BASMATI - A Brokerage Architecture on Federated Clouds for Mobile Applications

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The BASMATI Consortia

EU consortium
- ICCS – NTUA, Greece [EU Project Coordinator]
- ISTI – CNR, Italy [Scientific Coordinator]
- ATOS, Spain
- CAS, Germany
- Amenesik, France

Korean consortium
- ETRI [Korean Project Coordinator]
- SNU
- INNOGRID
Background

- Diffusion of **smart mobile devices** has increased
  - Pervasive and permanent connection to the Internet
  - Internet as a way to access services

- **Mobile services become more complex** through personalization, computational- and data-intensive tasks, and contextualization

- Cloud computing could become an **enabling technology for** providing storage and computing capabilities to **smart mobile devices**
Current Issues and Shortcomings

- **Heterogeneity of applications and mobility of users** lead to unpredictable demand posing relevant challenges to provisioning of resources

- **Location and capacity constraints** are still a challenge
  - As existing solutions target specific cloud providers and
  - **No federations of cloud providers** that allow strategic sharing of resources, and
  - **No socio-economic optimization**

- Therefore, there is need for **scalable resource provisioning at low cost**
  - Advanced provisioning mechanisms (e.g., computing offloading, context-awareness, brokering)
  - Advanced data and code management (e.g., code portability, data integrity)
Research Objective

- **Delivering an architecture** that supports the changing needs of mobile users and considering different socio-economic optimization objectives

- The architecture also needs to support:
  - Modelling and run-time adaptable prediction of mobile applications and mobile users
  - Cross-border, business-aware federation of cloud resources
  - Scalable brokerage and dynamic offloading of services
State-of-the Art and Methodology

- **Foundation of the architecture** comes from the projects: CompatibleOne, BetaaS, OPTIMIS, PaaSport, Broker@Cloud, Easiclouds, and AnyBroker

- The **methodology** used comprises:
  - Specification of requirements, which is based on
    - Insights of stakeholders through ad-hoc meetings, and
    - Literature research of market studies, scientific articles, innovation standards, and
    - Project-specific (use-case-specific) requirements
  - Deriving architecture functionality from the requirements
  - Integration of the functionality into the BASMATI architecture
The BASMATI Architecture Requirements

1. **Infrastructure management** of infrastructures from heterogeneous resources (i.e., edge resources, mobile devices, servers)

2. **Algorithms for brokerage and offloading**, considering legal, governance, and socio-economic aspects

3. **Cloud federation management**, considering business aspects and resource information for enabling federation decisions

4. **Service enablement**, i.e., modeling of applications and users in terms of their different mobility patterns
### Stakeholders are
- Mobile users, mobile application vendors, federated cloud provider, BASMATI platform provider

### Functions for
- **Handling mobile applications** on server and client-side (Application Manager)
- **Strategic and automated reconfigurations of applications** (Decision Maker)
- **Managing federated clouds** (Federation Manager)
Conclusion and Future Work

- **Advancement through BASMATI architecture**
  - Multi-objective optimization technique for enhancing the brokerage logic with respect to legal, governance and socio-economic aspects
  - Management models for adaptive and reconfigurable mobile applications
  - Federation models that consider cooperative modes and strategic utilizations of computing resources

- **Future Work**
  - Detailed interaction model between different functions and stakeholders of the architecture
  - Validation through a prototype implementation
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