

PHYSICAL MEASUREMENTS, COMPUTING AND SCIENTIFIC CULTURE 2 FIELD_9 ECTS

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Introduction to networks

Introducing

Description

The course introduction provides a general overview of network applications and their communication needs, followed by an overview of networks and their interconnection within the Internet. The central part of the course presents and illustrates the fundamental concepts associated with network design: connectivity, resource sharing, switching, quality of service and architecture (including the concepts of service and protocol). These concepts are illustrated and explored in depth within the framework of standardized local area networks and their connection to the TCP/IP Internet. A case study on Ethernet local area networks connected to the Internet (networks used in the practical work rooms) punctuates the course. The concepts are illustrated in tutorials and practical work.

Objectives

This course focuses on computer networks (local area networks, wide area networks and the Internet) from the perspective of their main concepts: connectivity, addressing, resource sharing + loss models, switching / routing + desequencing models, quality of service, architecture / service / protocol, basic protocol mechanisms.

Necessary prerequisites

C Language, Operating System, Algorithms and Programming Courses

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Practical info

Location(s)

 Toulouse

C language and networks

Introducing

Description

The course is structured in two parts :

The first part presents the Socket Programming Interface (Socket API), the basic technology for coding a distributed application (particularly on) the Internet.

The second part consists of a programming project for a distributed client/server application on the Internet.

The objectives are assessed based on a project report and an assessment of student engagement during the practical sessions. An individual written exam may complete the validation of theoretical skills.

Objectives

At the end of this module:

- The student should have understood and be able to explain the fundamental concepts associated with programming distributed applications on the Internet via the Socket API
- The student should be able to use the Socket API to develop (in C language) a distributed client/server application on the Internet

Necessary prerequisites

Introduction to Operating Systems

Introduction to Computer Networks (3rd year IMACS)

C Language (3rd year IMACS)

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Practical info

Location(s)

 Toulouse

Databases

Introducing

Location(s)

 Toulouse

Description

The aim of this course is to study relational databases. The fundamental concepts of the relational model are studied. The emphasis is then placed on relational algebra and the SQL language for manipulating and querying databases.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- The different data models, their advantages and limits
- What is DBMS (Database management system)
- The different concepts of the relational model
- Data integrity constraints
- Relational algebra and SQL languages

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Practical info

Assembly language

Introducing

Description

Definition and role of assembly language among programming tools.

Generic assembly language notions: data operations (arithmetic, logic), memory access (addressing modes), execution control (conditional processing).

Application to ARM architecture.

Subroutine calls and returns, role of the stack, interrupts, special case of ARM architecture.

Conventions for calling functions, passing arguments, return values, context preservation.

Development of mixed C-language and ARM-language applications

Objectives

At the end of this module, the student should have understood and be able to explain (main concepts):

- o Von Neuman model
- o Computation, storage, input-output circuits, control unit, interrupt mechanism, instruction-level pipeline execution
- o Instruction set and assembly language programming
 - o Elements of a development chain : compiler, assembler, linker, loader, debugger

The student should be able to:

- o Understand the principles of instruction set creation
 - o Develop an assembly language program on a microcontroller
- o Use cross-development tools

Necessary prerequisites

1st year Algorithms and Programming.

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Practical info

Location(s)

 Toulouse

Hardware architecture



ECTS



Hourly volume
55h

Introducing

functional description (processor, memory, caches).
- C language.

Description

- Description and programming in Arm and x86 assembly languages.
- Description and use of a standardized C compilation chain via scripts, as well as the use of associated debugging tools.
- Description and analysis of the main aspects of the software's lower layers (function calls, data storage, associated security aspects) at C and assembly language level.
- Description and optimization of the use of hardware resources, particularly memory.
- Description and analysis of hardware vulnerabilities.

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Practical info

Location(s)

Toulouse

Objectives

At the end of this module, students will be able to program in assembly language, identify and correct software problems (resource under-utilization, bugs) in C and assembly language, and identify potential hardware vulnerabilities.

Necessary prerequisites

- Knowledge of computer architecture and internal

Numerical culture and skills 2

Introducing

Description

The flow of Machine Learning
Data preparation
Machine Learning Terminology
Data types
Data visualization, quality and size
Reliability
Some activation functions
Model performance
Environmental impact

Objectives

At the end of this module, which follows the 2A module, the student will have consolidated his knowledge of the field of AI: accuracy, loss function, overfitting, batch size, visualization techniques... He will also have prepared and passed a PIX certification.

Necessary prerequisites

Basics of Python programming

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Practical info

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