Reduced precision for radio-astronomical imaging on graphical processing units
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The Square Kilometre Array (SKA) will be the biggest radio-telescope in the world. It is currently in the design phase with anticipated construction in South Africa and Australia in the first half of the coming decades. It aims at processing over 100 terabytes of raw data samples per second and around 300 petabytes of data produced annually by the SKA. Usually, radio-astronomical algorithms show massive parallelism and low operational intensity. While most of the kernels employed in this field are already optimized on GPUs [1], only few works recently started investigating the impact of reduced precision on radio-astronomical kernels [2, 3]. This project will evaluate and optimize the above-mentioned kernels employing half precision and Nvidia FP32 (as soon as it will be available) on GPUs.

Goal of this project and tasks:
- Radio-astronomical imager analysis.
- Reduced precision analysis.
- Optimizations on GPUs.
- Comparison with previous work and CPU.

![Diagram of GPU architecture](image)

Figure 1: Proposed flow: reduced precision for radio-astronomical kernels on GPUs.
Skills acquired in this project

- Hands-on experience on radio-astronomical imaging code.
- Application characterization.
- Application optimization on GPUs.

Pre-requisite:

- C/C++
- CUDA

Helpfull Skills

- Perf, papi, Vtune (basic application analysis skills).
- Work independently.

References

