18th Class – Monday, April 28, 2014

Text: Illustrated C# 2005, Daniel Solis, Apress

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

Lesson #17 - Microsoft SqlServer – Stored Procedures, 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

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 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 handles closing resources.

21st Class – Wednesday, May 7, 2014

Eye dew knot sea watt two due. Or, 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 but 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#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).

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.