COURSE DESCRIPTION CARD - SYLLABUS

Course name
Cloud Systems [S2Inf1-GiTI>SCHMUR]

Course

Field of study
Computing

Year/Semester
2/3

Area of study (specialization)
Games and Internet Technologies

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr hab. inż. Jędrzej Musiał prof. PP
jedrzej.musial@put.poznan.pl

Lecturers

Prerequisites

A student beginning this course should have basic knowledge of algorithmization methods, programming constructs, abstract data types (e.g. lists, stacks, queues, trees, arbitrary graphs), typical algorithms (e.g. sorting, data retrieval), basic knowledge of computational complexity of problems and algorithms, as well as knowledge of computer networks and distributed computing. He/she should have the ability to solve basic algorithmic problems, program solutions to these problems, estimate the complexity of algorithms, and the ability to obtain information from indicated sources. He should also have advanced programming skills in various programming environments and languages. He should also understand the necessity of broadening his competencies and be ready to cooperate within a team. Moreover, in terms of social competence, a student should demonstrate such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

To learn selected topics about cloud systems, in particular: 1. to provide students with basic knowledge about the principle of cloud systems and how to implement network infrastructure. 2. demonstration of cloud technologies (such as e.g. AWS, Azure, Google Cloud, OpenStack, vSphere) in different types of services (Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and other "X as a service"). 3. introduce "big data" warehouses and data storage management. 4) To discuss the principle of creating a network of computing centers (using the example of Facebook computing centers and others). 5) Illustrate the complex aspects of implementing computing and running cloud computing centers. 6) Presenting current trends and latest solutions that positively affect the principle of sustainable development - electricity consumption and ways to reduce it. 7. to indicate challenges and problems associated with the use of cloud environments: legalization/law, security, risk management.

Course-related learning outcomes

Knowledge:
1. has structured and theoretically grounded general knowledge related to key issues of distributed computing [k2st_w2].
2. has advanced detailed knowledge about cloud computing issues related to such technologies as aws, azure, google cloud, openstack, vsphere [k2st_w3].
3. knows development trends and the most significant new developments in computer science - especially in the field of distributed computing centers [k2st_w4].
4. knows economic, legal, and other conditions of cloud computing companies" activity [k2st_w8].

Skills:
1. is able to acquire information from literature, databases and other sources (in polish and english), integrate them, interpret and critically evaluate, draw conclusions and formulate and fully justify opinions [k2st_u1].
2. is able to plan and carry out experiments related to the implementation of computational tasks in a cloud environment: including measurements and computer simulations, interpret the obtained results and draw conclusions, as well as formulate and verify hypotheses related to complex engineering problems and simple research problems [k2st_u3].
3. is able to assess the usefulness and applicability of new achievements (methods and tools) and new computer products [k2st_u6].
4. is able - using, among others, conceptually new methods - to solve complex computer tasks, including atypical tasks and tasks with a research component - using advanced distributed / cloud computing systems [k2st_u10].

Social competences:
1. understand that in computer science knowledge and skills become obsolete very quickly [k2st_k1].
2. understand the importance of using the latest knowledge in computer science (including cloud computing systems) in solving research and practical problems [k2st_k2].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomespresented above are verified as follows:
Formative assessment:
(a) in lectures:
- Based on answers to questions on material discussed in lectures;
b) in terms of the laboratory:
- based on the assessment of the current progress of the tasks,
- based on the work activity while solving the tasks.
Summative assessment:
Verification of the assumed educational effects is realized by:
a) in terms of lectures:
- assessment of knowledge and skills from the written test.
b) in the scope of the laboratory:
- evaluation and defense by students of prepared tasks - projects.
Obtaining additional points in the laboratory for:
- discussing additional aspects of the presented issues, not presented in class;

- the use of skills and knowledge from outside the curriculum to solve the tasks;
- remarks allowing to improve the didactic process.

Programme content

The course curriculum includes the following topics:
- Basic knowledge of cloud system principles and how to implement network infrastructure.
- Demonstration of cloud technologies (such as e.g. AWS, Azure, Google Cloud, OpenStack, vSphere) in different types of services (Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and other "X as a service").
- Introduce "big data" warehouses and data storage management.
- Discussing the principle of creating a network of computing centers (using Facebook and other computing centers as an example).
- To present complex aspects of implementing computing and running cloud computing centers.
- Presenting current trends and latest solutions that positively influence the principle of sustainable development - electricity consumption and ways to reduce it.
- To indicate the challenges and problems associated with the use of cloud environments: legalization/law, security, risk management.
During laboratory classes, students learn about cloud programming environments and different types of services/applications. They complete assigned programming tasks aimed at using distributed cloud environments.

Course topics

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- Basic knowledge of cloud system principles and how to implement network infrastructure.
- Demonstration of cloud technologies (such as e.g. AWS, Azure, Google Cloud, OpenStack, vSphere) in different types of services (Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and other "X as a service").
- Introduce "big data" warehouses and data storage management.
- Discussing the principle of creating a network of computing centers (using Facebook and other computing centers as an example).
- To present complex aspects of implementing computing and running cloud computing centers.
- Presenting current trends and latest solutions that positively influence the principle of sustainable development - electricity consumption and ways to reduce it.
- To indicate the challenges and problems associated with the use of cloud environments: legalization/law, security, risk management.
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Teaching methods

1.Lecture: multimedia presentation illustrated with examples given on the blackboard.
2. Laboratory exercises: practical familiarization with available technologies, programming of cloud applications, implementation of calculations, analysis of results, individual work as well as group work.

Bibliography

Basic
1. AWS Documentation - https://docs.aws.amazon.com/index.html?nc2=h_ql_doc_do_v
2. Azure Documentation - https://docs.microsoft.com/pl-pl/azure/
3. Google Cloud Documentation - https://cloud.google.com/docs/
4. Openstack Documentation - https://docs.openstack.org/
5. Vmware vSphere Documentation - https://www.vmware.com/products/vsphere.html#resources
Additional
1. Ruparelia N.B. (2016). Cloud Computing, MIT Press Essential Knowledge series, The MIT Press.
2. Guzek, M., Gniewek, A., Bouvry, P., Musial, J., Blazewicz, J. (2015). Cloud Brokering: Current Practices and Upcoming Challenges, IEEE Cloud Computing 2(2), 40-47.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	2,00