**Indexing, slicing, and iterating**

Numpy arrays can be indexed, sliced, and iterated like other Python data structures.

**Broadcasting**

Broadcasting is meant to vectorize the array operations. Numpy is written in C language. Broadcasting operations vectorize Numpy arrays, so the traversing operation of arrays occurs in C language which makes it very fast. It also avoids making extra copies of the array, which makes it consume less memory.

Numpy operations, on a pair of arrays, usually happen on an element-by-element basis. For example, suppose we multiply two arrays of the same shape, as seen below. See the results.

**Coding exercise**

import numpy as np

a = np.array([1.0, 2.0, 3.0])

b = np.array([2.0, 2.0, 2.0])

print(a \* b)

Array multiplication

As you can see below, Numpy Broadcasting will relax the requirement of having the same shape for multiplication.

import numpy as np

a = np.array([1.0, 2.0, 3.0])

b = 2.0

print(a \* b)

Broadcasting Illustration

The output is the same. Numpy is smart to use only the Scalar to do the calculation instead of making multiple copies. This saves memory.