- Explain the difference between classic control and PLC
- Explain the purpose of a PLC Interface Modules (IM) and Expansion modules SM , CM ,PS and describe how it is connected in the PLC Rack
- Using practical examples, explain the Wiring of Digital Input/Digital Output and Analog Input/Analog Output modules
- List and explain all methods of connecting the PLC to the programming computer
- Explain how to configure the PLC Hardware, Rack, Power Supply, CPU and Digital Input(DI), Digital Output(DO), and Analog Input (AI) in TIA Portal
- Explain how to use the PLC Simulator
- Explain the concept of scan cycle and operation modes in PLC
- Explain watch and force table and List the 3 programming languages available in Step 7
- Demonstrate how to populate ladder logic rungs and address Bit Logic instructions on each rung using Absolute and Symbolic Addressing
- Explain the purpose of the Latch and Set , Reset instructions, RS and SR Flip-flops and demonstrate the proper use of each
- Demonstrate how to use markers and POS,NEG edges
- Demonstrate how to use all types of STEP 7 timers and counters
- Demonstrate how to use all types of SIMATIC timers and counters
- Explain the Numbering System terms Decimal, Binary, and BCD
- Explain Data Types
- List and explain the operation of all CMP instructions
- Write a ladder logic program using Math instructions
- Perform PLC Data Numbering Type conversions
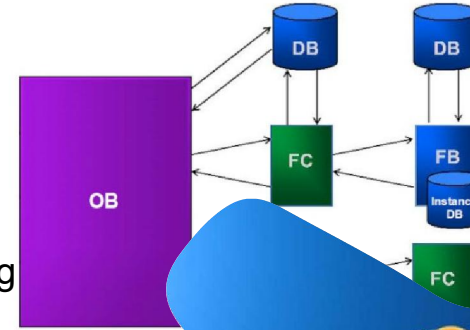
TIA V15

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1-PLC

- Write a ladder logic program using Move instructions
- Write a ladder logic program using Shift and Rotate Instructions
- Explain the operation of the following Logic Gates: AND, OR, XOR, and Invert
- Explain the purpose of a Jump Instruction
- Explain what a Watchdog Timer is and describe an example of where it can be used
- Explain what an Infinite Loop Error is
- Demonstrate pulse generation using timers and the CPU Clock
- Configure a function (FC) to perform a task or calculation such as volume in a tank
- Configure a Function Block (FB) to perform a repetitive task
- Define and configure a Data Block (DB)
- Understading structures, arrays and UDT
- Configure and describe the most common types of OBs and when to use them (OB1 , OB100 , OB30 , OB20 , OB10 , OB 80 , OB82, OB...)

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2-HMI

1. WinCC Comfort/Advanced HMI System Overview
2. Project Creation &Communication Setup in TIA Portal
3. Screen Design (screens, pop-up screens and templates).
4. Multi-Language Setup
5. Basic elements and Library Utilization
6. Navigating through the process pictures
7. User administration
8. Alarm display, alarm logging, alarm configuration
9. Tag logging, trend configuration, trend display
10. Recipe Management
11. Faceplates for reuse and centralized modification of graphics blocks
12. (C) Working with Layers
13. (C) Animation (rotation / vertical movement / text & graphic list)
14. (C) How to Add trends f(t) & f(x) / value table/ table view
15. Schedualed Tasks
16. VB Scripting example

(C) Common with SCADA

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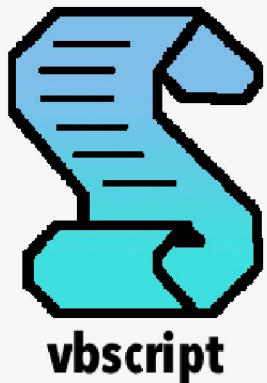
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3-SCADA   Level 1

1. SCADA introduction
2. Buttons and I/o field
3. Internal and external Scaling
4. Animation (rotation / vertical movement / text & graphic list)
5. How to Add trends f(t) & f(x) / value table/ table view
6. Recipe management
7. User administration
8. Printing reports
9. Create Faceplate
10. Working with Layers
11. (C)Alarm display, alarm logging, alarm configuration
12. (C)Screen Design (screens, pop-up screens and templates).
13. (C)Multi-Language Setup
14. (C)Schedualed Tasks
(C) Common with HMI

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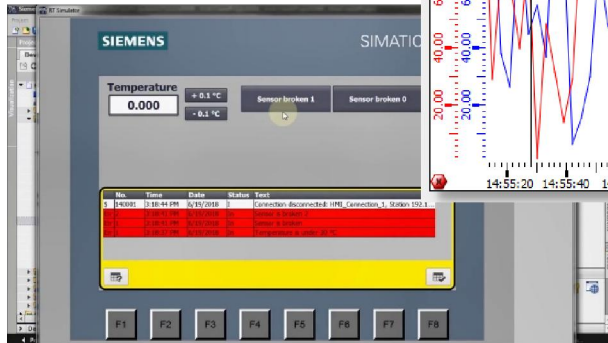
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3-SCADA   Level 2

1-Learn how to program By C#

- Get started(Syntax/ Output/ Comments/ Variables/ Data Types / Type Casting / User Input / Operators / math/ Strings/ Booleans/ If ... Else / Switch / While Loop / For Loop / Break and Continue / Arrays)
- Methods (Method Parameters/ Method Overloading)
- Classes(OOP / Classes and Objects/ Class Members/ / Constructors)

2-building SCADA using C #

Connecting with real PLC S7-1200

3-explain Data Base and all types of SQL Commands in SQL server

DDL (create / drop / alter /truncate)
DML (insert / update / delete)
DCL (grant / revoke)
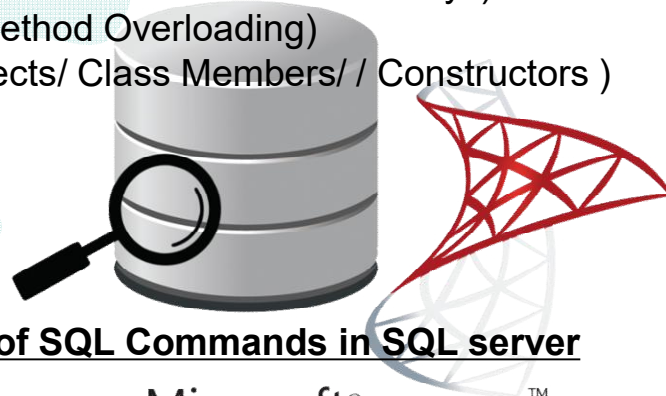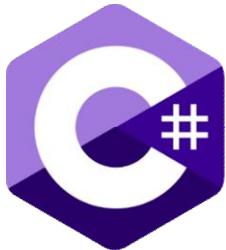TCL (commit / roll back / save point)
DQL (select)

4- linking C# with SQL Server to create final program

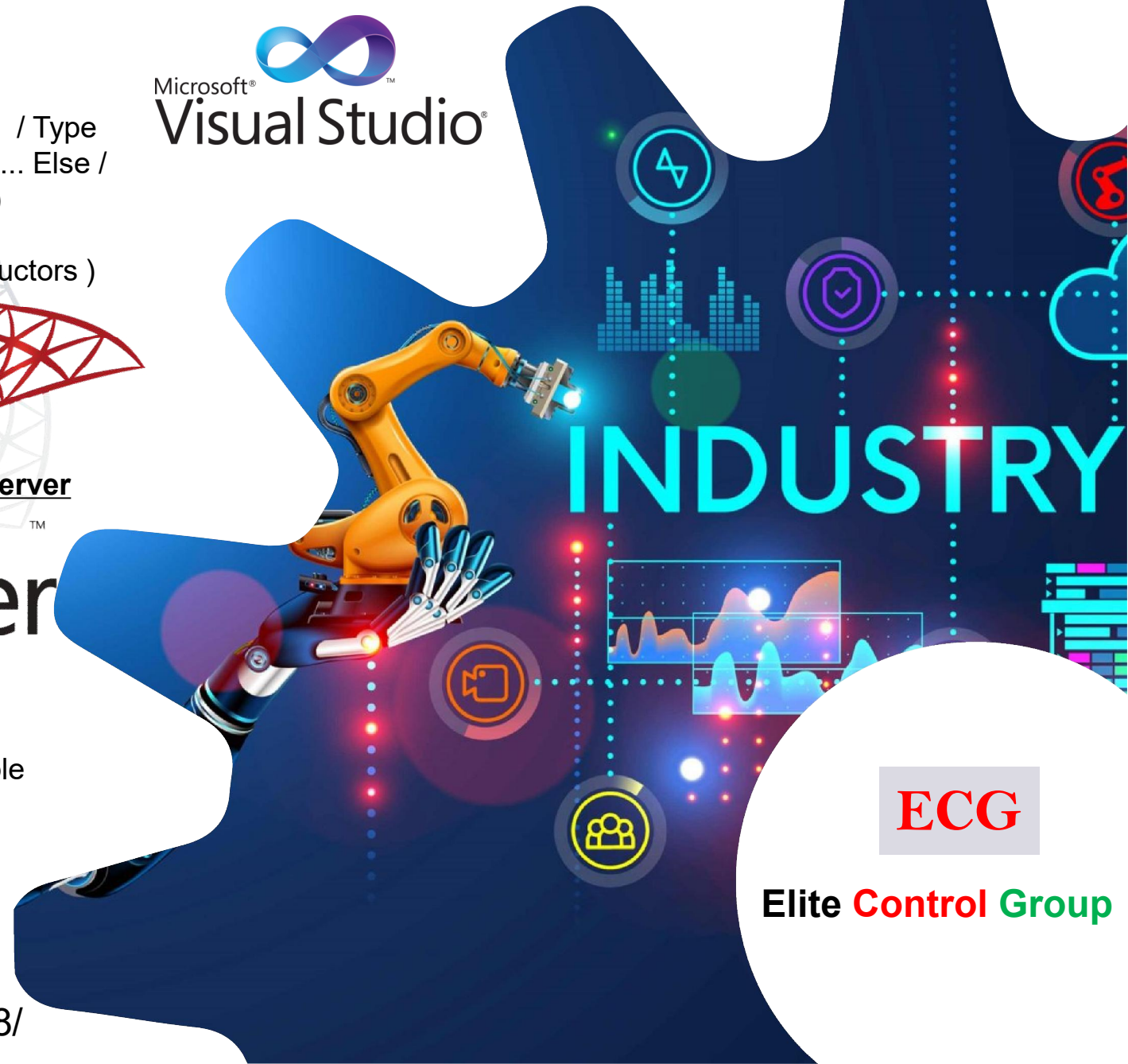Read / Write Data (Analog / digital) in SQL Database with example
Create exe App
Projects and examples

Microsoft Visual Studio

Microsoft SQL Ser

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4- Communication

1-fundamentals (Transmission Methods - Network topology - Transmission Media - OSI Model - network devices -Error control)

2-Modbus RTU.

    a-Connecting s7-1200 with P18D via modbus RS485

    b-Connecting s7-1200 with kinco servo via modbus RS485

3-Foundadion Fieldbus.

a. 1-Basics of FF

b. 2-architecture of H1 Vs OSI.

c. 3-architecture OF HSE Vs OSI.

d. 4-Diffrenece between H1 and HSE according to physical layer

e. 5-Design of FF segment

f. 6-FF Terminator.

g. 7-FF power supply&Fielbus Barrier.&FF Topologies.& FF Grounding.

4-Profibus

a. OSI & PROFIBUS (DP-FMS-PA)

b. Difference between Centeralized and Decenteralized

c. Profibus_DP Design introduction

d. PROFIBUS-DP Addressing

e. Bus Termination.

f. PROFIBUS-DP cable specs.

g. GSD files.

h. Communicatopn port parameters

i. ET200.

j. Connecting PLC with ET200 via PROFIBUS-DP

k. Connecting PLC s7-400 with PLC s7-300 via PROFIBUS-DP

5-S7-Communication.

6-USS communication

    a- Connecting s7-1200 with SINAMICS V20 via USS

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5- Servo motion

1. programming digital inputs and outputs of dervo drive ASDA-B2
2. Explain Servo in position mode with plc + application
3. Explain Servo in velocity mode + application
4. Explain Servo in torque mode + application
5. Explain Servo in dual mode + application

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- All lessons contain More than 20 real Application