

# ECE 220: Computer Systems & Programming

## Lecture 26: Review I Thomas Moon

April 25 , 2024



- +1% for 70% completion of ICES forms (across all sections)
- Extra credit quiz:
  - The extra credit quiz will be available from 5 pm onwards on Thursday, 04/25.
  - The course website will be updated with study materials.
  - They will have until 05/05 (the day before the final) to take the extra credit quiz.
- The final item is the **due date for the last MP**. By popular request, we have extended it to **04/28** at the usual time. Note that this MP will be re-weighted at 1.2 times whatever you score (see note on [MP page](#)).

# Final Exam

- ALL (Lectures, MPs, Quizzes, Labs, Practice questions, etc)
  - 3 hour exam
1. Linked-list
  2. Tree
  3. C++
  4. C to LC3
  5. Concepts

## Get the example codes

- [https://github.com/tmoon-illinois/ece220\\_sp24/tree/main/lec26](https://github.com/tmoon-illinois/ece220_sp24/tree/main/lec26)

# 1. Practice Problem- Update City class

vehicle\_STL\_list.cpp

1. Add a private member, "name", under City class.
2. Write the required new constructors.
3. Add "+" operator for City classes.

Example code and result:

```
int main(){
    City Champaign("Champaign");
    Champaign.AddVehicle(new Airplane(30,100,5));
    Champaign.AddVehicle(new Airplane(10,200,10));

    City Urbana("Urbana");
    Urbana.AddVehicle(new Train(130,300,15));

    City CU = Champaign + Urbana; ←
    CU.ShowList();
}
```

```
→ Champaign Urbana
  <<Airplane>>
  passenger: 30
  baggage: 100
  crew man: 5
  <<Airplane>>
  passenger: 10
  baggage: 200
  crew man: 10
  <<Train>>
  passenger: 130
  baggage: 300
  length: 15
```

## 2. Practice Problem – Linked List

link.c

```
int additem(item *head, int input){
    item *newitem = (item*) malloc(sizeof(item));
    if(newitem == NULL) return 0;
    newitem->data = input;
    newitem->next = head;
    head = newitem;
    return 1;
}

int main(){
    item *head = NULL;
    additem(head, 5);
    additem(head, 10);
    printitem(head);
}
```

Try to insert a node before the head, but does not work.

1. Why?
2. Debug the code.

### 3. Practice Problem – Delete a node by value

link.c

1 → 9 → 3 → 5

1 → 9 → 3 → 5

Delete 3

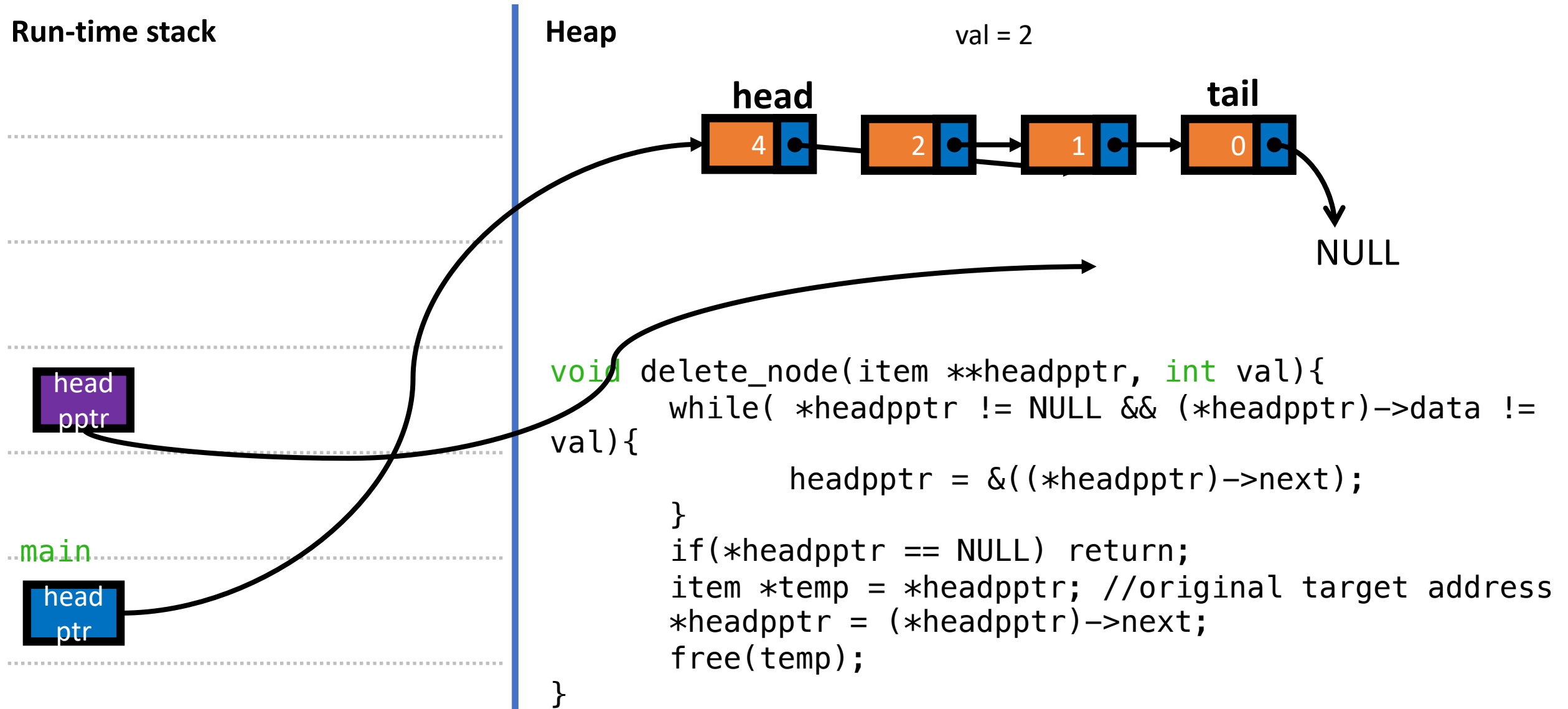
Delete 1

1 → 9 → 5

9 → 3 → 5

### 3. Practice Problem – Delete a node by value

link.c





## 4. Practice Problem – Split by even and odd

[link.c](#)

6 → 12 → 4 → 1 → 5

odd sorted data:

1 → 5

even sorted data:

4 → 6 → 12

```
void split(item *head, item **odd_head, item **even_head){
    item *cur = head;

    item *cur = head;
    while(cur != NULL){
        if(cur->data % 2 == 0 ){
            insert_sorted(even_head, cur->data);
        }
        else{
            insert_sorted(odd_head, cur->data);
        }
        cur = cur->next;
    }
}
```