**Searching Algorithms**

**Handout 1 – Searching Algorithms: Student led tasks**

**Task 1 - Linear search**

1. Describe the steps that a linear search would take to find Simon in the below data set

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fred | Bob | Sally | Simon | John | Ajay |

|  |
| --- |
| Searches each time in the list starting at Fred until Simon is found.  Number of searches = 4 |

1. Below is a list of numbers. Describe the steps that a linear search would find number 4

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 6 | 3 | 7 | 6 | 4 |

|  |
| --- |
| Searches each time in the list starting at 1 until 4 is found  Number of searches = 6 |

1. Describe the steps a linear search would take when searching for a number that is **not** in the given list.

|  |
| --- |
| Starting with the **first value**  checking **all values in order**  If it reaches the end (Length -1) then we know the item is not in the list |

**Task 2 - Binary search**

1. Show the stages of a binary search to find the word ‘Terry’ when applied to the data shown.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alice | Fred | Geraint | Loise | Ravina | Sam | Steven | Terry | Wilma |

|  |
| --- |
| * Find the Midpoint (0 + 8) // 2 = 4 * Comparing Terry to Ravina * Greater, so split and take right side (Left = Mid + 1) = 5 * Find the Midpoint = (5 + 8) // 2 = 6 * Comparing Terry to Steven * Greater, so split and take right side (Left = Mid + 1) = 7 * Find the Midpoint = (7 + 8) // 2 = 7 * Correct identification of Terry using methodology above |

1. Explain how a binary search would find the word “House” below.

|  |  |  |  |
| --- | --- | --- | --- |
| Apartment | Brick | Bungalow | House |

|  |
| --- |
| * Find the mid point. Midpoint = (0 + 3) // 2 = 1 * Compare House to Brick. * Greater, so split and take the right side. (Left = Mid + 1) = 2 * Find the mid point. Midpoint = (2 + 3) // 2 = 2 * Compare House to Bungalow. * Greater, so split and take the right side. (Left = Mid + 1) = 3 * Find the mid point. Midpoint = (3 + 3) // 2 = 3 * Correct identification of House using methodology above |

1. State one reason why a binary search can be used on the below data set.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5 | 3 | 2 | 1 | 8 |

|  |
| --- |
| This is an unordered list |

3.1. State a searching algorithm that can be used on the above data

|  |
| --- |
| Linear Search |

**Task 3 – Gameboard**

Complete the below activity

<https://isaaccs.org/assignment/9c661cf8-3cbb-41b8-a7a9-7e604041c77c>

**Further Reading Isaac Computer Science**

For further reading on searching algorithms visit the Isaac Computer Science website- <https://isaaccomputerscience.org/topics/searching?examBoard=all&stage=all>