

INTERMON

Advanced architecture for INTER-domain quality of service MONitoring, modelling and visualisation

<http://www.ist-intermon.org>

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1. Overview

In order to enhance the inter-domain Quality of Service (QoS) analysis in large-scale, multi-domain Internet infrastructures, the project INTERMON developed a scalable inter-domain QoS monitoring, modelling, simulation, and visual data mining architecture using common QoS database with policy-controlled interworking of components and automated processing of different kind of inter-domain QoS information (interdomain QoS, traffic, resource, events).

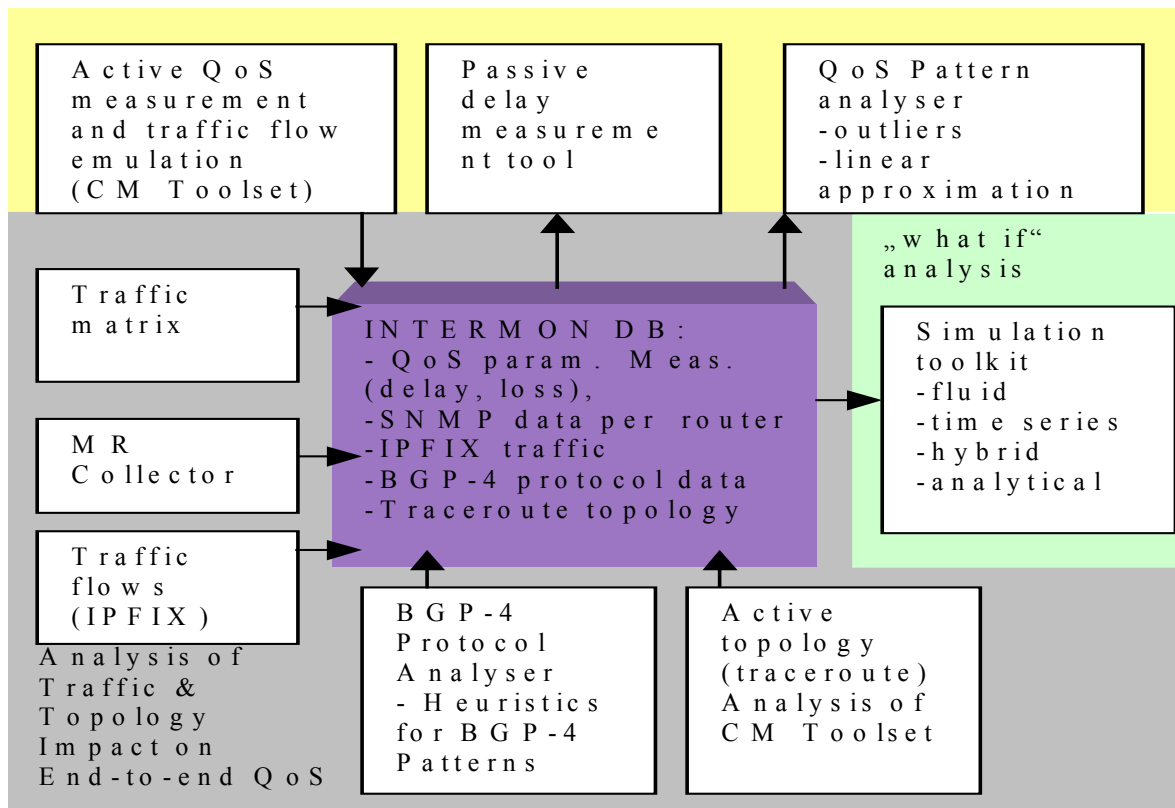


Figure 1 : flexible interaction between the INTERMON components.

E.g. the monitoring tools like the IPFIX meter can export their data directly to the load and topology visualisation or to the modelling tools like measurement based simulation.

The novel idea of the INTERMON architecture is the automated tool interaction and data base integration to support the complex QoS analysis in the inter-domain environment, particularly focussed on:

- effect of inter-domain routing and BGP-4 protocol behaviour on QoS parameter values
- QoS parameter behaviour dependent on the link failures
- traffic and congestion impact on the QoS of applications

- automated detection of impact of topology and traffic on the QoS parameters
- modelling abstractions based on patterns allowing discovery of structures and dependencies
- measurement based simulation technologies using automated integration of interdomain topology and border router traffic models (hybrid, fluid, time series data, analytical)
- policy driven traffic monitoring (IPFIX)

2. CM toolset active monitoring

This chapter presents the CM toolset active monitoring toolkit based on the controlled interaction between different components and integrated data base to support longterm QoS analysis in large scale Internet. Initially developed in the AQUILA EU project for QoS /SLA monitoring, the CM Toolset was enhanced in INTERMON EU project with new facilities for active topology discovery (traceroute) and time series data analysis of QoS parameter data to get valid and useful status information over long time for performance and fault management, network resource planning and active QoS/SLA monitoring. The presentation shows the collaborative usage of the tools and the role of the integrated data base to support QoS analysis for longterm performance management scenarios.

The presentation describes methods for QoS time series pattern analysis, especially the usage of linear approximation for supporting for efficient representation and understanding of long term QoS parameter data describing the quality of inter-domain Internet connections. Based on real QoS and topology monitoring data collected in the CMToolset data base, involving European Internet Providers, „what-if“ analysis based on gradient descriptions of increase / decrease patterns is discussed.

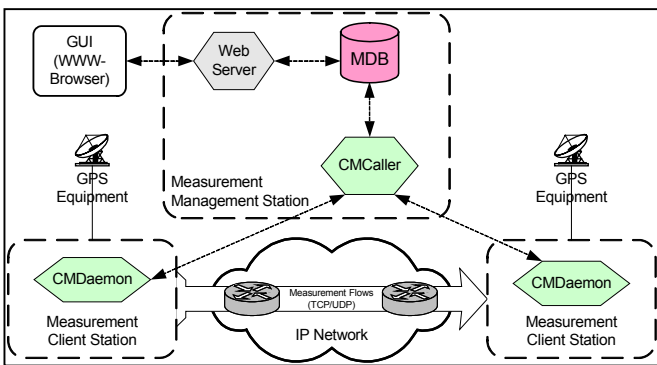


Figure 2: CMToolset components

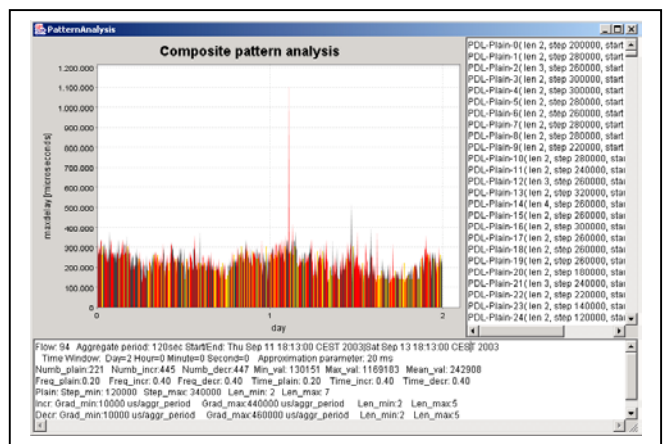


Figure 4 :CMToolset PLA and outlier detection

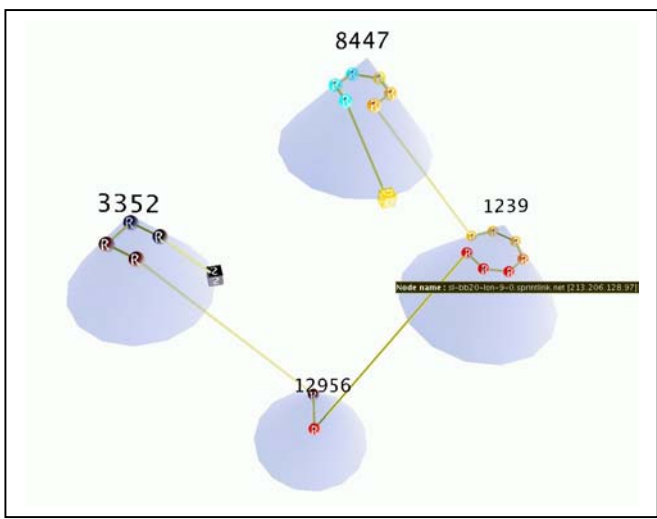


Figure 3 :CMToolset active topology discovery