Challenges on software engineering for services and applications

Cluster on Software Engineering for Services and Applications

April 20th 2016

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/

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

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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

Design

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

Quality

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

Middleware

- Programmability of infrastructures (e.g., SDN)
- Middleware for data locality and volatility
- Management of ready to run workloads

Challenges for the new workprogramme – 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
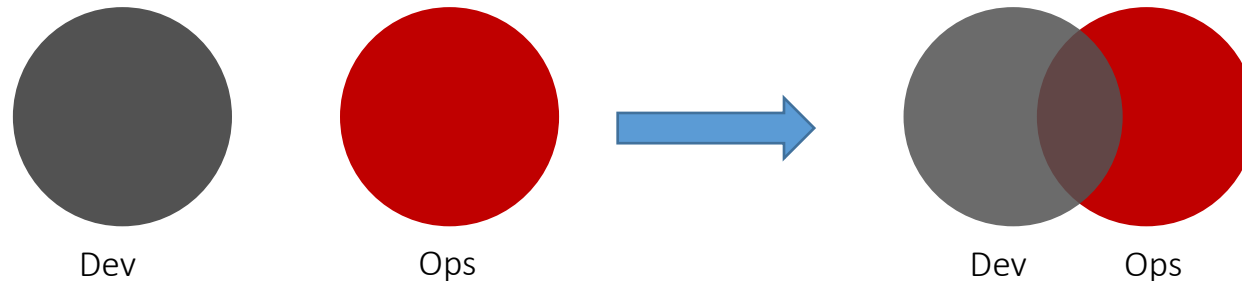
- How can we support organizations in customizing DevOps for their purposes? How can we help organizations in adopting it?
- As we control Ops, to shorten time to market, we can tolerate failures provided that we cope with them quickly. How can we keep such process under control?
- We need to change 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?

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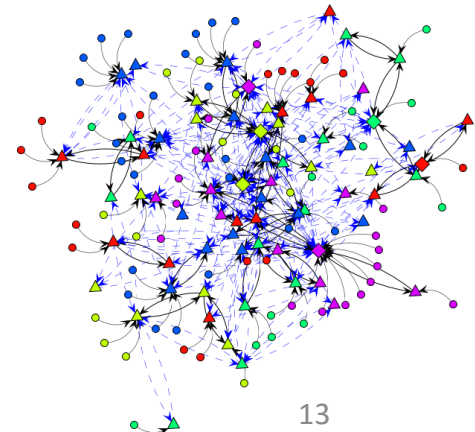
Privacy and security

- *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

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

The Egg, Brussels.
Floor Plan.