

COMP1001 – Problem solving in IT

Due Date: 5:00pm, Friday, 23

September 2016 Assignment 1 (30
marks)

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2. (Tower of Hanoi) One of the algorithms to solve the Tower of Hanoi requires $2^n - 1$ number of moves, where $n > 1$ is the number of disks. Assuming that each move takes one nanosecond, what is the smallest n that will require at least one year to move the n disks from one pole to the other? Please show the evidence for your answer

Solution:

(I treated 1 year as 365 days, as the 1-day difference would be negligible)

1 year = $1 * 365 * 24 * 60 * 60 * 1,000,000,000$ nanosecond = 31,536,000,000,000 nanosecond

Let: $2^n - 1 > 31,536,000,000,000$

Then: $2^n > 31,536,000,000,000,001$

Then: $n > \log_2 31,536,000,000,000,001 \approx 54.8$

Then, the smallest n is 55.