Using the Binary Search Algorithm and trace table examples at the end of this document, complete the trace tables below for the Color Array. Upload this document to github and submit the link to your repository to the dropbox.

1st search: violet

| First | Last | Middle | Comparison |
|---|---|---|---|
| 0 | 10 | 5 | Violet > indigo |
| 6 | 10 | 8 | Violet > red |
| 9 | 10 | 9 | Violet = violet |
| | | | |
| | | | |

2nd search: green

| First | Last | Middle | Comparison |
|---|---|---|---|
| 0 | 10 | 5 | Green < indigo |
| 0 | 4 | 2 | Green > chartreuse |
| 3 | 4 | 3 | Green> dark brown |
| 4 | 4 | 4 | Green = green |
| | | | |

3rd search: yellow

| First | Last | Middle | Comparison |
|---|---|---|---|
| 0 | 10 | 5 | Yellow > indigo |
| 6 | 10 | 8 | Yellow > red |
| 9 | 10 | 9 | Yellow > violet |
| 10 | 10 | 10 | Yellow = yellow |
| | | | |

**Color array**:

| | |
|---|---|
| aqua | [0] |
| brown | [1] |
| chartreuse | [2] |
| dark brown | [3] |
| green | [4] |
| indigo | [5] |
| lavender | [6] |
| magenta | [7] |
| red | [8] |
| violet | [9] |
| yellow | [10] |

# Binary Search

```
Set first to 0
Set last to length-1
Set found to FALSE
WHILE (first <= last AND NOT found)
    Set middle to (first + last)/ 2
    IF (item equals data[middle]))
        Set found to TRUE
    ELSE
        IF (item < data[middle])
            Set last to middle – 1
    ELSE
        Set first to middle + 1
RETURN found
```

Above: Binary Search Algorithm

# Binary Search

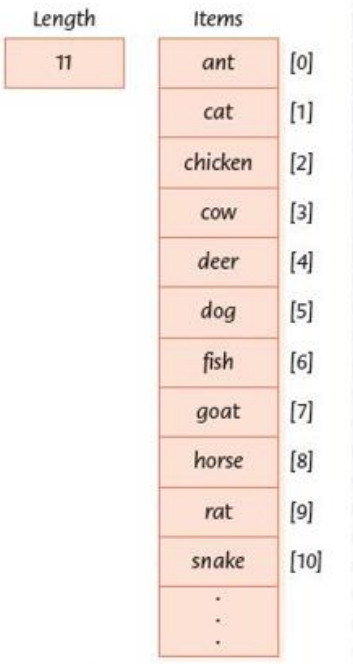


FIGURE 7.9 Binary search example

Searching for *cat*

| First | Last | Middle | Comparison | |
|---|---|---|---|---|
| 0 | 10 | 5 | *cat* < *dog* | |
| 0 | 4 | 2 | *cat* < *chicken* | |
| 0 | 1 | 0 | *cat* > *ant* | |
| 1 | 1 | 1 | *cat* = *cat* | Return: true |

Searching for *fish*

| First | Last | Middle | Comparison | |
|---|---|---|---|---|
| 0 | 10 | 5 | *fish* > *dog* | |
| 6 | 10 | 8 | *fish* < *horse* | |
| 6 | 7 | 6 | *fish* = *fish* | Return: true |

Searching for *zebra*

| First | Last | Middle | Comparison | |
|---|---|---|---|---|
| 0 | 10 | 5 | *zebra* > *dog* | |
| 6 | 10 | 8 | *zebra* > *horse* | |
| 9 | 10 | 9 | *zebra* > *rat* | |
| 10 | 10 | 10 | *zebra* > *snake* | |
| 11 | 10 | | *first* > *last* | Return: false |

FIGURE 7.10 Trace of the binary search