CSC236 Fall 2016

Office Hour 05

In the office hour this week, we mostly reviewed Example 61. In particular, we discussed different variants of the recurrence relation of the $binSearch$,

$$T(n) = \begin{cases} c_1 & n = 1 \\ c_2 + either\ T(m-b+1)\ or\ T(e-m) & n > 1 \end{cases}$$

$$T(n) \cong \begin{cases} c_1 & n = 1 \\ c_2 + T\left(\frac{n}{2}\right) & n > 1 \end{cases}$$

$$T(n) = \begin{cases} c_1 & n = 1 \\ c_2 + either\ T\left(\left\lceil\frac{n}{2}\right\rceil\right)\ or\ T\left(\left\lfloor\frac{n}{2}\right\rfloor\right) & n > 1 \end{cases}$$

$$T(n) = \begin{cases} c_1 & n = 1 \\ c_2 +\ T\left(\left\lceil\frac{n}{2}\right\rceil\right) & n > 1 \end{cases}$$ worst case

$$T(n) = \begin{cases} 1 & n = 1 \\ 1 + either\ T\left(\left\lceil\frac{n}{2}\right\rceil\right)\ or\ T\left(\left\lfloor\frac{n}{2}\right\rfloor\right) & n > 1 \end{cases}$$

$$T(n) = \begin{cases} 1 & n = 1 \\ 1 +\ T\left(\left\lceil\frac{n}{2}\right\rceil\right) & n > 1 \end{cases}$$ worst case

We also saw both intuitively and mathematically why $m - b + 1 = \left\lceil\frac{n}{2}\right\rceil$

Since $m = \left\lfloor\frac{e+b}{2}\right\rfloor$

$$m - b + 1 = \left\lfloor\frac{e+b}{2}\right\rfloor - b + 1$$

$$= \left\lfloor\frac{e+b}{2} - b + 1\right\rfloor = \left\lfloor\frac{e-b+1}{2} + \frac{1}{2}\right\rfloor = \left\lfloor\frac{n}{2} + \frac{1}{2}\right\rfloor = \left\lceil\frac{n}{2}\right\rceil$$

We left as a practice for you to show $e - m = \left\lfloor\frac{n}{2}\right\rfloor$