Observable vs. Task

This article explains when to use observables and when to use tasks.

Introduction

In Implementing GeoCordinateWatcher as a Reactive Service we saw how to convert an event-based asynchronous API into an API based on *observables*, while in Bringing async/await to the Contacts service we saw how to convert to an API based on *tasks*.

This article answers the question "in what circumstances should each of the techniques be used".

When to use observables

Reactive Programming allows you to compose asynchronous and event-based programs using observable sequences and LINQ-style query operators. It is very suited to handling, combining and filtering *streams* of events.

The need to combine several event streams or filtering is a good clue for the use of observables.

When to use tasks

As the name suggests, a task is something that has a beginning and an end. So, all asynchronous APIs based on callbacks or events are candidates to be converted into a task-based asynchronous API.

Applicability matrix

Another way to look at this is:

- Tasks are for a single future value
- Observables are for multiple future values

The following table shows the correspondence between asynchronous APIs and their synchronous counterparts:

	Synchronous	**Asynchronous**

Single Value	**-**
	`// synchronous call`
	`var x = F(42);`
	
	`// synchronous call`
	`var y = G(x);`
		Task
		`// asynchronous call`
		`var x = FAsync(42);`
		
		`// asynchronous call`
		`var y = GAsync(x);`

Multiple Values	**Enumerable**
	`// Shopping database`
	`var res =`
	`  from o in orders`
	`  from p in p.Products`
	`  where p.Price > 29.95m`
	`  select p.Name;`
	
	`// Synchronous MoveNext`
	`foreach (var p in res)`
	`{`
	`  Console.WriteLine(p);`
		Observable
		`// Stock trade events`
		`var res =`
		`  from t in trades`
		`  from q in t.Symboils`
		`  where q.Quote > 29.95m`
		`  select q.Symbol;`
		
		`// Asynchronous MoveNext`
		`res.Subscribe(p => Console.WriteLine(p));`

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	`}`	

References

- Reactive Extensions (Rx)
- Asynchronous Programming with Async and Await (C# and Visual Basic)

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