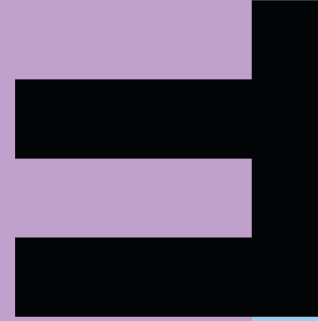


FHV

Vorarlberg University
of Applied Sciences



Application Integration and Security

Valmir Bekiri

Philipp Scambor

Async programming with async and await

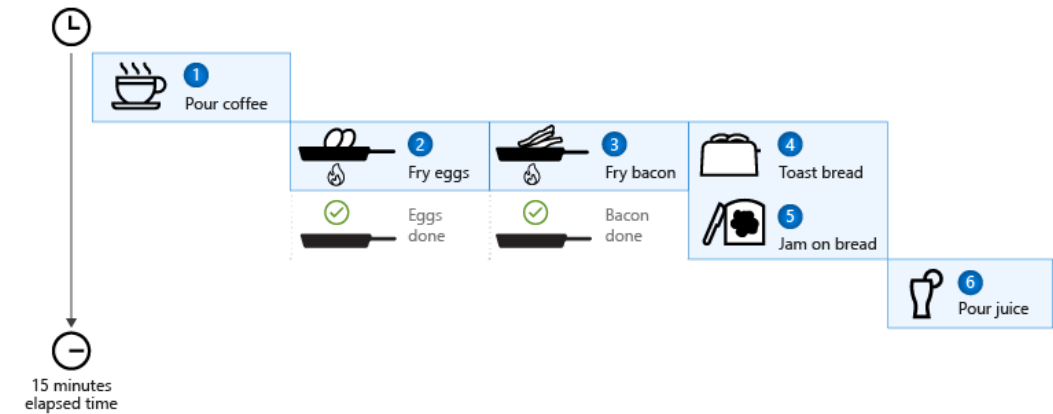
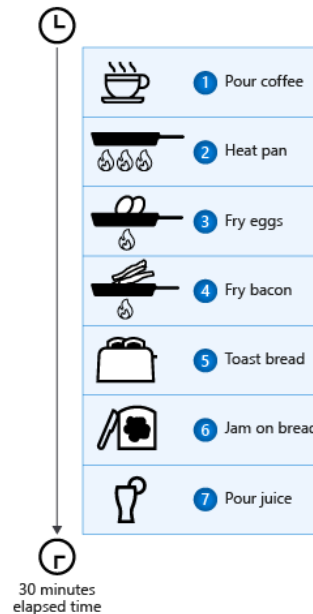
The core problem

- Consider you are making breakfast

1. Pour a cup of coffee. (2 min)
2. Heat a pan, then fry two eggs. (12 min)
3. Fry three slices of bacon. (5 min)
4. Toast two pieces of bread. (8 min)
5. Add butter and jam to the toast. (2 min)
6. Pour a glass of orange juice. (1 min)

- Total time if you execute any of the 6 tasks **one by one after each other** would be **30 minutes**.

- Total time if you do things **concurrently** would be around **15 min**.



Source: <https://learn.microsoft.com/en-us/dotnet/csharp/asynchronous-programming/>



Task asynchronous programming model (TAP)

- C# has a language-level asynchronous programming model, which allows for easily writing asynchronous code
- Asynchronous programming has advantages if there are I/O-bound needs like **requesting data from a network, accessing a database, or reading and writing to a file system.**
 - The idea is to not block an application thread while it is waiting for slow I/O-calls
- TAP models asynchronous programming in a way that it can be easily written and overseen almost like synchronous code
 - **Task** and **Task<T>** objects model asynchronous operations
 - **async** keyword is added to method signatures to mark them as asynchronous
 - **await** keyword waits in a non blocking manner for the Task to finish



Task asynchronous programming model (TAP)

- In our example all asynchronous methods are started at the beginning without waiting for them. After all have been started we await them in bulk.

```
1  PourCoffee();
2  Task eggs = FryEggsAsync();
3  Task bacon = FryBaconAsync();
4  Task toast = MakeToastAsync();
5  PourJuice();
6
7  await Task.WhenAll(eggs, bacon, toast);
8  Console.WriteLine("Breakfast is ready!");
```

```
1  static async Task FryEggsAsync()
2  {
3      await HeatPanAsync();
4      PourEggsIntoPan();
5      await FryThemEggsAsync();
6  }
```



That's it 😊
...for now

