

	UČNI NAČRT PREDMETA/COURSE SYLLABUS
Predmet	Porazdeljeno računanje in programiranje
Course title	Distributed Computing and Programming

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Poslovna informatika 1	Poslovna informatika	2./3.	4./5.
Business Informatics 1	Business informatics	2 nd /3 rd	4 th /5 th

Vrsta predmeta/Course type izbirni/elective

Univerzitetna koda predmeta/University course code

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30		15	15			6

Nosilec predmeta/Lecturer: Doc. dr. Sebastian Lahajnar

Jeziki/
Languages: **Predavanja/Lectures:** slovenski/Slovenian
Vaje/Tutorial: slovenski/Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: **Prerequisites:**

<ul style="list-style-type: none"> • Pogoj za vključitev v delo je vpis v 2. ali 3. letnik študija. • Študent mora pred izpitom opraviti obveznosti pri seminarskih in laboratorijskih vajah. 	<ul style="list-style-type: none"> • The prerequisite for participation is enrolment in the second or third year of study. • Students have to successfully accomplish all necessary tasks in tutorial and laboratory work before the examination.
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Vsebina:

Content (Syllabus outline):

<ul style="list-style-type: none"> • <i>Klasifikacija računalniških arhitektur</i> (po Flynn-u). • <i>Arhitekturi SIMD in MIMD.</i> • <i>Glavni programski modeli</i> ('shared memory', 'message passing', 'data parallel'). • <i>Problemska dekompozicija</i> (trivialna, funkcionalna, podatkovna/domenska). • <i>Analiza paralelnega procesiranja</i> (Amdahl-ov, Gustafson-Barsis-ov zakon). • <i>Osnove MPI</i> in primeri uporabe. • <i>Osnove 'open MP'</i> in primeri uporabe. • <i>Platformi alchemi in condor</i> skupaj z navodili za uporabo. • <i>Reševanje konkretnega problema s</i> 	<ul style="list-style-type: none"> • <i>Classification of computer architectures</i> (according to Flynn). • <i>SIMD and MIMD architecture.</i> • <i>Main programming models</i> ('shared memory', 'message passing', 'data parallel'). • <i>Problem decomposition</i> (trivial, functional, data/domain). • <i>Analysis of parallel processing</i> (Amdahl's and Gustafson-Barsis's law). • <i>Basics of MPI</i> and examples of use. • <i>Basics of 'open MP'</i> and examples of use. • <i>Alchemi and Condor platforms</i> together with instructions for their use. • <i>Solving a concrete problem</i> in the field of business and management with parallel
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področja upravljanja in poslovanja s paralelnim programiranjem.	programming.
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Temeljna literatura in viri/Readings:

Dobnikar, A.: Celularne strukture in sistemi. <http://laspp.fri.uni-lj.si/css>.
Pacheco, P. S. (1997). Parallel Programming with MPI. Morgan Kaufmann Publishers.
Pfister, G. (1998). In search of clusters, 2. izdaja, jan. 1998.
Roosta, S. H. (2000). Parallel Processing and Parallel Algorithms - Theory and Computation. Springer.
Snir, M. (1998). The MPI core, 2. izdaja, sept. 1998.

Cilji in kompetence:

Učna enota prispeva predvsem k razvoju naslednjih splošnih in specifičnih kompetenc:

- usposabljanje za raziskovanje na področju informatike v upravljanju in poslovanju ter razvoj kritične in samokritične presoje;
- fleksibilna uporaba znanja v praksi;
- sposobnost za reševanje konkretnih delovnih problemov na področju upravljanja in poslovanja;
- sposobnost uporabe informacijsko-komunikacijske tehnologije in sistemov na področju upravljanja in poslovanja;
- razumevanje bistva porazdeljenega procesiranja in ustrezne tehnologije;
- pridobivanje znanja s področja porazdeljenih arhitektur;
- pridobivanje znanja s področja porazdeljenega programiranja;
- novo znanje s področja systemske in specializirane programske opreme;
- spoznavanje programskih orodij za paralelno programiranje (MPI, open MP);
- pridobivanje praktičnih izkušenj za paralelno programiranje.

Objectives and competences:

The learning unit mainly contributes to the development of the following general and specific competences:

- the ability to carry out research in the field of informatics and business and the development of critical and self-critical assessment;
- flexible use of knowledge in practice;
- the ability to solve concrete work problems in the field of business and management;
- the ability to use information and communication technology and systems in the field of management and business;
- understanding of the essence of distributed processing and appropriate technology;
- knowledge in the field of distributed architectures;
- knowledge in the field of distributed programming;
- new knowledge in the field of systemic and specialised software;
- familiarisation with programming tools for parallel programming (MPI, open MP);
- practical experience in parallel programming.

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent/Študentka:

- spozna lastnosti različnih računalniških arhitektur;
- pridobi osnovno znanje s področja arhitektur za paralelno procesiranje;
- spozna glavne programske modele za paralelno programiranje;

Intended learning outcomes:

Knowledge and understanding:

Students:

- learn about the characteristics of various computer architectures;
- gain basic knowledge in the field of architectures for parallel processing;
- learn about the main programming models for parallel programming;

<ul style="list-style-type: none"> • se seznanjajo z različnimi problemskimi dekompozicijami; • pridobi ustrezno znanje o analizah paralelnega procesiranja; • dobi vpogled v programska orodja 'MPI' in 'OPEN MP'; • spozna platforme Alchemi in Condor; • spozna načine, kako uporabiti orodja in platforme za paralelno programiranje; • osvoji potrebne veščine za paralelno programsko realizacijo konkretnega problema s področja upravljanja in poslovanja. 	<ul style="list-style-type: none"> • are familiarised with different problem decompositions; • gain the appropriate knowledge about analyses of parallel processing; • gain an insight into the mpi and 'open mp' programming tools; • learn about the Alchemi and Condor platform; • learn about the ways of using tools and platforms for parallel programming; • gain necessary skills for parallel program realisation of a concrete problem in the field of business and management.
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Metode poučevanja in učenja:

Learning and teaching methods:

<ul style="list-style-type: none"> • <i>predavanja</i> z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov, obisk računskega centra); • <i>seminarske vaje</i> za utrjevanje znanja, reševanje konkretnih aplikacij, demonstracija uporabe programskih modelov v problemih upravljanja in poslovanja, spoznavanje različnih računalniških implementacij; • <i>laboratorijske vaje</i> za soočanje z računalniško tehnologijo, sistemi in napravami, potrebnimi za paralelne programske realizacije problemov s področja upravljanja in poslovanja; • individualne in skupinske <i>konzultacije</i> (diskusija, dodatna razlaga, obravnava specifičnih vprašanj); • <i>projektno delo</i> - priprava na individualno in skupinsko reševanje ustreznih problemov in programskih projektov. 	<ul style="list-style-type: none"> • <i>lectures</i> with active participation of students (explanation, discussion, questions, examples, problem solving, visit to a computer centre); • <i>tutorial</i> for recycling knowledge, solving concrete applications, demonstration of the use of programming models in problems related to management and business, learning about various types of computer implementation; • <i>laboratory work</i> for familiarisation with computer technology, systems and devices necessary for parallel program realisation of problems in the field of business and management; • individual and group <i>consultations</i> (discussion, additional explanation, dealing with specific issues); • <i>project work</i> - preparation for individual and group solving of appropriate problems and programming projects.
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Delež (v %)

Načini ocenjevanja:

Weight (in %)

Assessment:

Način (pisni izpit, ustno spraševanje, naloge, projekt):		Types (written examination, oral examination, coursework, project):
<ul style="list-style-type: none"> • pisni (ustni) izpit • seminarska naloga s predstavitevijo in zagovorom 	<p>60</p> <p>40</p>	<ul style="list-style-type: none"> • written (oral) exam • seminar presentation and defence