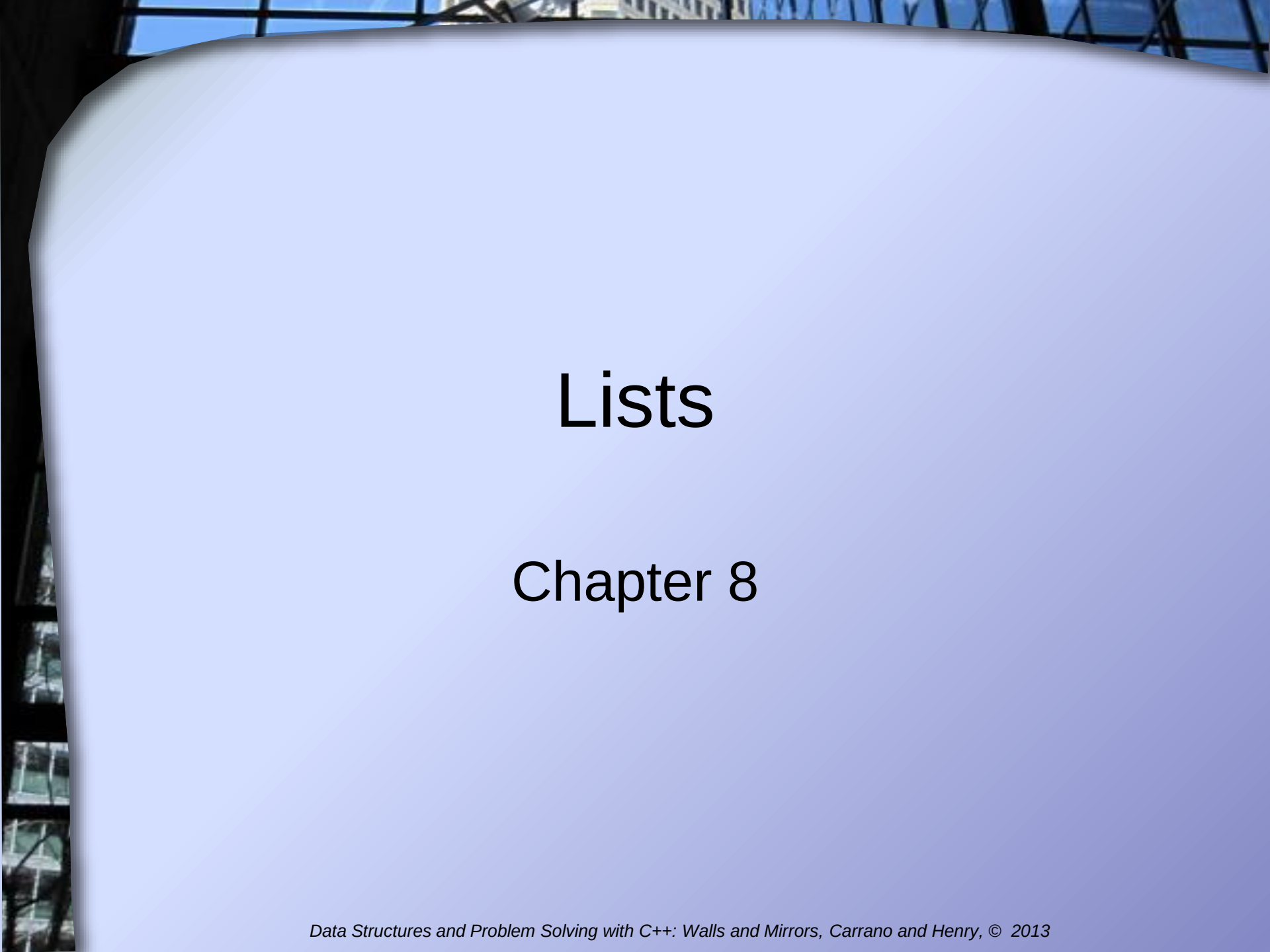


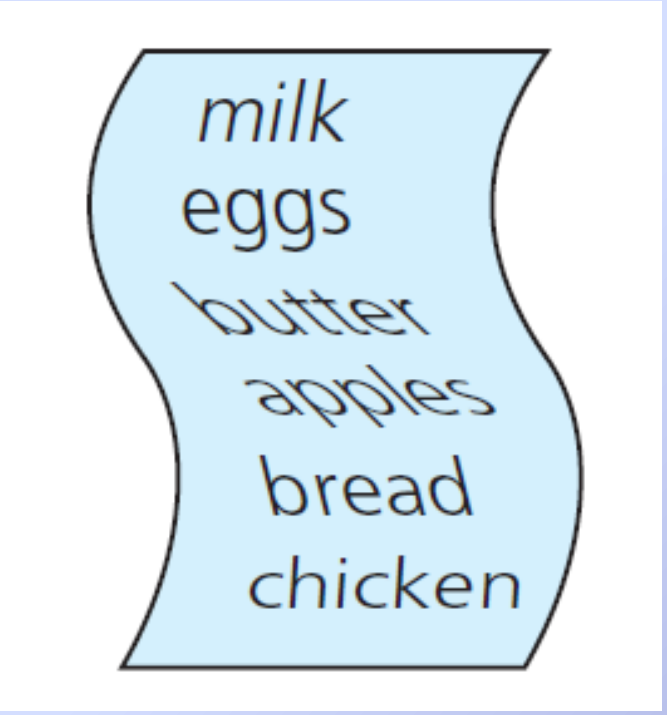
Lists

Chapter 8

Contents

- Specifying the ADT List
- Using the List Operations
- An Interface Template for the ADT List

Specifying the ADT List



You reference list items by their position

FIGURE 8-1 A grocery list

ADT List Operations

- Test whether a list is empty.
- Get number of entries on a list.
- Insert entry at given position on list.
- Remove entry at given position from list.
- Remove all entries from list.
- Look at (get) entry at given position on list.
- Replace (set) entry at given position on list.

ADT List Operations

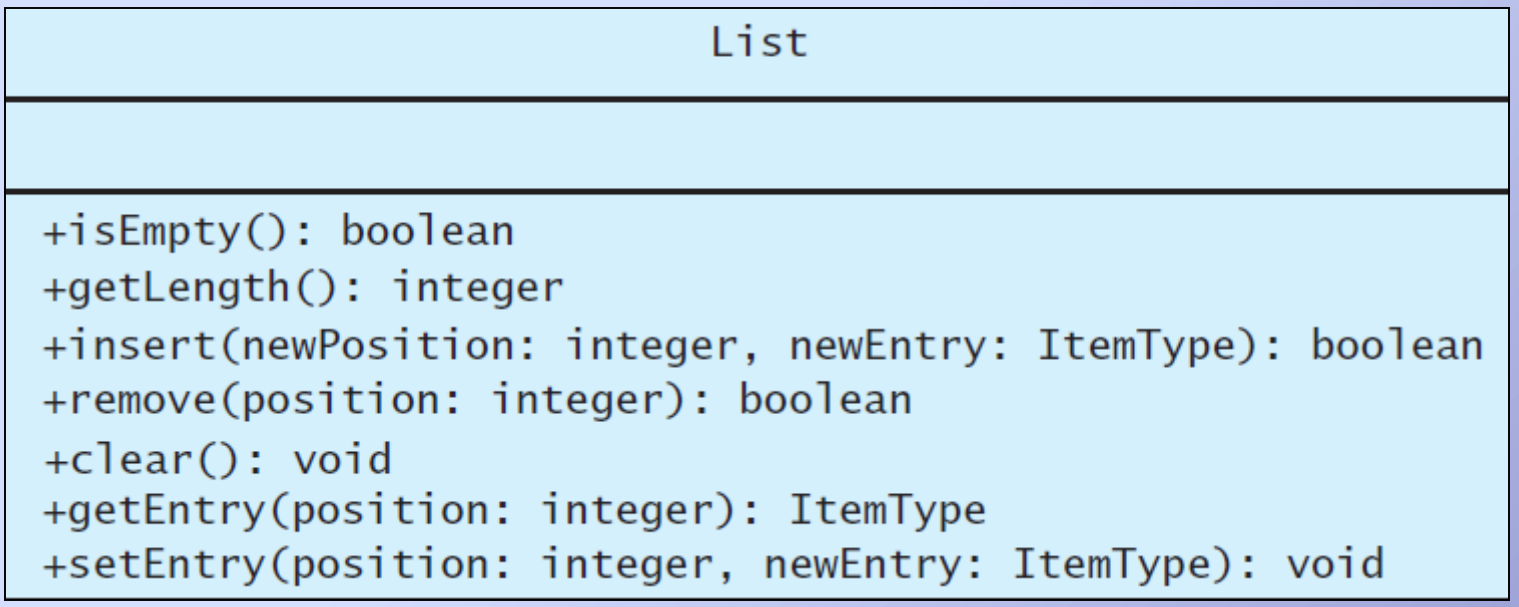


FIGURE 8-2 UML diagram for the ADT list

Abstract Data Type: LIST

- Data : A finite number of objects
  - Not necessarily distinct
  - Having the same data type
  - Ordered by their positions determined by client.

Abstract Data Type: LIST

- Operations
  - isEmpty()
  - getLength()
  - insert(newPosition, newEntry)
  - remove(position)
  - clear()
  - getEntry(position)
  - setEntry(position, newEntry)

Axioms for the ADT List

- (new List()).isEmpty() = true
- (new List()).getLength() = 0
- aList.getLength()=(aList.insert(i, x)).getLength() - 1
- aList.getLength()=(aList.remove(i)).getLength() + 1
- (aList.insert(i, item)).isEmpty() = false
- (new List()).remove(i) = false
- (aList.insert(i, x)).remove(i) = aList

Axioms for the ADT List

- (new List()).getEntry(i) = error
- (aList.insert(i, x)).getEntry(i) = x
- aList.getEntry(i) = (aList.insert(i, x)).getEntry(i + 1)
- aList.getEntry(i + 1) = (aList.remove(i)).getEntry(i)
- (new List()).setEntry(i, x) = error
- (aList.setEntry(i, x)).getEntry(i) = x

Using the List Operations

- Displaying the items on a list independent of the implementation

```
// Displays the items on the list aList.
displayList(aList)

   for (position = 1 through aList.getLength())
   {
      dataItem = aList.getEntry(position)
      Display dataItem
   }
```

Using the List Operations

- Replacing an item.

```
// Replaces the ith entry in the list aList with newEntry.
// Returns true if the replacement was successful; otherwise return false.
replace(aList, i, newEntry)

    success = aList.remove(i)
    if (success)
        success = aList.insert(i, newItem)

    return success
```

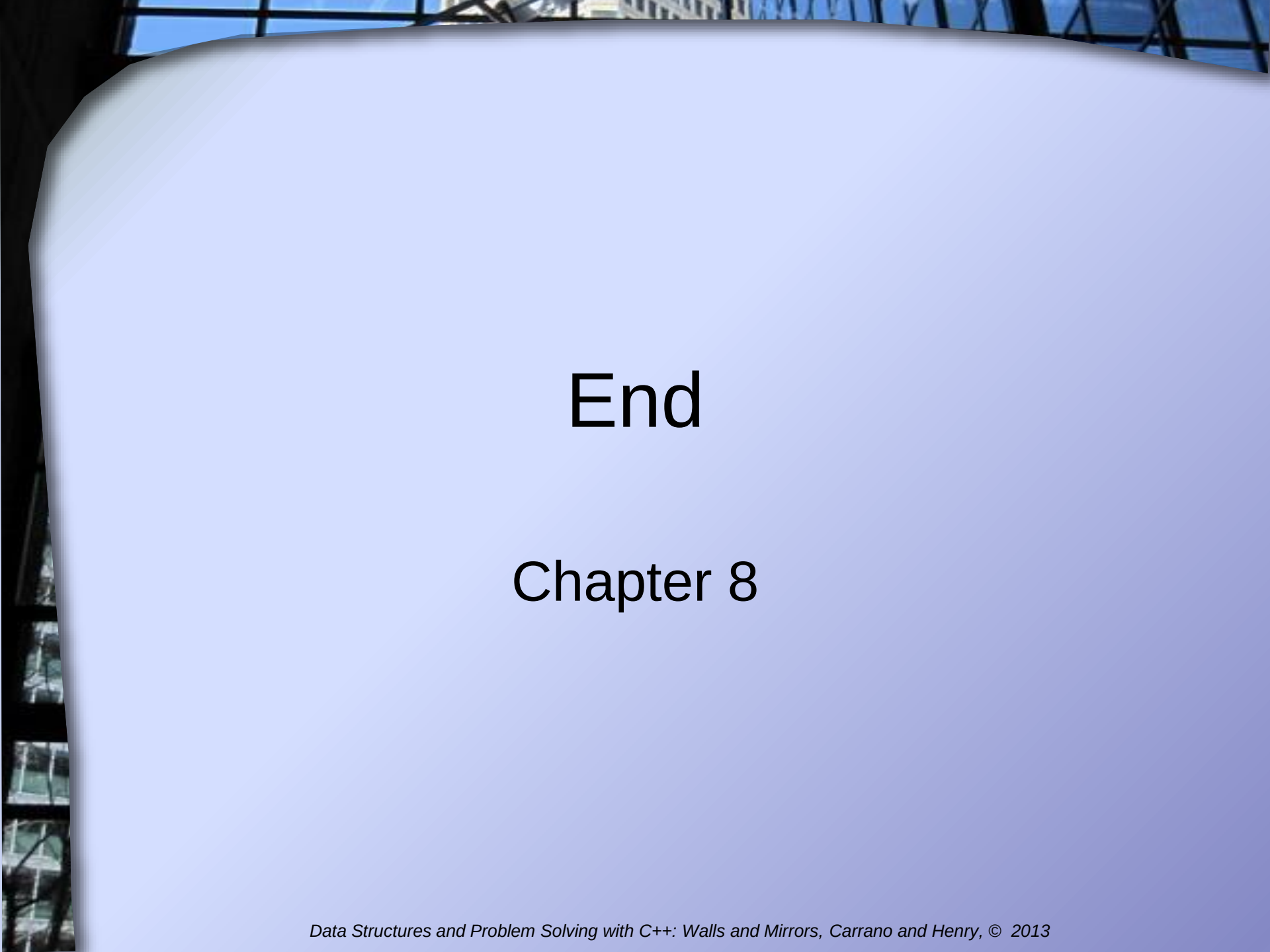
Using the List Operations

- Pseudocode statements place names in an alphabetical list

```
alphaList = a new empty list
alphaList.insert(1, "Amy")      // Amy
alphaList.insert(2, "Ellen")    // Amy Ellen
alphaList.insert(2, "Bob")      // Amy Bob Ellen
alphaList.insert(3, "Drew")     // Amy Bob Drew Ellen
alphaList.insert(1, "Aaron")    // Aaron Amy Bob Drew Ellen
alphaList.insert(4, "Carol")    // Aaron
```

- View Interface Template fo
  Listing 8-1

.htm code listing files must be in the same folder as the .ppt files for these links to work



End

Chapter 8