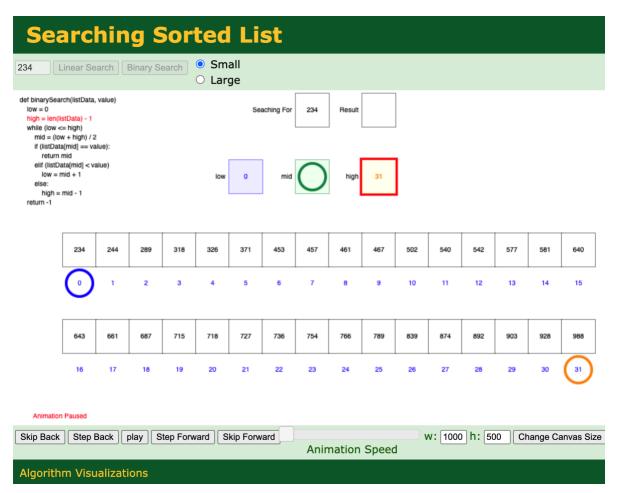**Binary Search - Searching Sorted List**

This USFCA website shows two types of visualizations, the one we're focusing on is for Binary Search. The site shows us a step-by-step visualization of how the binarySearch algorithm is working, when passed a default listData value, the website provides an ordered list (Small or Large) with a set number of values (Small-32, Large-?) and lets the user choose a value (either one that exists in listData or not).

- When you select the smallest value (in this instance, 234 is at the index 0) the process is set "low" to zero, set "high" to 31.
- Because "low" is less than "high", it sets "mid" to 15, it checks if the value at "mid" is the same as the param value 234 and it is not. The chosen value 234 is less than the value 640 at index 15, so it sets the "high" to 15-1, or 14.
- We go through the same process, but with a new "high" value of 14, "mid" set to 7 and value 457. This value is still larger than our selected value, so we set the new "high" to 6 now and "mid" becomes 3.
- Same process ensues, we check to see if the value at index 3 is equal to 234, but it is larger at 318, so we set a new "high" as 2 and "mid" as 1, value 244.
- We do one last check, and the "mid" value is still not the same as our selected value. We set the new "high" to index 0, but because "low" is also 0, "mid" is also 0, in this instance the value at index 0 matches our selected value of 234 and so we return the "mid" value as output and exit the function.

Searching Sorted List

234 | Linear Search | Binary Search | ● Small
○ Large

```
def binarySearch(listData, value)
    low = 0
    high = len(listData) - 1
    while (low <= high)
        mid = (low + high) / 2
        if (listData[mid] == value):
            return mid
        elif (listData[mid] < value)
            low = mid + 1
        else:
            high = mid - 1
    return -1
```

Searching For 234   Result

low 0   mid ◯   high 31

234	244	289	318	326	371	453	457	461	467	502	540	542	577	581	640
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

643	661	687	715	718	727	736	754	766	789	839	874	892	903	928	988
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Animation Paused

Skip Back | Step Back | play | Step Forward | Skip Forward | w: 1000 h: 500 | Change Canvas Size
Animation Speed

Algorithm Visualizations

Resources

Binary and Linear Search Visualization. (n.d.).
https://www.cs.usfca.edu/~galles/visualization/Search.html