Heaps in Maple

October 26, 2023   8:45 AM

Heap operations in Maple

```
> S := [[x,5], [x,6], [y,2], [x,1], [x,3], [z,7], [x,2], [y,5]];
```
$$S := [[x, 5], [x, 6], [y, 2], [x, 1], [x, 3], [z, 7], [x, 2], [y, 5]]$$

Sort S on the second component

```
> gtr := proc(a,b) evalb( a[2] < b[2] ) end;
```
$$gtr := \mathbf{proc}(a, b)\ evalb(a[2] < b[2])\ \mathbf{end\ proc}$$

```
> H := heap[new](gtr);
```
$$H := table([0 = 0, \text{`<`} = gtr])$$

```
> for a in S do heap[insert](a,H) od;
```
$$[x, 5]$$
$$[x, 6]$$
$$[y, 2]$$
$$[x, 1]$$
$$[x, 3]$$
$$[z, 7]$$
$$[x, 2]$$
$$[y, 5]$$

```
> heap[max](H);
```
$$[z, 7]$$

```
> while not heap[empty](H) do heap[extract](H) od;
```
$$[z, 7]$$
$$[x, 6]$$
$$[y, 5]$$
$$[x, 5]$$
$$[x, 3]$$
$$[x, 2]$$
$$[y, 2]$$
$$[x, 1]$$

Heap Sort.

insert $O(\log n)$ n inserts
extract $O(\log n)$ n extracts.

$$O(n \log n)\ !!$$

$$\leq (1+2) \lfloor \log_2 n \rfloor n \text{ comparisons}$$