



# **CELEBRITY PROBLEM & ITS TIME COMPLEXITY**

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Batch - 34

Course – Design Analysis Algorithm

Git hub repository link:

[https://github.com/AmanMaggon/DAALAB\\_-AmanMaggon-\\_590015673](https://github.com/AmanMaggon/DAALAB_-AmanMaggon-_590015673)

## 1. Celebrity Problem

The **celebrity problem** is about finding a person in a group who is known by everyone but does not know anyone else.

Implemented using **Stack elimination method**.

Time Complexity For Celebrity Problem:

- **Stack elimination phase:** Each comparison eliminates one person  $\rightarrow O(n)$ .
  - **Verification phase:** Check all  $n$  people  $\rightarrow O(n)$ .
  - **Total:**  $O(n)$ .
  - **Space Complexity:**  $O(n)$  because of stack (vs  $O(1)$  in elimination method).
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## 2. C Source Code

### INPUT-

```
#include <stdio.h>
```

```
#define N 3
```

```
int Matrix[N][N] = {
```

```
    {0, 1, 1},
```

```
    {0, 0, 1},
```

```
    {0, 0, 0}
```

```
};
```

```
int knows(int x, int y)
```

```
{
```

```
    return Matrix[x][y];
```

```
}
```

```
int celebrityFinder(int
```

```
n)
```

```
{
```

```
    int candidates[N],
```

```
    top = -1;
```

```
    for (int i = 0; i < n;
i++)
    {
        candidates[++top
p] = i;
    }
```

```
    while (top > 0)
    {
        int p1 =
candidates[top--];
        int p2 =
candidates[top--];
```

```
        if (knows(p1,
p2))
        {
            candidates[++
top] = p2;
        }
        else
        {
            candidates[++
top] = p1;
        }
    }
```

```
    if (top == -1)
    {
        return -1;
    }
```

```
        int cand =
candidates[top];
```

```
    for (int j = 0; j < n;
j++)
    {
        if (j != cand)
        {
            if (knows(cand,
j) || !knows(j, cand))
            {
                return -1;
            }
        }
    }
```

```
    return cand;
}
```

```
int main()
{
    int result =
celebrityFinder(N);

    if (result == -1)
    {
        printf("No
Celebrity\n");
    }
    else
    {
        printf("Celebrity
```

```
Found: %d\n", result);
```

```
}
```

```
return 0;
```

```
}
```

## OUTPUT-

```
PS D:\OneDrive\Desktop\DAALAB_-AmanMaggon-_590015673\Lab 3> cd "d:\OneDrive\Desktop\DAALAB_-AmanMaggon-_590015673\Lab 3\" ; if ($?) { gcc celebrityprob.c -o celebrityprob } ; if ($?) { .\celebrityprob }  
Celebrity Found: 2
```

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