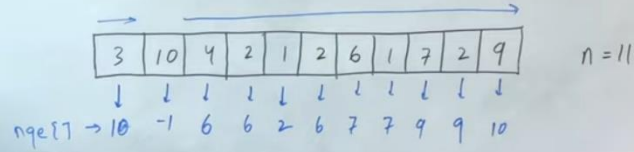
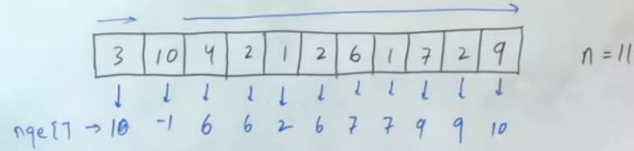


## Next Greater Element

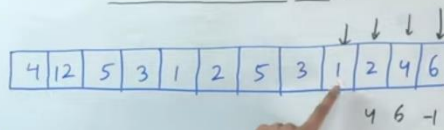


## Next Greater Element



for  $(i = 0 \rightarrow n-1)$       10 7 5 3 1  
 for  $(j = i+1 \rightarrow n-1)$       -1 -1 -1 -1 -1  
 $O(N^2)$       if  $(a[j] > a[i])$   
                   nge[i] = a[j];  
                   break;

## Next Greater Element



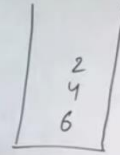
Stack (LIFO):

2
4
6

Sf. → LIFO.

### Next Greater Element

4	12	5	3	1	2	5	3	1	2	4	6
								↓	↓	↓	↓
								2	4	6	-1

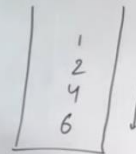


Sf. → LIFO.

TUF

### Next Greater Element

4	12	5	3	1	2	5	3	1	2	4	6
								↓	↓	↓	↓
								2	4	6	-1

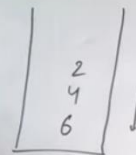


Sf. → LIFO.

TUF

### Next Greater Element

4	12	5	3	1	2	5	3	1	2	4	6
								↓	↓	↓	↓
								2	4	6	-1

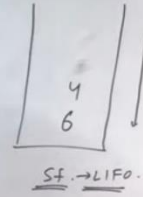


Sf. → LIFO.

TUF

### Next Greater Element

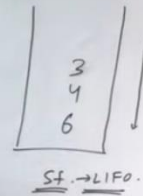
2	5	3	1	2	5	3	1	2	4	6
						2	4	6	-1	



TUF

### Next Greater Element

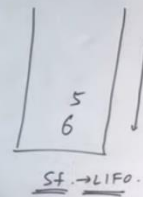
4	12	5	3	1	2	5	3	1	2	4	6
						4	2	4	6	-1	



TUF

### Next Greater Element

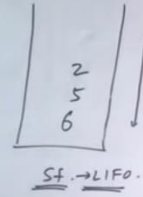
4	12	5	3	1	2	5	3	1	2	4	6
						6	4	2	4	6	-1



TUF

### Next Greater Element

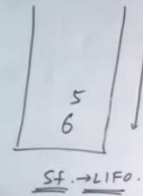
4	12	5	3	1	2	5	3	1	2	4	6
					5	6	4	2	4	6	-1



TUF

### Next Greater Element

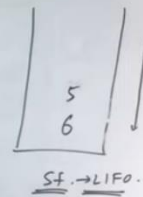
4	12	5	3	1	2	5	3	1	2	4	6
					5	2	5	6	4	2	4
											6
											-1



TUF

### Next Greater Element

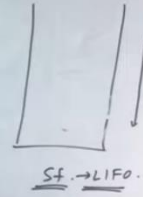
4	12	5	3	1	2	5	3	1	2	4	6
					6	5	2	5	6	4	2
											4
											6
											-1



TUF

### Next Greater Element

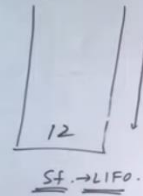
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
4	12	5	3	1	2	5	3	1	2	4	6
-1	6	5	2	5	6	4	2	4	6	-1	



TUF

### Next Greater Element

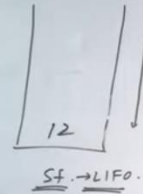
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
4	12	5	3	1	2	5	3	1	2	4	6
-1	6	5	2	5	6	4	2	4	6	-1	



TUF

### Next Greater Element

↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
4	12	5	3	1	2	5	3	1	2	4	6
12	-1	6	5	2	5	6	4	2	4	6	-1



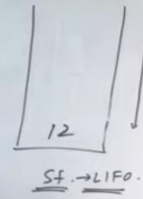
TUF

### Next Greater Element

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓  

4	12	5	3	1	2	5	3	1	2	4	6
---	----	---	---	---	---	---	---	---	---	---	---

  
 nge[] → 12 -1 6 5 2 5 6 4 2 4 6 -1



TUF

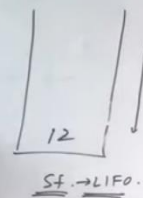
### Next Greater Element

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓  

4	12	5	3	1	2	5	3	1	2	4	6
---	----	---	---	---	---	---	---	---	---	---	---

  
 2 -1 6 5 2 5 6 4 2 4 6 -1

→  
n.    2n     $\propto$      $n/2$



TUF

### Next Greater Element

2	10	12	1	11
---	----	----	---	----

TUF



## Next Greater Element

2	10	12	1	11
---	----	----	---	----

 2 10 12 1 11

TUF

## Next Greater Element

2	10	12	1	11
---	----	----	---	----

 2 10 12 1 11  
↓ ↓ ↓ ↓ ↓  

10	12	-1	11	12
----	----	----	----	----

TUF

## Next Greater Element

$n=5$

$i \rightarrow$  0 1 2 3 4 5 6 7 8 9

2	10	12	1	11
---	----	----	---	----

 2 10 12 1 11  
↓ ↓ ↓ ↓ ↓  

10	12	-1	11	12
----	----	----	----	----

$(i \% n)$

TUF

Next Greater Element

$n=5$

$i \rightarrow$  0 1 2 3 4 5 6 7 8 9  $(2n-1)$

2	10	12	1	11	2	10	12	1	11
---	----	----	---	----	---	----	----	---	----

↓ ↓ ↓ ↓ ↓

10	12	-1	11	12
----	----	----	----	----

$(i \cdot n)$

$5 \cdot 5 = 0^{\text{th}} \text{ index}$   
 $6 \cdot 5 = 1^{\text{st}} \text{ index}$   
 $7 \cdot 5 = 2^{\text{nd}} \text{ index}$

TUF

$(0 \rightarrow n-1)$

int nge[n], stack<int> st

for (i=0; i<=2n-1; i++) {

while (!st.empty() && st.top() <= a[i])  
st.pop();

if (i < n)  
if (st.empty() == false)  
nge[i] = st.top();  
else  
nge[i] = -1;

st.push(a[i]);

TUF



$(0 \rightarrow n-1)$

```

int nge[n], stack<int> st
for (i=0; i <  $\frac{2n-1}{2}$ ; i++) {
    while (!st.empty() && st.top() <= a[i])
        st.pop();
    if (i < n)
        if (st.empty() == false)
            nge[i] = st.top();
        else
            nge[i] = -1;
    st.push(a[i]);
}

```

$T.C \rightarrow O(2n + \frac{2n}{\log n})$

$i: n$

$1+2+0+3$

TUF

$(0 \rightarrow n-1)$

```

int nge[n], stack<int> st
for (i=0; i <  $\frac{n-1}{2}$ ; i++) {
    while (!st.empty() && st.top() <= a[i])
        st.pop();
    if (i < n)
        if (st.empty() == false)
            nge[i] = st.top();
        else
            nge[i] = -1;
    st.push(a[i]);
}

```

$T.C \rightarrow O(2n + \frac{2n}{\log n})$   
 $\approx O(n)$   
 $S.C \rightarrow O(n)$

$i: n$

$1+2+0+3$

$\frac{n-1}{2}$

$(cnt++)$   $cnt--$

$st.pop()$

$st.push(a[i]) \rightarrow i: n$

@STRIVE

TUF