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Atos Breakout session
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Edge to Cloud Workload Orchestration

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Abstract:

Data-intensive applications are usually developed based on Cloud resources whose service delivery model helps towards building reliable and scalable solutions. However, especially in the context of Internet of Things-based applications, Cloud Computing comes with some limitations as data, generated at the edge of the network, are processed at the core of the network producing security, privacy, and latency issues. On the other side, Fog Computing is emerging as an extension of Cloud Computing, where resources located at the edge of the network are used in combination with cloud services.

In DITAS research project (coordinated by Atos), the design of a Cloud platform is proposed to optimize the development of data-intensive applications providing information logistics tools that are able to deliver information and computation resources at the right time, right place, with the right quality. Applications that will be developed with DITAS tools live in a Fog Computing environment, where data move from the cloud to the edge and vice versa to provide secure, reliable, and scalable solutions with excellent performance.

One of the main relevant advantages in adopting Fog Computing concerns the improvement in the data delivery through an active role of the edge side. In fact, Fog computing advocates a prominent usage of computation of the edge devices, i.e. where the data are generated. This results in a reduced amount of data to be sent to the cloud resources where, in this way, less data is stored, or the computation can be finalized to return with a lower response time a result to the final user. Although a lot of effort has been done in the community to optimize the computation and the data delivery from the edge to the cloud (Mouradian, et al., 2018), one of the goal of DITAS to improve the data-intensive applications is to investigate also how the data delivery in other way around (from the cloud to the edge) can be improved.

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In particular, Information Logistics has been considered in DITAS to properly organize the data delivery to the final users. DITAS is interested in user-oriented Information Logistics: i.e., the delivery of information at the right time, the right place, and with the right quality and format to the user. As a consequence, user requirements can be defined in terms of functional aspects, i.e., content, and non-functional ones, i.e., time, location, representation, and quality.

Based on these assumptions, in the context of DITAS data delivery has been considered in a service-oriented architecture (SOA) where at the provider's side data could be stored in different formats on the cloud or on the premises of the provider (the edge). Data can be organized in databases (relational or schemaless) or they are generated on-the-fly and transmitted through streams. Furthermore, as the data provider can offer the owned data as they are or after a processing, this computation can be distributed among the nodes belonging to the provider and the consumer.

In this context, data movement holds a crucial role, as methods and techniques able to move the data from the provider to the consumer in order to satisfy the consumer needs in terms of functional and non-functional properties are not fully studied in the literature. In fact, most of the existing work considers the data flow in a controller environments where fog nodes are devices with specialized elements (e.g., GPU, CPU, and RAM) and computation and data are properly distributed to reduce latency, resource utilization. Goal of DITAS is to focus on a broader environment in which the providers and consumers belong to different organizations and no control over the network is possible.

In the context of the talk a demonstration of DITAS features will be provided.

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