Feature Stories - Cloud computing in real time

Cloud computing has made a vast array of computing resources available to anyone with an internet connection. Now an EU-funded research project has developed a way to harness those resources in real time, enabling companies and individuals to save time and money by collaborating and working together in the cloud.

DIGITAL ECONOMY

© Shutterstock

By providing computing resources as a service rather than a product, cloud computing is revolutionising access to software, processing power and storage. Whereas previously someone who needed to store or process a large amount of data would have to buy computers, servers, databases and other infrastructure, cloud computing enables them to rent as much as they need for as long as they need it. With just an internet connection, they can access the resources they require - much as people draw electricity from the electricity grid without having to worry about building their own power station.

Increasingly though, people want to interact in the cloud. They want to run applications remotely on cloud infrastructure, not just transfer data for processing or storage, and that requires 'Service-oriented infrastructure' (SOI) with real-time functionality.

It is an issue that a team of European researchers set out to address, supported by EUR 7.9 million in funding from the European Commission. Working in the 'Interactive real-time multimedia applications on service oriented infrastructure' (IRMOS) project, they have brought real-time functionality to the cloud.

'The new generation of applications we are seeing are all about interactivity - people need and want to access and work with them in real time, so any platform, any

environment must also enable interactivity,' explains Dimosthenis Kyriazis, the IRMOS technical coordinator from the National Technical University of Athens. 'If the applications are interactive, the infrastructure that services them should facilitate that interaction.'

Dr Kyriazis points to the example of a film post-production crew working on a project, one application the IRMOS team used to demonstrate the results of their work. Different people in separate locations, from sound technicians and special effects artists to the director, all need to be able to access, view, edit and modify parts of the movie, often at the same time. The film data may be stored in one location in the cloud, while the applications needed to edit the colour or apply the special effects may be run somewhere else. Until now, each process would have had to be carried out separately with long waiting times to see the effect of the modifications - and in the film industry, as in any other, time means money.

Saving time and money

'Cloud computing has lowered the cost of computing resources and enabled many people and companies, particularly SMEs, to do things they would not have been able to afford to do before. Cloud computing in real time offers even more cost benefits as it enables collaboration in the cloud and saves time,' notes IRMOS coordinator Stuart Smithson from Xyratex, a UK-based digital storage solutions provider. 'What before might have taken a few days, can be done in a few seconds.'

Mr Smithson notes, however, that 'real time' in this context does not necessarily mean instantaneous.

'We're talking about so-called "soft" real time, which guarantees that a certain process will be performed within a given period, maybe a few seconds, depending on the quality of service constraints,' he explains.

'Quality of service' (QoS) is a key factor in providing any degree of real-time interactive services, and lies at the heart of the IRMOS project. For a user to trust and benefit from such a system they need to be sure that processes are being carried out within a given period depending on the application, and that the results are communicated between different services and back to them.

'It is this communication aspect that had a direct impact on the design of the virtual systems we developed and which these interactive systems did not have before. This is what real-time applications actually require and this is what IRMOS provides,' Dr Kyriazis adds.

To achieve that, the IRMOS researchers addressed several technical challenges. They developed tools to model an application and estimate its infrastructure needs,

such as how much processing power it will require and for how long, along with benchmarking and resource management tools to monitor and manage its behaviour in a real-time cloud environment.

The researchers looked at the best process for establishing 'Service level agreements' (SLAs) covering the relationship between the different providers in the cloud - platform providers, infrastructure providers and service providers. And they developed a service-oriented network infrastructure solution based on virtualised computing, networking and storage with dynamic resource allocation, QoS guarantees and resiliency mechanisms, such as redundancy and live-migration.

The tools are open source and available to anyone to build applications for real-time cloud computing. The IRMOS team used them to build three real-world applications covering video post-production, virtual and augmented reality and interactive e-learning using mobile devices and virtual worlds.

In the e-learning scenario, the IRMOS system was used to power a virtual environment in which a large number of people can interact with multimedia content, accessing and modifying it at the same time from different locations.

The augmented reality demonstrator, on the other hand, showed how different teams in different locations can work in parallel using data gathered from both the real world and a virtual simulation. The researchers used the IRMOS system to allow distributed teams working on car aerodynamics to visualise and manipulate experimental data being gathered from a wind-tunnel test and compare it with a virtual simulation. All users, no matter their location, were able to interact with the hybrid data in real time, visualising the car from different angles and modifying wind speed and direction, for example.

'The demonstrators show how this technology can be used and [show] the benefits, but the potential applications for this are almost endless,' explains Mr Smithson. 'Initially, the most obvious uses are in areas that require large amounts of real-time processing power - multimedia, for example - but beyond that there are many other applications.'

He points to health care, gaming, energy and finance, among others. 'It could benefit anyone, especially amid a growing tendency to migrate away from the desktop and into the cloud,' Mr Smithson notes.

IRMOS received EUR 7.9 million (of the EUR 12.76 million total budget) in research funding under the EU's Seventh Framework Programme, sub-programme 'Service and software architectures, infrastructures and engineering'.

Useful links:

- 'Interactive real-time multimedia applications on service oriented infrastructure' project
- IRMOS project data record on CORDIS

Related articles:

- EU project to tackle semantic interoperability issues in cloud platforms
- EU project to smooth the path through data-intensive environments
- Good view from the clouds
- Cloud computing research precipitates spin-off tech

Related projects

PROJECT

ARCHIVED

Interactive Realtime Multimedia Applications on Service Oriented Infrastructures

IRMOS

3 September 2022

Last update: 29 September 2011

Permalink: https://cordis.europa.eu/article/id/87049-feature-stories-cloud-computing-in-real-time