Course Specifications

Valid as from the academic year 2023-2024

Operating Systems (E761060)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0   **Study time** 180 h

Course offerings and teaching methods in academic year 2023-2024

| A (semester 2) | Dutch | Gent | lecture |
| | | | seminar |

Lecturers in academic year 2023-2024

| Van Den Breen, Wim | TW05 | lecturer-in-charge |

Offered in the following programmes in 2023-2024	crdts	offering
Bachelor of Science in Engineering Technology(main subject Information Engineering Technology)	6	A
Linking Course Master of Science in Information Engineering Technology	6	A
Preparatory Course Master of Science in Information Engineering Technology	6	A

Teaching languages

Dutch

Keywords

Architecture of operating systems, proces and memory management, concurrency, processor scheduling, I/O management. Unix, scripting languages, system programming

Position of the course

The course is made out of two parts: architecture of modern operating systems and the Linux operating system (system programming and the scripting language bash)

- Architecture of operating systemsStudy of the architecture and of the basic principles of modern operating systems. Acquire experience in order to better understand how to manage computer systems.
- study of the Linux operating system.
- Getting acquainted with how the Linux operating system is internally structured and how it functions. Using the bash scripting language students will learn to perform the most important management tasks.

Contents

Architecture of Operating Systems:

- Basis principles of computer architecture: interrupts, kernel mode and user modus, the memory hierarchy, caching
- Process Management: symmetric and asymmetric multiprocessing, multitasking, process states and transitions, process control information, process identification and processor state information, process creation and switching, kernel-level and user-level threads, process scheduling
- Concurrency: mutual exclusion, process synchronisation, semafores, sequencers and event counters, monitors, deadlocks
- Memory management: adressing and adress translation, paging and segmentation, virtual memory, pagefaults

Linux

- Scripting for system administration (basic bash commands, variables and parameters, expressions, conditional and iterative loops, input and output, processing large log files)
- System programming (universal I/O interaction, memory layout of processes, virtual memory management, process creation and termination, child processes, thread creation and termination, using pipes, using semaphores)

Initial competences

Strict prerequisites: none

Advisory initial competences: Knowing the basic technologies of computer technology. Being able to write error-free programs in C/C++, making using of pointers

Final competences

1. Understand how the concept a of process implements multitasking, and how it is supported by an 1 operating system.
2. Assess whether or not an application should use multiple threads, and, if so, which model should be 1 followed.
3. Understand which alternatives an operating system has to perform its scheduling tasks.
4. Master various techniques to treat concurrency problems.
5. Apply semaphores correctly for mutual exclusion and process synchronization.
6. Understanding how both an operating system and an application can handle deadlocks
7. Understand memory management models, and the techniques they use.
8. Understand and configure the inner workings of the Linux operating system.
9. Master the Linux and UNIX programming interface

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Extra information on the teaching methods

architecture and linux: lecture

Linux system programming and the scripting language bash: lecture + practical PC room classes

Learning materials and price

course in dutch (ca. 5 euro). Additional presentation material (slides), used during lectures, is available on Ufora. Exercises and their solutions are posted on the electronic learning environment.

References

- Deitel, Harvey M., Deitel, Paul J. en Choffnes, David R., Operating Systems, Prentice Hall, 2004, ISBN 978-013182827-8.
- O'Gorman, John, Operating System with Linux, Palgrave, 2001, ISBN 978-033380288- 5.
- Silberschatz, Abraham, Galvin, Peter Baer en Gagne, Greg, Operating System Concepts Essentials, Wiley, 2013, ISBN 978-1118804926.
- Kerrisk, Michael, The Linux Programming Interface, No Starch Press, 2010, ISBN 978-1593272203

Course content-related study coaching

An appointment with the lecturer can always be made

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Skills test, Written assessment with open-ended questions

Examination methods in case of periodic assessment during the second examination period

Skills test, Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Calculation of the examination mark

45% written examination

55% % examination with exercises on computer