

# Tower of Hanoi Runtime

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## Goal

Determine the runtime for a recursive function which calculates the moves for “Tower of Hanoi” with 26 plates.

## Runtime Visualization

```
library(ggplot2)

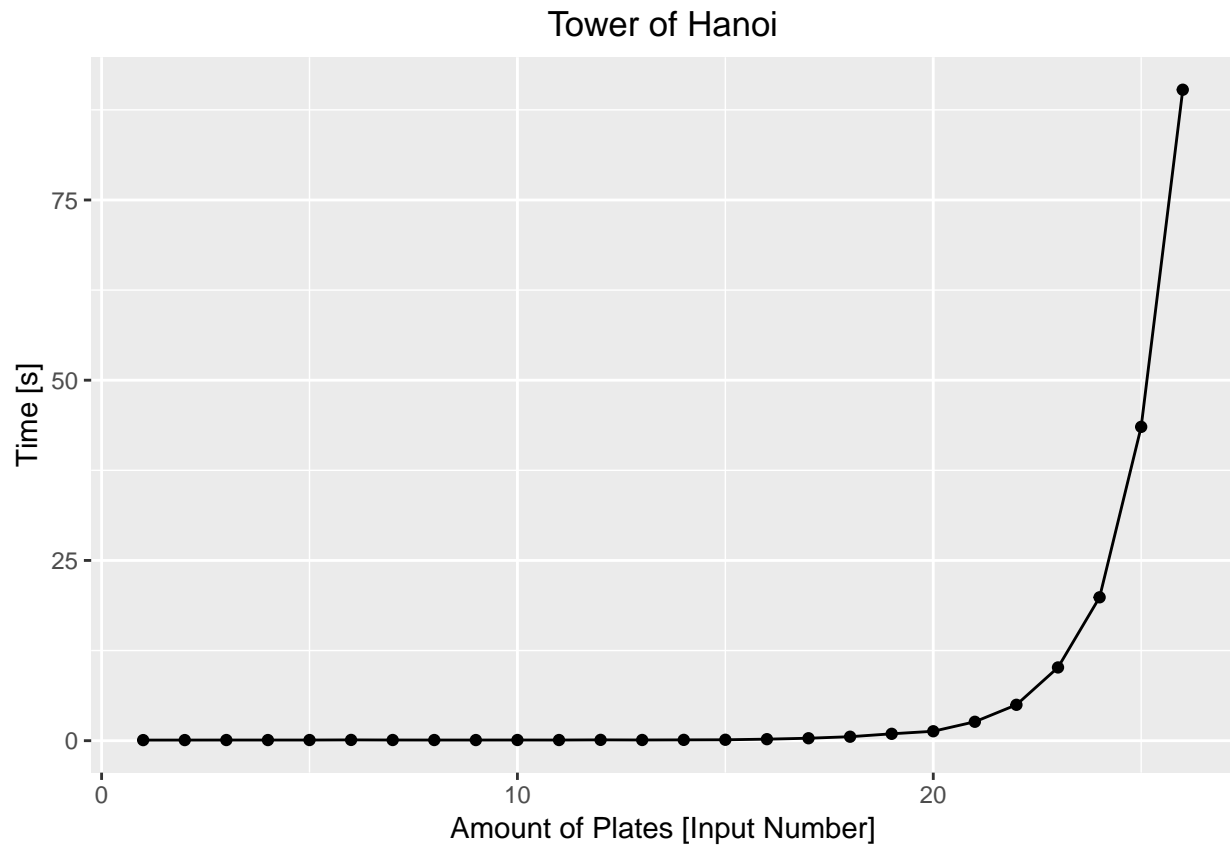
plates <- c(seq(1,26,1))
time <- c(0.078, 0.083, 0.088, 0.086, 0.089, 0.104, 0.091, 0.088, 0.087, 0.092, 0.089, 0.110, 0.095, 0.125, 0.208, 0.338, 0.549, 0.952, 1.306, 2.621, 4.975, 10.158, 19.886, 43.529, 90.291)

df <- data.frame(plates,time)
df
```

##	plates	time
## 1	1	0.078
## 2	2	0.083
## 3	3	0.088
## 4	4	0.086
## 5	5	0.089
## 6	6	0.104
## 7	7	0.091
## 8	8	0.088
## 9	9	0.087
## 10	10	0.092
## 11	11	0.089
## 12	12	0.110
## 13	13	0.095
## 14	14	0.110
## 15	15	0.125
## 16	16	0.208
## 17	17	0.338
## 18	18	0.549
## 19	19	0.952
## 20	20	1.306
## 21	21	2.621
## 22	22	4.975
## 23	23	10.158
## 24	24	19.886
## 25	25	43.529
## 26	26	90.291

```
ggplot(df, aes(x=df$plates, y=df$time))+geom_line()+
  geom_point()+ggtitle("Tower of Hanoi")+
  xlab("Amount of Plates [Input Number]")+
  ylab("Runtime [seconds]")
```

```
ylab("Time [s]") +  
theme(plot.title = element_text(hjust = 0.5))
```



As expected, the function shows an exponential increase in time.

## CLI commands

The following CLI commands were used

```
for (( i=0; i<=26; i++ )) { echo "for $i plates:" time python3 toh.py -n $i >plate_moves.txt }
```