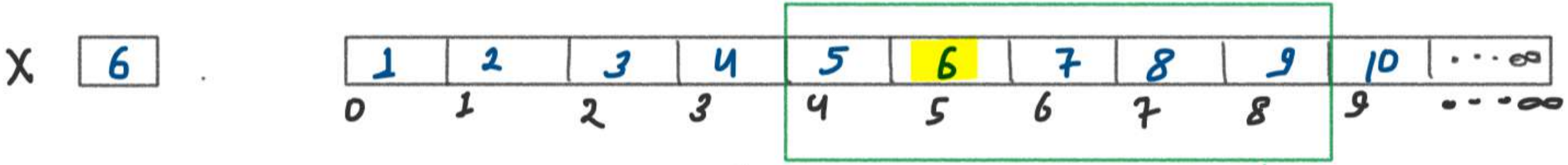
HW 04: Unbounded Binary Search (Concept)

Unbounded Binary Search involves two steps:
Step 01: *Find range where element is present using exponential search*
Step 02: *Do Binary Search in above found range*

Unbounded Binary Search applications:
Search in ∞ infinite array (Sorted Array)

Time complexity: *O(Log n)*
Space complexity: *O(Log n)*



STEP:01

```
i=0 , j=1 ;

while (arr[i] < X) {
        i=j ;
        j = j*2 ;
}

start=i and end=j

return BS(arr, start, end, X);
```

→ step:02

```cpp
// HW 04: Unbounded Binary Search (Concept)

// Step 01: Find range where element is present using exponential search
int unboundedBinarySearch(vector<int>& arr,int x){
    int i = 0;
    int j = 1;

    if(arr[0]==x){
        return 0;
    }
    int j = 1;
    while( arr[j]<x){
        i = j;
        j = j*2; // i = i<<1 or i*=2
    }

    // Step 02: Do Binary Search in above found range
    return binarySearch(arr, i, j, x);
}
/*
Time complexity: O(Log n)
Space complexity: O(Log n)
*/
```