Concurrency and Concurrent Collections

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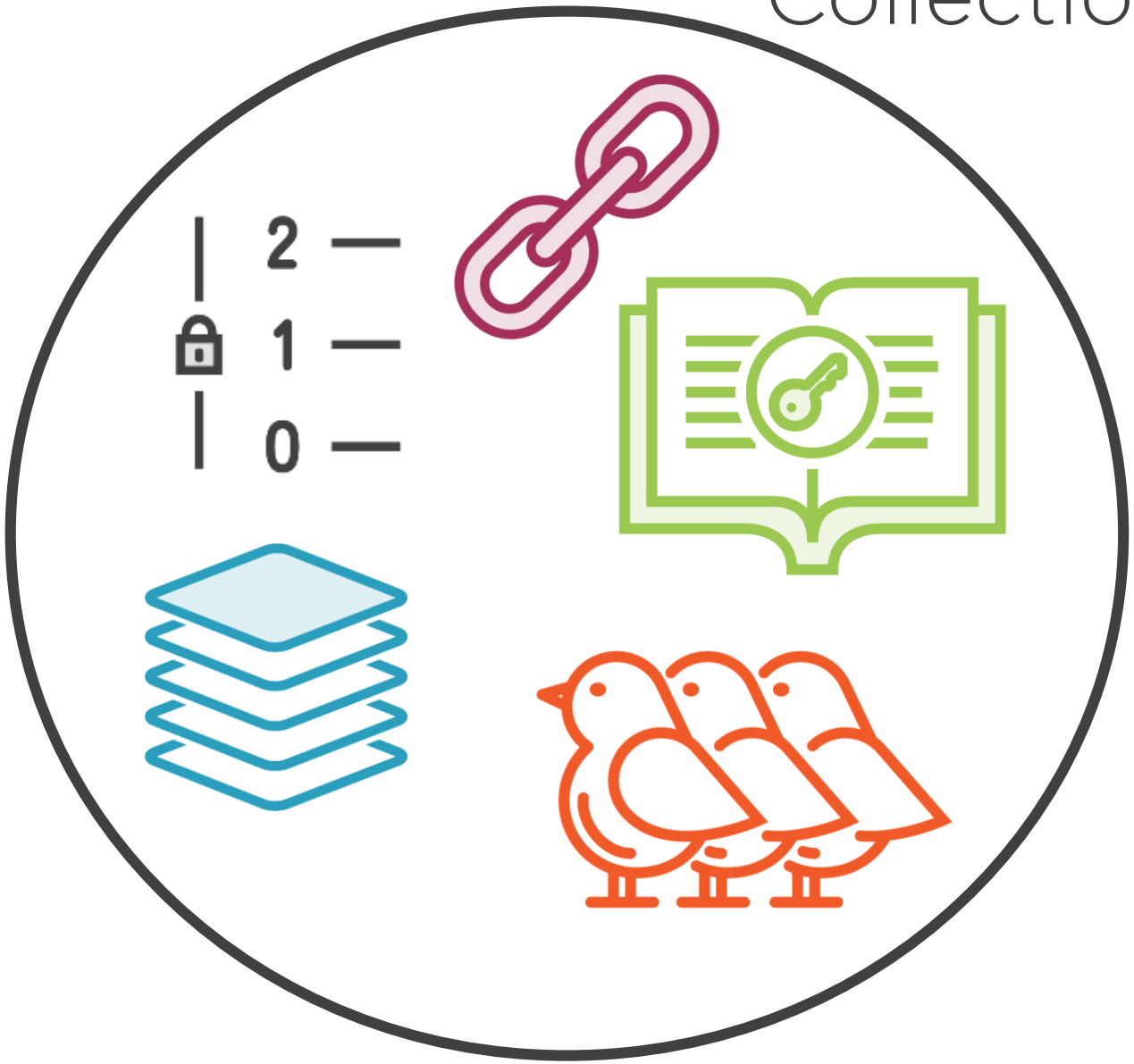
Collection Types



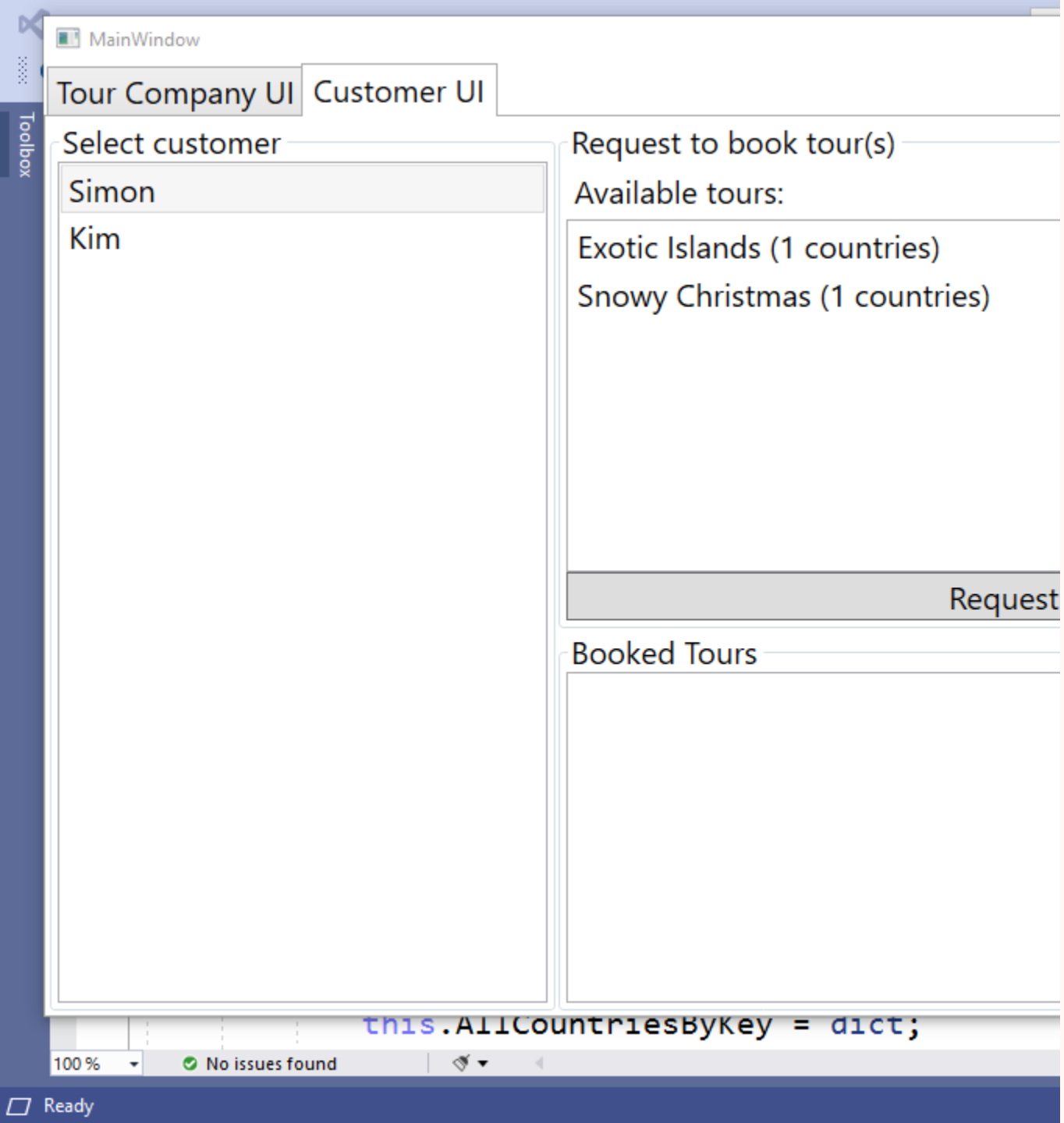
None of these are thread-safe

All should be used from only one thread at a time

Overview

Concurrent collections

- Coding with `ConcurrentQueue<T>`
- Concurrent collections replicate standard collection features
- But they are often different in how you must use them



Customers can
make tour booking requests

Requests are all
on the same thread

Multiple threads more likely
in a real app

Queue<T> **is not thread-safe**

- So risks data corruption
  with multiple threads

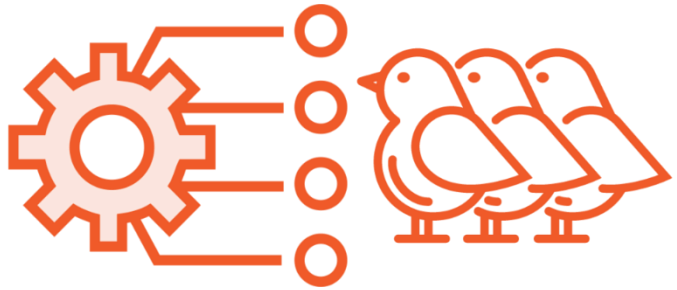
Demo

Concurrency

- Replace `Queue<T>` with `ConcurrentQueue<T>`
- Will still only have one customer
- But customer can make simultaneous requests
- Will do this asynchronously

Enqueuing and Dequeuing

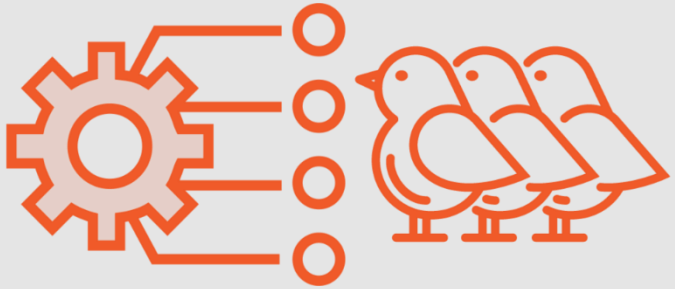
`Queue<T>`	`ConcurrentQueue<T>`
`Dequeue()`	`TryDequeue()`
`Enqueue()`	`Enqueue()`



Queue<T> vs. ConcurrentQueue<T>

Queue<T>

ConcurentQueue<T>



Functionality is largely the same

But details of methods differ

- ConcurrentQueue has no Dequeue( ) or Peek( )
- Because some standard operations need adapting for multiple threads

Concurrent collections don’t always function the same way as their standard equivalents

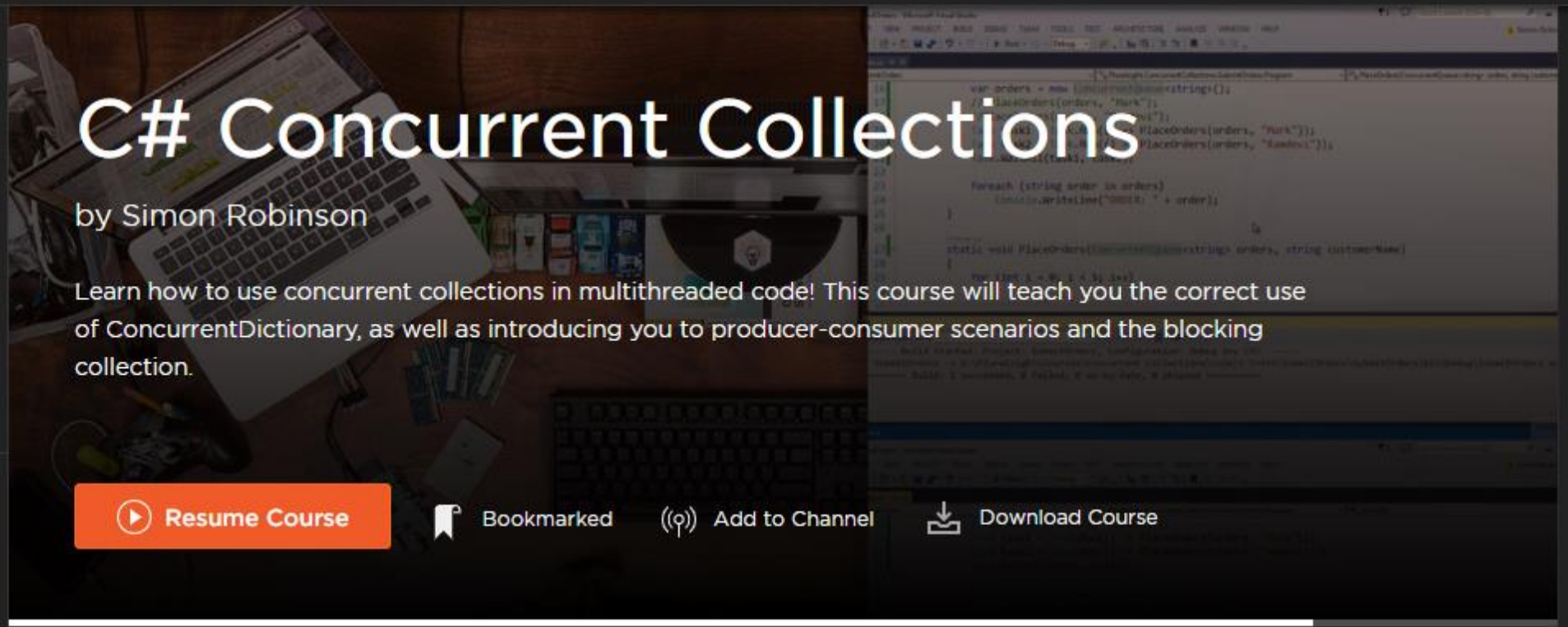
There Aren't Many Concurrent Collections

ConcurrentDictionary<TKey, TValue>

ConcurrentStack<T>

ConcurrentQueue<T>

ConcurrentBag<T>



C# Concurrent Collections

by Simon Robinson

Learn how to use concurrent collections in multithreaded code! This course will teach you the correct use of ConcurrentDictionary, as well as introducing you to producer-consumer scenarios and the blocking collection.

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Course author

Simon Robinson

Simon Robinson first cut his developer teeth in the early 1980s writing a scheduling system in BBC Basic(!) for his local college. Since then, his programming career has spanned industries ranging...

Course info

Level	Advanced
Rating	★★★★½ (557)
My rating	★★★★★
Duration	3h 32m
Released	15 May 2015

Summary

Concurrent collections

- Thread safe alternative to standard collections
- Mimic standard collection features
- But concurrency enforces differences in logic

Next up: Sets