

Help Please: Finding out the Iterator to the Child node in binary heap

Source: http://coding.derkeiler.com/Archive/C_CPP/comp.lang.cpp/2003-12/2377.html

From: CoolPint (coolpint_at_yahoo.co.uk)

Date: 12/18/03

Date: 18 Dec 2003 06:42:10 -0800

I am trying to write a generic heapsort (of course as a self-exercise) with Iterator interface: something like blow....

But I got into trouble finding out the Iterator to the Child node. If indexing was used, I could do something like `child = hole * 2 + 1`; but since only thing the function accepts are random access Iterators, how do I calculate the Iterator to the child node?

```
template <typename Iterator, typename Functor>
void heapsort(Iterator begin, Iterator end, Functor cmp)
// I assume that begin and end are random access iterators
{
    int noleafOffset = (end - 1 - begin) / 2;
    // since end is the iterator to one past the last one

    for (Iterator i = begin + noleafOffset; i >= begin; i--)
        shiftdown(i, end-1, cmp);
    for (Iterator j = end - 1; j > begin; j--) {
        swap (*begin, *j);
        shiftdown(begin, j, cmp);
    }
}
```

The problem is making "shiftdown" function template work with Iterator.

```
template <typename Iterator, typename Functor>
void shiftdown(Iterator top, Iterator bottom, Functor cmp)
{
    Iterator hole = top;
    ----->> Iterator child = hole * 2 + 1; // This is the problem!
    // I know I cannot apply operator*() to an Iterator so how do I
    find an
    // Iterator to the left child?

    while ( bottom >= child) {
```

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```
if (child != bottom && cmp( *(child + 1), *child) )
    child++;
if ( cmp( *child, *bottom)) {
    *hole = *child;
    hold = child;
----->> child = hole * 2 + 1;
    // Again, how do we find out the Iterator to child?
}
else break;
}
*hole = *bottom;
}
```

```
template <typename T>
void swap(T & a, T & b)
{
    T temp = a;
    a = b;
    b = temp;
}
```

Can I not implement the generic heapsort template accepting only iterators to first element and one past the last element? Please help. Thank you in advance. BTW, I could write bubblesort, quicksort based on this interface. I think the problem is my lack of understanding certain features, logic, etc... I would very much appreciate any suggestion.