Advanced Topics in Service-Oriented Computing and Cloud Computing

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Outline

- Why do we need this course?
- What is the course about?
- Course administrative information
Services offer well-defined interfaces for consumers to
- access resources: contents, things, machines, and people
- provide functions: computation, networking, sensing, actuating, analytics, etc.
- offer diverse types of business models: pay-per-use, and subscription

Services are associated with and characterized by scalability, reliability, elasticity, etc.
Services are provisioned in distributed systems of IoT, edge/fog and cloud infrastructures
Services computing

Large-scale, distributed computational infrastructures and software systems

- Things
  - Software
  - People

Size matters
- Large-scale interactions
- Big data generated and consumed
- Big quantities to be managed
- Hard to control quality of data and services

Any * access behaviour does matter
- Unpredictable workload
- Scalability
- Elasticity
- Software-defined *

Economic factors do matter
- On-demand, pay-as-you-go
- Complex contracts
- Blockchain payment
Original definition from NIST

“This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.”

Internet of Things (IoT)

- Things and Objects
  - Home
  - Shops
  - Official Business
  - Hospital
  - Factory
  - Infrastructure
  - Etc.

- How to make such things and objects being connected and interacting each other?

Current trends in SOC and Cloud

- Integration of Internet of Things (IoT)/cyber-physical systems, Cloud computing, and Fog/Edge-centric computing
  - Dispersed computing in cities
  - Cloud robotics
  - Connected Cars/Electronic Horizon
  - Autonomous cars/unmanned aerial vehicle (UAV)
  - Smart contracts with blockchain + IoT
  - IoT + Machine learning
Current trends in SOC and Cloud

- Intelligences from human and machines
  - Analytics services atop big data infrastructures

- Infrastructures for big data analytics + human interaction + artificial intelligence

- Human-centric robotics

- Predictive maintenance

- Cloud manufacturing + business service integration
Complex requirements and SOCloud focus

- Some key issues
  - High availability, data sharding, geographical multi-cloud/ and fog-edge load balancing, automatic formation of on-demand data centers and of IoT/edge services, etc.
  - Horizontal scalability in big data, elasticity coordination in multi-cloud environments, elasticity algorithms for fog and network function virtualization (NFV)
  - Complex connectivity and execution models
  - Algorithms for large-scale data ingestion/big data.
  - Performance and reliability monitoring and analysis

- Gaps between theoretical concepts and practical applications of advanced algorithms and techniques
Logistics scenario from DHL

Figure source: DHL Trend Research & Cisco Consulting Services, INTERNET OF THINGS IN LOGISTICS, 2015
Industrial internet


SOCloud Winter 2018
Video analytics + business applications/public security

Use Case 3: Video Analytics

Figure 4: Example of video analytics

Figure source:
We study and explore complex algorithms and techniques in SOC, Cloud, Fog/edge, and Big data systems.

It is a kind of “advanced distributed systems and software systems” focused SOC, Cloud, and fog/edge environments.
SOCloud – relevant courses

- Advanced Internet Computing
  - Give you some advanced technologies about SOC, Cloud Computing and (business) processes/workflows

- Advanced Services Engineering
  - Focus on services engineering techniques atop IoT, big data and clouds

- Distributed Systems Technologies:
  - Give you fundamental distributed technologies and how to use them for complex software systems
Course administration (1)

- Lectures + participant’s presentations + discussions
  - Held through the whole semester
  - But not every week – check the course website!
  - Make sure you reserve all slots for changes

- Who could participate in the course?
  - Master students in advanced stages (e.g., seeking for master thesis) in informatics and business informatics
  - PhD students: normal PhD track, PhD School of Informatics, and Doctoral Colleges
  - Students should have knowledge about fundamental distributed systems, internet computing and distributed computing technologies
Course administration (2)

- Learning methods
  - Discussion, individual and team work, literature and practical studies

- Evaluation methods
  - Assignments and a final examination

- Assignments
  - 4 home assignments resulting in some analysis summaries (presentations) and discussions
    - Each assignment: 10 points for presentation content and 10 points for answers/questions

- Oral final exam
  - Flexible – 30 minutes
Grades

- Assignments: 80 points
- Final oral examination: 20 points

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Failed ? → retake the final oral examination part!
THANKS! ANY QUESTION?
Thanks for your attention

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