

# Module 09:

# "Concurrent Collections"



**TEKNOLOGISK**  
**INSTITUT**

# Agenda

- ▶ Introducing Concurrent Collections
- ▶ Examples of Usage

# Task Parallel Library

- ▶ Task Parallel Library (TPL)
  - Was introduced in .NET 4.0
  - Enhanced in .NET 4.5
    - Special keywords are included in C# 5.0, C# 8.0
  
- ▶ Features
  - Task Parallelism
  - Data Parallelism
  - Parallel LINQ
  - **Thread-safe collections**
  
- ▶ Emerging trends leverage parallelism! Also .NET!

# Introducing Concurrent Collections

- ▶ Task Parallel Library includes thread-safe collection alternatives to the conventional generic collections
- ▶ **System.Collections.Concurrent** namespace
  - `ConcurrentQueue<T>`
  - `ConcurrentStack<T>`
  - `ConcurrentDictionary<K,V>`
  - `ConcurrentBag<T>`

# Agenda

- ▶ Introducing Concurrent Collections
- ▶ **Examples of Usage**

# ConcurrentQueue<T>

- ▶ `ConcurrentQueue<T>` is a thread-safe version of `Queue<T>`

```
ConcurrentQueue<int> queue = new ConcurrentQueue<int>();
```

```
Task producer = Task.Factory.StartNew( () => { ...  
    queue.Enqueue( DateTime.Now.Milliseconds );  
    ...  
}
```

```
Task consumer = Task.Factory.StartNew( () => { ...  
    int number;  
    if( queue.TryDequeue( out number ) ) { ... }  
}
```

# BlockingCollection<T>

## ▶ BlockingCollection<T>

- Concurrent collection
- Optional bounded capacity
- Blocking operations

```
BlockingCollection<int> bc = new BlockingCollection<int>( 5 );  
...  
string result = string.Format( $"Successfully took {0}",  
    await Task.Run<int>( () => bc.Take() );
```

- ## ▶ Implement your own concurrent collection using
- `IProducerConsumerCollection<T>`

# Summary

- ▶ Introducing Concurrent Collections
- ▶ Examples of Usage





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