1ST Class – Monday, March 17, 2014

Text: Illustrated C# 2005, Daniel Solis, Apress

Instructor (weeks 1 - 6): Somya Ganore – [sganore@coleman.edu](mailto:sganore@coleman.edu)

Instructor (weeks 7-10): John Wyatt – [jwyatt@coleman.edu](mailto:jwyatt@coleman.edu)

Assignments on WebClass

**PowerPoint – ‘Comparing C# with C++ and Java’, Comparing C#.ppt**

<http://www.thinkingparallel.com/2007/03/06/c-vs-c-a-checklist-from-a-c-programmers-point-of-view/>

Java and C++ are just programming languages and you have to write a lot of stuff.

C++, Java, C#

Java – lacks pointers and memory management

C# = C++ + Java + VB

C++ is for Games

Java, NetBeans, Apache is free

A framework is more powerful and

- Managed C# includes:

Java + VB. No C++ but we will see Operator overloading.

- Unmanaged C# includes:

C++ - But it has no dynamic memory allocation, no pointers,

C# is a framework – to communicate easily with other things, i.e. a database.   
 C#, J#, VB. – Database. For large projects.

For years C# was playing catch up with Java. The ended with C#/.Net 3.0/3.5 and now it’s mostly the other way around: The @ symbol for strings, Operator Overloading, Indexers, Conditional Compiler, Partial Classes (GUI, two classes), Extern Aliases.

Polymorphism, inheritance, collections

PowerPoint – ‘C# Intro’,

Android – Java

Windows Phone – C#

Apple – IOS

What is the CLR?

What is an assembly?

What is an interface?

CTS – Only managed code, not unmanaged code.

Primitive data types

Var is determined during runtime

To learn C++ use MS Visual Studio 2008 instead of 2010.

Comments

//

\*/…/\*

<summary>

/// This method demonstrates placeholder

/// and concatenation methods

/// Using System.console.writeln()

/// and printing the numbers and their sum.

</summary>

2nd Class – Wednesday, March 19, 2014

We have even-number Thursday Labs, so no class tomorrow.

Structs – Value Type – on the stack – (Chapter 12 – not assigned, but only a few pages)

Heap is faster but is more volatile than stack (reread pages 38-39)

Struct Person

{

String name;

Int age;

Float height;

}

Person onePerson;

onePerson.name = “Sam”;

onePerson.age = 25;

onePerson.height = 172;

Better to pass parameters of classes than structs because they are just references.

Class – reference type – on the Heap

Will see more in C++

Template type

Data members and member functions

Data members –

Member functions –

docs.Nuget.org – Finding and installing NuGet Package using the Package Manager Console.

Do Lesson 2 and Project 1 from the Student Manual.

DO:

Execute the program from wherever you are.

Set path = “C:\WINDOWS\Microsoft.NET\Framework\v4.0.30319”

3rd Class – Monday, March 24, 2014

Extending – Extend – indicates inheritance

Project 1. UML Class Diagrams of classes: Address1, Employee, EmployeeObjectExample,

- Each attribute has a property

- Client (external object)

Static Constructor

Overloaded Constructor

#region

#endregion

- Automatically indents them.

Polymorphism uses the keyword “virtual” class with an accompanying “override” method

Relationship is Composite or Aggregate

- Example of Composite: car wheel

- Example of Aggregate: house room

4th Class – Wednesday, March 26, 2014

- Facebook bought up Oculus for $19B.

- Oculus created virtual reality 3-D for gaming, porn, medical procedures

Microsoft Should Have Acquired Oculus Rift, Not Facebook – Forbes

<http://www.forbes.com/sites/erikkain/2014/03/25/microsoft-should-have-acquired-oculus-rift-not-facebook/>

Oculus Rift: Step Into the Game by Oculus — Kickstarter

<https://www.kickstarter.com/projects/1523379957/oculus-rift-step-into-the-game>

- Facebook has it’s own language called, “Hack” which is like PHP with strong typing.

- Steve job didn’t program but he was good at getting other people to work on the programming.

- Some pirated music became background music on various Hollywood Movie DVDs.

Alienware - <http://www.alienware.com/>

When overloading a method avoid ambiguous method signatures, i.e. (int, double) and (double, int) – fix with (Double, Double)

String[] array = new string[2];

String[] array = new string[2]{“Koon”, “Somya”};

String[] array ={“Koon”, “Somya”};

Shock 3 – [www.Stickpage.com](http://www.Stickpage.com)

Int[] numArr = { 2, 3, 4, 5 };

Foreach (int elem in arr)

}

Console.Write(“Value is {0}”, val);

}

(

PrintAnyArray(2, 3, 4);

PrintAnyArray(param int[] arr) {}

Keyword ‘param’ - Can pass individual elements of an array

Pass-by-value

Pass-by-reference – type keyword ‘ref’ in the method declaration – calls it an alias ‘intVar’

- Another way to Pass-by-reference is to use the keyword ‘out.’

- ‘Out’ variable does not need to be initialized before passing the parameter.

- Java cannot do Pass-by-reference but C# can do Pass-by-reference.

VB was meant to be front-end only.

Capstone – ASP, database, JavaScript. PHP, Framework,

5th Class – Thursday, March 27, 2014

Project 1 - Michael Fetick, 84270

Employee types: 'F' Full-time, 'P' Part-time, 'C' Consultant,

Enter letter for employee type or 'Q' to quit: p

Employee Record:

1. Type: Part-time

2. ID: 2525

3. Name: 5252454

4. Hired: 3/27/2014

5. Address: 43242dgd

6. Zipcode: 23442

7. Hourly: $ 10

ID Name Hired Address Zip Hr Rate

2525 5252454 3/27/2014 43242dgd 23442 10 0

Employee types: 'F' Full-time, 'P' Part-time, 'C' Consultant,

Enter letter for employee type or 'Q' to quit: c

Employee Record:

1. Type: Consultant

2. ID: 3432

3. Name: 4324324

4. Hired: 3/27/2014

5. Address: 1324324

6. Zipcode: 22333

7. Hourly: $ 12

8. Fee: $ 100

9. Ext Hrs: 2

ID Name Hired Address Zip Fee & Time

3432 4324324 3/27/2014 1324324 22333 12 0 0 100

Employee types: 'F' Full-time, 'P' Part-time, 'C' Consultant,

Enter letter for employee type or 'Q' to quit: q

Personnel Report (All Employees)

(0) Full-time Employees - - - - - - - - - - - - - - - - - - - - - - - - - -

ID Name Hired Address Zip Salary

(1) Part-time Employees - - - - - - - - - - - - - - - - - - - - - - - - - -

ID No Name Hired Address Zip Hr Rate

2525 5252454 3/27/2014 43242dgd 23442 10

(1) Consultants - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ID No Name Hired Address Zip Fee & Time

3432 4324324 3/27/2014 1324324 22333 0 100

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Press any key to continue . . .

6th Class – Monday, March 31, 2014

<http://lifehacker.com/can-i-learn-how-to-play-an-instrument-online-1548792371?utm_campaign=socialflow_lifehacker_twitter&utm_source=lifehacker_twitter&utm_medium=socialflow>

Abstract class – polymorphism

Example: Enemy class,

Enemy – virtual attack() method

Enemy – Pirate – override attack() method

Enemy – Zombie – override attack() method

Enemy – Alien – override attack() method

To force a method in the objects, make the method abstract (incomplete) in the class

Example: Shape class,

Shape – virtual area() method

Shape – Triangle – override area() method

Shape – Rectangle – override area() method, perimeter() method //ERROR

Shape – Circle – override area() method

But don’t make a method that is not in the base abstract class, i.e. perimeter, because it cannot do polymorphism.

When you make an abstract class into an Interface you don’t put code. Name it, beginning with the letter “I.”

An Interface has all abstract (no body) methods.

Example: IEnemy class,

Enemy – virtual health() method

Samples of Interfaces :

SingleInterface.cs

MultipleInterface.cs

IComparableExample.cs

Note: IComparable Interface

<http://msdn.microsoft.com/en-us/library/System.IComparable.aspx>

SingleInterface.cs

8th Class – Monday, April 2, 2014

Exception handling

Exception handling Code samples:

9th Class – Wednesday, April 4, 2014

Delegates

A delegate can change code at run-time, like a macro.

delegate void myDelegate();

C++ Pointer to a function (like a Delegate) Advantage is the Pointer can point to every memory location if they are the same data type.

Test obj = new Test();

obj = new AnotherTest();

ArrayList aLobj = new AnotherTest();

C# wraps the pointer. C++ uses the star operator to declare it and the arrow operator to use it,

Using the same pointer to point to different memory locations.

Highest paid jobs are in C++

Real application of a delegate is event handling

Delegate

Keyword: PassByValueAndRef -

Keyword: PassByValue (int val) -

Keyword: PassByRef (ref int val) – Add ‘ref’ in front of the parameter, Processing time is faster

Difference? <http://stackoverflow.com/questions/373419/whats-the-difference-between-passing-by-reference-vs-passing-by-value>

Code:

PassByValueAndRef.cs

RefParam.cs // Ref <http://msdn.microsoft.com/en-us/library/14akc2c7.aspx>

AnonymousMethods.cs // Methods without a name

ReturnVales.cs

Program.cs

10th Class – Monday, April 7, 2014

Events

“Raising an event”

Publisher: Makes an event available to other classes

Subscriber: registers methods with the publisher

Events are not objects like delegates, they are more like methods

We don’t declare them like delegates

Rarely use ‘static’ events

C++ is faster, less secure, is good for drivers

C# has more encapsulation, is good for applications

Structures

struct – Different from a class. It also has constructors. It is a ‘value’ type created on a stack. It is not a ‘reference’ type like a class and it is not created on the heap. Treat it as a complex variable type.

Object Lifetime

11th Class – Wednesday, April 9, 2014

Do the practical exercises (lab) on a project of our choice and implement events and exception handling.

\* Assignment: Practical Exercise 1

\* Define a set of application-specific Exception classes (2 hours)

\* implemented to project 2 - Student Handbook (Pages 46)

12th Class – Thursday, April 10, 2014

Do the practical exercises (lab) on a project of our choice and implement delegates.

\* Assignment: Practical Exercise 2

\* Implement and test a delegate chain of actions (minimum 3)

\* based on a method invocation (4 hours)

\* implemented to project 2 - Student Handbook (Pages 46)

Somya is running late.

**Project 3 uses interfaces to extend the payroll system developed in Project 2.**

Suppose that the company involved wants to perform several accounting operations in a single accounts-payable application—in addition to calculating the payroll earnings that must be paid to each employee, the company must also calculate the payment due on each of several invoices. Though applied to unrelated things, both operations have to do with calculating some kind of payment amount. For an employee, the payment refers to the employee’s earnings. For an invoice, the payment refers to the total cost of the goods listed on the invoice. Can we calculate such different things as the payments due for employees and invoices polymorphically in a single application? Does C# offer a capability that requires that unrelated classes implement a set of common methods? C# interfaces offer exactly this capability.

Interfaces define and standardize the ways in which people and systems can interact with each other. For example, the controls on a radio serve as an interface between a user and the radio’s internal components. The controls allow users to perform a limited set of operations (e.g., changing the station, adjusting the volume, choosing between AM and FM), and different radios may implement the controls in different ways (e.g., using push buttons, dials, voice commands). The interface specifies what operations a radio must permit users to perform but does specify how the operations are performed. Similarly, the interface between a driver and a car with a manual transmission includes the steering wheel, the gear shift, the clutch pedal, the gas pedal and the brake pedal. This same interface is found in nearly all manual-transmission cars, enabling someone who knows how to drive one particular manual-transmission car to drive just about any manual-transmission car. The components may look a bit different, but the general purpose is the same—to allow people to drive the car.

Software objects also communicate via interfaces. A C# interface describes a set of methods that can be called on an object, to tell the object to perform some task or return some piece of information, for example. The next part of Project Two introduces an interface named IPayable that describes the functionality of any object that must be capable of being paid and thus must offer a method to determine the proper amount due. an interface declaration begins with the keyword interface and can contain only abstract methods, properties, indexers, and events. All interface members are implicitly declared both public and abstract. In addition, each interface can extend one or more other interfaces to create a more elaborate interface that other classes can implement.

To use an interface, a class must specify that it implements the interface by listing the interface after the colon ( : ) in the class declaration. Note that this is the same syntax used to indicate inheritance from a base class. A class implementing the interface must declare each member of the interface with the signature specified in the interface declaration. A class the implements an interface but does not implement all the interface’s members is an abstract class—it must be declared abstract and must contain an abstract declaration for each unimplemented member of the interface. Implementing an interface is like signing a contract with the compiler that states, “I will provide an implementation for all the members specified by the interface, or I will declare them abstract.”

An interface is typically used when unrelated classes need to share common methods. This allows objects of unrelated classes to be processed polymorphically—objects of classes that implement the same interface can respond to the same method calls. Programmers can create an interface that describes the desired functionality, then implement this interface in any classes requiring that functionality. For example, in the accounts-payable application for this project, we implement interface IPayable in any class that must be able to calculate a payment amount.

An interface often is used in place of an abstract class when there is no default implementation to inherit—that is, no fields and no default method implementations. Like public abstract classes, interfaces are typically public types, so they are normally declared in files by themselves with the same name as the interface and the .cs filename extension.

To build an application that can determine payments for employees and invoices, you will create an interface named IPayable. Interface IPayable contains method GetPaymentAmount that returns a decimal amount that must be paid for an object of any class that implements the interface. Method GetPaymentAmount is a general purpose version of method Earnings of the Employee hierarchy—method Earnings calculates a payment amount specifically for an Employee, while GetPaymentAmount can be applied to a broad range of unrelated objects. After declaring interface IPayable, you will create class Invoice, which implements interface IPayable. Finally, you will update Employee derived classs SalariedEmployee to ‘fit’ into the IPayable hierarchy.

**Required: Submit the path to your project on S drive by clicking on the submit button.**

13th Class – Monday, April 14, 2014

Files Class – MSDN System.IO  
<http://msdn.microsoft.com/en-us/library/system.io.file%28v=vs.110%29.aspx>

File Stream  
<http://msdn.microsoft.com/en-us/library/system.io.filestream%28v=vs.110%29.aspx>

StreamReader Class  
<http://msdn.microsoft.com/en-us/library/system.io.streamreader%28v=vs.110%29.aspx>

BinaryReader Class  
<http://msdn.microsoft.com/en-us/library/system.io.binaryreader%28v=vs.110%29.aspx>

# [STAThread] // Telling the compiler there is only one thread running.

# STAThreadAttribute Class <http://msdn.microsoft.com/en-us/library/system.stathreadattribute%28v=vs.110%29.aspx>

We will go over Generics first, then Collection Classes. (not covering ArrayList, Dictionary)  
Looking at the Collections code.

Collection (C# and Visual Basic)  
<http://msdn.microsoft.com/en-us/library/ybcx56wz.aspx>

‘Constant time’ takes the same about of time for any size of data structure.

ArrayList Class  
<http://msdn.microsoft.com/en-us/library/system.collections.arraylist%28v=vs.110%29.aspx>

// A disadvantage of an ArrayList is it tries to predict the capacity...

Console.WriteLine(" Capacity: {0}", myAL.Capacity);

Better to use a List<string>. Still limited by capacity prediction but we specify a stype. We can find substrings with .Contains

And we can use the .TrimExcess method to trim the capacity.

And we can use the .Clear method to set the capacity to zero.

Need using collections.Generic for using list, linkedlist, stacks and ques.

Collection

Hashtable

Dictionary

EnumeratorTypes

IEnumerator  
<http://msdn.microsoft.com/en-us/library/system.collections.ienumerable.aspx>

Use while loop everywhere.

14th Class – Wednesday, April 16, 2014

Sick – Absent from class

15th Class – Monday, April 21, 2014

Quiz. 1st Attempt: 5 wrong, 2nd Attempt: 100% right.

Design Patterns of Object-Oriented Designs  
<http://oodesign.com/>

Factory Pattern

<http://www.oodesign.com/factory-pattern.html>

Factory Method Pattern

<http://www.oodesign.com/factory-method-pattern.html>

Adapter Pattern

<http://www.oodesign.com/adapter-pattern.html>

Bridge Pattern

<http://www.oodesign.com/bridge-pattern.html>

Web Services:

MS Misual Studio, New Projects:

- WCF Service Application (not used ), good, uses IIS

- ASP.NET Web Application (used), good, uses

**Test connection to MS SQL Server – database**

---- Personal information for Michael Fetick ----

Student number db84270 Microsoft SQL Server account information - PRIVATE  
Hello Michael,  
Here is your information for the Microsoft SQL Programming Course:  
Your username:          db84270  
Your password:          5a0c1de0  
Your database name:     db84270  
MSSQL Server FQDN:      mssql-2-34.int.coleman.edu  
or at this IP address:  172.16.2.34  
Have Fun!

School: MS Visual Studio – View – Server Explorer – Data Connection (Right-Click) – Add Connection… –

Home: MS Visual Studio – View – Server Explorer – Data Connection (Right-Click) – Add Connection… –

Microsoft SQL Server – Add Connection (Form). Server Name: (Nothing listed)

(Have installed) MySQL – MySQL Workbench 6.0 CE. [Started]

(Have MySQL Connections already set up)

mine – pm84270, pm84270, pm84270@linuxsandbox.coleman.edu:22

atHomeDefault – 127.0.0.1, 3306, root, Test Connections (Parameters are correct)

[Configure Server Management] – Configure Local Management:

(Also have installed) MS SQL Server 2008.

16th Class – Wednesday, April 23, 2014

Mid-term Exam 24:25 95%, break till 0920.

Handout: “Stream Architecture”, reference book: “C# in a NutShell”

MS Visual Studio Project – “Disconnected Objects”

Completed Practical Exercise 3 “XML Serialization”

(the WebClass needs to be updated with a textbox to submit our link)

17th Class – Thursday, April 23, 2014

+ Lesson #15 – Microsoft SqlServer – Connected Objects - SqlConnection , SqlCommand SqlDataReader

+ Lesson #16 – Microsoft SqlServer – Disconnected Objects – SqlDataAdapter, DataSets, DataTable, DataRow

Lesson #17 - Microsoft SqlServer – Stored Procedures (SPROCS), Update, Delete, Insert, Database Triggers

Lesson #18 Microsoft SqlServer – Cursors, Transactions

Lesson #19 Winforms – Project 4 ATM Machine

<http://www.informationisbeautiful.net/>

<http://www.informationisbeautiful.net/visualizations/million-lines-of-code/>

18th Class – Monday, April 28, 2014

Substitute Instructor: John Wyatt

Lesson #17 - Microsoft SqlServer – Stored Procedures (SPROCS), Update, Delete, Insert, Database Triggers

**Stored Procedures**: Database server is doing the work. Better security because of implemented.

**Triggers**: Set a condition and when it is changes the DB detects that and does something. Runs when something action happens.

**Transactions**: We can use Winforms to change data in fields. We change the whole record at once.

Before year 2000, MS SQL used ‘Page-level locking’ ( restricts access to other uses)

Around year 2000, MS SQL used ‘Row-level locking’ came out.

**Reserved Keywords (Transact-SQL)**

<http://msdn.microsoft.com/en-us/library/ms189822%28v=sql.120%29.aspx>

Microsoft SQL Server Management Studio Express 2005. Login 172.16.2.34, 5a0c1de0, db84270

In Object Explorer, find db84270 – Tables – dbo.accounts\_t – Triggers

And create new two files:

(from Template: SQLQuery1.sql)

ADO – Active X Data objects

COM objects (old way, supported for backward compatibility)

Concatenated key (use multiple keys together to make a primary key.

‘Surrogate key’ – an identity key – make an extra column on the table to be the primary key.

Get a connection with a SQLConnection object

DataAdapters and Datasets (My image on the client side as a result of the Select queries.

DataAdapters is a snapshot of DB going into tables to be held. It has the query and the connection. To make multiple queries, make multiple adapters.

Datasets we interact with to read the tables and manage the data.

Test driven development.

Winforms versus MFC

Lesson #18 Microsoft SqlServer – Cursors, Transactions

Lesson #19 Winforms – Project 4 ATM Machine

19th Class – Wednesday, April 30, 2014

Lesson #19 Winforms (Continued)

Processes – completely separate programs with their own stack and code segments

Thread, Task (Synonyms) – live within a single process.

Fibre – A faster way to switch between threads. Must be careful of shared threads. Not used much.

CPU

Memory – stack, heap, code segment,

Windows API-level sends an event to the process

MFC programming sends the event by putting the function in the message.map

Winforms hides that so you don’t see it. It has the name of the function after the name of the button, i.e. button\_click() (Isolates you from the Windows API).

In the designer.cs file you can see the connection where it adds the event += to the EventHandler.

WPF is newer than WinForms. WPF uses xml and is used for tablet, phone and with Java.

– Project 4 ATM Machine

Event-driven application.

Default the account type.

WPF – wmchar keydown, wmchar message for that character to the message box. Wmchar keyup.

Multi-lingual, read right-to-left . European numerals. Web UTF-8

The delete key ‘del’ does not generate a keypress whchar message.

20th Class – Monday, May 5, 2014

“This sentence is false.”

iroot(a)\*iroot(a) <= a < (iroot(a)+1)\*(iroot(a)+1)

iroot(a)\*iroot(a) <= a < (iroot(a)+1)\*(iroot(a)+1)

true (a)\*iroot(a) <= a < (iroot(a)+1)\*(iroot(a)+1)

insert object x into list s

Coding standards

Software Testing:

Geometry Proof – if premise is true, the theory is true

With empirical science, you have to test every case.

So, consider only the pathways.

Thomas McCabe – graph theory

Third-party functions may not be able to handle an exception so the catch-finally block can handle closing resources.

21st Class – Wednesday, May 7, 2014

Eye dew knot sea watt two due.

I cuold not bleveie what I hared.

THREADS

(No solutions without restrictions)

- Traveling salesman (os)

- Dining philosophers (multi-threading)

- Sleeping barber (multi-threading)

MS Visual Studio - ThreadTesterApplication.MessagePrinter

Doing threading varies from language to language

Multiple processes: (MS Word, Network, MS Paint, Virus Scanner) It pages (switches) between them.

Methodology to do time allocated to do a process:

Emptive multitasking gives time slots of equal size

In Windows – Pre-emptive multitasking: Time slot size is determined by what you need.

Keywords:

Thread, threadstart

while (thread1.IsAlive && thread2.IsAlive && thread3.IsAlive)

Thread current = Thread.CurrentThread;

current.Name, sleepTime );

current.Name, sleepTime );

Thread.Sleep( sleepTime );

Can control the order of things within a thread

Cannot control the order of things across multiple threads

Problems with reader and writer getting interrupts

**Reader-Writer Lock**

(Control of the order in which things happen)

Terms: ‘Reader-Writer Lock’ or ‘Critical Section’

Set the lock, do the work, (never interrupted), release the lock (clear the flag).

Begin Critical Section – End Critical Section

In C# Monitor.enter and Monitor.exit

Another way is called a ‘MUTEX’ or ‘semaphore’

**Deadlock:**

Dining philosophers (multi-threading) paradigm (deadlock between two nodes)

- Process starvation

A shared resource (network connections to Internet, devices, servers)

You can put restrictions to ensure this doesn’t happen.

**Sleeping barber** (multi-threading)

How do they communicate two tasks together without stepping on each other?

Task1 (writes a message)

Task1 (raises a flag) - - - - - - - - - - - - - - - - - - - Task2 (looking to see if a flag is set)

Task1 (waiting for flag to be cleared) - - - - - - Task2 (reads the message)

Task1 (waiting for flag to be cleared) - - - - - - Task2 (clears the flag)

Task1 (waiting for flag to be cleared) - - - - - - Task2 (clears the flag)

static object locker = new object();

MS Windows (under the hood) uses MUITEX’s

Monitor.Enter(locker);

Monitor.Exit(locker);

DI - Disable interrupts

EI - Enable interrupts

NMI - Non-maskable interrupts

Threading – Problem with the Reader-Writer Lock with certain hardware.

Multiple CPUs (CPU Cores) run faster, have cache memory

In C#, for ‘volatile reads and writes’ it to force it to write it out from the cache to memory

And read from the memory.

**‘c# volatile memory model**’  
The C# Memory Model in Theory and Practice  
<http://msdn.microsoft.com/en-us/magazine/jj863136.aspx>  
<http://msdn.microsoft.com/en-us/magazine/jj883956.aspx>  
<http://igoro.com/archive/volatile-keyword-in-c-memory-model-explained/>  
<http://stackoverflow.com/questions/4269498/volatile-and-thread-memorybarrier-in-c-sharp>

**‘c# volatile memory barrier’**

Threading in C#

<http://www.albahari.com/threading/part4.aspx>

**‘Volatile Class’**

<http://msdn.microsoft.com/en-us/library/system.threading.volatile%28v=vs.110%29.aspx>

**‘volatile and MemoryBarrier()’**

<http://blogs.msdn.com/b/brada/archive/2004/05/12/volatile-and-memorybarrier.aspx>

**Thread.VolatileWrite method** (printed)

<http://msdn.microsoft.com/en-us/library/system.threading.thread.volatilewrite%28v=vs.110%29.aspx>

Generally, when possible, have only one writer, with multiple readers.   
Because, multiple writers don’t know which writer has the most current data.

### **Memory Model, Memory Barrier and Singleton Pattern in .NET**

<http://www.codeproject.com/Articles/37282/Memory-Model-Memory-Barrier-and-Singleton-Pattern>

**Monitor Class** (printed)

<http://msdn.microsoft.com/en-us/library/system.threading.monitor%28v=vs.110%29.aspx>

**Thread synchronization: Wait and Pulse demystified** (printed)

<http://www.codeproject.com/Articles/28785/Thread-synchronization-Wait-and-Pulse-demystified>

No longer concerned about the order of processes running in the background:

save

write

close

flush

open

read

22nd Class – Thursday, May 8, 2014

**Indexer**

Specific to C#, it's really cool to use a floating point indexer to interpolate a value

public double this[double X]

{

get { return X \* m\_slope + m\_offset; }

}

Web Services

AJAX is like the wild West.

It has some good stuff, but you spend more time (90% of effort) trying to determine the browser your using.

**Binding a control to a new datasource**

When binding a control to a new datasource. In the properties there is a binding

When you have a conection with a local database, you can use a Datasource for the listbox as listbox.datasource

Datasource does not require the code for connection string and query because you already have a connection.

Besides using a local database there should be only access by one user.

The integrity of the data is not ensured with multiple user access because there is no concept of transactions.

The refresh time gets longer when the database gets bigger.

Table: accounts\_t

account\_number account\_type customer\_id

|  |  |  |
| --- | --- | --- |
| 22222 | C | 7 |
| 33333 | C | 3 |
| 33343 | S | 3 |

Table: ATMCard\_t

card\_number account\_number pin

|  |  |  |
| --- | --- | --- |
| 1111 | 22222 | 1234 |
| 1121 | 33333 | 5678 |

Table: customer\_t

customer\_id customer\_name

|  |  |
| --- | --- |
| 1 | Freddie The Freeloader |
| 2 | Susan Of The Savanah |
| 3 | George Of The Jungle |
| 4 | Mary Quite Contrary |
| 5 | Moe Rocca |
| 6 | Kathleen Turner |
| 7 | Jerry F. Smootherfeld |
| 8 | Edgardo Fernandez |
| 9 | Zuleika Andressa |
| 10 | Winona Franklin |

transaction\_number,

account\_number,

amount,

transaction\_type,

last\_date\_modfied;

transaction\_number, account\_number, amount, transaction\_type,last\_date\_modfied

transaction\_number int

account\_number numeric(6,0)

amount money

transaction\_type char(1)

last\_date\_modified datetime

transaction\_number, account\_number, amount, transaction\_type, last\_date\_modfied

transaction\_number int

account\_number numeric(6,0)

amount money

transaction\_type char(1)

last\_date\_modfied datetime

23rd Class – Monday, May 12, 2014

**Web Services**

First tried Lesson 22 but it doesn’t work, then got it to work and put stuff on the R drive \ web service instructions.

* Model-View-Controller (MVC)
* Windows Presentation Foundation (WPF) with xml code
* Window Forms

Service Oriented Architecture (SOA) with servers that provide functions,

Contrary to installed libraries like C# APIs and base class library (bcl)   
 – they live on the local computer (and must be installed)

Service Providers advertise services to Service consumers.

To advertise the services:

WSDL – Web Services Description Language. How my program describes itself.

SOAP – The Microsoft method.

Microsoft - SOAP – The Microsoft method.

Unix - CORBA – Common Object Request Broker Architecture,

COM – Common Object Model, Distributed COM (DCOM)

Rest - Jobs

Sends messages as Remote Procedure Calls (RPC)

Consumers – to/back (value) – Servers

MS has done online Office and now getting back to it with Office 360

If you lose Google Docs then you will lose ‘Intellectual Property rights.’

Microsoft Visual Studio – Web – .NET Framework 3.5 – ASP.NET Web Service Application – Visual C#

Do all three project in one Solution… Hellowrold

Add – New Project…

Setup As Startup Project.

Problems with the debugger, run it as Release for no problems.

using system.web

using system.web.services

**REST vs. SOAP: How to choose the best Web service**

<http://searchsoa.techtarget.com/tip/REST-vs-SOAP-How-to-choose-the-best-Web-service>

Representational State Transfer (REST)

Rest does not rely on a response

CORBA, COM do rely on a response

AJAX is in between there.

Fyi:

Multi-Mode Fiber, Single-mode Fiber

Lossless, lossy,

Around the world in 360 degrees – 3 year epic selfie

<https://cafe.coleman.edu/cafeweb/login>

You can’t send binary across the Internet.

The Internet sends UTF-8 (ASCII) messages. UUEncode and UUDecode

The ISPs send UTF-8 messages (multi-national) to other ISP.

pre-fetched pages

http://localhost:4453/Service1.asmx

http://localhost:1722/Service1.asmx

WebApplicationDemo

Numeric: A string that has only numbers, not an integer.

INSERT INTO 'transaction\_t'

(account\_number, amount, transaction\_type, last\_date\_modified)

VALUES (33333, 1000, 'D', GETDATE())

INSERT INTO transactions\_t

(account\_number, amount, transaction\_type, last\_date\_modified)

VALUES (33333, 1000, 'D', GETDATE())

"INSERT INTO transactions\_t \r\n (account\_number, \r\n amount, \r\n transaction\_type, \r\n last\_date\_modified)\r\n VALUES (33333,2500,D,GETDATE())"

"INSERT INTO transactions\_t(account\_number, amount, transaction\_type, last\_date\_modified) VALUES (33333,2500,'D',GETDATE())"

24th Class – Wednesday, May 14, 2014

**Project4-ATM**

Article-MarketingRequirementsAnalysis.doc

RM-ODP

Use cases, actor (not stakeholders)

Guarantees

Workflow, action sequence

“Writing Effective Use Cases” by Alistair Cockburn

<http://www.amazon.com/Writing-Effective-Cases-Alistair-Cockburn/dp/0201702258>

“The Leader’s Handbook: Making Things Happen, Getting Things Done” by Peter R. Scholtes

<http://www.amazon.com/The-Leaders-Handbook-Making-Getting/dp/0070580286>

25th Class – Monday, May 19, 2014

PID –Proportional Integral Derivative. PID controller

<http://www.ni.com/white-paper/3782/en/>

<http://www.ask.com/question/what-is-a-pid-controller?ad=semD&an=google_s&am=broad&o=11612>

Fuzzy logic – many valued logic. Rebutted Aristotle.

**Heuristics** – PPT. relates to best practices, thoughts about . Biological equivalent of an algortyhm.

Conamen and David Kaversky.

Conjunction Fallacy

<http://en.wikipedia.org/wiki/Conjunction_fallacy>

The **conjunction fallacy** is a [formal fallacy](http://en.wikipedia.org/wiki/Formal_fallacy) that occurs when it is assumed that specific conditions are more probable than a single general one.

The most often-cited example of this fallacy originated with [Amos Tversky](http://en.wikipedia.org/wiki/Amos_Tversky) and [Daniel Kahneman](http://en.wikipedia.org/wiki/Daniel_Kahneman):[[2]](http://en.wikipedia.org/wiki/Conjunction_fallacy" \l "cite_note-Tversky_.26_Kahneman_1982-2)[[3]](http://en.wikipedia.org/wiki/Conjunction_fallacy#cite_note-tk83-3)

*Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.*

Which is more probable?

1. Linda is a bank teller.
2. Linda is a bank teller and is active in the feminist movement.

The majority of those asked chose option 2. However the [probability](http://en.wikipedia.org/wiki/Probability) of two events occurring together (in "conjunction") is always less than or equal to the probability of either one occurring alone—formally, for two events *A* and *B* this inequality could be written as \Pr(A \and B) \leq \Pr(A), and \Pr(A \and B) \leq \Pr(B).

\_Generics\_allow you to declare type-parameterized code, which can be instantiated with different types. What this means is that you can write the code with “placeholders for types,” and then supply the actual types when you create an instance of the class.

<http://msdn.microsoft.com/en-us/library/512aeb7t.aspx>

A \_SqlDataAdapter\_ object allows you to specify what type of interaction you want to perform with a database. For example, you can do select, insert, modify, and delete commands on rows of data in a database table. This object can be used to support disconnected data management scenarios

<http://msdn.microsoft.com/en-us/library/system.data.sqlclient.sqlcommand%28v=vs.110%29.aspx>

A \_Connected\_ environment requires a constant connection to transfer data between client application and data source.

<http://msdn.microsoft.com/en-us/library/aa303133.aspx>

\_Disconnected\_ objects cache data locally and perform extensive processing on data without requiring an open connection to the data source, and therefore allows other clients to interact with the data source.

<http://social.msdn.microsoft.com/Forums/en-US/845ccdc3-0a4e-4f19-831f-e9e3189c831d/disconnected-development-with-adonet-entity-framework?forum=adodotnetentityframework>

A \_stored procedure\_ is a group of Transact-SQL statements compiled into a single execution plan

<http://www.codeproject.com/Articles/126898/Sql-Server-How-to-write-a-Stored-procedure-in-Sql>

<http://social.msdn.microsoft.com/Forums/sqlserver/en-US/c8d7d8f4-b412-45cb-8f76-995a5ae7ac3c/sql-server-2008-stored-procedure?forum=sqltools>

<http://msdn.microsoft.com/en-us/library/ms811006.aspx>

\_Triggers\_ are a special class of stored procedure defined to execute automatically when an UPDATE, INSERT, or DELETE statement is issued against a table or view. These are powerful tools that sites can use to enforce their business rules automatically when data is modified. They can extend the integrity checking logic of SQL Server constraints, defaults, and rules, although constraints and defaults should be used instead whenever they provide all the needed functionality.

<http://msdn.microsoft.com/en-us/library/ms189799.aspx>

<http://www.codeproject.com/Articles/25600/Triggers-Sql-Server>

<http://msdn.microsoft.com/en-us/library/system.windows.trigger%28v=vs.110%29.aspx>

<http://msdn.microsoft.com/en-us/library/dd301068.aspx>

<http://msdn.microsoft.com/en-us/library/system.windows.frameworkelement.triggers%28v=vs.110%29.aspx>

\_Winforms\_  is a graphical user interface application programming interface (API) included as a part of Microsoft's .NET Framework.

<http://msdn.microsoft.com/en-us/library/dd30h2yb%28v=vs.110%29.aspx>

<http://msdn.microsoft.com/en-us/library/system.windows.forms%28v=vs.110%29.aspx>

Winforms is event driven programming

When programs download large files, such as audio clips or video clips over the Internet, users do not want to wait until the entire clip downloads before starting the playback. To solve this problem, we can put multiple \_Threads\_ to work, one \_thread\_ downloads a clip, while another plays the clip. These activities proceed concurrently.

<http://msdn.microsoft.com/en-us/library/vstudio/6kac2kdh%28v=vs.100%29.aspx>

<http://msdn.microsoft.com/en-us/library/aa645740%28v=vs.71%29.aspx>

Which of the following is not a thread state? Start

<http://msdn.microsoft.com/en-us/library/system.threading.threadstate%28v=vs.110%29.aspx>

<http://msdn.microsoft.com/en-us/library/system.threading.thread%28v=vs.110%29.aspx>

<http://msdn.microsoft.com/en-us/library/system.threading.threadstate%28v=vs.100%29.aspx>

\_Web services\_have been created to solve the interoperability of applications across operating systems, programming languages, and object models and can achieve this by relying on well supported Internet standards, such as Hypertext Transfer Protocol (HTTP) and Extensible Markup Language (XML).

<http://msdn.microsoft.com/en-us/library/ms950421.aspx>

<http://msdn.microsoft.com/en-us/library/ms972326.aspx>

Which of the following is not a type of generic? Abstract classes (Page 432)

<http://msdn.microsoft.com/en-us/library/512aeb7t.aspx>

<http://msdn.microsoft.com/en-us/library/d5x73970.aspx>

<http://msdn.microsoft.com/en-us/library/c6cyy67b.aspx>

Which of the following is not a characteristic of Web services?

Select one:

a. Web service is simple to build and supported on a wide range of platforms.

b. Web service can extend its interface and add new methods without affecting the client's operation.

c. Web services cannot communicate if there is a firewall

d. Web service are stateless, there is no permanent connection that scale up the many clients.

<http://msdn.microsoft.com/en-us/library/aa480509.aspx>

lass MyStack <**T**>

{

**T** [] StackArray;

public void Push(**T** x ) {...}

public **T** Pop() {...}

...

}

The above code is an example of: Generics

Which of the following is not a characteristic of Generics

(Page 432) Difficulty to Maintain: More error-prone to maintain, since all changes need to be applied for each applicable type.

Which of the following is false about XML serialization:

Select one:

a. XML serialization serializes private fields

b. XML serialization does not include any type information.

c. We need to have a default/ non-parameterised constructor in order to serialize an object.

d. ReadOnly properties are not serialized.

“type fidelity is not always preserved during XML serialization.”

<http://msdn.microsoft.com/en-us/library/ms950721.aspx>

XML serialization serializes the public fields and properties of an object, or the parameters and return values of methods, into an XML stream that conforms to a specific XML Schema definition language (XSD) document. XML serialization results in strongly typed classes with public properties and fields that are converted to XML. [System.Xml.Serialization](http://msdn.microsoft.com/en-us/library/system.xml.serialization.aspx) contains the classes necessary for serializing and deserializing XML.

You can apply attributes to classes and class members in order to control the way the [XmlSerializer](http://msdn.microsoft.com/en-us/library/system.xml.serialization.xmlserializer.aspx) serializes or deserializes an instance of the class.

<http://msdn.microsoft.com/en-us/library/ms233843.aspx>

**\_**Serialization**\_** is the process of converting complex objects into stream of bytes for storage. It allows the developer to save the state of an object and recreate it as needed.

Through serialization, a developer can perform actions like

Select one:

a. sending the object to a remote application by means of a Web Service

b. passing an object from one domain to another

c. passing an object through a firewall as an XML string

d. maintaining security or user-specific information across applications.

e. All of the above

The \_SqlConnection\_ class provides all the properties and methods needed to make a connection to a Microsoft SQL database.

<http://msdn.microsoft.com/en-us/library/system.data.sqlclient.sqlconnection%28v=vs.110%29.aspx>

\_SqlDataReader\_reads database rows one-by-one. It reads in forward order from an SQL database. The SqlDataReader type can be used in a loop to read multiple rows from an SQL database. It provides good performance and strong typing.

<http://msdn.microsoft.com/en-us/library/system.data.sqlclient.sqldatareader%28v=vs.110%29.aspx>

<http://msdn.microsoft.com/en-us/library/system.data.sqlclient.sqldataadapter%28v=vs.110%29.aspx>

26ST Class – Wednesday, March 21, 2014

True/False – “The sentence I am writing is the sentence you are reading.” False

Make a user-friendly message – Otherwise, it makes it look like there is something wrong with the code and not what the user input.

Dining philosophers – can result in “deadlock” and “process starvation.”

It is impossible to guarantee prevention of both.

It is best to

* Prevent - Deadlock
* Detect - Process Starvation

The most common method to detect Process Starvation and Deadlock is for the system or you,

will use one task to find them (lowest-priority task, called “idle.”)

When a deadlock stops everything; a “Watchdog” time outs, making the system halt.

Semaphore – any can set the flag and any can reset the flag

Mutex – any can set the flag but only the setter can reset the flag.

Lock – monitor (C#)

27TH Class – Thursday, March 22, 2014

FINAL EXAM today.

Grab CWnd::PreTranslateMessage

<http://msdn.microsoft.com/en-us/library/kkbhxcs2.aspx>

Software Testing

<http://www.yitsplace.com/Programming/software_testing.htm>

Defect Seed Triangle Program - Test

<http://www.yitsplace.com/Programming/tri-ans.htm>

Cyclomatic Complexity – Modified Coverage Decision Coverage (MCDC) [Automated Code Analysis]  
Decision Tree

Software Testing – Basis Paths  
<http://www.yitsplace.com/Programming/basis_paths.htm>  
With a case when every premise is true the hypothesis is true and it is proven.

Test only functions. Each path has one entry and one ext. Count “if’s” but don’t count “else’s.”

+1 If, do, for, while  
+1 break, return. Case

If the Cyclomatic Complexity > 11 (make it smaller) - - - the DoD Standard for the max is 11).

Write the Case and call functions.

**Test Objectives for Software Testing Pre-Course Test**

1. Input will be numbers that represent the length of each side of a triangle. A triangle has three sides that have some length. Test for input of three values of a valid triangle or quit.
2. Input from the keyboard is validated for three integers. The value of each input will be acceptable within boundaries, i.e. an integer between 1 to 100. Negative numbers are not accepted. Test for input of acceptable values.
3. Processing of the input involves comparing the value of each side to determine and identify the triangle type from the following types of triangle:

* scalene (no sides equal)
* isosceles (2 sides equal)
* equilateral (all sides equal)

Test for correct output from the computed result based on input values.