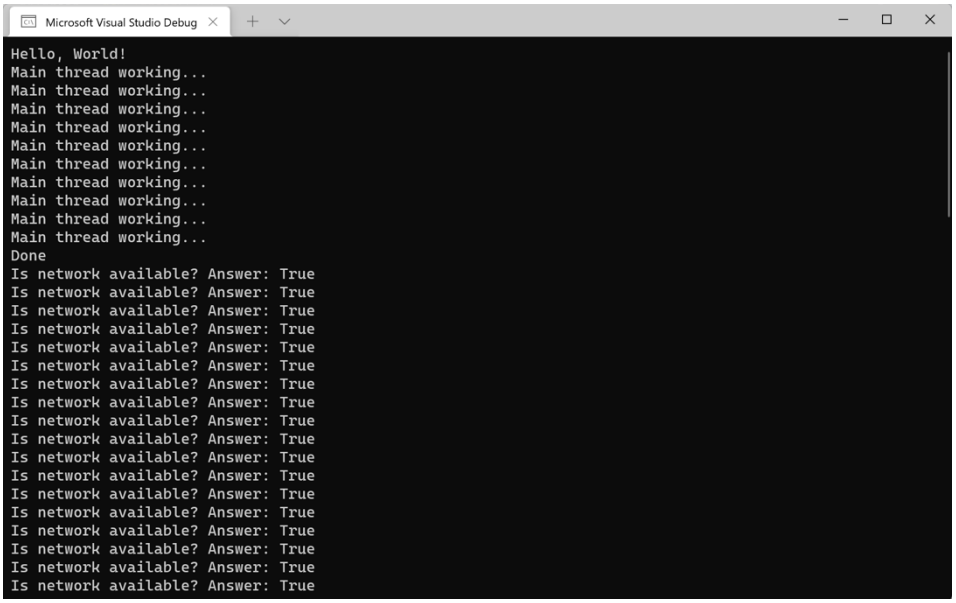
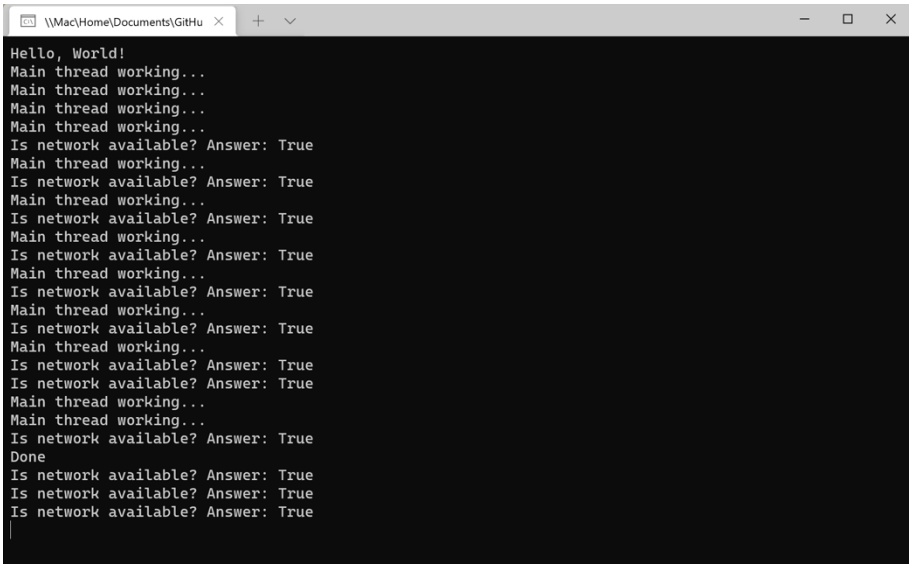
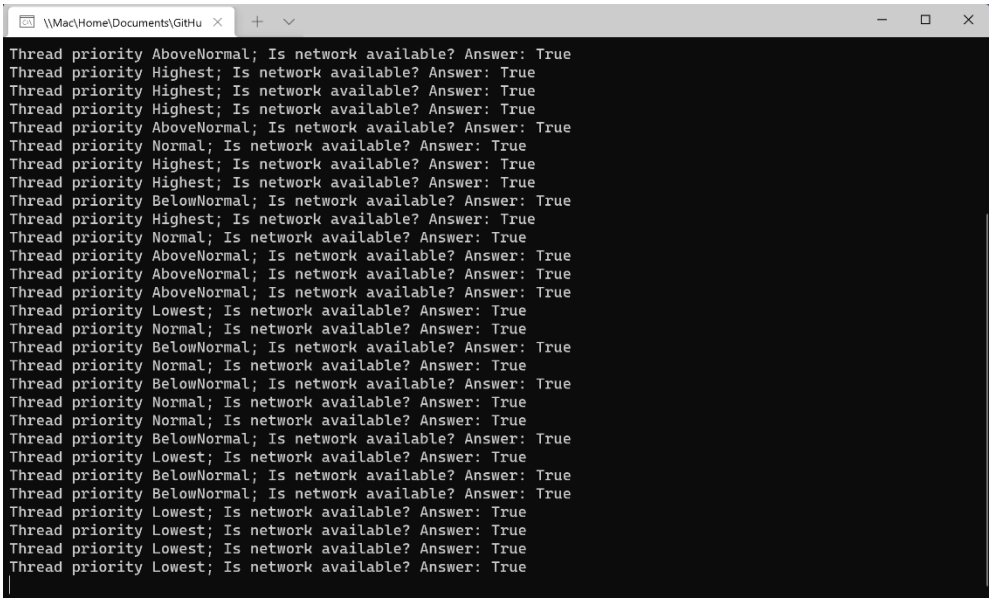
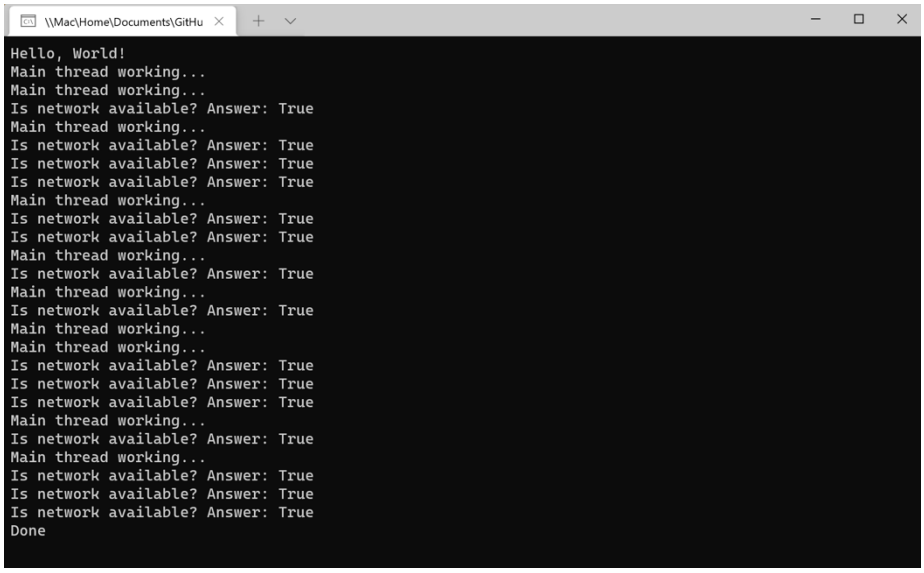
Chapter 1: Managed Threading Concepts

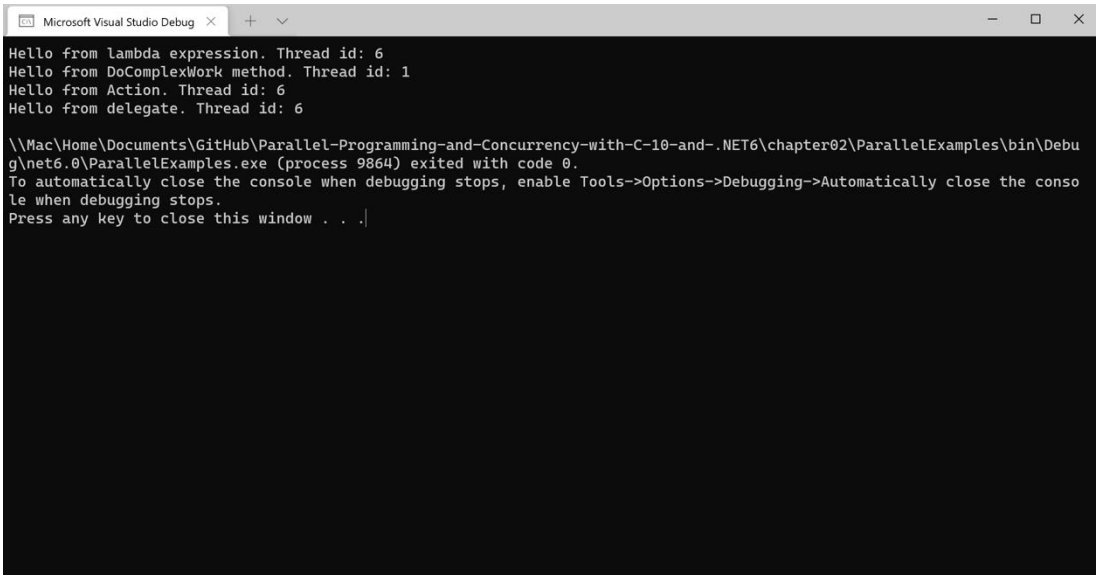


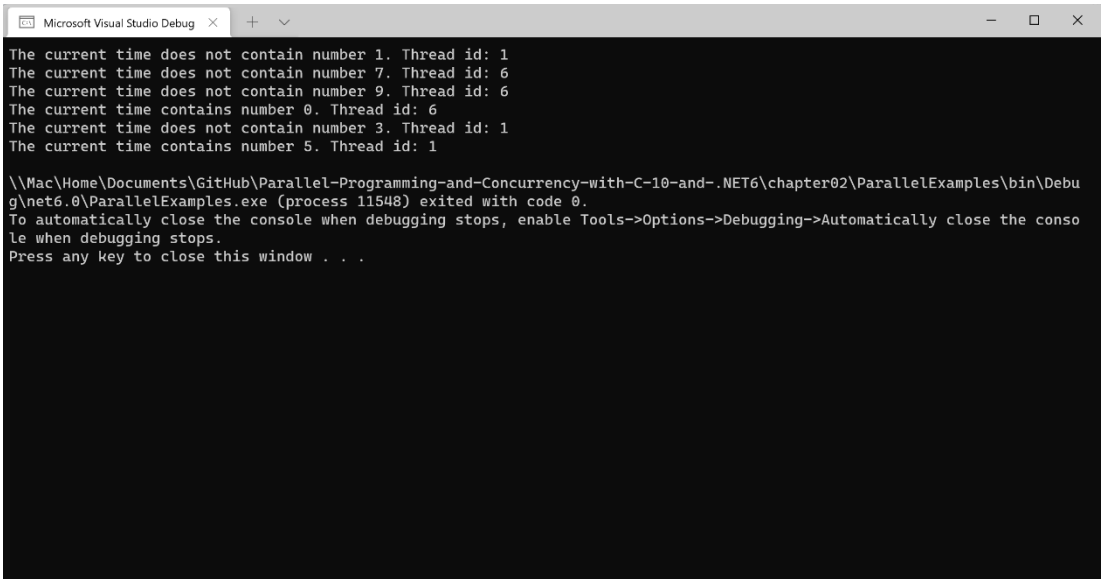


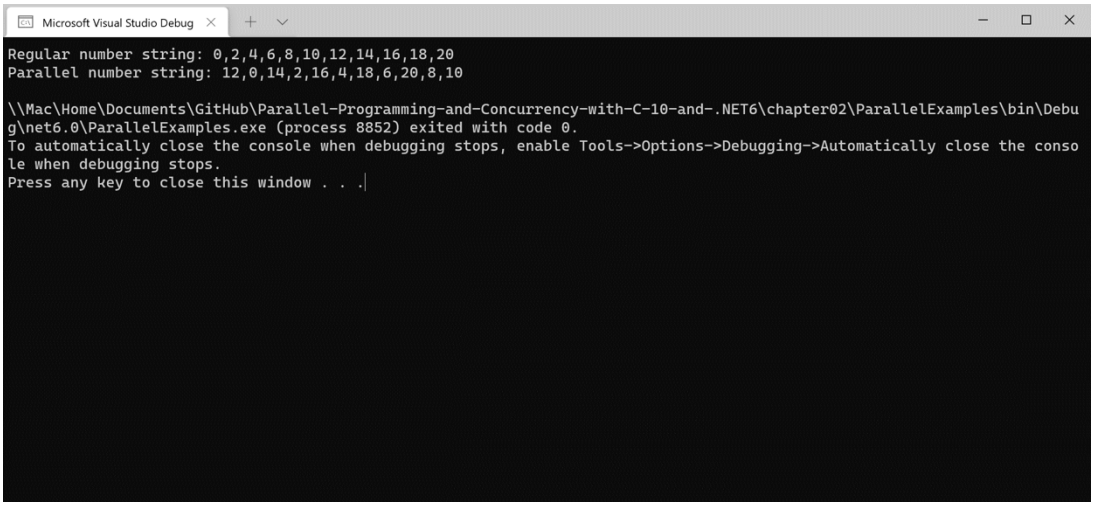

\\Mac\Home\Documents\GitHu
Thread priority AboveNormal; Is network available? Answer: True
Thread priority Highest; Is network available? Answer: True
Thread priority Highest; Is network available? Answer: True
Thread priority Highest; Is network available? Answer: True
Thread priority AboveNormal; Is network available? Answer: True
Thread priority Normal; Is network available? Answer: True
Thread priority Highest; Is network available? Answer: True
Thread priority Highest; Is network available? Answer: True
Thread priority BelowNormal; Is network available? Answer: True
Thread priority Highest; Is network available? Answer: True
Thread priority Normal; Is network available? Answer: True
Thread priority AboveNormal; Is network available? Answer: True
Thread priority AboveNormal; Is network available? Answer: True
Thread priority AboveNormal; Is network available? Answer: True
Thread priority Lowest; Is network available? Answer: True
Thread priority Normal; Is network available? Answer: True
Thread priority BelowNormal; Is network available? Answer: True
Thread priority Normal; Is network available? Answer: True
Thread priority BelowNormal; Is network available? Answer: True
Thread priority Normal; Is network available? Answer: True
Thread priority Normal; Is network available? Answer: True
Thread priority BelowNormal; Is network available? Answer: True
Thread priority Lowest; Is network available? Answer: True
Thread priority BelowNormal; Is network available? Answer: True
Thread priority BelowNormal; Is network available? Answer: True
Thread priority Lowest; Is network available? Answer: True
Thread priority Lowest; Is network available? Answer: True
Thread priority Lowest; Is network available? Answer: True
Thread priority Lowest; Is network available? Answer: True

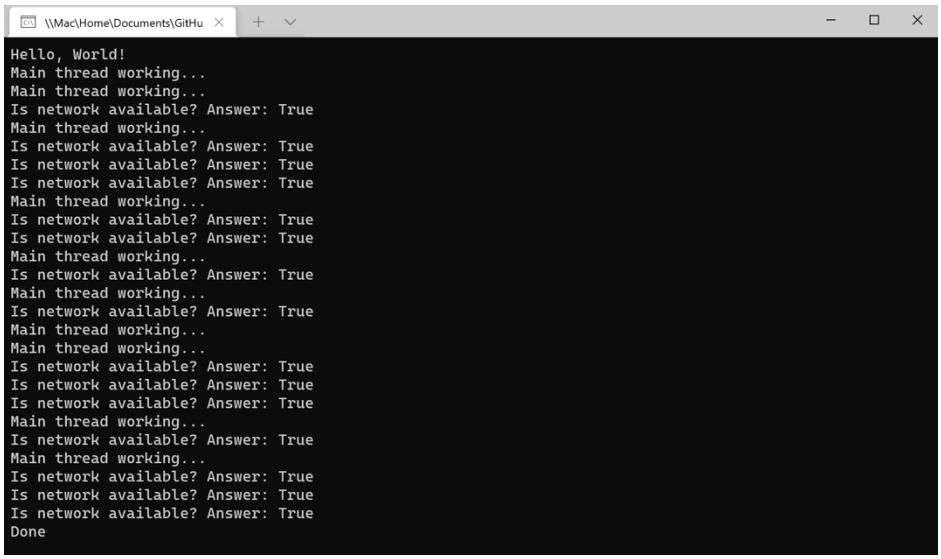

\\Mac\Home\Documents\GitHu
Hello, World!
Main thread working...
Main thread working...
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Main thread working...
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Is network available? Answer: True
Done

Chapter 2: Evolution of Multi-Threaded Programming in .NET

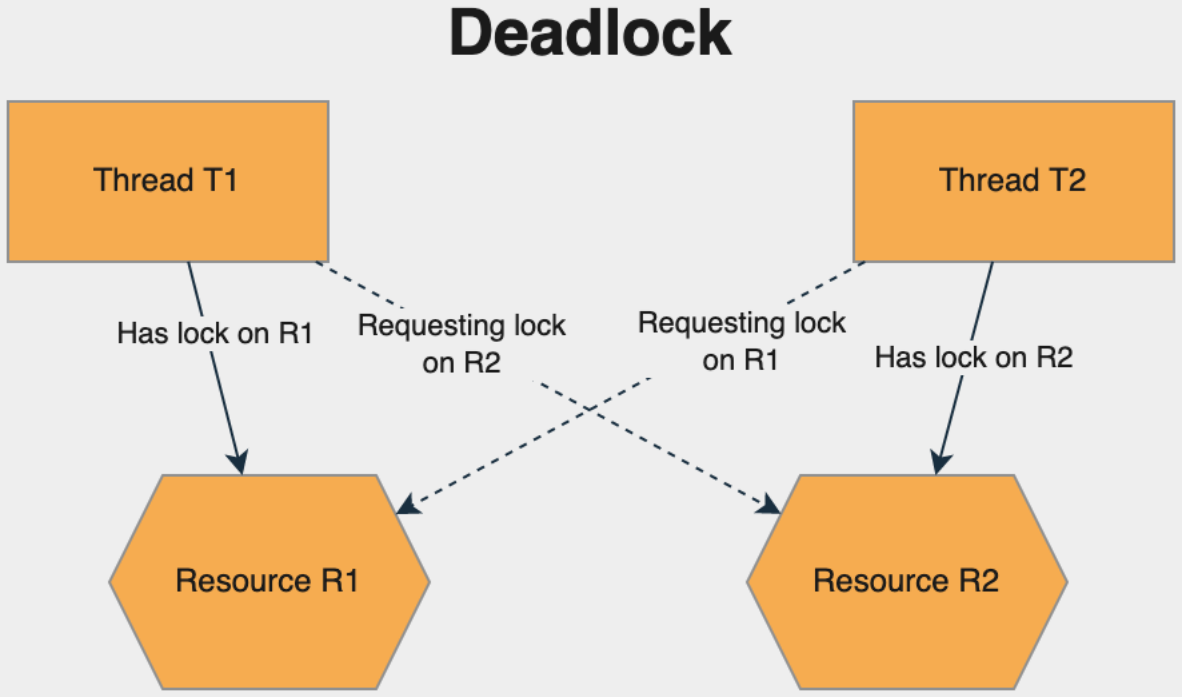




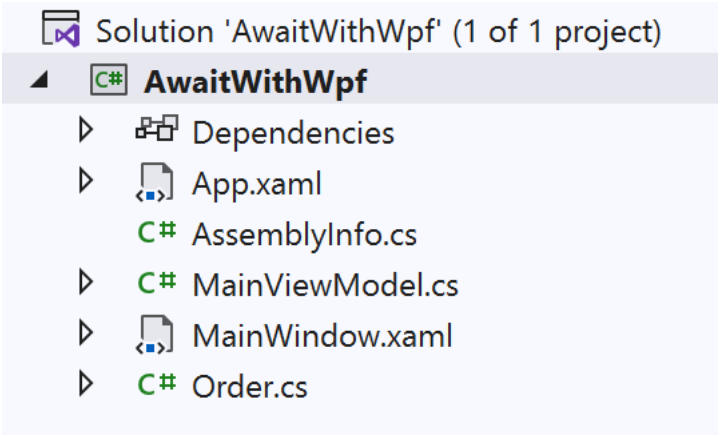

Microsoft Visual Studio Debug
Regular number string: 0,2,4,6,8,10,12,14,16,18,20
Parallel number string: 12,0,14,2,16,4,18,6,20,8,10
\\Mac\Home\Documents\GitHub\Parallel-Programming-and-Concurrency-with-C-10-and-.NET6\chapter02\ParallelExamples\bin\Debug\net6.0\ParallelExamples.exe (process 8852) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .

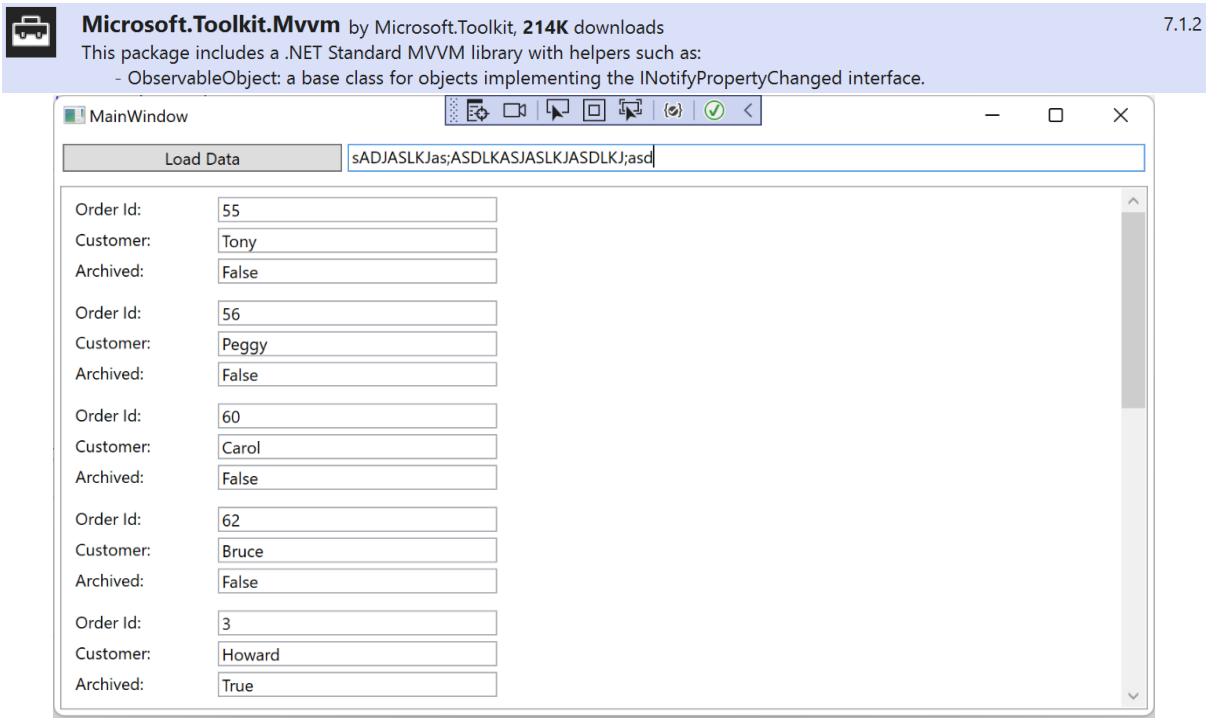

\\Mac\Home\Documents\GitHu
Hello, World!
Main thread working...
Main thread working...
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Main thread working...
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Main thread working...
Is network available? Answer: True
Is network available? Answer: True
Is network available? Answer: True
Done

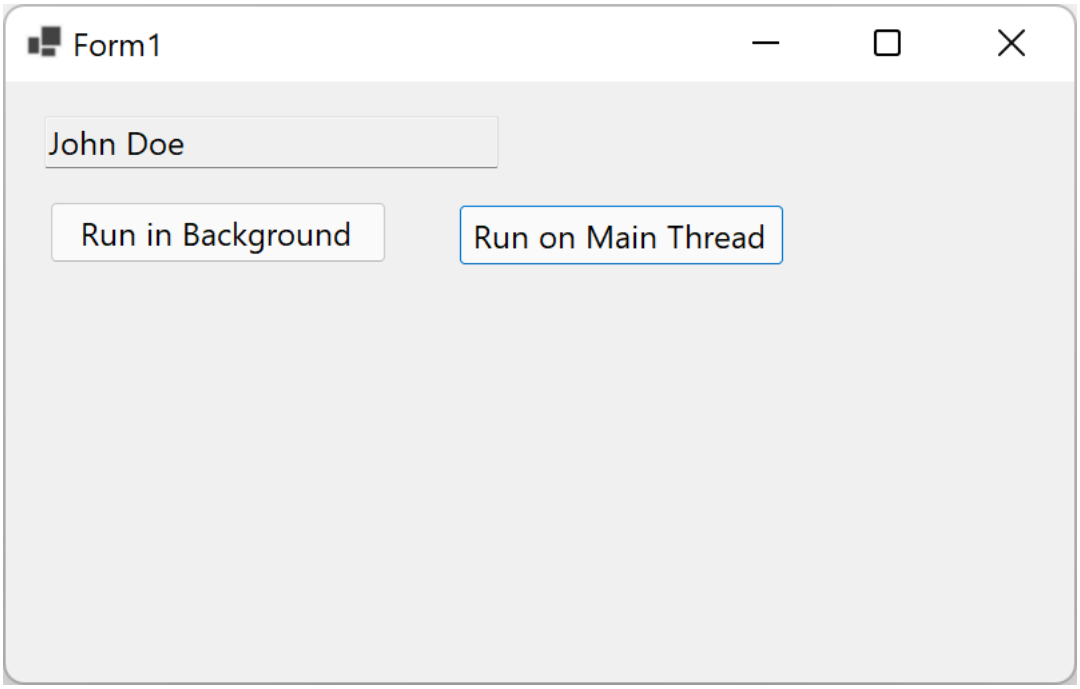
Chapter 3: Best Practices for Managed Threading



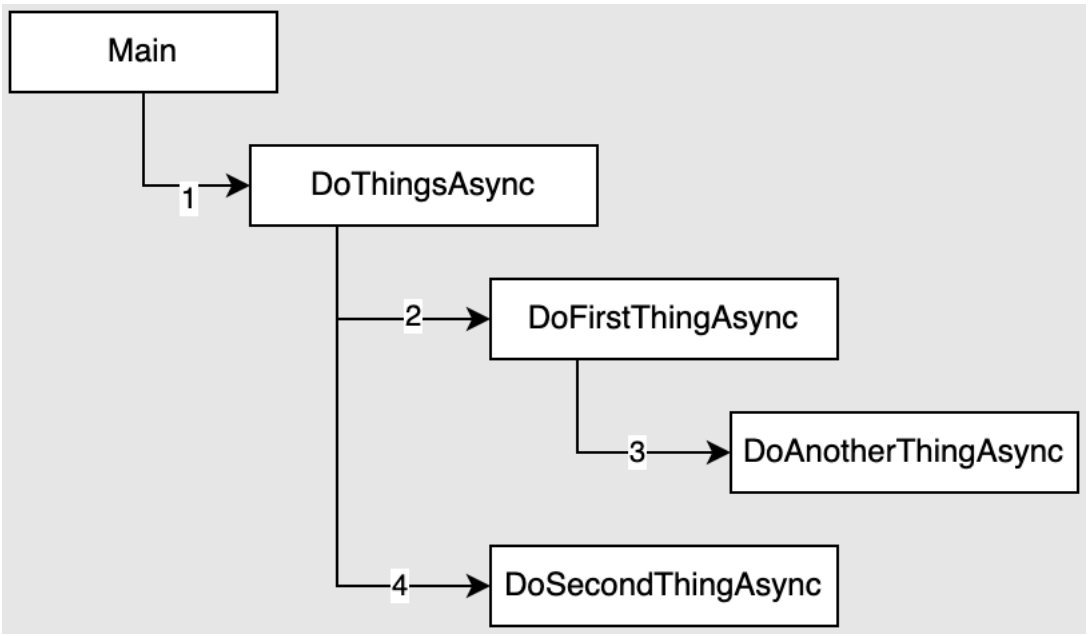
Chapter 4: User Interface Responsiveness with Threading

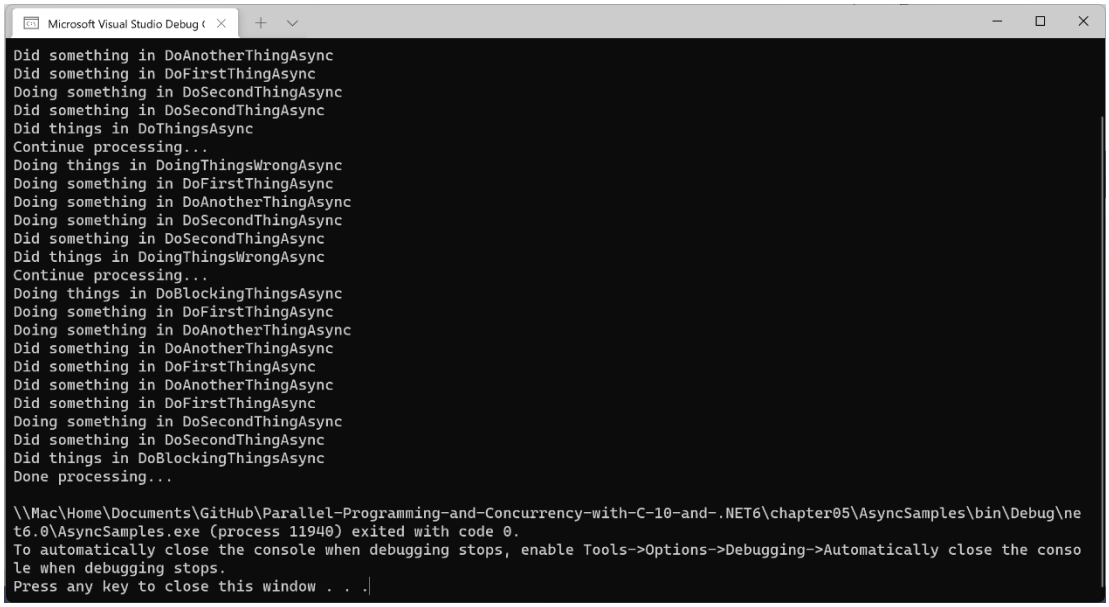


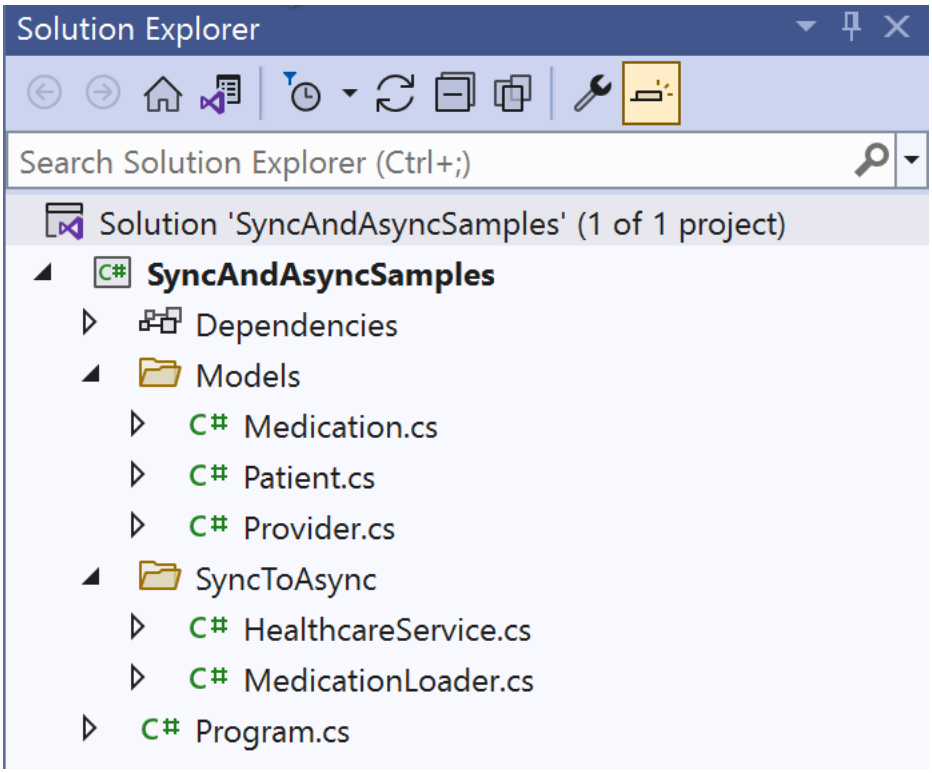



Form1
John Doe
Run in Background
Run on Main Thread

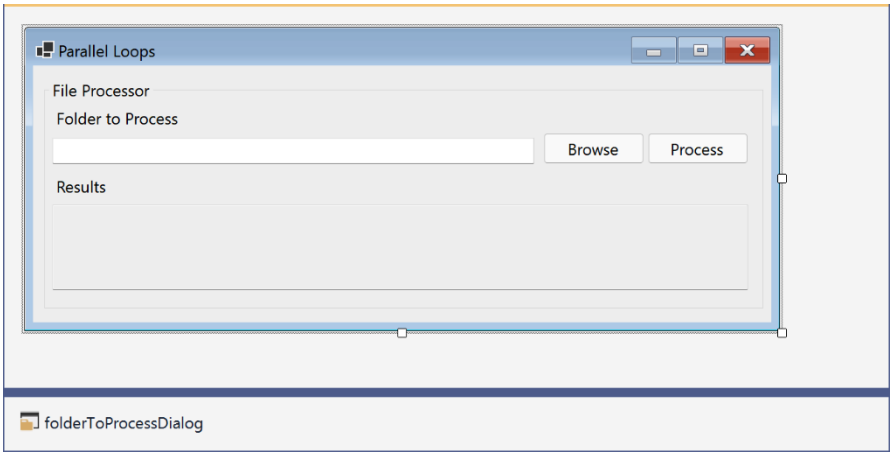
Chapter 5: Asynchronous Programming with C#

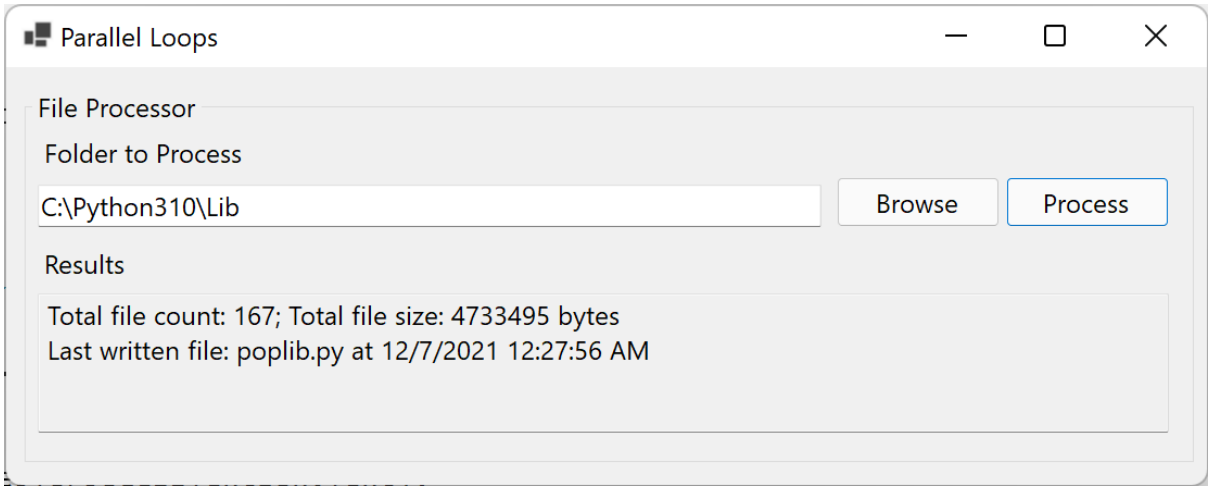


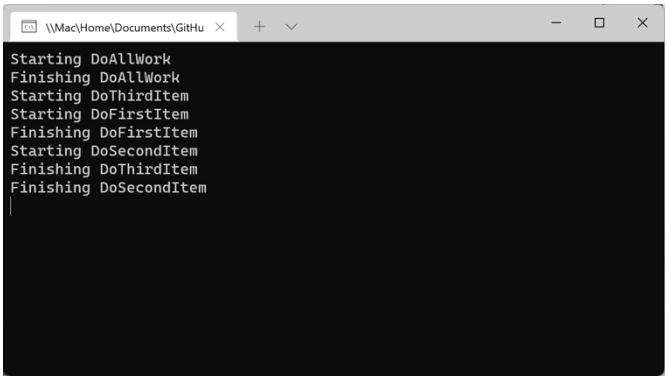

Microsoft Visual Studio Debug
Did something in DoAnotherThingAsync
Did something in DoFirstThingAsync
Doing something in DoSecondThingAsync
Did something in DoSecondThingAsync
Did things in DoThingsAsync
Continue processing...
Doing things in DoingThingsWrongAsync
Doing something in DoFirstThingAsync
Doing something in DoAnotherThingAsync
Doing something in DoSecondThingAsync
Did something in DoSecondThingAsync
Did things in DoingThingsWrongAsync
Continue processing...
Doing things in DoBlockingThingsAsync
Doing something in DoFirstThingAsync
Doing something in DoAnotherThingAsync
Did something in DoAnotherThingAsync
Did something in DoFirstThingAsync
Did something in DoAnotherThingAsync
Did something in DoFirstThingAsync
Doing something in DoSecondThingAsync
Did something in DoSecondThingAsync
Did things in DoBlockingThingsAsync
Done processing...
\\Mac\Home\Documents\GitHub\Parallel-Programming-and-Concurrency-with-C-10-and-.NET6\chapter05\AsyncSamples\bin\Debug\net6.0\AsyncSamples.exe (process 11940) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .

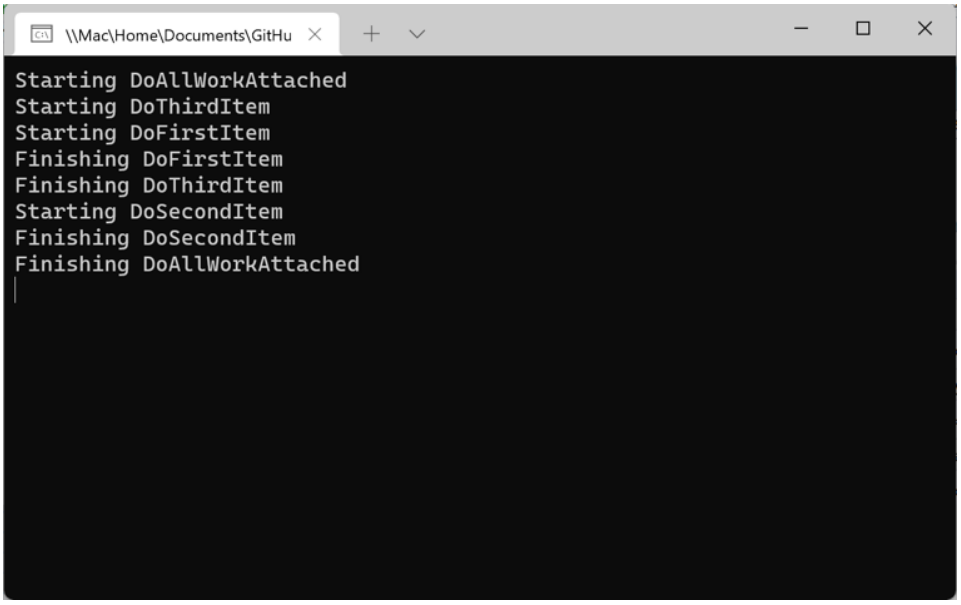

Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'SyncAndAsyncSamples' (1 of 1 project)
SyncAndAsyncSamples
Dependencies
Models
Medication.cs
Patient.cs
Provider.cs
SyncToAsync
HealthcareService.cs
MedicationLoader.cs
Program.cs

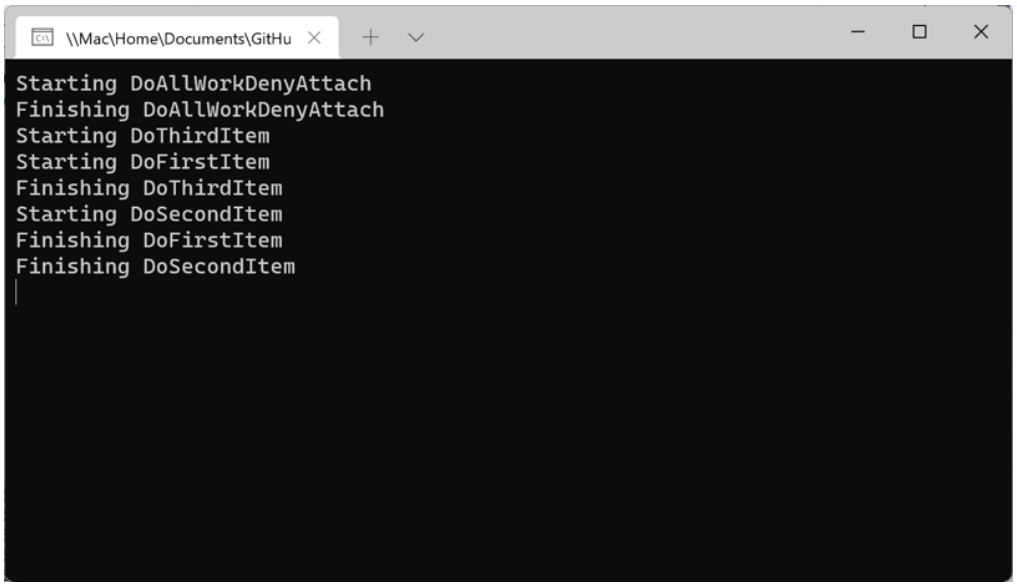
Chapter 6: Parallel Programming Concepts



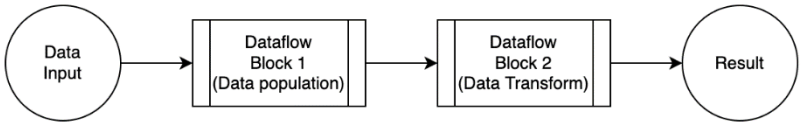




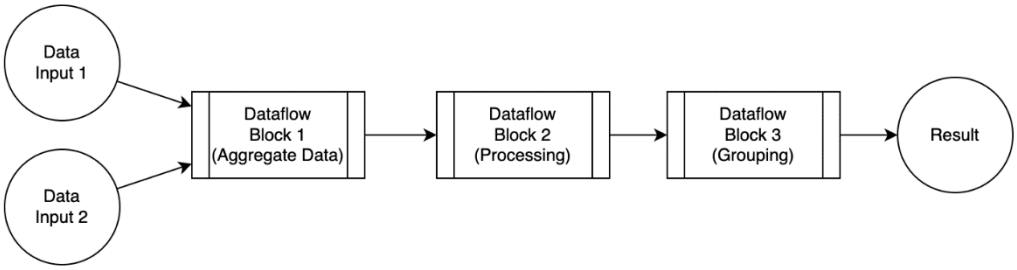

\\Mac\Home\Documents\GitHu
Starting DoAllWorkAttached
Starting DoThirdItem
Starting DoFirstItem
Finishing DoFirstItem
Finishing DoThirdItem
Starting DoSecondItem
Finishing DoSecondItem
Finishing DoAllWorkAttached


\\Mac\Home\Documents\GitHu
Starting DoAllWorkDenyAttach
Finishing DoAllWorkDenyAttach
Starting DoThirdItem
Starting DoFirstItem
Finishing DoThirdItem
Starting DoSecondItem
Finishing DoFirstItem
Finishing DoSecondItem

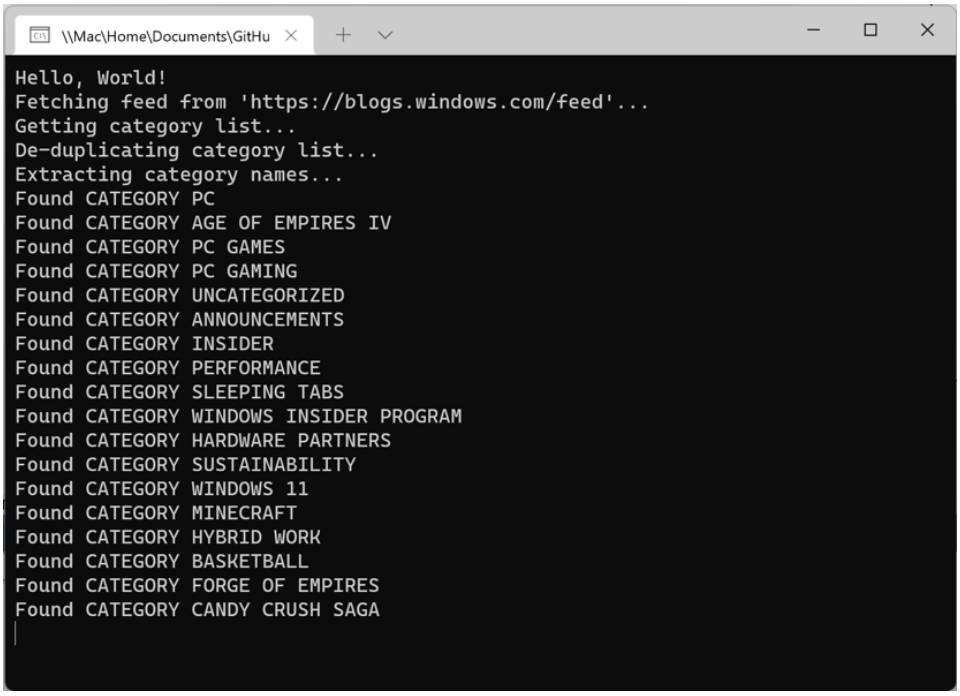
Chapter 7: Task Parallel Library (TPL) and Dataflow



Example 1 - Load and transform data with dataflow pipeline

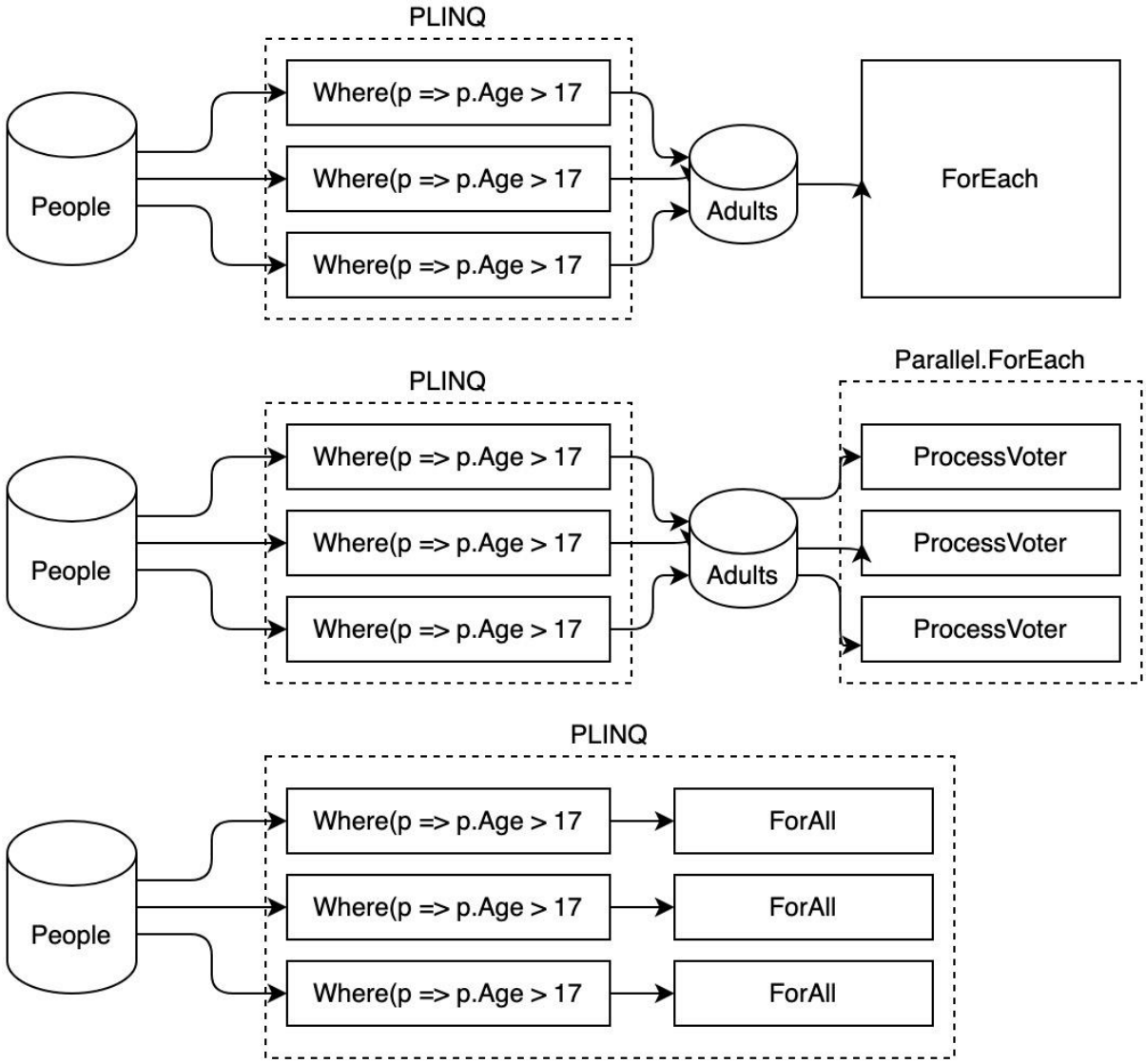


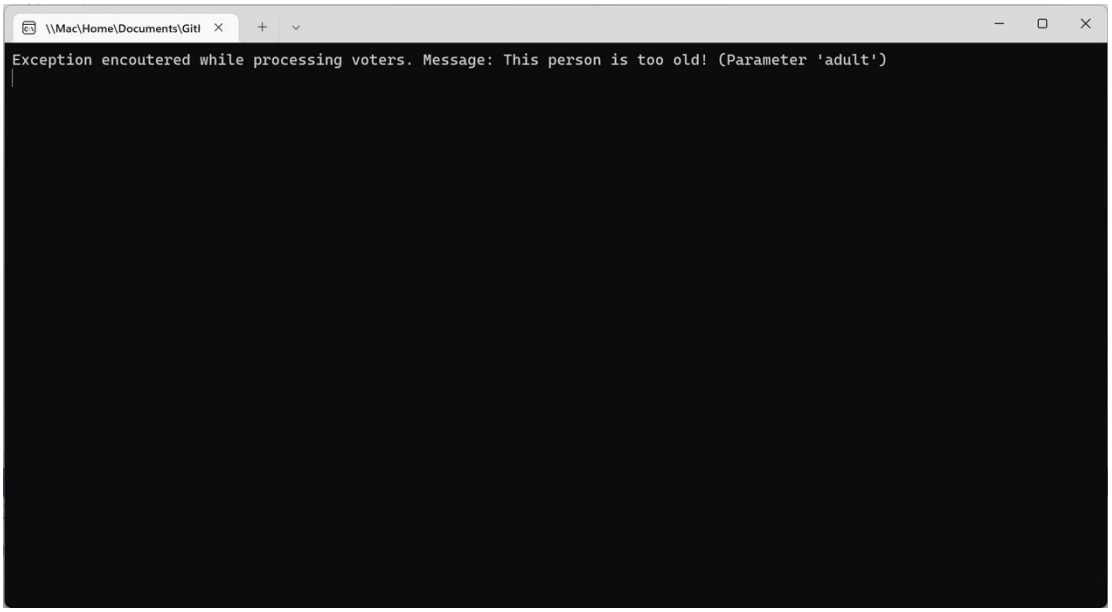
Example 2 - Aggregate, process, and group data with dataflow pipeline

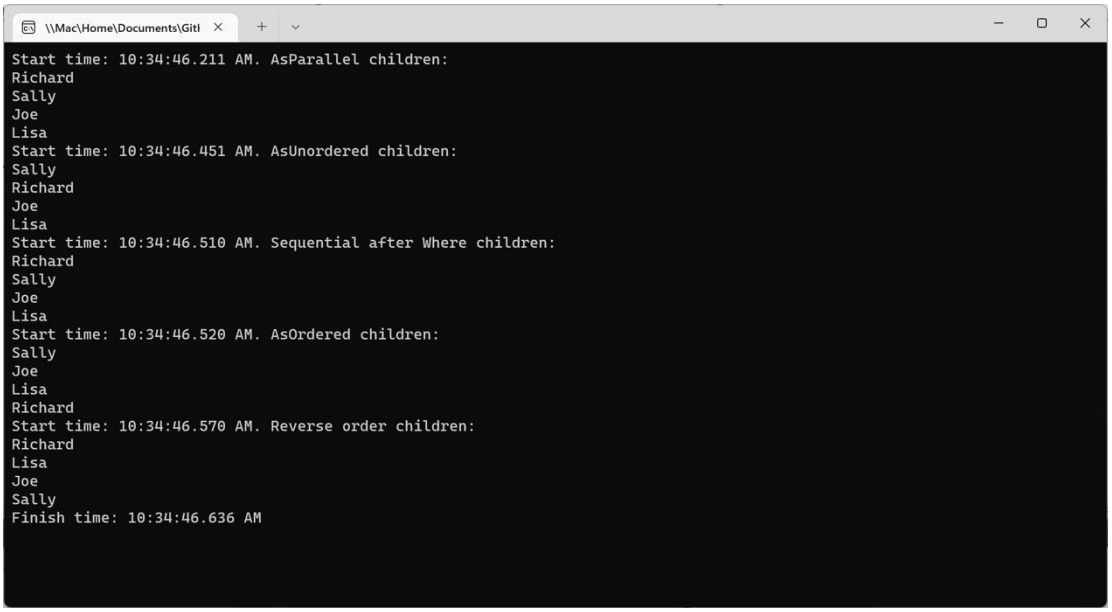


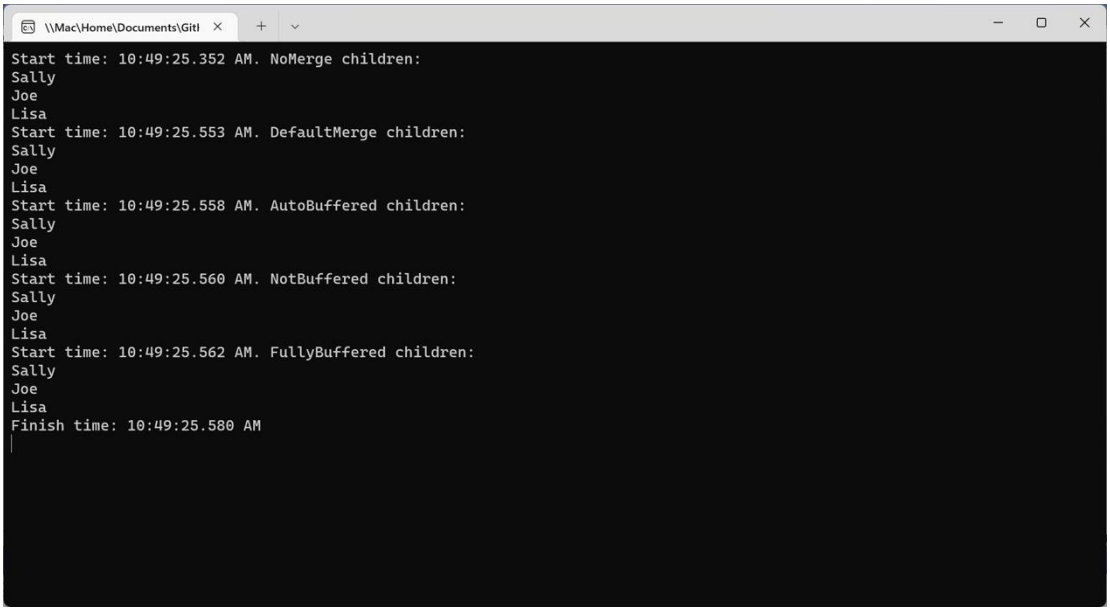
Microsoft Visual Studio Debug
String received: one
Integer received: 1
String received: two
Integer received: 2
String received: three
Integer received: 3
Complete
\\Mac\Home\Documents\GitHub\Parallel-Programming-and-Concurrency-with-C-10-and-.NET6\chapter07\JoinBlockExample\bin\Debug\net6.0\JoinBlockExample.exe (process 8320) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .

Chapter 8: Parallel Data Structures and Parallel LINQ

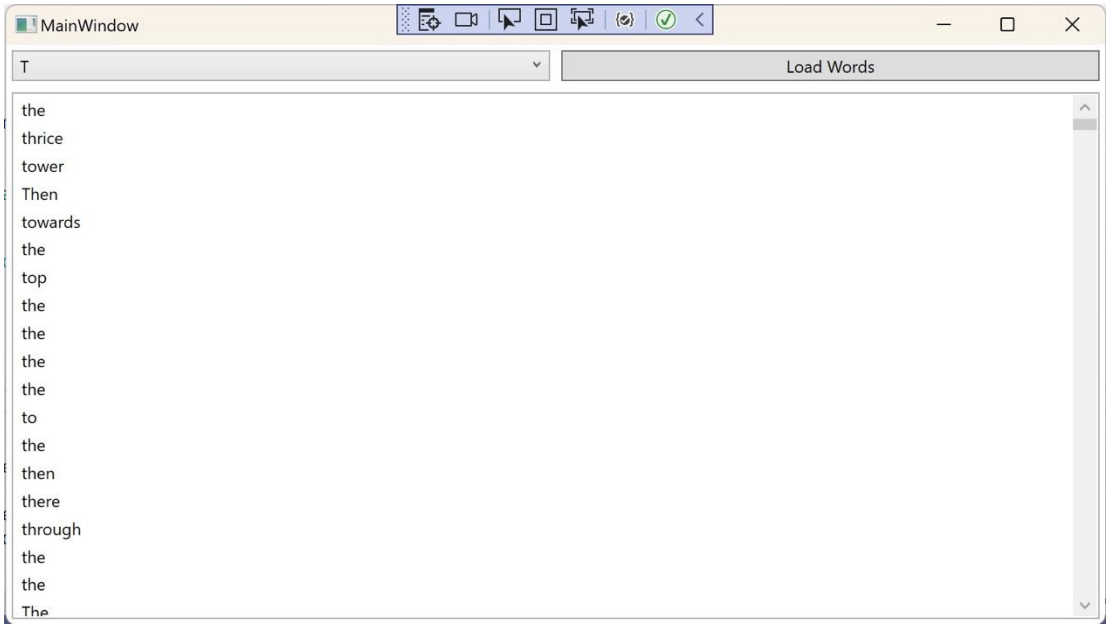


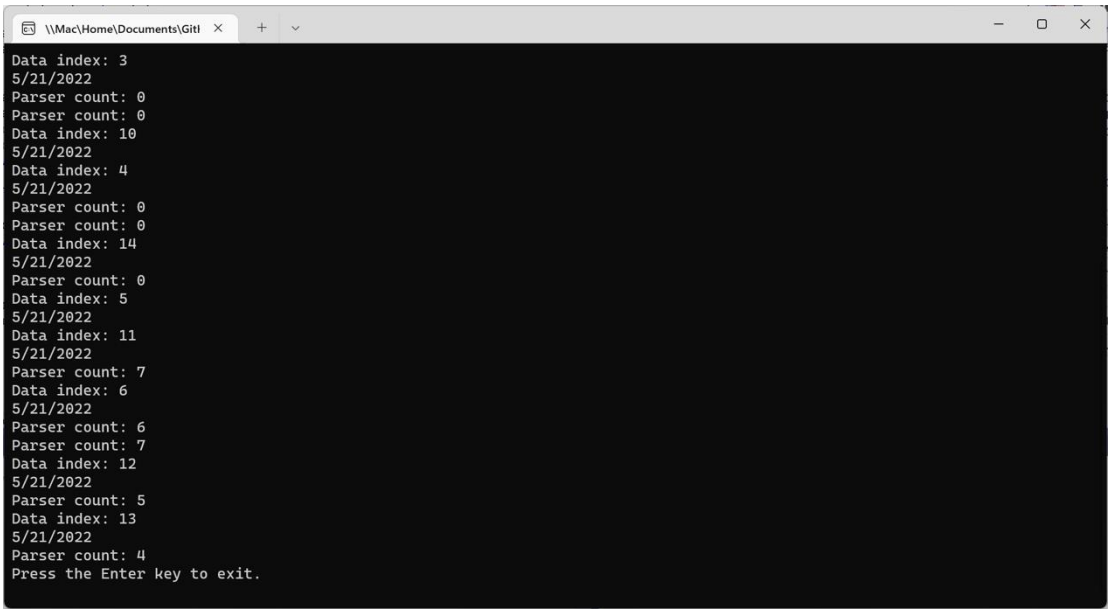

\\Mac\Home\Documents\GitI
Exception encoutered while processing voters. Message: This person is too old! (Parameter 'adult')

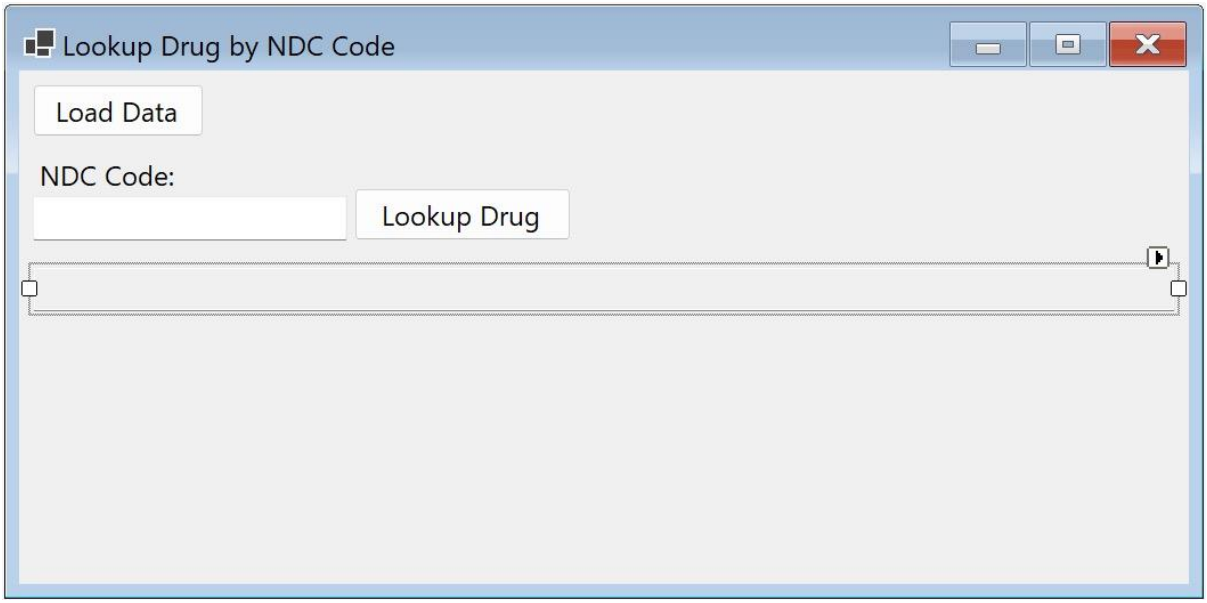

\\Mac\Home\Documents\GitI
Start time: 10:34:46.211 AM. AsParallel children:
Richard
Sally
Joe
Lisa
Start time: 10:34:46.451 AM. AsUnordered children:
Sally
Richard
Joe
Lisa
Start time: 10:34:46.510 AM. Sequential after Where children:
Richard
Sally
Joe
Lisa
Start time: 10:34:46.520 AM. AsOrdered children:
Sally
Joe
Lisa
Richard
Start time: 10:34:46.570 AM. Reverse order children:
Richard
Lisa
Joe
Sally
Finish time: 10:34:46.636 AM

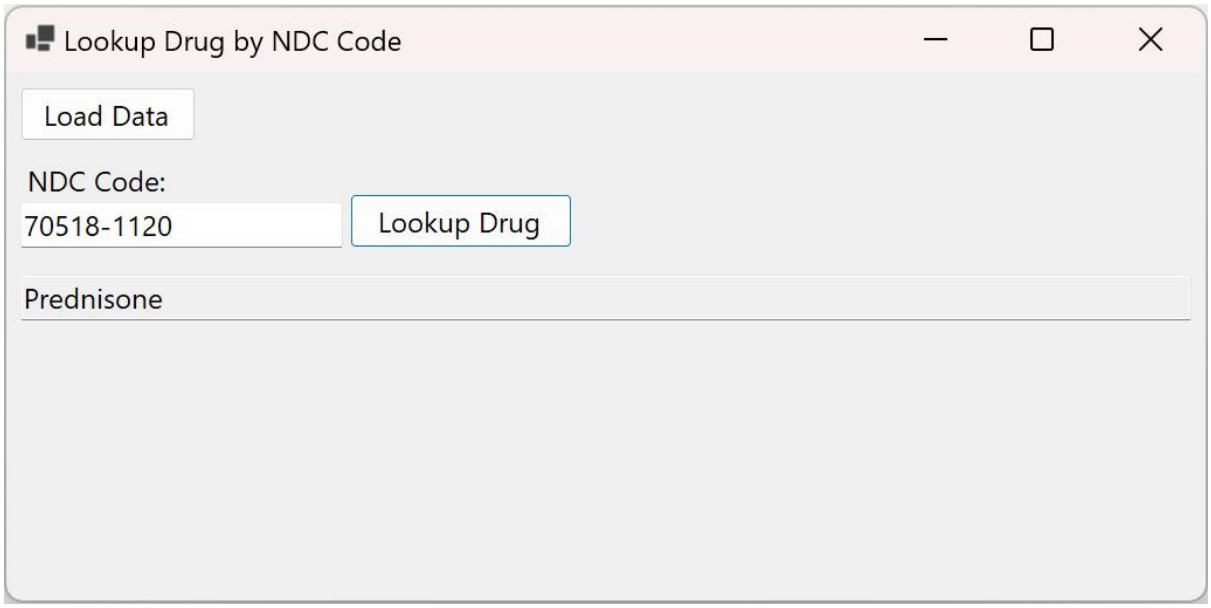

\\Mac\Home\Documents\GitI
Start time: 10:49:25.352 AM. NoMerge children:
Sally
Joe
Lisa
Start time: 10:49:25.553 AM. DefaultMerge children:
Sally
Joe
Lisa
Start time: 10:49:25.558 AM. AutoBuffered children:
Sally
Joe
Lisa
Start time: 10:49:25.560 AM. NotBuffered children:
Sally
Joe
Lisa
Start time: 10:49:25.562 AM. FullyBuffered children:
Sally
Joe
Lisa
Finish time: 10:49:25.580 AM

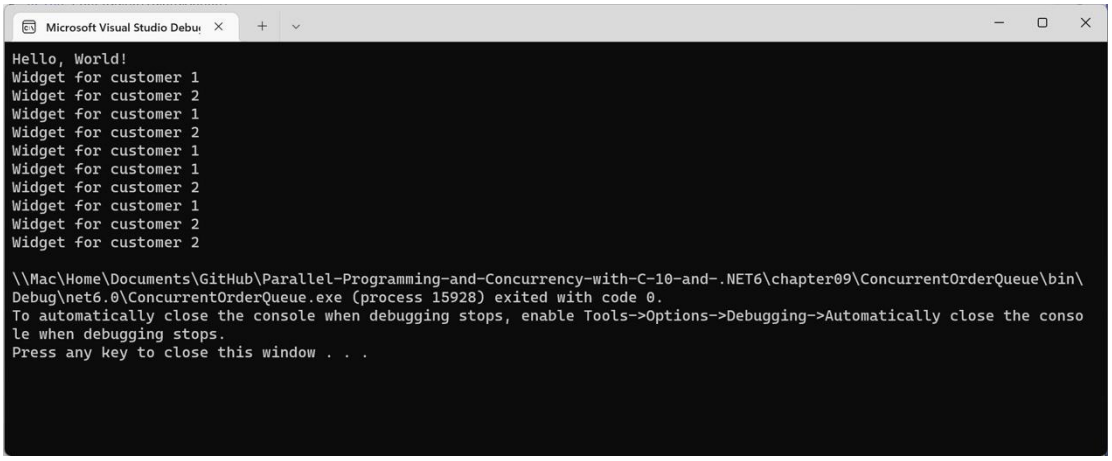
Chapter 9: Working with Concurrent Collections in .NET

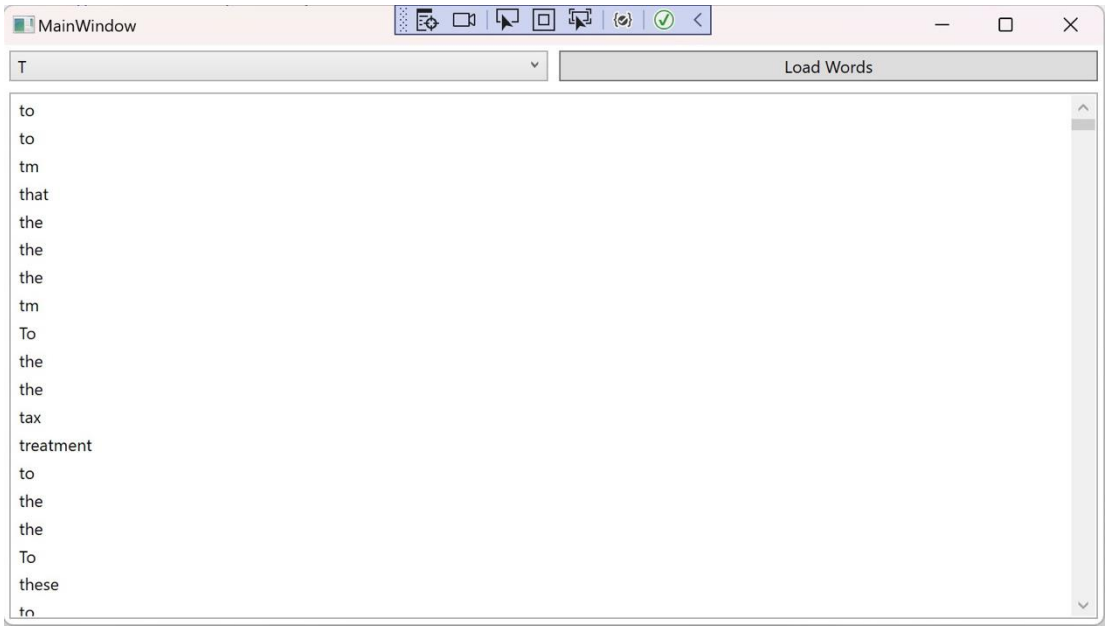





Lookup Drug by NDC Code
Load Data
NDC Code:
Lookup Drug


Lookup Drug by NDC Code
Load Data
NDC Code:
70518-1120
Lookup Drug
Prednisone


Microsoft Visual Studio Debu
Hello, World!
Widget for customer 1
Widget for customer 2
Widget for customer 1
Widget for customer 2
Widget for customer 1
Widget for customer 1
Widget for customer 2
Widget for customer 1
Widget for customer 2
Widget for customer 2
\\Mac\Home\Documents\GitHub\Parallel-Programming-and-Concurrency-with-C-10-and-.NET6\chapter09\ConcurrentOrderQueue\bin\
Debug\net6.0\ConcurrentOrderQueue.exe (process 15928) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .


MainWindow
T
Load Words
to
to
tm
that
the
the
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tm
To
the
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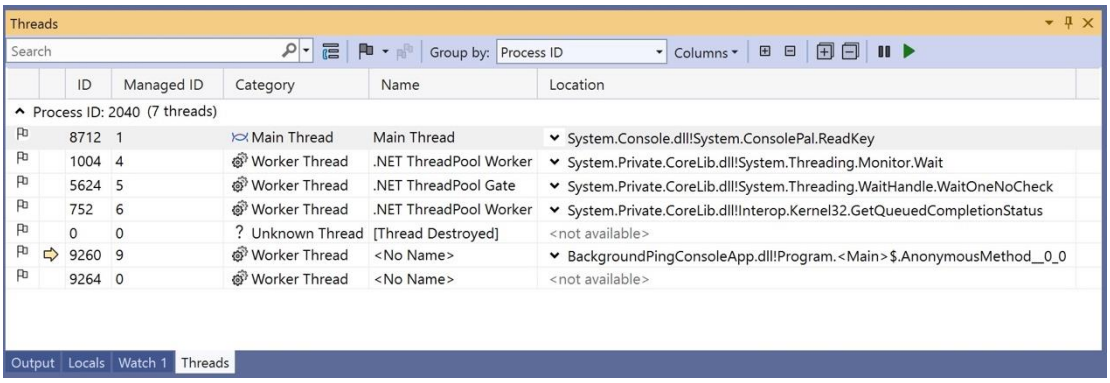
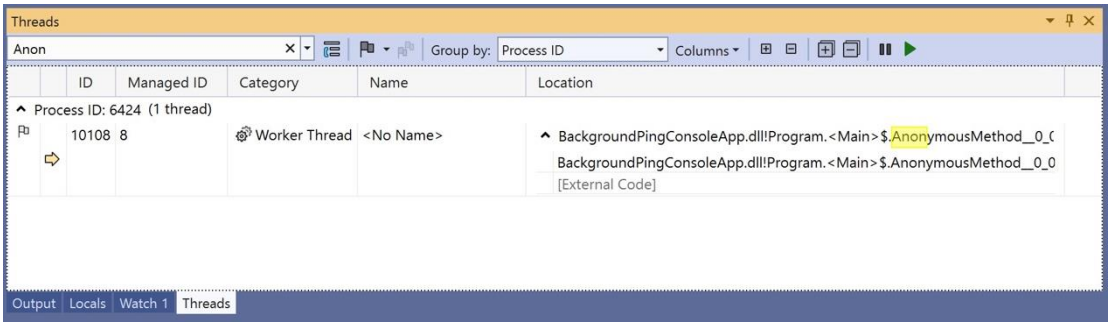
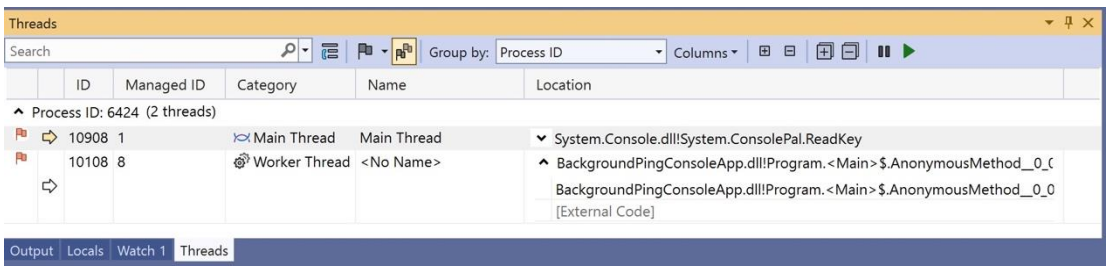
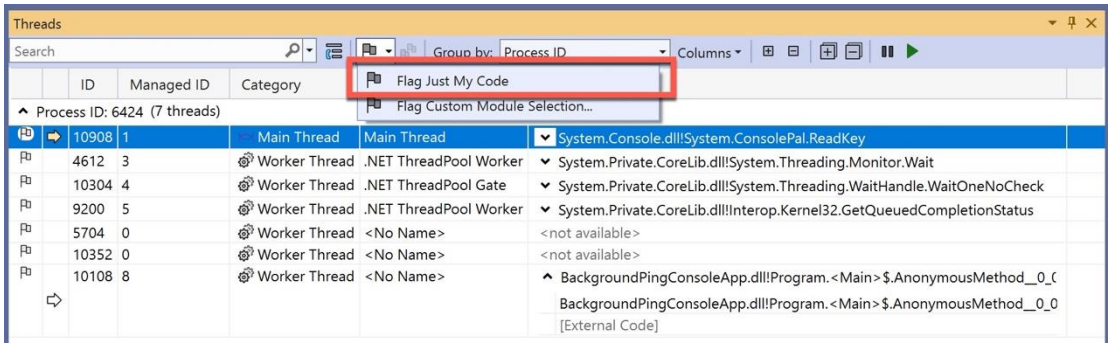
tax
treatment
to
the
the
To
these
to

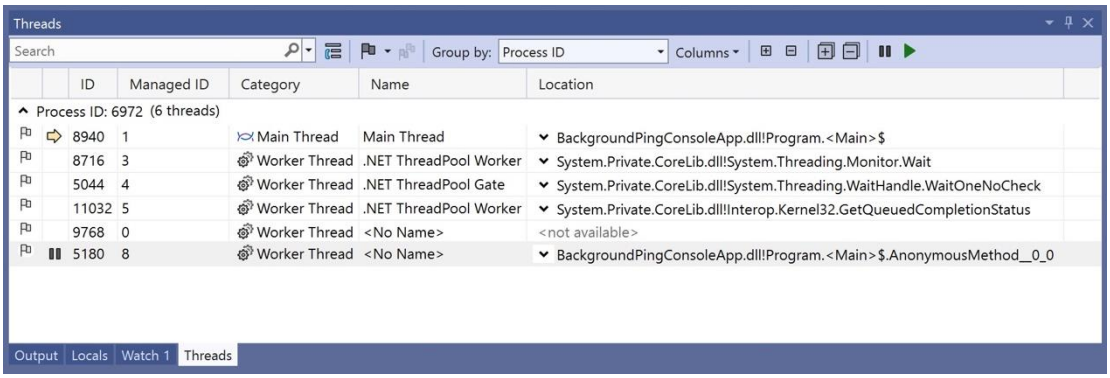
Chapter 10: Debugging Multi-Threaded Applications with Visual Studio

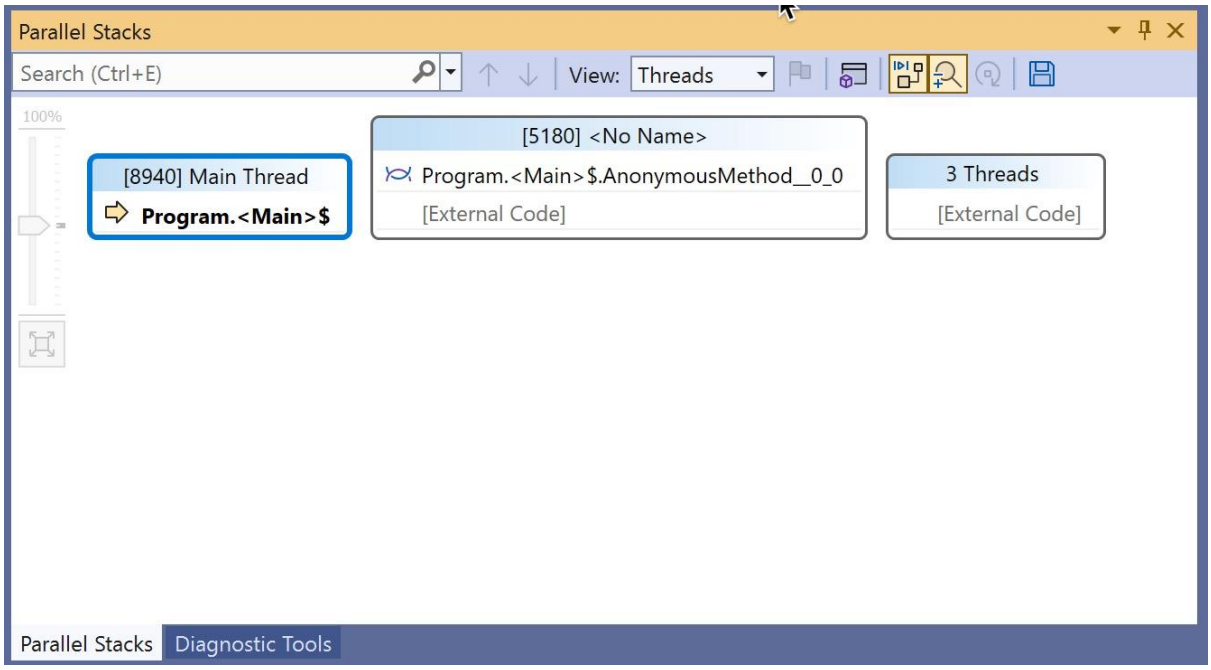


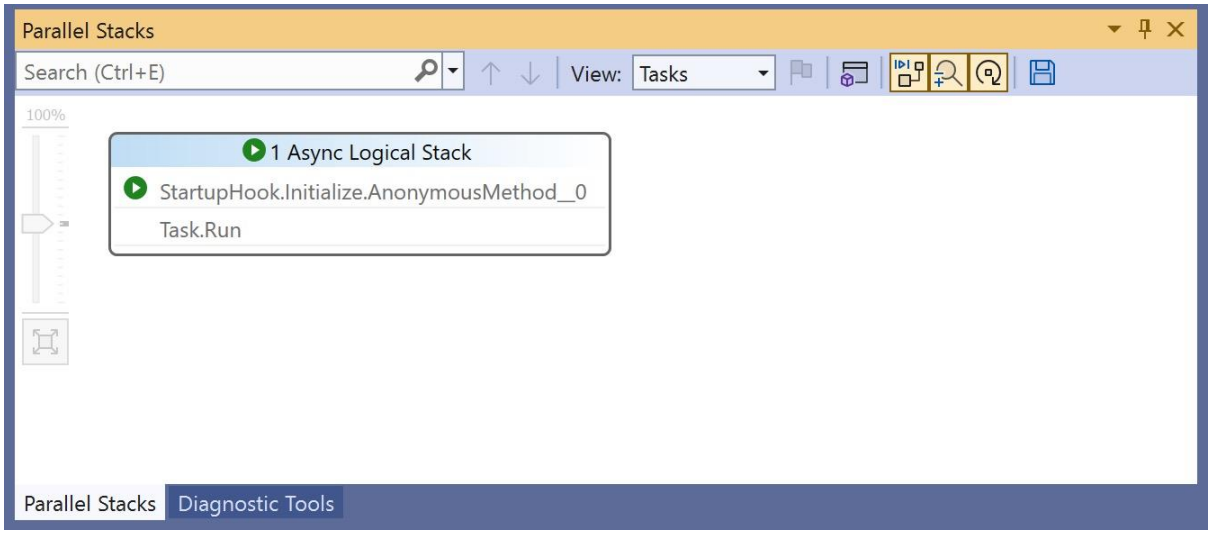


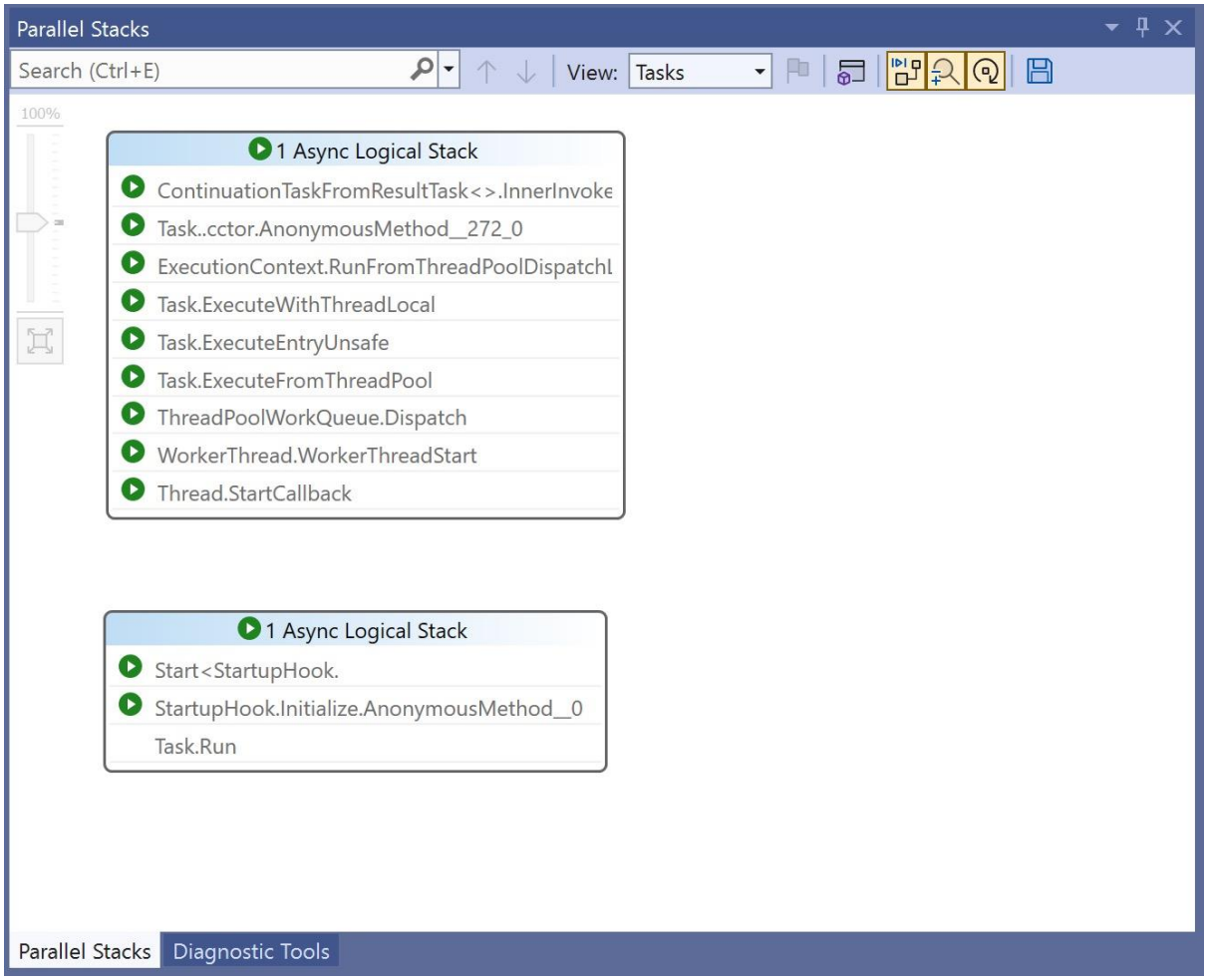


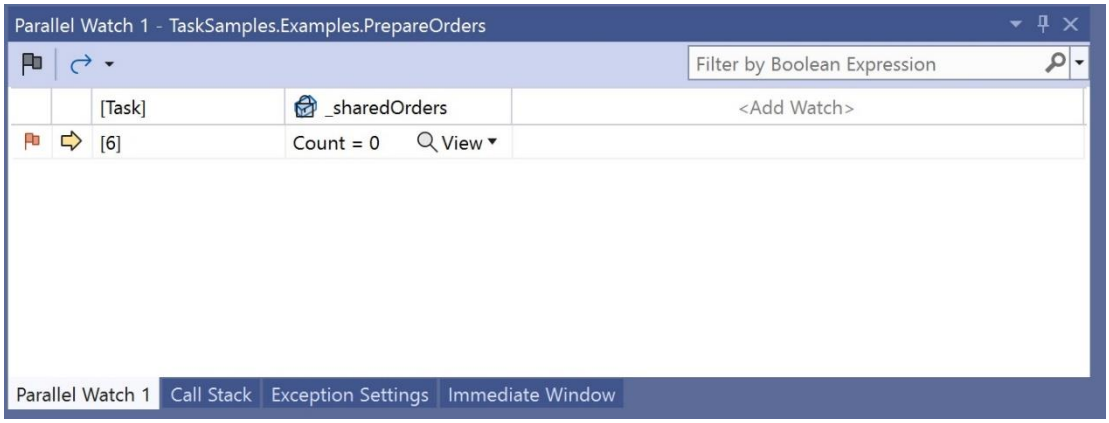

Threads
Search
Group by: Process ID
Columns
Flag Just My Code
Flag Custom Module Selection...
ID
Managed ID
Category
Process ID: 6424 (7 threads)
10908 1 Main Thread Main Thread System.Console.dll!System.ConsolePal.ReadKey
4612 3 Worker Thread .NET ThreadPool Worker System.Private.CoreLib.dll!System.Threading.Monitor.Wait
10304 4 Worker Thread .NET ThreadPool Gate System.Private.CoreLib.dll!System.Threading.WaitHandle.WaitOneNoCheck
9200 5 Worker Thread .NET ThreadPool Worker System.Private.CoreLib.dll!Interop.Kernel32.GetQueuedCompletionStatus
5704 0 Worker Thread <No Name> <not available>
10352 0 Worker Thread <No Name> <not available>
10108 8 Worker Thread <No Name> BackgroundPingConsoleApp.dll!Program.<Main>$.AnonymousMethod__0_(
BackgroundPingConsoleApp.dll!Program.<Main>$.AnonymousMethod__0_0
[External Code]

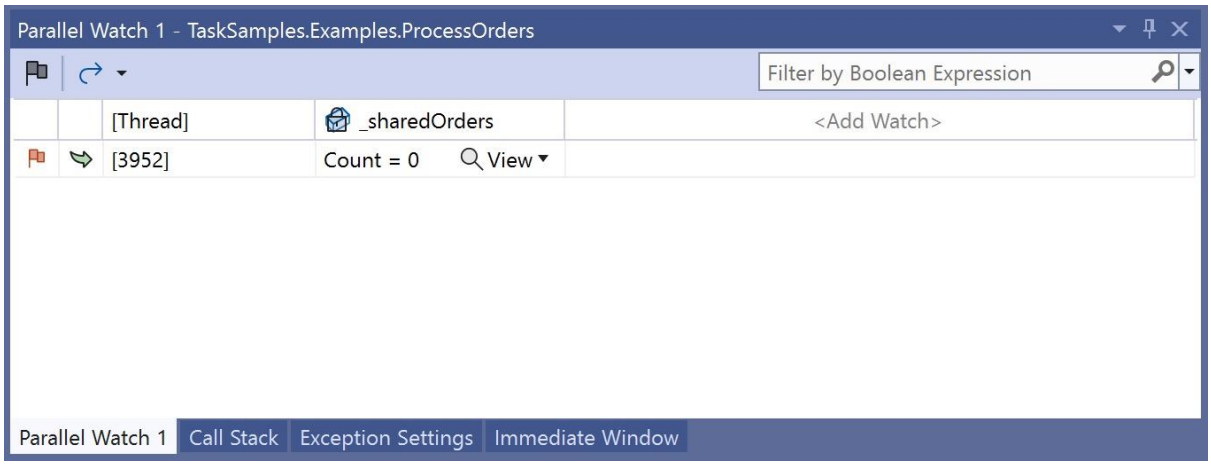

Threads
Search
Group by: Process ID
Columns
ID
Managed ID
Category
Name
Location
Process ID: 6972 (6 threads)
8940 1 Main Thread Main Thread BackgroundPingConsoleApp.dll!Program.<Main>$
8716 3 Worker Thread .NET ThreadPool Worker System.Private.CoreLib.dll!System.Threading.Monitor.Wait
5044 4 Worker Thread .NET ThreadPool Gate System.Private.CoreLib.dll!System.Threading.WaitHandle.WaitOneNoCheck
11032 5 Worker Thread .NET ThreadPool Worker System.Private.CoreLib.dll!Interop.Kernel32.GetQueuedCompletionStatus
9768 0 Worker Thread <No Name> <not available>
5180 8 Worker Thread <No Name> BackgroundPingConsoleApp.dll!Program.<Main>$.AnonymousMethod__0_0
Output
Locals
Watch 1
Threads

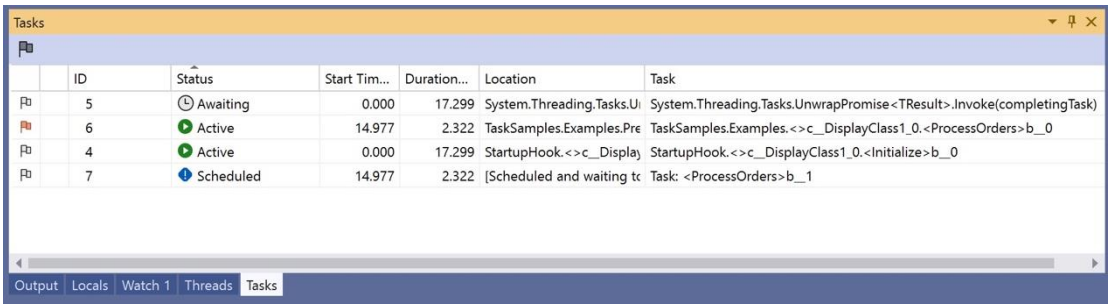

Parallel Stacks
Search (Ctrl+E)
View: Threads
100%
[8940] Main Thread
Program.<Main>$
[5180] <No Name>
Program.<Main>$.AnonymousMethod__0_0
[External Code]
3 Threads
[External Code]
Parallel Stacks
Diagnostic Tools

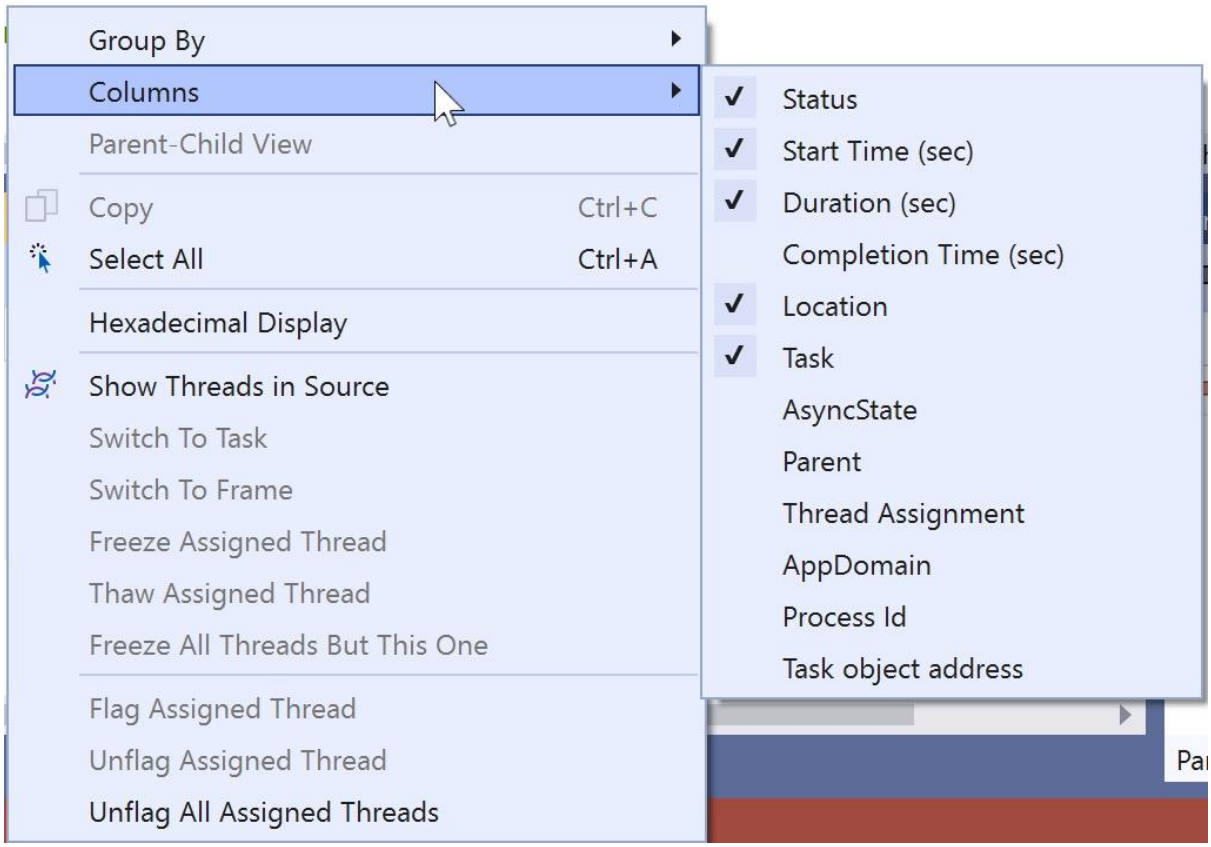

Parallel Stacks
Search (Ctrl+E)
View:
Tasks
100%
1 Async Logical Stack
StartupHook.Initialize.AnonymousMethod__0
Task.Run
Parallel Stacks
Diagnostic Tools


Parallel Stacks
Search (Ctrl+E)
View:
Tasks
100%
1 Async Logical Stack
ContinuationTaskFromResultTask<>.InnerInvoke
Task..cctor.AnonymousMethod__272_0
ExecutionContext.RunFromThreadPoolDispatchI
Task.ExecuteWithThreadLocal
Task.ExecuteEntryUnsafe
Task.ExecuteFromThreadPool
ThreadPoolWorkQueue.Dispatch
WorkerThread.WorkerThreadStart
Thread.StartCallback
1 Async Logical Stack
Start<StartupHook.
StartupHook.Initialize.AnonymousMethod__0
Task.Run
Parallel Stacks
Diagnostic Tools

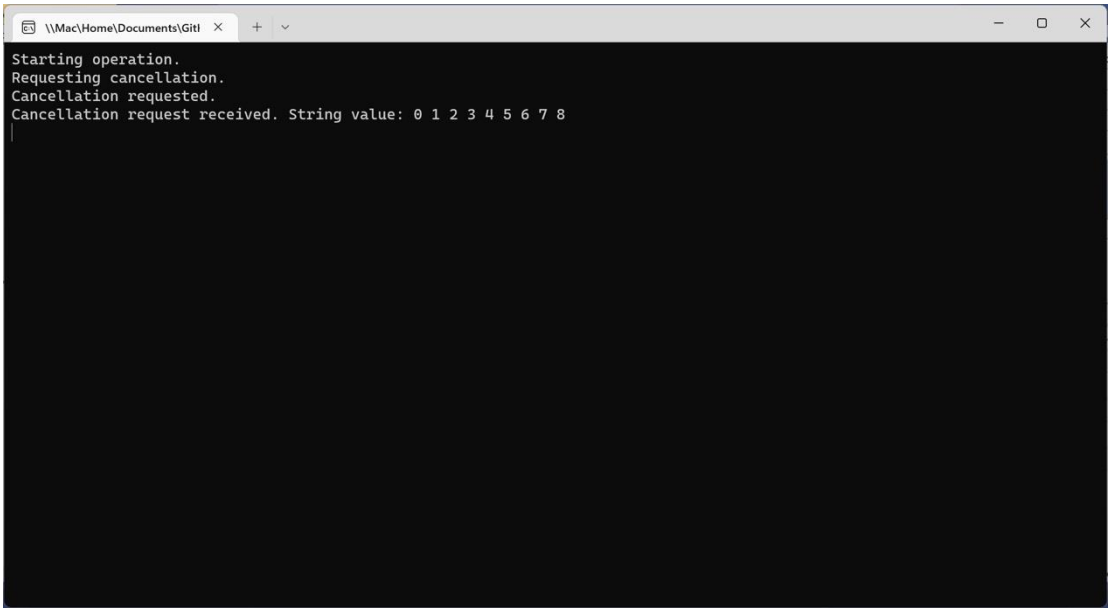

Parallel Watch 1 - TaskSamples.Examples.PrepareOrders
Filter by Boolean Expression
[Task]
_sharedOrders
<Add Watch>
[6]
Count = 0
View
Parallel Watch 1
Call Stack
Exception Settings
Immediate Window

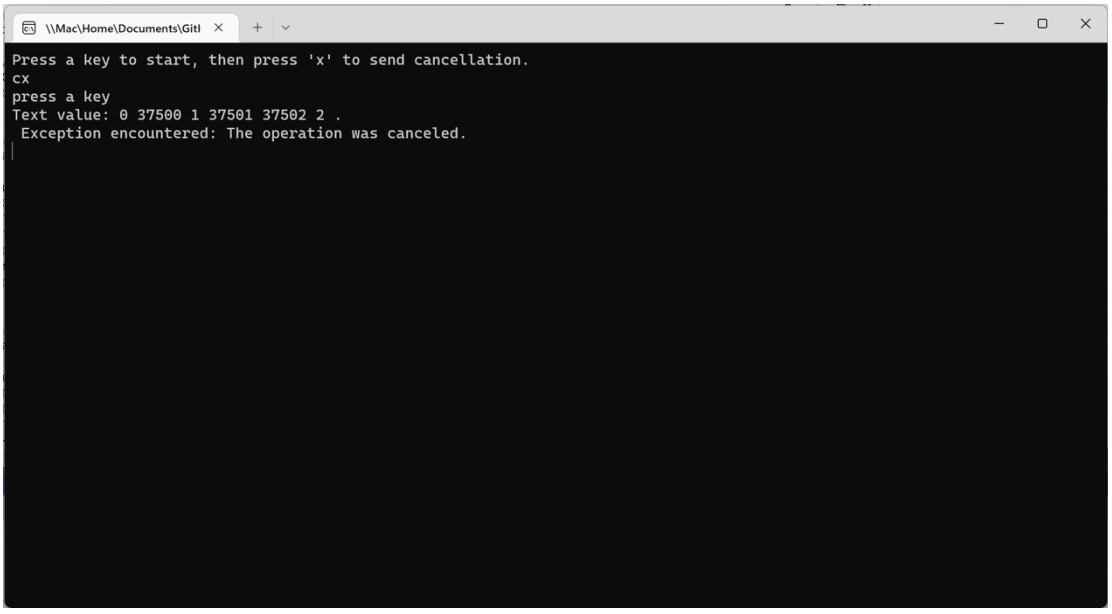

Parallel Watch 1 - TaskSamples.Examples.ProcessOrders
Filter by Boolean Expression
[Thread]
_sharedOrders
<Add Watch>
[3952]
Count = 0
View
Parallel Watch 1
Call Stack
Exception Settings
Immediate Window

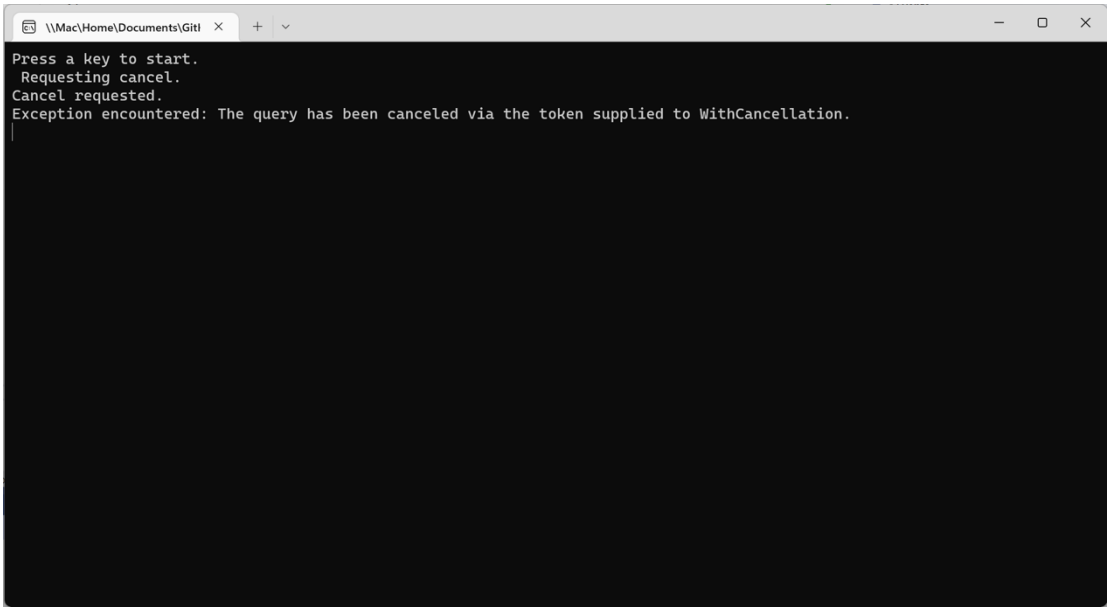

Tasks
ID
Status
Start Tim...
Duration...
Location
Task
5
Awaiting
0.000
17.299
System.Threading.Tasks.U
System.Threading.Tasks.UnwrapPromise<TResult>.Invoke(completingTask)
6
Active
14.977
2.322
TaskSamples.Examples.Pre
TaskSamples.Examples.<>c__DisplayClass1_0.<ProcessOrders>b__0
4
Active
0.000
17.299
StartupHook.<>c__Displa
StartupHook.<>c__DisplayClass1_0.<Initialize>b__0
7
Scheduled
14.977
2.322
[Scheduled and waiting tc
Task: <ProcessOrders>b__1
Output
Locals
Watch 1
Threads
Tasks

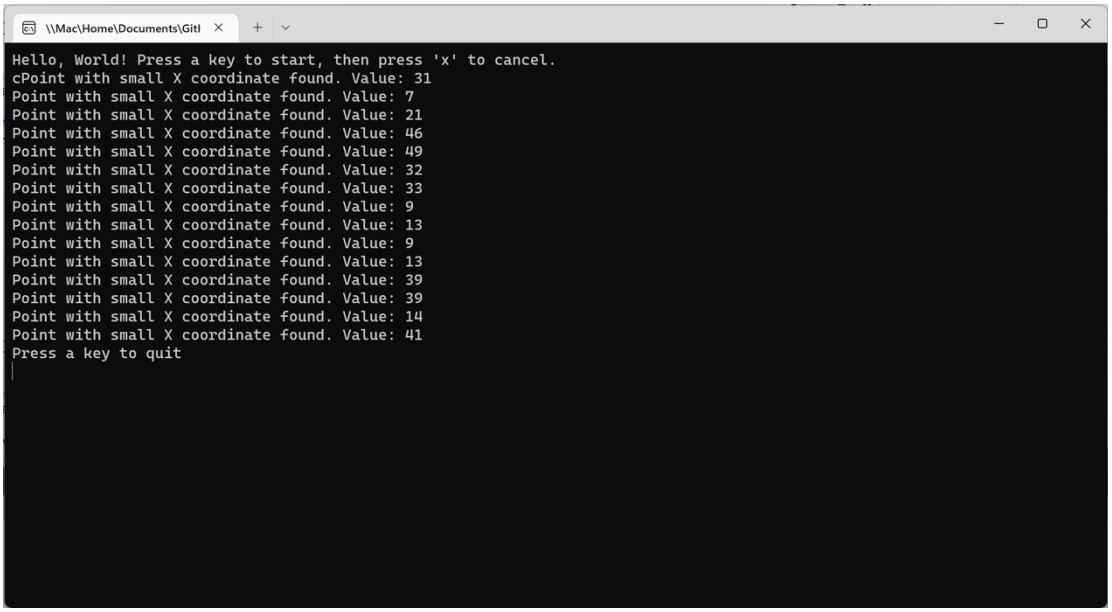

Group By
Columns
Parent-Child View
Copy Ctrl+C
Select All Ctrl+A
Hexadecimal Display
Show Threads in Source
Switch To Task
Switch To Frame
Freeze Assigned Thread
Thaw Assigned Thread
Freeze All Threads But This One
Flag Assigned Thread
Unflag Assigned Thread
Unflag All Assigned Threads
Status
Start Time (sec)
Duration (sec)
Completion Time (sec)
Location
Task
AsyncState
Parent
Thread Assignment
AppDomain
Process Id
Task object address

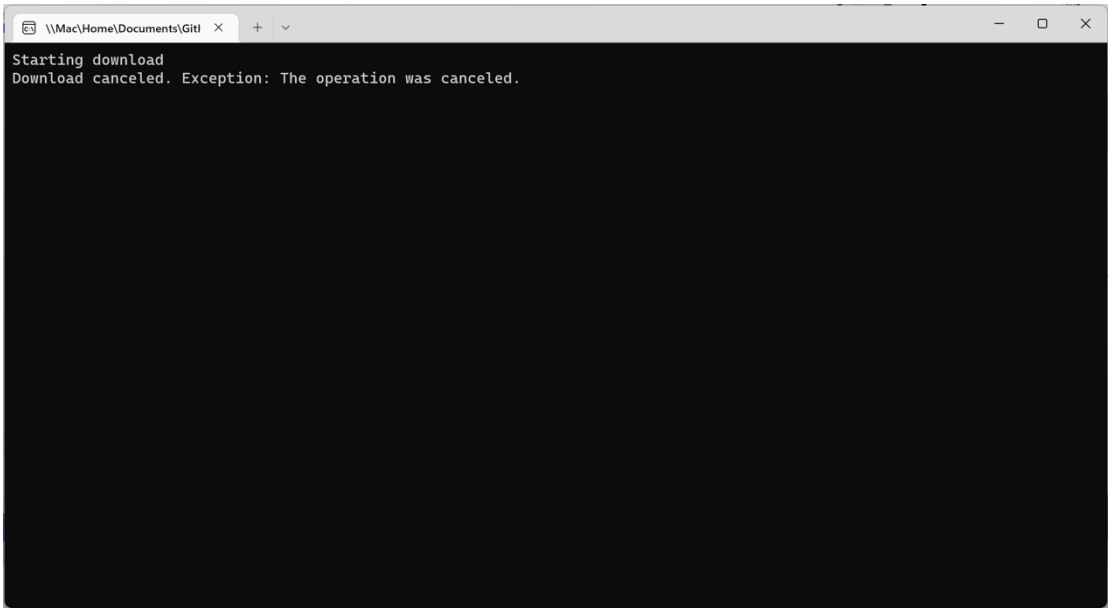
Chapter 11: Cancelling Asynchronous Work

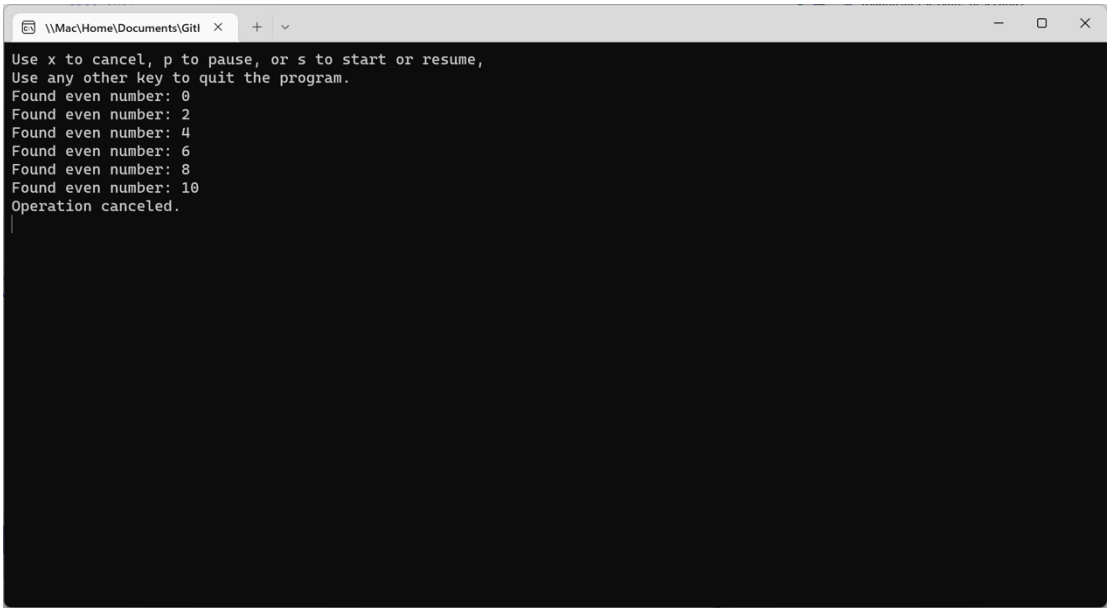




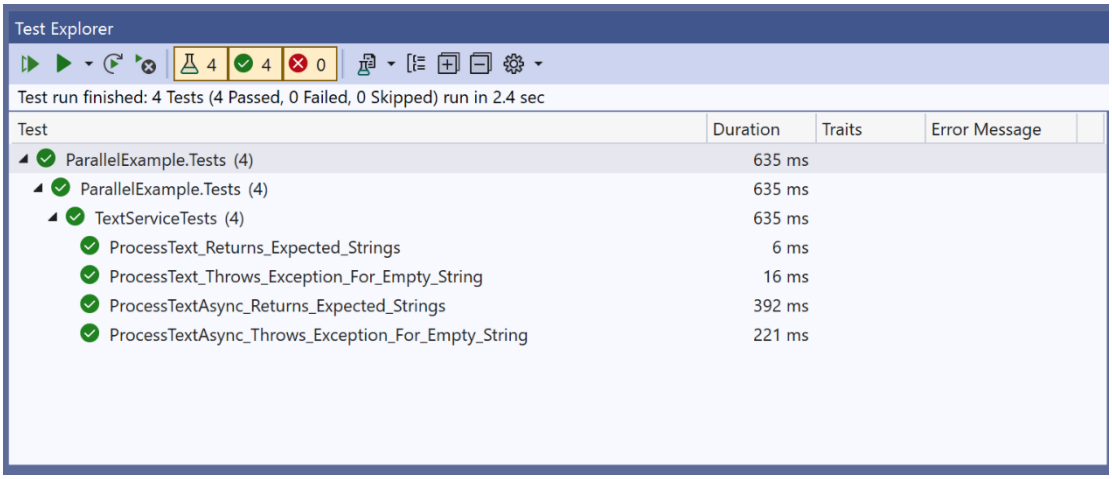

\\Mac\Home\Documents\GitH
Press a key to start.
Requesting cancel.
Cancel requested.
Exception encountered: The query has been canceled via the token supplied to WithCancellation.


\\Mac\Home\Documents\GitH
Hello, World! Press a key to start, then press 'x' to cancel.
cPoint with small X coordinate found. Value: 31
Point with small X coordinate found. Value: 7
Point with small X coordinate found. Value: 21
Point with small X coordinate found. Value: 46
Point with small X coordinate found. Value: 49
Point with small X coordinate found. Value: 32
Point with small X coordinate found. Value: 33
Point with small X coordinate found. Value: 9
Point with small X coordinate found. Value: 13
Point with small X coordinate found. Value: 9
Point with small X coordinate found. Value: 13
Point with small X coordinate found. Value: 39
Point with small X coordinate found. Value: 39
Point with small X coordinate found. Value: 14
Point with small X coordinate found. Value: 41
Press a key to quit

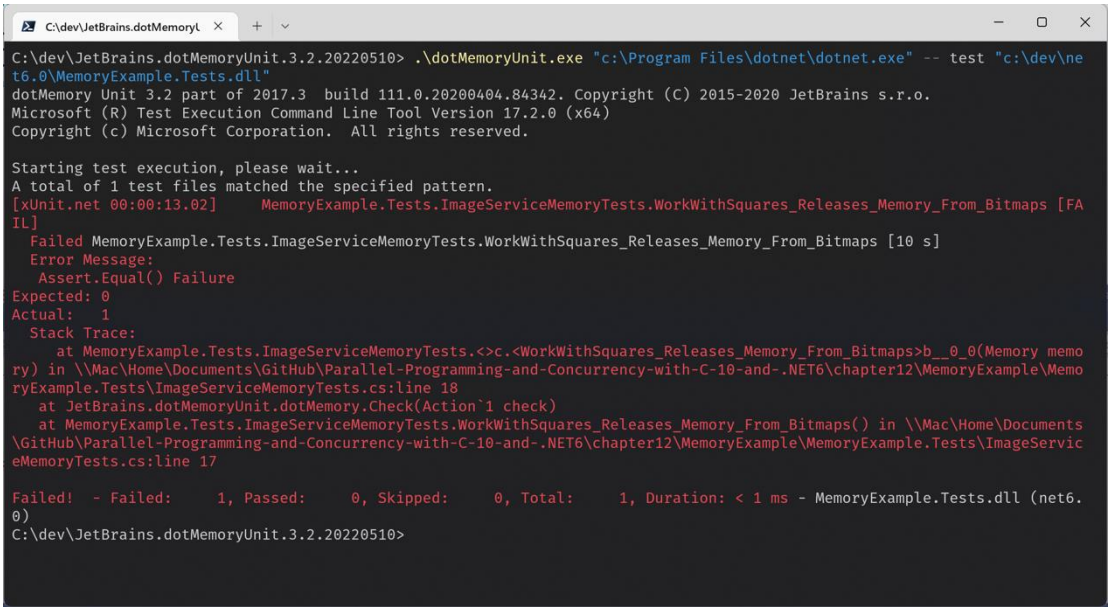

\\Mac\Home\Documents\GitI
Starting download
Download canceled. Exception: The operation was canceled.

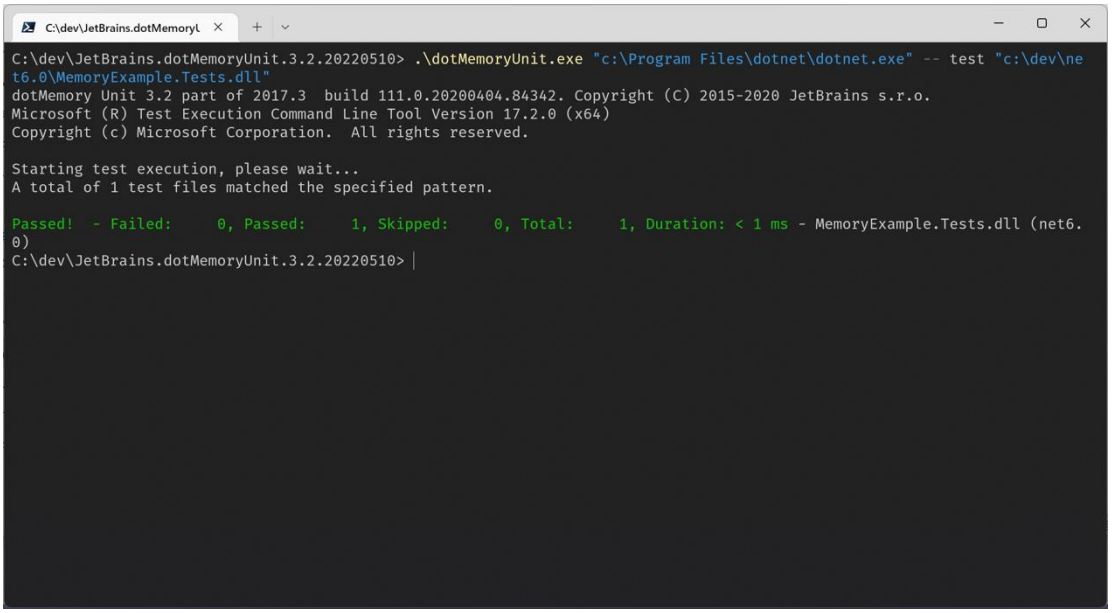

\\Mac\Home\Documents\GitI
Use x to cancel, p to pause, or s to start or resume,
Use any other key to quit the program.
Found even number: 0
Found even number: 2
Found even number: 4
Found even number: 6
Found even number: 8
Found even number: 10
Operation canceled.

Chapter 12: Unit Testing Async, Concurrent, and Parallel Code



JetBrains.dotMemoryUnit by JetBrains, **5.11M** downloads
dotMemory Unit is an additional unit testing framework that allows you to write tests that check code for all kinds of memory issues. For example, these can be tests that determine leaks by checking memory for objects of a particular...




C:\dev\JetBrains.dotMemoryU
C:\dev\JetBrains.dotMemoryUnit.3.2.20220510> .\dotMemoryUnit.exe "c:\Program Files\dotnet\dotnet.exe" -- test "c:\dev\net6.0\MemoryExample.Tests.dll"
dotMemory Unit 3.2 part of 2017.3 build 111.0.20200404.84342. Copyright (C) 2015-2020 JetBrains s.r.o.
Microsoft (R) Test Execution Command Line Tool Version 17.2.0 (x64)
Copyright (c) Microsoft Corporation. All rights reserved.
Starting test execution, please wait...
A total of 1 test files matched the specified pattern.
Passed! - Failed: 0, Passed: 1, Skipped: 0, Total: 1, Duration: < 1 ms - MemoryExample.Tests.dll (net6.0)
C:\dev\JetBrains.dotMemoryUnit.3.2.20220510>