

HORIZON2020 FRAMEWORK PROGRAMME

TOPIC EUK-03-2016

“Federated Cloud resource brokerage for mobile cloud services”



D7.5

Training plan and activities

Project acronym: BASMATI

Project full title: *Cloud Brokerage Across Borders for Mobile Users and Applications*

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BASMATI Glossary

Term/Acronym	Definition
Mobile cloud services	Online services offered by cloud resources to support mobile apps. The backend of the mobile apps.
CP	Cloud Provider. The actor that provides the cloud infrastructure/resources, such as VMs
CSP	Cloud Service Provider. The actor that provides cloud services on top of a rent infrastructure from a CP
Cloudlet	Limited capacity infrastructures with virtualization capabilities, often used to support a limited amount of users or perform a limited set of operations on behalf of the central cloud infrastructure that hosts the complete application
Edge resources	Resources aimed to operate specialized functionality, located at the "edge" of the network infrastructure, thus, closer to the end users. Examples are (clusters of) RaspberryPis or cloudlets
BUDaMaF	BASMATI Unified Data Management Framework
KE	Knowledge Extractor
DM	Decision Maker
RB	Resource Broker
MVD	Mobile Virtual Desktop
DASFEST	An 3-day long music festival taking place in Karlsruhe, Germany every July
ACE	Amenesik Cloud Engine. The cloud service deployment tool through which actual federation is achieved
BEAM	BASMATI Enhanced Application Model. An extension of the TOSCA specification
ASP	Application Service Provider. A Federation user that rents resource services in order to provide an Application services to End-users
Brokering	The matchmaking support provided by BASMATI platform to decide about the best cloud resources to exploit for the execution of the back-end of BASMATI applications. This activity regards the placement of the services or data on computational resources and storages belonging to the cloud data centre and the cloudlets within the federation.
End user	A user who benefits the various application and infrastructure services provided by the Cloud. Within BASMATI, the most typical example is exploiting the Cloud federation via a mobile device (possibly a laptop) using specialized apps or a web browser.
Offloading	The ability of BASMATI platform supporting the runtime placement of the components composing the front-end of BASMATI applications on edge resources available nearby the end user. This activity takes place both when edge and mobiles exchange one each other their own workload or when such devices transfer some workload to the clouds or cloudlets. In BASMATI we often distinguish Front-end offloading, related to the mobile part of application, from Back-end offloading, concerning the server side of applications. The latter roughly translates to the known concept of Cloudbursting.
QoE	Quality of experience. It is a measure of a customer's experiences with a service. It may be related to some aspects of the QoS and QoP, but can also take into account other metrics.

Service handover	Service handover refers to the activity of transferring an active service between two computational resources (e.g. Cloudlets) with minimal or no disruption on the availability of the service. Ideally, service handover is transparent with respect to the user.
Situational Awareness	The ability of the BASMATI platform to recognise the “situation” characterising the actual combined status of users, applications and resources, aimed at achieving an effective and efficient management of applications and resources.

Executive Summary

The training activities of BASMATI aimed at stimulating take-up of BASMATI results by the broader innovation community or even society at large. In order to maximise project impact and ensure long-term sustainability of project results, it is necessary not only to disseminate results but to let different stakeholders to access to preliminary results and gather their feedback about BASMATI. At the same time, trainees had the opportunity to assimilate novel concepts that could potentially act as a leverage in their future business and scientific endeavours. With this in mind, BASMATI selected the technologies that it developed and that answered the two central (in terms of project objectives) questions: a) the resource allocation question in highly heterogeneous environments (multi-clouds and edge computing infrastructures) and b) the business incentives between a federated cloud.

Tools like the BASMATI BEAM and the Decision Maker were demonstrated in two training workshops. The objectives of the workshops were to formulate the question in various contexts, to identify the problems that these technologies solve, demonstrate their use and receive feedback about potential use cases and improvements. The results were positive with attendants showing interest and giving positive feedback. The first workshop was organized independently and the second in the frame of an international conference, both after an open invitation.

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1 Introduction

In the digital era ICT technologies are integrated in daily life in a way that citizens are not completely aware of the research effort needed to develop new services that can cover their needs. On the other hand, BASMATI also aims not only to gain visibility within the potential market but to attract and engage services' customers. In this sense, training activities seem to provide a good opportunity for letting the public know about BASMATI outcomes while gathering their initial impressions about the joint EU-Korean research efforts.

This document reports the results of the work done in the frame of Task 7.5: "Awareness and Training". The aim of this task was both to obtain information from the community and to deliver the BASMATI training programmes. Workshops were organized to support the collection of insights and market expectations from the targeted ICT industry (cloud and mobile), in view to explore possible business models for exploitation of project results. The workshops targeted users both internal and external to the project consortium to collect market insights. Furthermore, the envisioned training activities included courses on how to exploit the BASMATI outcomes for future cases, thus allowing different audiences to gain insights into latest technical/technological developments in the project. Training activities were structured around two workshops.

This deliverable provides the training plan and activities with respect to different groups, and the corresponding training syllabus.

1.1 Relationship to other deliverables

This report is related to the following list of deliverables:

- D7.2: "Market analysis and business potentials"
- D7.3: "Exploitation plan"
- D7.4: "Communication plan and activities"

The Market Analysis (D7.2) deliverable is the one that allowed us to do a mapping between the technologies that seemed to be closer to the market and with a higher business value. This is how the BASMATI technologies to be included in the workshops were selected. The training activities are generally part of the exploitation and communication plan of the project and as such the activities reported in this document are also reported there.

1.2 Structure of the document

The document starts with presenting the main objectives and the plan to achieve them regarding the training activities (Section 2) and it continues with providing the details from the organization and implementation of the two BASMATI training workshops (Section 3). Some conclusions are reported at the last section (Section 4).

2 Training plan

In order to start with this activity it was mandatory to develop a plan determining the objectives to be fulfilled (WHY), the intended audiences (WHO) and the expected outcomes (WHAT).

Having this in mind, a set of goals and topics were defined and adapted to the different audience of the two workshops as explained in the following subsections.

2.1 Training goals

The training activities, part of the project impact plan, are intertwined with the dissemination and exploitation activities of the project. The objective is, on one hand, to let people know about BASMATI outcomes and on the other to contribute towards creating a community of interested parties to adopt and continue its work. This implies not only to attract people and inform them about BASMATI results, but to engage them during the project lifetime in order to create awareness about a prototype adjusted to their real expectations and needs.

A secondary objective is to receive feedback from third parties, potentially from audiences that are heterogeneous and may provide divergent opinions. This kind of feedback can enforce the value of the BASMATI outcome and show a possible business value previously unseen.

2.2 Topics for training

The plan for the training activities of BASMATI was to focus on the two most important BASMATI concepts in terms of potential business value but also those to which the project anticipated some feedback. These are: a) the resolution of the resource allocation question in highly heterogeneous environments (multi-clouds and edge computing infrastructures) and b) the business incentives between a federated cloud environment.

This will allow to validate the approach proposed by BASMATI, as well as to enrich the offerings documented in D7.3.

2.3 Intended Audience

The people who could best serve the goals underlined in the previous sections, is people working in the IT industry but from a diverse range of specific fields, in order to consider different points of view for the broad audience tackled by the project. People using cloud technologies, application developers, researchers, engineers, cloud providers, open source communities, etc.

3 Training plan implementation

To accommodate the requirements mentioned above, it was decided to host two different workshop sessions for each of the topics of interest: resource allocation and business incentives. A web invitation was distributed through mailing lists and the project website for people to register. The selection of participants was only implicit; the mailing lists and the dissemination channels of the project are targeted towards specific audiences that meet the stated requirements. The participants were given a simple questionnaire to fill out after the end of the sessions so as to acquire some notion of their general characteristics and understand the possible biases in the feedback analysis.

To further motivate the attendance, the project employed the following two approaches: a) left the attendance open, not isolating it to the registered participants, and b) incorporated the sessions in a large event, namely the International Conference on Open Source Systems (<https://www.oss2018.org>).

3.1 1st workshop

The 1st workshop was organized in Athens, on the 17th of May 2018 from Konstantinos Tserpes (project coordinator - ICCS) and Patrizio Dazzi (scientific coordinator - CNR). The topic was related to the resource allocation question. The subject was: “Smart Brokering Solutions for Clouds and Cloudlets”.

The agenda of the workshop as was announced on the website and circulated through various dissemination channels, was the following:

BASMATI WORKSHOP

Date: 17/05/2018@18:15

Organizer: Dr. Patrizio Dazzi

Host: Institute of Communication and Computer Systems

Objective: Deliver courses on how to exploit the BASMATI platform and technologies for future cases

Audience: Cloud technologies practitioners from pure and cross-cutting IT fields

Attendance: 30-40 people (based on confirmations)

Registration: Free/Open meeting

Address: Omirou 9, Tavros 17778, “G. Karampatzos” amphitheater

Agenda

18:00-18:15	Organizational issues/BASMATI Presentation	K. Tserpes/ICCS
18:15-19:00	Smart Brokering Solutions for Clouds and Cloudlets	P. Dazzi/CNR
19:00-19:30	Use cases	K. Tserpes/ICCS
19:30-20:00	Discussion	All

Description

Cloud technologies represent one of the main pillars around which revolved recent developments targeting large, distributed and high-availability cyber-infrastructure. These technologies enabled both SMEs as well as big companies to access computing resources in scalable, efficient and cost-effective ways. However, the highly dynamic behaviour of supply and demand in clouds, due to changing need from customers as well as mutable resource availability, require specific solutions to be managed. This is particularly relevant in a technological landscape characterized by many actors and platforms, each having its own distinctive features and costs, seldom used in isolation. This complex and dynamic scenario defines a need for automated entities, Cloud Brokers, aimed at helping consumers in discovering, considering and comparing services with different capabilities and offered by different cloud providers, both in isolation and in combination, promoting cross-cloud application migration to alleviate the vendor lock-in.

In this talk we present two contributions in the field of Cloud Brokering, the first is a highly flexible genetic approach for Cloud Brokering, focusing on Infrastructure-as-a-Service (IaaS) resources for satisfying Quality of Service (QoS) requirements of applications. The experimental evaluation of such approach showed that near-optimal solutions can be found, even when dealing with hundreds of providers.

The other result presented is about the self-optimising decentralised service placement in heterogeneous Cloud Federation and targets the complex needs of comprehensive sets of different kinds of applications, ensuring energy efficiency, reduced costs for resource providers while enhancing the user experience. This approach provides decentralized service placement plans by conducting efficient deployments in a scalable, distributed, adaptive, context-aware solutions characterised by high-efficiency and reduced overhead by means of point-to-point interactions occurring among clouds belonging to the same federation.



3.1.1 Structure of the workshop

The workshop was revolving around the presentations that the BASMATI members did. These were structured as interactive sessions, allowing and encouraging the audience to ask and discuss about the presented topics. The following 30' were reserved for discussion about use cases and examples, encouraging the attendants to give examples from their relevant working environment and experience.

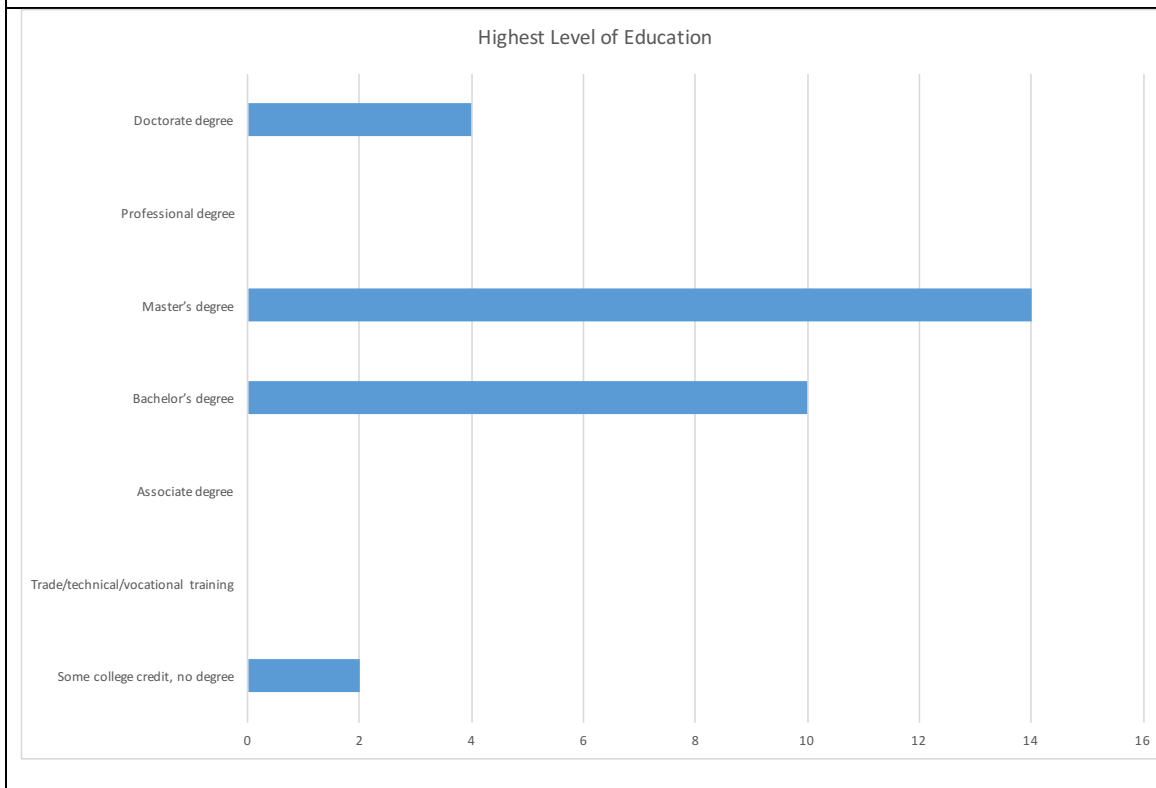
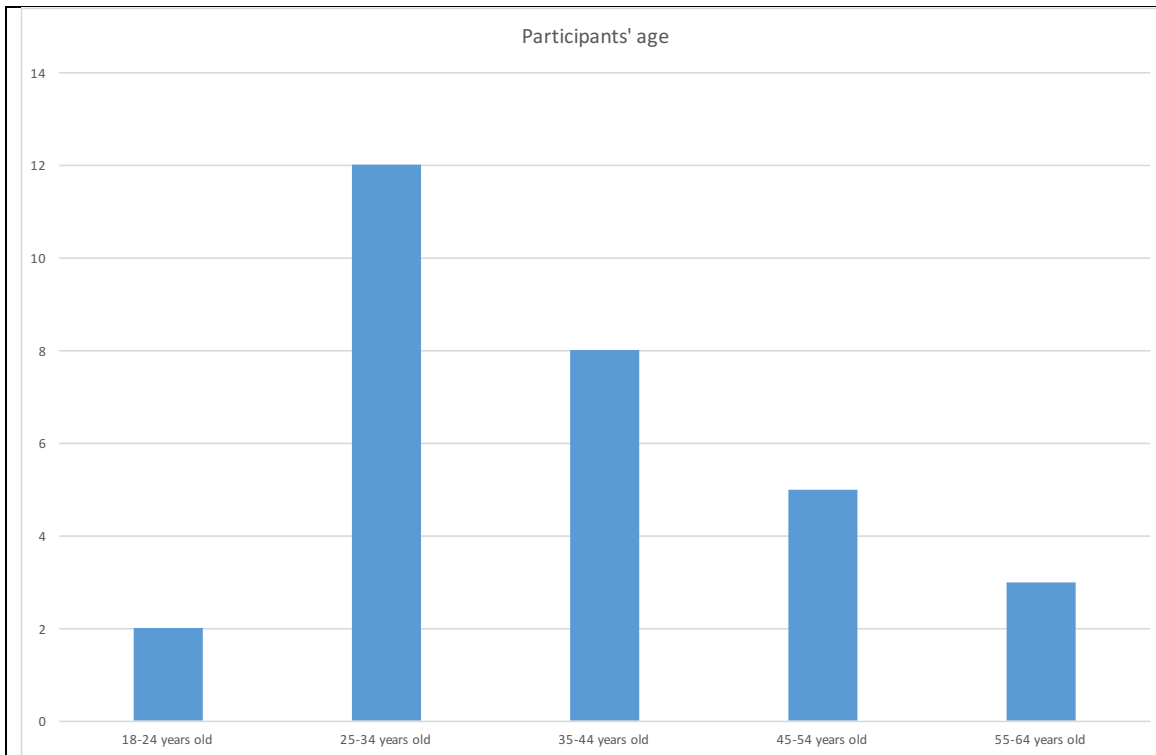
The underlying idea was to involve participants, allowing them to interact among them and with BASMATI representatives. Interactive sessions also allow organizers to gather real-time feedback through participants expressions and discussed impressions.



Figure 1: Photos from the event

3.1.2 Participants' characteristics

30 people attended the workshop. Their background was mainly computer science and telecommunications, while the majority of them were working in IT-based companies or IT departments. About half of them had obtained a Master's degree. This ensured that they had the necessary background to follow the workshop and to participate, as well as, to provide some feedback regarding the relation of the BASMATI artefacts and their work. Their age ranged from 25 to 56 with the vast majority sitting in the range of 28-38. This allowed us to have a representative sample of IT employees since in EU, the majority of the IT employees are aged around the age of 34 & 35. Figure 2 (a-c) presents those characteristics in detail.



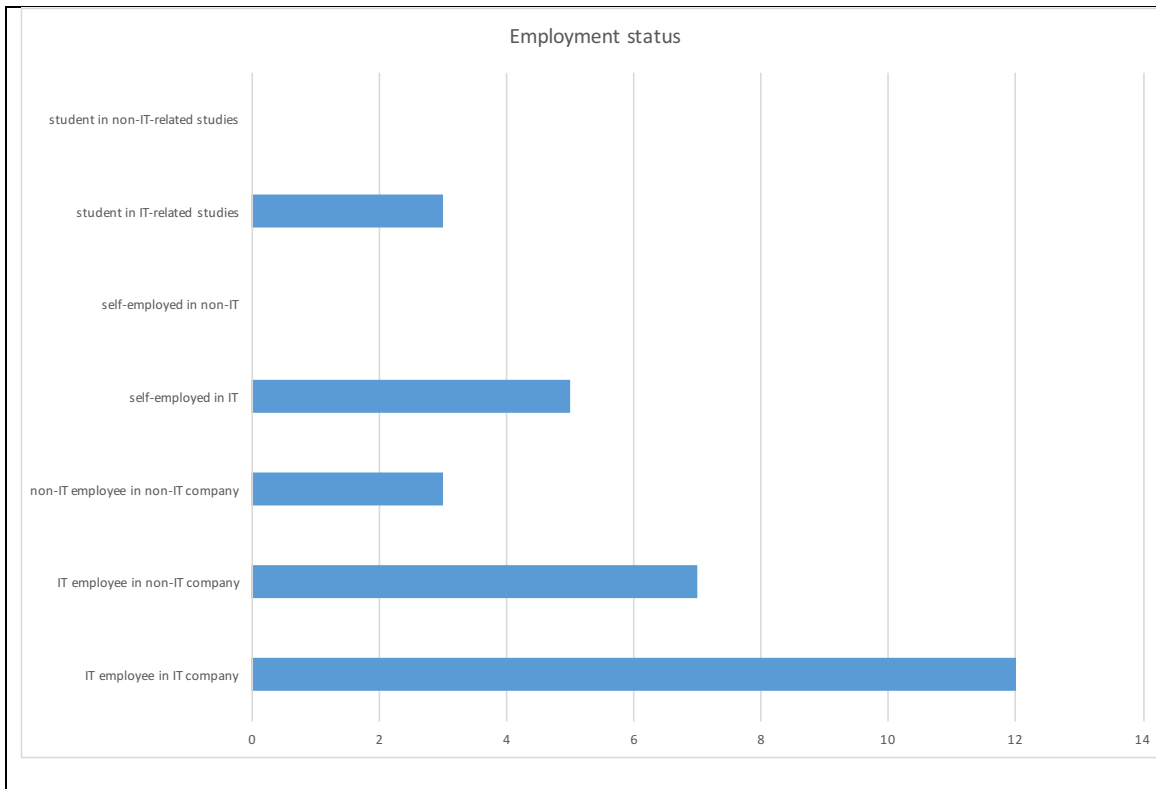


Figure 2a-c: Participants' characteristics

3.1.3 Feedback

The main takeaway from the workshop is summarized in Figure 3. The technologies presented in the workshop are borderline related to Cloud and Operations' Research (OR). This means that the BASMATI solution could be applied to multiple problems and not only in optimizing the cloud resource utilization and cloud-enabled mobile apps. As a result, the participants could relate the presented technologies with multiple problems that they are dealing with but had a problem extracting the parts that were of interest to them from the cloud framework. This is reflected in the middle, longer bar. Furthermore, from the 5 people who could see the relation between BASMATI technologies and their work, all of them worked with clouds on a daily basis and had a deep understanding of the particular technology.

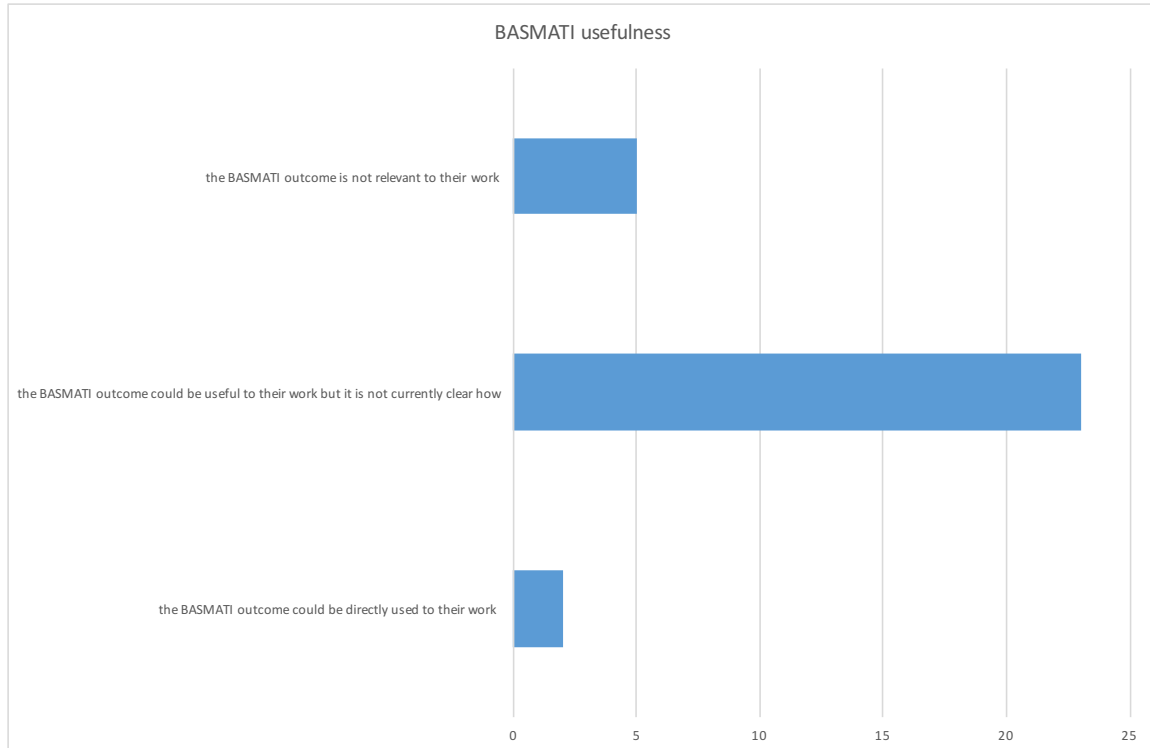


Figure 3: Usefulness of BASMATI as assessed by participants of the 1st workshop

3.2 2nd workshop

The 2nd workshop was organized in Athens, on the 9th of June 2018 from Konstantinos Tserpes (project coordinator - ICCS) and Jörn Altmann (SNU) in the frame of the International Conference on Open Source Software (OSS 2018). The topic was related to the business incentives behind cloud federations. The subject was: “Cloud Federation Economics”.

The agenda of the workshop as was announced on the website and circulated through various dissemination channels, was the following:

BASMATI WORKSHOP

Date: 09/06/2018@10:00

Organizer: Prof. Jörn Altmann

Host: Institute of Communication and Computer Systems (in the frame of OSS2018)

Objective: OSS Economics and Cloud Service Provider Federations

Audience: Open Source Software

Attendance: 30-40 people

Registration: Registration is required for OSS2018 (<https://www.oss2018.org/registration/>)

Address: Eleftheriou Venizelou 70, Kallithea 17676, Greece

Agenda

09:30-10:00	Organizational issues/BASMATI Presentation	K. Tserpes/ICCS
10:00-11:00	Cloud Federation Economics	J. Altmann/SNU
11:00-11:30	Discussion	All

Description

Cloud service providers (CSP) are the vendors who undertake the deployment and support of application services to the cloud. They mediate between application service providers (ASP) and cloud infrastructure providers (or cloud providers-CP), ensuring that all non-functional requirements are met by using the cloud infrastructure tools so as to ensure SLA compliance while maximizing their profit margin by minimizing the cost for cloud resources. This optimization process is of vital importance for the EU and Korean SME CSPs who operate with small CAPEX and restricted customer base. On top of this, the CPs limit the capacity for expansion of those CSPs, by changing the billing policy of resource provision beyond a certain amount (e.g. 100 VMs for Amazon) from a less risky pay per use model to an advance payment model. The latter is not sustainable by those CSPs resulting in the need for collaborations. BASMATI introduces the concept of a Federation of CSPs, that allows stakeholders to adopt a shared revenue scheme without the need for capital investment directed towards the CPs. From a technical point of view, this model requires the implementation of an abstraction layer on top of multiple CPs APIs that will allow the deployment, monitoring and management of an application to a naturally multi-cloud environment in a consistent and standardized way.

This workshop will focus on the business and technical aspects that support the CSP federation model.



3.2.1 Structure of the workshop

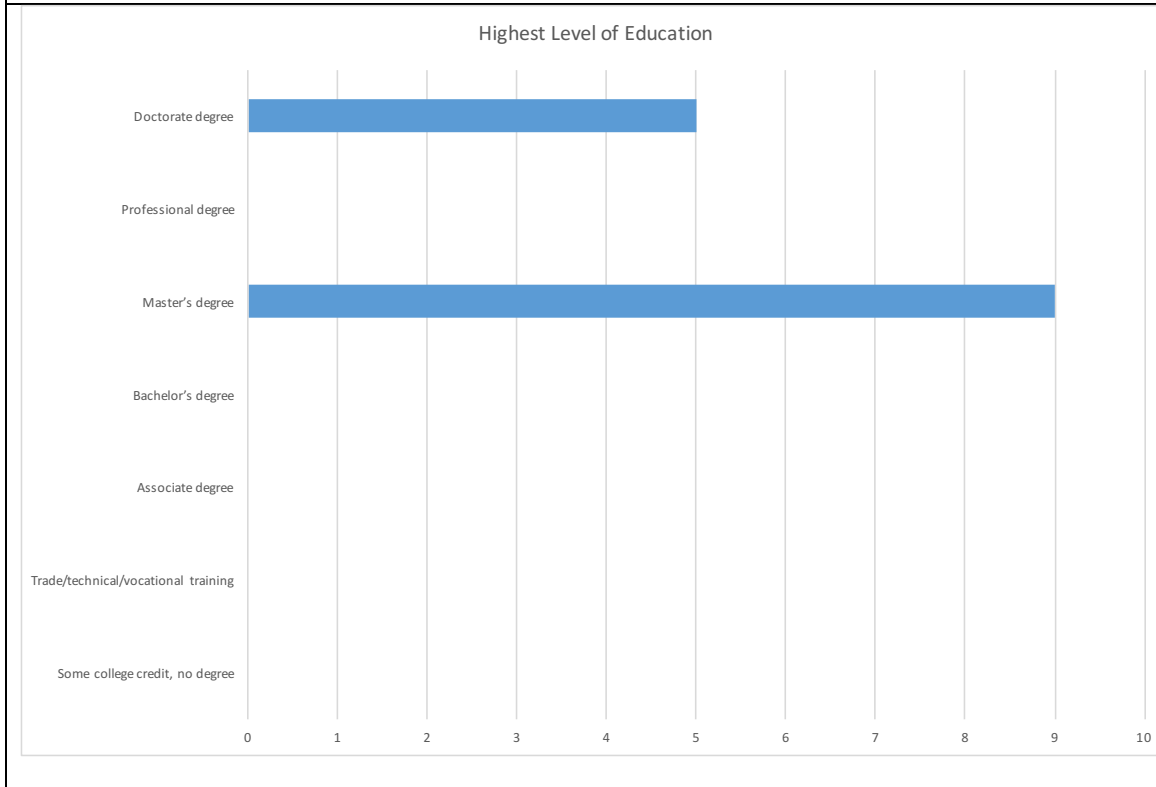
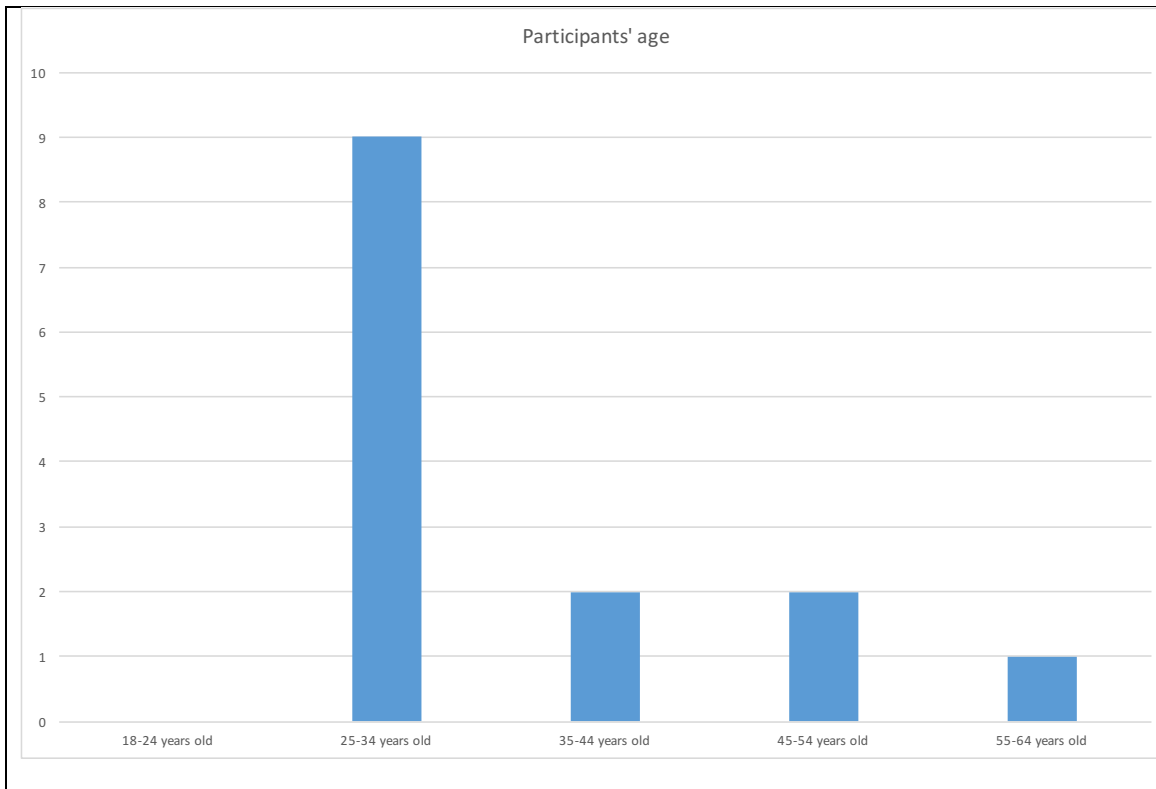
The workshop was following the same structure as the 1st. The BASMATI members gave presentations and tried to engage the audience to drive a meaningful discussion. The audience learned about the viability of the cloud federation approaches and were given examples and references to the Cloud Provider Management and the Cloud Federation Controller components. The last 30' were reserved for discussion about use cases and examples, encouraging the attendants to give examples from their relevant working environment and experience.



Figure 4: Photos from the event

3.2.2 Participants' characteristics

14 people attended the workshop. They were mainly PhD students and faculty. Most of them, aged between 25-34. Figure 5 (a-c) presents those characteristics in detail. As can be seen, the representation with the EU Employees in IT is not aligned to the one in reality. Rather it is aligned to the age standards in academia.



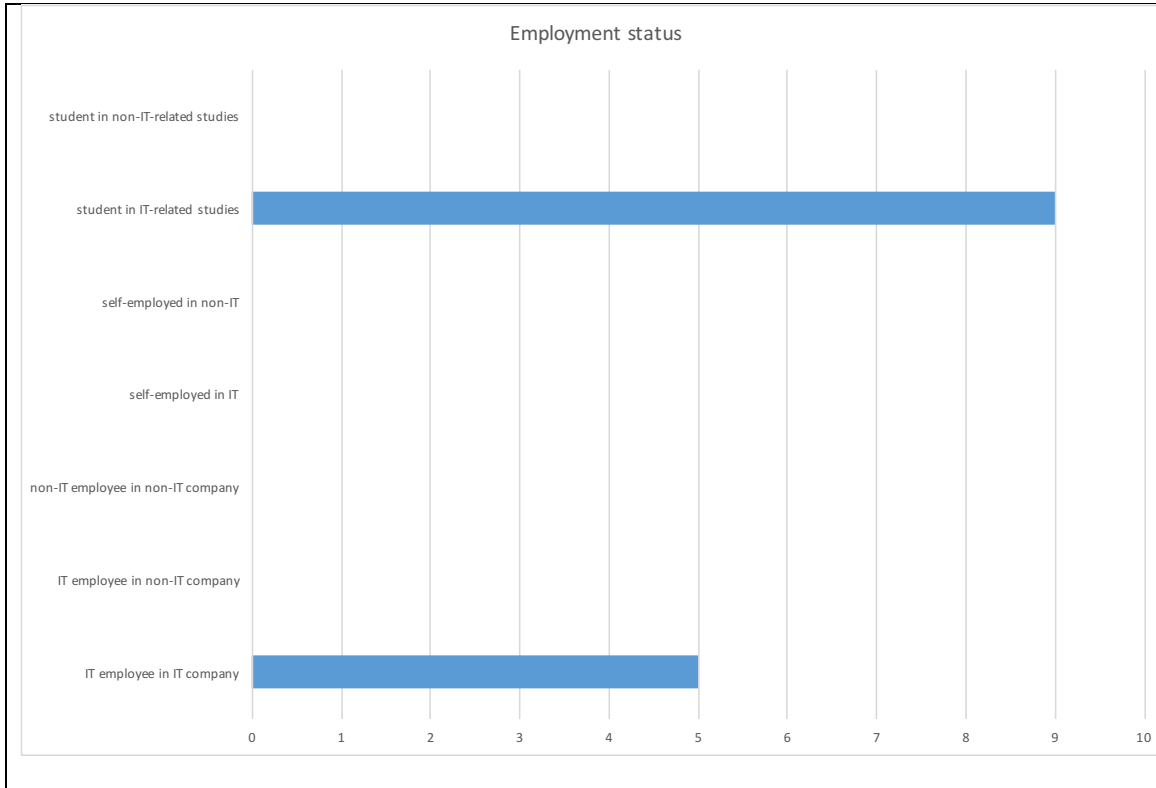


Figure 5a-c: Participants' characteristics

3.2.3 Feedback

The main takeaway from the workshop is summarized in Figure 6. The high representation of academics with expertise in non-Cloud domains, resulted in a confusing feeling that the presented BASMATI technology is useful but it is unclear to them where and how.

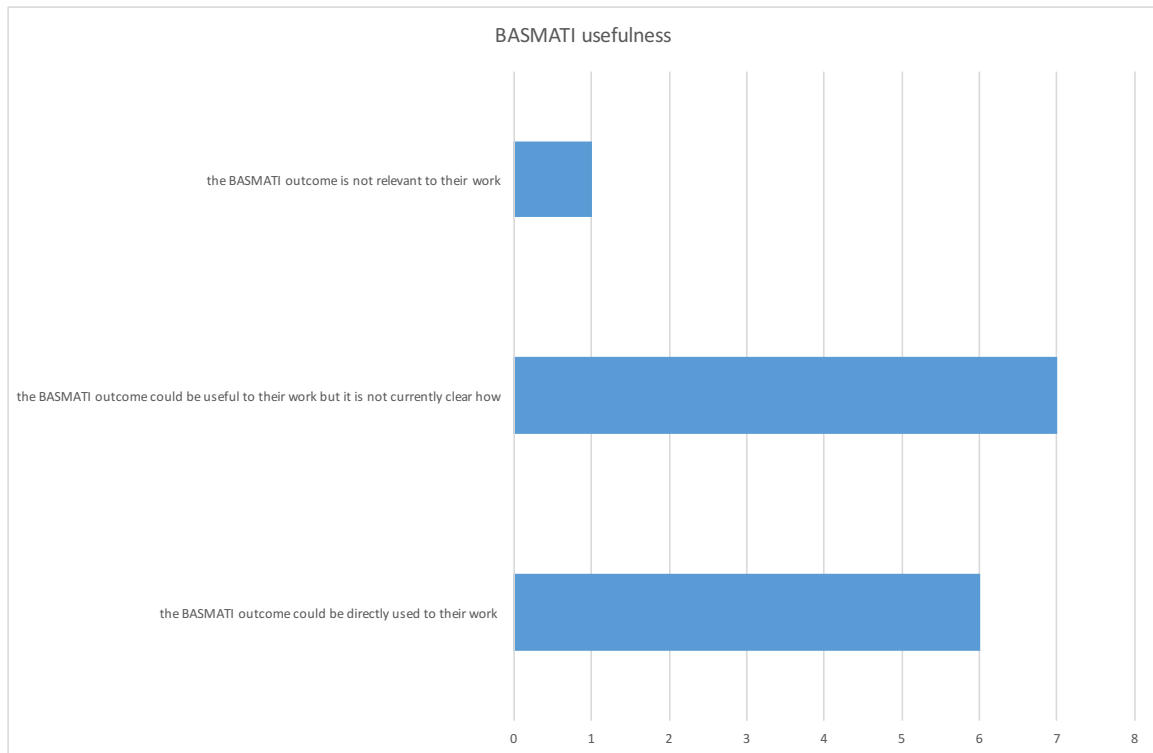


Figure 6: Usefulness of BASMATI as assessed by participants of the 1st workshop



4 Conclusions

These workshops managed to communicate the BASMATI outcomes to a wider public with the intention to find early adopters and receive useful feedback from –mainly- an external audience. Apart from the people that show the invitation there were 44 people who got a glimpse of the work that BASMATI does. Several concepts developed at BASMATI were explained and the audience got the chance to delve into the specific technologies that were made available to them during and after the workshops in the form of open source code repositories.

The rough outcome is that the vast majority felt that the BASMATI results could deliver some sort of value to the workshop participants' work. Unfortunately, only the people who followed an academic career managed to elaborate on their positive answers and only a few of the other categories could justify their positive feeling. One possible explanation is that the BASMATI concepts, at least those demonstrated in the training sessions, are targeting directly only a very specific and perhaps limited audience and further work needs to be done so as to customize the outcomes to the direction of the various exploitation paths. Another explanation is that, from a business perspective, the people who pay for technology are not commonly interested on the technical aspects but on the monetary ones.