Dr Giuliano Casale

RADON: Expanding the use of serverless computing technologies

Research Objectives

Dr Giuliano Casale coordinates the RADON Consortium, which is broadening the use of serverless computing technologies.

Detail

Bio
Giuliano Casale joined the Department of Computing at Imperial College London in 2010, where he is currently a Reader. Previously, he worked as a research scientist and consultant in the capacity planning industry. He teaches and does research in performance engineering and cloud computing, topics on which he has published more than 100 refereed papers. He has served on the technical program committee of over 80 conferences and workshops and as co-chair for several conferences in the area of performance and reliability engineering, such as ACM SIGMETRICS/Performance and IEEE/IFIP DSN. His research work has received multiple awards, recently the best paper award at ACM SIGMETRICS. He serves on the editorial boards of IEEE TNSM and ACM TOMPECS and as current chair of ACM SIGMETRICS.

Funding
Horizon 2020

Collaborators
RADON Consortium (https://radon-h2020.eu/)

References


Personal Response

What has been the most rewarding outcome of the RADON project to date?

In a collaboration with the EU project SODALITE, the two projects were able to define and execute an integrated scenario related to machine learning prediction with the ability to deploy distributed and learning and prediction heterogeneous software simultaneously across HPC, Function-as-a-Service (FaaS), and edge. The results were published into an open-source repository: https://github.com/RADON-SODALITE/hybrid-compute-profile. A public seminar telling the full story is available at https://youtu.be/jusRsrKds. This experience showed us the advantages of joining forces in an open-source world and the power of model-based abstraction that made the work of two independent projects immediately compatible with each other.
serverless computing – a cloud-computing execution model where the cloud provider manages services on behalf of the customer with a high degree of automation – is rapidly growing in popularity. Serverless technologies, such as ‘Function-as-a-Service’ (FaaS), in particular execute functions in response to specific events automatically from the cloud. This enables the user to run backend code without having to provide or maintain servers. Developers can virtualise the internal logic of an application and thereby simplify the management of cloud-native applications. In addition, billing and scaling are at the level of individual functions, so the overall cost is reduced.

Software vendors are rapidly shifting their attention to the problem of developing cloud applications that can use serverless platforms. Two of the main advantages and research challenges of the serverless FaaS paradigm can be classified as ‘fine-grained autoscaling’ and ‘productivity gains’. Fine-grained autoscaling dynamically adjusts, or scales, the number of computational resources being allocated to an application based on its needs at any given time. Productivity gains stem from storing IT know-how as reusable serverless functions for automatic orchestration onto private or public cloud or multi-cloud infrastructures.

The EU-funded RADON (Rational decomposition and orchestration for serverless computing) project aims to unlock the benefits of serverless computing for the software industry. This €4 million project is coordinated by Dr Giuliano Casale, a Reader in the Department of Computing at Imperial College London. The RADON consortium is made up of researchers from four universities: Imperial College London, Tilburg University, University of Stuttgart, and the University of Tartu. As part of the team at Athens Technology Centre, Engineering Ingegneria Informatica, XLAB, and Eficode. The consortium has developed a software engineering framework that addresses the challenge of developing cloud applications for serverless computing. By working with a multitude of industries – from tourism to assisted living – RADON is fine-tuning the benefits of serverless computing.

The RADON (Rational decomposition and orchestration for serverless computing) project is coordinated by Dr Giuliano Casale, with researchers from Imperial College London, Tilburg University, University of Stuttgart, and University of Tartu, as well as the Athens Technology Center, Engineering Ingegneria Informatica, XLAB, and Eficode. The consortium has developed a software engineering framework that addresses the challenge of developing cloud applications for serverless computing. By working with a multitude of industries – from tourism to assisted living – RADON is fine-tuning the benefits of serverless computing.

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Several of which are FaaS-based, have been added to an existing architecture, helping service personalisation.

With the help of the RADON framework, the team at Athens Technology Center have enriched Viarota with a story-building environment. Here, journalists can harness online content collected from multiple sources, such as social media, blogs, and news reports, to compile stories about a city’s points of interest. Data processing and AI technologies, such as natural language processing, are used to facilitate the real-time analysis of online contents and their links to points of interest and routes. These stories can be used by news portals and tourist agencies to introduce their clients to points of interest on alternative routes and to promote relevant services and data.

RADON offers function level scaling and delivers FaaS-based applications faster, easier, and cheaper. In this prototypical use case, the RADON model is used to capture SARAs existing IoT/edge landscape. Edge takes advantage of cloud infrastructure but keeps computation close to the edge of the network. This is evident in the process of coding new Infrastructure-as-Code (IaC) recipes to set up the robotic and embedded devices. RADON underpins the development of a reusable library of deployment templates and configuration recipes, giving SARA access to serverless computing technologies. Serverless functions are used to detect and react to specific events relative to the individual resident’s environment.

MANAGED DEVP0S
Using their expertise in continuous integration and continuous delivery methods and automation, Eficode have created a function hub that can host a collection of reusable software-defined infrastructure modules that organizations can use to implement DevOps-style governance.

This use case offers the opportunity to explore the interface between serverless, DevOps systems and ensure that RADON is not seen as a form of lock-in. Eficode’s main business comes from consulting, so function hub is consolidating and expanding their market, offering for digital transformation.

CONCLUSION
RADON offers function level scaling and billing together with automated orchestration and reusable functions, microservices, and data pipelines while avoiding vendor lock-in. RADON provides end-users with modern, integrated software engineering tools enabling software vendors to develop and deliver FaaS-based applications faster, easier, and cheaper.