CS152: Data Structure

Week 4 Knowledge Check

Write the full name of all collaborators inside this box

Discuss these questions and write your answers in the space provided below it.

1. Explain how random access works and why it is so fast.

2. What are the differences between an array and a Python list?

3. Explain the difference between the physical size and the logical size of an array.

4. Suppose you have an array of 32-bit integers with 64 elements. Compute the total memory size (in bytes) required to store this array. Write your answer in base 2.

A 32-bit integer is 4 bytes (since 32 bits = 4 × 8 bits). So, total memory size = 64 elements × 4 bytes = 256 bytes.

In base 2:
256 bytes = 2^8 bytes.

5. If the base address of an array is `10011101~2~` (in base 2), what is the address of the item at index position 7? Assume each element has a constant size of 1. Give your answer in base 2.

Solution:
The address of an item at index `i` is:
`base address + i × size of each element`

Here,
- Base address = `10011101` (in base 2)
- Index = 7
- Size of each element = 1 byte

So,
Address = `10011101` + `111` = `10100000` (in base 2)

6. State the run-time complexity for inserting an item when the insertion point is the logical size of the array.