W12-assignment

- Use pointer to pointer to implement memory allocation
- Use bitwise operation to manage your memory
- Two types of data (big and small)
- For big data, find two continuous spaces for that data
 - If no continuous spaces, response not found

Only one "malloc" is allowed

```
tQueue* createQueue(void){
    tQueue *queue;
    queue=(tQueue *) malloc (sizeof(tQueue));
```

```
ryanpan@Ryan-Mac-mini-M2 2023-w12 % ./run
                                                      Which type you are going to operate?
                                                      1. Add a type 1 (small) item
Which type you are going to operate?
                                                      2. Add a type 2 (big) item
1. Add a type 1 (small) item
                                                      3. Remove a type 1 item with a specific Id
2. Add a type 2 (big) item
                                                       4. Remove a type 2 item with a specific Id
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
                                                         Enter an ID to remove 11
 Enter id:10
                                                             byte_buf_mask: 0 1 1 1 1 1 0 1
     byte buf mask: 0 0 0 0 0 0 0 1
                                                             queue content: 10(1) 12(1) 21(2) 22(2)
     queue content: 10(1)
                                                       Which type you are going to operate?
Which type you are going to operate?
                                                      1. Add a type 1 (small) item
1. Add a type 1 (small) item
2. Add a type 2 (big) item
                                                      2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
                                                      3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
                                                      4. Remove a type 2 item with a specific Id
 Enter id:11
                                                         Enter id:23
     byte_buf_mask: 0 0 0 0 0 0 1 1
                                                           Enqueue False!!!
     queue content: 10(1) 11(1)
                                                           Cannot enter to the queue
Which type you are going to operate?
                                                             byte_buf_mask: 0 1 1 1 1 1 0 1
1. Add a type 1 (small) item
                                                             queue content: 10(1) 12(1) 21(2) 22(2)
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
                                                      Which type you are going to operate?
4. Remove a type 2 item with a specific Id
                                                      1. Add a type 1 (small) item
 Enter id:12
                                                      2. Add a type 2 (big) item
     byte buf mask: 0 0 0 0 0 1 1 1
                                                      3. Remove a type 1 item with a specific Id
     queue content: 10(1) 11(1) 12(1)
                                                       4. Remove a type 2 item with a specific Id
Which type you are going to operate?
1. Add a type 1 (small) item
                                                         Enter an ID to remove 12
                                                             byte buf mask: 0 1 1 1 1 0 0 1
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
                                                             queue content: 10(1) 21(2) 22(2)
4. Remove a type 2 item with a specific Id
                                                      Which type you are going to operate?
 Enter id:21
                                                      1. Add a type 1 (small) item
     byte_buf_mask: 0 0 0 1 1 1 1 1
                                                      2. Add a type 2 (big) item
     queue content: 10(1) 11(1) 12(1) 21(2)
                                                      3. Remove a type 1 item with a specific Id
Which type you are going to operate?
                                                       4. Remove a type 2 item with a specific Id
1. Add a type 1 (small) item
2. Add a type 2 (big) item
                                                         Enter id:23
3. Remove a type 1 item with a specific Id
                                                             byte buf mask: 0 1 1 1 1 1 1 1
4. Remove a type 2 item with a specific Id
                                                             queue content: 10(1) 21(2) 22(2) 23(2)
 Enter id:22
     byte_buf_mask: 0 1 1 1 1 1 1 1
                                                      Which type you are going to operate?
     queue content: 10(1) 11(1) 12(1) 21(2) 22(2)
                                                      1. Add a type 1 (small) item
                                                      2. Add a type 2 (big) item
Which type you are going to operate?
                                                      3. Remove a type 1 item with a specific Id
1. Add a type 1 (small) item
                                                       4. Remove a type 2 item with a specific Id
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
                                                         Enter an ID to remove 4
                                                           Cannot find the target node
 Enter id:23
                                                             byte buf mask: 0 1 1 1 1 1 1 1
   Enqueue False!!!
                                                             queue content: 10(1) 21(2) 22(2) 23(2)
   Cannot enter to the queue
     byte_buf_mask: 0 1 1 1 1 1 1 1
                                                      Which type you are going to operate?
     queue content: 10(1) 11(1) 12(1) 21(2) 22(2)

    Add a type 1 (small) item

                                                      2. Add a type 2 (big) item
                                                      3. Remove a type 1 item with a specific Id
                                                      4. Remove a type 2 item with a specific Id
                                                           No such operation
```

queue content: 10(1) 21(2) 22(2) 23(2)

```
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 21
      byte buf mask: 0 1 1 0 0 1 1 1
      queue content: 10(1) 22(2) 23(2)
Which type you are going to operate?

    Add a type 1 (small) item

2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 23
      byte buf mask: 0 1 1 0 0 0 0 1
      queue content: 10(1) 22(2)
Which type you are going to operate?

    Add a type 1 (small) item

2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:11
      byte buf mask: 0 1 1 0 0 0 1 1
      queue content: 10(1) 22(2) 11(1)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:23
      byte buf mask: 0 1 1 0 1 1 1 1
      queue content: 10(1) 22(2) 11(1) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:24
    Enqueue False!!!
    Cannot enter to the queue
     byte buf mask: 0 1 1 0 1 1 1 1
      queue content: 10(1) 22(2) 11(1) 23(2)
```

```
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 11
      byte buf mask: 0 1 1 0 1 1 0 1
      queue content: 10(1) 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:24
    Enqueue False!!!
    Cannot enter to the queue
      byte_buf_mask: 0 1 1 0 1 1 0 1
      queue content: 10(1) 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 10
      byte buf mask: 0 1 1 0 1 1 0 0
      queue content: 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
 Enter id:24
      byte buf mask: 0 1 1 0 1 1 1 1
      queue content: 22(2) 23(2) 24(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
 Enter id:10
      byte_buf_mask: 0 1 1 1 1 1 1 1
      queue content: 22(2) 23(2) 24(2) 10(1)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:11
      byte_buf_mask: 1 1 1 1 1 1 1 1
     queue content: 22(2) 23(2) 24(2) 10(1) 11(1)
```

Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific Id 4. Remove a type 2 item with a specific Id 1. Esten id:22	Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific I 4. Remove a type 2 item with a specific I 4
Enter id:12 Enqueue False!!! Cannot enter to the queue byte_buf_mask: 1 1 1 1 1 1 1 queue content: 22(2) 23(2) 24(2) 10(1) 11(1)	Enter an ID to remove 23 byte_buf_mask: 1 0 0 1 0 0 1 1 queue content: 24(2) 10(1) 11(1)
Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific Id 4. Remove a type 2 item with a specific Id	Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific I 4. Remove a type 2 item with a specific I 4
Enter id:22 Enqueue False!!! Cannot enter to the queue byte_buf_mask: 1 1 1 1 1 1 1 queue content: 22(2) 23(2) 24(2) 10(1) 11(1)	Enter an ID to remove 24 byte_buf_mask: 1 0 0 1 0 0 0 0 queue content: 10(1) 11(1)
Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific Id 4. Remove a type 2 item with a specific Id 3	Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific I 4. Remove a type 2 item with a specific I 3
Enter an ID to remove 19 Cannot find the target node byte_buf_mask: 1 1 1 1 1 1 1 queue content: 22(2) 23(2) 24(2) 10(1) 11(1)	Enter an ID to remove 10 byte_buf_mask: 1 0 0 0 0 0 0 0 queue content: 11(1)
Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific Id 4. Remove a type 2 item with a specific Id 2	Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific I 4. Remove a type 2 item with a specific I
Enter id:22 Enqueue False!!! Cannot enter to the queue byte_buf_mask: 1 1 1 1 1 1 1 queue content: 22(2) 23(2) 24(2) 10(1) 11(1)	3 Enter an ID to remove 11 byte_buf_mask: 0 0 0 0 0 0 0 0 queue content:
Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific Id 4. Remove a type 2 item with a specific Id 4	Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific I 4. Remove a type 2 item with a specific I 1
Enter an ID to remove 22 byte_buf_mask: 1 0 0 1 1 1 1 1 queue content: 23(2) 24(2) 10(1) 11(1)	Enter id:19 byte_buf_mask: 0 0 0 0 0 0 1 queue content: 19(1)
	Which type you are going to operate? 1. Add a type 1 (small) item 2. Add a type 2 (big) item 3. Remove a type 1 item with a specific I 4. Remove a type 2 item with a specific I 2
	Enter id:21 byte_buf_mask: 0 0 0 0 0 1 1 1

queue content: 19(1) 21(2)

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Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:22
     byte buf mask: 0 0 0 1 1 1 1 1
     queue content: 19(1) 21(2) 22(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:23
     byte_buf_mask: 0 1 1 1 1 1 1 1
     queue content: 19(1) 21(2) 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter id:24
    Enqueue False!!!
    Cannot enter to the queue
     byte buf mask: 0 1 1 1 1 1 1 1
     queue content: 19(1) 21(2) 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 19
     byte_buf_mask: 0 1 1 1 1 1 1 0
     queue content: 21(2) 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 21
     byte_buf_mask: 0 1 1 1 1 0 0 0
     queue content: 22(2) 23(2)
Which type you are going to operate?
1. Add a type 1 (small) item
2. Add a type 2 (big) item
3. Remove a type 1 item with a specific Id
4. Remove a type 2 item with a specific Id
  Enter an ID to remove 22
     byte_buf_mask: 0 1 1 0 0 0 0 0
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queue content: 23(2)

```
Which type you are going to operate?

1. Add a type 1 (small) item

2. Add a type 2 (big) item

3. Remove a type 1 item with a specific Id

4. Remove a type 2 item with a specific Id

4

Enter an ID to remove 23

byte_buf_mask: 0 0 0 0 0 0 0 0

queue content:

Which type you are going to operate?

1. Add a type 1 (small) item

2. Add a type 2 (big) item

3. Remove a type 1 item with a specific Id

4. Remove a type 2 item with a specific Id
```