A Decision Framework for Discovery and Integration of Cloud Services

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Abstract—Cloud computing is a fundamental shift how services are delivered. There are many definitions available for Cloud computing [1]. Nicholas Carr draws an analogy between Cloud services and how electricity is delivered as a utility [2]. Cloud computing offers several advantages such as elasticity and scalability, economy of scale, on-demand service delivery, mobility and collaboration [3,4]. Many providers have identified this huge business opportunity and are offering Cloud services to a different range of target groups. The Cloud market is not exclusive to big players such as Amazon, Google or Microsoft, rather the list of Cloud providers is being constantly enlarged by newcomers. The availability of many Cloud providers on the one hand promotes competition and democratization in the Cloud market and gives end users more freedom to choose the best Cloud provider. On the other hand it became a tedious and time consuming task for organizations to evaluate and compare the available Cloud offerings in the market.

Moving to the Cloud and choosing the right Cloud provider is a major business decision. Organizations must ensure that their business critical applications are not negatively affected, appropriate security measures are in place and they still comply to business rules and regulations. Organizations need to consider a series of factors for choosing a Cloud provider, e.g. which Cloud deployment model and service model is the most appropriate? Which security measures are offered? Which kinds of applications does the Cloud provider offer? Which programming language framework is supported? Does the Cloud provider fulfill legal requirements and business policies that the organization must adhere to.

The contribution of this work is a decision framework for discovery and integration of the right Cloud services. It includes the following four components:

i) Matchmaking component: This component is an ontology based repository of Cloud services with discovery capabilities. Cloud providers on the one hand can publish their services in the repository and on the other hand these services can be discovered by users according to their functional and non-functional characteristics. The ontology considers several aspects such as: business functions and processes, provider type, management tools, geographical location, security mechanism, load balancing, virtualization technology, etc. This component gives answer to two leading questions: how we can structure the term "Cloud computing" (as a question of basic research) and how we can enable a matching between offered Cloud computing services and demand. Particularly the demand for flexibility and exchangeability addressed by the Cloud computing paradigm is answered. The ontology integrates different classification frameworks for processes in order to allow integration in a real business environment.. The classification frameworks include eTOM [6] and the business process framework by the American Productivity and Quality Center [6],

ii) Cost analysis component: This component ranks the discovered Cloud services according to their cost models.

iii) Energy efficiency component: This component estimates the total CO_2 foot print caused by integration of discovered Cloud services. This component not only considers how green a Cloud provider operates but also the energy needed for data transportation and switching, which in turn depends on factors such as function of transport, location of processing and usage pattern [5].

iv) Risk analysis component: This component assesses the associated risks of the discovered Cloud services.

Using this framework, organizations are able to discover Cloud services according to their requirements. Furthermore, discovered Cloud services are ranked according to their cost model, global carbon foot print and associated risks.

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