Enabling CLoud Orchestration, Performance and Cost Efficiency Tools for QoE Enhancement and Provider Ranking

Reporting

Project Information

CloudPerfect

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Periodic Reporting for period 2 - CloudPerfect (Enabling CLoud Orchestration, Performance and Cost Efficiency Tools for QoE Enhancement and Provider Ranking)

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Summary of the context and overall objectives of the project

Cloud computing has become an integral part of IT and is evolving into an equally integral part of IT strategies. Despite the rising popularity of IaaS, cloud IaaS adopters still face a number of challenges. CloudPerfect mainly focuses on addressing three big challenges of those cloud adopters that host or run their applications on cloud IaaS (e.g. owners of on demand applications offering them as services to third parties – SaaS - or owners of applications with high computational demand). (1) The first challenge they have to face is the selection of the most appropriate cloud provider service. Cloud comparison tools exist but a crucial aspect usually not taken under consideration is to understand how the application will perform on a specific cloud. For this purpose cloud adopters can use benchmarking tools specialized in generating application-specific workloads. However, to have realistic results, the benchmark tests need to be executed repeatedly and their results need to be compared. When taking into account the multitude of cloud providers, in conjunction with the different resource types and sizes that are offered and that need to be analysed, it becomes obvious that the simulation of an application behaviour is a time consuming and not trivial task. (2) Once the cloud service has been selected the cloud adopters find themselves dealing with the deployment of an application for which they cannot avoid to read the deployment manual in detail, provide the required information (adapting them to the particular cloud provider platform configuration/setup) and generate an according script before actually deploying the service(s). The deployment gets even more complicated when cloud adopters decide to opt for a multi-cloud strategy, which today is chosen by more and more enterprises. (3) As soon as the application has been deployed the adopters' attention moves towards the monitoring of the quality of service (QoS) that is assured through Service Level Agreements (SLAs) signed between the cloud adopter and the provider. There is no common framework –among cloud providers - in the market regarding SLA assurance and the existing tools provide only a generic infrastructure availability monitoring which does not always coincide with the actual availability levels experienced by the cloud adopters.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

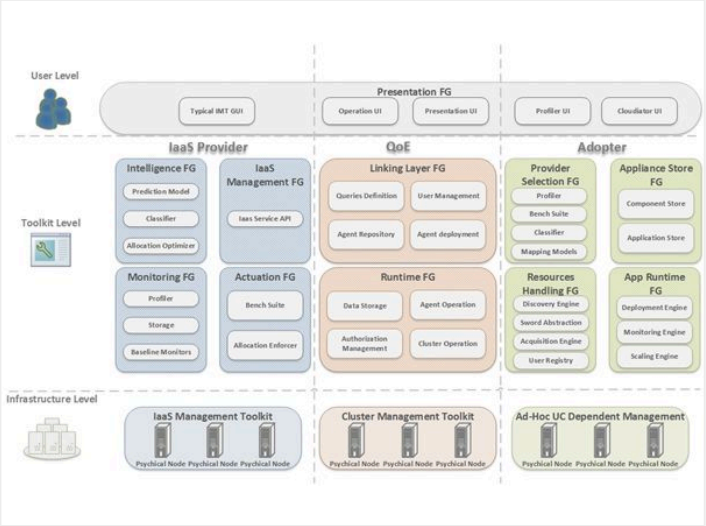
During the course of the project, the Consortium collected and analysed requirements and customers needs, investigated and reviewed the state of the art and developed and/or evolved a set of tools which were then classified in market-ready CloudPerfect tools, comprising Cloudiator and QoE (integrating QoE portal, the Benchmarking Suite and 3ALib) and research oriented CloudPerfect tools, including Profiling and Classification tool, Mapping Models, Allocation Optimizer and Interference Models. In this respect during the second year, for the market-ready CloudPerfect tools, work focused on delivering a stable market-ready version, while for the research oriented CloudPerfect tools, worked focused on testing and validating them in the use case scenarios.
The QoE supports the cloud adopters in two stages of their cloud journey:
1) In selecting the right cloud – the QoE Portal supports the cloud adopters in selecting the most appropriate cloud offering according to their application or business needs. It provides the adopters with the possibility to create rankings of clouds based on the performance results for the specific application workload and the related pricing parameters. Rankings can also be made on the basis of

specific measurable QoS parameters that are guaranteed by the cloud providers through their SLAs.
2) In maintaining record of the quality of service – through the QoE Portal the cloud adopters can access SLA monitoring functionalities, view monitoring results and access detailed SLA monitoring logs (which can be used to support compensation claims).
Cloudiator supports the cloud adopters in the phase of deploying on the cloud. It offers a common interface and model for describing and configuring applications independently from their actual runtime environment and the infrastructure where they are deployed.
Throughout the projects life time experimentations took place with the support of the use case partners (CRM/ERP and CFD domains) which gave the Consortium the opportunity to collect feedback and further improve the developed tools. The use of the QoE and Cloudiator by Cloud Providers (for self-assessment and infrastructure management) was also examined and tested during the project lifetime.
A set of communication tools was prepared and activities were performed aiming at generating awareness and knowledge around CloudPerfect. Business Models and exploitation plans were developed for all Cloudperfect results.
CloudPerfect Consortium also actively participated in relevant standardization-collaboration activities representing project results and monitored and applied existing standards in the project's software developments.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

As described above, CloudPerfect tools support cloud adopters throughout their cloud adoption process reducing the hassle and effort needed during such process. With the QoE, adopters have the possibility to create personalized rankings of clouds based on the performance results for the specific application type and the related pricing parameters. Rankings can also be made on the basis of specific measurable QoS parameters that are guaranteed by the cloud providers through their SLAs. The QoE portal provides homogeneous results supporting the adopter in comparing the numerous and different cloud offerings available on the market while reducing the time and the hassle spent on the provider selection phase. Indirectly it supports cloud adopters in optimizing cost management (and billing strategies of SaaS providers), by selecting the optimal offering in terms of performance and cost trade-off per user.
Similarly on the deployment side, Cloudiator reduces deployment time, since applications can be seamlessly moved across different cloud provider infrastructures without any additional effort. The tool implements a generic and provider independent way of application implementation and management which eases the use of clouds in general and does not bind tenants to specific provider offers and their platforms (vendor lock-in). It increases flexibility, since more apps can be handled in parallel on various provider infrastructures and increases the competition between providers in terms of favourable offers and conditions for their resources.
CloudPerfect enables the extension of the Broker role in Cloud environments as a mean to support cloud adopters in evaluating the provider service which better fits their needs and in monitoring and validating the issued Service Level Agreements.

Besides the Business Models identified, CloudPerfect key outcomes are released Open Source, in order to make them available for other future evaluation schemes or for their incorporation by cloud brokerage experts and providers into their service portfolio, in agreement with the CloudPerfect license.
The proposed outcomes are based on innovations to existent and new standards, especially with contributions to ISO (and the upcoming 19086-2 DIS standard on SLA metrics in which the CloudPerfect partners are actively contributing).



CloudPerfect General Architecture

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