

Cloud App Development and Management

Code: 44735
ECTS Credits: 6

Degree	Type	Year	Semester
4318303 Research and Innovation in Computer Based Science and Engineering	OT	0	2

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Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Remo Lucio Suppi Boldrito

Pedro Luis Pons Pons

Prerequisites

It is recommended to have a basic knowledge of programming languages like Python and basic skills of any Linux distribution.

Objectives and Contextualisation

The objectives of the module:

- Solve data analysis problems with open source tools
- Understand tool data management limitations and learn criteria to select suitable tools for a specific problem
- Learn data query methodologies related to each technology
- Use Cloud Computing providers to solve data analysis problems
- Apply a data analysis methodology to solve practical problems

By the end of the lectures and practical labs students should have enough knowledge to understand the requirements of typical large data analysis problems in industrial contexts. They should be able to pick some combination of tools and design a solution for a given large data analysis problem. This subject is oriented to develop data problem solving skills. Languages, tools and techniques are described in a data analysis context and students will solve a list of data problems applying the technology described at every chapter.

Learning Outcomes

- CA14 (Competence) Graduates will be able to design reliable, efficient and secure data processing and storage systems, using cloud computing.
- CA15 (Competence) Graduates will be able to develop innovative research projects in the face of new scientific and engineering challenges using cloud computing.
- KA19 (Knowledge) Describe architectural principles in order to explain cloud-based applications and organise their services.
- KA20 (Knowledge) Identify the main services offered by cloud computing.
- SA24 (Skill) Develop computing systems based on cloud resources.
- SA25 (Skill) Develop a cloud application architecture for private or public services whilst managing resources, costs and security requirements.
- SA26 (Skill) Evaluate a prototype cloud application including its cost, resources, security and maintenance requirements over time.

Content

1. Introduction to Cloud Computing: benefits, challenges and risks.
2. Cloud Computing Models: Infrastructure / Platform / Software as a Service.
- 3-Virtual private cloud and node network configuration
- 4-Basic computation services
- 5-Basic storage services
- 6-Elasticity and scalability
- 7-Cost evaluation: TCO

Methodology

The methodology will combine classroom work and problem solving in laboratory sessions.

Lab sessions will be scheduled at the beginning of the course and will use the same Teams space for the development of all practical labs. Students will use a local Linux environment: native, using local or remote Cloud Computing services.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			

Lab	26	1.04	CA14, KA19, KA20, SA24, SA25, SA26, CA14
Theory	38	1.52	CA14, CA15, KA19, KA20, CA14
Type: Autonomous			
Lab development	62	2.48	CA14, KA20, SA24, SA25, SA26, CA14

Assessment

Evaluation will come out from the combination of work developed in the lab sessions.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Computational lab	40%	6	0.24	CA14, KA19, KA20, SA24, SA25
Elasticity lab	20%	6	0.24	CA14, CA15, KA19, SA26
TCO lab	20%	6	0.24	CA14, KA19, KA20, SA24, SA26
VPC lab	20%	6	0.24	CA14, KA20, SA24, SA25

Bibliography

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Chang, Fay, et al. "Bigtable: A Distributed Storage System for Structured Data." OSDI, 2006

Dewitt, David, and Jim Gray. "Parallel Database Systems: The Future of High Performance Database Processing." Communications of the ACM 35, no. 6 (1992): 85-98

Schwartz, Baron; Zaitsev, Peter; Tkachenko, Vadim; Zawodny, Jeremy D.; Lentz, Arjen; Balling, Derek J. "High Performance MySQL", O'Reilly, 2008.

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William E. Shotts. "The Linux Command Line". Second Internet Edition. 2013. <http://linuxcommand.org/tlcl.php>

Dan C. Marinescu. "Cloud Computing. Theory and Practice". Morgan-Kaufmann. 2018.

R. Buyya, R. N. Calheiros, A. V. Dastjerdi. "Big data. Principles and paradigms". Morgan-Kaufmann. 2016.

Software

Students will use latest version of Ubuntu Linux. During the first lab sessions students who need it will receive a configuration tutorial of Windows 11 WSL