

Faculty: Telecommunications and Management
Department: Information Technologies
Professional Field: 5.3 Communications and computer technologies.
Specialty: Computer administration of software applications
Educational-qualification degree: Prof. Bachelor

LEARNING COURSE DESCRIPTION

- 1.Course title:** Introduction to cloud technology
2.Course code: P.16.039.2
3.Type of the course: elective
4.Level: Prof. Bachelor
5.Year of study: 3
6.Semester: 5
7.Number of credits: 6
8.Name of the lecturer: Assist. Prof. Strahil Sokolov, Eng. PhD
9.Course learning outcomes:

The aim of the course is to give the students a systematic overview of the theoretical and practical knowledge about the different technologies of virtualisation in cloud services. Students who have completed their training in the discipline must acquire knowledge and be able to identify the main steps in virtualization technology; Understand and be able to explain the basic concepts of cloud services Know and be able to explain the main features of cloud application development To be able to identify their advantages and disadvantages, incl. to be able to indicate when it is appropriate to use cloud services and when not. To know the application development processes in a cloud environment; Know the programming model of at least one public cloud service; To master application development and deployment tools in cloudy environments; Be able to troubleshoot, test and analyze their applications; Be able to indicate which are the main security considerations for cloud applications.

Students who have completed their training in the discipline must acquire:
Basic knowledge:

- Be able to indicate the main steps in virtualization technology;
 - To understand and be able to explain the basic concepts in the field of cloud services
 - To know and be able to explain the main features of cloud application development
 - To be able to point out their advantages and disadvantages, incl. be able to indicate when it is appropriate to use cloud services and when not.
- Practical skills:

- To know the processes of application development in a cloud environment;
- To know the program model of at least one public cloud service;
- To master tools for development and deployment of applications in a cloud environment;
- Be able to troubleshoot, test and analyze their applications;
- Be able to indicate the main security concerns of cloud applications.

Competencies: Upon successful completion of the course students should be able to:

- to build and maintain services in a cloud environment;
- construct cloud service management solutions;
- to identify and eliminate malfunctions;
- Demonstrate confident performance in Chef server-based environments.

10.Teaching methods:

The method of teaching is through lectures, block or one lesson per week for 15 weeks and practical exercises in block or one lesson per week for 15 weeks.

11. Prerequisites:

Students should have prior knowledge of programming basics, cryptography, computer architectures and computer networks.

12. Course contents:

The discipline explores an Introduction to cloud technologies. Basic concepts and definitions. Virtualization. VirtualBox. Vagrant. Xen. KVM. ESX. Infrastructure as a Service (IaaS). Amazon EC2. Azure virtual machine. Digital Ocean.

Infrastructure as a service (IaaS). Google Compute Engine. OpenStack. Platform as a service (PaaS). Cloud Foundry. OpenShift. The Heroku Platform. Deis. Concept of images and containers, differences with a virtual machine. Micro OS for containers. Atomic Host. CoreOS. VMware Photon. RancherOS. Presentation of Docker and basic operations. Container management. Docker Swarm. Kubernetes. Deployment of containers: Mesos. Nomad by Hashicorp. Amazon ECS. Google Container Engine. Azure Container Service

Fixed-purpose OS kernels (Unikernels). Advantages and disadvantages. Difference with a virtual machine. Micro services. Container as a service (CaaS). Docker universal control panel. OpenStack Magnum Project. Program-Defined Network (SDN). Container net. Manage Networks for Docker. Program-Defined Storage (SDS). Managing container repositories. Ceph. Cluster. DevOps Practices for Continuous Deployment (CD) and Integration (CI). Jenkins. Dron. Travis CI. Shippable. Cloud Infrastructure Configuration Management Tools.

13. Bibliography

Basic literature:

1. Bahga, Arshdeep, and Vijay Madisetti. **Cloud computing: A hands-on approach.** CreateSpace Independent Publishing Platform, 2013.
2. Rafaels, Ray J. *Cloud Computing: From Beginning to End.* CreateSpace Independent Publishing Platform, 2015.

Additional literature:

1. <https://learn.chef.io/tutorials/manage-a-node/rhel/bring-your-own-system/run-chef-client-periodically/>
2. https://courses.edx.org/assetv1:LinuxFoundationX+LFS151.x+2T2016+type@asset+block/LFS151x_Syllabus.pdf

14. Assessment methods and criteria:

The course ends with an exam.

1.Requirements for the assessment of the six-point system

The total number of points from the written exam that can be reached is 100. Each of the questions in the final exam carries 3 points, and the answer to the open question can carry up to 10 points.

2. Formation of the final mark

The formation of the final grade is carried out on the basis of a point system as the maximum number of points that students can receive is 100 and can include various activities.

Forming an assessment in the training course at each of the above stages, according to the points obtained and their ranking according to the six-point system is given in Table 1.

Table 1.

Number of points	Assessment According to the 6-pointScale System
0 – 20	Fail 2 (F)
20 – 39	Fail 2 (FX)
40 – 49	Satisfactory 3.00 (E)
50 – 59	Satisfactory 3.00 (D)
60 – 69	Good 4.00 (C)
70 – 84	Very good 5.00 (B)
85 – 100	Excellent 6.00 (A)

15. Language of instruction:Bulgarian/English