

CS 225

Data Structures

Jan 23 – Lists and List ADT

G Carl Evans



Exam 0 start tomorrow

Covers prerequisite knowledge details on course website

<https://courses.engr.illinois.edu/cs225/sp2023/exams/exam0/>

Practice on PrairieLearn

Register on PrairieTest



Contacting the Course

cs225admin@lists.cs.illinois.edu



List ADT



What types of “stuff” do we want in our list?

--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--



Templates





List Implementations

1.

2.

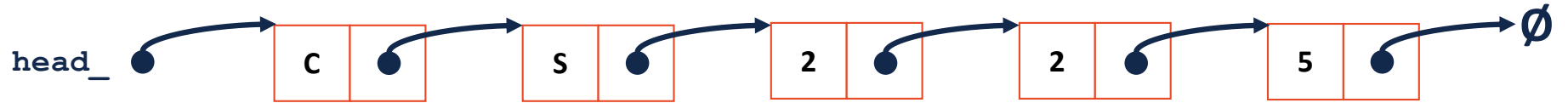
Linked Memory



List.h

```
28 struct ListNode {
29     T data;
30     ListNode * next;
31     ListNode(const T & data) : data(data), next(NULL) { }
32 };
```

Linked Memory



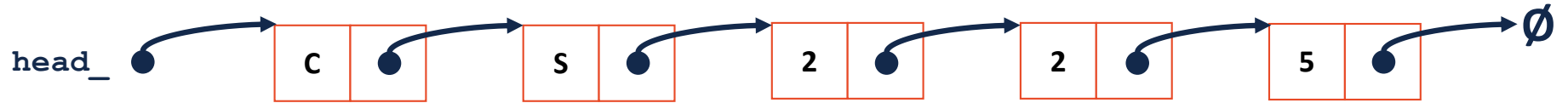
List.h

```
1 #pragma once
2
3
4 class List {
5     public:
6
7
8
9
10
11
12
13
14     private:
15
16
17
18 };
19
20
21
22
```

List.hpp

```
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
```

Linked Memory : `insertAtFront`



List.h

```
1 #pragma once
2
3 template <class T>
4 class List {
5     public:
6     /* ... */
7
8     private:
9     struct ListNode {
10         T data;
11         ListNode * next;
12         ListNode(const T & data) :
13             data(data), next(NULL) { }
14
15     };
16
17 };
18
19
20
21
22
```

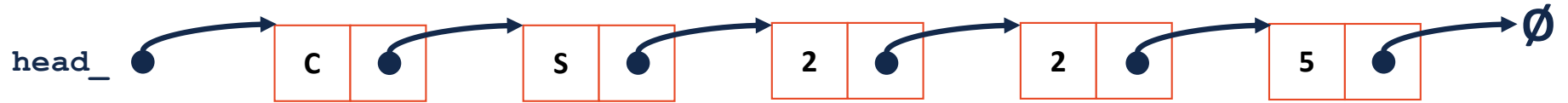
List.hpp

```
1 #include "List.h"
2
3 template <class T>
4 void List<T>::insertAtFront(const T& t) {
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22 }
```



Running Time of Linked List `insertAtFront`

Linked Memory : insertAtNth



List.hpp

```
33 ListNode *& List<T>::_index(int index) {  
34  
35  
36  
37  
38  
39  
40 }
```