Files and data bases

Academic Year: (2019 / 2020) **Review date: 08-05-2020**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: CALLE GOMEZ, FRANCISCO JAVIER

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Programming
- Algorithms and Data Structures
- Computer Structure

OBJECTIVES

This course aim is to understand the need of secondary storage, to learn the wide diversity of solutions and to become skilled at choosing and implementing the most appropriate in each case.
Agenda will cover the physical level from elementary to the Relational Model for database management. To achieve these objectives, the student must acquire a set of generic capabilities, knowledge, skills and attitudes.

1.- Cross/Generic Capabilities
- o Analysis and synthesis abilities (PO a)
- o Organize and plan abilities
- o Troubleshooting (PO c, e)
- o Teamwork (PO d)
- o Ability to apply knowledge in practice (PO c, e, k)

2.- Specific Capabilities
- o Cognitive (Knowledge) (PO a)
  - Fundamentals of Databases
  - Basic File Structures
  - Relational Data Model
- o Procedural/Instrumental (Know how) (PO a, b, c, e, g, k)
  - Abstraction and design of an information system using the Relational Model
  - Use of tools provided by RDBMS for creating, operating and controlling DB
  - Develop and implement tests for proving correctness and benefits of a database design.
  - Plan and manage adequate physical organizations for an information system
  - Implementing File Structures (on RDBMS and prog. languages)
  - Evaluate the performance of diverse physical structures
- o Attitudinal (To be) (PO c, i)
  - Ability to create designs (creativity)
  - Concerns about the effectiveness
  - Concerns about the efficiency
  - To discuss and clarify the diverse solutions to a problem

The aimed competences are of diverse type: basic (CB2), general (CG1, CG2, CG3, CGB4) and specific (CECRI5, CECRI7, CECRI12, CECRI13).

DESCRIPTION OF CONTENTS: PROGRAMME

The descriptors associated with the subject are: File structures serial, sequential, hashed and indexed. Multidimensional access. Relational Data Model. Database Management Systems for Relational Databases. SQL database language: definition and manipulation.

The program features the following agenda:

ITEM 1. Introduction to Data Bases
Storage and Files: Physical vs. Logical focuses
Definition of Database

ITEM 2. The Relational Statics
Elements of the Relational Model. Description and notation.
Inherent vs. Semantic Constraints
Normalization of RDBs

ITEM 3. The Relational Dynamics
Relational Algebra
Data Manipulation through SQL

ITEM 4. Advanced Relational
Views
Triggers

ITEM 5. Introduction and Basic Concepts
File Design. Goals of Physical Design.
Selection vs. Location

ITEM 6. Base Structures
Basic structures: Serial and Sequential
Hashing
Clusters

ITEM 7. Auxiliary Structures
Indexed Organization
B Tree-structured indexes
Special Indexes
Index supported Processes

ITEM 8. Data Base Management Systems
Architecture and Fundamentals of the RDBMS Oracle
Database Administration, Control and Tuning
Concurrence in RDBMS

ITEM 9. Storage Paradigms
Description of Needs and Storages
Comparative of SQL and NoSQL solutions
BigData

LEARNING ACTIVITIES AND METHODOLOGY

- Theoretical classes: 1 ECTS. Aim to achieve the specific cognitive skills of the subject
. (PO a)
- Practical Lessons: 1 ECTS. Develop specific instrumental skills and most of the cross capabilities, such as teamwork, to apply knowledge to practice, to plan and organize, and to analyze and synthesize. They are also aim to develop specific attitude skills, such as understanding the design and development of an information system. (PO a, c, e, g)

- Supervised Academic Activities
a) With the presence of the lecturer: 0.5 ECTS guidance on alternative paths of study through individual or small groups tutored activities. Discussion and joint resolution of problems. (PO a, c)
b) Without the presence of the lecturer: 1.5 ECTS. Exercises and basic and supplementary readings suggested by the lecturer. (PO a, i, k)
c) Working group: 1.5 ECTS. Consists in the development of an information system proposed in practical classes, through two implementations (file structures and relational databases) and the development of a report. (PO a, b, c, d, e, g, k)

- Review and Exercises: 0.5 ECTS. They aim to influence and complement in the development of specific cognitive and procedural skills. (PO a, c, e)

ASSESSMENT SYSTEM

Exercises and examinations are both learning and evaluation activities. The evaluation system includes the assessment of guided academic activities and practical cases, with the following weights:
Exercises and examination: 50% (PO a, c, e)
Guided academic activities
- Practical case & teamwork: 30% (PO a, b, c, d, e, g, k)
- Present teacher: 20% (PO a)

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- Cuadra D., Castro E., Iglesias A., Martínez P., Calle J., de Pablo C., Al'Jumaily H., Moreno L., García S., Martínez J.L., Rivero J., Segura I. Desarrollo de Bases de Datos: casos prácticos desde el análisis a la implementación. 2ª ed., Ra-Ma, 2013
- Elmasri, R. y Navathe, S. Fundamentals of Database Systems (5ª ed)., The Benjamin/Cummings Publishing Company, 2006
- Folk, M. J., Zoellick, B., y Riccardi, G. File Structures., Addison Wesley , 1998
- Oracle® SQL*Plus. User's Guide and Reference, http://docs.oracle.com/database/121/SQPUG/E18404-12.pdf, 2013
- Oracle® Database SQL Language Reference, http://docs.oracle.com/database/121/SQLRF/E41329-17.pdf, 2015
- Silverschatz, A., Korth, H. F. & Sudarshan, S. Database System Concepts, 6th ed (also 3rd to 5th), Mc-Graw Hill, 2011

ADDITIONAL BIBLIOGRAPHY

- Date, C.J. An introduction to database systems (5ª edición)., Addison Wesley (c) 1994.
- Frakes, W. y Baeza-Yates, R., Eds. Information retrieval. Data structures and algorithms., Prentice Hall. (c) 1992.
- Gaede, O. and Günther,V. (1998). Multidimensional Access Methods., ACM Computing Surveys, Vol. 30, No. 2. (c) 1998 ACM NY..
- Guttman, A. (1984). R-trees: A dynamic index structure for spatial searching, Procs. of the ACM SIGMOD ¿84, Int. Conference on Management of Data..
- Livadas, Panos E. File Structures: Theory and Practice., Ed. Prentice-Hall Int (c) 1990.
- Ramakrishnan, R. Database management systems, WCB/McGraw Hill. (c) 1998.

BASIC ELECTRONIC RESOURCES

- Oracle Corp . JDBC Java API Reference: http://docs.oracle.com/database/121/JAJDB/toc.htm
- Oracle Corp. . Oracle Database Express Edition 11g Release 2: http://www.oracle.com/technetwork/products/express-edition/downloads/index.html
- Oracle Corp. . Oracle Database Documentation Library: http://www.oracle.com/pls/db111/homepage
- Oracle Corp. . Oracle® Database PL/SQL Language Reference: http://docs.oracle.com/cd/B28359_01/appdev.111/b28370/toc.htm