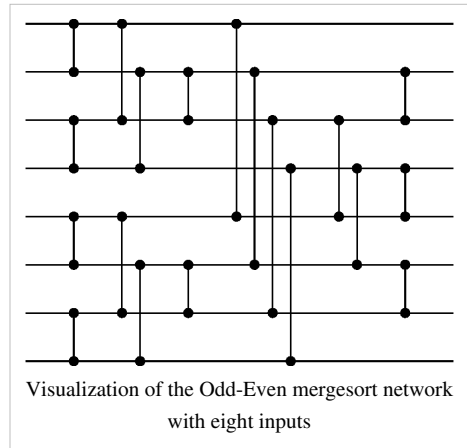


Batcher odd-even mergesort

Batcher's odd-even mergesort is a generic construction devised by Ken Batcher for sorting networks of size $O(n(\log n)^2)$ and depth $O((\log n)^2)$, where n is the number items to be sorted. Although it is not asymptotically optimal, Knuth concluded in 1998, with respect to the *AKS network* that “*Batcher's method is much better, unless n exceeds the total memory capacity of all computers on earth!*”^[1]

It is popularized by the second *GPU Gems* book^[2], as an easy way of doing reasonably efficient sorts on graphics-processing hardware.



Example Code

The following is an implementation of odd-even mergesort algorithm in Python. The input is a list x of length a power of 2. The output is a list sorted in ascending order.

```
def evenodd_mergesort(x):
    if len(x) <= 1:
        return x
    else:
        first = evenodd_mergesort(x[:len(x)/2])
        second = evenodd_mergesort(x[len(x)/2:])
        return evenodd_merge(first + second)

def evenodd_merge(x):
    if len(x) == 2:
        if x[1] < x[0]: #swap
            x[0], x[1] = x[1], x[0]
        return x
    else:
        e = evenodd_merge(extract(0,x)) #extract even indexed and sort
        o = evenodd_merge(extract(1,x)) #extract odd indexed and sort
        result = interleave(e,o)
        return evenodd_compare(result)

def evenodd_compare(x):
    for i in range(1, len(x)-1, 2):
        if x[i+1] < x[i]: #swap
            x[i+1], x[i] = x[i], x[i+1]
    return x

def interleave(x,y):
    res = range(len(x)+len(y))
```

```
for i in range(len(x)):  
    res[2*i]=x[i]; res[2*i+1] = y[i]  
return res  
  
def extract(start, x):  
    res = range(len(x)/2)  
    ind = range(start, len(x), 2)  
    for i in ind: res[i/2]=x[i]  
    return res  
  
>>> evenodd_mergesort([4,3,5,2,6,1,7,8])  
[1, 2, 3, 4, 5, 6, 7, 8]
```

References

- [1] D.E. Knuth. *The Art of Computer Programming*, Volume 3: *Sorting and Searching*, Third Edition. Addison-Wesley, 1998. ISBN 0-201-89685-0. Section 5.3.4: Networks for Sorting, pp. 219–247.
- [2] http://http.developer.nvidia.com/GPUGems2/gpugems2_chapter46.html

External links

- Description: Odd-even mergesort (<http://www.iti.fh-flensburg.de/lang/algorithmen/sortieren/networks/oemen.htm>)

Article Sources and Contributors

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