Internet / cloud applications

Emphasis: Teleinformatics

NAME OF THE SUBJECT:
Internet / cloud applications

- Obligatory ( ): Basic ( ) Complementary ( )
- Elective (X): Intrinsic ( ) Extrinsic (X)

NUMBER OF ACADEMIC CREDITS: Four (4).

COURSE TYPE: THEORETICAL: ___ PRACTICAL: ___ THEORETICAL-PRACTICAL: _X_
Methodological alternatives:
Master Class (X), Seminar ( ), Seminar - Workshop (X), Workshop ( ), Practice (X), Tutored projects (X), Other: _____

Justification

SYNOPSIS OF THE SUBJECT:

In this academic space, epistemological positions are established that allow the student to be placed in an ecosystem of computer opportunities oriented to the so-called "Cloud Computing". Starting with project-based learning, the student will question the technical-commercial premises that precede cloud solutions and will participate in the definition of viable solutions that exploit the properties of the services deployed in the cloud.

JUSTIFICATION:

Contemporary companies face the challenge of rapid value generation to stay afloat in a highly competitive environment. The provision of information technology (IT) resources should avoid underutilization in times of low demand; or scarcity in periods of high demand. In some business models, the provision of such resources must be immediate and cannot wait for the chain of request, acquisition, installation, configuration and launch in production; this would generate inadequate management of opportunity costs.

Given this perspective, companies are migrating from an approach focused on the ownership of technological resources (CAPEX), to a model based on the consumption of resources on

demand (OPEX) that allows them to manage an IT ecosystem that is dynamic, in accordance with the business needs.

Cloud Computing is the provision on-demand of technological resources with a service-oriented perspective. A third party, called a service provider, is responsible for maintaining a complex ecosystem of IT resources and abstractly offering a set of functionalities that customers can consume relatively easily through the Internet or any TCP / IP network. Currently, with cloud computing you can obtain: infrastructure services (IaaS) such as network interconnectivity, virtual machines, storage systems; application platform services (PaaS) including operating systems, containers, middlewares, runtime environments; software services (SaaS), among a wide range of many other services that are contributing to a new paradigm of IT management and application development.

With the growth and stabilization of Cloud Computing, businesses saw an opportunity to reduce their IT management costs (moving from a CAPEX to OPEX model); and to migrate - some eagerly and others wisely - their application and technology layers to cloud service providers. As related benefits they would find agility in the appropriation of services, elasticity in IT resources, pay as use, concentrating on their own business domain and having a safe, updated, high availability and high performance ecosystem.

The complexity of the existing ecosystems, the presence of different providers, the emergence of architectural styles and models; and the need to integrate business domains (development and IT operations) that were previously naturally separated, pose an academic challenge to deliver a body of knowledge to students that allows them to establish informed and critical attitudes regarding the opportunities of Cloud Computing that exceeds business premises and enables them to participate in the design, development, testing, and deployment of software solutions in cloud environments.

PREREQUISITE: None

Content

GENERAL OBJECTIVE

Address multi-domain tensions that arise from integrating cloud computing into software product development processes.

SPECIFIC OBJECTIVES

- Analyze a fundamental set of cloud computing services, understanding their characteristics and appropriating its discovery, consumption, monitoring and cost management procedures.
- Examine the concepts, processes and activities related to the development culture of cloud projects.
- Understand the socio-cultural, technological, legal and epistemic implications of cloud computing.
- Participate in collective processes of development of applications on the cloud.

SYNTHETIC PROGRAM:

- Introduction to cloud computing.
    - Approach to the concept
    - Benefits of cloud computing
    - Weaknesses of cloud computing
- Service Models
    - IaaS
    - PaaS
    - SaaS
    - FaaS
- Cloud Oriented Application Architecture.
    - Service Oriented Architecture
    - Microservices
    - Patterns
- Development of Cloud Oriented Applications
    - Case study
    - Containerized model
    - Serverless model
- DevOps culture
    - Key features
    - Continuous Testing of Cloud Oriented Applications
    - Continuous Integration of Cloud Oriented Applications
    - Continuous Deployment of Cloud Oriented Applications

- Advanced Services
  - Big data
  - Fast data
  - Smart data
  - Machine learning
  - IoT

Strategies

METHODOLOGY:
This subject, as an academic space, is developed in multiple interaction scenarios that fosters the construction of knowledge within a socio-cultural approach. In this way, the interaction between participants in the educational act is of vital importance and is intended to manifest itself in a dialogical, intentional, social, conscious and systematic style of relationship, aimed at generating learning experiences that allow the student, through their interaction with others, build their own knowledge related to the proposed competences (Escobar, 2011).

At a procedural level, six (6) didactic units are proposed, each one using a mixture of the following approach:

- Project-based learning
- Collaborative learning
- Master classes
- Multiple execution environments
- Significant learning
- Socio-cultural immersion learning

The proposed projects - related to uses cases, are developed in group-based activities that recreate team practices in DevOps environments.

	Hours			Teacher hours / week	Student hours / week	Total Hours Student / semester	Academic credits
Type of course	DW	CW	AW	(DW + CW)	(DW + CW +AW)	X 18 weeks	
	3	1	8	4	12	192	4

Direct Presential Work (DW): classroom work in plenary session with all students.
Mediated-Cooperative Work (CW): Teacher tutoring work to small groups or individually to students.
Autonomous Work (AW): Student work without the presence of the teacher, which can be done in different instances: in work groups or individually, at home or in a library, laboratory, etc.)

Resources

BIBLIOGRAPHY:

- Asadi, Z., Abdekhoda, M. & Nadrian, H. (2020). Cloud computing services adoption among higher education faculties: development of a standardized questionnaire. Educ Inf Technol 25, 175–191.
- Dashofy E.M. (2019) Software Engineering in the Cloud. En: Cha S., Taylor R., Kang K. (eds) Handbook of Software Engineering. Springer.
- Zhang, G. y Ravishankar, M. (2019). Exploring vendor capabilities in the cloud environment: A case study of Alibaba Cloud Computing. Information & Management, Volume 56, Issue 3, Pags 343-35
- Marozzo, F. y Belcastro. L. (2019). Cloud computing for Big Data analysis. Disponible en https://www.researchgate.net/profile/Fabrizio_Marozzo/publication/322696851_Cloud_computing_for_Big_Data_analysis/links/5e4fa5a7299bf1cdb93956d8/Cloud-computing-for-Big-Data-analysis.pdf
- Baron,J., Baz, Hisham., Bixler,T., Gaut, B., Kelly, K., Senior, S y Stamper, J. (2018). AWS Certified Solutions Architect Official Study Guide. Sybex.
- Kim, G., Humble, J., Debois, P. y Willis, J. (2016). The Devops Handbook. IT Revolution Press.
- Felsen, N. (2017). Effective DevOps with AWS. Packt Publishing.
- Tankariya, V. y Parmar, B. (2017). AWS Certified Developer - Associate Guide. Packt Publishing.
- Raheja, Y., Borgese, G et al. (2018). Effective DevOps with AWS: Implement continuous delivery and integration in the AWS environment. Packt Publishing.
- Richardson, C. (2019). Microservices Patterns. Manning.
- Singh, P. (2018). Microservices and Containers. Addison-Wesley.

BIBLIOGRAPHIC RESOURCES:

- IEEE Database
- SPRINGER Database
- ELSEVIER Database

Course Schedule

Week /Unid	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Introduction to cloud computing	X															
2. Service Models		X														
3. Application Architecture			X	X	X											
4.Application Development						X	X	X	X	X	X	X				
5. DevOps Culture						X	X	X	X	X	X	X				
6. Advanced Services													X	X	X	X

Evaluation

ASPECTS TO EVALUATE

The student will be able to:

- Know the fundamental services of cloud computing environments.
- Describes basic architectures to support application execution in cloud computing environments.
- Set up a technology layer integrating cloud computing services from descriptions of the architecture.
- Understand the fundamental aspects of a development process for cloud-oriented applications.
- Identify architecture styles and models that are useful in cloud computing environments.
- Appropriate knowledge related to programming languages for the development of cloud applications.
- Develop applications oriented to cloud computing environments.
- Track the different elements that make up applications in cloud computing environments at runtime.
- Automate the testing, integration and deployment mechanisms of the developed applications
- Actively participate in work groups, assuming and respecting roles that promote organization, feedback and the execution of tasks conducive to achieving established goals.
- Critically argue the attitudes, knowledge and premises presented in the academic space.

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