XMM-Newton Science Analysis Software: Development and Maintenance... but thinking of the future

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ABSTRACT:
The XMM-Newton Science Analysis Software (SAS) is a robust software designed to analyse X-ray data. It is coded mainly in C++ and Fortran, and it is distributed in binary format for several architectures (Intel, SPARC and PowerPC) and Operating systems: Linux (Red Hat, SuSE), Mac OS X (Tiger, Leopard) and Solaris. SAS is developed and distributed based on the free software paradigm. Except for the usage of the commercial NAG Fortran 95 compiler, SAS is built on GNU tools, including g++ and autotools and make. Although it is almost fifteen years old, the tool is evolving continuously to be inline with new compilers (g++-4.X, NAG 5.2), architectures (64-bit) and technologies (Web based interfaces).

Our goal now is to move beyond the paradigm of simply delivering products to providing a complete solution for the non-expert astronomer, SAS is offering a complete suite of programs to reduce and analyze XMM-Newton data. The advent of new computer paradigms focusing on low-cost computer resources and maintenance, such as, virtualization and cloud computing, force SAS to move towards a completely new field where data reduction demands will not decrease.

We discuss the origin, present and future of the XMM-Newton scientific data reduction software, with the aim of keeping the analysis capability throughout the next 10-15 years.

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Development and Maintenance... but thinking of the future

Mosaicing and source detection using several observations
Stacking spectra to improve signal to noise ratio.
Increasing quantities of data have been collected by XMM-Newton, and more and more users need to analyze large samples of data.
Calibration, always under development, needs reprocessing of an increasingly large data volume.
Slew processing is available as a SAS task. Useful to cross-match sources in different catalogues.
Stacking spectra to improve signal to noise ratio.
Mosaicing and source detection using several observations are highly demanded by users and CPU intensive

Future technologies
SAS is evolving thinking of...
How virtualization and software deployment work in virtual machines environment.
Ways to take advantage of cloud computing.

Cloud Computing
Thanks to virtualizations, we have the ability to dynamically shape a hardware infrastructure. Giving us new management techniques, such as, server consolidation and isolation, custom execution environment provisioning

Upper Limit Server

New Requirements: Massive data reduction

Future-proofing: Web interface

VO compliant

User’s point of view

Astronomy User Group advice.
Requirements from users.
Calibration improvements.
Hardware scalability to cope with a high number of users.
VO interoperability.
Higher-level products and processing. To easily cross-match results with catalogues in different energy ranges.
Provide solutions and products for non-X-ray experts.

References

R. Saxton et al., 2008: “The first X-MMM Newton slew survey catalogue: XMMLS1”. Astronomy and Astrophysics. 480, 611