Karachi Institute of Economics and Technology
College of Engineering

(SoftwareEngineering)

SE3301–SoftwareDesignandArchitecture

Semester: _____ **Date of Experiment:** _____

Student name: _____ **Faculty Signature:** _____

Student ID: _____ **Remarks/Comments:** _____

Lab12	**BehavioralDesignPattern-1:**TemplateMethodPattern				
PLOs	**PLO1–EngineeringKnowledge**		**Bloom'sTaxonomy**	**C1–Recall**	
	PLO3–DesignandDevelopment			**C3-Apply**	
	PLO8–Ethics			**P2–Set**	
LABTASK PERFORMANCE					
CLO's	**AspectsofAssessments**	**Excellent (75-100%)**	**Average (50-75%)**	**Poor (<50%)**	**Marks**
CLO1 10%	**Recall**Recallthe conceptsofC# Programming Language,OOPandDesignPatternsfromtheory.	Completeunderstandingoftheconcepts of C# ProgrammingLanguage,OOPandDesign Patterns / actively participatesduringlecture.	Complete understanding of theconcepts of C# ProgrammingLanguage,OOPandDesign Patterns / less activelyparticipate during lecture.	Studentlacksclearunderstandingof conceptsofC# ProgrammingLanguage,OOPandDesign Patterns / Unable to read andinterpretit.	
CLO5 80%	**Engineering Knowledge**Demonstrate and illustrateconceptsofBehavioral patternandexperimentswithittobuild Singleton Patternusing VisualStudio.	Accurately implementthe .netto create Behavioral designpattern (Template Method)usingVisualStudiotoobtain the correct output as perrequirement/ given tasks.	Implementthe.net.nettocreateBehavioral design pattern(TemplateMethod)using VisualStudioandgetminorerrorsthat will lead to a slightly differentoutput as per given in a task.	Notabletoimplementthe.net .net to create Behavioral designpattern(TemplateMethod)usingVisual Studio and don'tunderstandhowrequiredoutput andtaskis achieved.	
CLO7 10%	**LabSafety**Properlyhandle labinfrastructure/safety precautions	Properlyhandlelabequipment& obey safety measures.	Moderatelevellabhandlingand safety measurements	Minorornosafetymeasurementshas been considered.	
				TotalMarks:10	

Objective:

1) Makeattendeeunderstandthebasicconceptof BehavioralDesignPattern
2) Makeattendeeunderstandtheconceptof TemplateMethodDesignPattern
3) Makeattendeeimplementexampleof.nettocreateBehavioraldesignpattern(TemplateMethod Pattern)

Toolstobeused:

VisualStudioisusedtoimplement .nettocreatebehavioraldesignpattern(TemplateMethod Pattern).

WhatisBehavioralDesignPattern?

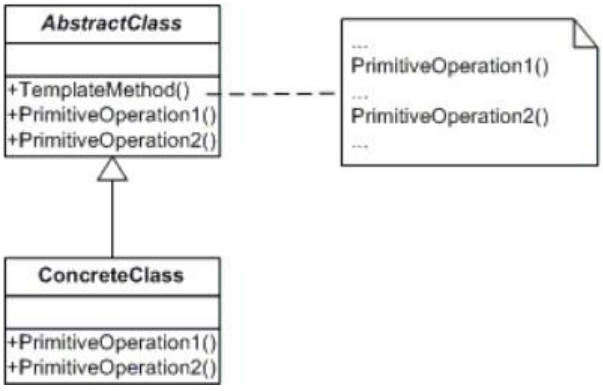
Behavioral Design patterns are the patterns for .Net in which there is a way through which we can pass therequestbetweenthechainofobjects,orwecansaythatitdefinesthemannertocommunicatebetween classesandobject. Behavioralpatternsarethose patternsthatareconcernedwiththeinteractionbetween theobjects.Theinteractionbetweentheobjectsshouldbeinsuchawaythattheyaretalkingtoeachother and still areloosely coupled.Theloose coupling is thekey to n-tierarchitecture. Following arethetypes of

1. TemplateMethodPattern
2. IteratorPattern
3. ObserverPattern
4. ChainofResponsibilityPattern
5. CommandPattern

TemplateMethod Pattern

Template method pattern defines the skeleton of an algorithm in an operation, deferring some steps to sub-classes. The Template Method lets sub-classes redefine certain steps of an algorithm without changingthealgorithm'sstructure. Itallowsyoutodefinesaskeletonofanalgorithminabaseclassand let subclasses override the steps without changing the overall algorithm's structure. Template Method can be recognized by behavioral methods that already have a "default" behavior defined by the base class.

TheUMLclassdiagramfortheimplementationoftheTemplatemethoddesignpatternisgiven below:



TemplateMethod Pattern

Therearetwocomponentsparticipatingintheabovepatterndiagram

1. Abstractclass
2. Concreteclass

1.AbstractClass(DataObject)

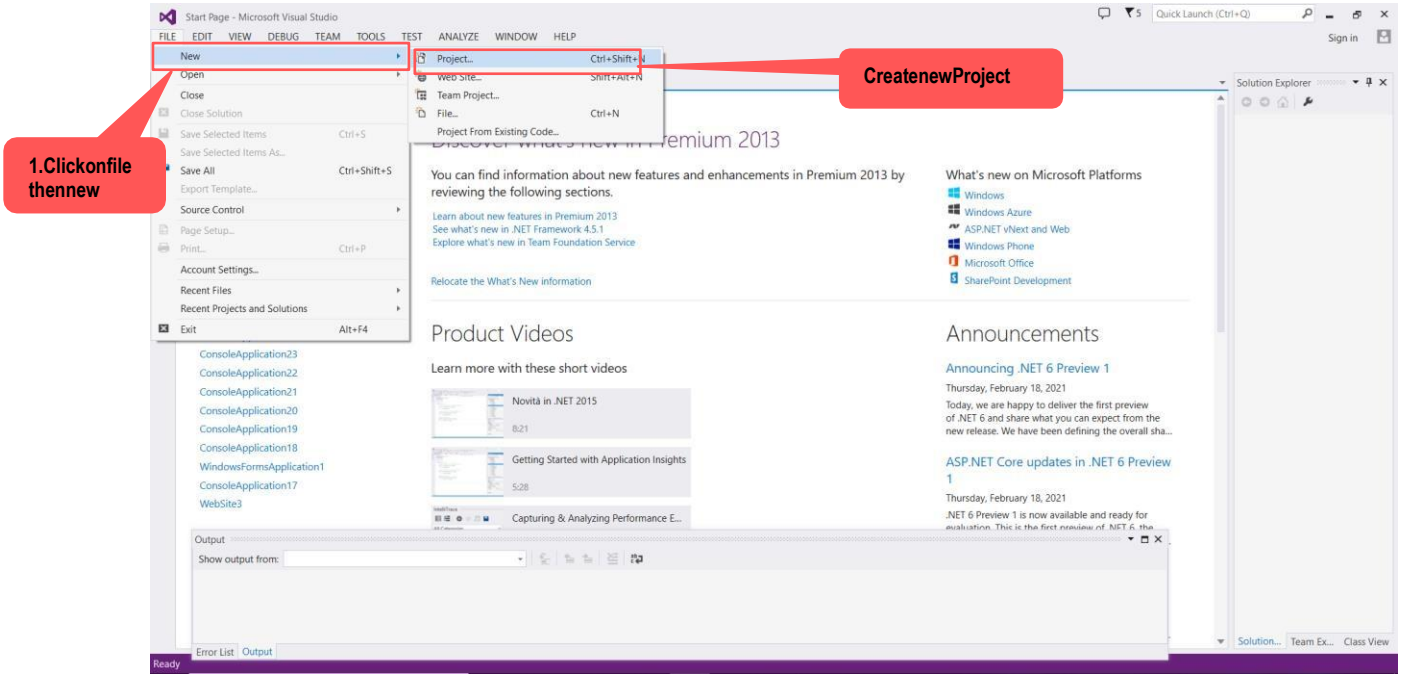
- Definesabstractprimitiveoperationsthatconcretesubclassesdefinetoimplementstepsofan algorithm
- Implementsatemplatemethoddefiningtheskeletonofanalgorithm.Thetemplatemethodcalls primitive operations as well as operations defined in AbstractClass or those of other objects.

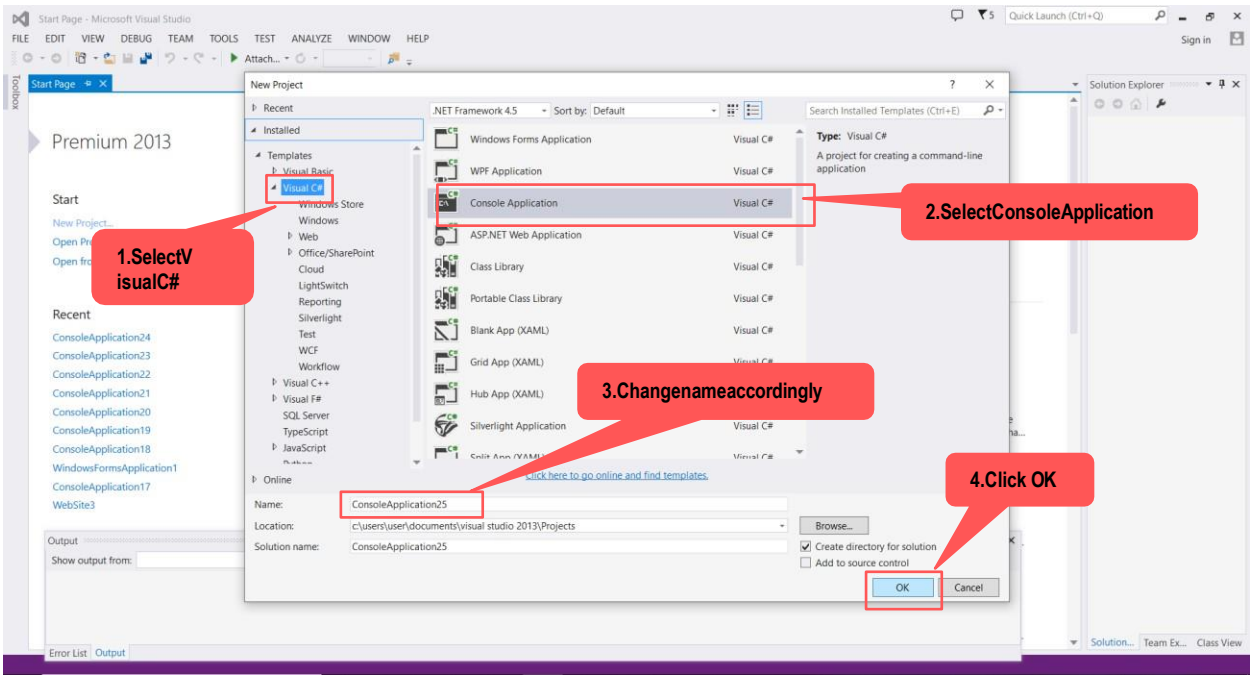
2.ConcreteClass(CustomerDataObject)

- Implementstheprimitiveoperationstocarryoutsubclass-specificstepsofthealgorithm.

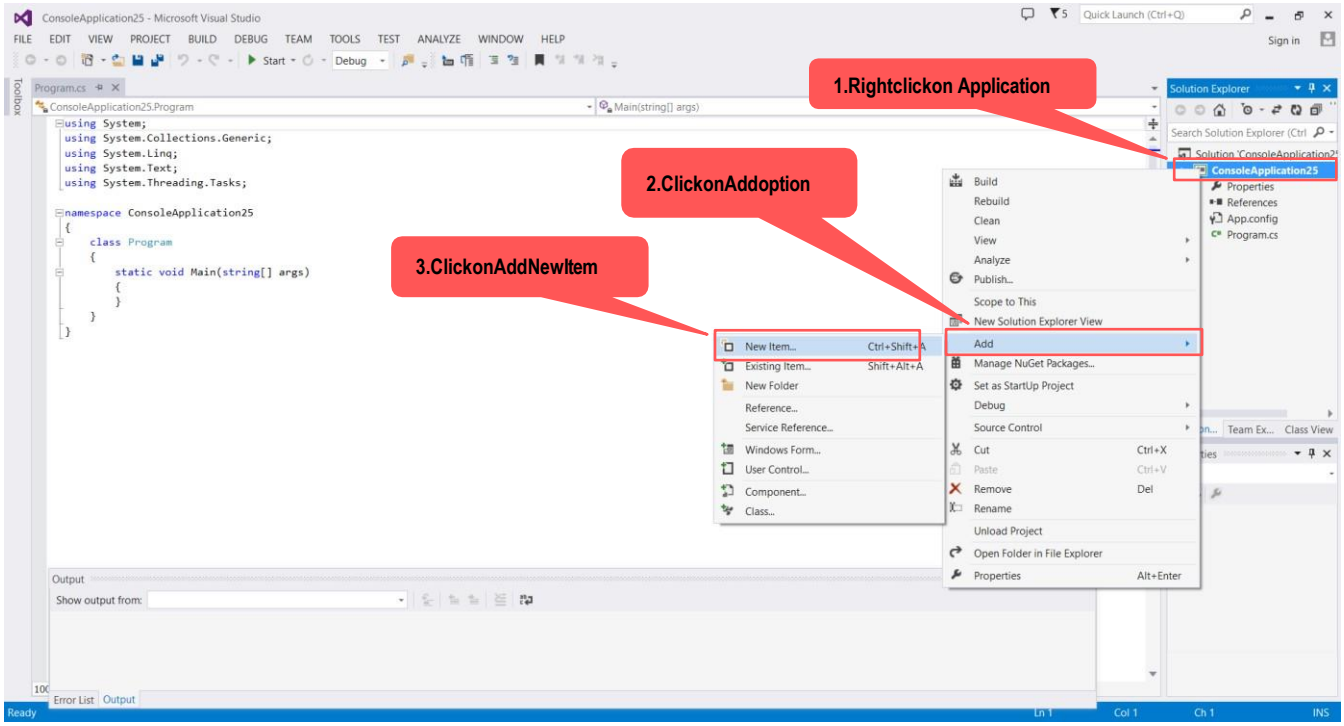
ToimplementTemplateMethodpatterninrealworldexample,letsfollow thefollowingsteps

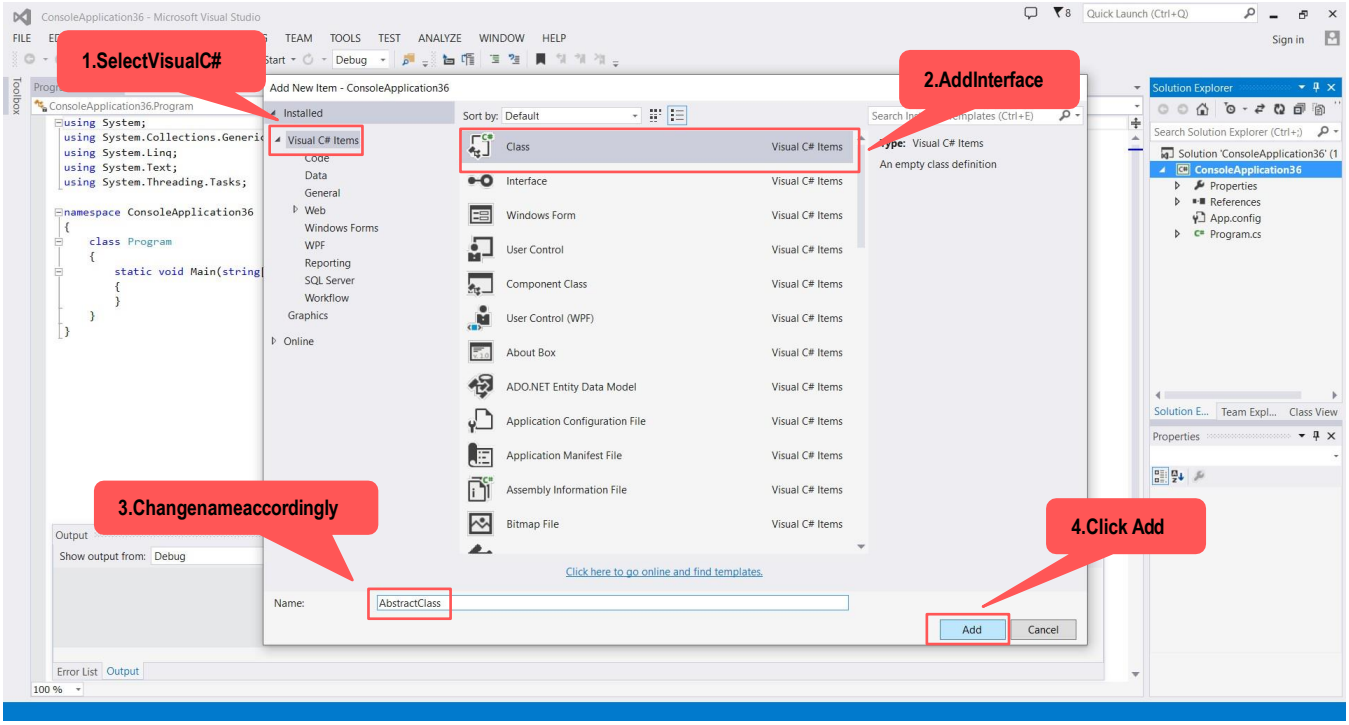
Step#01: Createnewprojectofconsole application.



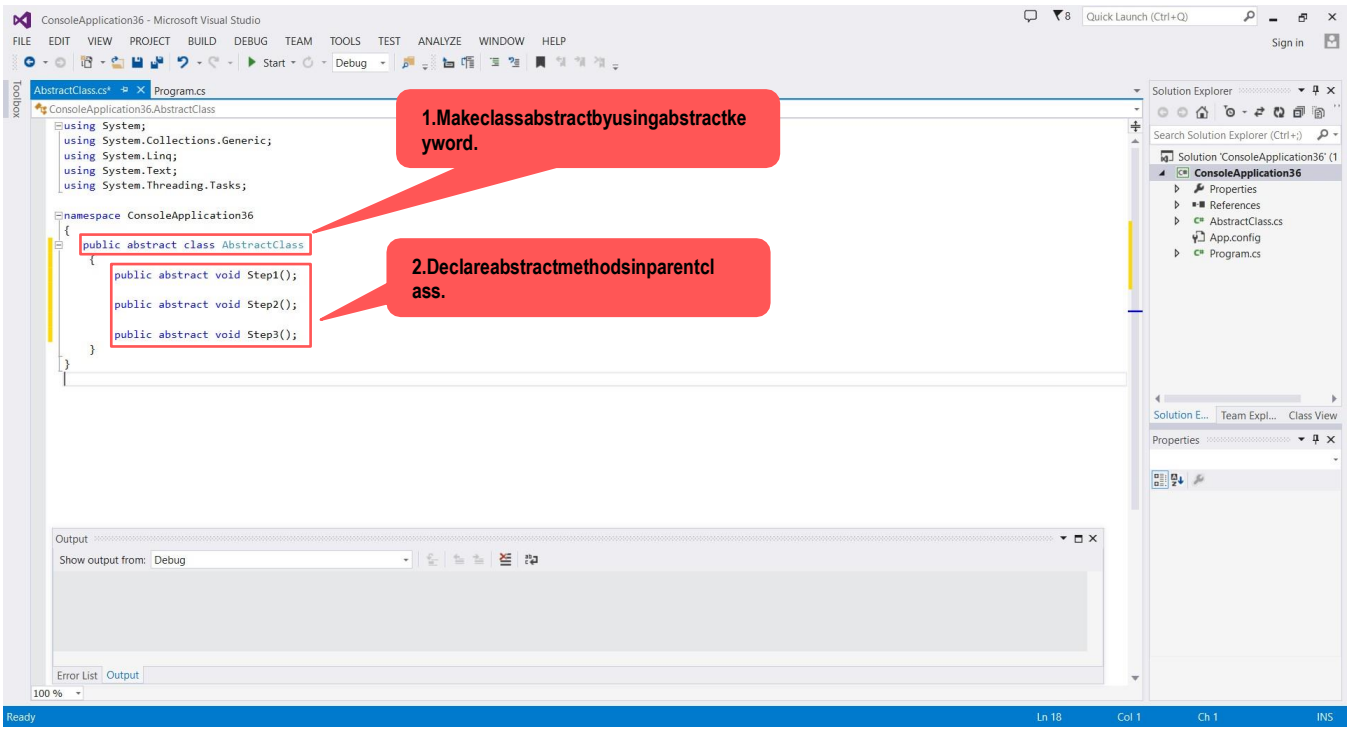


Step#02: AftercreationofProject.Addnewclassinsidethesolution.Insideclasswewilldefinea abstract methods which will override by child classes.

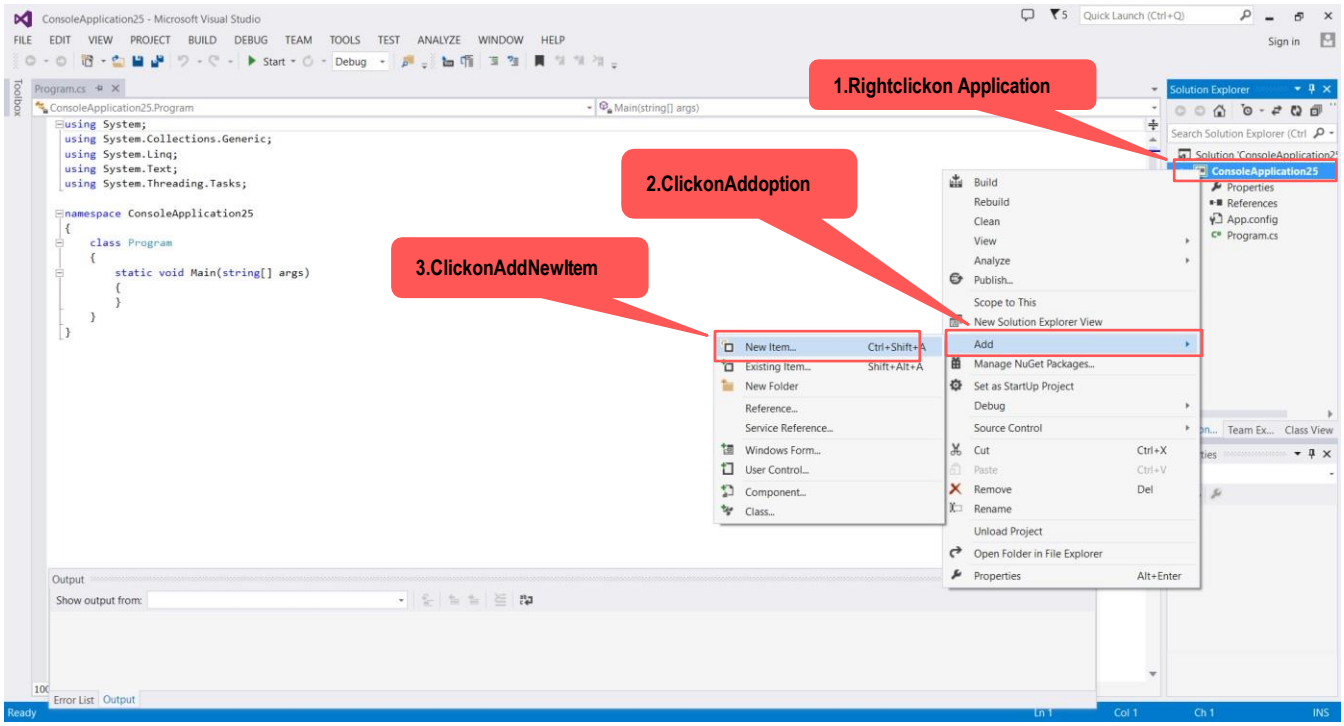


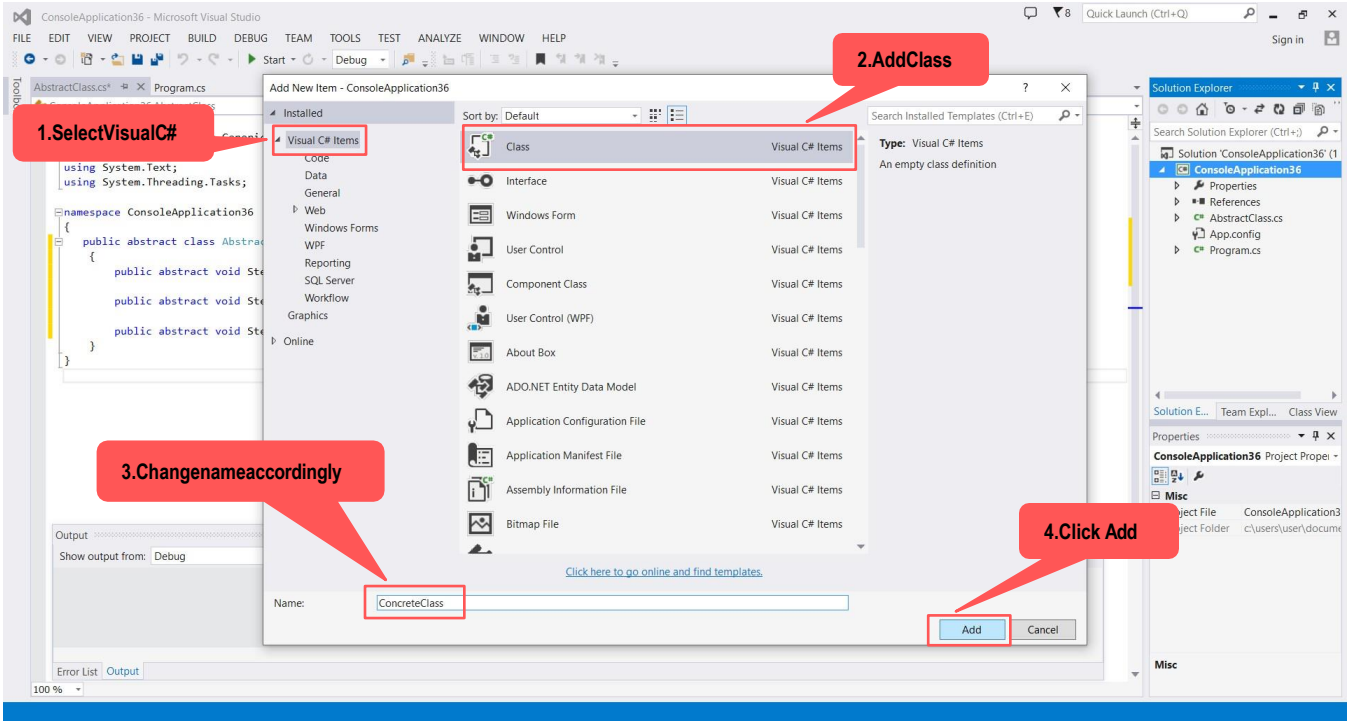


Step#03: InsideAbstractclass,declareabstractmethodswhichwilloverridebychildclasses.

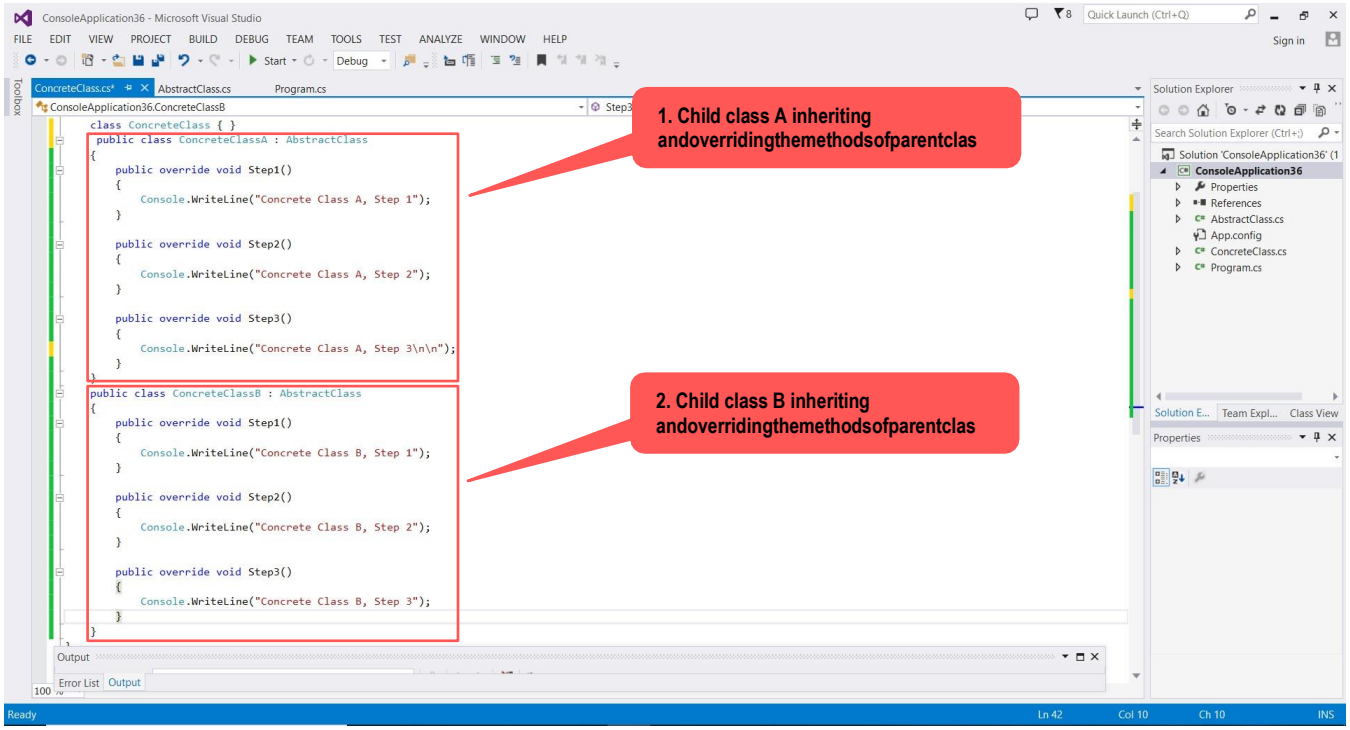


Step#04: NowaddConcreteclass.Theconcreteclasswillcontainallthechildclasseswhichwillinherit the data of parent class.

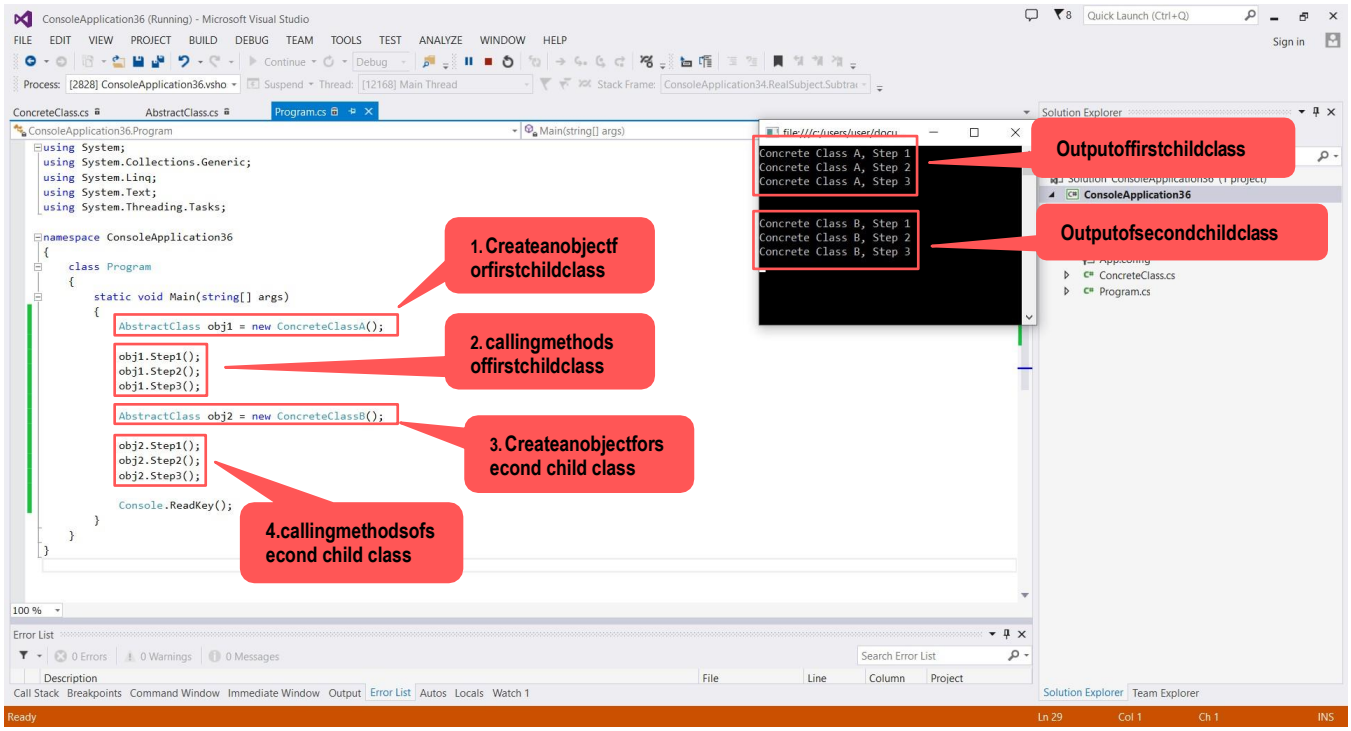




Step#05: Afteraddingconcreteclass,definechildclassesonebyoneinsideconcreteclass.



Step#06: Nowinmainprogram,createtheobjectsofchildclassesusingparentclassandcallthe methods in order to display the output.



LabTask:

1) Implement Template Method Design Pattern using simple methods (**Marks:1)**
2) Implement Template Method Design Pattern for following: (**Marks:3)**
    - Make a parent class and define the method that give square, cube, table and factorial of given number
    - Make three child classes and override the methods given in parent class.

Home Task:

1)ImplementTemplateMethodDesignPatterninUniversity Scenario. (**Marks:4)**

A university provides discount in fee based upon the student's cgpa. University offers 50% discount upon 4 cgpa, 30% on 3.5 and 15% on 3 cgpa respectively. Create the methods in parent class and make at least three child classes (three departments). Each department will inherit the methods from the parent class. Also display the result when cgpa< 3.

Create a program to solve above problem.