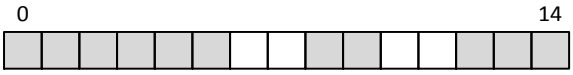
Exercise: Exceptions - Partially Filled Array

In this exercise you will create an implementation of the interface `IPartiallyFilledArray`, a data structure resembling an array of static length in which only some of the entries are occupied (see the figure below). In doing so, you will consider what may go wrong when using the array and handle the errors appropriately using exceptions.



To help you along, you are provided with the interface `IPartiallyFilledArray` and a console program which lets a user manipulate the data structure.

Exercise 1:
Investigate the provided interface `IPartiallyFilledArray` and make sure you understand what each method does.

Exercise 2:
What errors can occur in the use of implementations of `IPartiallyFilledArray`? Construct suitable exceptions that represent these errors and throw them when appropriate.

Exercise 3:
Implement the interface in class `PartiallyFilledArray` and unit test it using NUnit. Make sure you also test that exceptions are thrown when appropriate.

Exercise 4:
Investigate the provided console program. It allows a user to manipulate a partially filled array but has absolutely no error handling. Add error handling (try-catch-blocks) to the console program and ensure that your error handling is robust.