The Cloud2SM Project

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From the past decades the monitoring of civil engineering structure became a major field of research and development process in the domains of modelling and integrated instrumentation. This increasing of interest can be attributed in part to the need of controlling the aging of such structures and on the other hand to the need to optimize maintenance costs. From this standpoint the project Cloud2SM (Cloud architecture design for Structural Monitoring with in-line Sensors and Models tasking), has been launched to develop a robust information system able to assess the long term monitoring of civil engineering structures as well as interfacing various sensors and data. The specificity of such architecture is to be based on the notion of data processing through physical or statistical models. Thus the data processing, whether material or mathematical, can be seen here as a resource of the main architecture.

The project can be divided in various items:

-The sensors and their measurement process: Those items provide data to the main architecture and can embed storage or computational resources. Dependent of onboard capacity and the amount of data generated it can be distinguished heavy and light sensors.

- The storage resources: Based on the cloud concept this resource can store at least two types of data, raw data and processed ones.

- The computational resources: This item includes embedded "pseudo real time" resources as the dedicated computer cluster or computational resources.

- The models: Used for the conversion of raw data to meaningful data. Those types of resources inform the system of their needs they can be seen as independents blocks of the system.

- The user interface: This item can be divided in various HMI to assess maintaining operation on the sensors or pop-up some information to the user.

- The demonstrators: The structures themselves.

This project follows previous research works initiated in the European project ISTIMES [1]. It includes the infrared thermal monitoring of civil engineering structures [2-3] and/or the vibration monitoring of such structures [4-5]. The chosen architecture is based on the OGC standard in order to ensure the interoperability between the various measurement systems. This concept is extended to the notion of physical models. The last but not the least main objective of this project is to explore the feasibility and the reliability to deploy mathematical models and process a large amount of data using the GPGPU capacity of a dedicated computational cluster, while studying OGC standardization to those technical concepts.

References

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