Course Outline	
COMP6225 Object-Oriented Database (2/2)	**Study Program** Computer Science
Effective Date 01 February 2016	**Revision** 0

1. Course Description

This course comprises principle concept, design, development and all matters relating to the object-oriented databases implementation. It gives students basic knowledge related to the design, technology and skill to implement object-oriented database in various application

2. Graduate Competency

Each course in the study program contributes to the graduate competencies that are divided into employability and entrepreneurial skills and study program specific outcomes, in which students need to have demonstrated by the time they complete their course.

BINUS University employability and entrepreneurial skills consist of planning and organizing, problem solving and decision making, self management, team work, communication, and initiative and enterprise.

2.1. Employability and Entrepreneurial Skills

Aspect	Key Behaviour

2.2. Study Program Specific Outcomes

Study Program Specific Outcomes
Able to construct a solution by applying current technologies
Able to classify criteria and specifications appropriate to specific problems, plan strategies for their solution and construct software system development

3. Topics

- Introduction to Object Databases
- Object-Oriented Databases: The OM Data Model
- Object-Oriented Databases-1
- Object-Oriented Databases-2
- Case Study in Object-Oriented Databases
- Introduction to Object-Relational Databases
- Object-Relational Databases
- Object-Relational Databases Mapping
- Mapping Object-Oriented Conceptual Models to the Relational Data Model
- Object-Oriented Databases Design and Implementation: OMS Avon
- Object-Oriented Management Systems For Relational Databases (RxO DBMS)
- Commercial OODBMS: Versant
- Open Sources OODBMS: EyeDB

4. Learning Outcomes

On successful completion of this course, student will be able to:

- LO 1: Explain object-oriented conceptual modeling techniques with a specific focus on conceptual modeling of object database designs
- LO 2: Define the fundamental concept of object databases
- LO 3: Design object-oriented conceptual modeling techniques using enhanced entity relationship diagrams

and Unified Modeling Language
- LO 4: Apply a object-oriented and object relational databases with a case studies
- LO 5: Compare commercial and open source OODBMS

5. Teaching And Learning Strategies

In this course, the lecturers might deploy several teaching learning strategies, including case studies, Class Discussion, Lecture, and Presentation.

6. Textbooks and Other Resources

6.1 Textbooks

1. Suzanne W. Dietrich and Susan D. Urban. (2011). ***Fundamental of Object Databases : Object-Oriented and Object-Relational Design***. 01. Morgan & Claypool Publishers. ISBN: 978-1608454761.

The book in the first list is a must to have for each student.

6.2 Other Resources

1. Working with database object
2. http://zetcode.com/gui/csharpwinforms/menustoolbars/
3. http://www.tutorialspoint.com/csharp/
4. http://www.techotopia.com/index.php/Creating_a_Simple_C_Sharp_GUI_Application_with_Visual_Studio
5. http://www.odbms.org/wp-content/uploads/2013/11/035.09-Grossniklaus-ODBMS-Lecture-OM-Data-Model.2009.pdf
6. http://infolab.usc.edu/csci585/Spring2010/den_ar/ordb.pdf
7. http://www.odbms.org/2010/01/object-oriented-databases-version-2010/
8. http://www.odbms.org/wp-content/uploads/2013/11/lecture_12_objectDatabases.pdf
9. http://www.odbms.org/wp-content/uploads/2014/03/RxO_stones_common.pdf
10. http://www.odbms.org/wp-content/uploads/2013/11/035.11-Grossniklaus-ODBMS-Lecture-Avon.2009.pdf
11. http://www.eyedb.org/documentation/
12. http://docs.oracle.com/cd/E12839_01/web.1111/b32441/ormapun.htm#JITDG92643
13. http://www.odbms.org/wp-content/uploads/2013/11/lecture_12_objectDatabases.pdf
14. http://infolab.usc.edu/csci585/Spring2010/den_ar/ordb.pdf
15. http://msdn.microsoft.com/en-us/library/bb397897.aspx
16. http://cseweb.ucsd.edu/classes/wi00/cse132a/oql.htm
17. http://www.odbms.org/wp-content/uploads/2013/11/001.04-Ullman-CS145-ODL-OQL-Fall-2004.ppt
18. http://www.odbms.org/2010/01/object-oriented-databases-version-2010
19. http://www.odbms.org/wp-content/uploads/2013/11/lecture_12_objectDatabases.pdf

7. Schedule

Theory

Session/ Mode	Related LO	Topics	References
1 F2F	LO 1	Introduction to Object Databases - A Historical View of Object Databases - Fundamental Concepts - Object-Oriented Conceptual Modelling	- Introduction to Object Databases - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 1: Introduction to Object Databases - Introduction to Databases Object and Object-Relational Databases, http://www.odbms.org/wp-content/uploads/2013/11/lecture_12_objectDatabases.pdf
2 F2F	LO 1	Object-Oriented Databases: The OM Data Model - OM Data Model - Typing and Classification	- Object-Oriented Databases: The OM Data Model - Fundamental of Object

		- OM Data Model Layer - OM Classification Layer - Classification Structure - Association - Kinds and Roles - Classification Graphs - Controlling Evolution	Databases : Object-Oriented and Object-Relational Design, Chapter 2: Object-Oriented Databases - Object-Oriented Databases The OM Data Model, http://www.odbms.org/wp-content/uploads/2013/11/035.09-Grossniklaus-ODBMS-Lecture-OM-Data-Model.2009.pdf
3 GSLC	LO 2	Object-Oriented Databases-1 - The ODMG Standard - The ODMG Object Definition Language - Mapping Object-Oriented Conceptual Models to ODL	- Object-Oriented Databases-1 - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 2: Object-Oriented Databases - Working with database object - Introduction to Databases Object and Object-Relational Databases, http://www.odbms.org/wp-content/uploads/2013/11/lecture_12_objectDatabases.pdf - Object-Oriented Database Languages., http://www.odbms.org/wp-content/uploads/2013/11/001.04-Ullman-CS145-ODL-OQL-Fall-2004.ppt
4 F2F	LO 2	Object-Oriented Databases-2 - The ODMG Object Query Language - Ordering - Using Collections - Aggregation and Grouping	- Object-Oriented Databases-2 - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 2: Object-Oriented Databases - OQL - Object Query Language, http://cseweb.ucsd.edu/classes/wi00/cse132a/oql.htm - Introduction to Databases Object and Object-Relational Databases, http://www.odbms.org/wp-content/uploads/2013/11/lecture_12_objectDatabases.pdf
5 F2F	LO 2	Case Study in Object-Oriented Databases - Language INtegrated Query (LINQ) - DB4O	- Case Study in Object-Oriented Databases - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 2: Object-Oriented Databases - Object-Oriented Databases db4o: Part 1., http://www.odbms.org/2010/01/object-oriented-databases-version-2010 - Introduction to LINQ.,

			http://msdn.microsoft.com/en-us/library/bb397897.aspx
6 F2F	LO 3	Introduction to Object-Relational Databases - Built-In Constructed Types - User-Defined Types - Typed Tables - Type and Table Hierarchies	- Introduction to Object-Relational Databases - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 3: Object-Relational Databases - Introduction to Object-Relational Database Development, http://infolab.usc.edu/csci585/Spring2010/den_ar/ordb.pdf
7 GSLC	LO 3	Object-Relational Databases - A Closer Look at Table Hierarchies - Reference Types - Mapping to the SQL Standard Object-Relational Features - Classes, Attributes, and Associations - Class Hierarchies - Categories	- Object-Relational Databases - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 3: Object-Relational Databases - Introduction to Object-Relational Database Development, http://infolab.usc.edu/csci585/Spring2010/den_ar/ordb.pdf
8 F2F	LO 3	Object-Relational Databases Mapping - Oracle: Object-Relational Database Mappings - Object Types and Type Hierarchies - Object Tables - Reference Types - Querying Substitutable Tables - Varrays and Nested Tables as Collections	- Object-Relational Databases Mapping - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter 3: Object-Relational Databases - Introduction to Object-Relational Data Type Mappings, http://docs.oracle.com/cd/E12839_01/web.1111/b32441/ormapun.htm#JITDG92643
9 GSLC	LO 3	Mapping Object-Oriented Conceptual Models to the Relational Data Model - Notation and Terminology - Classes - Associations - Class Hierarchies - Shared Subclasses - Categories	- Mapping Object-Oriented Conceptual Models to the Relational Data Model - Fundamental of Object Databases : Object-Oriented and Object-Relational Design, Chapter A: Mapping Object-Oriented Conceptual Models to the Relational Data Model
10 F2F	LO 4	Object-Oriented Databases Design and Implementation: OMS Avon - OMS Avon - Architecture - Storage, Model and Interface Layer - Database Modules	- Object-Oriented Databases Design and Implementation: OMS Avon - Object-Oriented Databases Design and Implementation: OMS Avon, http://www.odbms.org/wp-content/uploads/2013/11/035.11-Grossniklaus-ODBMS-Lecture-Avon.2009.pdf
11 F2F	LO 4	Object-Oriented Management Systems For Relational Databases (RxO DBMS)	- Object-Oriented Management Systems For

		- RxO DBMS manages relational data in object-oriented way - Complex objects - How the objects are accessed in RxO DB - Relational representation of object data - New possibilities: dynamic object reclassification	Relational Databases (RxO DBMS) - Object-Oriented Management Systems For Relational Databases (RxO DBMS)., http://www.odbms.org/wp-content/uploads/2014/03/RxO_stones_common.pdf
12 F2F	LO 5	Commercial OODBMS: Versant - Versant Object Database for Java - Java Versant Interface (JVI) - Versant Query Language (VQL)	- Commercial OODBMS: Versant - Databases Commercial OODBMS: Versant, http://www.odbms.org/2010/01/object-oriented-databases-version-2010/
13 F2F	LO 5	Open Sources OODBMS: EyeDB - EyeDB Overview - The Object Definition Language - The Object Query Language - The C++ Binding - The Java Binding	- Open Sources OODBMS: EyeDB - EyeDB Open sources object database, http://www.eyedb.org/documentation/

Practicum

Session/ Mode	Related LO	Topics	References
1 F2F	LO 1 LO 2	Introduction to C# Programming & Graphical User Intefaces Part 1 - Basic C# Syntax - Variable - Arithmetic - Windows Form - Control properties and layout - Labels, TextBoxes, and Buttons - MessageBox	- C# 2010 How to Program - Basic Structure, http://www.tutorialspoint.com/csharp/
2 F2F	LO 1 LO 2	Graphical User Intefaces Part 2 & Control Structure - If else selection structure - Nested If selection structure - Labels, TextBoxes, and Buttons - GroupBoxes and Panels - CheckBoxes and RadioButtons - PictureBoxes - Mouse and Keyboard event handling - Switch multiple selection structure - While, do-while dan for repetition structure - Break and continue statement	- C# 2010 How to Program - Tools, http://www.techotopia.com/index.php/Creating_a_Simple_C_Sharp_GUI_Application_with_Visual_Studio
3 F2F	LO 1 LO 2	Advanced Graphical User Intefaces - Menu - ListBoxes and Checked ListBoxes - ComboBoxes - ListViews - MDI Windows	- C# 2010 How to Program - Menu, http://zetcode.com/gui/csharpwinforms/menustoolbars/
4 F2F	LO 2 LO 3	String, Character & Array - String constructor - String indexes, length, property and CopyTo method - Comparing string - Locating character and substring in strings - Concatenate strings	- Visual C# 2010 How to program - String, Array, Method, http://www.tutorialspoint.com/csharp/

		- Char method - Declaring and creating array - For-each statement - Two dimensional arrays	
5 F2F	LO 1 LO 2 LO 3	Methods - Pass by value & by reference - Passing arrays to methods	- Visual C# 2010 How to program - OOP, http://www.tutorialspoint.com/csharp/
6 F2F	LO 2 LO 3	Object Oriented Programming - Base and derived classes - Constructor in derived class - Overloading constructors - Abstract classes and Methods - Overriding properties - Operator Overloading	- Visual C# 2010 How to program - Save File, http://www.tutorialspoint.com/csharp/
7 F2F	LO 2 LO 3	LINQ: Object Oriented Database Design - Creating Object Database - Saving Data to File - Introduction to LINQ - Query Object using LINQ	- Visual C# 2010 How to program
8 F2F	LO 2 LO 3	LINQ: Object Oriented Database Design - Creating Object Database - Saving Data to File - Introduction to LINQ - Query Object using LINQ	- Visual C# 2010 How to program
9 F2F	LO 2 LO 3	LINQ: Object Relational design using SQL - LINQ to SQL - Query Database using LINQ - Dynamically Binding Query Result	- Visual C# 2010 How to program
10 F2F	LO 2 LO 3	LINQ: Advance Object Query Language and basic form validation - Basic validation - Searching - Sorting - Aggregate	- eyeDB Documentation
11 F2F	LO 1 LO 2 LO 3 LO 4	Project Collection - Project Collection - Review	- C# 2010 How to Program
12 F2F	LO 1 LO 2 LO 3 LO 4	Final Exam - Final Exam	- C# 2010 How to Program

8. Evaluation

Theory

Assessment Activity	Weight	Learning Outcomes				
		1	2	3	4	5
Assignment	20%	√	√	√	√	√
Mid Exam	30%	√	√	√		
Final Exam	50%			√	√	√

Practicum

Assessment Activity	Weight	Learning Outcomes				
		1	2	3	4	5
Project	40%	√	√	√	√	√
Final Exam	60%			√	√	√

Final Evaluation Score

Aspects	Weight
Theory	70%
Practicum	30%

9. A. Assessment Rubric (Study Program Specific Outcomes)

LO	Indicators	Proficiency Level			
		Excellent (85 – 100)	Good (75 – 84)	Average (65 – 74)	Poor (<= 64)
LO 1	1.1. Ability to define fundamental concept and conceptual modelling of object database	Fundamental concept and conceptual modelling of object database are clearly defined	Some of fundamental concept and conceptual modelling of object database are defined	Fundamental concept and conceptual modelling of object database defined small part	Fundamental concept and conceptual modelling of object database are incompletely defined
	1.2. Ability define The OM Data Model	OM Data Model are clearly defined	Some of OM data Model are defined	OM Data Model are defined in small part	OM Data Model are incompletely defined
LO 2	2.1. Ability to explain ODMG and ODMG Object Definition Language (ODL)	ODMG and ODMG Object Definition Language (ODL) are clearly explained	Some of ODMG and ODMG Object Definition Language (ODL) are explained	ODMG and ODMG Object Definition Language (ODL) are explained in small part	ODMG and ODMG Object Definition Language (ODL) are incompletely explained
	2.2. Ability to explain ODMG Object Query Language, ordering, collection, aggregation and grouping	ODMG Object Query Language, ordering, collection, aggregation and grouping are clearly explained	Some of ODMG Object Query Language, ordering, collection, aggregation and grouping are explained	ODMG Object Query Language, ordering, collection, aggregation and grouping are explained in small part	ODMG Object Query Language, ordering, collection, aggregation and grouping are incompletely explained
	2.3. Ability to explain the difference between language integrated query (LINQ) and DB4O	The difference between language INtegrated query (LINQ) and DB4O	Some of difference between language INtegrated query (LINQ) and DB4O	The difference between language INtegrated query (LINQ) and DB4O	The difference between language INtegrated query (LINQ) and DB4O

		are clearly explained	are explained	are explained in small part	are totally unexplained
LO 3	3.1. Ability to design object-oriented conceptual modeling techniques using enhanced entity relationship diagrams and unified modeling language	Object-oriented conceptual modeling techniques using enhanced entity relationship diagrams and unified modeling language completely design	Whole part of object-oriented conceptual modeling techniques using enhanced entity relationship diagrams and unified modeling language are design	Small part of object-oriented conceptual modeling techniques using enhanced entity relationship diagrams and unified modeling language are design	Object-oriented conceptual modeling techniques using enhanced entity relationship diagrams and unified modeling language incompletely design
	3.2. Ability to design object-oriented conceptual modeling techniques through object databases mapping	Object-oriented conceptual modeling techniques through object databases mapping are completely design	Whole part of object-oriented conceptual modeling techniques through object databases mapping are design	Small part of object-oriented conceptual modeling techniques through object databases mapping are design	Object-oriented conceptual modeling techniques through object databases mapping are design incompletely design
LO 4	4.1. Ability to apply object-oriented databases design	Object-oriented databases completely applied	Whole part of object-oriented database applied	Small part of object-oriented database applied	Object-oriented databases incompletely applied
	4.2. Ability to apply object-oriented management systems for relational databases	Object-oriented managemen t systems for relational databases completely applied	Whole part of object-oriented managemen t systems for relational databases applied	Small part of object-oriented managemen t systems for relational databases applied	Object-oriented managemen t systems for relational databases incompletely applied
LO 5	5.1. Ability to explain the commercial OODBMS	Commercial OODBMS clearly explained	Some of commercial OODBMS are explained	Commercial OODBMS are explained in small part	Commercial OODBMS incompletely explained
	5.2. Ability to compare commercial and opensources OODBMS	Commercial and opensources OODBMS are comparable very well	Commercial and opensources OODBMS are comparable well	Commercial and Open Sources OODBMS are compare in small part	Really cant compare the Commercial and Open Sources OODBMS

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