FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

FAKULTEIT INGENIEURSWESE, BOU-OMGEWING EN INLIGTINGTEGNOLOGIE



DEPARTMENT OF INFORMATICS

DEPARTEMENT INFORMATIKA

**INFORMATICS / INFORMATIKA 354**

**Semester test (open book practical) / Semester toets (oopboek prakties)**

**May 2016**

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| Lecturers / Dosente  Dr N Croft  Moderator / Moderator: | **Time / Tyd: 180 min**    **Mark / Punt: 80** |

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| **Instructions** | **Instruksies** |
| 1. Answer all the questions 2. This is an open book practical test, with no internet access. 3. No communication with other students is allowed. 4. Save regularly on the C drive and or flash drive. Do not use the H drive. 5. Please zip and upload all projects/documents on clickUP after the test. Name the zip file: s1234567\_Initials\_Surname, using your own information. | 1. Beantwoord al die vrae. 2. Hierdie is ’n oopboek praktiese toets, met geen internet toegang nie. 3. Geen kommunikasie met ander studente word toegelaat nie. 4. Maak seker dat U gereeld “save” op die C skyf en of ‘flash’ skyf. Moenie die H skyf gebruik nie. 5. Nadat die toets voltooi is, zip asseblief die programme/dokumente en laai die op na clickUP. Benoem die zip file: s1234567\_Voorletters\_Van deur jou eie inligting te gebruik. |

NOTE: Section A must be answered in a new blank word document clearly showing the question number and your answer. Name the word document ***Section A*** and upload it as part of zip file submission***.***

**Section A (Theory) [22]:**

1. Typed method for a stored procedure returns? [1]

**A** a single value

**B** tabular data

**C** no value

**D** all of the above

1. In web service development, WSDL is ?[1]

**A** an XML-based standard that business’ use to publish and find web services

**B** a SOAP-formatted language used to completely describe a Web Service

**C** is data communications protocol for exchanging XML-based messages over a computer network, normally using HTTP (the Web)

**D** none of the above

The **WSDL** is an XML-based interface definition language that is used for describing the functionality offered by a web service

**WSDL** (Web Services Description Language) – an XML-formatted language used to completely describe a Web Service

1. The server responsible for responding to http requests is known as a ? [1]

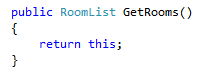
**A** internet server

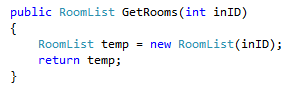
**B** web server

**C** cloud server instance

**D** none of the above

1. The code snippet below is an example of? [1] (Its overloading)





**A** class construction

**B** overriding

**C** polymorphism

**D** none of the above

Overloading

1. Complete the PHP code snippet below [1]

if (hmac\_hash("sha256", $\_POST['password'], $saltFromDatabase) === $hashFromDatabase){

$login = \_\_\_\_\_\_\_\_\_;

}

True

1. Why would having such a code snippet in your PHP script above (question 5) be useful? [1]

(To do with successful login)

1. MongoDB is an example of? [1]

**A** a document orientated database

**B** a no sql database

**C** a relational database

**D** two of the above

1. PHP is considered to be a \_\_\_\_\_\_\_\_ development language? [1]

**A** standalone

**B** database

**C** procedural

**D** none of the above

1. When programming a multi-tier object-orientated program, why is it considered good practise to structure a program using this methodology? [2]

Because in software engineering, multitier architecture is a client-server architecture in which presentation, application processing, and data management functions are physically separated. And it provides a model by which developers can create flexible and reusable applications, also developers acquire the option of modifying or adding a specific layer, instead of reworking the entire application.

1. Give two examples of where a scripting language might be used instead of an object-orientated language? [2]

**Object**-**oriented programming** (**OOP**) is a **programming** paradigm based on the concept of "**objects**", which may contain data, in the form of fields, often known as attributes; and code, in the form of procedures, often known as methods.

A **scripting** or **script language** is a programming **language** that supports scripts, programs written for a special run-time environment that automate the execution of tasks that could alternatively be executed one-by-one by a human operator. **Scripting languages** are often interpreted (rather than compiled).

1. Discuss the advantages of including stored procedures as part of your relational database design. [2]

Better performance, higher productivity, ease of use (write once use many), and increased scalability, better memory management

1. Discuss the advantages of document orientated databases over relational databases. [2]

**Documents are independent units** which makes performance better (related data is read contiguously off disk) and makes it easier to distribute data across multiple servers while preserving its locality.

**Application logic is easier to write.** You don’t have to translate between objects in your application and SQL queries, you can just turn the object model directly into a document.

**Unstructured data can be stored easily**, since a document contains whatever keys and values the application logic requires. In addition, costly migrations are avoided since the database does not need to know its information schema in advance.

The **main advantage** of MongoDB is that because it is not done in a relational entity structure, it returns values a lot faster and take up less space.

1. In a multi-level application, which tier contains the logical rules of the application? [1]

**A** The Presentation tier

**B** The Business tier

**C** The Data tier

**D** The Class tier

Three-**tier** architecture is a client–server software architecture pattern in which the user interface (presentation), functional process logic ("**business** rules"), computer data storage and data access are developed and maintained as independent modules, most often on separate platforms.

1. In a class, Get and Set accessor methods must be \_\_\_\_\_\_\_ in order to allow other modules (forms or classes) to assign and retrieve their values. [1]

**A** Functions

**B** Strings

**C** Public

**D** Private

1. Property procedures are \_\_\_\_\_\_\_ by default [1]

**A** Local

**B** Module-level

**C** Private

**D** Public

1. When deploying a C# project, a .msi file is created to package the entire project resources together ready for deployment. Name an advantage and disadvantage of choosing this approach? [2]

Some

1. In a software server configuration, servers are deployed to facilitate development, staging and finally production. What is the purpose of a staging server in a software deployment configuration? [1]

**Section B (Multi-tier Programming): [35] create dll**

**Please run the sql script provided called Company.sql.** Some questions are theoretical.Name the word document ***Section B*** and upload it as part of zip file submission***.***

1. Provide the SQL script to create the database [1].

If Exists (Select \* from sys.databases where name = 'Appointments')

DROP DATABASE Appointments

Go

create database Appointments

GO

1. Write ***stored procedures*** for deleting and updating data from each of the database tables (client, employee, appointment).[9]

USE Appointments

Go

--============================Client================-----

create procedure sp\_Client\_Update

(

@ID int,

@First\_Name varchar(50),

@Last\_Name varchar(50),

@Contact\_Number varchar(10)

)

as

UPDATE Client

SET

First\_Name = @First\_Name,

Last\_Name = @Last\_Name,

Contact\_Number = @Contact\_Number

WHERE ID = @ID

Go

-----------------------------------------//-------------------------

create procedure sp\_Client\_Delete

(

@ID int

)

as

Delete Client

WHERE ID = @ID

Go

--============================Employee================-----

create procedure sp\_Employee\_Update

(

@ID int,

@First\_Name varchar(50),

@Last\_Name varchar(50),

@Office\_Phone varchar(10),

@Room\_Number varchar(10)

)

as

UPDATE Employee

SET

First\_Name = @First\_Name,

Last\_Name = @Last\_Name,

Office\_Phone = @Office\_Phone,

Room\_Number = @Room\_Number

WHERE ID = @ID

Go

-----------------------------------------//-------------------------

create procedure sp\_Employee\_Delete

(

@ID int

)

as

Delete Employee

WHERE ID = @ID

Go

--============================Appointment================-----

create procedure sp\_Appointment\_Update

(

@ID int,

@Client\_id int,

@Employee\_id int,

@Start\_Time datetime,

@End\_Time datetime,

@Amount\_Billed decimal(9,2)

)

as

UPDATE Appointment

SET

Client\_id = @Client\_id,

Employee\_id = @Employee\_id,

Start\_Time = @Start\_Time,

End\_Time = @End\_Time,

Amount\_Billed = @Amount\_Billed

WHERE ID = @ID

Go

-----------------------------------------//-------------------------

create procedure sp\_Appointment\_Delete

(

@ID int

)

as

Delete Appointment

WHERE ID = @ID

Go

1. Complete the business tier program called **AppointmentBusinessTier.** Complete the methods in the classes for updating and deleting ONLY. Complete **client.cs, employee.cs and appointment.cs and the bindinglist classes** [12].
2. Write a method which returns all the appointments for a specific day. In other words, the method must take a parameter (today) and return all appointments scheduled for today. [5]
3. Write a method to sort all the appointments for a specific day. In other words, the method must call the method in the previous question, returning all the appointments in ascending (ASC) order for a specific day. [3]
4. Once compiled the AppointmentBusinessTier.dll file is created. What is a dll file and how is it used in other projects? [2]

Dynamic link library, it’s used as an external reference in another project. The dll will have to be included and deployed along with a project which is using it.

DLL is a dynamic link library where it is a file that contains dynamically pluggable code decks that can be used in other programs. This is a process where programmers make user of code from project to project and decided to save some time and create a library where other programs can read code from it. A library typically contains collections of code, whether it be classes, components, methods, etc., and any of these sections of code can be called when we need code a larger program

1. If we are presented with two or more .dll files with the **same name**, how might we define their uses in the same project to reference the correct .dll file? [1]

Namespace

In order to deal with 2 of the same dll file name, we need to create 2 separate projects (preferably class library projects) that will be named differently (e.g. ‘a’ and ‘b’) and will reference one of each dll (one of the dll that has the same name). Once the code has been done in those separate projects then the main class will reference both of the projects (‘a’ and ‘b’) into it then the solution can be completed

1. We can choose to compile in our Visual Studio source code in either debug mode or in release mode. Explain the difference between the two? [2]

The main difference is when compiled in debug mode, pdb files are also created which allow debugging (so you can step through the code when it’s running). In **Debug Mode** your program has **debug information** inside of it (source code, variable names and other similar stuff like that).

In **Release Mode** your program lacks of **debug information** makes it smaller and probably performs better due to its smaller footprint

**Section C: Mobile Web Development [5]**

Name the word document ***Section C*** and upload it as part of zip file submission***.***

As a developer you are tasked with the design of a digital strategy to develop a mobile site, a web site and a mobile application. You decide on a RWD approach making use of a DDR for the mobile and web site. You also decide on a Native approach to the mobile application development.

1. What is the purpose of a DDR and how is it used? [1]

Device detection repository, to lookup a requesting device and find its capabilities

1. Discuss what a RWD approach entails? [1]

Responsive web design, to render back a response to a requesting browser based on its unique properties/capabilities. Response on the fly

1. If we are not to make use of a DDR, what other technology may be used to accommodate for mobile device screen size restrictions. [1]

CSS3 media queries for screen resolution styling.

We can use something like wurlf top retrieve the screen size of the device and then resize the image accordingly.

1. What decision is made in choosing whether the mobile application is developed in “Native” rather than a “Hybrid” mobile application approach? [1]

Building native applications means using the native language of the platform, Objective-C on iOS, and Java on Android. The main advantage of native applications is their **performance**.

Hybrid apps are developed using HTML, CSS and Javascript, and then wrapped in a native application using platforms like Cordova. This allows you to use any web-native framework you want, and there are plenty of these.

1. Name one mobile application development framework we may consider using for this project? [1]

**Section D: LINQ** **and Lamda [13]**

Name the word document ***Section D*** and upload it as part of zip file submission***.***

1. Convert the following sql query to linq and or lambda [5]:

SELECT a.CustomerName, b.CustomerAddress FROM Customer AS a JOIN Address AS b ON   Customer.ID= Address.CustomerID WHERE Customer.Age>18

GO

var query =

from b in db.Customer.Include(o => o.Address)

where b.Customer.ID = Address.CustomerID && b.Customer.Age > 18

select b;

2.  A vehicle manufacturer has multiple customers, these customers can be of three different types i.e. Commercial, Public or Governmental, and the different types have different data including geographical location information.

2.1 Design a database that will cater for the above scenario. [3]

2.2 Write a linq/lambda query to get the GeographicalLocation all the “Governmental” customers. [3]

3. Entity Framework (EF) is an object-relational mapper (ORM) that enables .NET developers to work with relational data using domain-specific objects. Name two advantages of making use of a ORM in your project? [2]

1. Facilitates implementing the [Domain Model](http://www.martinfowler.com/eaaCatalog/domainModel.html) pattern. This one reason supercedes all others. In short using this pattern means that you model entities based on real business concepts rather than based on your database structure. ORM tools provide this functionality through mapping between the logical business model and the physical storage model.

2. Huge reduction in code. ORM tools provide a host of services thereby allowing developers to focus on the business logic of the application rather than repetitive CRUD (Create Read Update Delete) logic.

3. Changes to the object model are made in one place. One you update your object definitions, the ORM will automatically use the updated structure for retrievals and updates. There are no SQL Update, Delete and Insert statements strewn throughout different layers of the application that need modification.

4. Rich query capability. ORM tools provide an object oriented query language. This allows application developers to focus on the object model and not to have to be concerned with the database structure or SQL semantics. The ORM tool itself will translate the query language into the appropriate syntax for the database.

5. Navigation. You can navigate object relationships transparently. Related objects are automatically loaded as needed. For example if you load a PO and you want to access it’s Customer, you can simply access PO.Customer and the ORM will take care of loading the data for you without any effort on your part.

6. Data loads are completely configurable allowing you to load the data appropriate for each scenario. For example in one scenario you might want to load a list of POs without any of it’s child / related objects, while in other scenarious you can specify to load a PO, with all it’s child LineItems, etc.

7. Concurrency support. Support for multiple users updating the same data simultaneously.

8. Cache managment. Entities are cached in memory thereby reducing load on the database.

9. Transaction management and Isolation. All object changes occur scoped to a transaction. The entire transaction can either be committed or rolled back. Multiple transactions can be active in memory in the same time, and each transactions changes are isolated form on another.

10. Key Management. Identifiers and surrogate keys are automatically propogated and managed.

**Section E: Web Services [5]**

A WSDL document defines services as collections of network endpoints, or ports.

1. Provide a definition of a network endpoint and give an example of one? [2]

A network endpoint is the logical endpoint of separate protocol traffic of a specific protocol layer.

Example: An IP endpoint is will send and receive all packets to a specific IP address.

1. Create your own webservice that has a single web method called “TwoNumbersMod”. This webservice must take two numeric numbers as input as return the Modulo result. **Modulo** computes a remainder when two numbers are divided. [3] (see example C# program below)

**C# example program that uses modulo operator**

using System;

class Program

{

static void Main()

{

*// When 1000 is divided by 90, the remainder is 10.*

Console.WriteLine(*1000 % 90*);

*// When 100 is divided by 90, the remainder is also 10.*

Console.WriteLine(*100 % 90*);

*// When 81 is divided by 80, the remainder is 1.*

Console.WriteLine(*81 % 80*);

*// When 1 is divided by 1, the remainder is zero.*

Console.WriteLine(*1 % 1*);

}

}

**Output**

10

10

1

0