

# CS 1.2: Intro to Data Structures & Algorithms

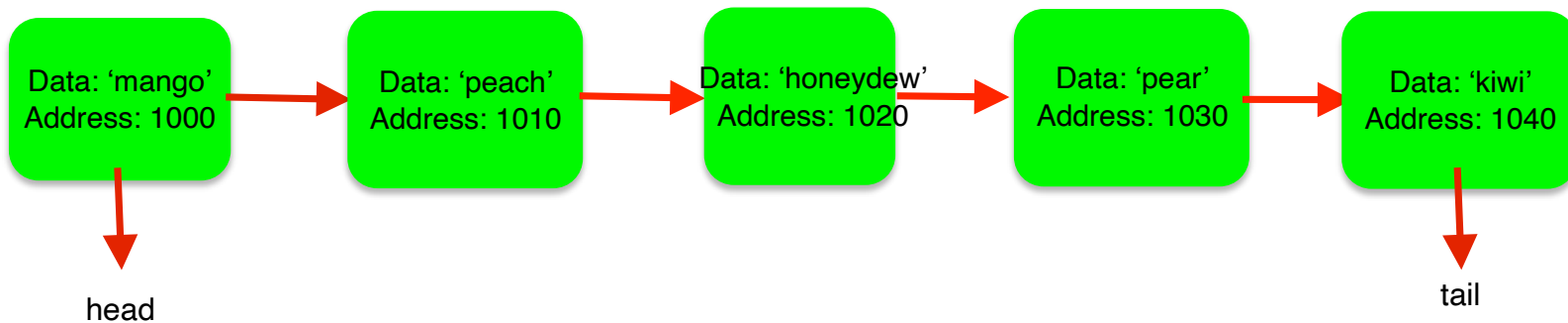
## Linked List Time Complexity Worksheet

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### Linked List Diagram – organization of data structure in memory

Draw a diagram of how a linked list data structure is organized in memory using references. The linked list should contain exactly 5 items: 'mango', 'peach', 'honeydew', 'pear', and 'kiwi'.

Label the head, tail, data, and next properties in appropriate places to complete the diagram.



### Linked List Operations – implementation and time complexity

Using your diagram above to guide you, complete the table below. First, write a short summary in pseudocode (English) of the major steps performed in the implementation of each operation. Then, analyze each operation's best case and worst case time complexity using big-O notation. Use the variable  $n$  for the number of items stored in the list (equivalently, the number of nodes).

<i>Linked List operation</i>	<i>short summary in pseudocode (English) of the major steps performed in the implementation</i>	<i>best case running time</i>	<i>worst case running time</i>
is <input type="checkbox"/> empty	Check if head is there	O(1)	O(1)
length	Counts the number of nodes and add 1	O(n)	O(n)
append	Updates tail.next to new node	O(1)	O(1)
prepend	Add new node next to start, set it as head	O(1)	O(1)
find	Loop through all elements to find matching data point	O(1)	O(n)
delete	Set previous node next to the current nodes next	O(1)	O(n)