Binary Search

$O = \lceil \log (1 + n) \rceil$
Suppose that we partition the array into two parts of length $d/u$ and $d/u - u$ at each step.

Still $O(\log n)$
yes.
you start in the middle?

- Specifically, if I asked you find "Alan Cox" in the phone book would

  How do you find a number in a phone book?

- Suppose that keys are uniformly distributed.

Can we improve on Binary Search?
\[
(3) \quad \frac{[I + o] \text{key} - [I - i] \text{key}}{(i - i) * ([I + o] \text{key} - \text{key})} + o = \text{mid}
\]

We're looking for an expression that places us closer to what we can rewrite as

\[
(2) \quad z/(i - i) + o = \text{mid}
\]

\[
(1) \quad z/(i + o) = \text{mid}
\]

Interpolation Search
How many steps would interpolation search require in order to find 68?

How many steps would binary search require in order to find 68?

9, 21, 32, 38, 51, 59, 68, 91, 97, 113, 119, 131, 142, 149

Consider the following array of elements:

(Cont.)
Suppose that IOrdered includes a method int sub(IOrdered.Key)

Interpolation Search (cont.)
and we search for 9, performance is poor.

1, 2, 3, 4, 5, 6, 7, 8, 9, 999

- If instead, the keys are not uniformly distributed, e.g.,
- Interpolation search is \( O(\log \log n) \).

\( \text{The Computational Cost of Interpolation Search} \)
Consider the abstract class A Sorter in the handout.

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The Template Pattern
The Template Method Pattern

March 26, 2001

A "template method" is an example of the "Template Method Pattern". The method sort() is an example of the "Template Method Pattern". The method sort() is an example of the "Template Method Pattern".

to do the actual work in split() and join(). It is the responsibility of all the variants (i.e., subclasses) of Abstract

for Abstract.

The method sort() in terms of split() and join(), two abstract methods.

The sort() method, as shown, is NOT abstract. Class Abstract defines

The Template Pattern

March 26, 2001
The following is an UML diagram describing the template method pattern.
Final field is a field that, once initialized, cannot be modified.

Final method that cannot be overridden by any of the subclasses.

A final class is a class that cannot be extended. A final method
* Final cannot be changed"

Roughly speaking, the key word final means "whatever is defined as

word final.

• In Java, it's good practice to specify template methods with the key

The Template Pattern (cont.)