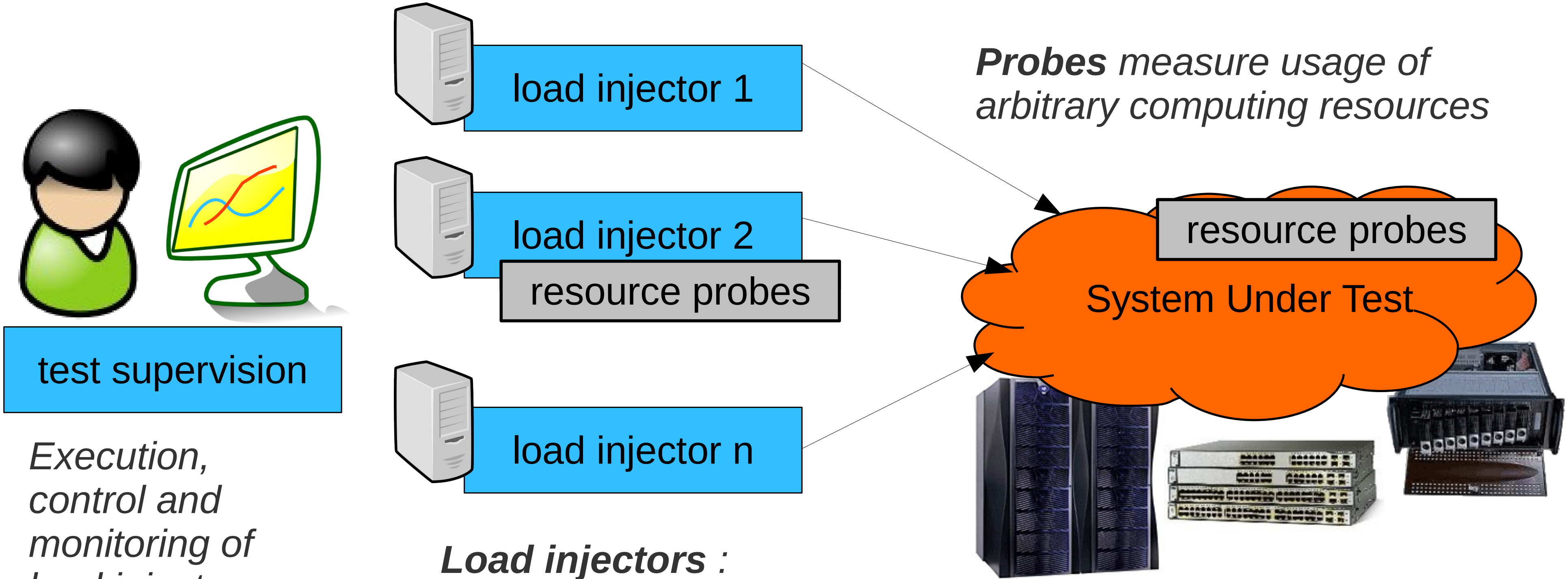
Among the tens of real CLIF use cases at Orange, WSOI is the web-service oriented infrastructure that runs over 500 web services consumers and providers, and handles about half a billion calls per month for the Orange Group.

Testing a service performance and resilience to high traffic



***Probes** measure usage of arbitrary computing resources*

Execution, control and monitoring of load injectors and probes.

***Load injectors** :*

- *send requests, wait for replies, measure response times*
- *according to a given **scenario** defining the workload*
- *for example, emulating the load of a number of real users*

→ ***virtual users***

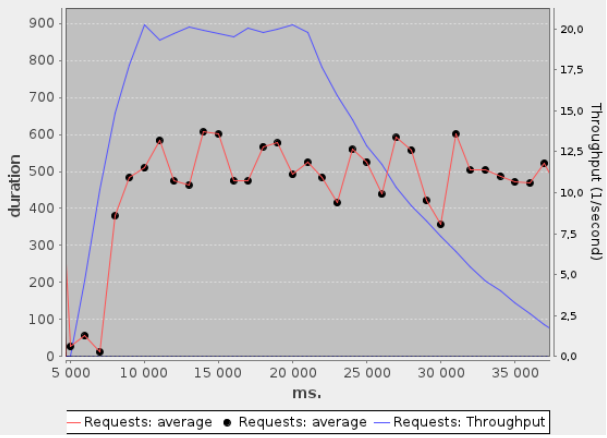
CLIF, an outstanding load testing framework

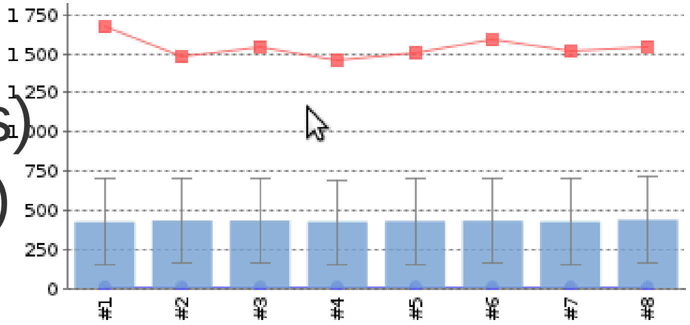
Advanced features

- dynamically adjustable number of virtual users
- support for tests of any scale
  - from one to millions of virtual users
  - from one to more than 1000 load injectors
- integrated resources monitoring
- embedded reporting tool

Versatility

- OS-independent (Java 1.5+)
- integration to Eclipse
- continuous integration (Hudson/Jenkins)
- command line (through ant and maven)
- custom probes and load injectors





Orange's motivation for performance testing is great

As an integrated telecommunication operator, Orange manages a huge variety of technologies

- networks, protocols
- equipments
- service platforms...

More than 221 millions clients in 42 countries!

- quality of service, user experience and user confidence are key priorities for Orange
- performance issues are critical (testing, sizing, capacity planning)

CLIF, an OW2 project lead by Orange

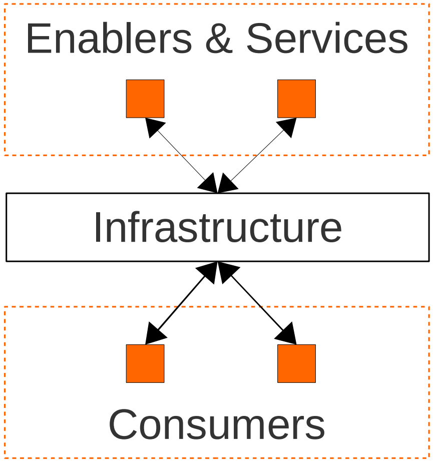
The CLIF open source project was jointly launched in 2003 by INRIA and Orange in ObjectWeb/OW2

Maintaining CLIF is strategic for Orange

- versatility/adaptability to almost all technologies
  - HTTP, SOAP, REST, FTP, DHCP, LDAP, DNS, Diameter, Radius, EAP, GBA, GTPP, TR69, SIP, RTP, proprietary protocols...
- much cheaper than specific commercial tools
- growing confidence (feedback from the community)
- community contributions
- research transfer applied to performance testing
  - software components, autonomic computing, cloud computing...

The WSOI use case: Orange's web-service oriented infrastructure

SMS/MMS, address book, storage...



Enablers & Services

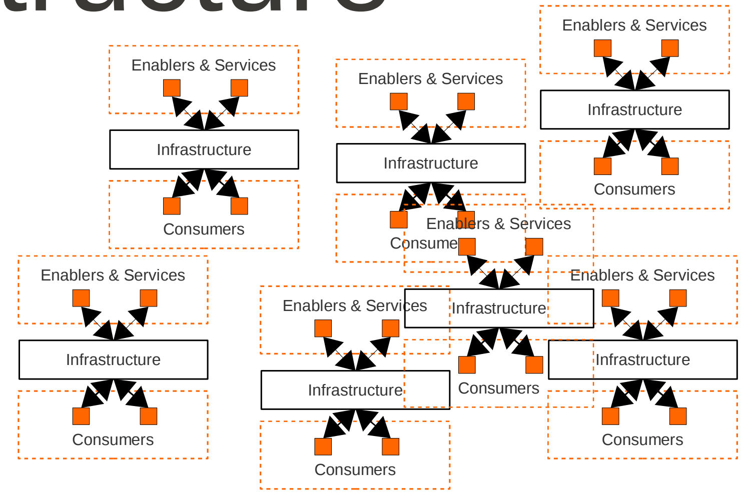
Infrastructure

Consumers

identity, log, accounting, billing...

***end-user services**: personal storage, TV program, music*

before WSOI



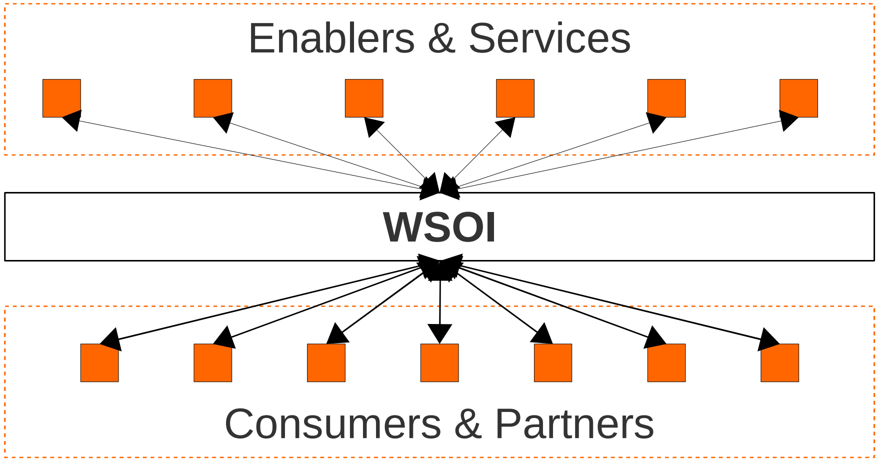
Enablers & Services

Infrastructure

Consumers

Proliferation of specific infrastructures

with WSOI



Enablers & Services

WSOI

Consumers & Partners

Unified and shared infrastructure

Benefits:

• cost reduction (common security, access control, scaling, supervision, maintenance)

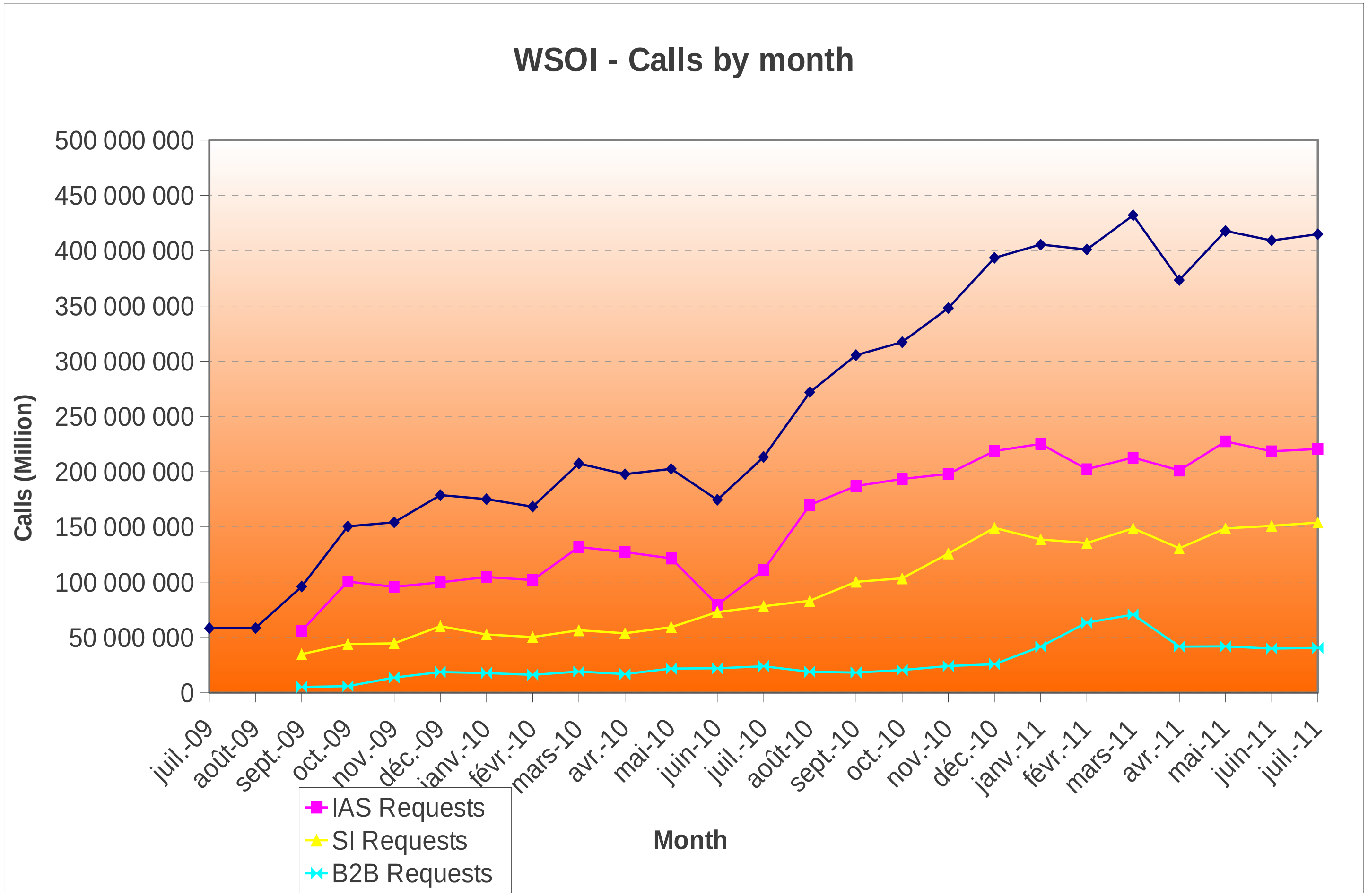
• ready-to-use and no-cost infrastructure for new services

Challenge:

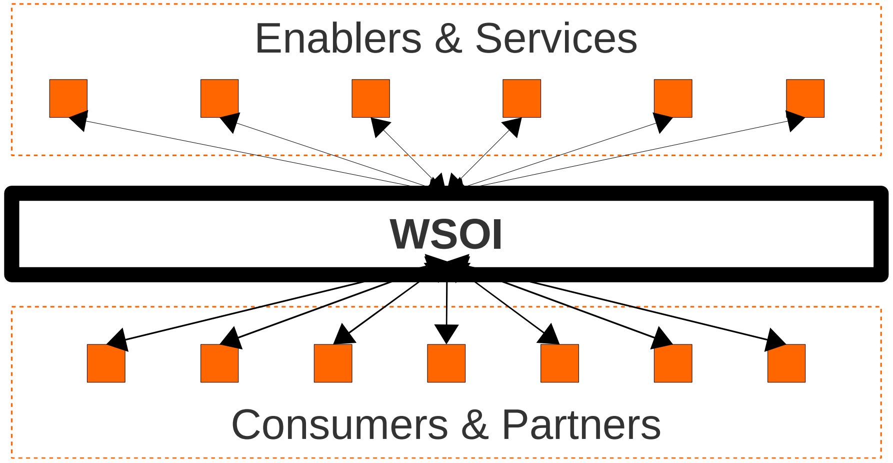
• **Performance and availability!**

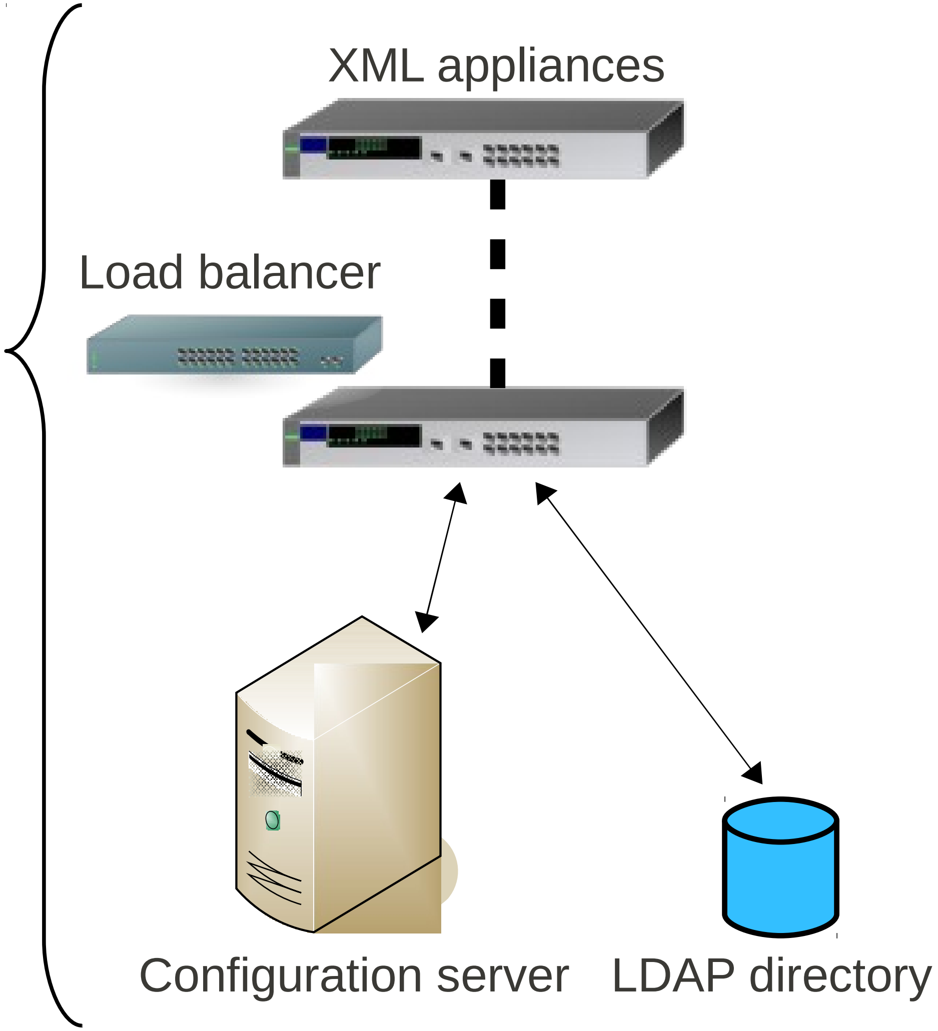
WSOI performance challenge

- Over 500 web services consumers and providers
- Half a billion calls per month



Inside WSOI





Main features:

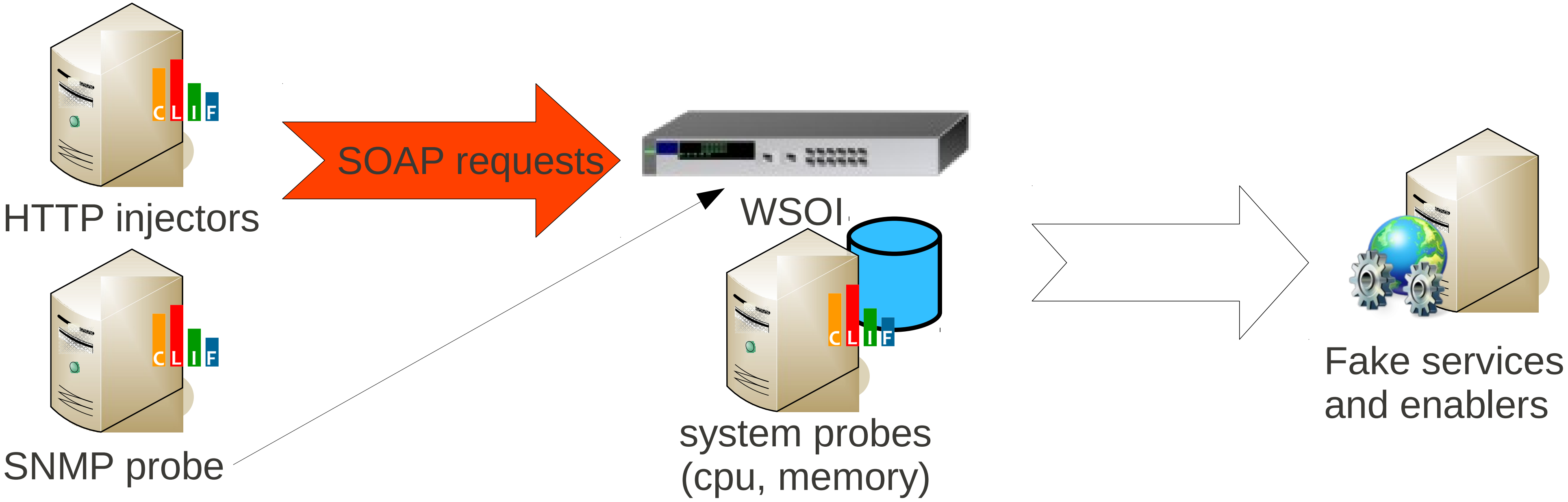
- XML validation
- routing
- access control
- service level management
- security
- encryption, compression
- scalable

Mostly supported by hardware (XML appliance)

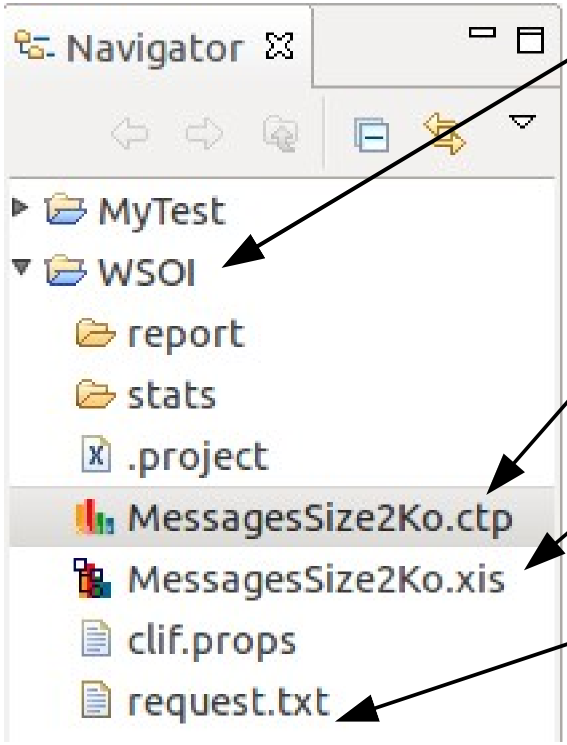
WSOI testbed with CLIF

Performance qualification of WSOI:

- request throughput and response times
- WSOI load:
  - CPU and memory usage on configuration server and LDAP server
  - XML appliance load (via SNMP monitoring)
- according to a variety of requests and responses sizes



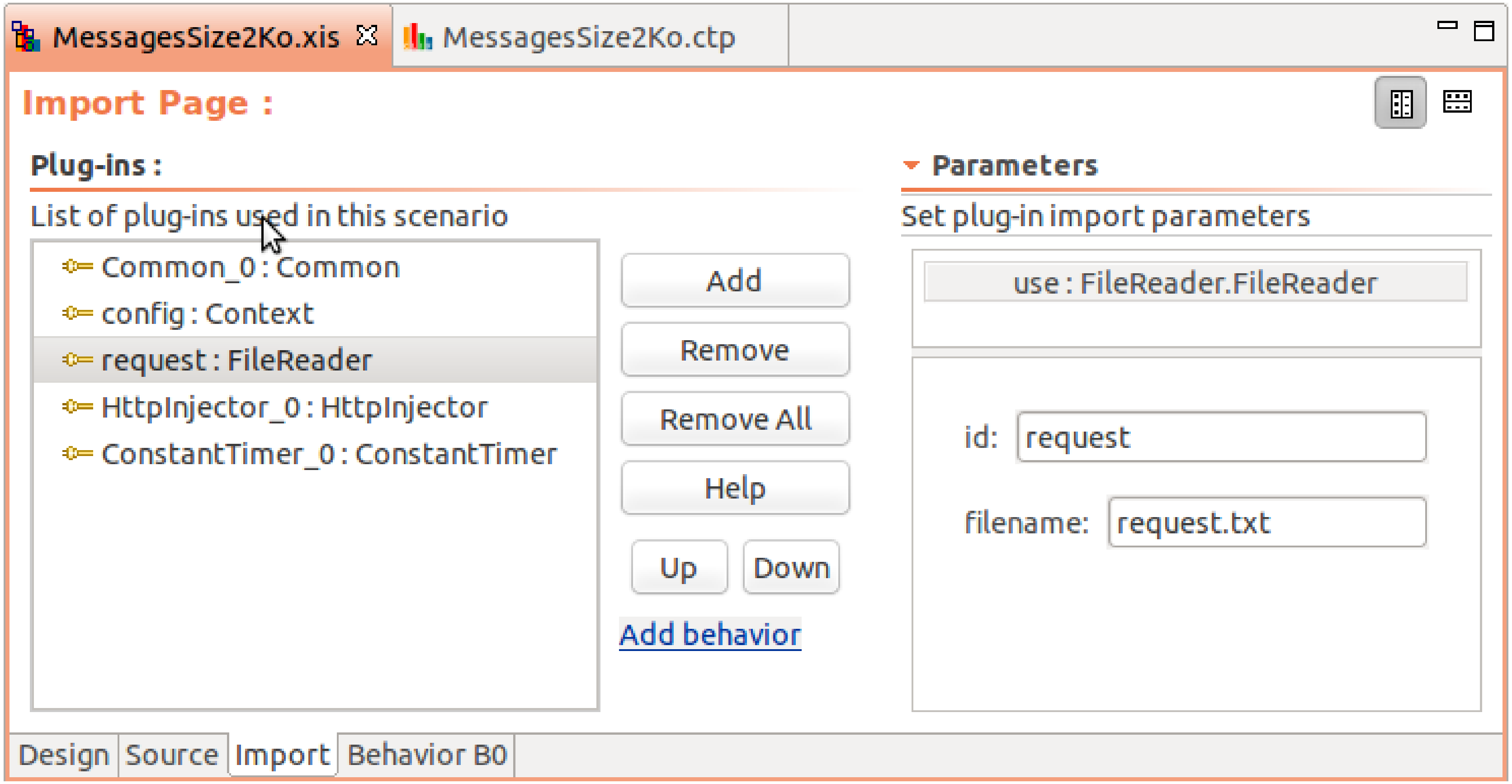
Create a CLIF test project



The WSOI "project" will contain all test definitions, input data and results:

- test plans files (.ctp)
  - definition of injectors and probes to deploy
- scenarios files (.xis)
  - virtual users behaviors
  - load profile (number of active virtual users)
- input data
  - a SOAP request to replay (captured with the XML appliance)
- raw measures (report)
- moving statistics on measures gathered during test executions (stats)

Scenario: import necessary plug-ins



Import Page :

Plug-ins :

List of plug-ins used in this scenario

- Common_0 : Common
- config : Context
- request : FileReader
- HttpInjector_0 : HttpInjector
- ConstantTimer_0 : ConstantTimer

Parameters

Set plug-in import parameters

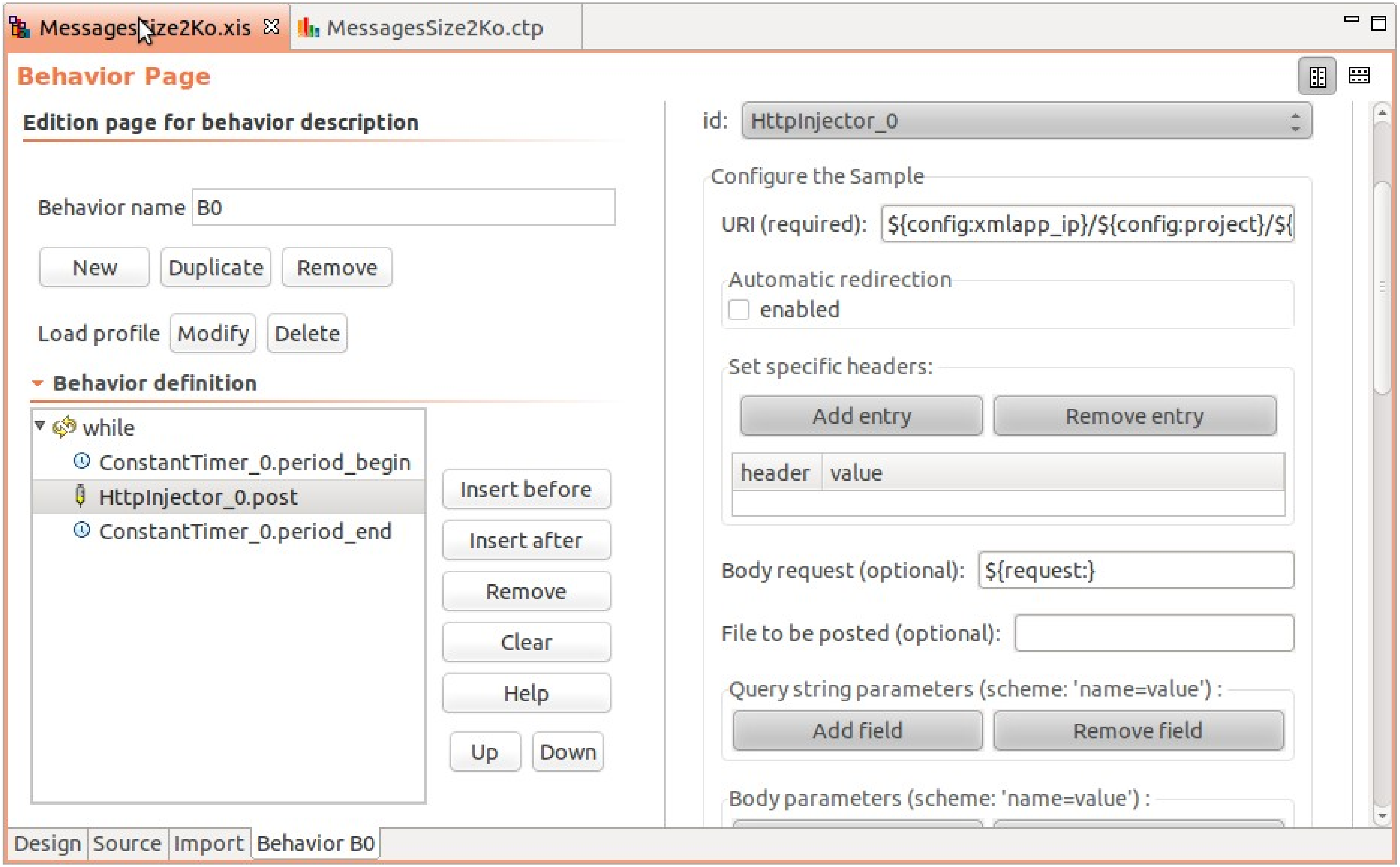
use : FileReader.FileReader

id: request

filename: request.txt

The FileReader plug-in will load the captured SOAP request and let it available to the HttpInjector.

Scenario: define virtual users behaviors



Behavior Page

Edition page for behavior description

Behavior name: B0

Load profile

Behavior definition

```
▾ while
    ConstantTimer_0.period_begin
    HttpInjector_0.post
    ConstantTimer_0.period_end
```

id: HttpInjector_0

Configure the Sample

URI (required): ${config:xmlapp_ip}/${config:project}/${

Automatic redirection

☐ enabled

Set specific headers:

header	value

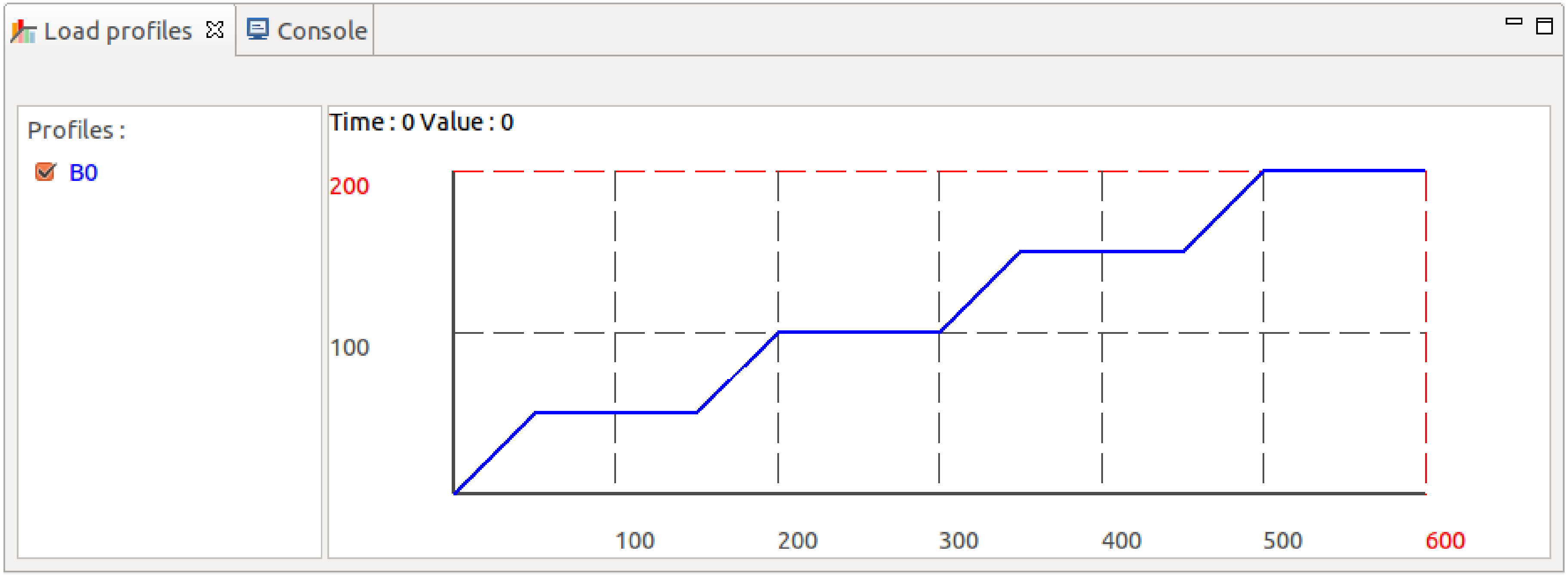
Body request (optional): ${request:}

File to be posted (optional):

Query string parameters (scheme: 'name=value') :

Body parameters (scheme: 'name=value') :

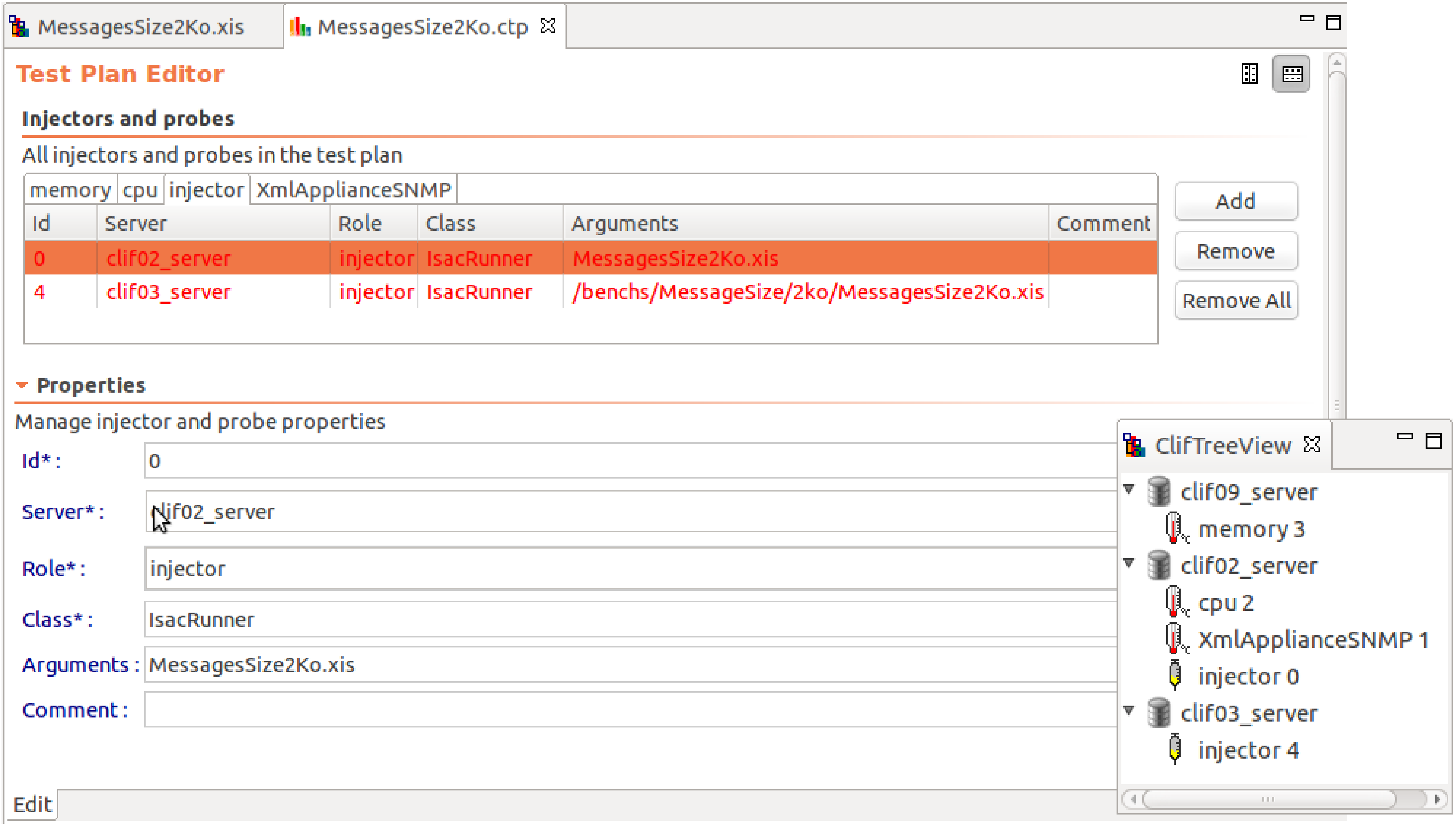
Scenario: define load profiles



Evolution of the number of active virtual users with behavior B0 according to time (in seconds).

Note: the number of active virtual users may be set and changed manually also at test execution time.

Define your load injectors and probes



Test Plan Editor

Injectors and probes

All injectors and probes in the test plan

memory | cpu | injector | XmlApplianceSNMP

Id	Server	Role	Class	Arguments	Comment
0	clif02_server	injector	IsacRunner	MessagesSize2Ko.xis	
4	clif03_server	injector	IsacRunner	/benchs/MessageSize/2ko/MessagesSize2Ko.xis	

Properties

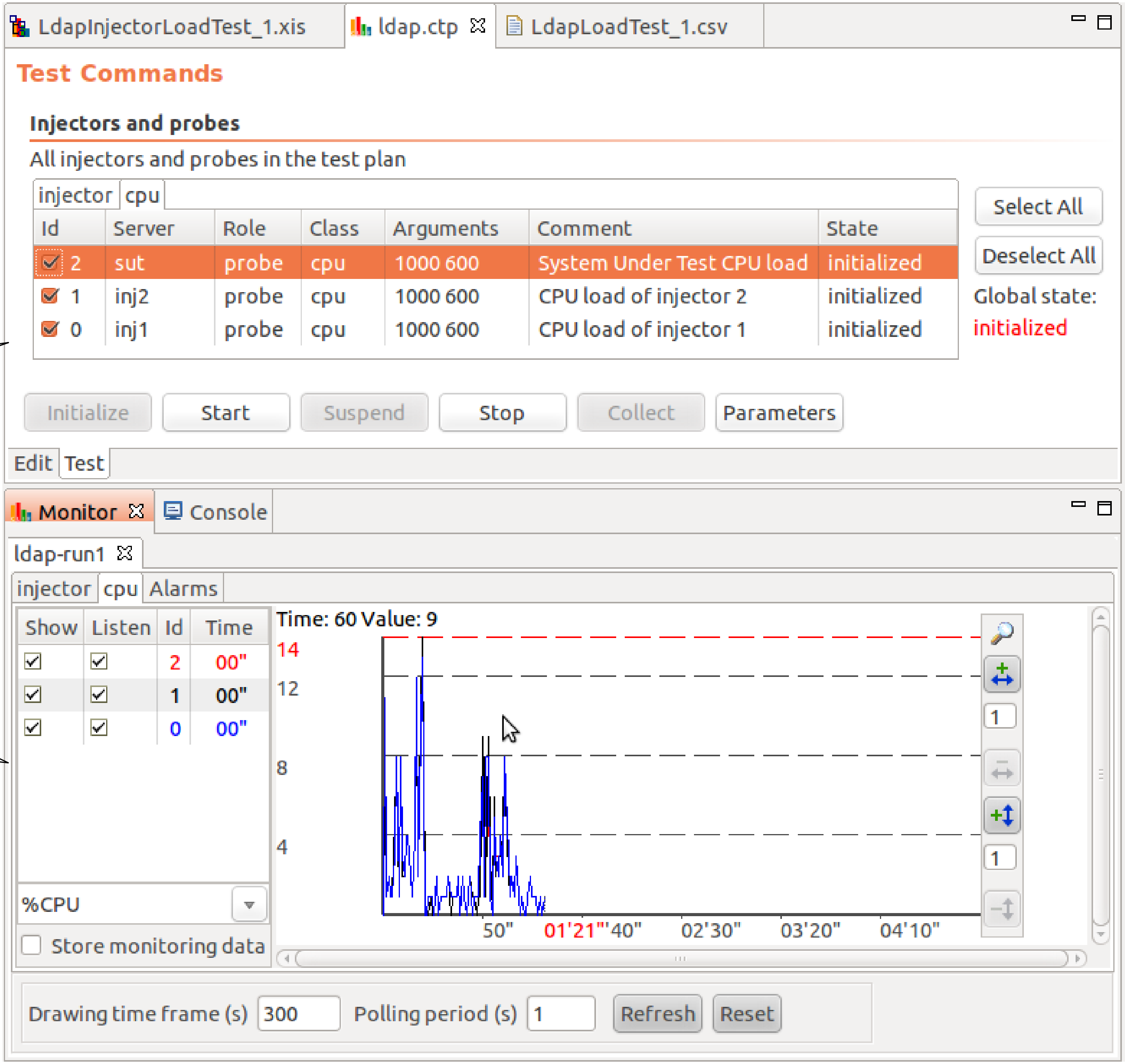
Manage injector and probe properties

Id* :	0
Server* :	clif02_server
Role* :	injector
Class* :	IsacRunner
Arguments :	MessagesSize2Ko.xis
Comment :	

- clif09_server
  - memory 3
- clif02_server
  - cpu 2
  - XmlApplianceSNMP 1
  - injector 0
- clif03_server
  - injector 4

OW2Con 2011, November 23-24, Orange Labs, Paris.
www.ow2.org.

Run a test



LdapInjectorLoadTest_1.xis | ldap.ctp | LdapLoadTest_1.csv

Test Commands

Injectors and probes

All injectors and probes in the test plan

injector | cpu

Id	Server	Role	Class	Arguments	Comment	State
☑ 2	sut	probe	cpu	1000 600	System Under Test CPU load	initialized
☑ 1	inj2	probe	cpu	1000 600	CPU load of injector 2	initialized
☑ 0	inj1	probe	cpu	1000 600	CPU load of injector 1	initialized

Select All

Deselect All

Global state: initialized

Initialize | Start | Suspend | Stop | Collect | Parameters

Edit | Test

Monitor | Console

ldap-run1

injector | cpu | Alarms

Show	Listen	Id	Time
☑	☑	2	00"
☑	☑	1	00"
☑	☑	0	00"

%CPU

☐ Store monitoring data

Time: 60 Value: 9

Drawing time frame (s) 300

Polling period (s) 1

Refresh | Reset

Control of probes and load injectors

Monitoring of probes and load injectors

Browse the measures

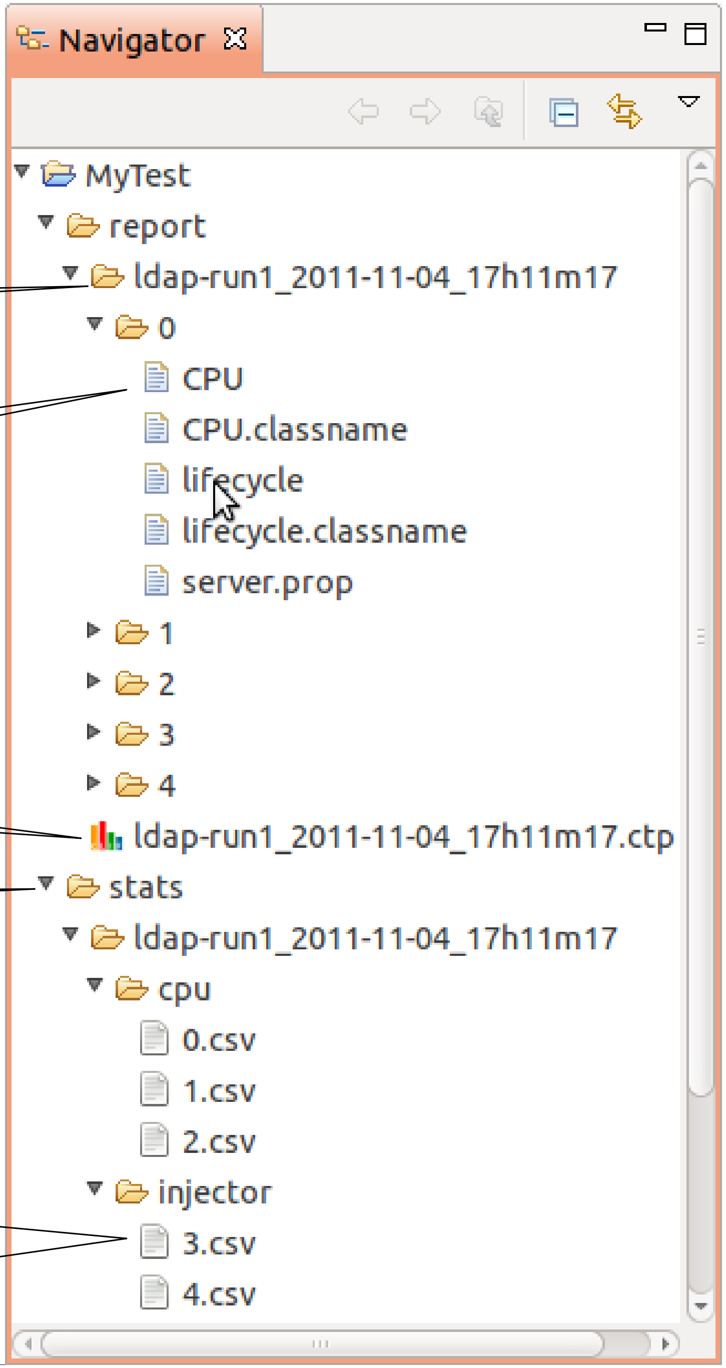
raw measures from one test execution

CSV-formatted text file with raw CPU usage

test plan back-up

moving statistics from monitoring

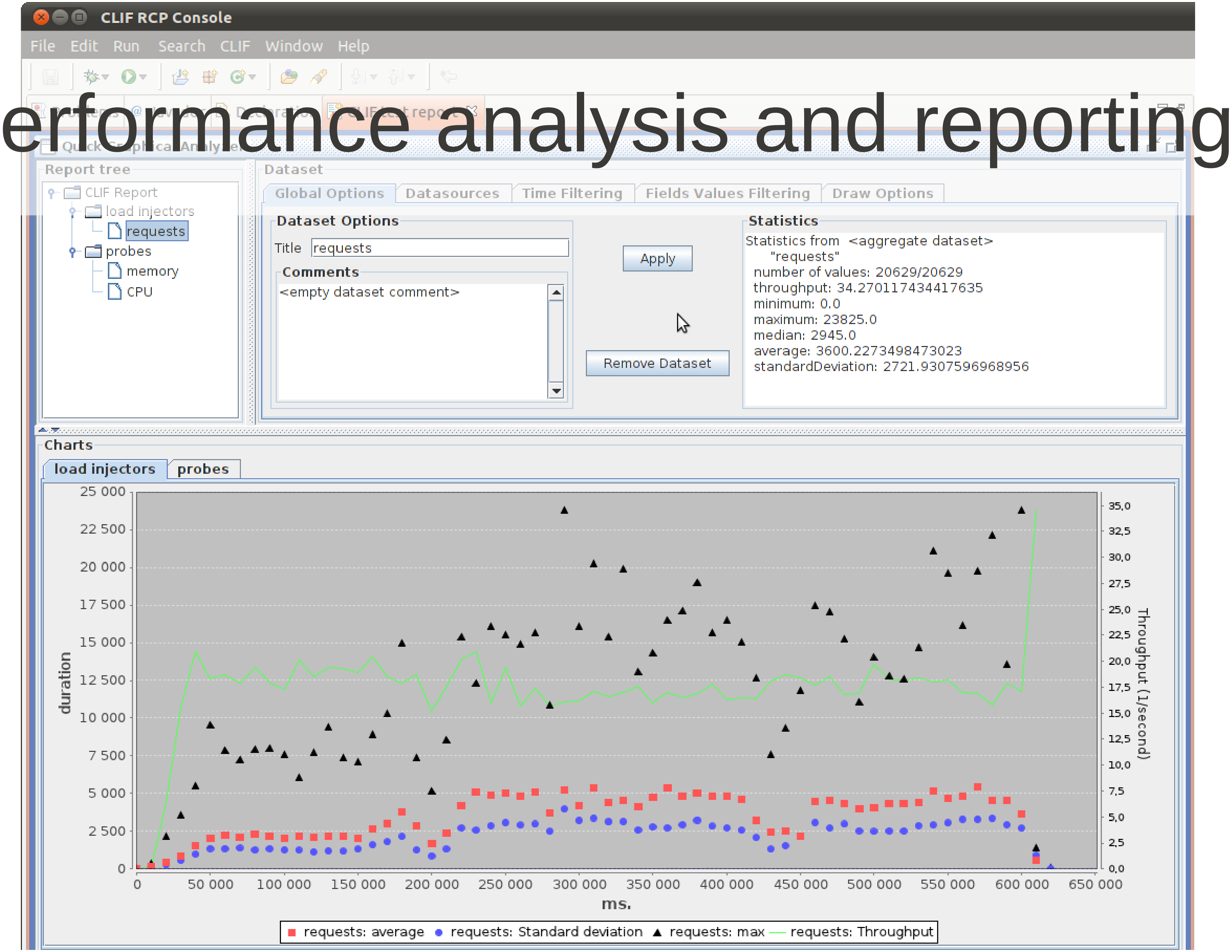
CSV-formatted text file with moving statistics on requests throughput, response times and errors



Navigator

```
▼ MyTest
  ▼ report
    ▼ ldap-run1_2011-11-04_17h11m17
      ▼ 0
          CPU
          CPU.classname
          lifecycle
          lifecycle.classname
          server.prop
      ▶ 1
      ▶ 2
      ▶ 3
      ▶ 4
      ldap-run1_2011-11-04_17h11m17.ctp
  ▼ stats
    ▼ ldap-run1_2011-11-04_17h11m17
      ▼ cpu
          0.csv
          1.csv
          2.csv
      ▼ injector
          3.csv
          4.csv
```

Performance analysis and reporting



Title: requests

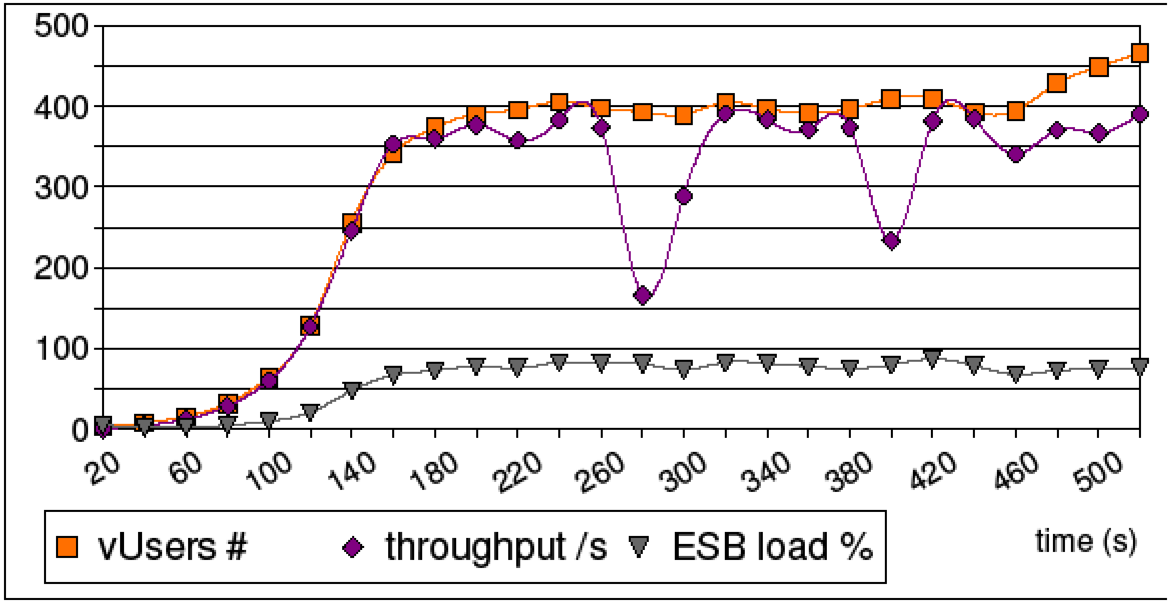
Comments

<empty dataset comment>

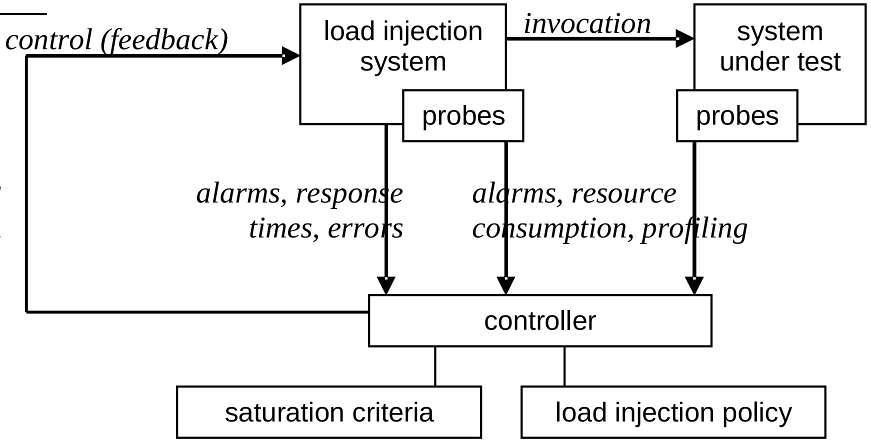
Statistics

```
Statistics from  <aggregate dataset>
    "requests"
 number of values: 20629/20629
 throughput: 34.270117434417635
 minimum: 0.0
 maximum: 23825.0
 median: 2945.0
 average: 3600.2273498473023
 standardDeviation: 2721.9307596968956
```

Advanced usage: self-regulated load injection on WSOI



What is the maximum number of virtual users such that the XML appliance load keeps less than 80%?



CLIF is enhanced with a load controller component monitoring the SNMP probe and controlling the load injectors

Conclusion

CLIF is not just "yet another load injection" software

- high power and scalable
- versatility
  - user interfaces, supported protocols, monitored resources
- more advanced features to come

The WSOI use case for Orange

- qualification of an XML appliance-based SOA infrastructure
- captured SOAP requests replayed with a plain HTTP injector
- full system load monitoring, including the XML appliance

3561 CLIF downloads in November 2011 for new 2.0.7 production release

- go to clif.ow2.org

Questions time

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