Optimization of Martian and Venusian planetary image processing through cloud computing

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Introduction: Much of the data used in planetary studies comes in the form of images or needs to be converted to this representation form in order to process it. Moreover, the computing requirements use to be prohibitive by means of time, cost or even a combination of both, preventing further advances in the research process.

In the present work we are considering two representative applications. The first one is related to the MARSIS radar instrument from ESA Mars Express mission, which data is processed as images in order to study the Martian ionosphere [1]. The second application processes images from the Venus Monitoring Camera from the ESA Venus Express mission for studying the dynamics of its atmosphere [2,3].

These two applications have different characteristics by means of input file arrival and computing requirements, preventing the use of inhouse solutions (such as supercomputers) due to budget restrictions or the inexistence of dedicated environments.

With this in mind, we have relied on cloud computing, a seamless paradigm that allows a dynamic, elastic and on-demand provision of computing resources like CPU and storage [4]. In particular, we have focused in public cloud infrastructures, which follow a "pay as you go" basis. Estimating an optimal computing setup based on the offerings of these providers adds a level of complexity to the whole solution [5]. For this reason, we have fostered execution models that allow establishing the best cloud infrastructure for the considered applications.

References:

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