EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Introduction to the ATLAS TDAQ Network Monitoring System

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(Marie Curie Researcher)

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Introduction

About Me

- BSc in Computer Science;
- MSc in Project Management;
- Interest: networking, programming, databases and project management;
- Early Stage Researcher, Marie Curie, ACEOLE Project.

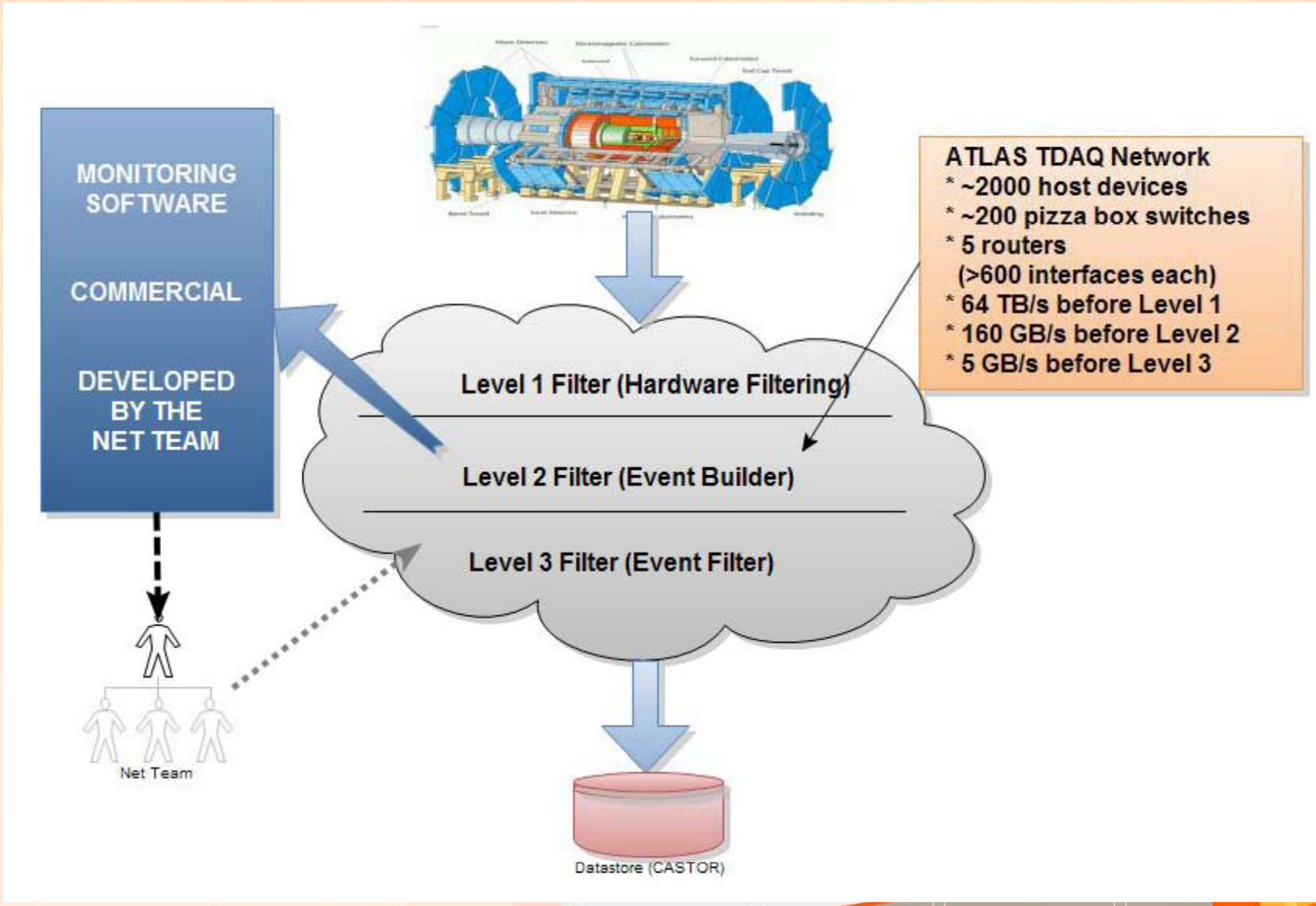
My Team

- ATLAS TDAQ Networking Team;
- 5 members + supervisor;
- Implementation, configuration and maintenance of the TDAQ Network for ATLAS experiment;
- Develop software packages for network monitoring and improve existing ones.

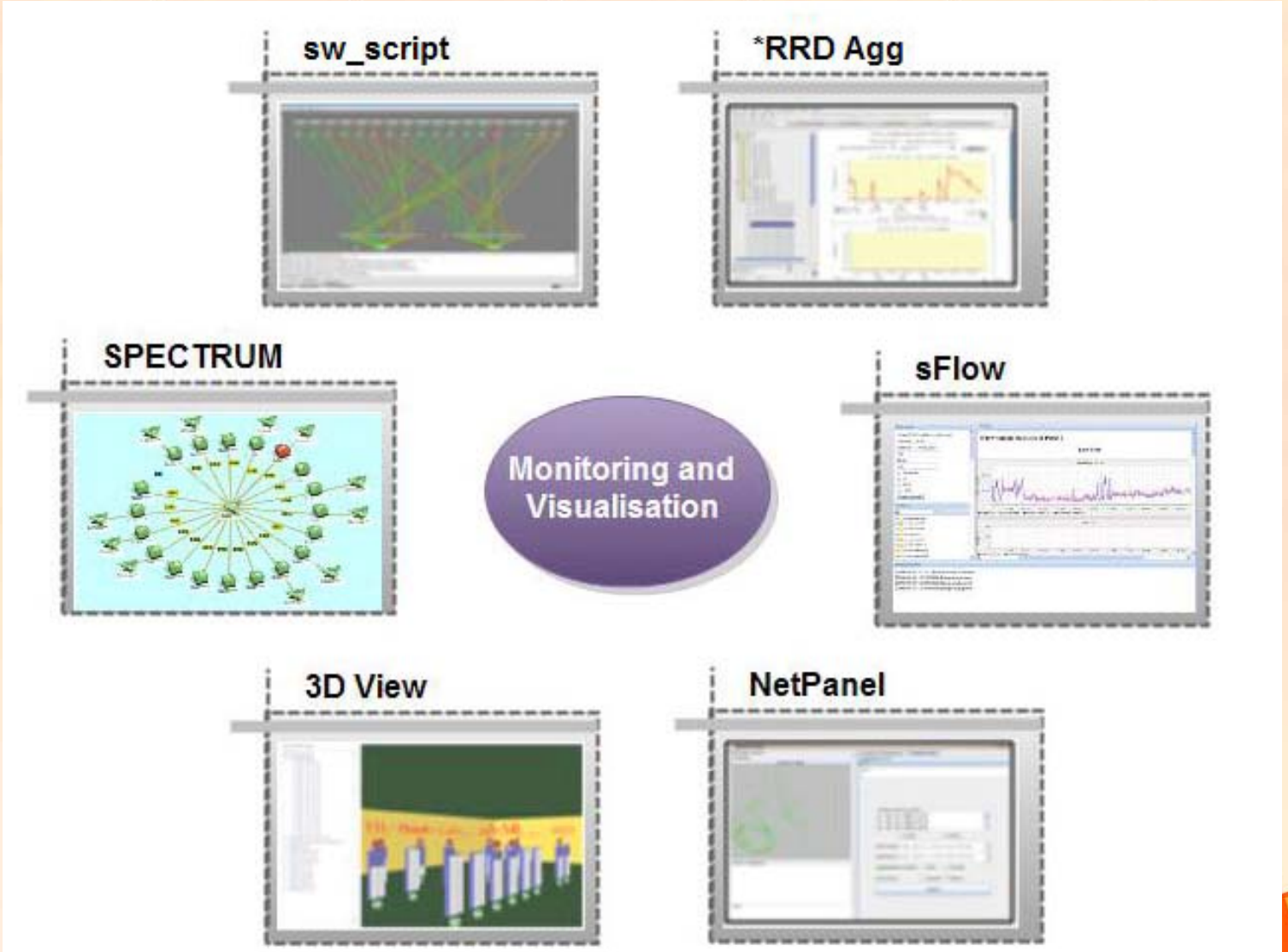
Research Project

- Analysis of the actual systems used for monitoring the network;
- Architecture design for a real time analysis system (using data provided by the actual monitoring systems);
- Development of the core modules;
- Project management for the development of various external modules.

ATLAS TDAQ Network(ing)

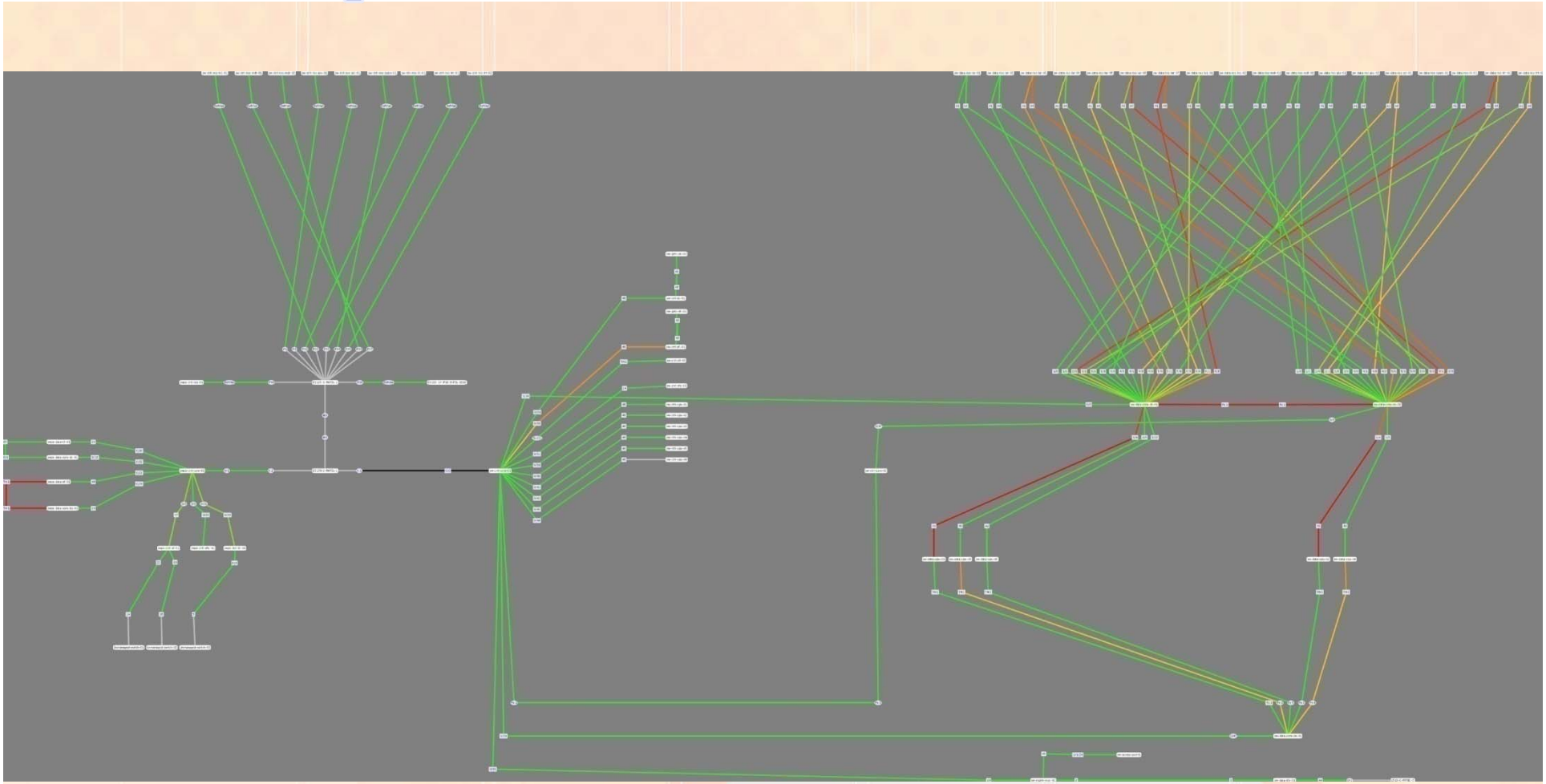


Monitoring and Visualisation



*RRD Aggregates are extracted from Spectrum via RRD and sw_script.

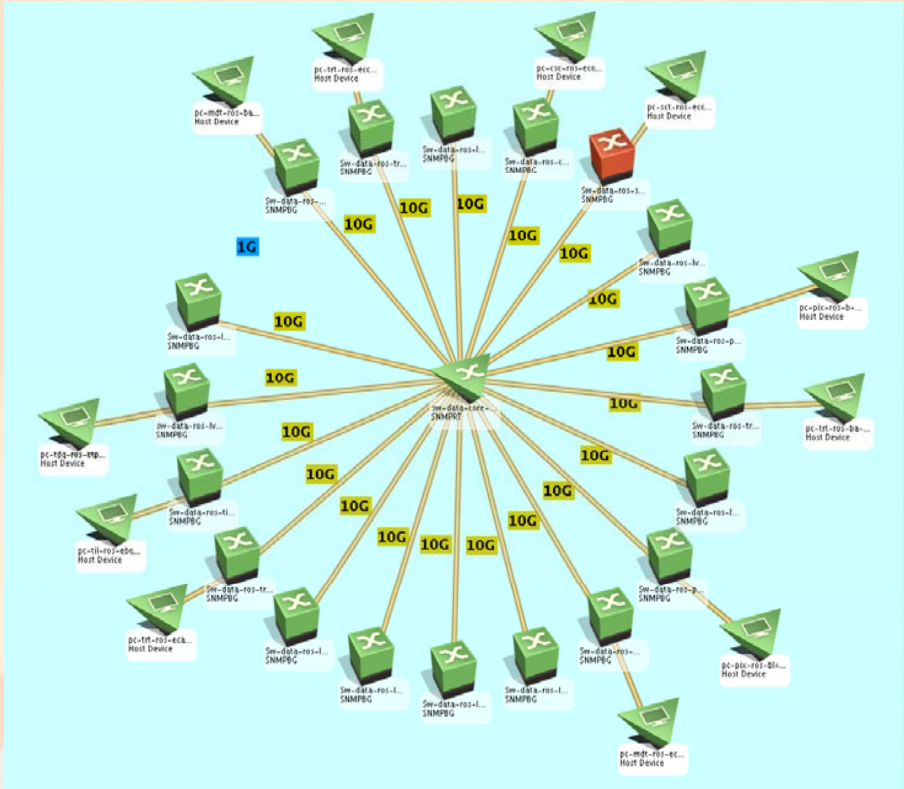
sw_script



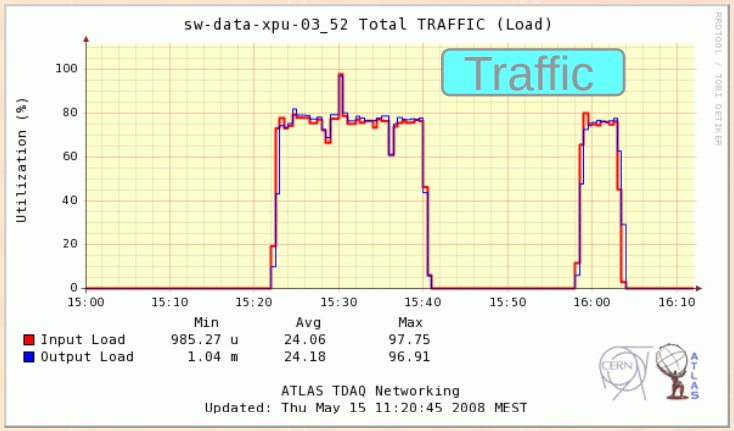
Spectrum

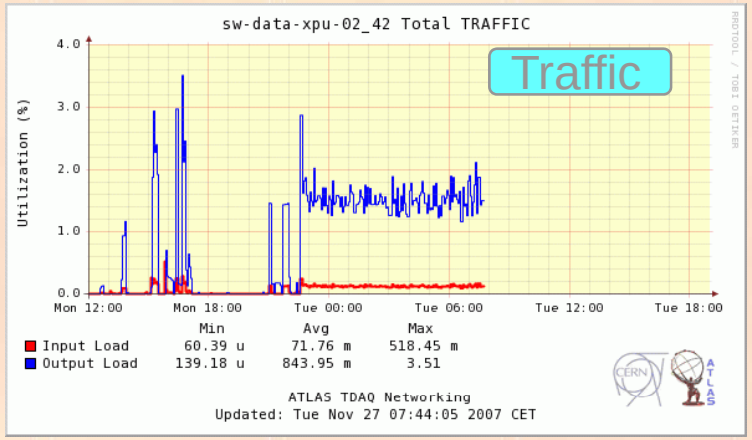
- Complex Commercial Network Monitoring Software
- Every device has a **model** associated
- The network should be modelled before using the product
- Gather/store counters/info from every device on the network

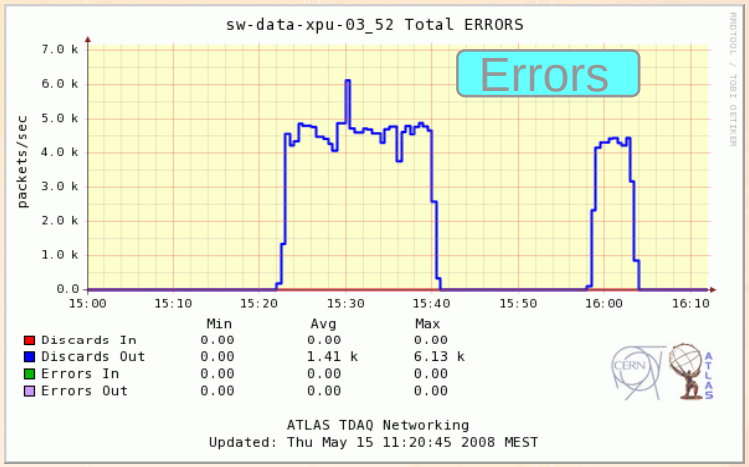
- Various features
  - Trigger Allarms
  - Watches
  - CORBA
  - Import/Export topology

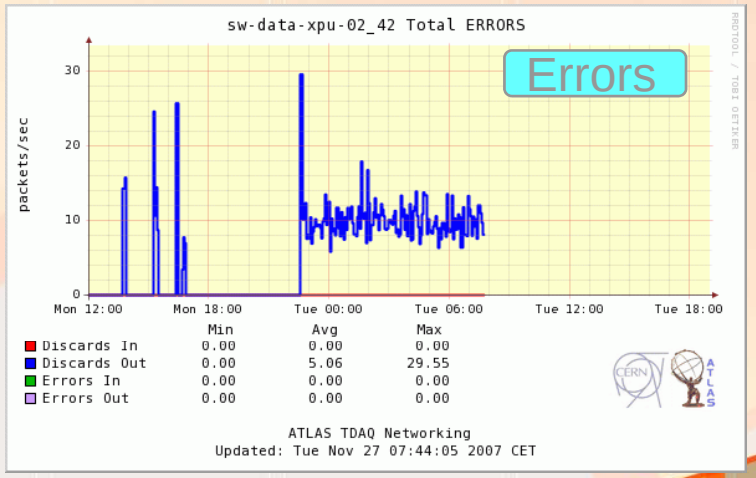


Monitoring Counters/ RRD

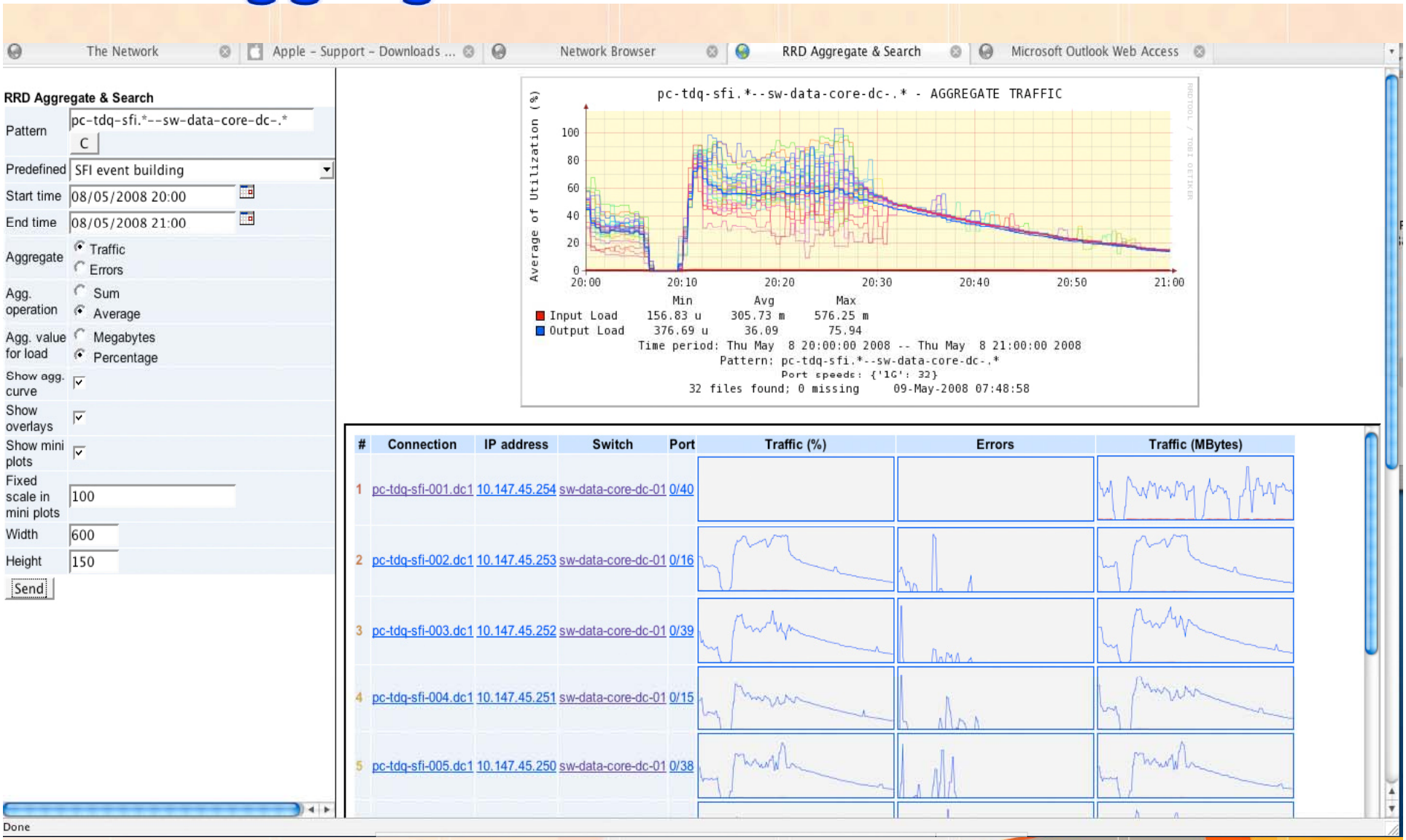








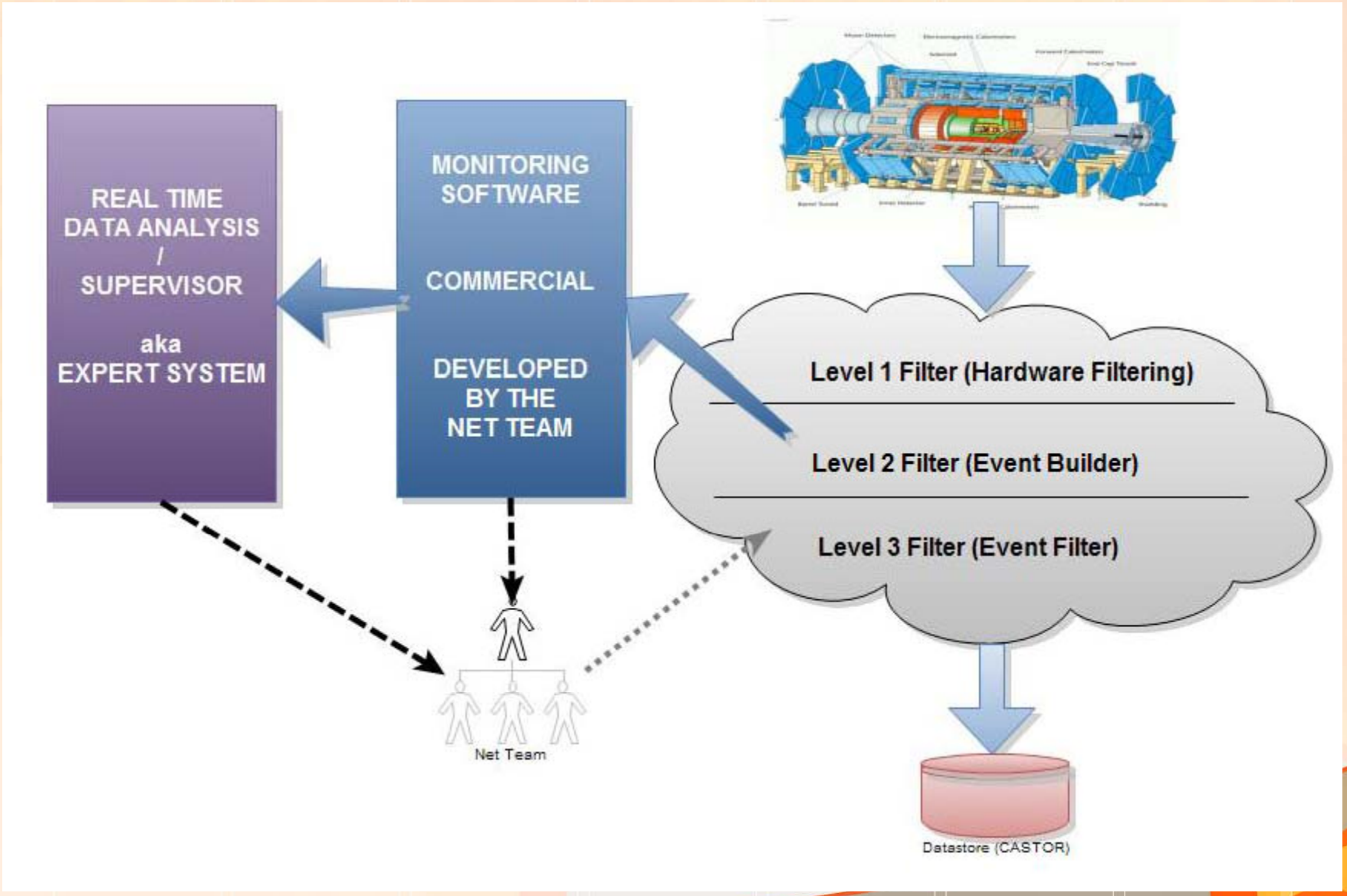
RRD Aggregates



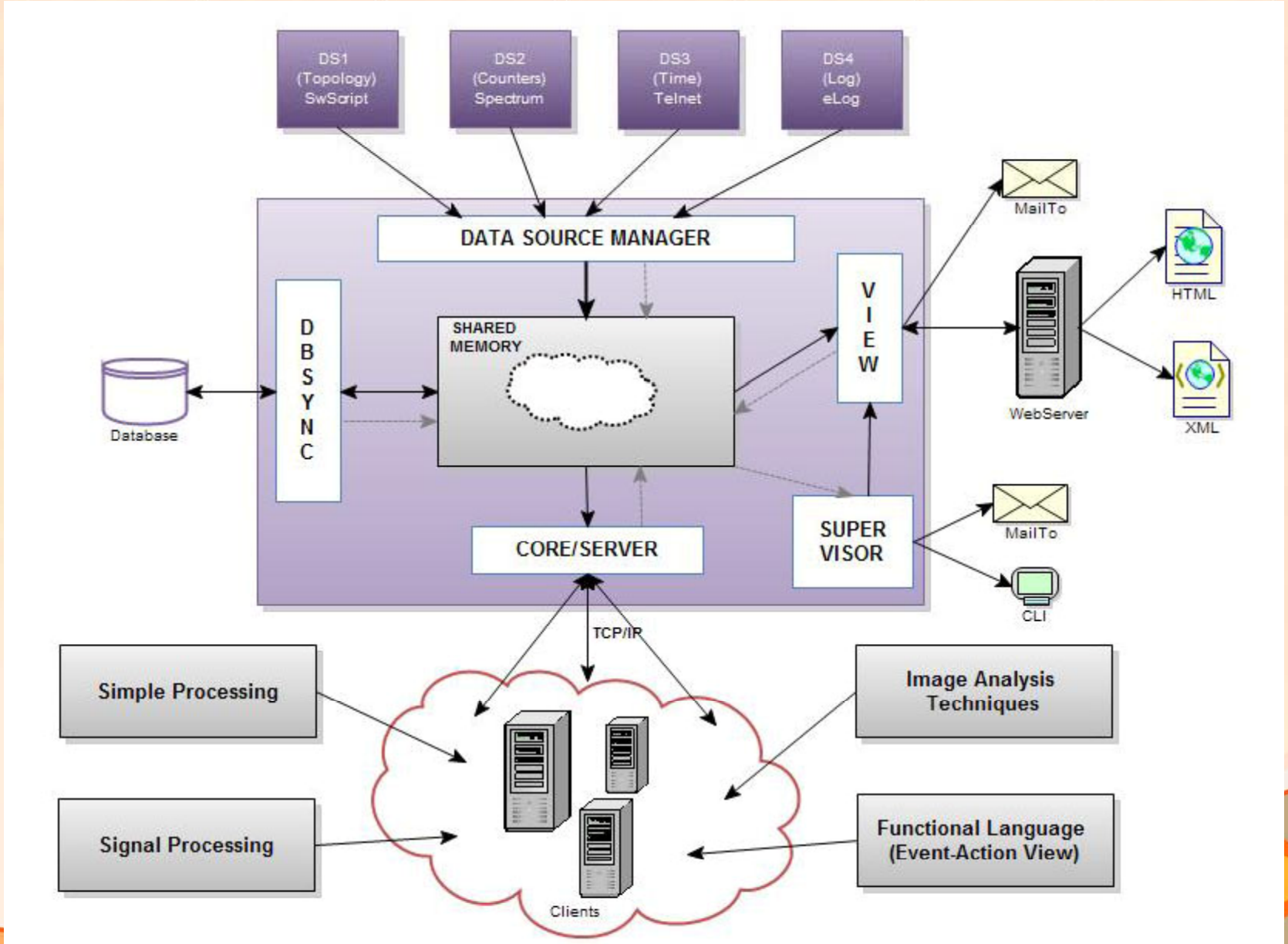
Real Time Data Analysis

- ***The Problem:***
  - *The volume of data is too high for anyone to analyse all of it in real time*
  - *Time should be spent only on important tasks*
- ***One Solution:***
  - *Design and Implement a system that can analyse the traffic in real time according to a set of rules:*
    - *Simple analysis*
    - *Signal Processing*
    - *Image Analysis*
    - *Functional Programming*

Real Time Data Analysis



Real Time Monitoring Architecture



Collaboration

- ***L.A.P.I.*** *(The Image Processing and Analysis Laboratory)*

  University Politehnica of Bucharest

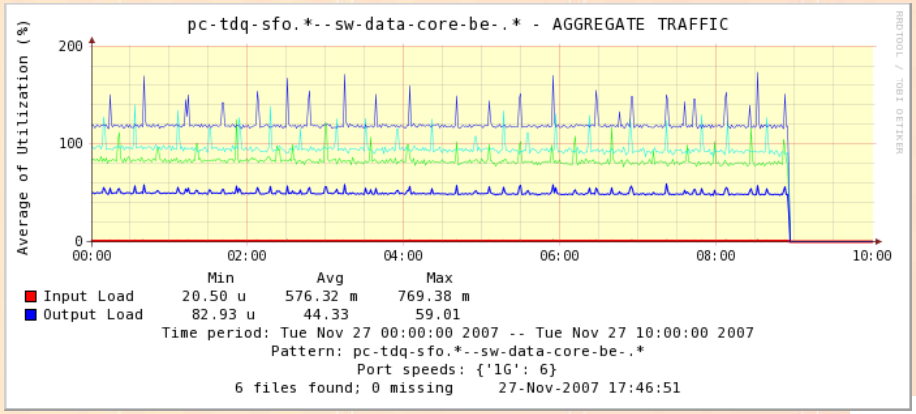
  - *Image analysis*
  - *Computer engineering experience*
  - *Summer and winter schools*

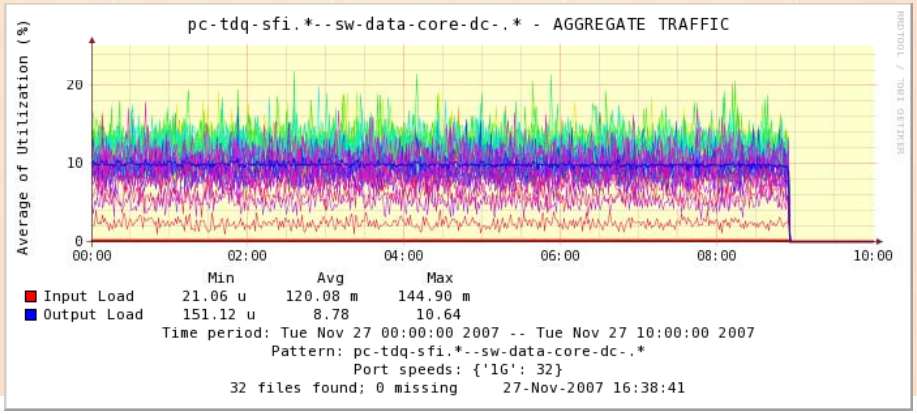
- ***MIV Imaging Venture Laboratory***

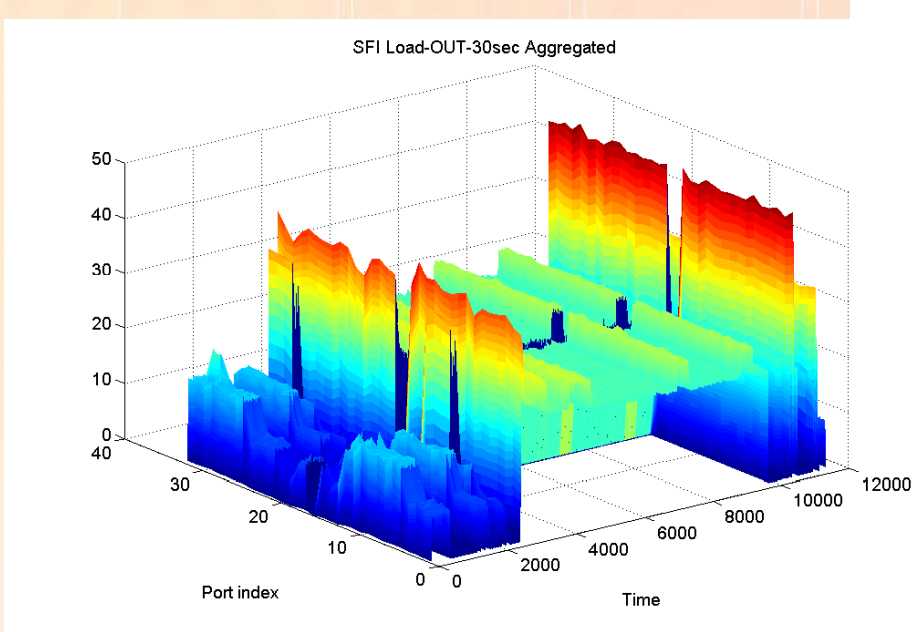
  Transilvania University, Brasov

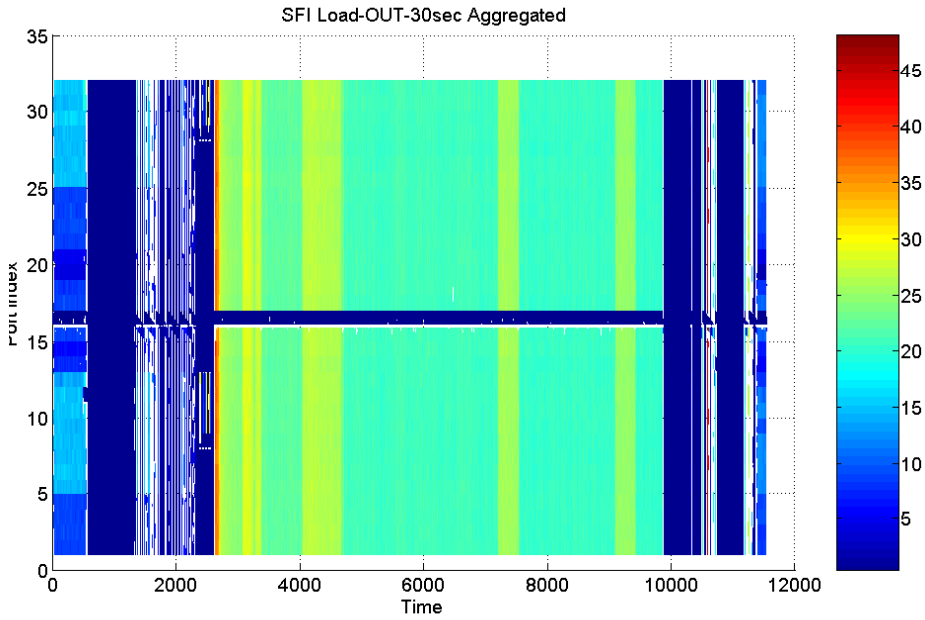
  - *Image Analysis*
  - *Summer and winter schools*

Image Analysis









Status

What has been done:

- ***TECHNICAL***
  - *Improved the speed of RRD data access*
  - *Automatic topology check between Spectrum and sw_script*
  - *Centralized point for network device time check*
  - *General architecture design*
  - *Communication tests in shared memory systems*
- ***PERSPECTIVE***
  - *Visit to Transilvania University, Brasov*
  - *Presentation about ATLAS TDAQ Network(ing)*
  - *Meeting/discussion with skilled students*

Status

Work in progress on...

- *Core system for simple access to RRD files*
- *Research in basic and advanced image analysis applyed on real time data (using the core system for accessing RRD)*
- *Developing the memory allocation/manager for the shared memory subsystem*
- *Analyze of the best technology options for the front end module*
- *Collaboration with MIV Imaging Venture Laboratory for image analysis*

Status

Future plans

- *Develop the core module, data source manager and supervisor*
- *Implement some image analysis clients (processing units)*
- *Develop some clients using functional programming (ex: SCALA) for creating complex alarms and feedback actions.*
- *Implement a view panel over the real time virtual topology*
- *Develop the DBSYNC module for storing persistent data.*
- *Develop web scripts for various views of the results in an easy and universal way.*

** in strong collaboration with LAPI and MIV*

Summary

- The ATLAS TDAQ Network is complex (such as the traffic that passes by).
- Complex monitoring tools in use (both commercial and non commercial).
- The volume of data gathered (by monitoring tools) is big.
- New tools (like sFlow) gives us high accuracy over monitored traffic.
- There is a need for a real time data analyser

- **Research activities**
  - Rules based data analysis software (expert system)
  - Image Analysis applied on ATLAS TDAQ NetworkTraffic
  - Traffic patterns
  - Creating a common interface for all the monitoring tools (something similar to the IP level in networking)
  - Creating a centralized database for the monitoring tools

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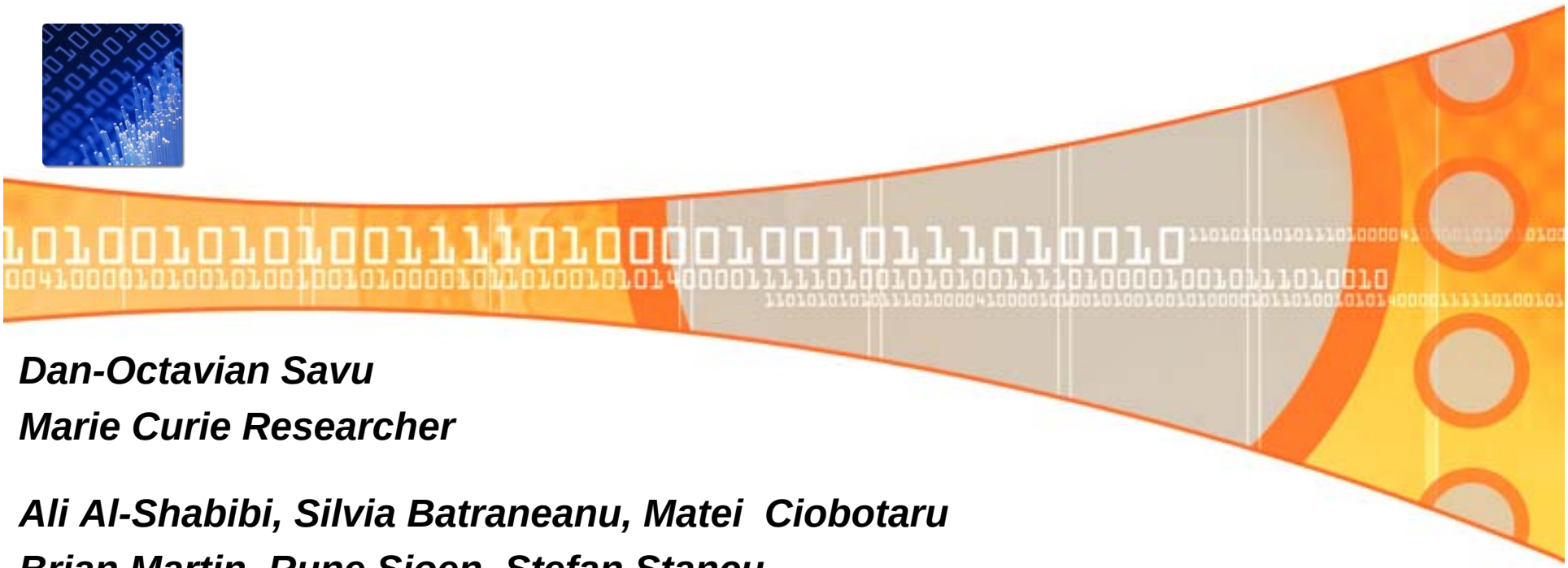
Thank you !



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