

CS101 - Data Abstraction

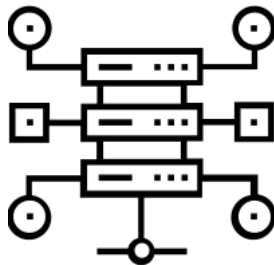
DS Basics - Module1

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- **Definition** - A data structure is a technique that is primarily used to access, process, store, and organize data.

- Core operations supported by a data structure:
 - Add [store]
 - Retrieve [access/read]
 - Remove [organize]
- Other supporting operations are possible based on the data structure.
- Few examples:
Arrays, Linked List, Stacks, Queues, Hash Maps, Trees, Graphs, etc.

What is an Array?



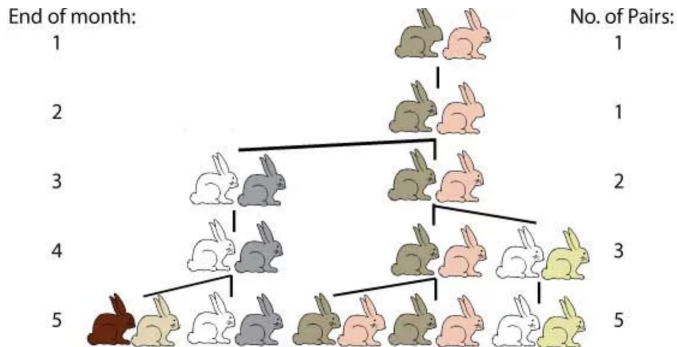
- Consecutive blocks of data in memory. Elements in an array are contiguous (located next to each other).
- All elements of an array should be of same type.
- Any type of object can be stored in an array: integers, doubles, booleans, strings, ...
- The size of the array can be found using **len(a)**

How is an Array different from a List?



- Arrays are **Homogenous** data storage. List are **Heterogenous** data storage.
- Arrays are compact and does not take up too much of space in memory. List take up additional space in memory.
- Arrays [**built-in** and **Numpy**] are more efficient in terms of time taken compared to a List.

How do we process an Array?



- **Fibonacci Sequence:** $\{0, 1, 1, 2, 3, 5, 8, \dots\}$
- **Leonardo Problem:** At the end of year, how many pairs of rabbits exist?

More discussion on Dynamic Arrays, Multi-Dimensional structures!

Reading Assignment

GT Chapter 5 - 5.2, 5.3, 5.4

Questions?

Please ask if there are any Questions!