Enabling technologies for real-time acquisition and processing of large volumes of data and their applications to giant astronomical telescopes and radar systems.

A collaboration between L'Observatoire de Paris and Thales

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Radio-Astronomy

Context:

- LOFAR and SKA face challenges in handling high data rates for image reconstruction
- DDF-Pipeline is an existing solution with potential for improvement in deconvolution and scheduling

From short-term to long-term objectives:

- Trace DDF-Pipeline runs on supercomputer (Adastra), identify areas for improvement
- Familiarization with simulation and deconvolution tools
- Study possible scheduling strategies (including StreamPU)

- Integrate deconvolution techniques for diffuse objects into DDF-Pipeline and evaluate performance (scientific and technical)

- Optimize DDF-Pipeline scheduling, including different deconvolution approaches, and execution control (several metrics: time, resource occupancy, overall performance, flexibility) on different use cases.

THALES

Context:

- Secondary Surveillance RADAR
- Enables communication with aircraft transponders for identification and tracking
- Real-time signal processing under timing and resources constraints.

Objectives:

- Reduce jitter to improve predictability, consistency and reliability
- Analysis of different schedulers under constraints (CPU load and pipelines priorities)

Current roadmap

- Extract and analyse the task graph (identify dependencies and resources)
- Measure metrics: computing times, latency and jitter
- Use tools like StreamPU to manage CPU scheduling and thread prioritization