		Teaching	g Guide		
	Identifying	Data			2022/23
Subject (*)	HPC on the Cloud Code			614473106	
Study programme	Mestrado Universitario en Computación de Altas Prestacións / High Performance Compu			uting (Mod. Presencial)	
		Descri	iptors		
Cycle	Period	Ye	ar	Туре	Credits
Official Master's Degree	1st four-month period	Fir	st	Optional	6
Language	Spanish		'		
Teaching method	Face-to-face				
Prerequisites					
Department	Departamento profesorado másterE	Enxeñaría de	Computadores		
Coordinador	Pardo Martínez, Xoán Carlos		E-mail xoan.pardo@udc.es		
Lecturers	Fernández Pena, Anselmo Tomás		E-mail	t.fernandez.pen	na@col.udc.es
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Web	aula.cesga.es/courses/MASTERHP	PC7			
General description	For several years, the use of paralle	el computing	architectures was a	fundamental aspect	that allowed the development of
	important areas in multiple fields of	basic and ap	plied science. How	ever, the high cost of	traditional parallel systems limited
	its use practically to large industries	s and research	h centers. The use	of low-cost computer	networks, as well as computing
	using connected infrastructures thro	ough the Inter	net, has been a pra	actical and cheap alte	ernative to large systems for some
	time. Thus, Cloud computing has er	merged as a p	paradigm of distribu	ited computing that c	hanges the way we use
	computers, allowing a transparent,	safe and chea	ap access to huge	computational resour	ces from anywhere in the world.
	The main objective of this subject is	s to introduce	the Cloud Computi	ng model, and how th	he field of High Performance
	Computing can use the cloud to dea	al with proble	ms that, until now,	were restricted to be	solved in large supercomputers.
	You will see different examples of h	now it is possi	ble to solve probler	ns in the field of High	Performance Computing using
	distributed services and resources a	accessible in	the cloud.		

	Study programme competences
Code	Study programme competences
A1	CE1 - Define, evaluate and select the most appropriate architecture and software to solve a problem
A6	CE6 - Know the available tools for the distributed systems computing
B2	CB7 - The students have to know how to apply the acquired knowledge and their capacity to solve problems in new or hardly explored
	environment inside wider contexts (or multidiscipinary) related to its area of development
B5	CB10 - The students have to possess learning skills that allows them to continue to study in a mainly self-driven or autonomous manner
В6	CG1 - Be able to search and select useful information to solve complex problems, using the bibliographic sources of the field
C1	CT1 - Use the basic technologies of the information and computing technology field required for the professional development and the
	long-life learning

Learning outcomes					
Learning outcomes			Study programme		
	COI	mpeten	ces		
The student will know the basics of cloud computing and service virtualization.	AJ6				
The student will know and learn to use the basic services provided by the main Cloud public providers.			CJ1		
	AJ6				
The student will know and know how to apply the main paradigms of distributed programming used in Cloud computing.		BJ2	CJ1		
	AJ6				
The student will know and learn to use the services and resources available in the cloud to prepare and execute applications	AJ6		CJ1		
in the field of high performance computing.					
The student will acquire the necessary skills for the search, selection and management of resources (bibliography, software,		BJ5			
etc.) related to Cloud computing in the field of high performance computing.		BJ6			

	Contents
Topic	Sub-topic Sub-topic
Introduction to Cloud Computing	
Cloud Computing services: virtual clusters	
Distributed processing models and frameworks	
Services for distributed processing in the cloud	

	Planning	J		
Methodologies / tests	Competencies	Ordinary class	Student?s personal	Total hours
		hours	work hours	
Guest lecture / keynote speech	A1 A6	24	0	24
Laboratory practice	A1 A6 B2 B5 B6 C1	12	63	75
Supervised projects	B2 B5 B6	0	40	40
Objective test	A1 A6 B2 B6	2	0	2
Personalized attention		9	0	9

	Methodologies		
Methodologies	Description		
Guest lecture /	In which the content of each topic is exposed. The student will have all the supporting material in advance (notes, slides,		
keynote speech	articles, etc.).		
Laboratory practice	The students will resolve diverse problems which allow them to practice the topics introduced in the keynote lectures.		
Supervised projects	The subject of an individual assignment will be agreed with the teacher and the student will elaborate it more deeply in an		
	autonomous way.		
Objective test	At the end of the term there will be an exam on the contents of the subject. The topics discussed in the theoretical and		
	practical classes will be evaluated in this exam.		

	Personalized attention
Methodologies	Description
Supervised projects	The personalized attention during the laboratory practices will serve to guide and check the students' work following the
Laboratory practice	indications they were given.
	To carry out the supervised assignments, students will be given the necessary initial indications and bibliographic references
	for consultation. During the elaboration, their progress will be monitored to offer additional guidelines to ensure the quality of
	the result according to predefined criteria.
	Every teacher will provide a tutorial schedule to resolve students' questions related to the topics of the subject. Students will
	be encouraged to take advantage of the tutorial sessions as a fundamental part of their learning process.

		Assessment	
Methodologies	Competencies	Description	Qualification
Objective test	A1 A6 B2 B6	The test may contain multiple-choice questions, short answers or problems related to	40
		the contents covered in the subject	
Supervised projects	B2 B5 B6	The supervised projects will be about some topic agreed between the student and the	15
		teacher. It will be evaluated the compliance with specifications, originality, personal	
		contribution, methodology, rigour and presentation of the results.	
Laboratory practice	A1 A6 B2 B5 B6 C1	It will be evaluated the degree of compliance with the specifications, methodology,	45
		rigour and presentation of the results.	



Assessment comments

In order to pass the subject, the student has to get a total score of 5 or higher.

Students that fail the subject can keep the marks of the labs and the supervised project in which they scored 5 or higher for the following year. Second opportunity (July) and extraordinary

The evaluation will be the same as in the first opportunity. Students will have a second deadline before the final exam to submit failed practical assignments.

Condition to be considered "Absent"

Not handing in any assignments and not taking the exam.

Fraud

The fraud regulation of the UDC will be applied in case fraud was detected in any assignment or in the exam.

	Sources of information
Basic	- Erl T., Puttini R. and Mahmood Z. Cloud Computing, Concepts, Technology & Concepts, Architecture (2013). Ed.
	Prentice-Hall White, T. Hadoop: The Definitive Guide, Storage and Analysis at Internet Scale, 4ª edición (2015).
	O'Reilly Media B. Chambers, M. Zaharia, "Spark: The Definitive Guide", O'Reilly, 2018
Complementary	- Foster, I. and Gannon, D.B. Cloud Computing for Science and Engineering (2017). The MIT Press. - Zaharia,
	M., Karau, H., Konwinski, A. y Patrick Wendell. Learning Spark: Lightning-Fast Big Data Analysis (2015), O'Reilly
	Media. - Karau, H., Warren, R,. High Performance Spark: Best Practices for Scaling and Optimizing Apache
	Spark, (2017). O'Reilly Media Foster, I. and Gannon, D.B. Cloud Computing for Science and Engineering (2017). The
	MIT Press Zaharia, M., Karau, H., Konwinski, A. y Patrick Wendell. Learning Spark: Lightning-Fast Big Data Analysis
	(2015), O'Reilly Media Karau, H., Warren, R,. High Performance Spark: Best Practices for Scaling and Optimizing
	Apache Spark, (2017). O'Reilly Media.

Recommendations
Subjects that it is recommended to have taken before
Parallel Programming/614473102
Subjects that are recommended to be taken simultaneously
High Performance Infrastructures/614473104
Subjects that continue the syllabus
Data Analytics with HPC/614473108
Other comments
Considering the strong interrelation between the theoretical and practical contents of the subject and the progressive introduction of new concepts

Considering the strong interrelation between the theoretical and practical contents of the subject and the progressive introduction of new concepts closely related to each other, it is advisable a weekly review to make the most of the subject. An intensive use of online communication tools will be encouraged: videoconference, e-mail, chat, etc.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.