Challenges on software engineering for services and applications

Cluster on Software Engineering for Services and Applications
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The cluster on Software Engineering for Services and Applications (SE4SA)

• Group of EU project focusing on software engineering for
  • Services, Cloud-based applications, IoT, Big data

• Aligned, AppHub, ARCADIA, ARTIST, CloudTeams, CloudWave, DICE, ENTICE, Envisage, HyVar, MODAClouds, MONDO, Prowess, RISCOSS, SeaClouds, S-CASE, Supersede, SWITCH, U-QASAR

• [https://eucloudclusters.wordpress.com/software-engineering-for-services-and-applications/](https://eucloudclusters.wordpress.com/software-engineering-for-services-and-applications/)
Cluster objectives and current outcomes

• Identify complementarities, synergies, possibilities for collaboration/results adoption between projects
  • White paper to map the contributions of all projects (in progress)
  • Directory of researchers available to participate to advisory boards

• Identify new challenges and trends to influence the European research agenda
  • List of challenges derived from open discussions and questionnaires

• Organise common dissemination (publications, training and workshops)
  • Cloud Expo 2015, ICT 2015

• Identify effective go-to-market strategies for the outcomes of research projects
  • Three ingredients identified so far: Open Source, Common marketplaces, Standardization
Why software engineering is important

• Software is everywhere and our society is now totally dependent on software-intensive systems
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What do we need in these areas?

We need software engineering to help manage the complexity of new software-intensive systems, ensure that these systems are reliable and secure and meet the needs of their users.
From software industry to the service industry

• Development is only a part! Operation becomes critical
  • Need for DevOps approaches
  • Focus on performance and availability

• Number of non-controllable users increases
  • Design for scalability, robustness, security

• Quantity of data to store and query increase dramatically
Current EU projects Challenges

(still on going)

**Process (DevOps)**
- Increase productivity and quality through model-based techniques
- Manage the development complexity and risks at design time and runtime

**Quality**
- Improve quality, maintainability and acceptability of cloud-based software
- Improve trust, transparency, interoperability
- Exploit user feedbacks

**Design**
- Micro-service architectures
- Architectures for big data management
- Approaches for self adaptive Systems

**Middleware**
- Programmability of infrastructures (e.g., SDN)
- Middleware for data locality and volatility
- Management of ready to run workloads
Challenges for the new work programme – areas

• Process
  • DevOps and Open Source Process
• Big data for software engineering
• Platforms and programming paradigms
• Quality guarantees
• Requirement engineering
• Privacy and security
• Systems of systems
• Issues relevant to specific application contexts
New challenges - process

• DevOps

  • How can we support organizations in customizing DevOps for their purposes? How can we help organizations in adopting it?
  • As we control Ops, to shorten time to market, we can tolerate failures provided that we cope with them quickly. How can we keep such process under control?
  • We need to change our notion of productivity both for Dev and Ops? Which metrics should we use? How do we use them?
Platforms and programming paradigms

• The new technological frameworks (for instance for big data applications) require a deep knowledge of their internals

• It could be counter-productive if not impossible for small companies to hire specialists for these technological frameworks
• How can we assist these companies to go quickly to the market?

• Decentralized systems are built outside the control of a single organization
  • Services emerge and become available to others when possible
  • What programming paradigm should we use in this context?
  • How do we cope with the intrinsic dynamicity of this context?
Privacy and security

• *Privacy, big data and complex applications:*  
  • How does privacy fit in information systems handling big data?  
  • How do we ensure that private data chunks do not cross the specified boundaries?  
  • Which code at which boundary is responsible for some privacy leak?

• *Secure computation:* issues such as data structures for secure computation, approaches for establishing optimality of the level of encryption to use, theory of responsibility, accountability are still completely open.
Final remarks

• Working document on challenges available here [https://eucloudclusters.files.wordpress.com/2016/04/se4sachallenges.pdf](https://eucloudclusters.files.wordpress.com/2016/04/se4sachallenges.pdf)

• If you want to contribute, visit our booth and compile our questionnaire