Databases

Introduction to the Databases Course

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Bachelor in Informatics Engineering
Department of Informatics Engineering
University of Coimbra
2021/2022

Databases Course

- Scientific Domain: Computer Science / Informatics
- Program: Bachelor in Informatics Engineering
  - *Licenciatura em Engenharia Informática* (LEI)
- Curricular Year: 2nd
- Semester: 2nd
- ECTS: 6 = 162 hours of effort
- Effort:
  - Theoretical (T): 2:00h per week, total effort of 26 hours
  - Theoretical-Practical (TP): 1:00h per week, total effort of 13 hours
  - Practical Labs (PL): 2:00h per week, total effort of 26 hours

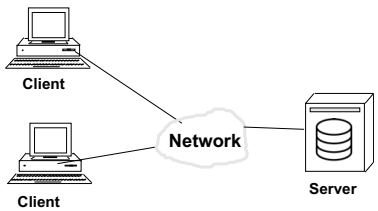
The Team

- Course coordination, T and TP classes:
  - Nuno Antunes
  - Email: *nmsa@dei.uc.pt*
  - Office: D2.5
  - Office hours: Wednesday, 14:00h to 18:00h
    or at any other time; just send me an email and we will find a time slot

- PL classes:
  - João Campos <*jrcampos@dei.uc.pt*>
  - José D'Abruzzo Pereira <*josep@dei.uc.pt*>
  - Hugo Amaro <*hamaro@dei.uc.pt*>
  - Nuno Laranjeiro <*cnl@dei.uc.pt*>

What will you learn?

- What is a (relational) database?
- How to install a database server?
- How to design a database schema?
- How to develop a database application?
  - Including database specific languages
- What are the main database administration tasks?
  - Including security challenges



Syllabus – T & TP Classes

- Relational Model & Structured Query Language (SQL)
- Entity-Relationship Model
- Functional Dependencies and Database Normalization
- Transactions and Concurrency Control
- Development of Database Applications

Syllabus – T & TP Classes

- Data Storage and Indexing
- Database Performance Tuning and Query Optimization
- Database Administration and Security
- Data Warehouses and OLAP
- Big Data Storage and NoSQL Databases

Syllabus – PL Classes

- Installing a Database Management System (DBMS)
- SQL
- Entity-Relationship Model
- Transactions and Concurrency Control
- Procedural SQL (PL/pgSQL)
- Database Indexing and SQL Tunning

Some time devoted to monitoring/assessing the status of the practical assignment!

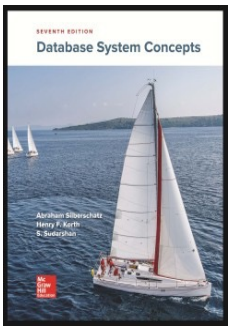
Schedule for the Semester

Week		T	TP	PL
1	14/02/2022	Introduction to Databases	Introduction to SQL	Installing a DBMS (PostgreSQL)
2	21/02/2022	Relational Model & SQL	Developing a Simple Database Application	SQL
3	28/02/2022	Entity-Relationship Model	Entity-Relationship Model	SQL
4	07/03/2022	Entity-Relationship Model	Entity-Relationship Model	SQL
5	14/03/2022	Functional Dependencies and Database Normalization	Functional Dependencies and Database Normalization	SQL
6	21/03/2022	Transactions and Concurrency Control	Transactions and Concurrency Control	Entity-Relationship Model
7	28/03/2022	Transactions and Concurrency Control	Transactions and Concurrency Control	Project: Midterm Presentation
8	04/04/2022	Development of Database Applications	Introduction to Procedural SQL (PL/pgSQL)	Transactions and Concurrency Control
9	18/04/2022	Data Storage and Indexing	Database Indexing (cont. T lesson)	PL/pgSQL
10	25/04/2022	Database Performance Tuning, Query Execution, and Indexing	Database Indexing	PL/pgSQL
11	02/05/2022	Database Administration and Security	SQL Tuning	PL/pgSQL
12	09/05/2022	Data Warehouses and OLAP	Data Warehouse Modelling	Database Indexing and SQL Tunning
13	16/05/2022	Big Data Storage and NoSQL Databases	Data Warehouse Modelling	Reserved for Defenses

Small adjustments might happen

Bibliography

- Slides and other materials
  - Will be provided during the semester
- Documentation from DBMS providers
  - PostgreSQL, Oracle…
  - Available online
- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 7th Edition, McGraw Hill Education, 2019
  - https://www.db-book.com/db7/
- Carlos Coronel, Steven Morris, "Database Systems: Design, Implementation, and Management", 12th Edition, Cengage Learning, 2017



Format for the Lessons

- Theoretical (T): Friday, 14h – 16h
  - Present and discuss key concepts, including demos and examples
- Theoretical-Practical (TP): Friday, 16h – 17h
  - Application of concepts in concrete examples / exercises
- Practical Labs (PL): 8 different classes / slot
  - Hands-on, exercises, discussion…
  - **Download the materials before class!**
  - Arrive on time for the lessons!
  - If you have a question, just ask!
- You are responsible for marking your presence at *ucstudent*

Format for the T & TP Lessons (Fridays)

- T lesson starts at 14:15h
- Break at 15:45h
- TP lesson starts at 16h
- Three slots for Q&A (doubts and discussion)
- We may end-up mixing T and TP lessons

Assessment

- Exam:
  - Weight: 12 points (minimum of 35%)
  - Without consultation
- Practical Assignment / Project:
  - Weight: 8 points (minimum of 35%)
  - Groups of 2 or 3 (no other option is accepted)
  - Statement of Work: week of Feb. 28
  - Mid-term deadline: March 27 (defenses in W7 PL classes - 20% of the grade)
  - Final deadline: May 16 (defenses in the following days - 80% of the grade)
  - Submission at *inforestudante* for both mid-term and final submissions

Effort Distribution

Activity	Hours Estimated
Theoretical classes (T)	26
Theoretical-Practical (TP)	13
Practical Labs (PL)	26
Practical Assignment / Project	40
Independent study	55
Exam	2
Total	**162**

6 ECTS ⇔ 162 hours of work

Resources and Generalities

- Resources made available at *inforestudante*
- Attending classes is of utmost importance!
  - You are responsible for marking your presence at *ucstudent*
- **Plagiarism and fraud** → Immediately fail the course + disciplinary procedure FCTUC
- Questions → Talk to one of the professors whenever necessary
- Your *feedback* is always welcome ☺

Q&A

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