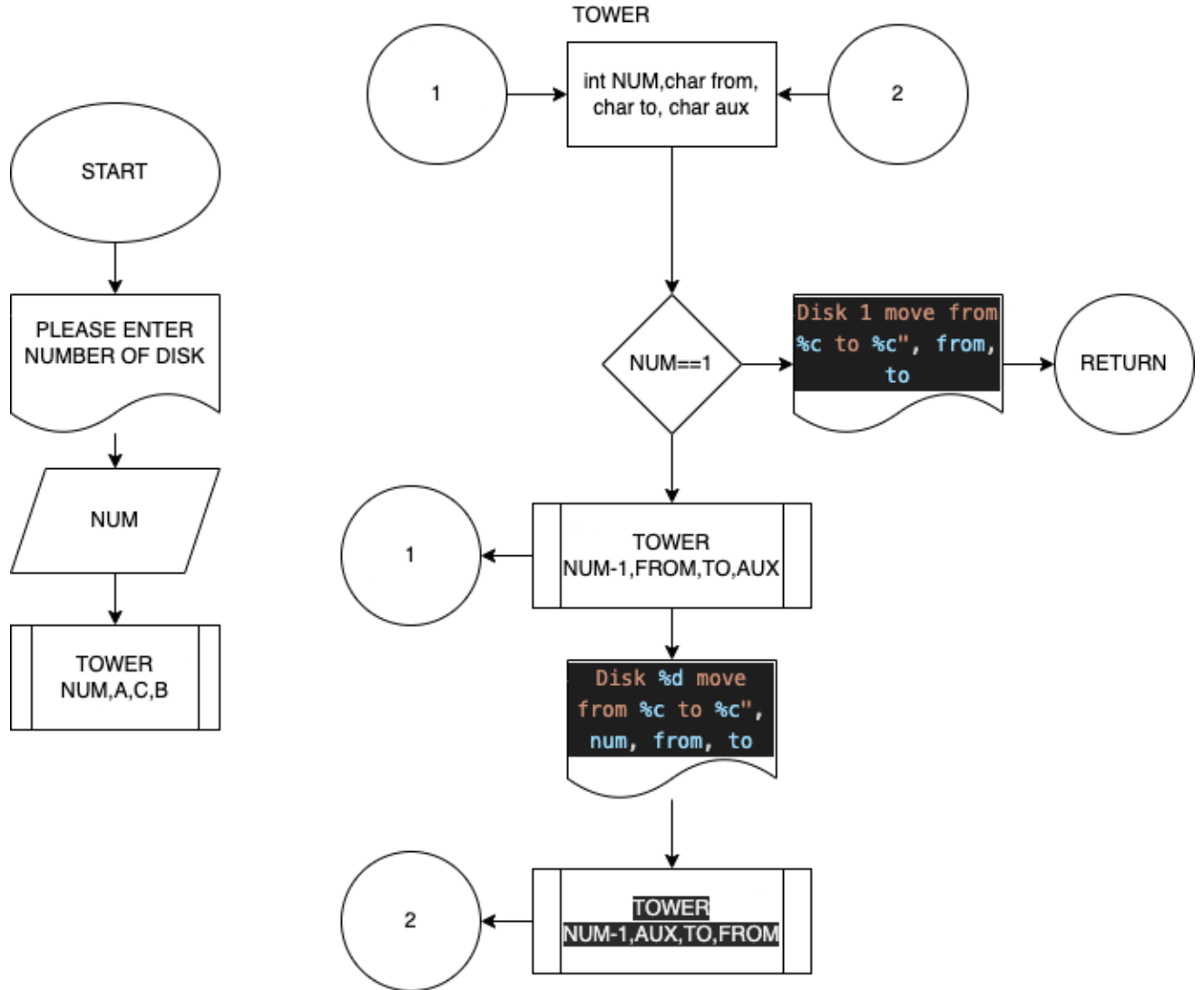


Hanoi Kulesi Dokümantasyonu

1) Amaç

Hanoi kulesi oyununu en az hamle sayısı ile çözüme ulaştırma.

2) Algoritma



Kullanıcıdan alınan disk sayısı işleme sokulur.Örnekle açıklanması gerekirse 3 diski A'dan C'ye taşıdığımızı düşünelim.Tower yapısını kurmakla başlayalım:

TOWER(NUM,FROM,TO,AUX) -> 3 ile işlem yapılacaksa ilk olarak 3 diski A'dan C'ye taşıyacağımızı belirtiriz;

TOWER(3,A,C,B) -> Daha sonra 3'ün üzerini boşaltmak için;

TOWER(2,A,B,C) -> Daha sonra 2'nin üzerindeki diski boşaltmak için tekrar TOWER fonksiyonunu çağdırmamız gerekir;

TOWER(1,A,C,B) -> Ve daha sonra B'de bulunan iki diski C'ye taşımak için TOWER fonksiyonunu çağırırız;

TOWER(2,B,C,A)

3) Kullanılan Fonksiyon

```
void towers(int num, char from, char to, char aux)
{
    if (num == 1)
    {
        printf("\nDisk 1 move from %c to %c", from, to);
        return;
    }

    towers(num - 1, from, aux, to);
    printf("\nDisk %d move from %c to %c", num, from, to);
    towers(num - 1, aux, to, from);
}
```

4) Performans Testi

Test Edilen Bilgisayar -> Macbook Air 2022 (M2,8GB RAM)

(1-5)

```
Starting Point: 880
Ending Point: 905
Elapsed Time for 1 disk (sec): 0.000025
```

```
-----
| System          |
| Macbook Air 2022 |
| CPU: M2         |
| RAM: 8GB        |
|-----|
```

```
Starting Point: 947
Ending Point: 980
Elapsed Time for 2 disk (sec): 0.000033
```

```
-----
| System          |
| Macbook Air 2022 |
| CPU: M2         |
| RAM: 8GB        |
|-----|
```

```
Starting Point: 975
Ending Point: 1027
Elapsed Time for 3 disk (sec): 0.000052
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 1025
Ending Point: 1099
Elapsed Time for 4 disk (sec): 0.000074
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 968
Ending Point: 1095
Elapsed Time for 5 disk (sec): 0.000127
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

(10-15)

```
Starting Point: 1090
Ending Point: 3691
Elapsed Time for 10 disk (sec): 0.002601
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

Disk 1 move from A to C

```
Starting Point: 1030
Ending Point: 5478
Elapsed Time for 11 disk (sec): 0.004448
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 989
Ending Point: 7931
Elapsed Time for 12 disk (sec): 0.006942
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 969
Ending Point: 12358
Elapsed Time for 13 disk (sec): 0.011389
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 963
Ending Point: 20982
Elapsed Time for 14 disk (sec): 0.020019
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 1044
Ending Point: 30986
Elapsed Time for 15 disk (sec): 0.029942
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

(20-25)

```
Starting Point: 887
Ending Point: 713593
Elapsed Time for 20 disk (sec): 0.712706
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 918
Ending Point: 1415315
Elapsed Time for 21 disk (sec): 1.414397
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 789
Ending Point: 2790264
Elapsed Time for 22 disk (sec): 2.789475
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 852
Ending Point: 5665037
Elapsed Time for 23 disk (sec): 5.664185
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 890
Ending Point: 11117833
Elapsed Time for 24 disk (sec): 11.116943
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

```
Starting Point: 864
Ending Point: 22392166
Elapsed Time for 25 disk (sec): 22.391302
```

```
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
|-----
```

30 DİSK İÇİN -> ANLIK 35 GB RAM KULLANIMI OLMUŞTUR (SWAP DAHİL)

```
Starting Point: 809
Ending Point: 741178119
Elapsed Time (sec): 741.177310
```

5) Kayıt Edilenler

1. Uygulama farklı IDE'lerde farklı sonuçlar vermektedir.

```
Starting Point: 16071
Ending Point: 828967
Elapsed Time for 20 disk (sec): 0.812896
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
-----
Program ended with exit code: 0
```

XCode -> Yaklaşık 0.81 saniye

```
Starting Point: 776
Ending Point: 707422
Elapsed Time for 20 disk (sec): 0.706646
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
-----
```

Visual Studio Code -> Yaklaşık 0.70 saniye

2. Foksiyonu int main üzerinde yazmak performansı arttırmaktadır.

```
Starting Point: 776
Ending Point: 707422
Elapsed Time for 20 disk (sec): 0.706646
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
-----
```

Fonksiyon int main üzerindeyken

```
Starting Point: 870
Ending Point: 724419
Elapsed Time for 20 disk (sec): 0.723549
-----
| System
| Macbook Air 2022
| CPU: M2
| RAM: 8GB
|
-----
```

Fonksiyon int main altındayken (prototip tanımlanmış)

6) Kaynakça

- <https://blog.sdkakcy.com/wp-content/uploads/2018/03/gecensure.c> -> süre hesaplamak için referans alınmıştır.

HAZIRLAYAN

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