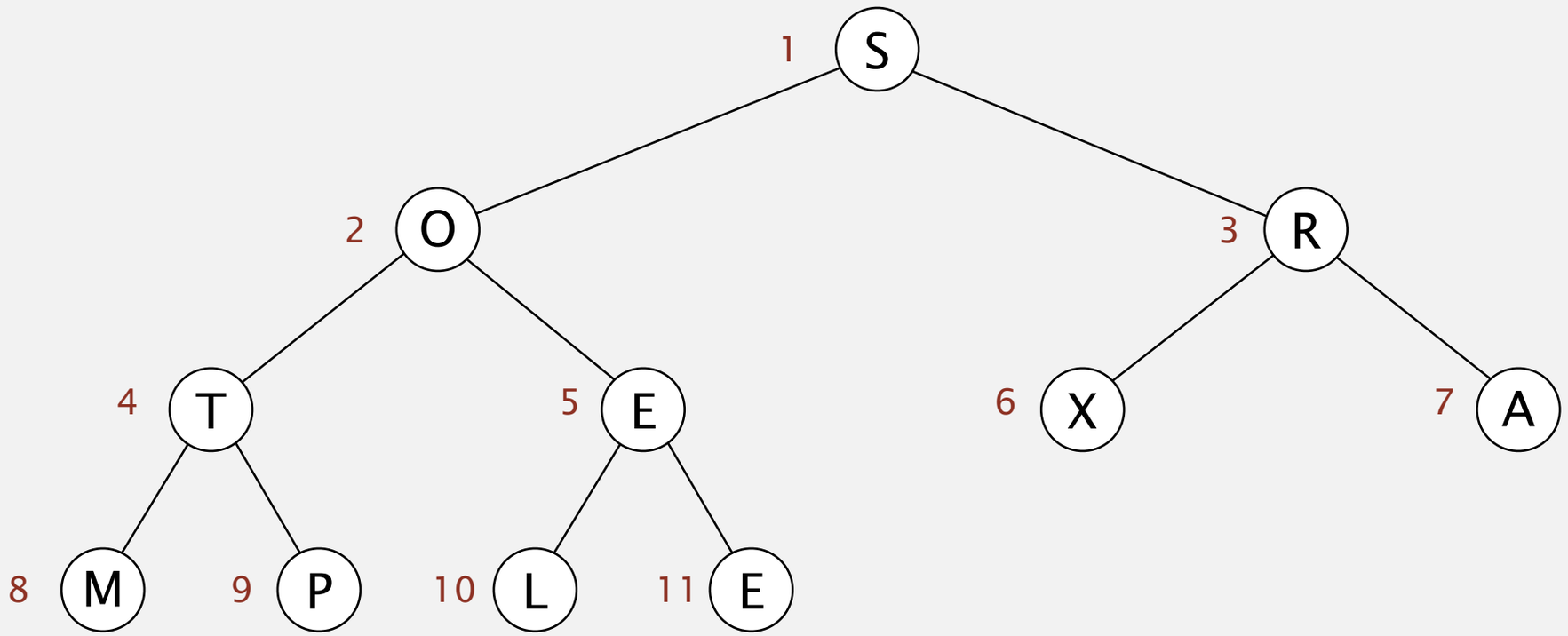
2.4 Heapsort Demo

click to begin demo

Heapsort

Starting point. Array in arbitrary order.

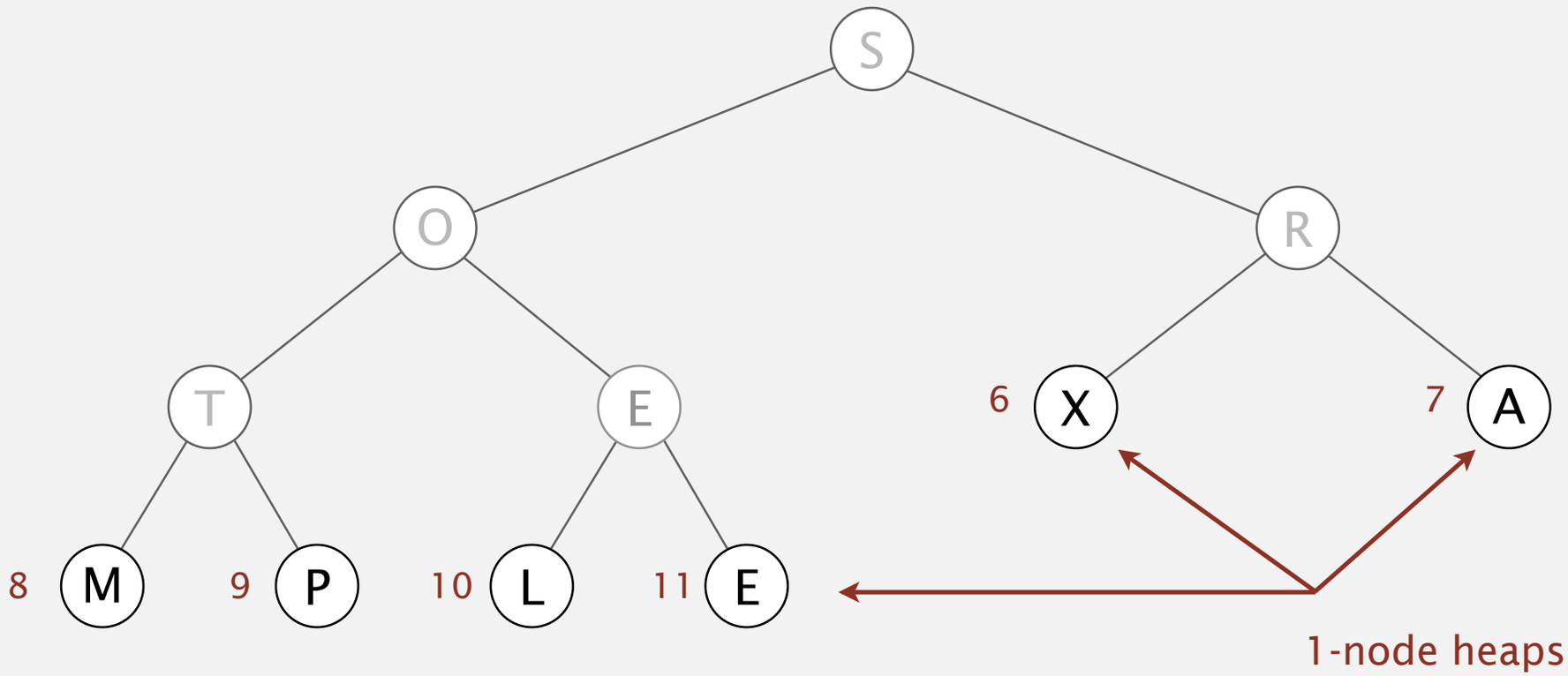
we assume array entries are indexed 1 to N



S	O	R	T	E	X	A	M	P	L	E
1	2	3	4	5	6	7	8	9	10	11

Heapsort

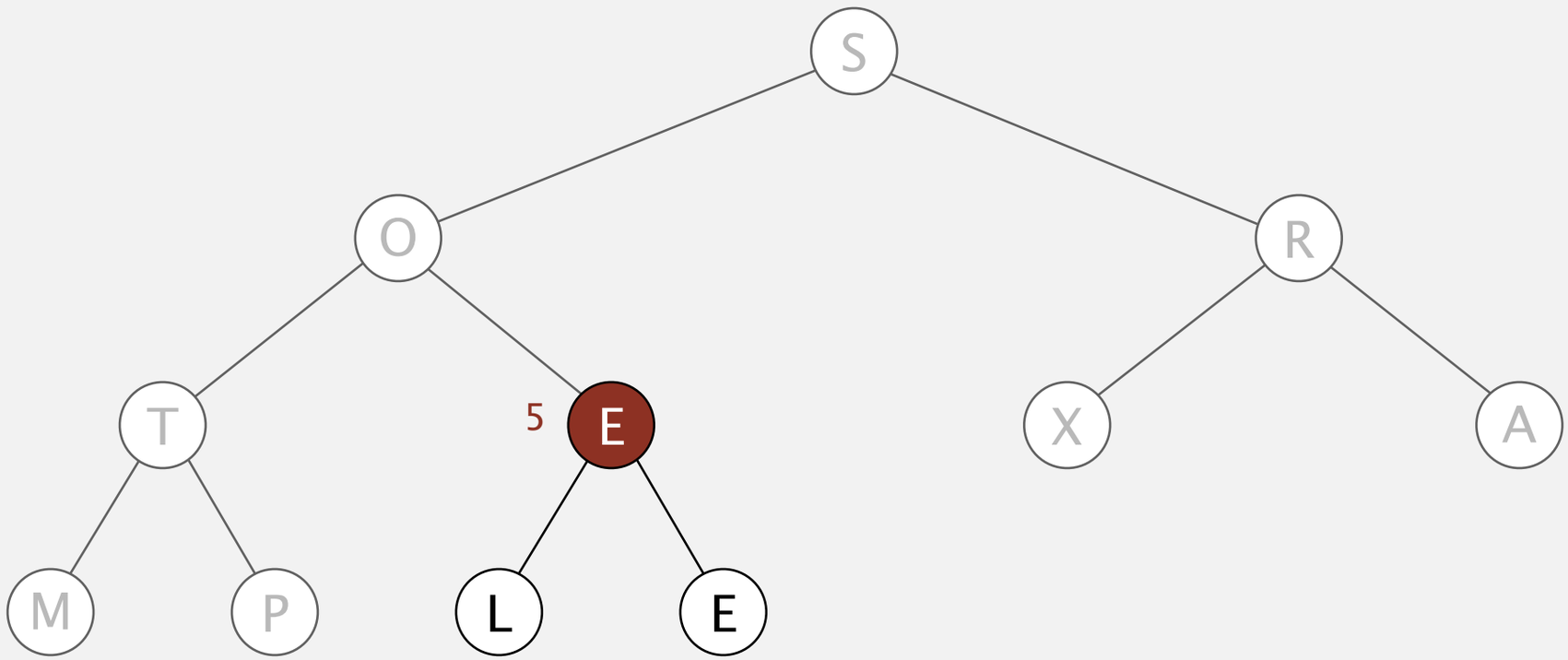
Heap construction. Build max heap using bottom-up method.



S	O	R	T	E	X	A	M	P	L	E
					6	7	8	9	10	11

Heap construction. Build max heap using bottom-up method.

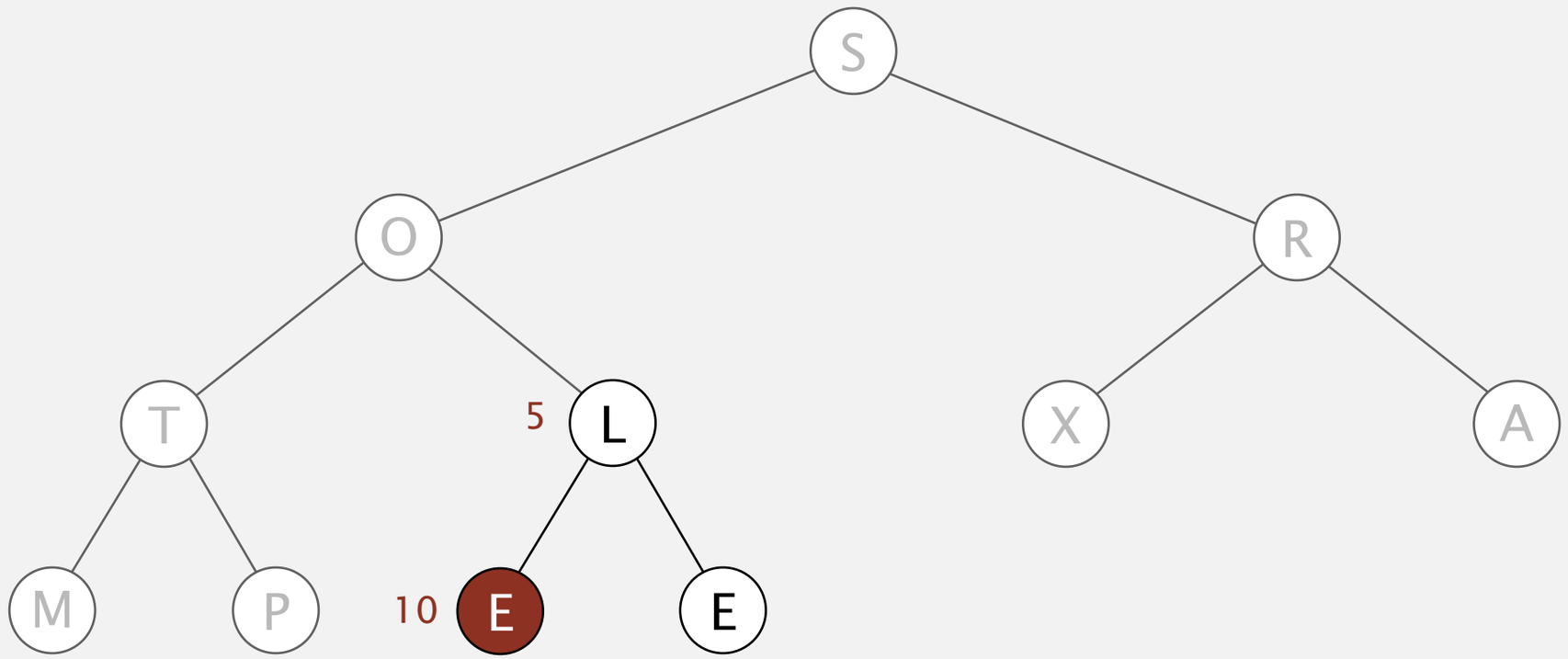
sink 5



S	O	R	T	E	X	A	M	P	L	E
				5						

Heap construction. Build max heap using bottom-up method.

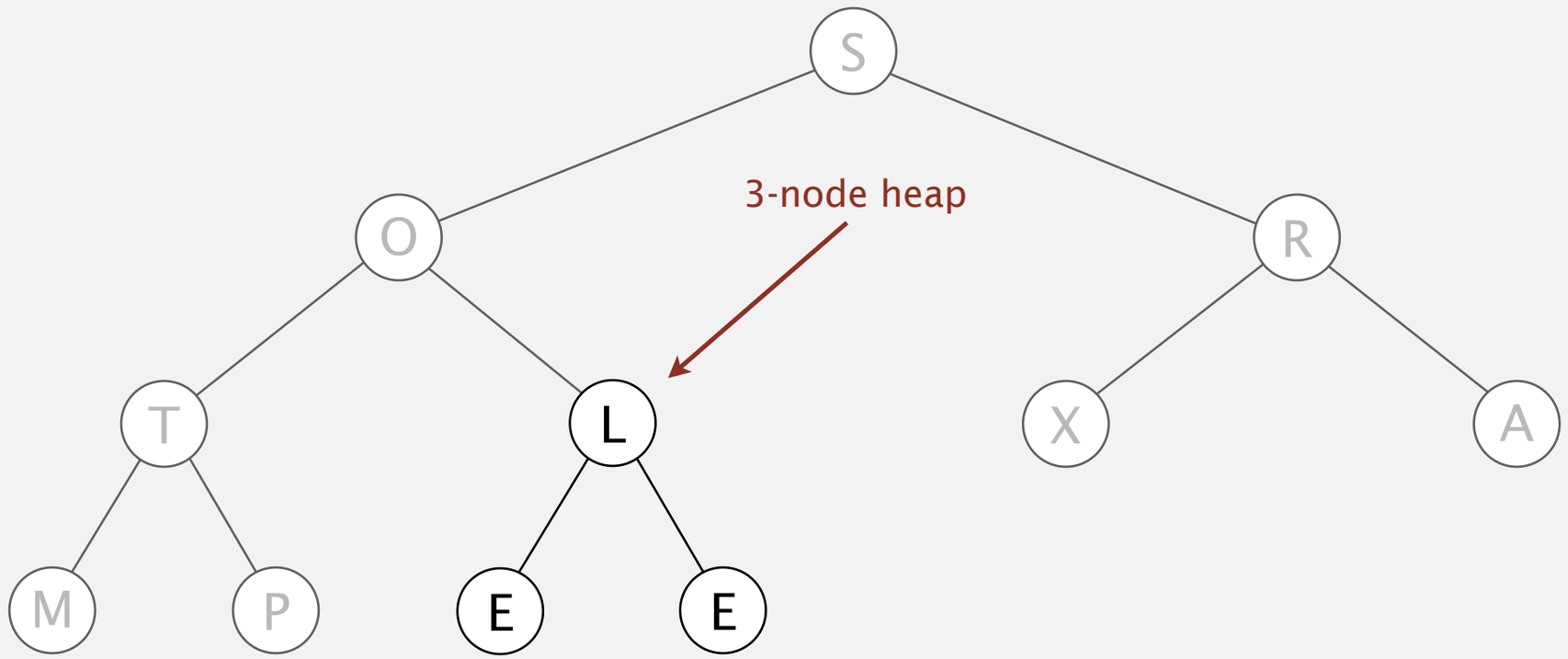
sink 5



S	O	R	T	L	X	A	M	P	E	E
				5					10	

Heap construction. Build max heap using bottom-up method.

sink 5

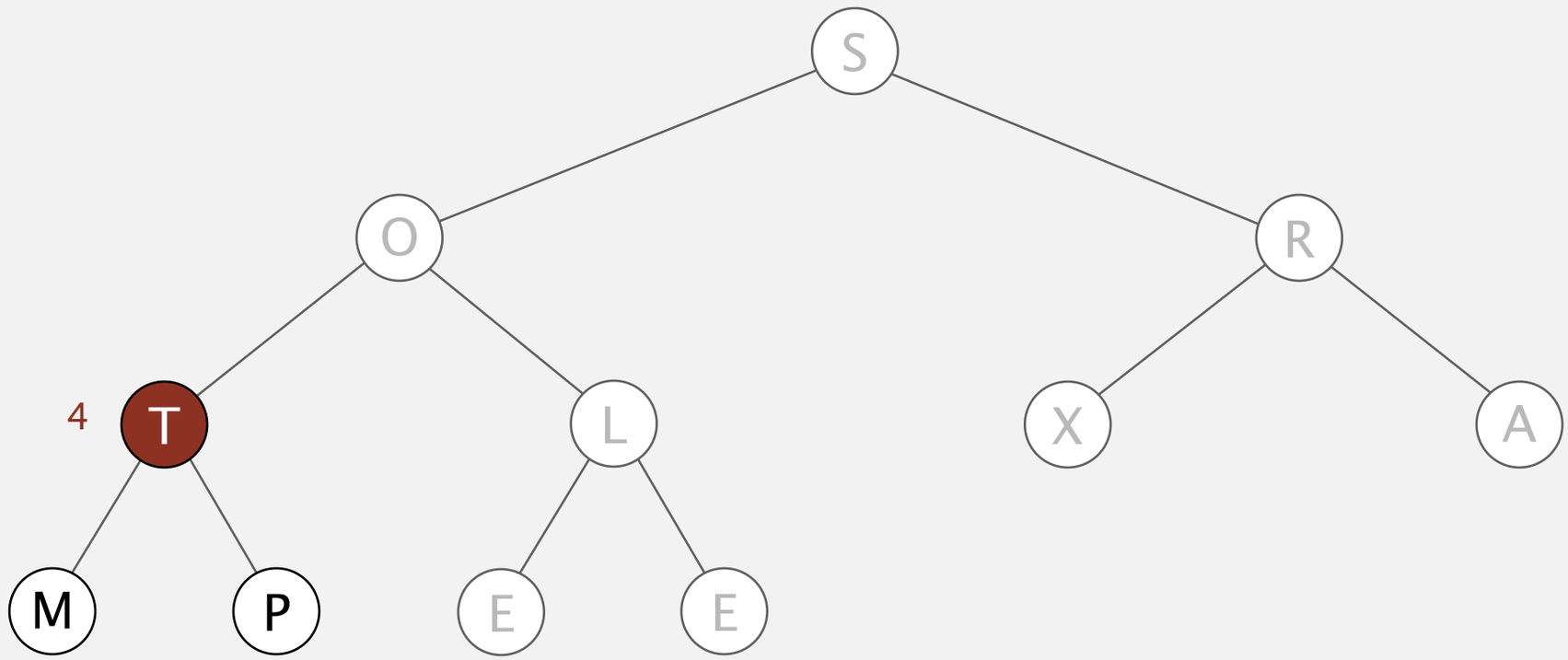


S	O	R	T	L	X	A	M	P	E	E

Heapsort

Heap construction. Build max heap using bottom-up method.

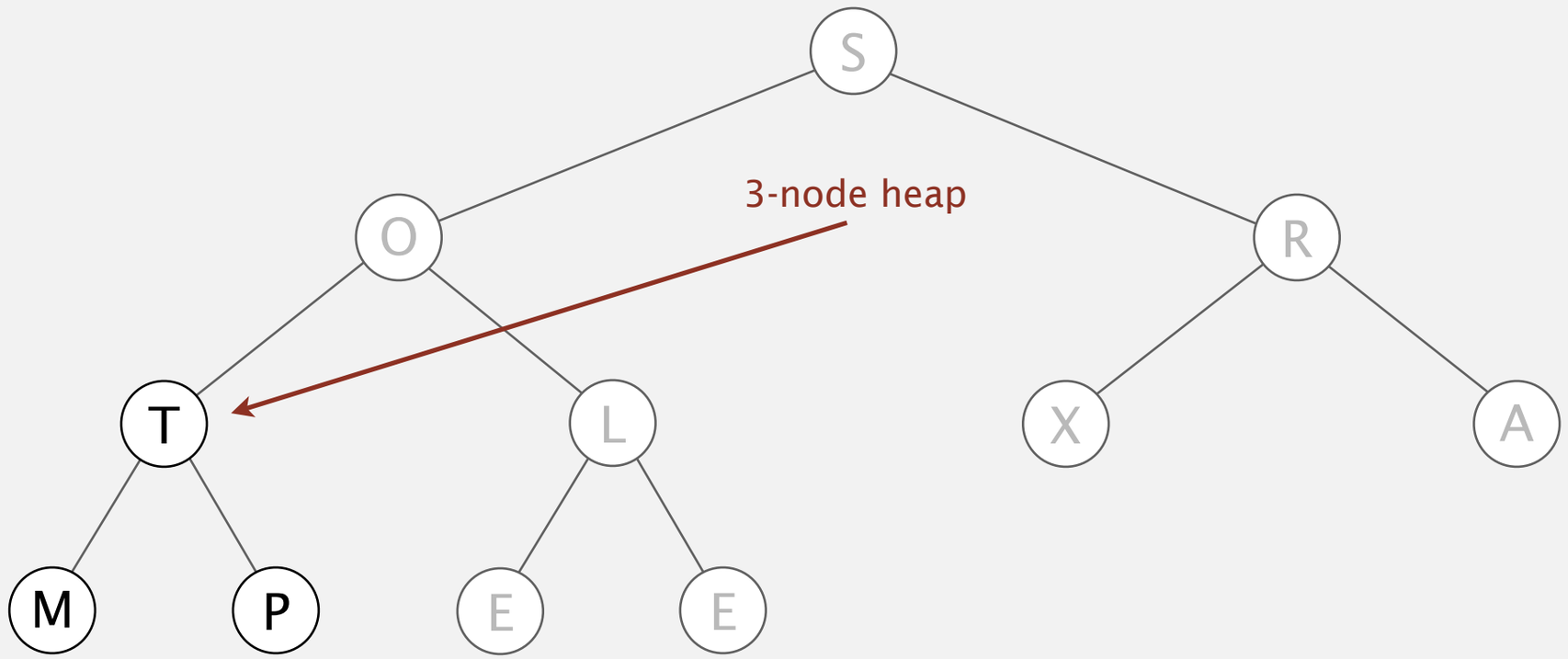
sink 4



S	O	R	T	L	X	A	M	P	E	E
			4							

Heap construction. Build max heap using bottom-up method.

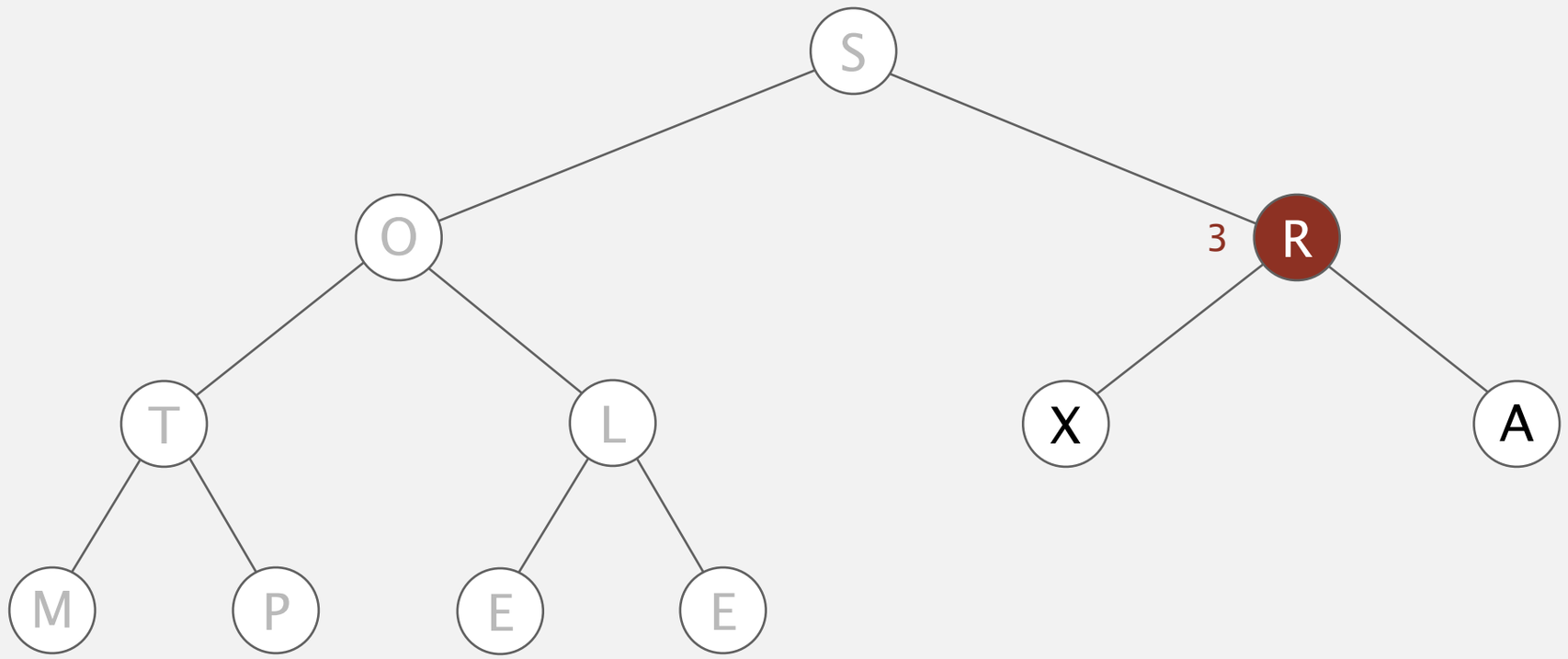
sink 4



S	O	R	T	L	X	A	M	P	E	E

Heap construction. Build max heap using bottom-up method.

sink 3

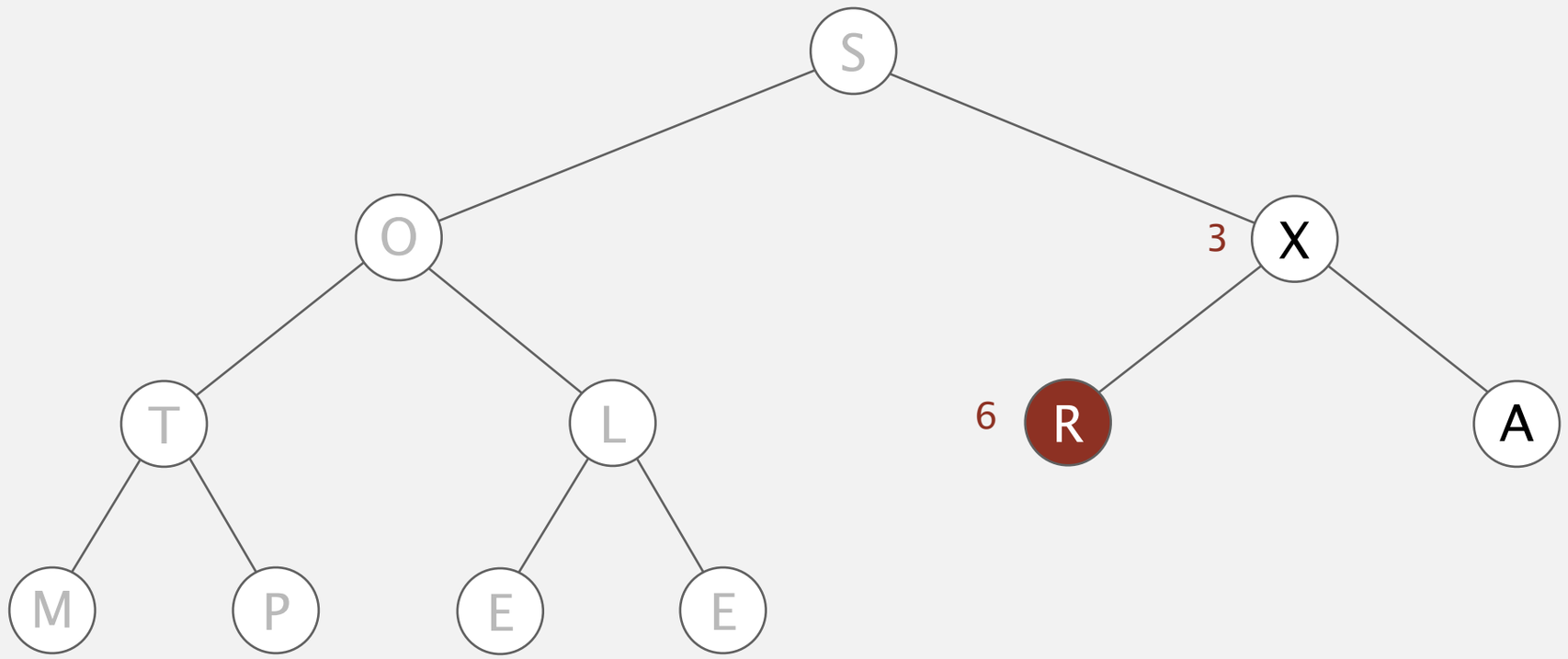


S	O	R	T	L	X	A	M	P	E	E
		3								

Heapsort

Heap construction. Build max heap using bottom-up method.

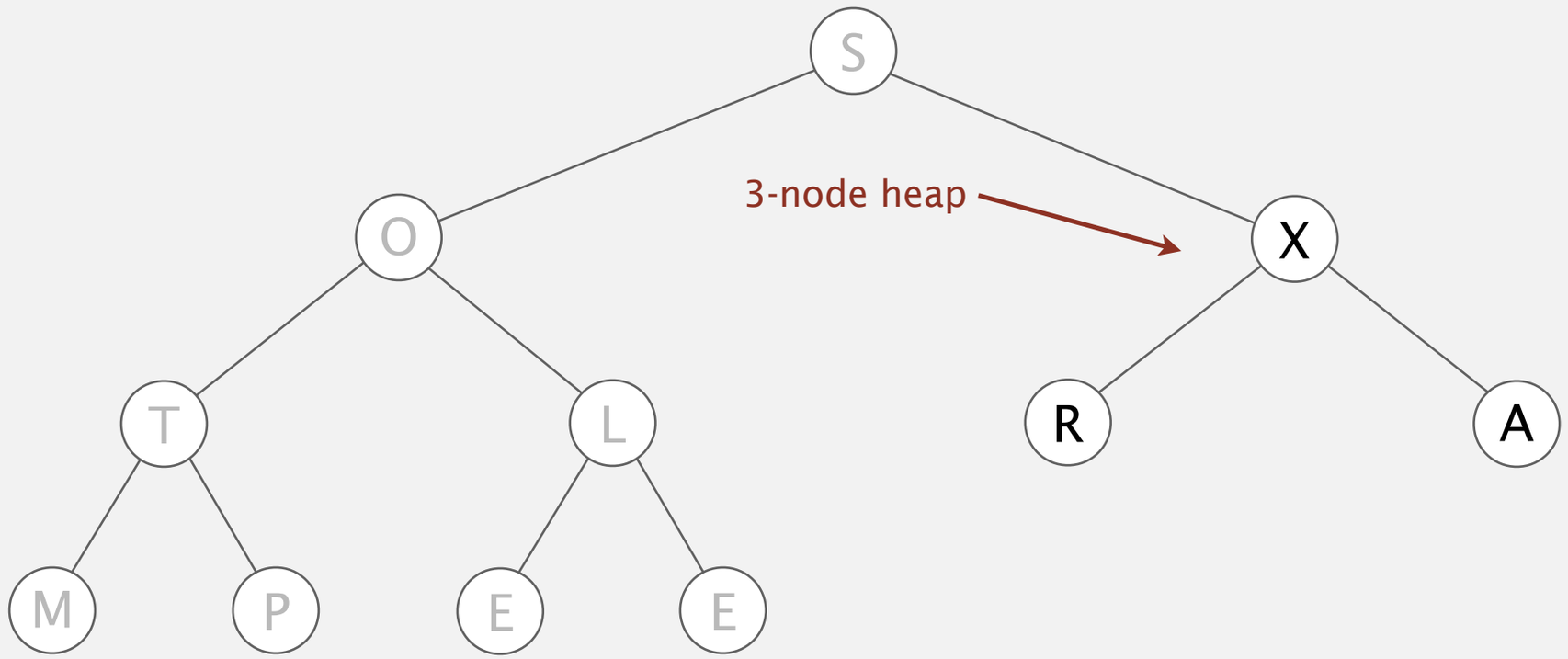
sink 3



S	O	X	T	L	R	A	M	P	E	E
		3			6					

Heap construction. Build max heap using bottom-up method.

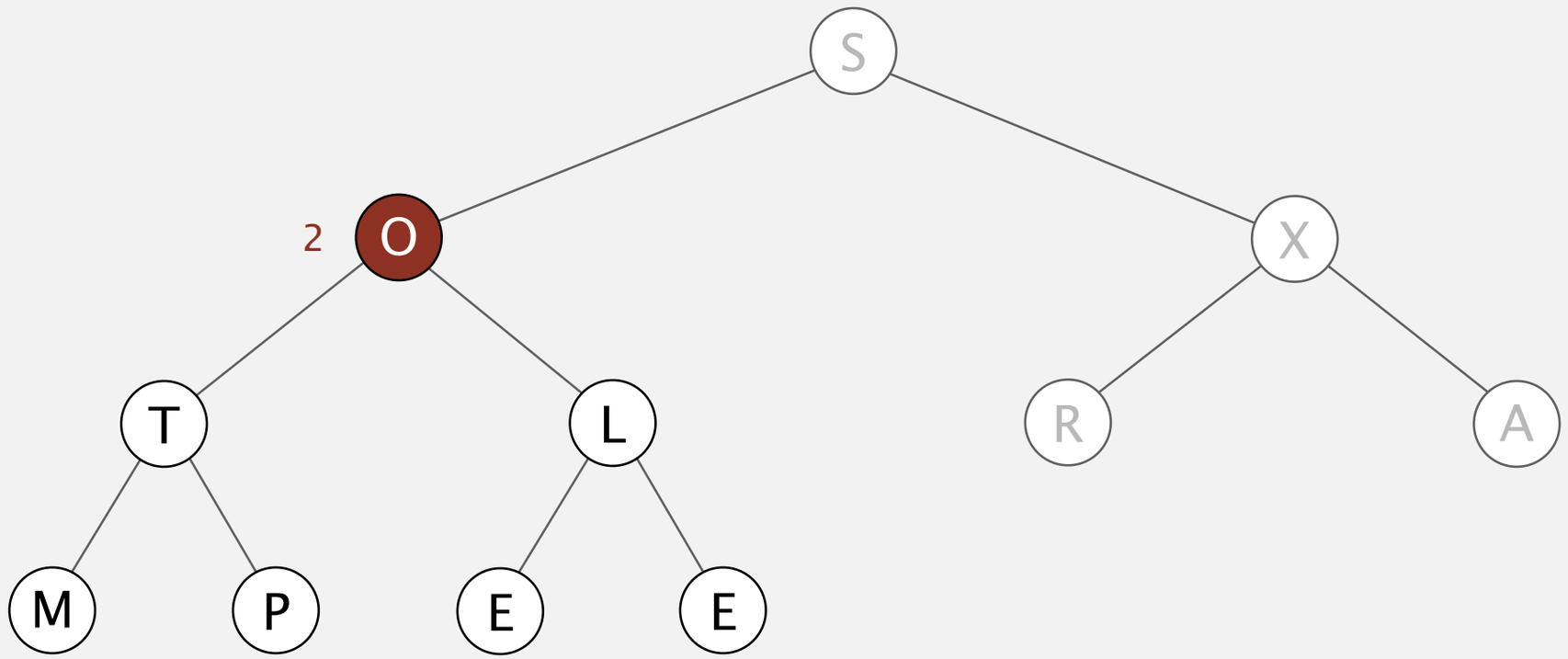
sink 3



S	O	X	T	L	A	A	M	P	E	E

Heap construction. Build max heap using bottom-up method.

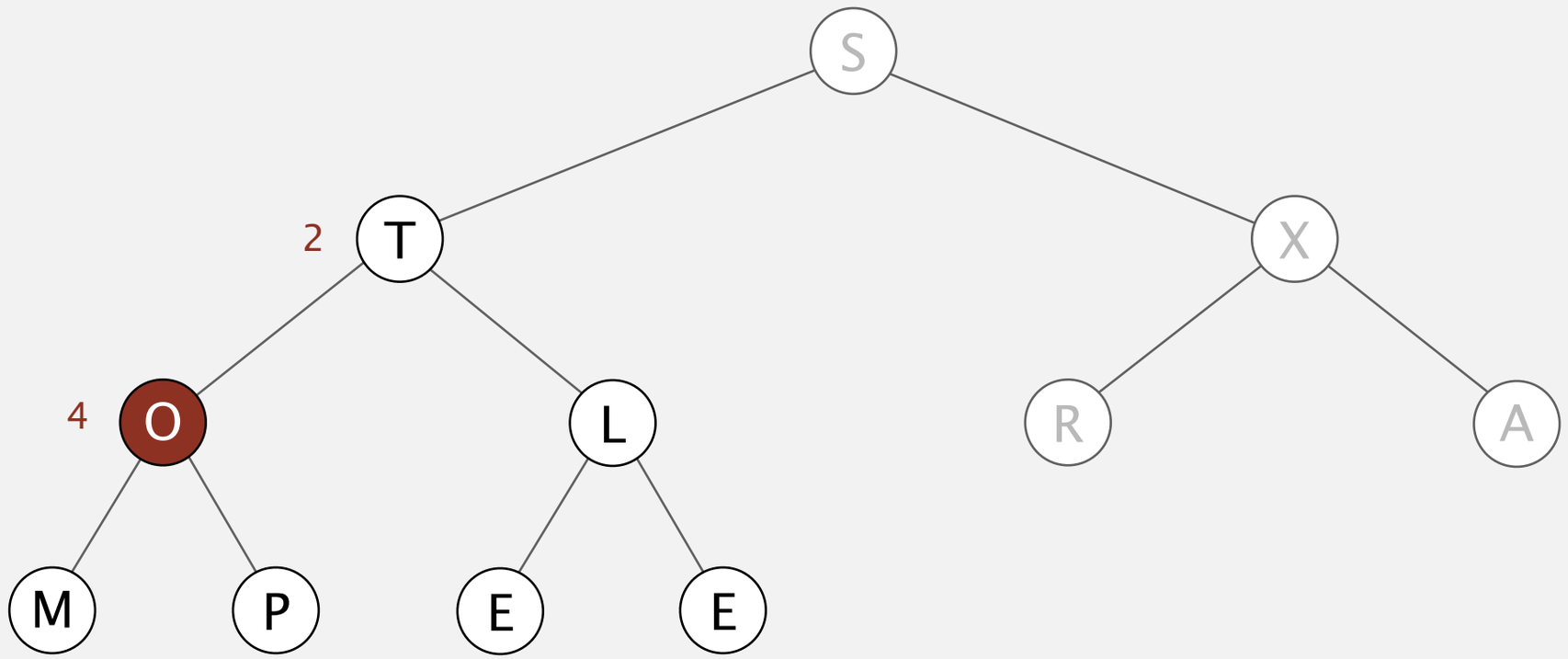
sink 2



S	O	X	T	L	R	A	M	P	E	E
	2									

Heap construction. Build max heap using bottom-up method.

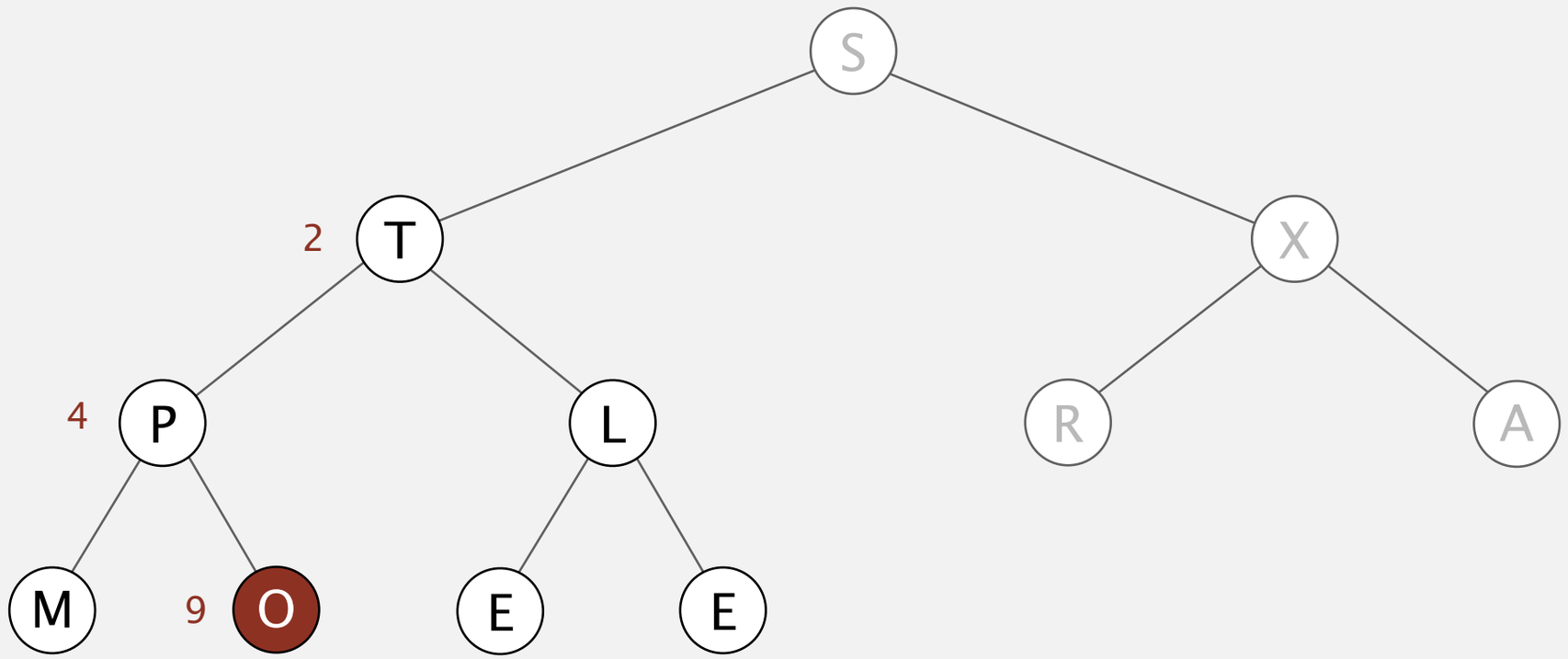
sink 2



S	T	X	O	L	R	A	M	P	E	E
	2		4							

Heap construction. Build max heap using bottom-up method.

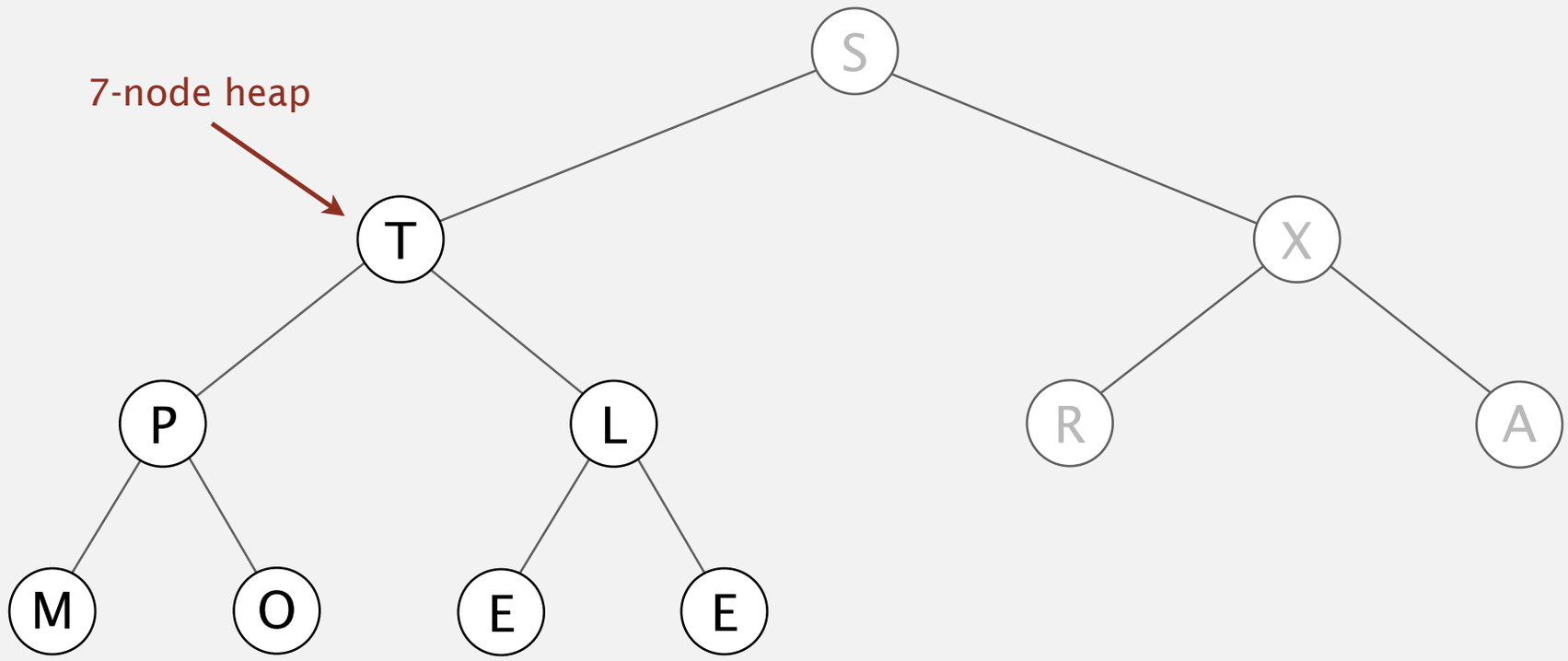
sink 2



S	T	X	P	L	R	A	M	O	E	E
	2		4					9		

Heap construction. Build max heap using bottom-up method.

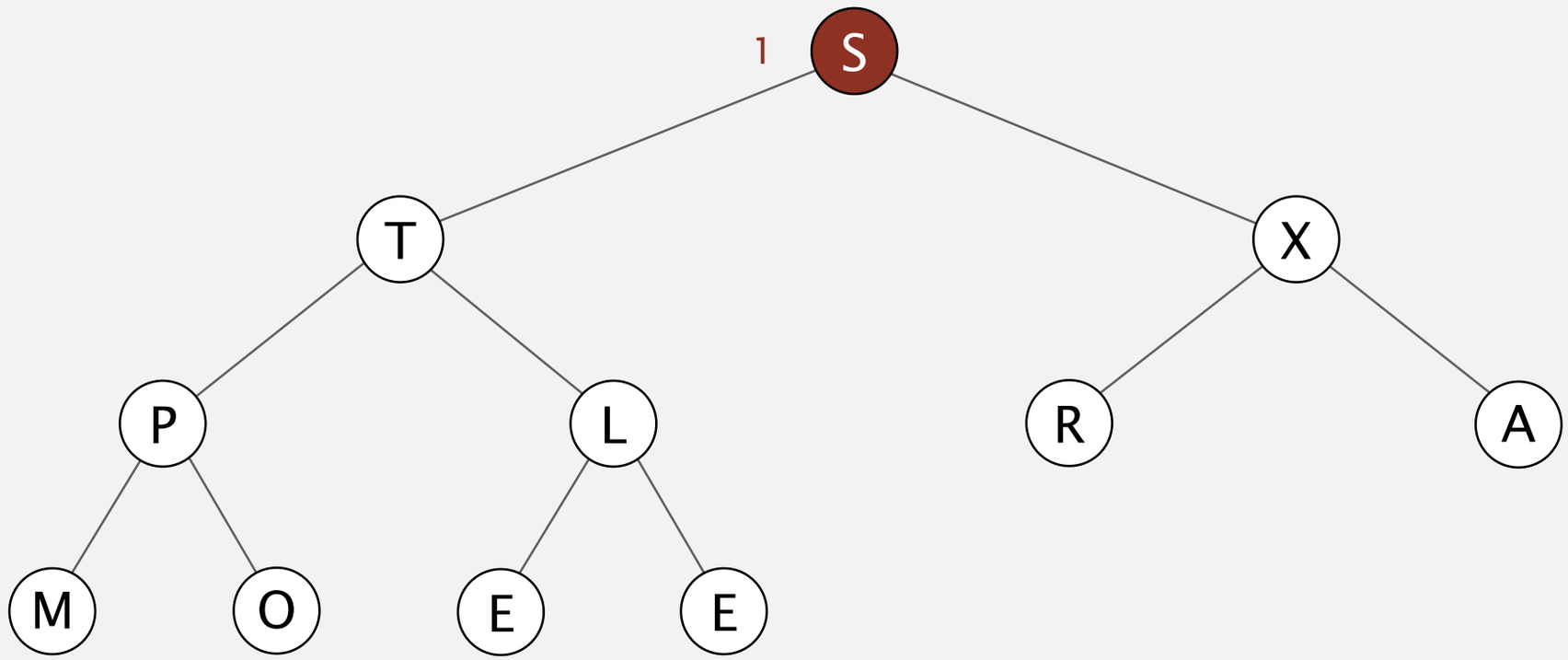
sink 2



S	T	X	P	L	R	A	M	O	E	E

Heap construction. Build max heap using bottom-up method.

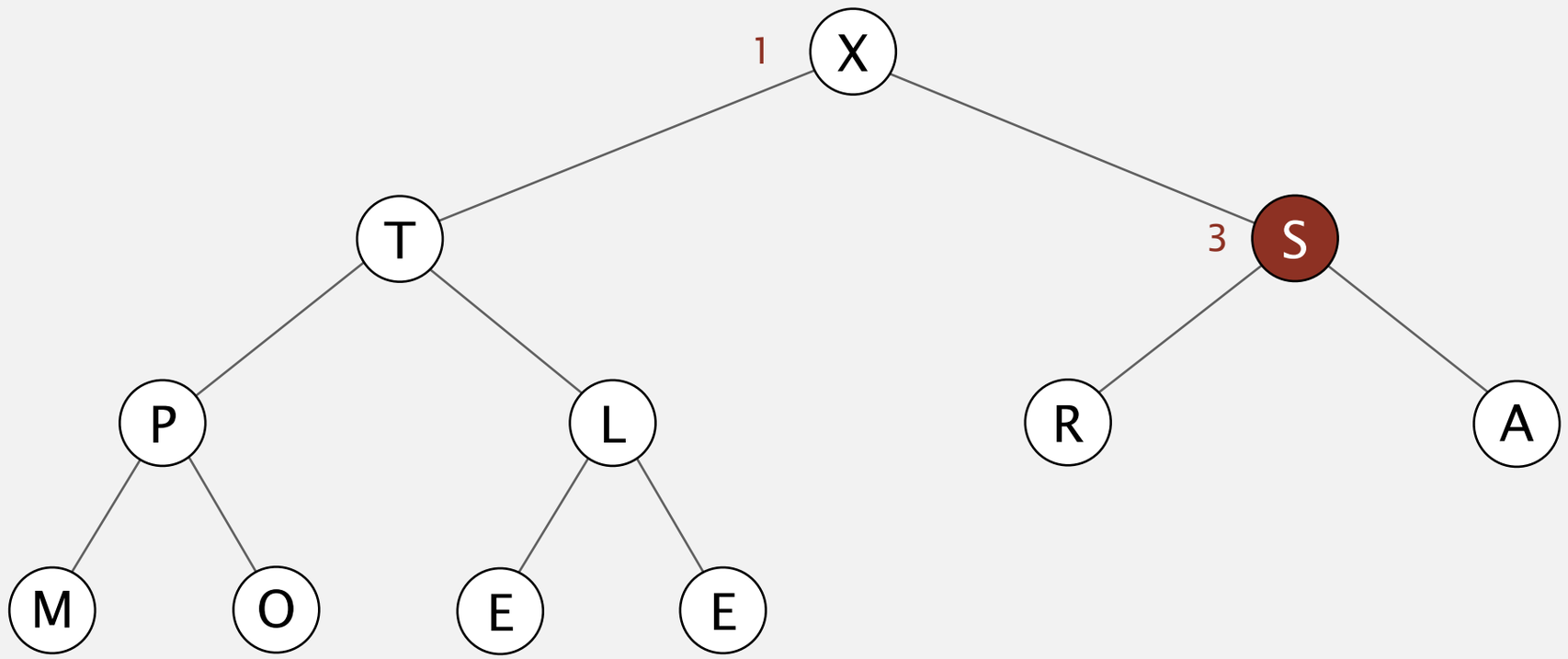
sink 1



S	T	X	P	L	R	A	M	O	E	E
1										

Heap construction. Build max heap using bottom-up method.

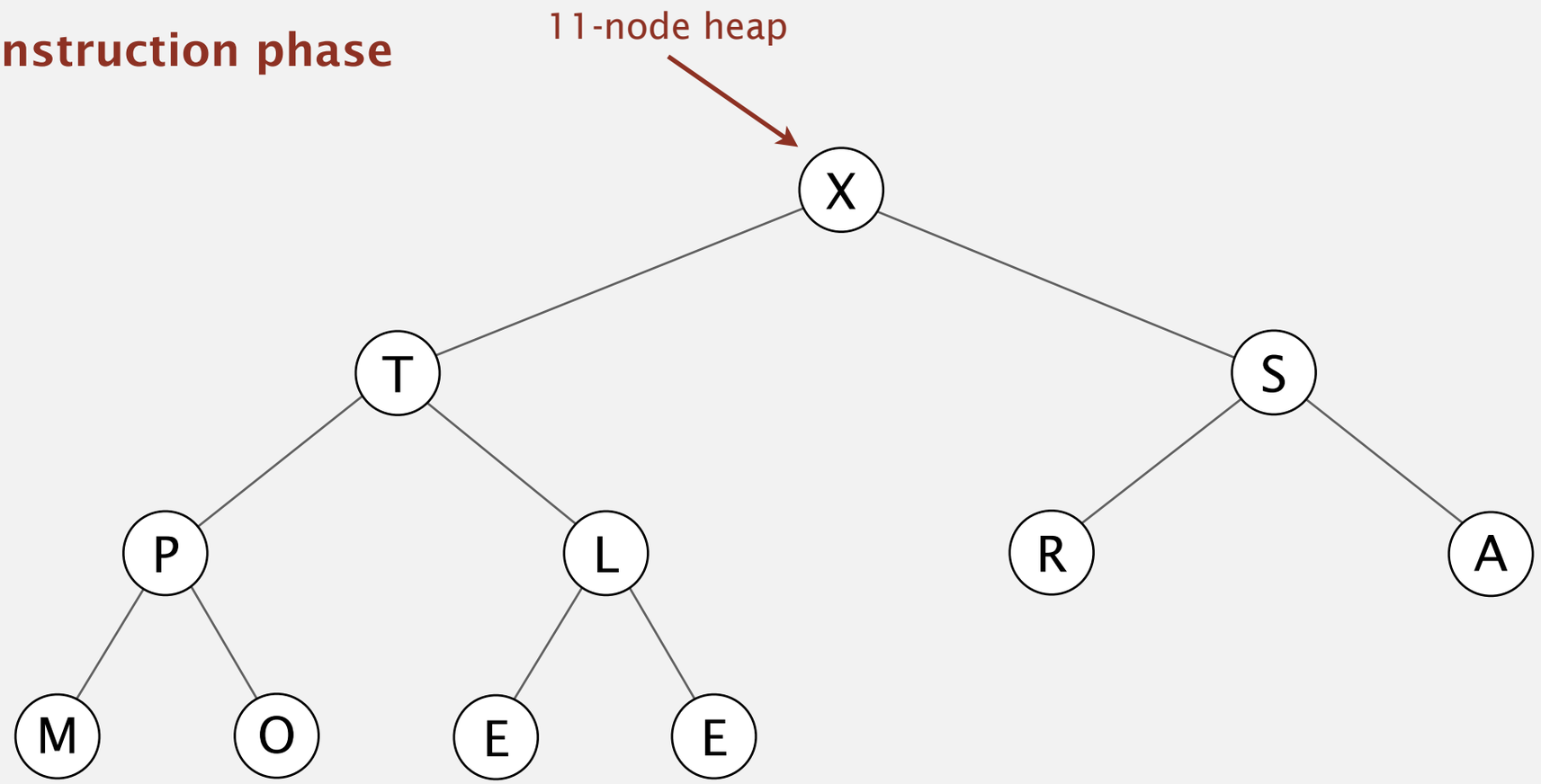
sink 1



X	T	S	P	L	R	A	M	O	E	E
1		3								

Heap construction. Build max heap using bottom-up method.

end of construction phase

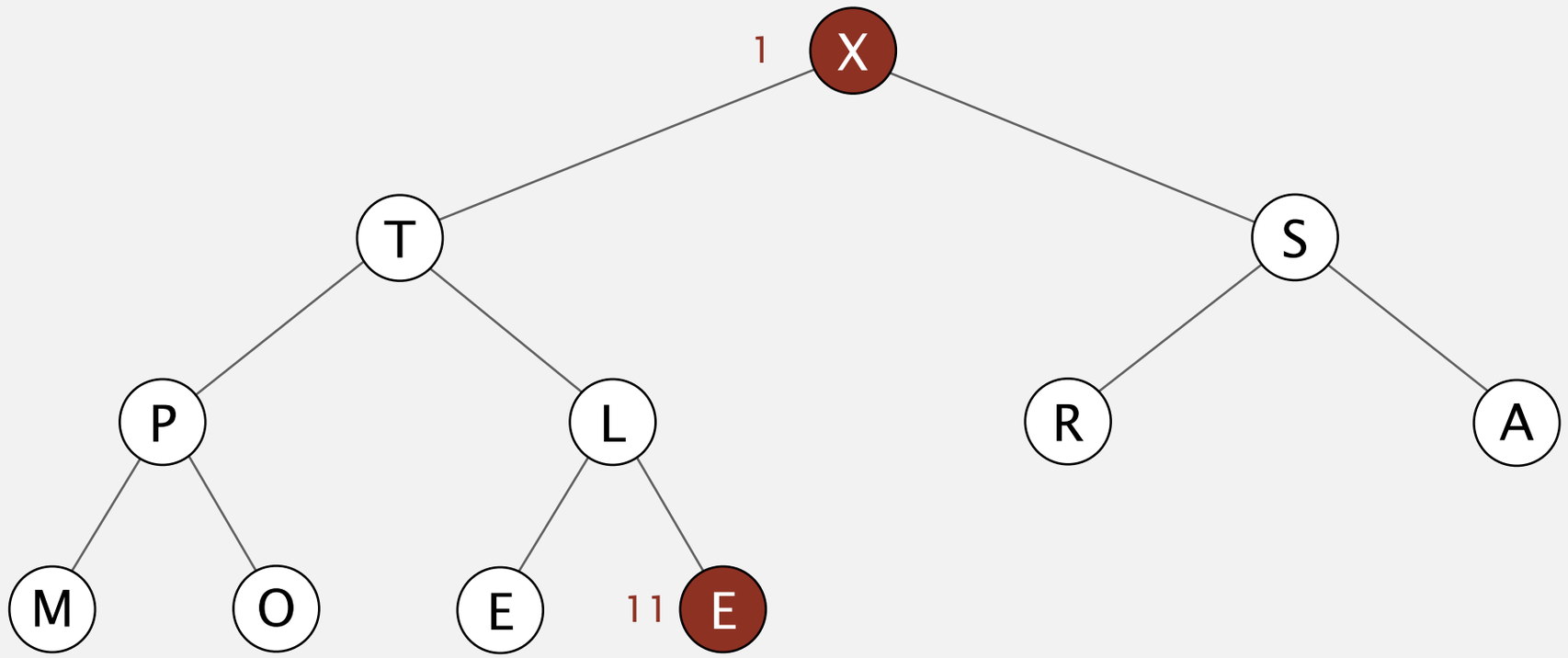


X	T	S	P	L	R	A	M	O	E	E

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 11

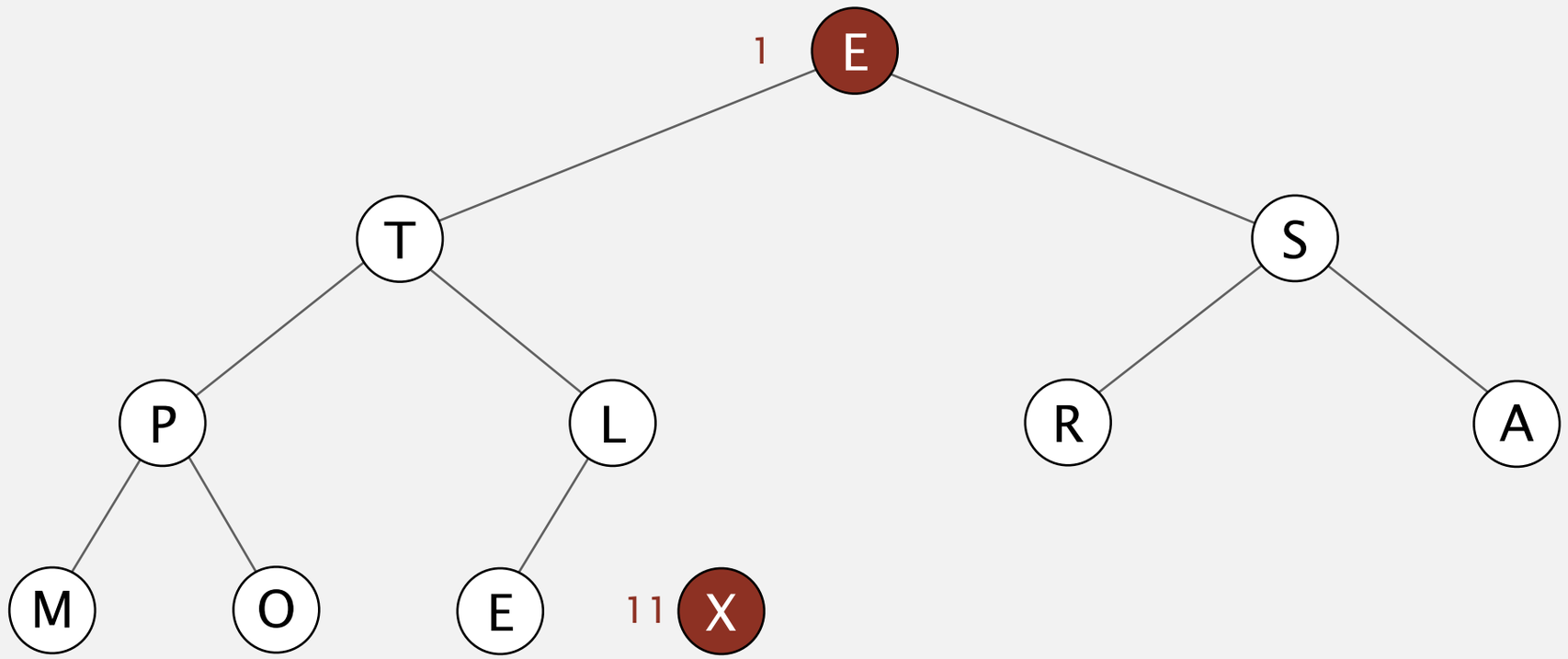


X	T	S	P	L	R	A	M	O	E	E
1										11

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 11

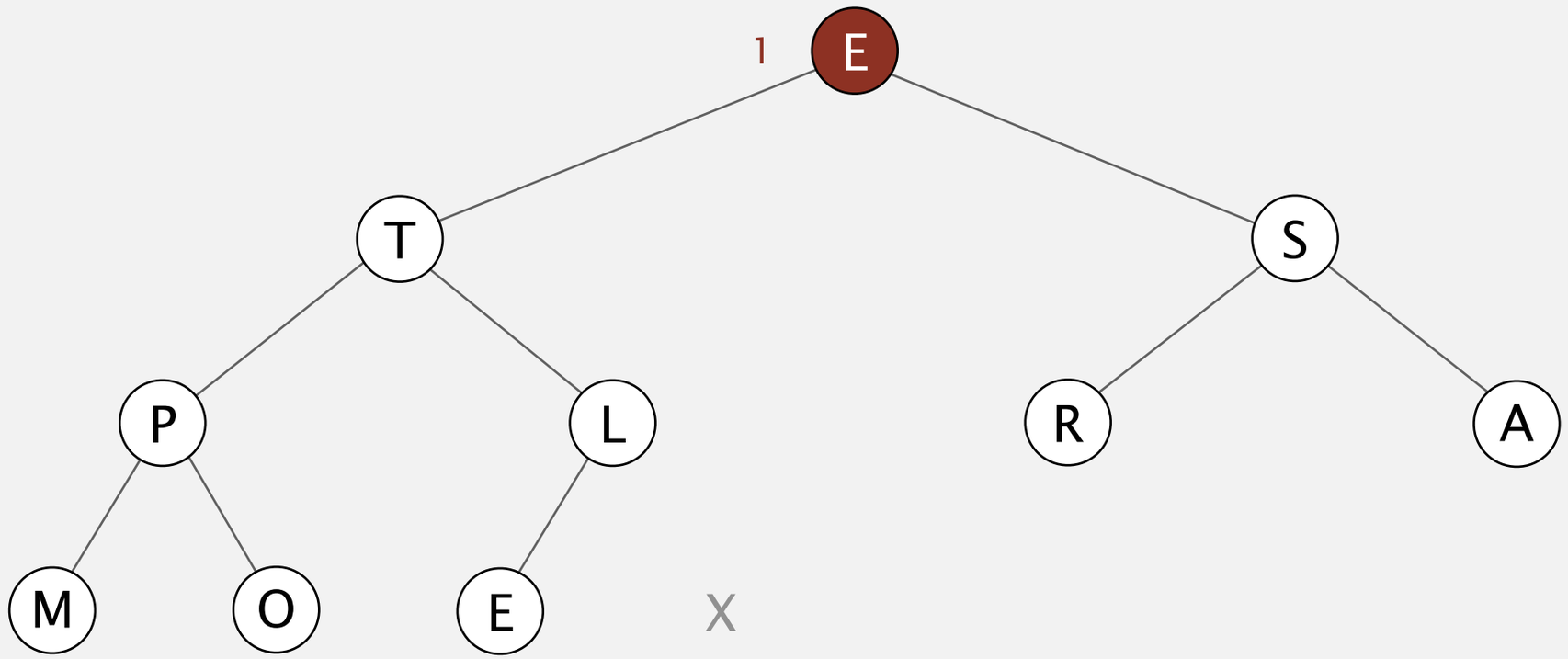


E	T	S	P	L	R	A	M	O	E	X
1										11

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

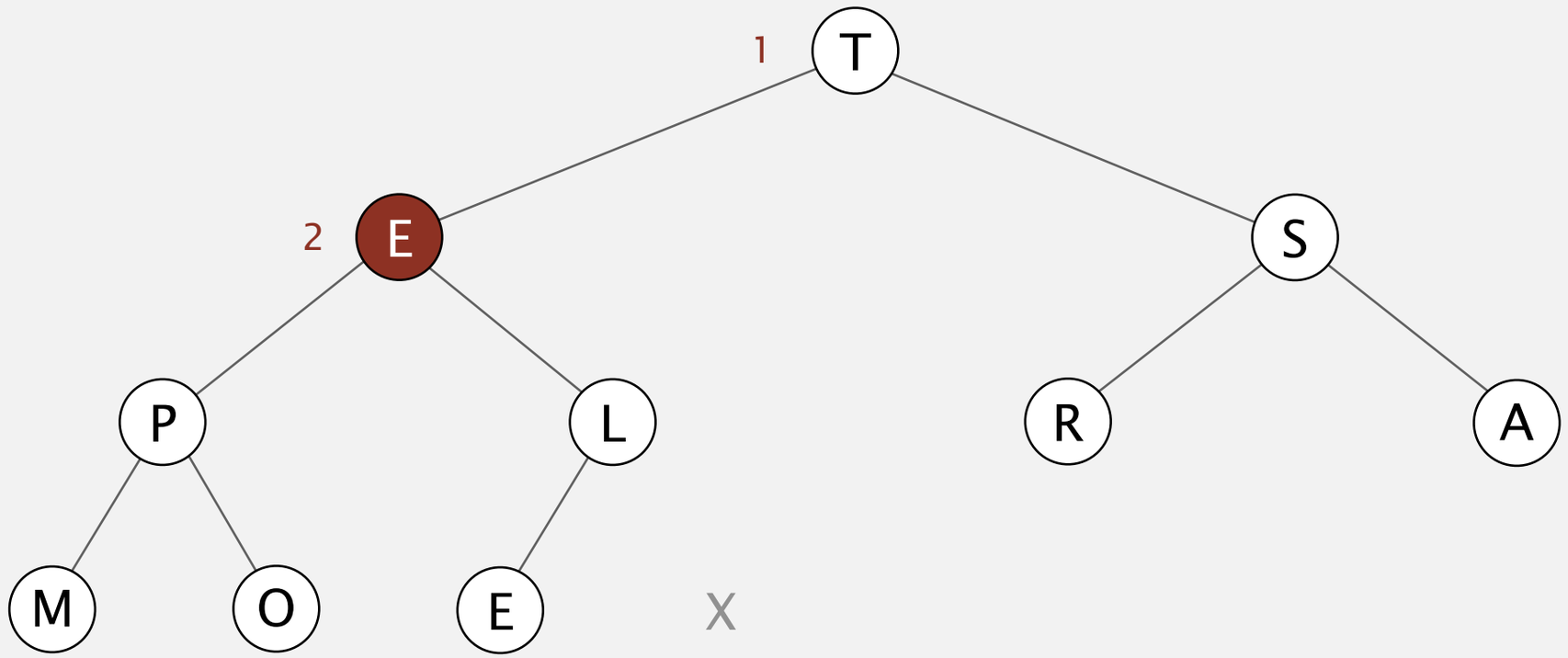
sink 1



E	T	S	P	L	R	A	M	O	E	X
1										

Sortdown. Repeatedly delete the largest remaining item.

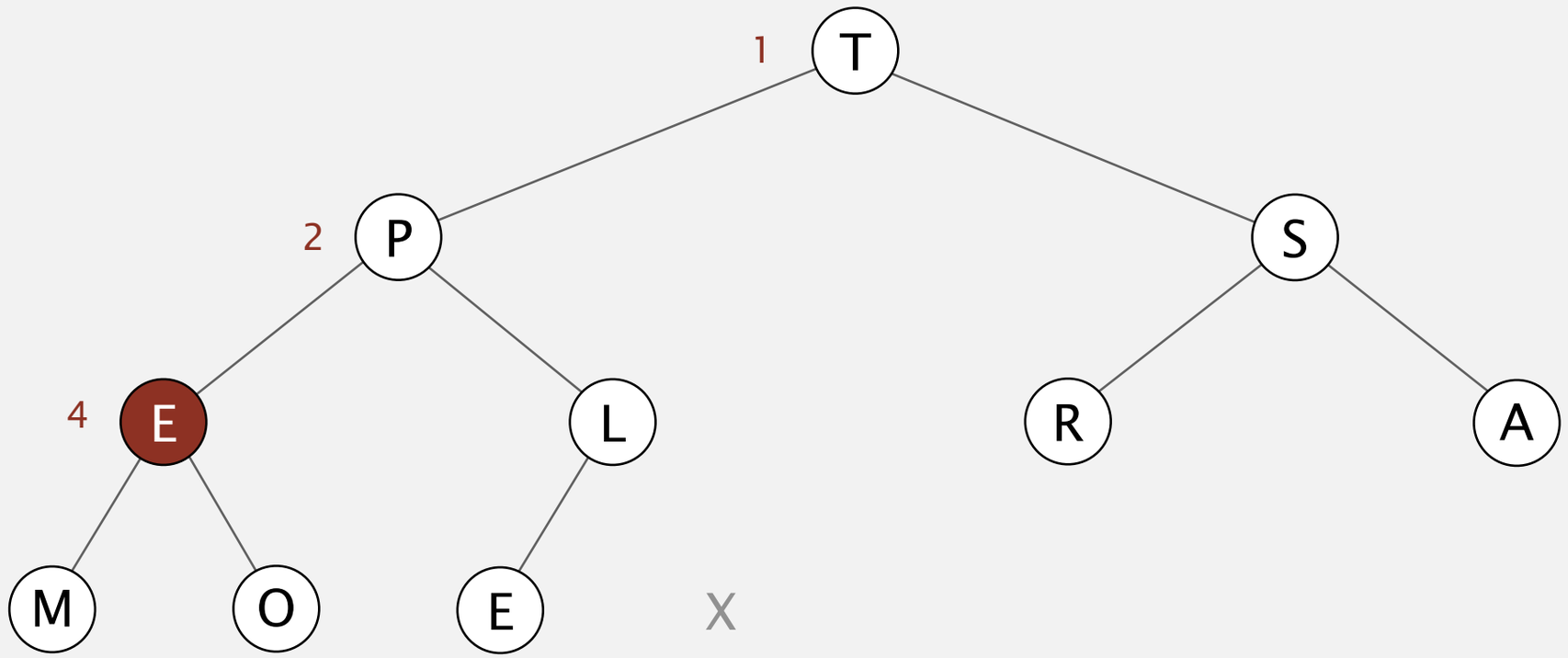
sink 1



T	E	S	P	L	R	A	M	O	E	X
1	2									

Sortdown. Repeatedly delete the largest remaining item.

sink 1

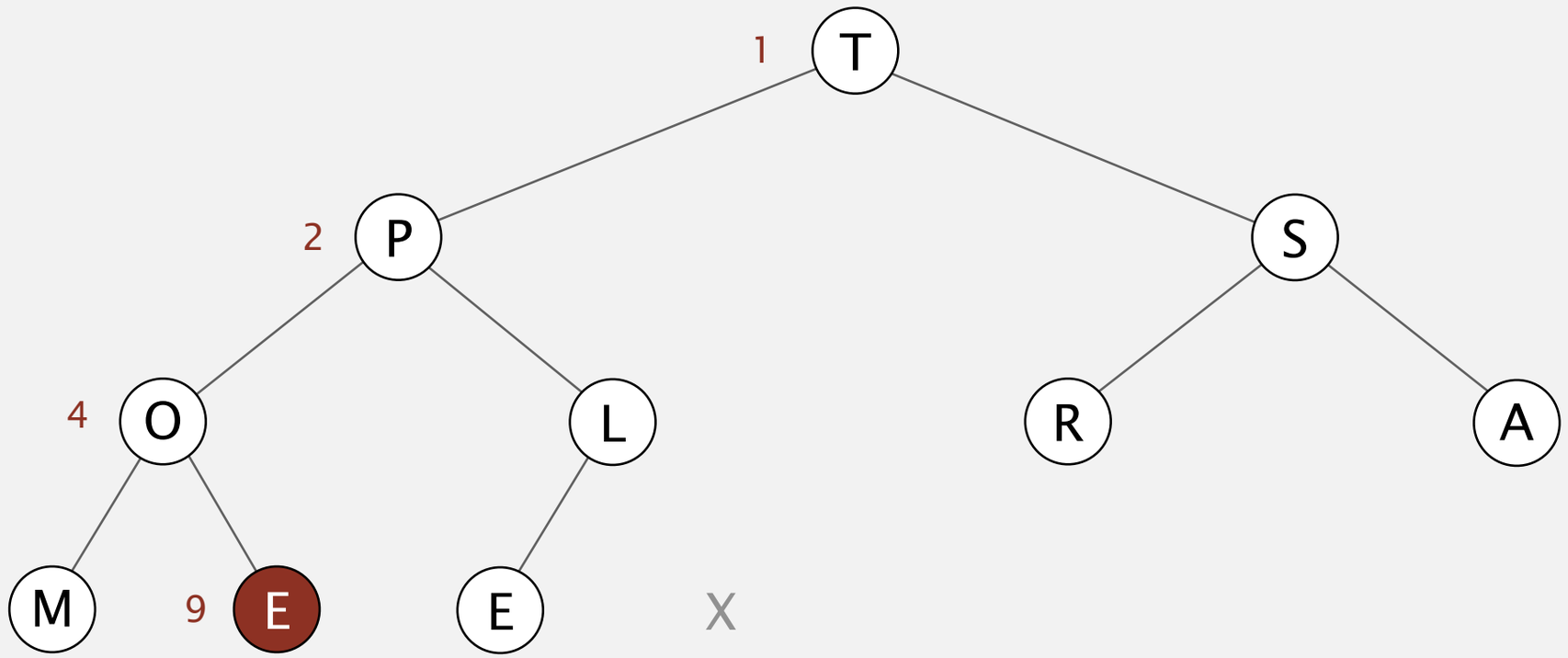


T	P	S	E	L	R	A	M	O	E	X
1	2		4							

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

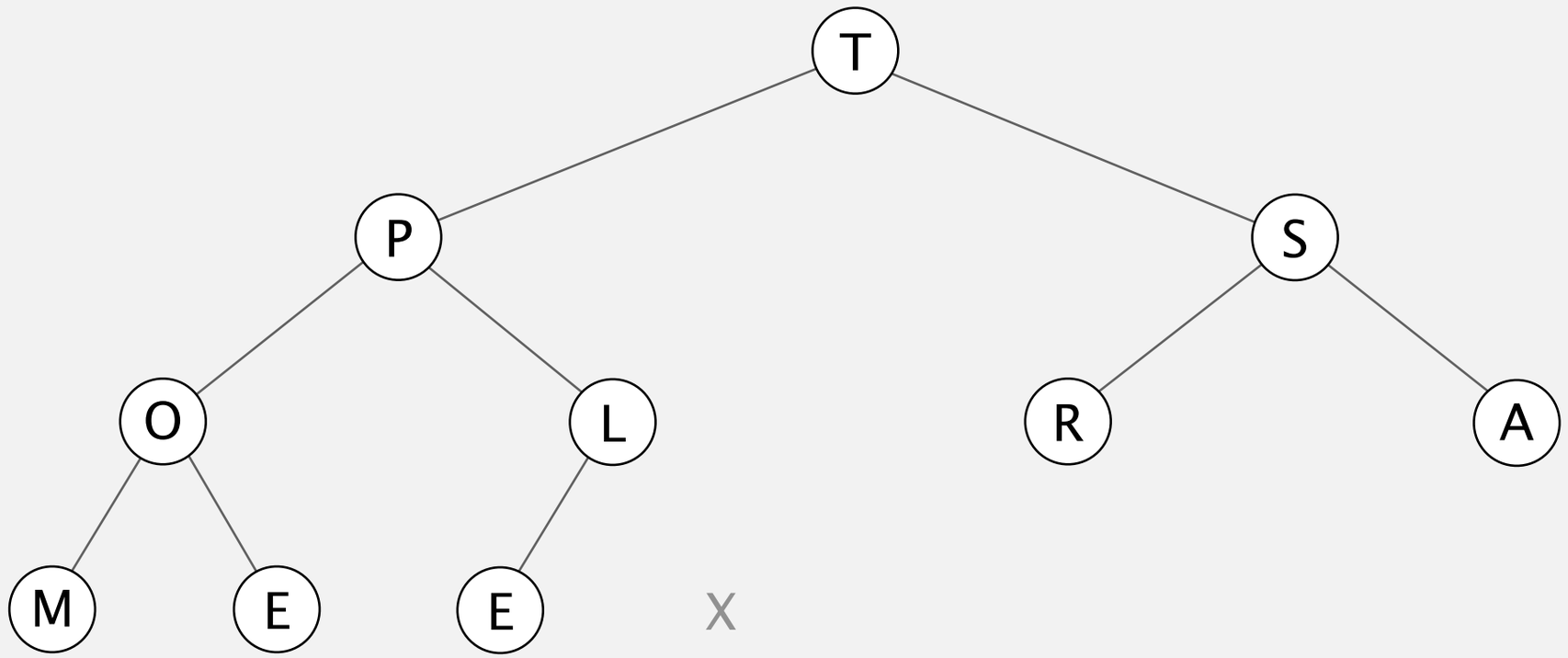
sink 1



T	P	S	O	L	R	A	M	E	E	X
1	2		4					9		

Heapsort

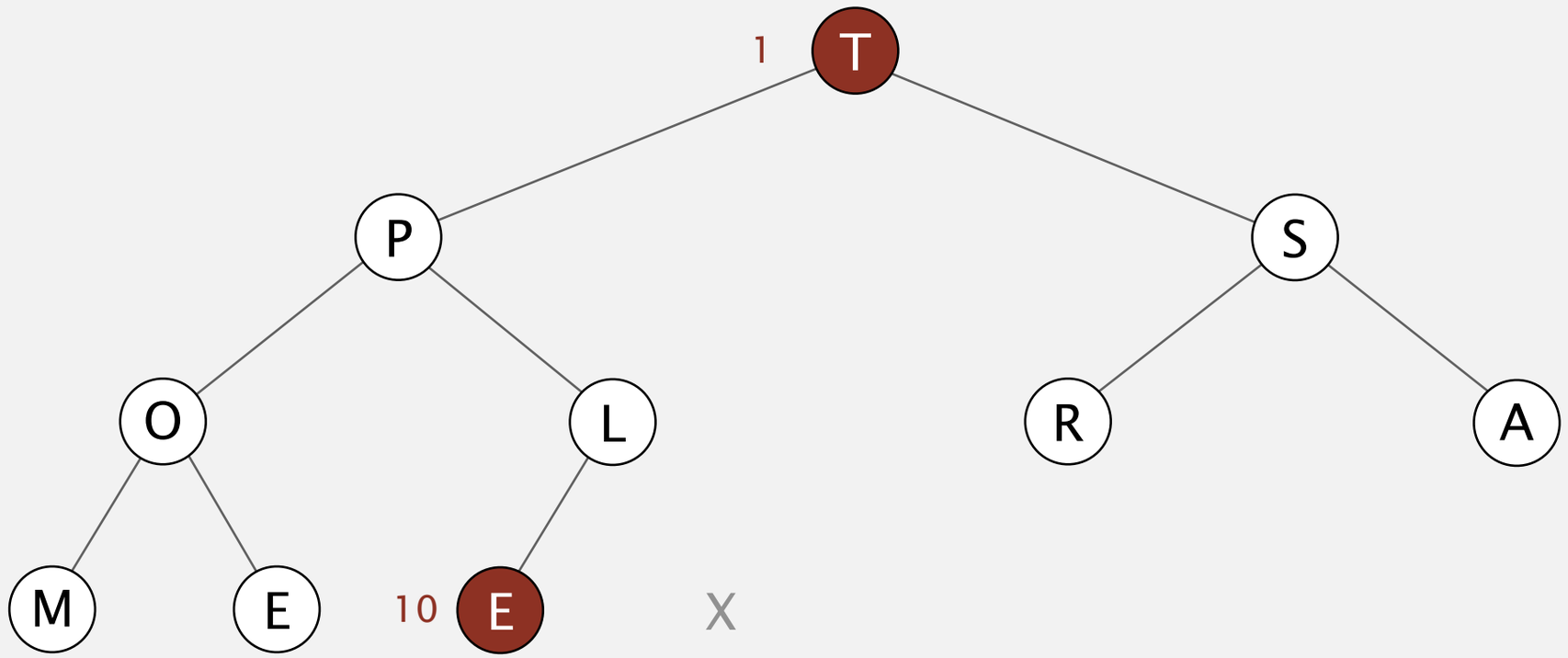
Sortdown. Repeatedly delete the largest remaining item.



T	P	S	O	L	R	A	M	E	E	X

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 10

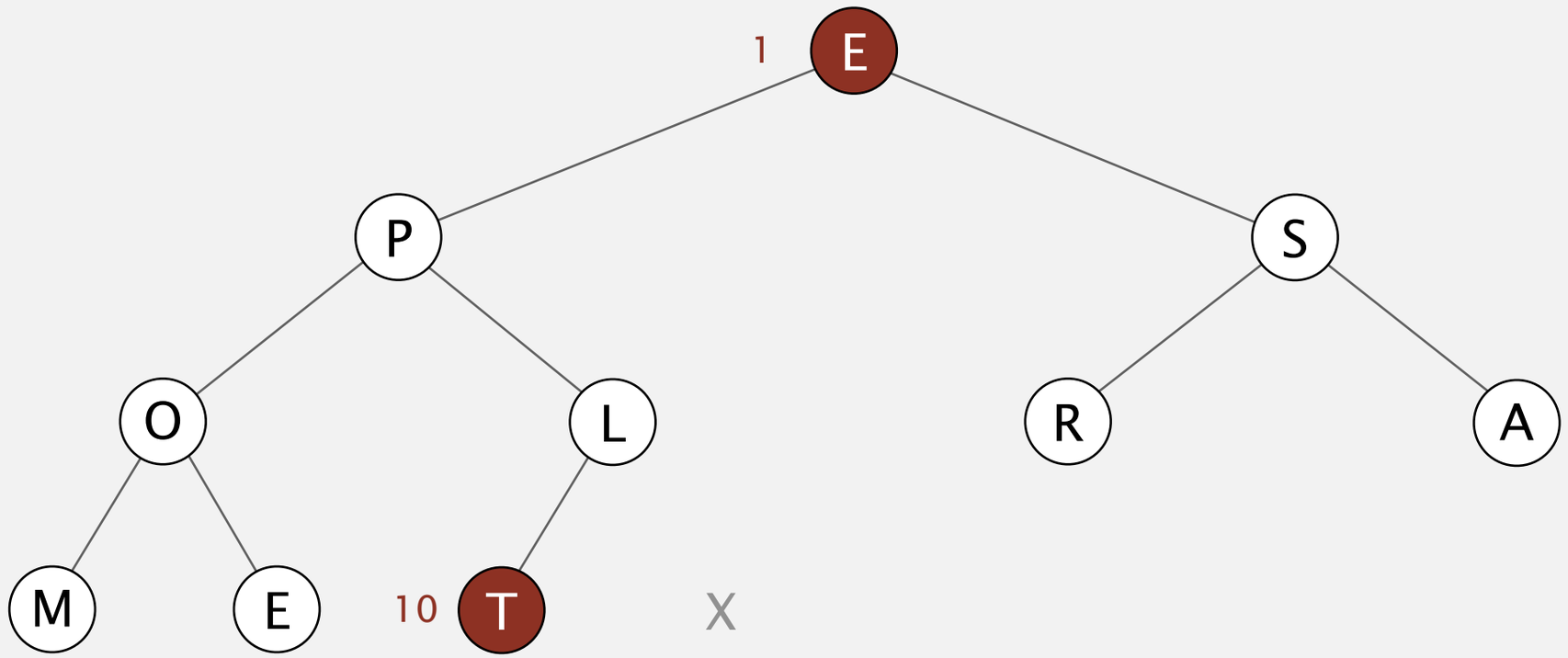


T	P	S	O	L	R	A	M	E	E	X
1									10	

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 10

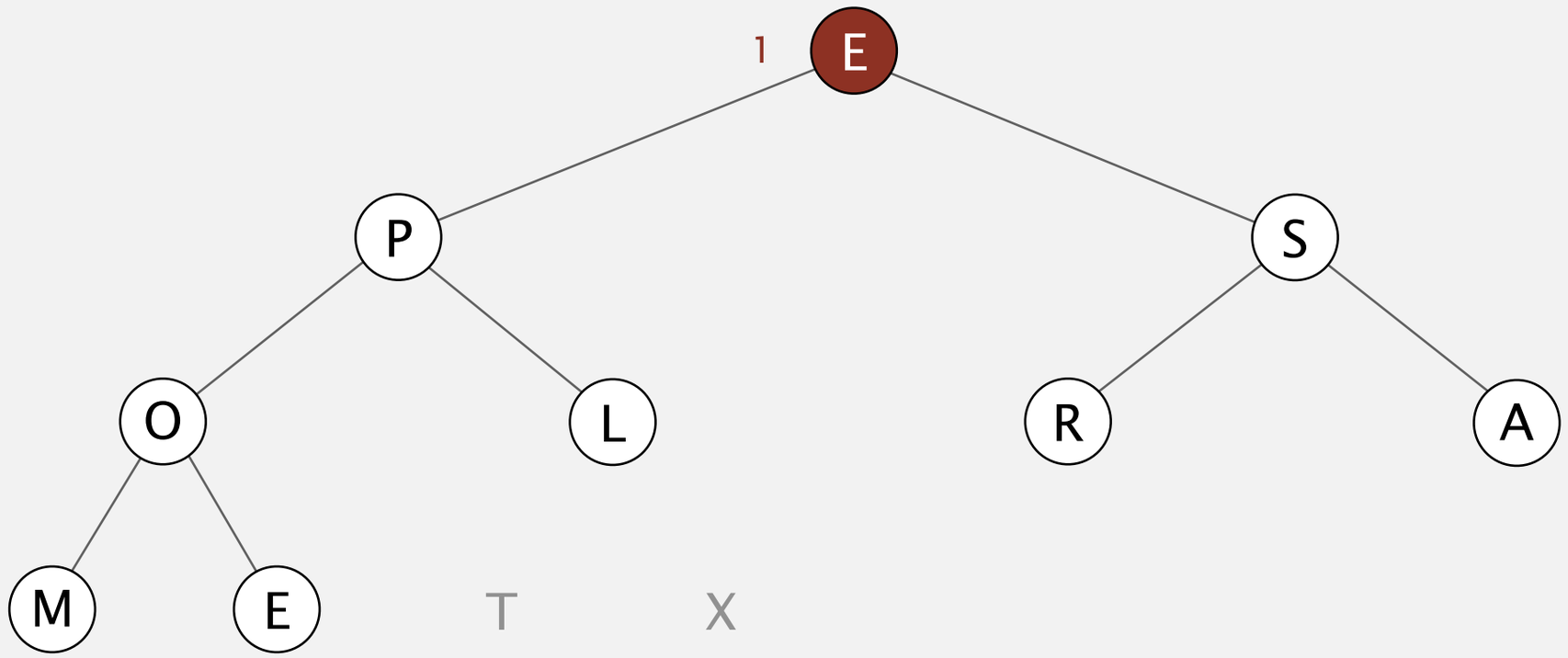


E	P	S	O	L	R	A	M	E	T	X
1									10	

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1

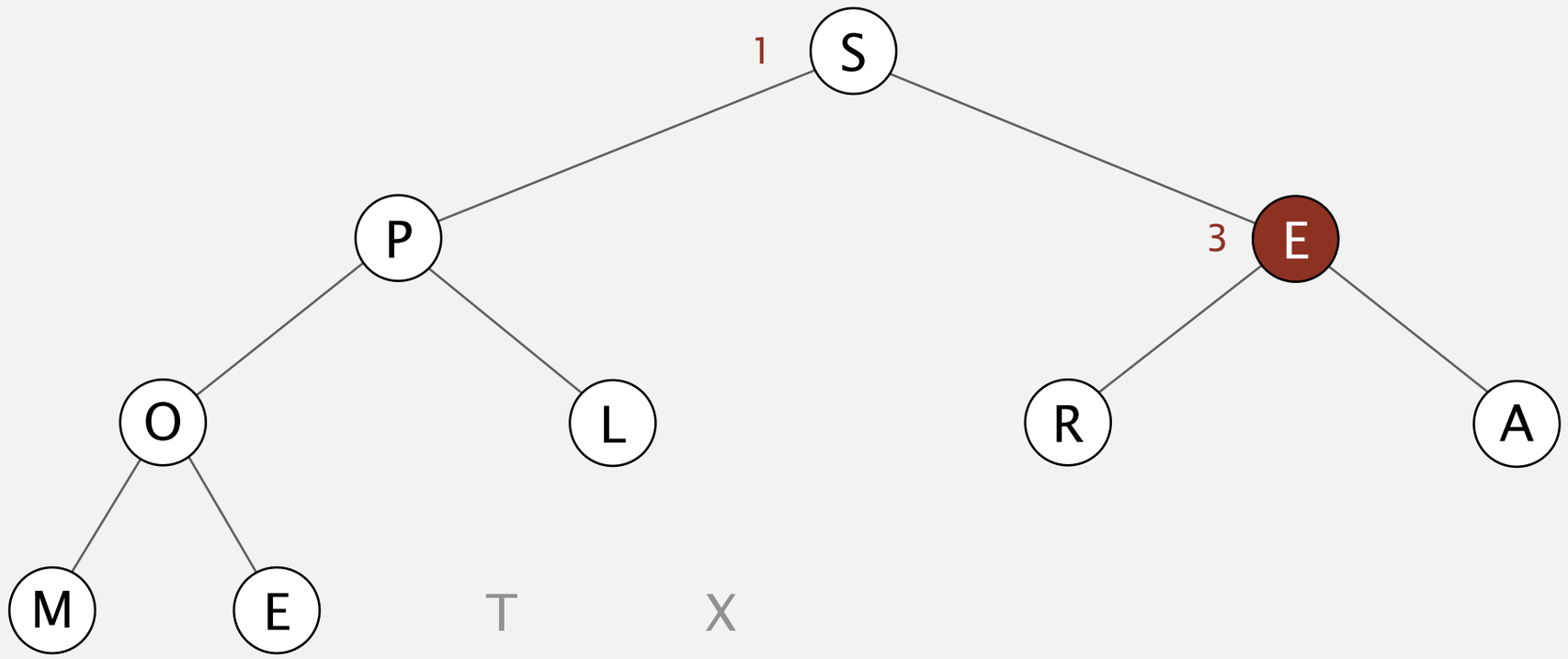


E	P	S	O	L	R	A	M	E	T	X
1										

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1

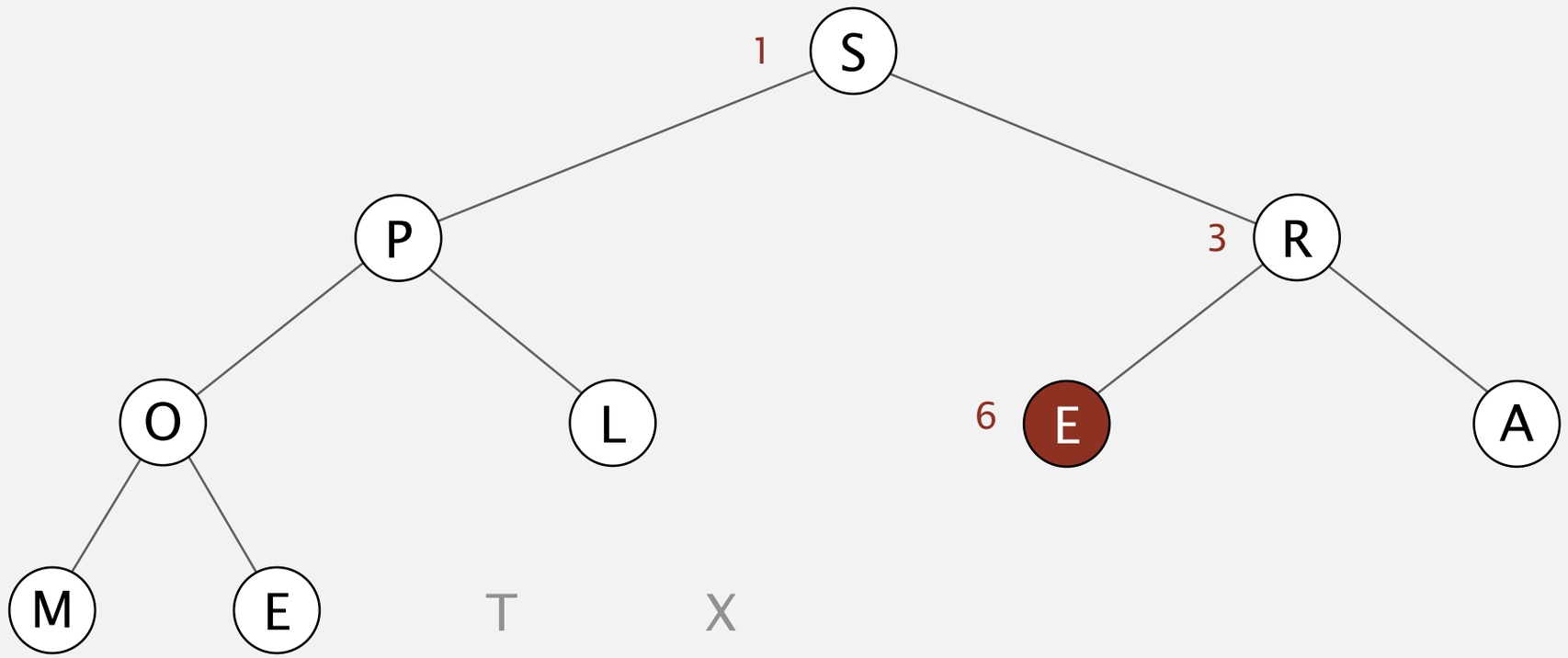


S	P	E	O	L	R	A	M	E	T	X
1		3								

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

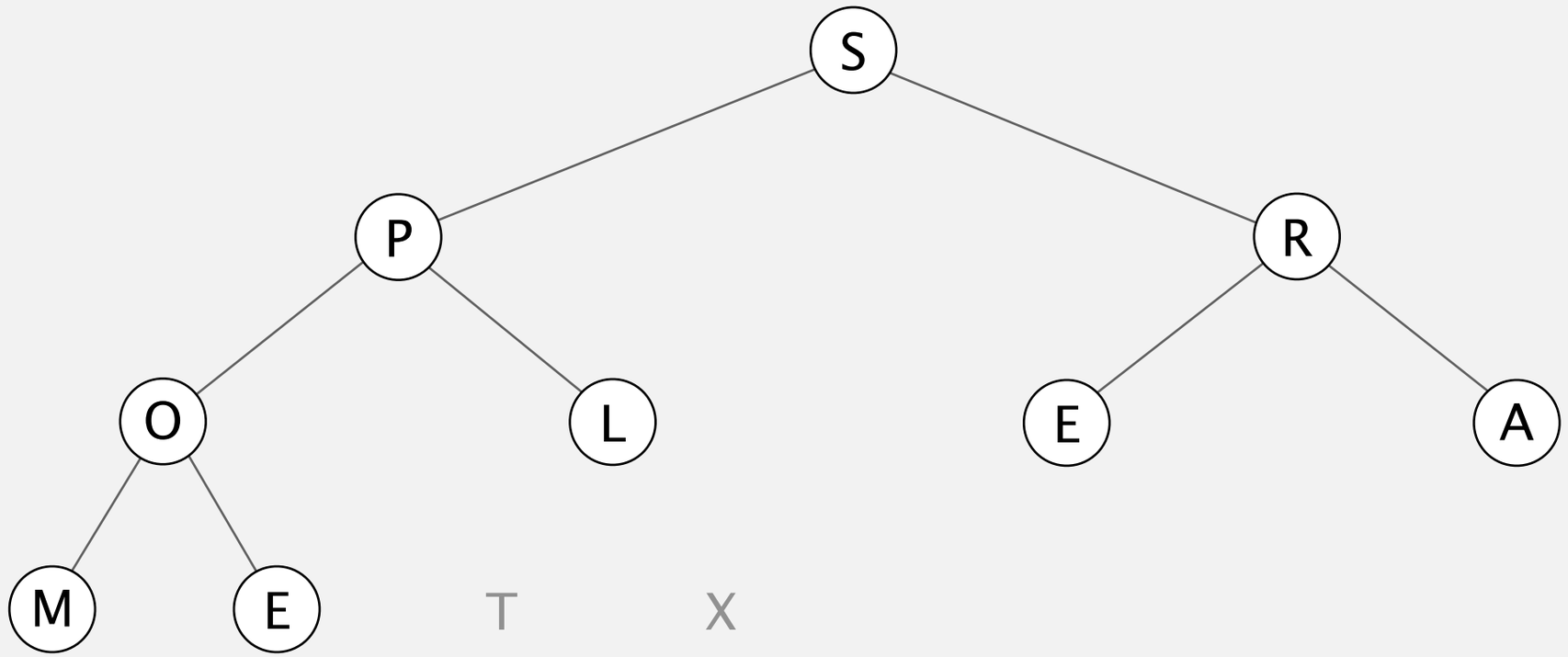
sink 1



S	P	R	O	L	E	A	M	E	T	X
1		3			6					

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

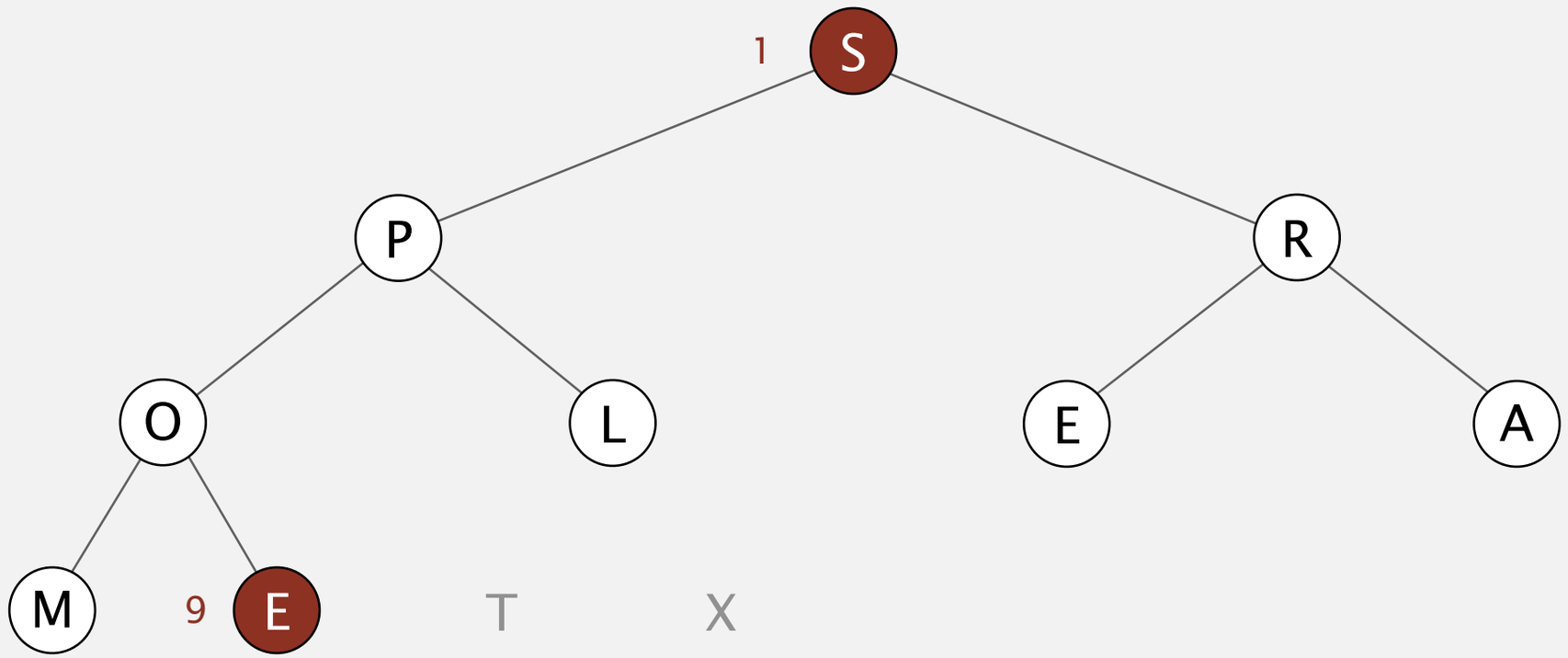


S	P	R	O	L	E	A	M	E	T	X

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 9

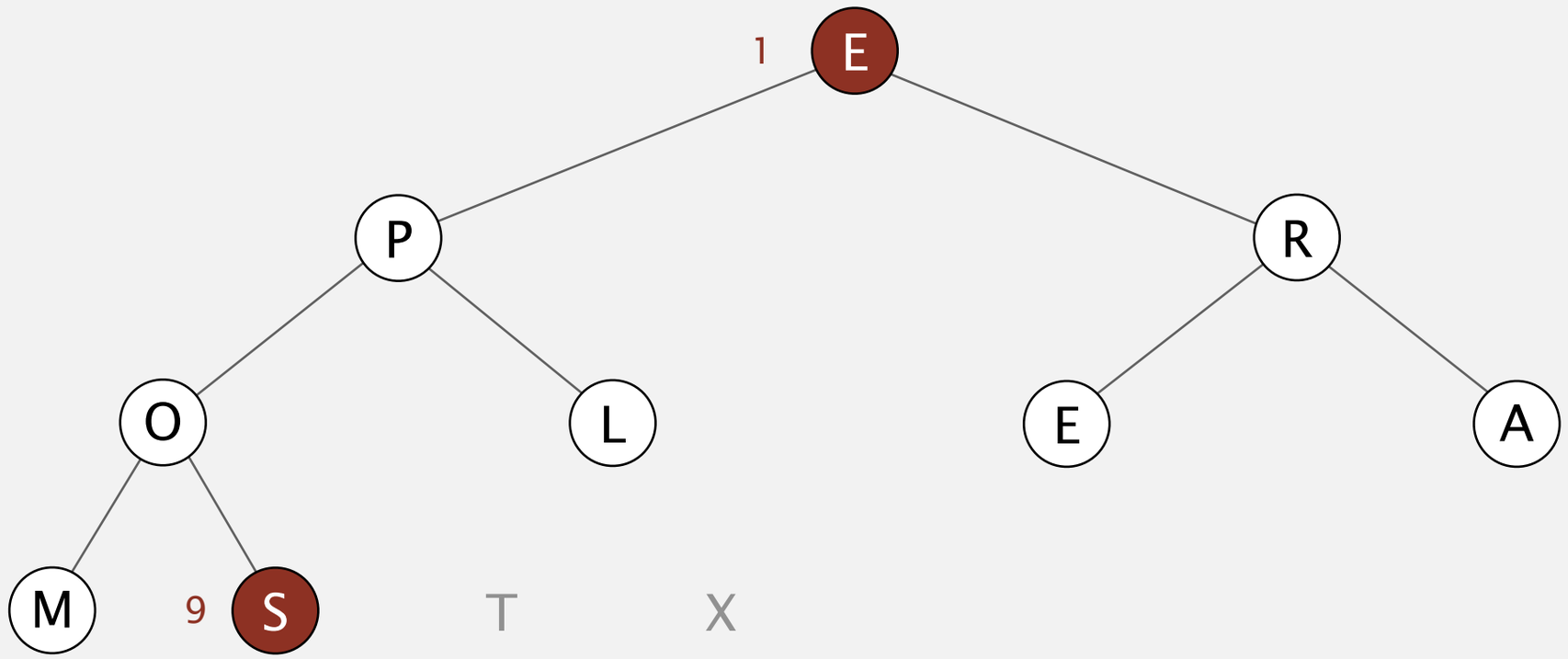


S	P	R	O	L	E	A	M	E	T	X
1								9		

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 9

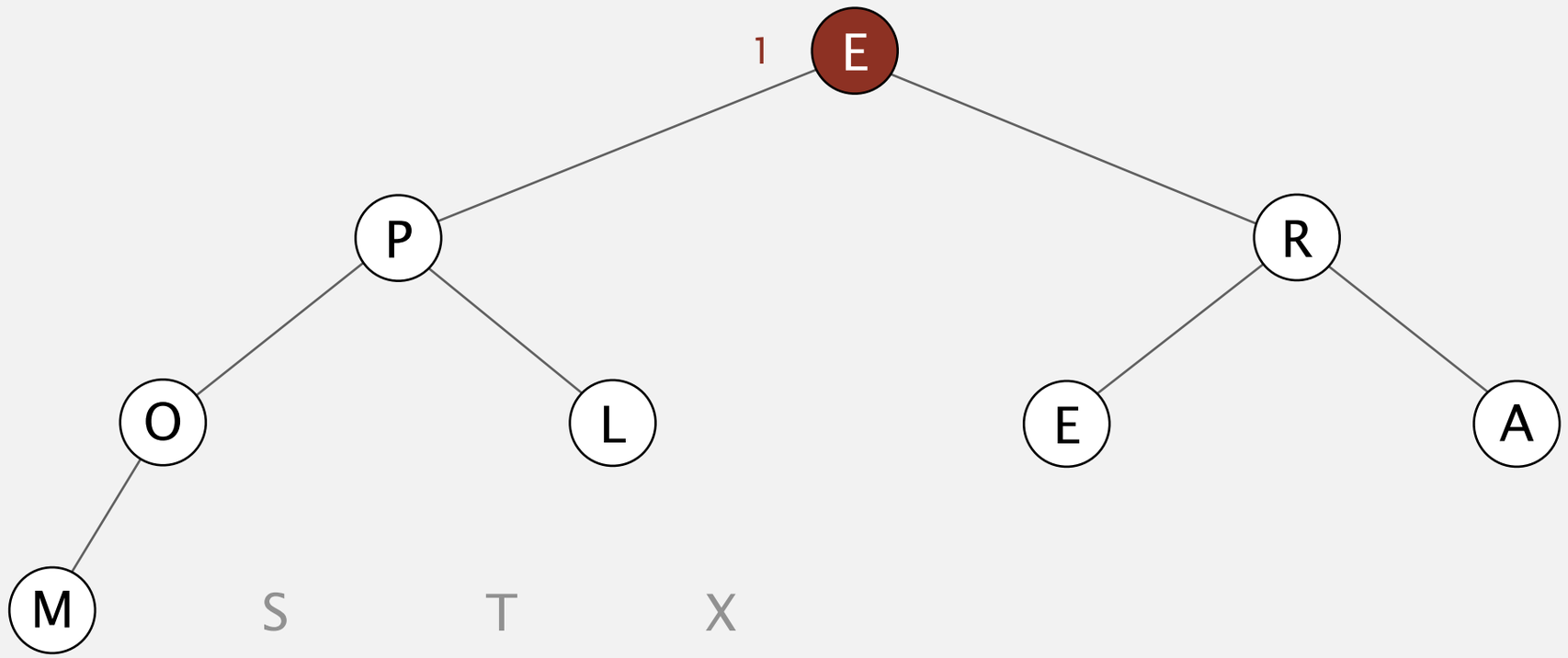


E	P	R	O	L	E	A	M	S	T	X
1								9		

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

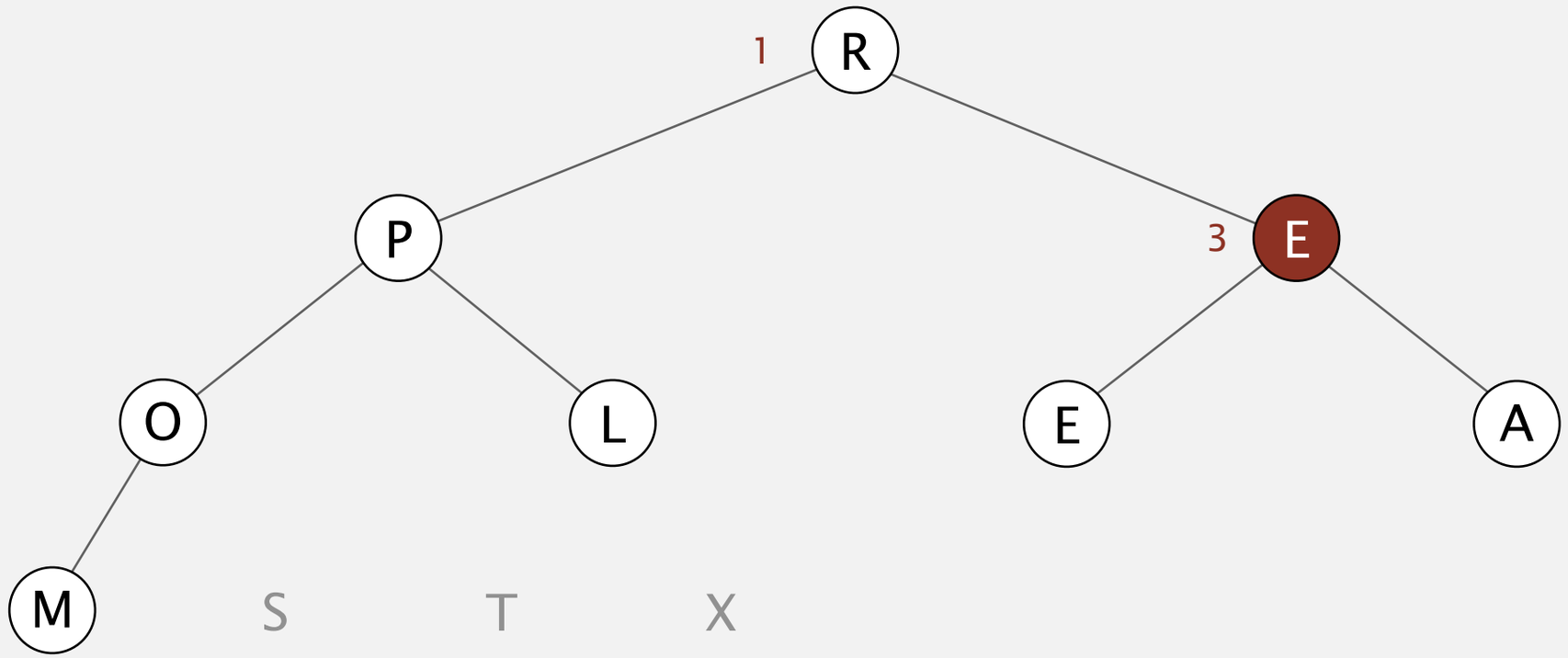
sink 1



E	P	R	O	L	E	A	M	S	T	X
1										

Sortdown. Repeatedly delete the largest remaining item.

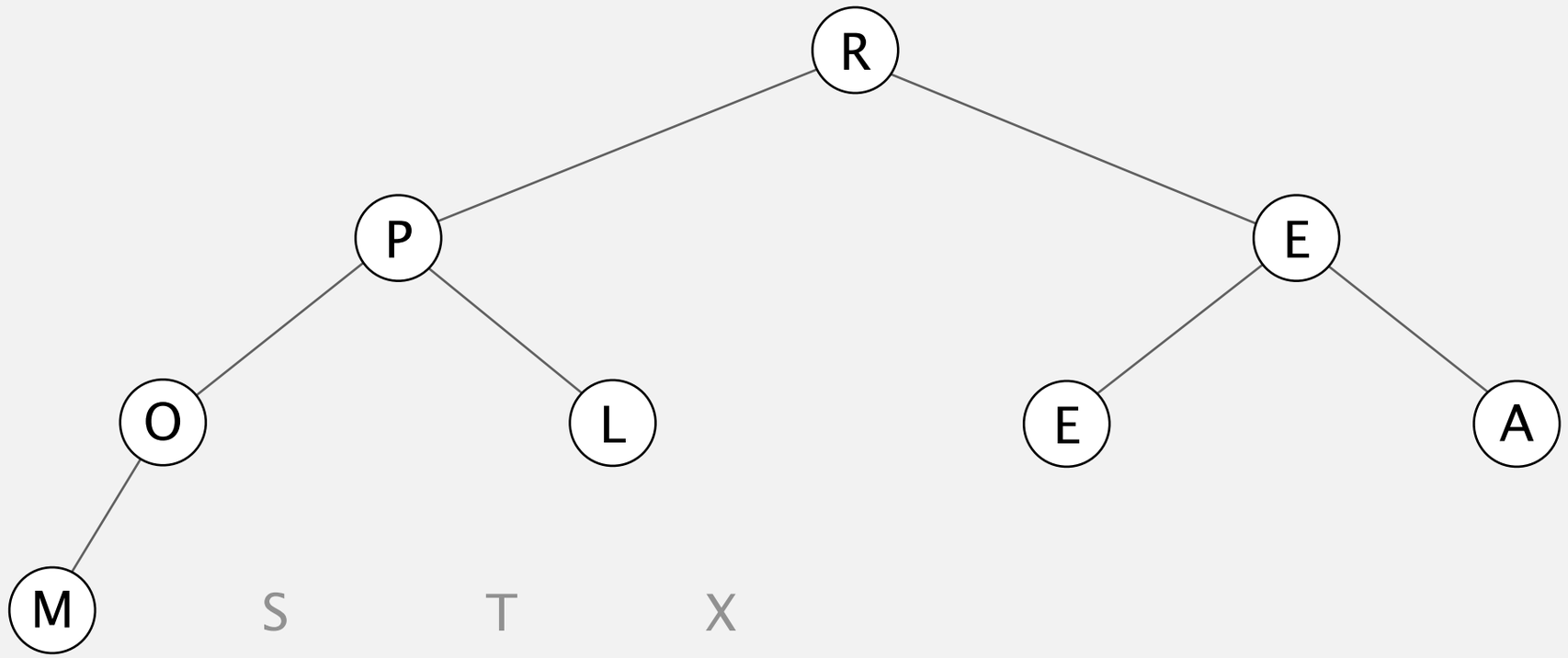
sink 1



R	P	E	O	L	E	A	M	S	T	X
1		3								

Heapsort

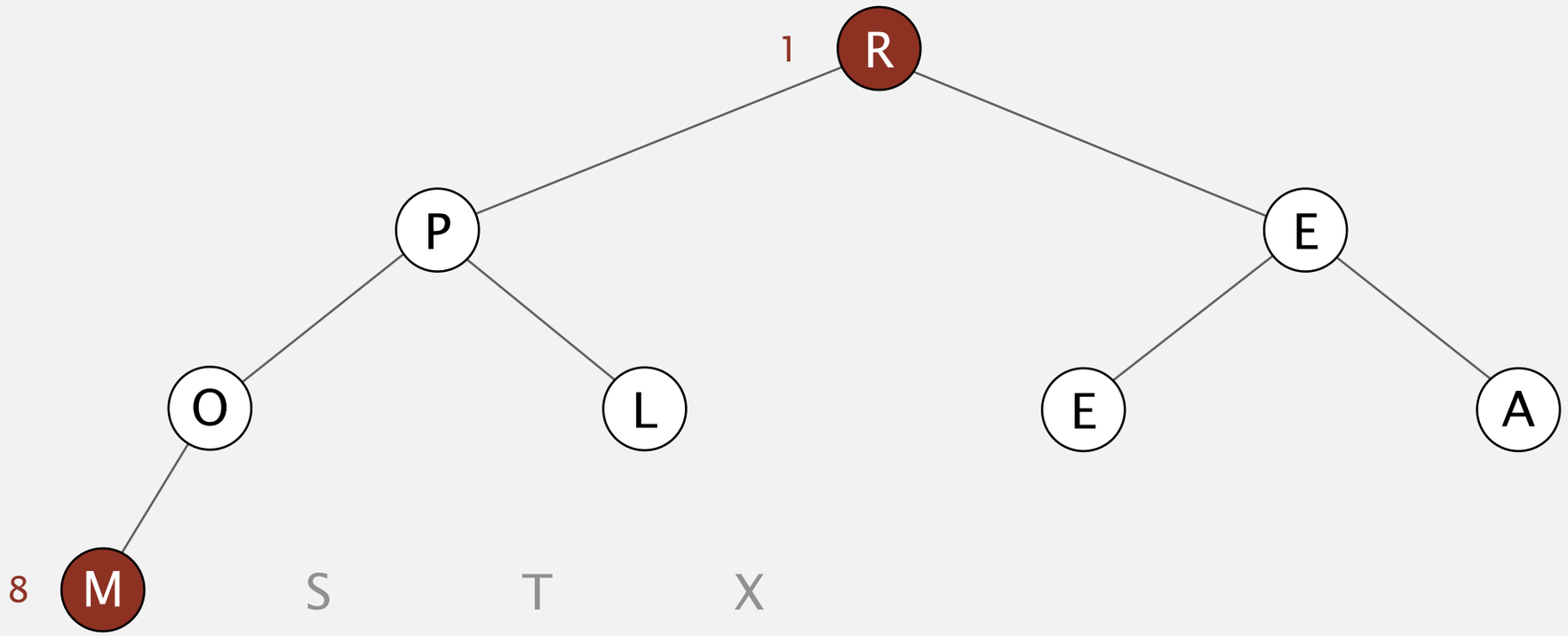
Sortdown. Repeatedly delete the largest remaining item.



R	P	E	O	L	E	A	M	S	T	X

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 8

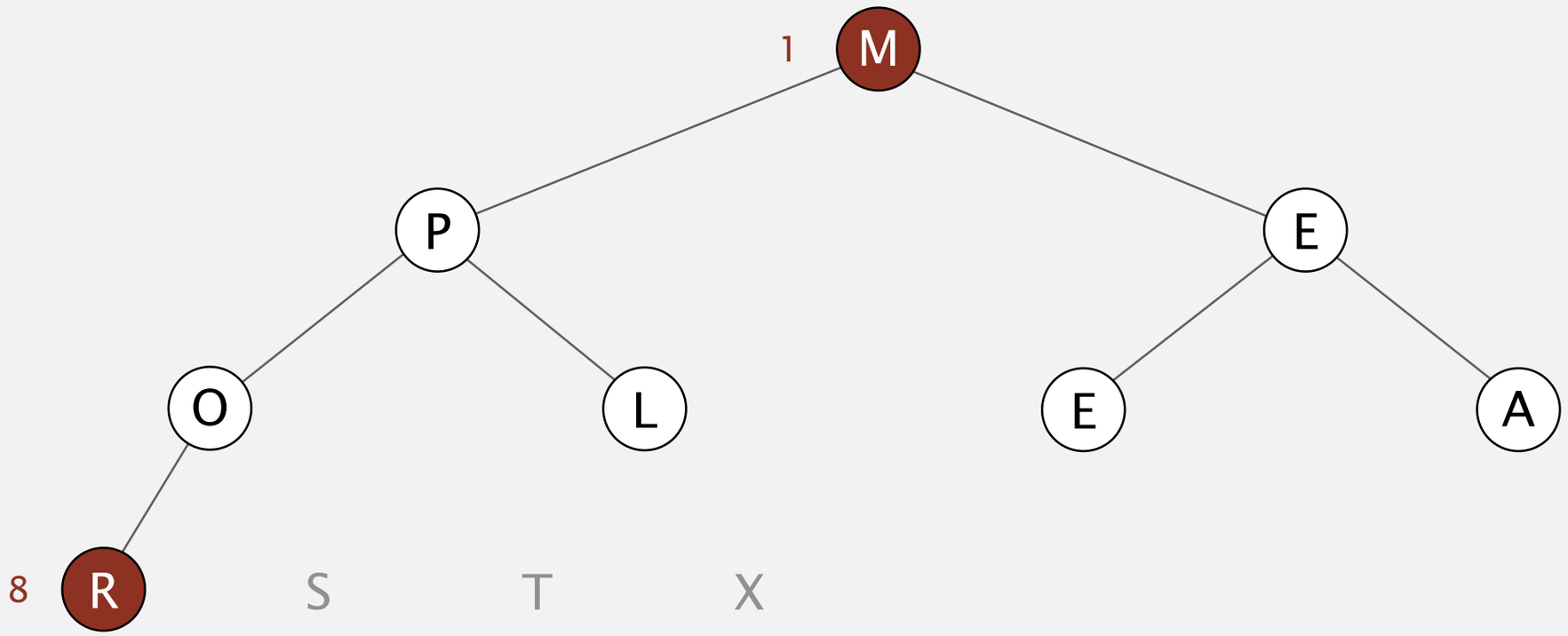


R	P	E	O	L	E	A	M	S	T	X
1							8			

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 8

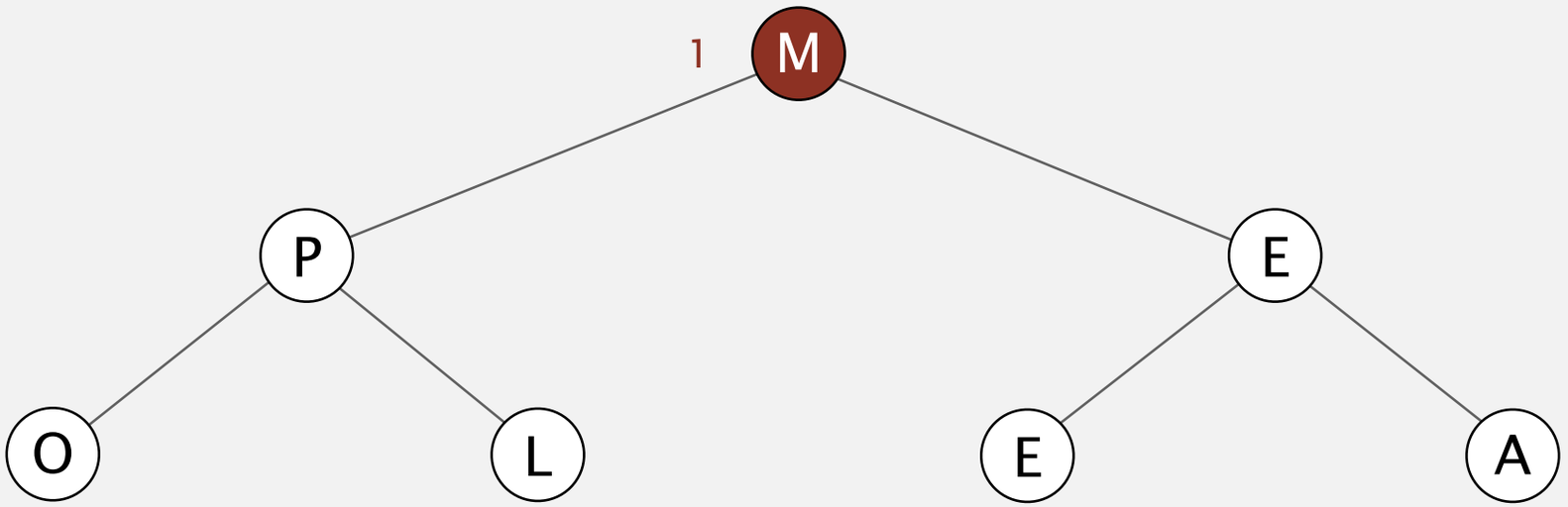


M	P	E	O	L	E	A	R	S	T	X
1							8			

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1

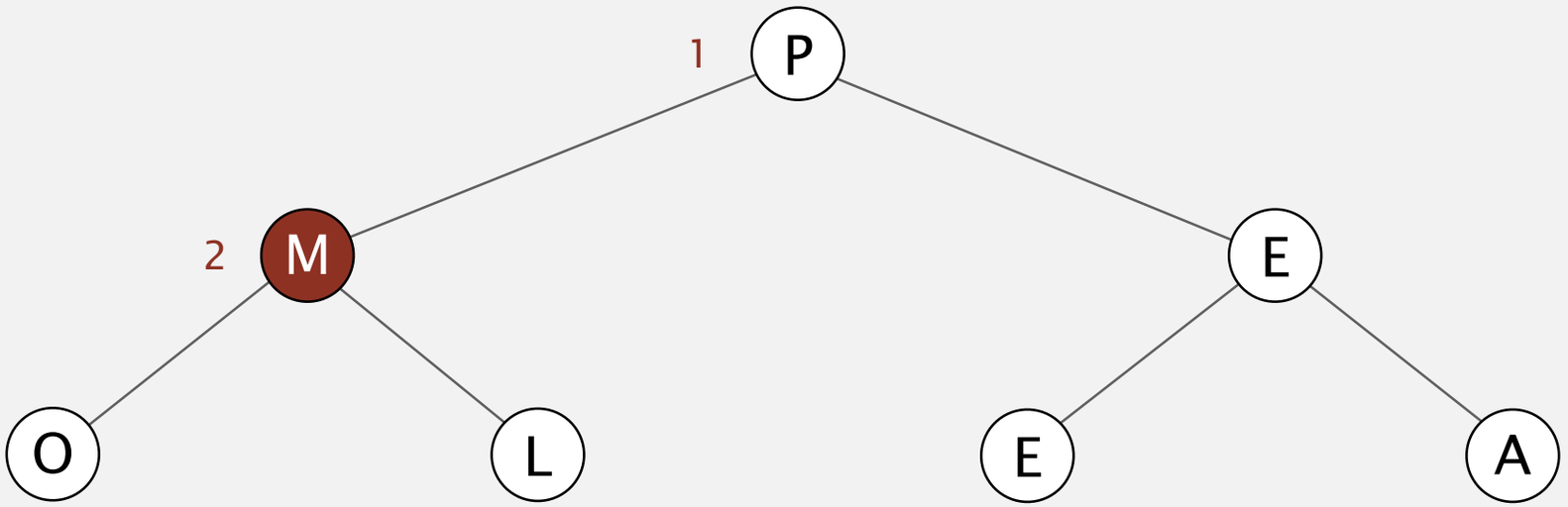


R S T X

M	P	E	O	L	E	A	R	S	T	X
1										

Sortdown. Repeatedly delete the largest remaining item.

sink 1



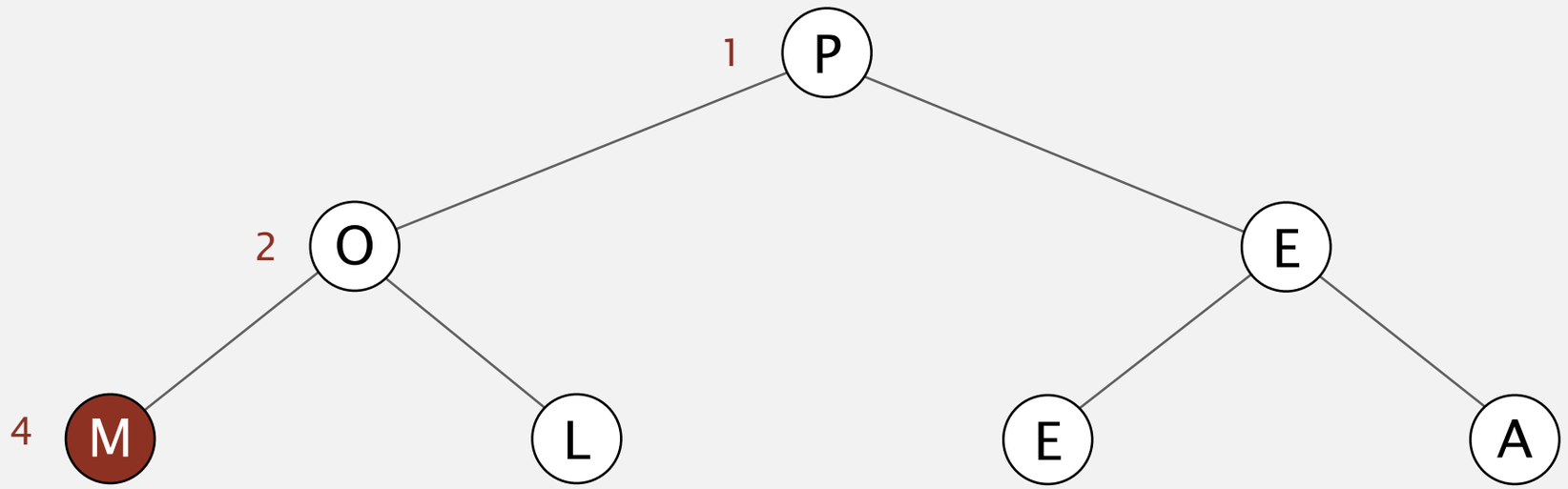
R S T X

P	M	E	O	L	E	A	R	S	T	X
1	2									

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1

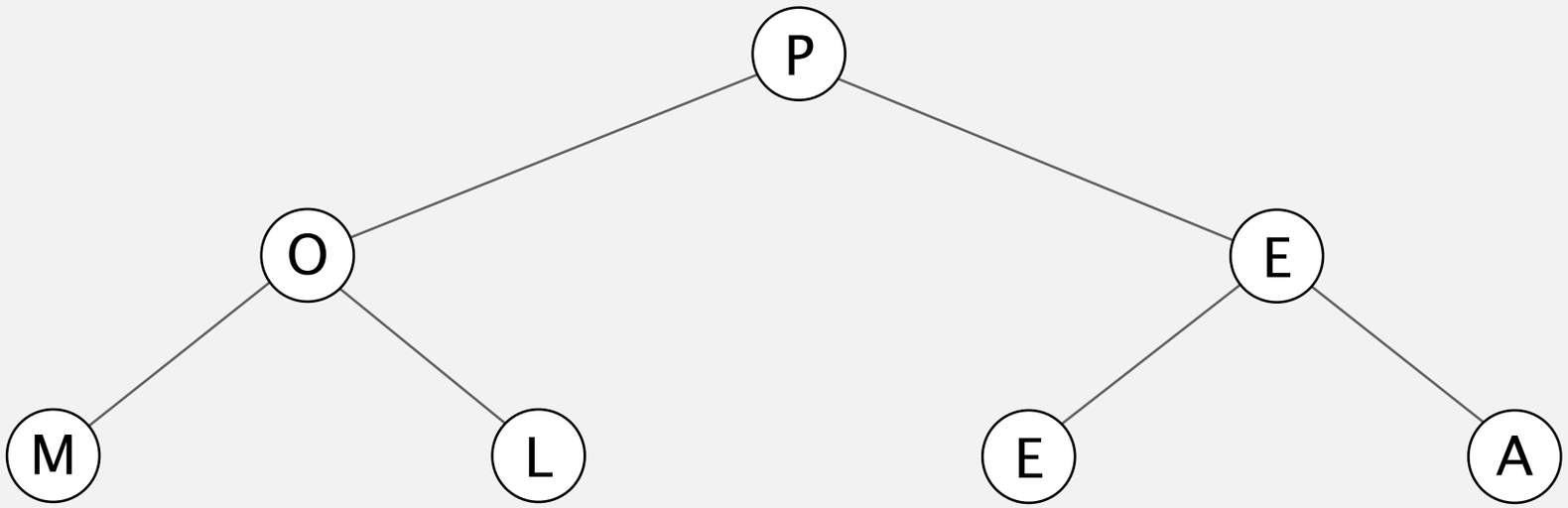


R S T X

P	O	E	M	L	E	A	R	S	T	X
1	2		4							

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

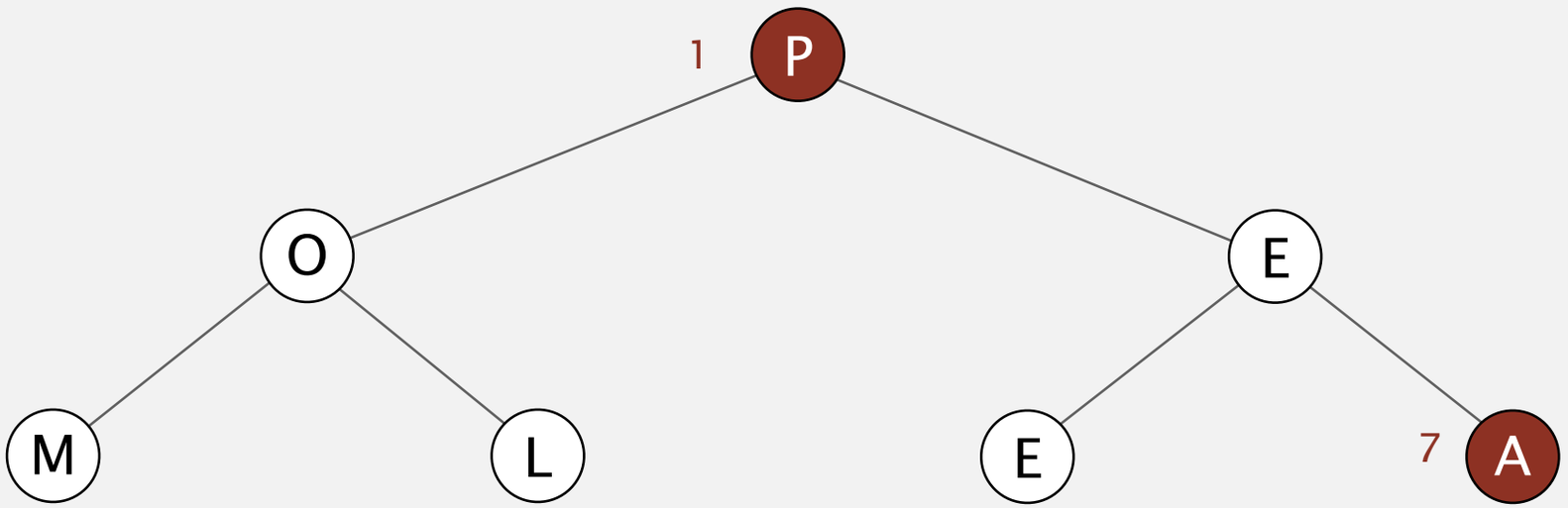


R S T X

P	O	E	M	L	E	A	R	S	T	X

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 7

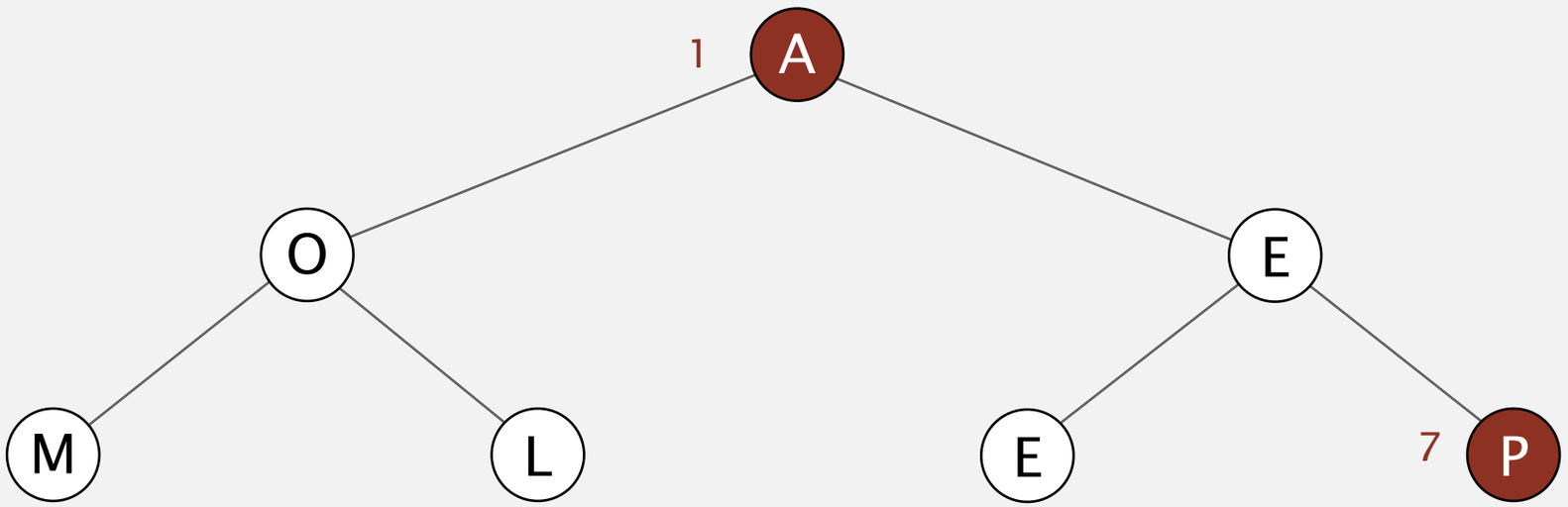


R S T X

P	O	E	M	L	E	A	R	S	T	X
1						7				

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 7



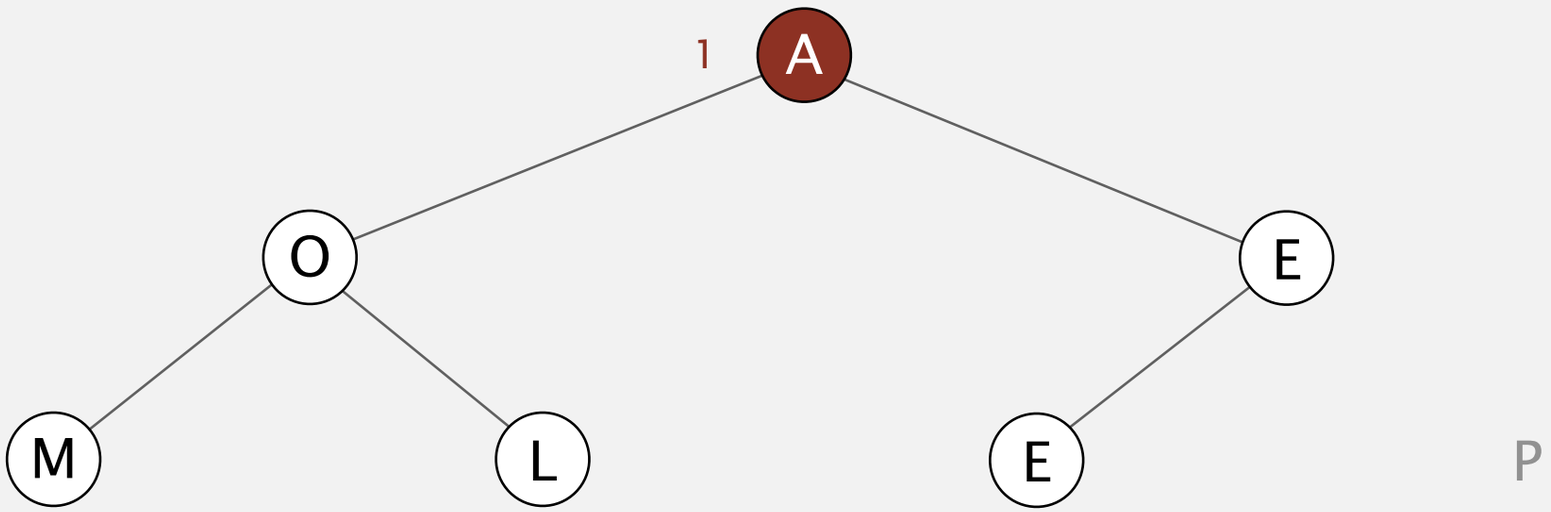
R S T X

A	O	E	M	L	E	P	R	S	T	X
1						7				

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1



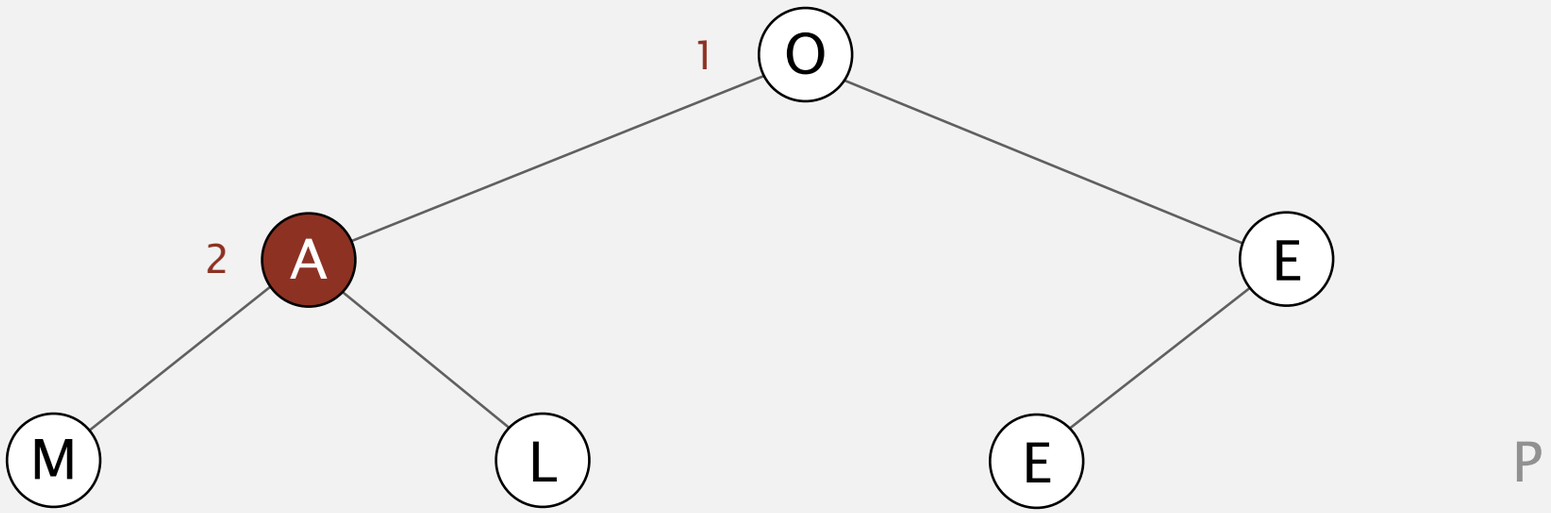
R S T X

A	O	E	M	L	E	P	R	S	T	X
1										

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

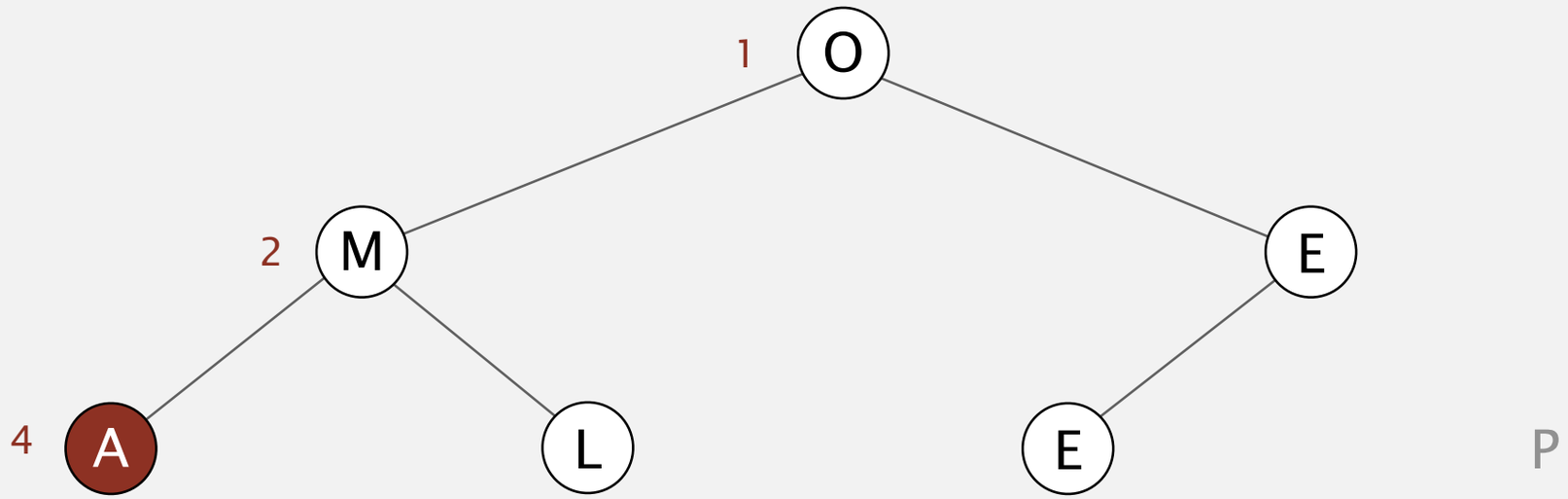
sink 1



	O	A	E	M	L	E	P	R	S	T	X
	1	2									

Sortdown. Repeatedly delete the largest remaining item.

sink 1

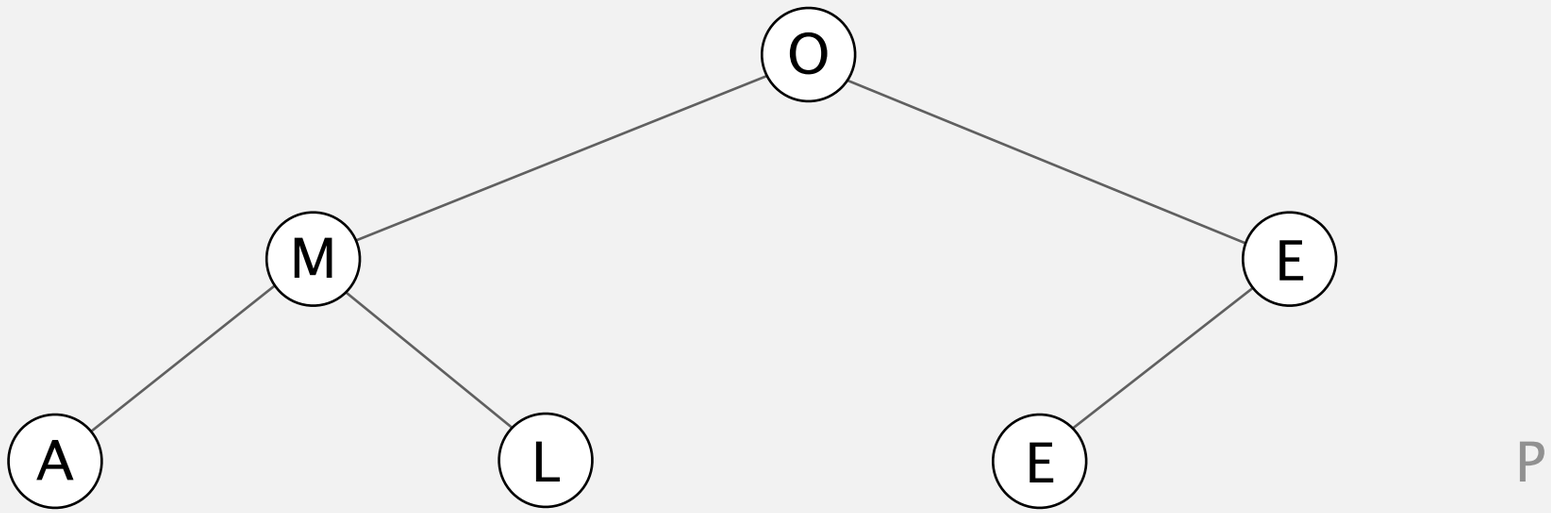


O	M	E	A	L	E	P	R	S	T	X
1	2		4							

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1

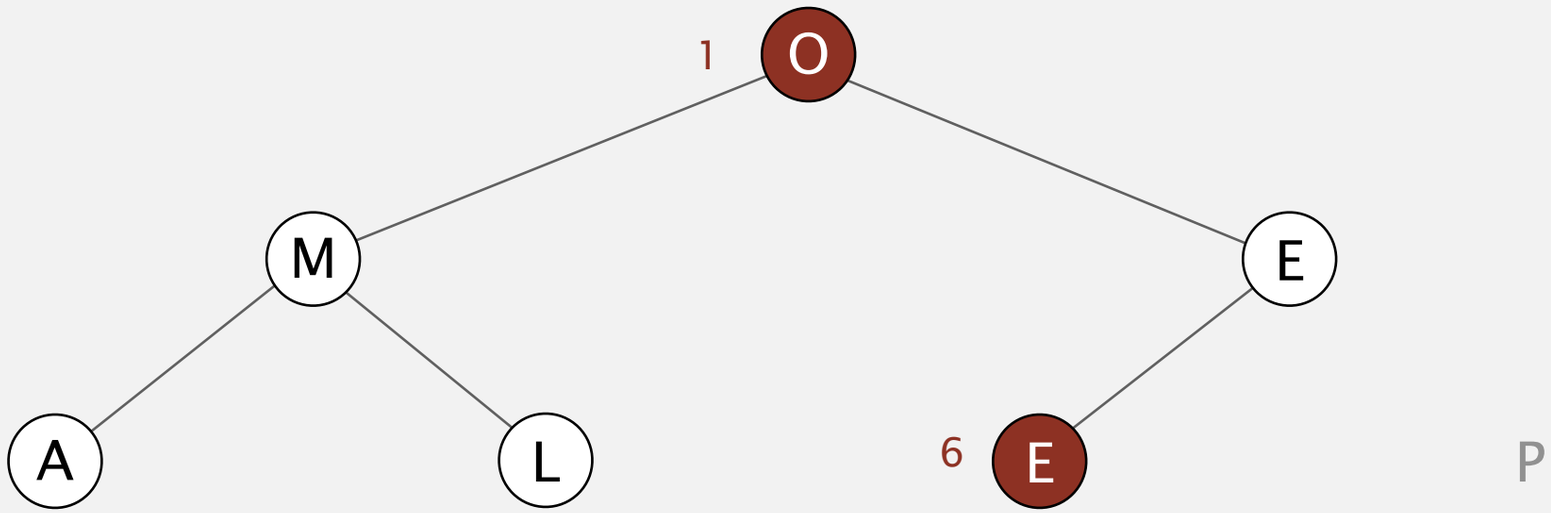


O	M	E	A	L	E	P	R	S	T	X

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 6

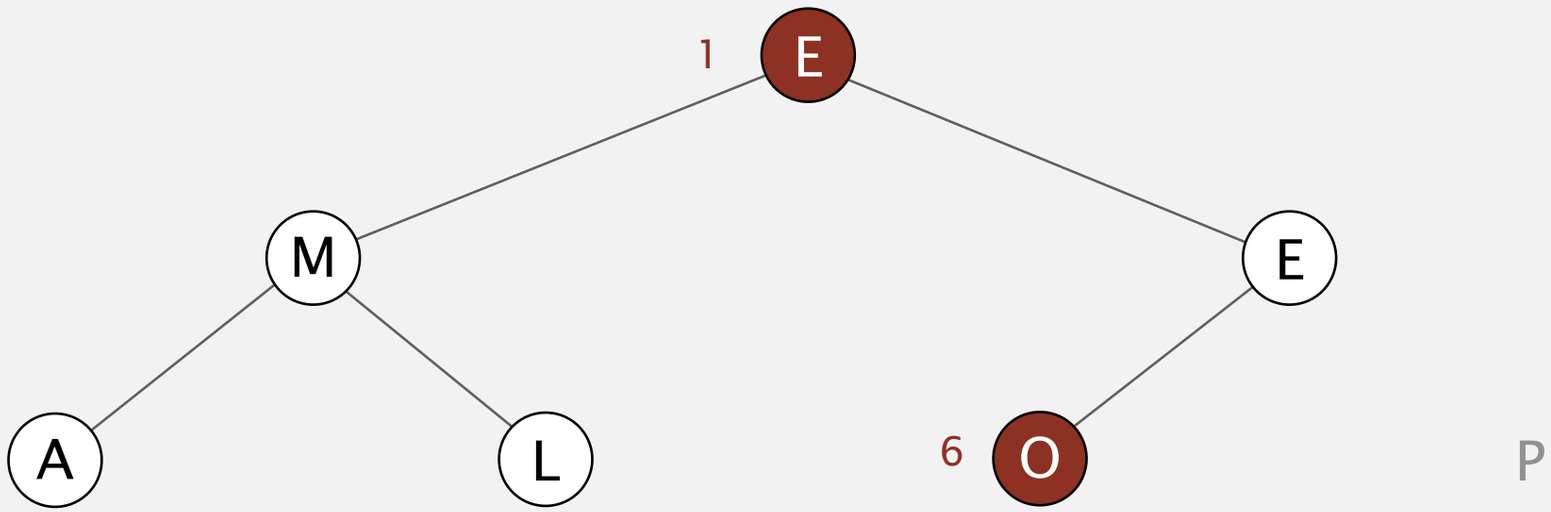


O	M	E	A	L	E	P	R	S	T	X
1					6					

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 6

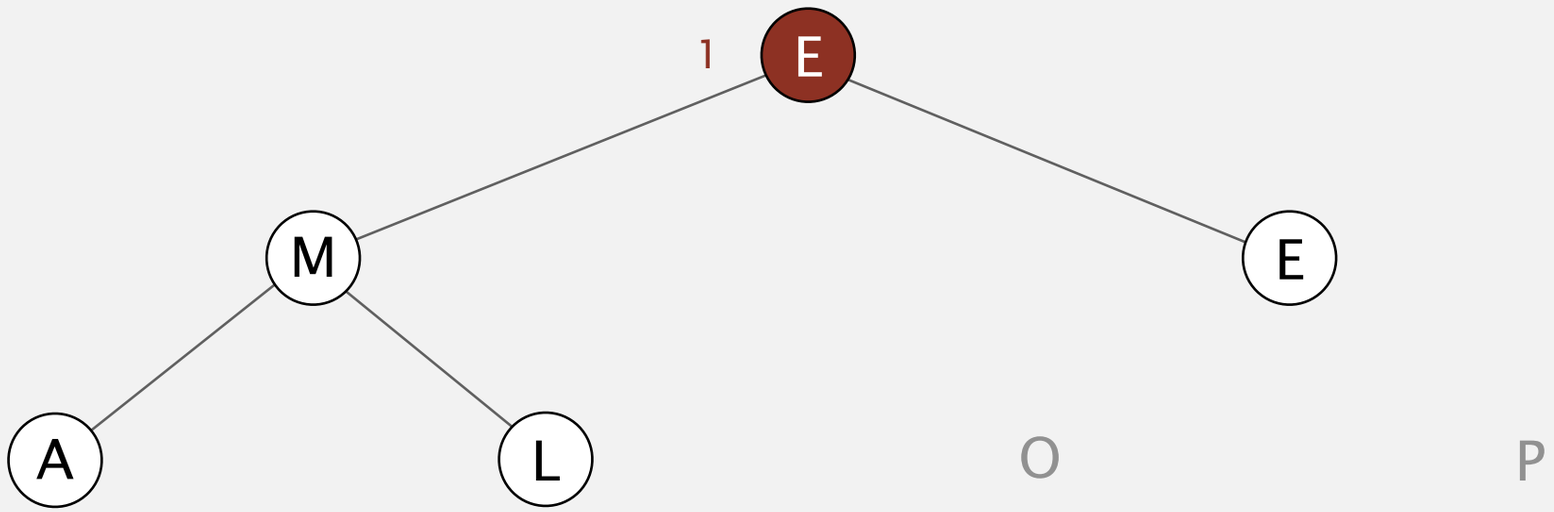


E	M	E	A	L	O	P	R	S	T	X
1					6					

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

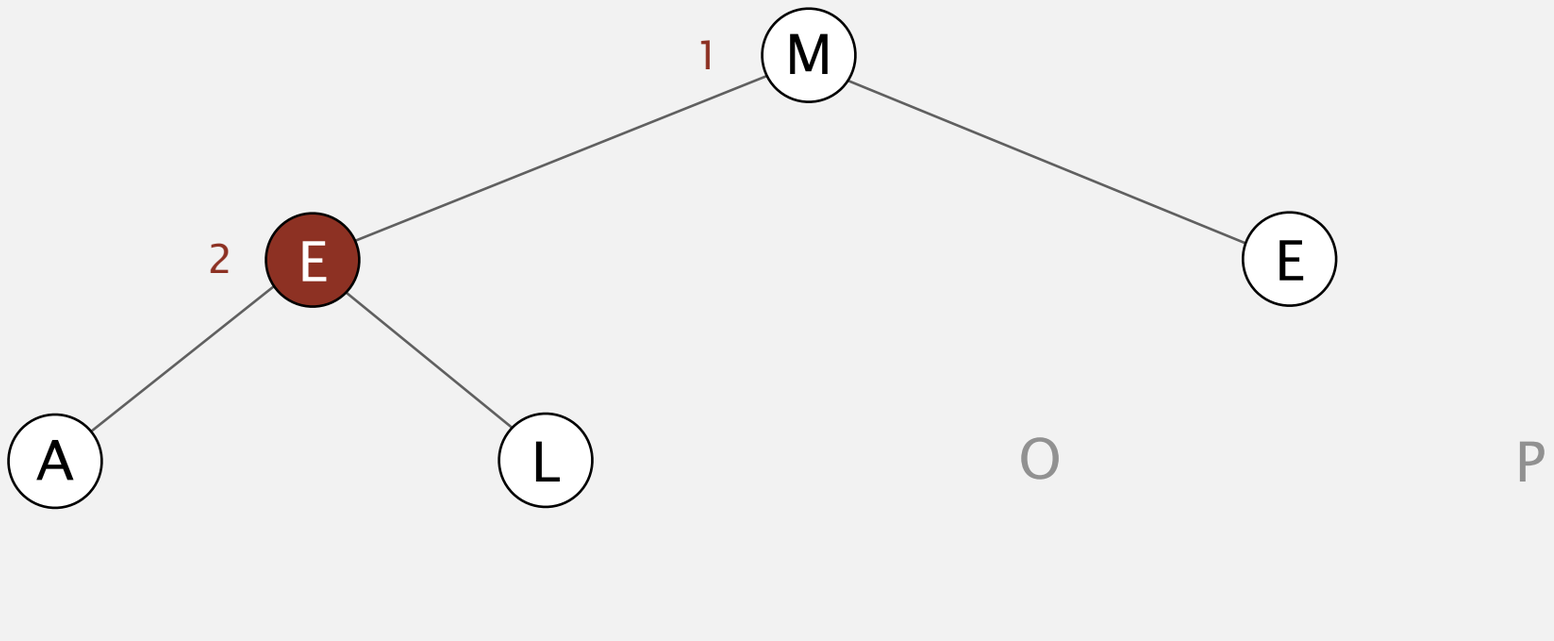
sink 1



E	M	E	A	L	O	P	R	S	T	X
1										

Sortdown. Repeatedly delete the largest remaining item.

sink 1

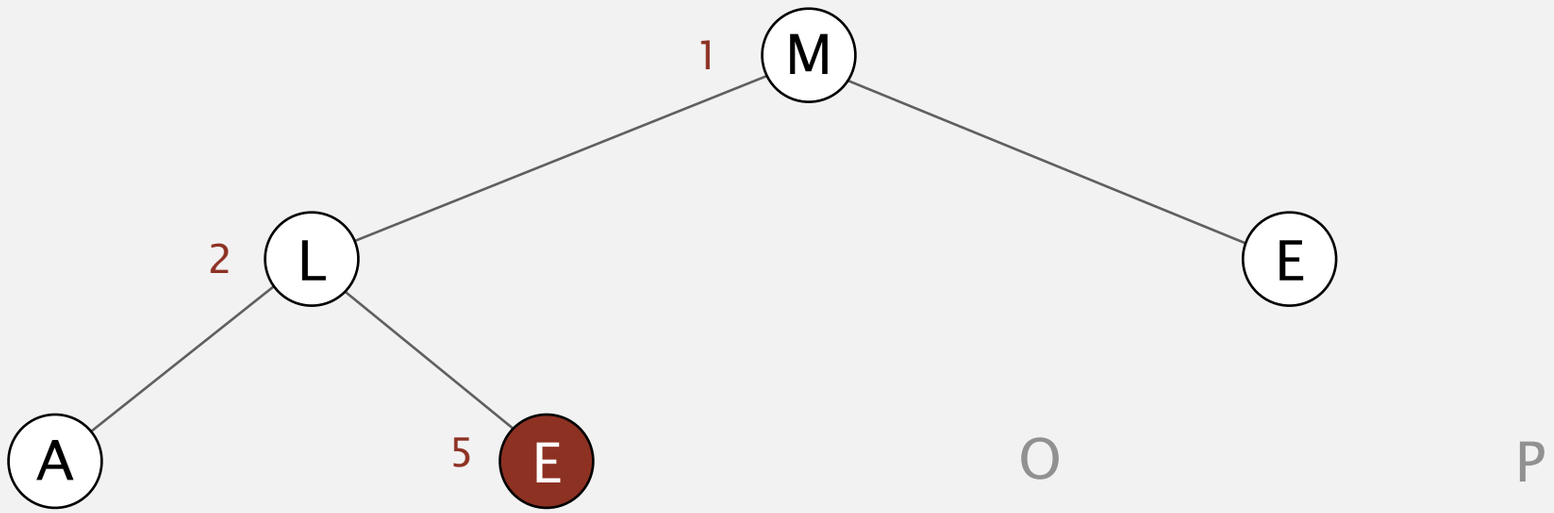


M	E	E	A	L	O	P	R	S	T	X
1	2									

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

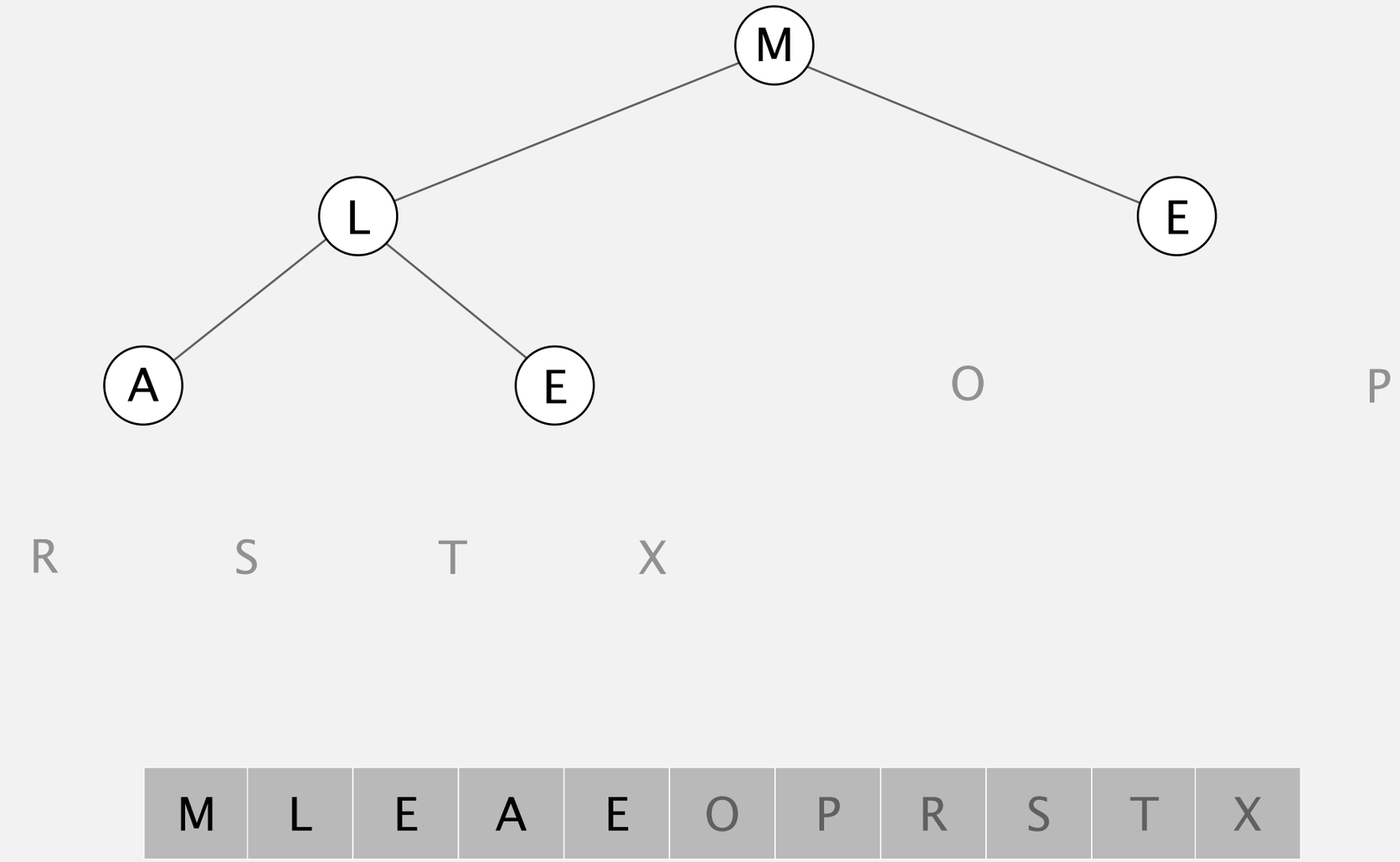
sink 1



M	L	E	A	E	O	P	R	S	T	X
1	2			5						

Heapsort

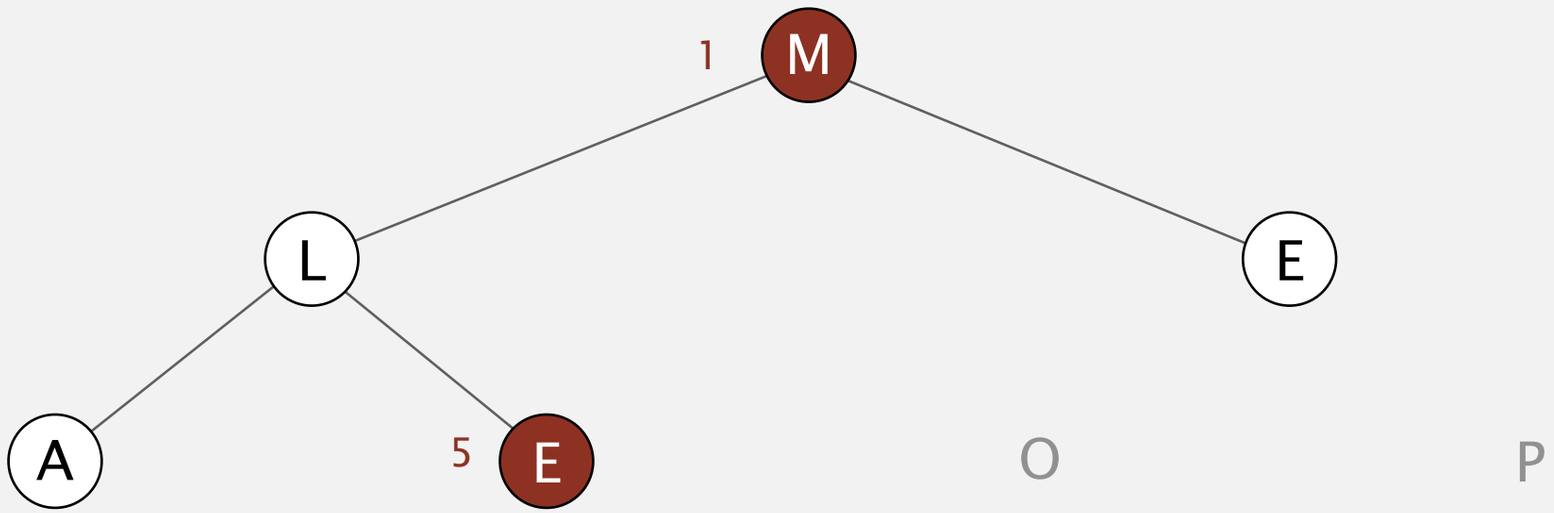
Sortdown. Repeatedly delete the largest remaining item.



Heapsort

Sortdown. Repeatedly delete the largest remaining item.

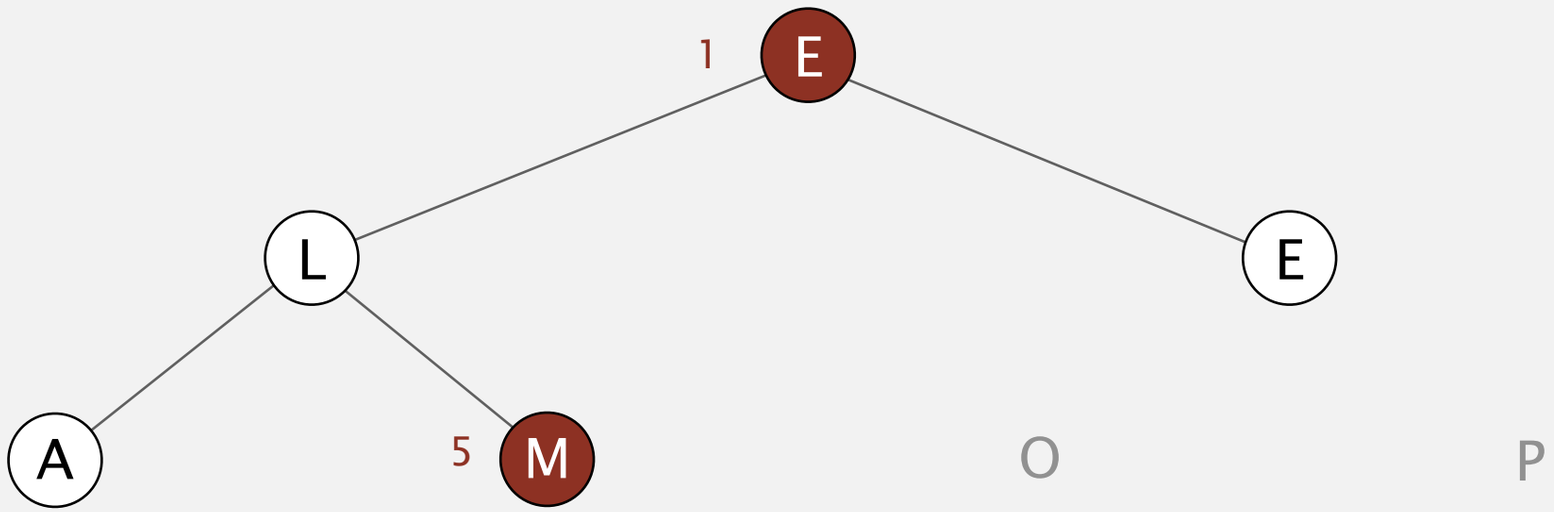
exchange 1 and 5



M	L	E	A	E	O	P	R	S	T	X
1				5						

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 5

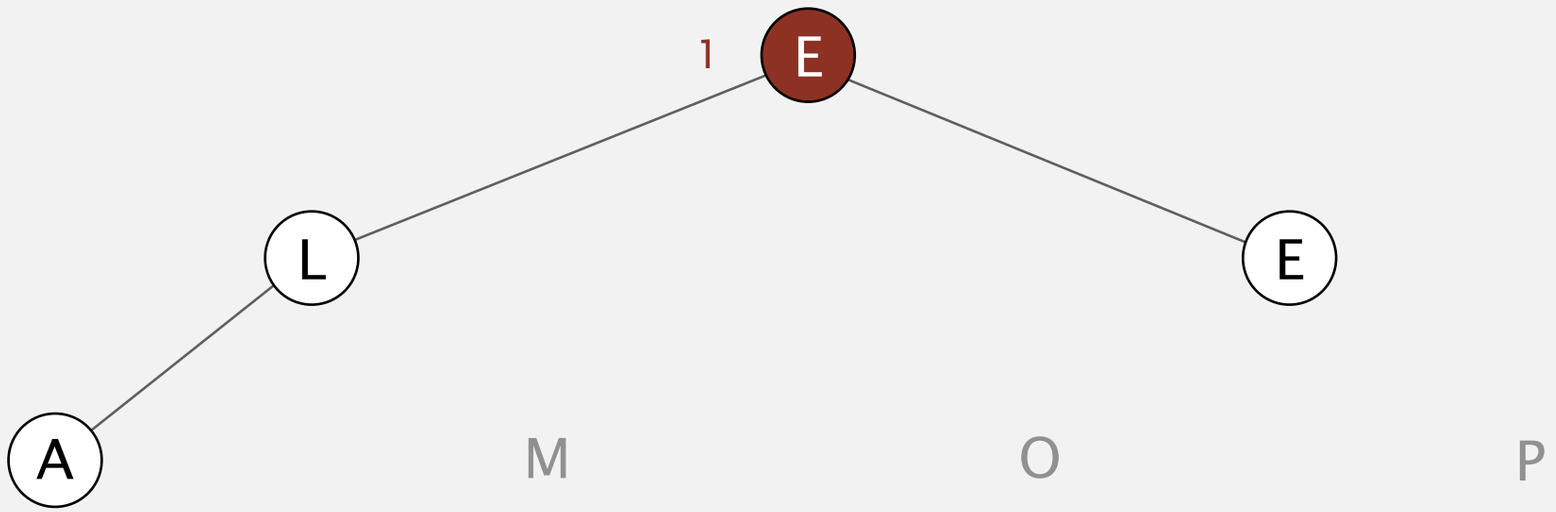


E	L	E	A	M	O	P	R	S	T	X
1				5						

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

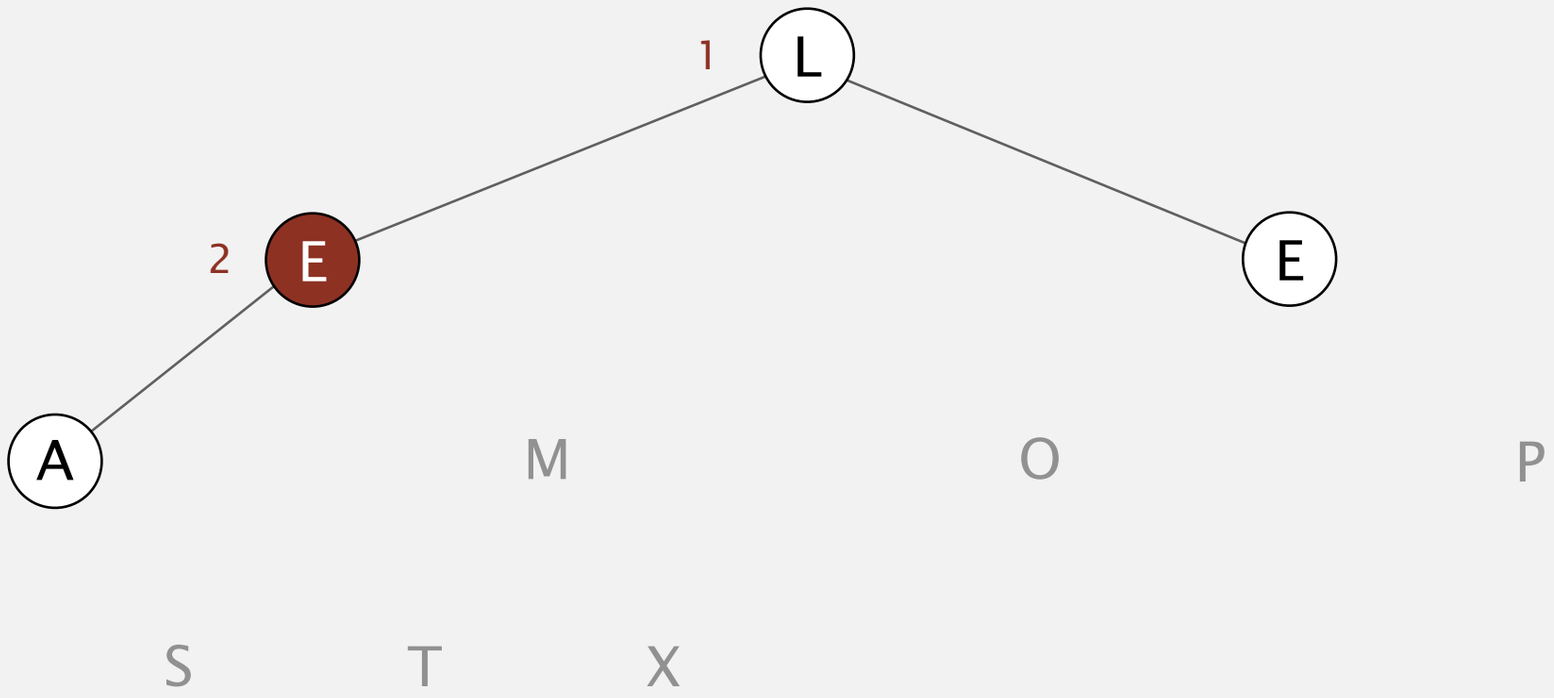
sink 1



E	L	E	A	M	O	P	R	S	T	X
1										

Sortdown. Repeatedly delete the largest remaining item.

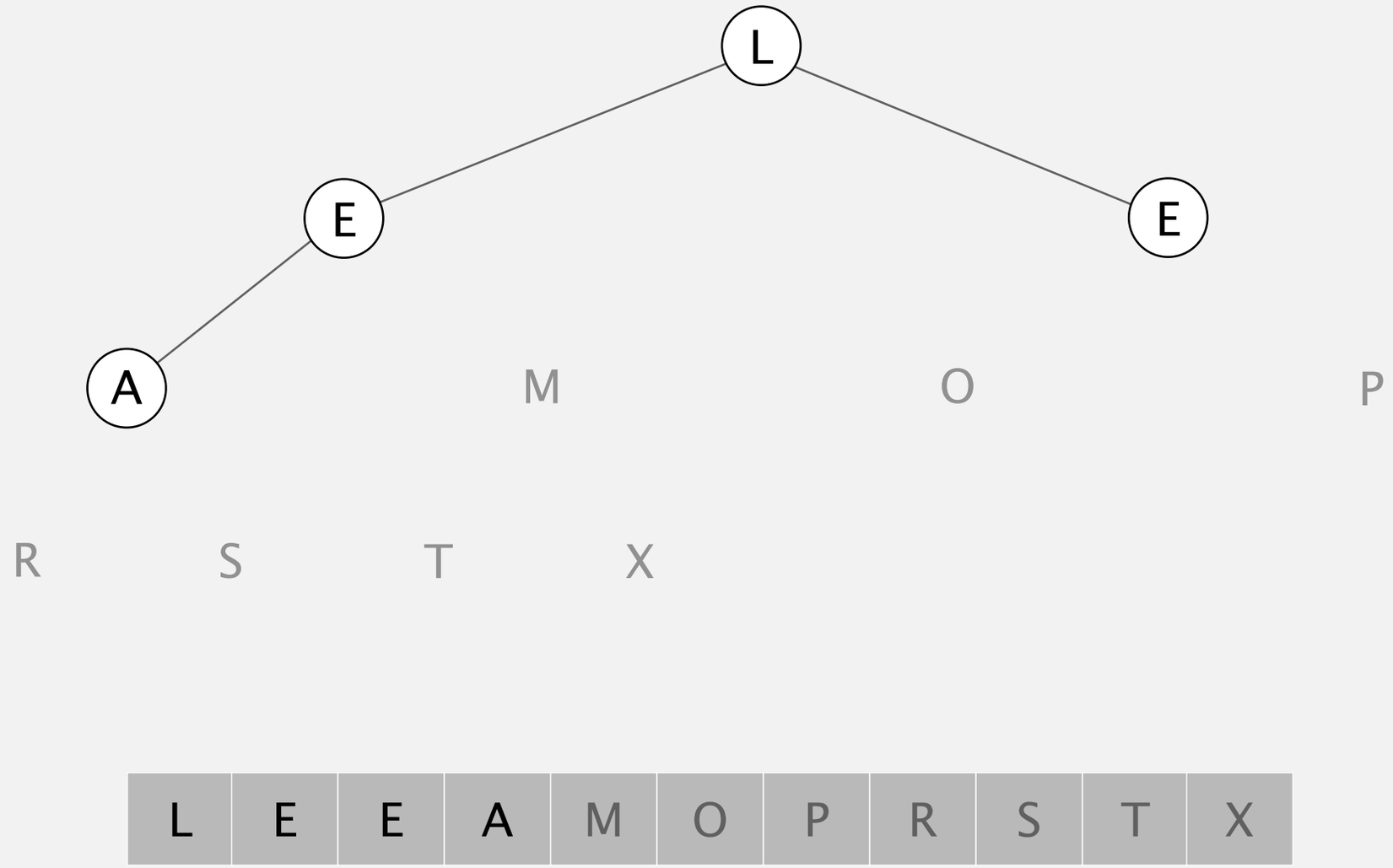
sink 1



L	E	E	A	M	O	P	R	S	T	X
1	2									

Heapsort

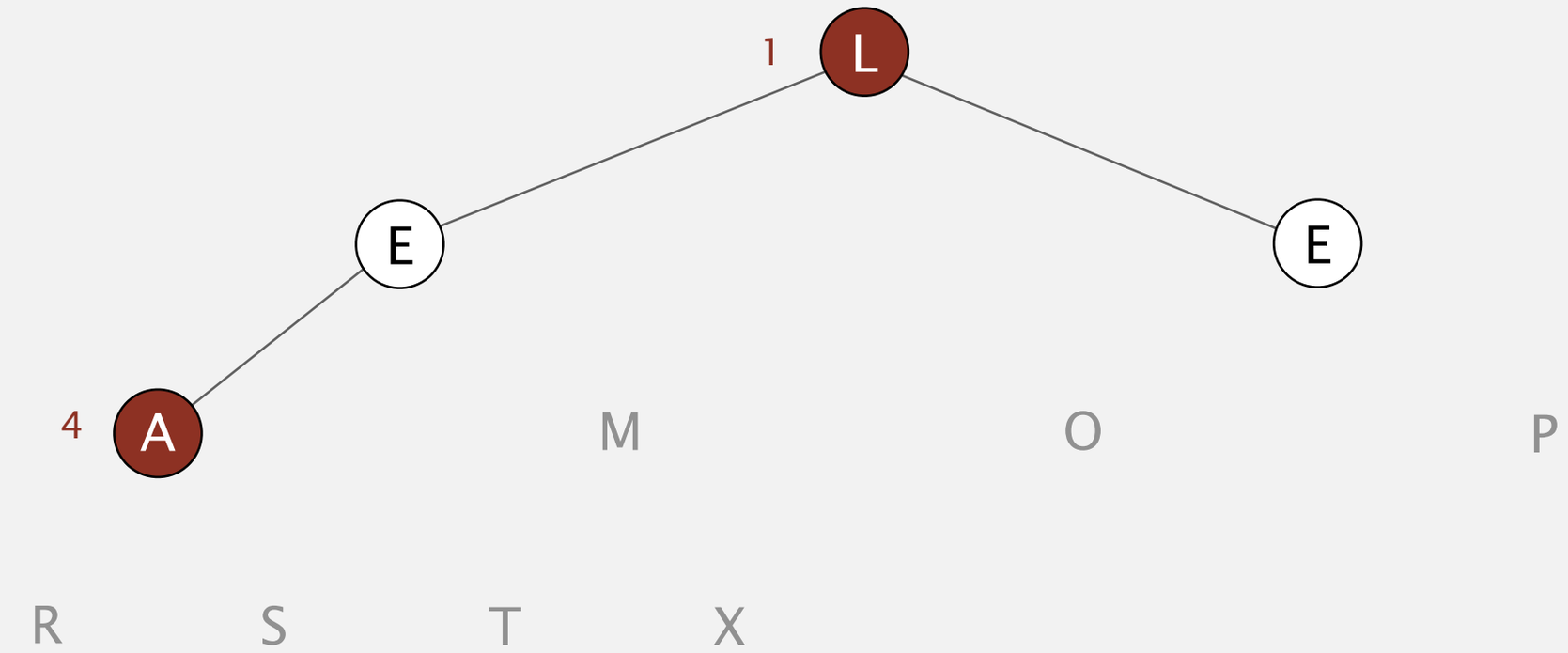
Sortdown. Repeatedly delete the largest remaining item.



L	E	E	A	M	O	P	R	S	T	X

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 4

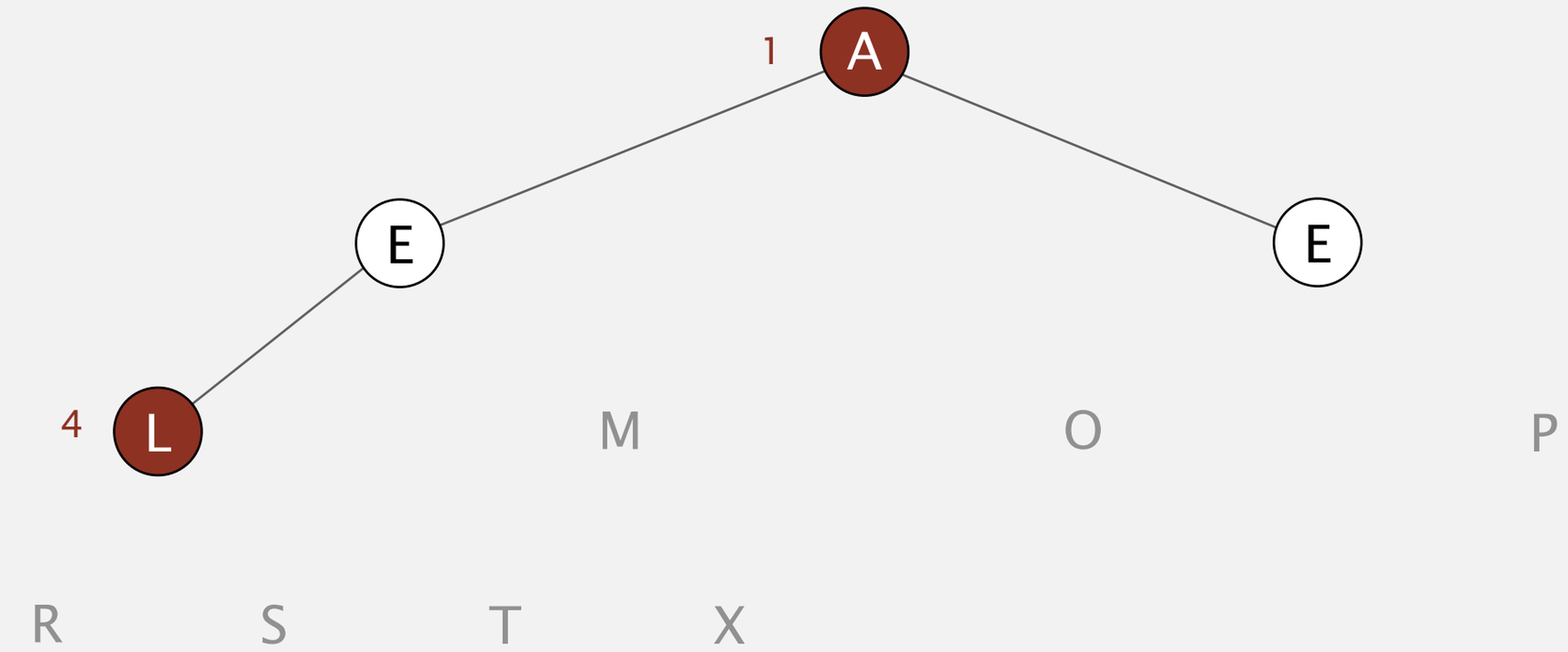


L	E	E	A	M	O	P	R	S	T	X
1			4							

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 4

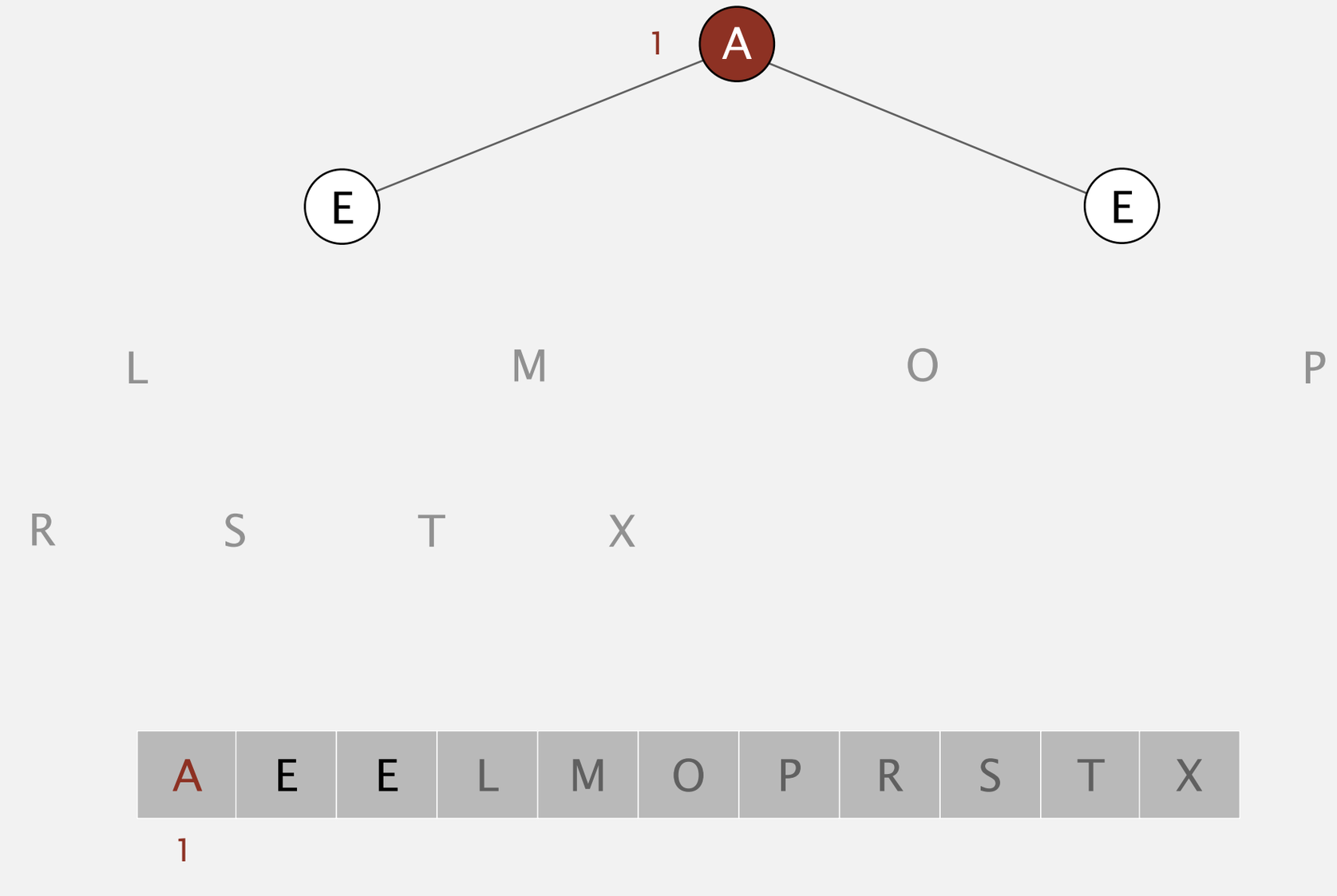


A	E	E	L	M	O	P	R	S	T	X
1			4							

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1

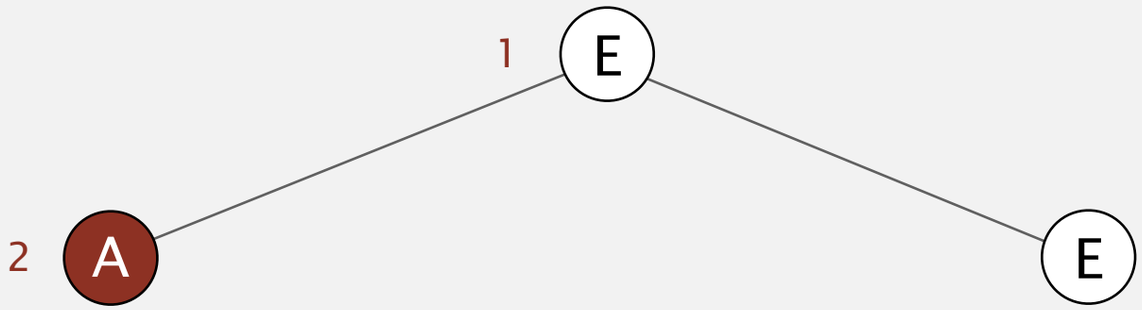


A	E	E	L	M	O	P	R	S	T	X
1										

Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1



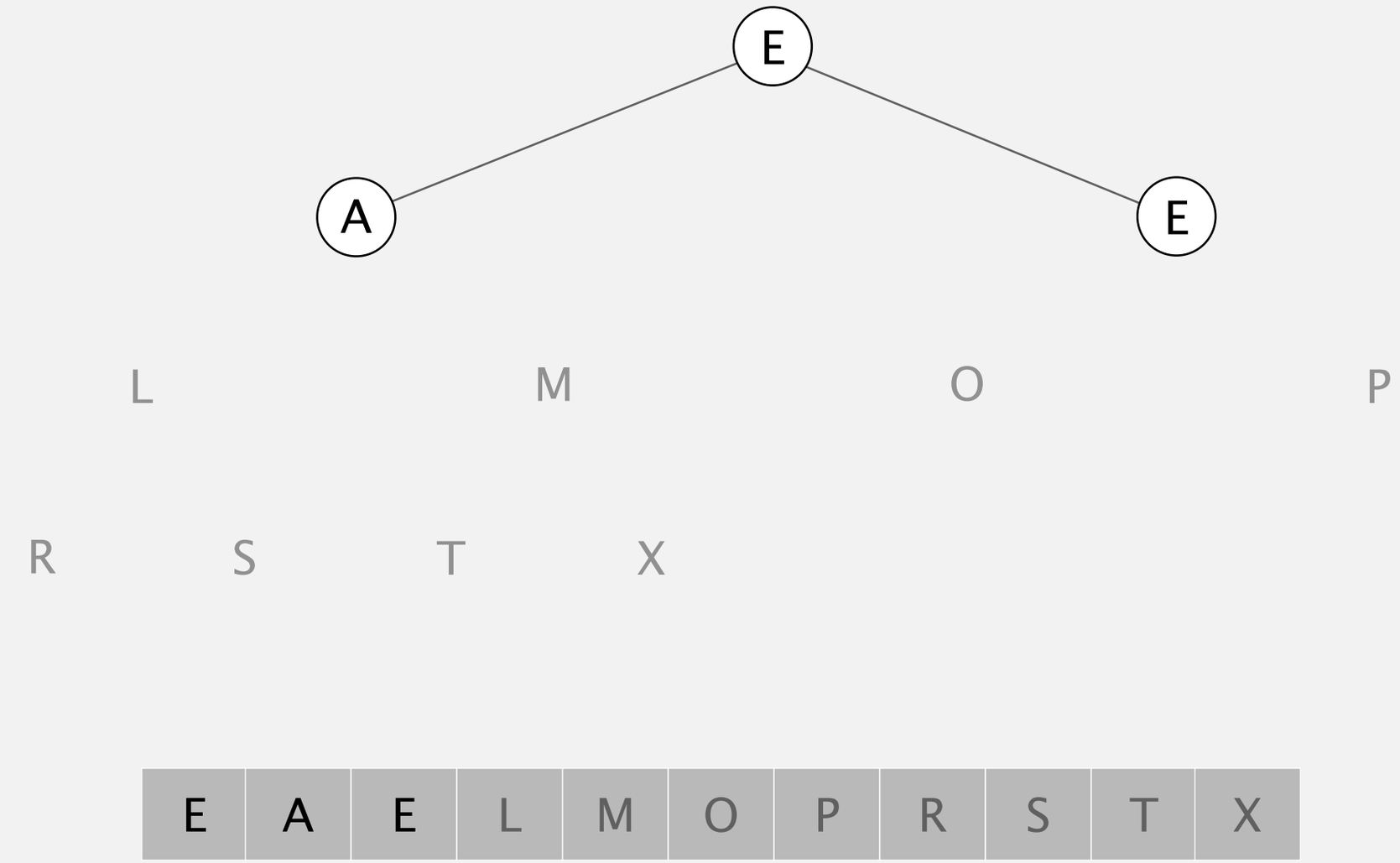
L M O P

R S T X

E	A	E	L	M	O	P	R	S	T	X
1	2									

Heapsort

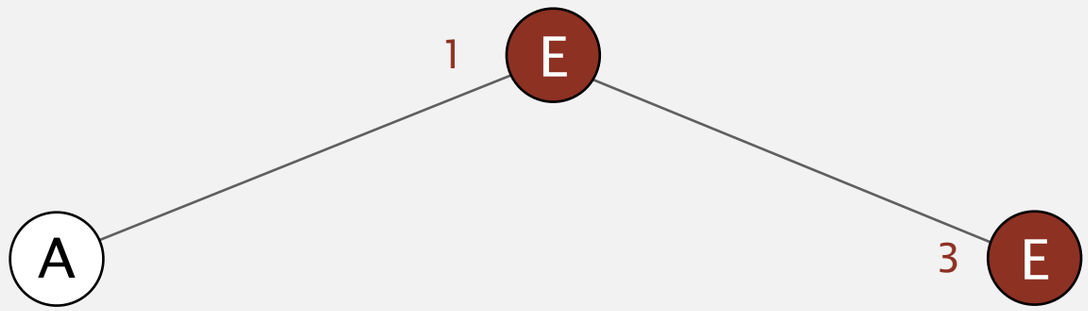
Sortdown. Repeatedly delete the largest remaining item.



E	A	E	L	M	O	P	R	S	T	X

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 3



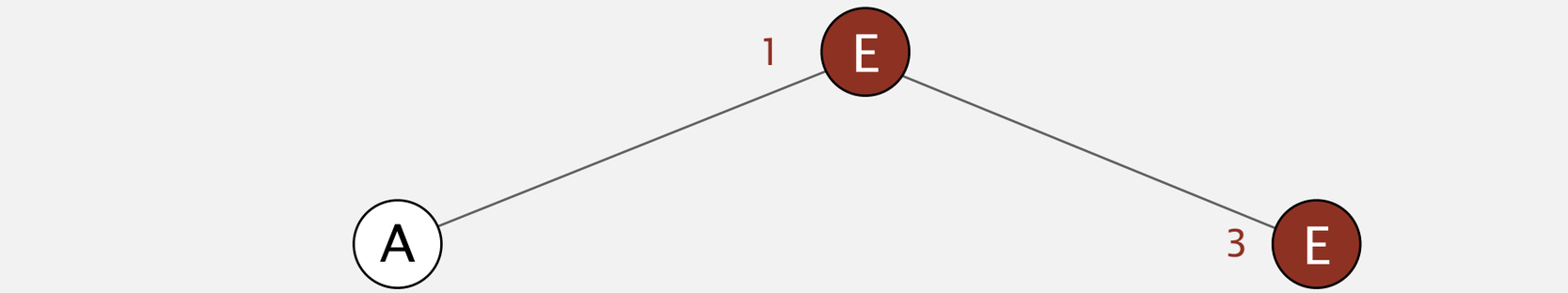
L M O P

R S T X

E	A	E	L	M	O	P	R	S	T	X
1		3								

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 3



L M O P

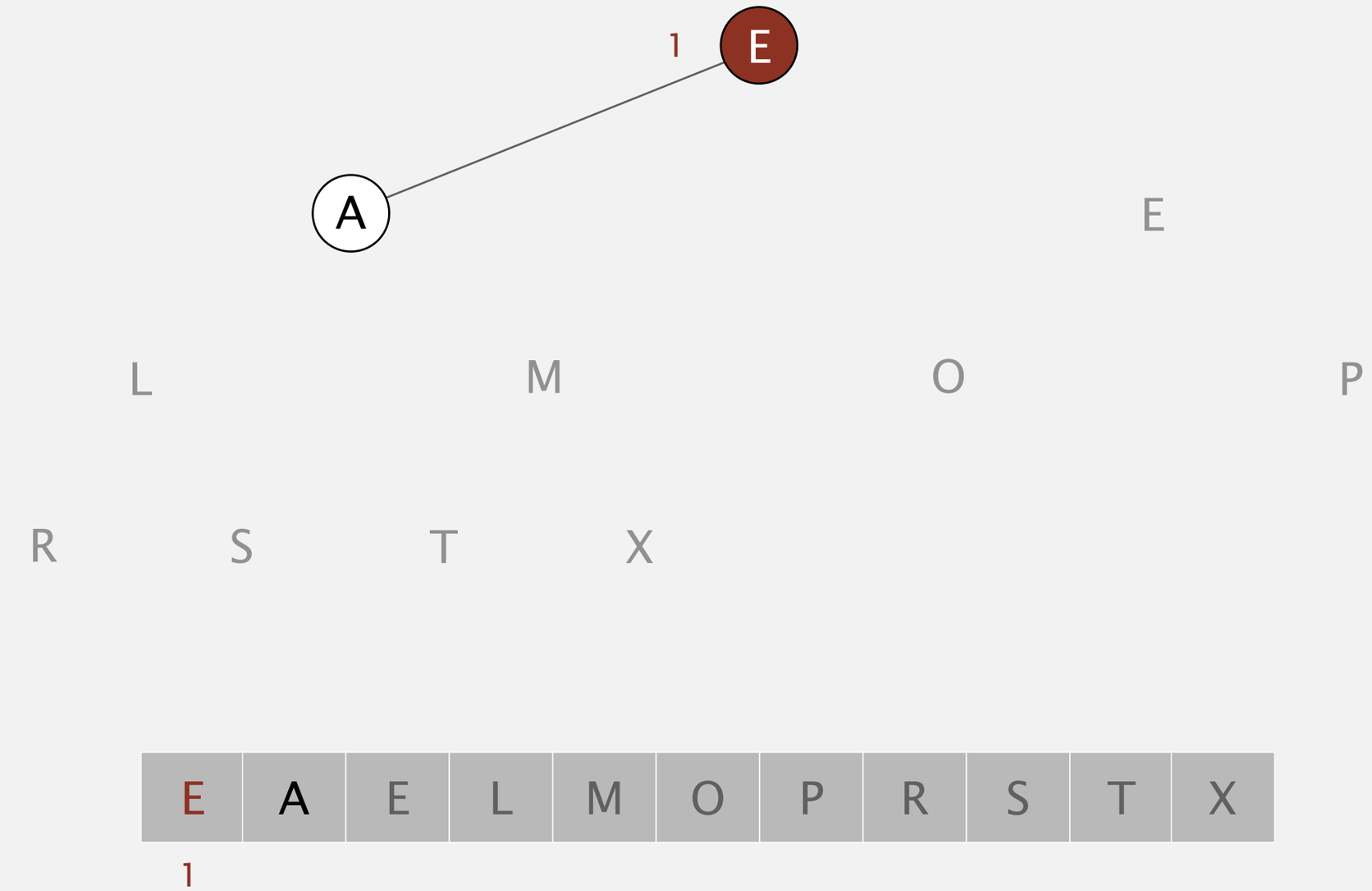
R S T X

E	A	E	L	M	O	P	R	S	T	X
1		3								

Heapsort

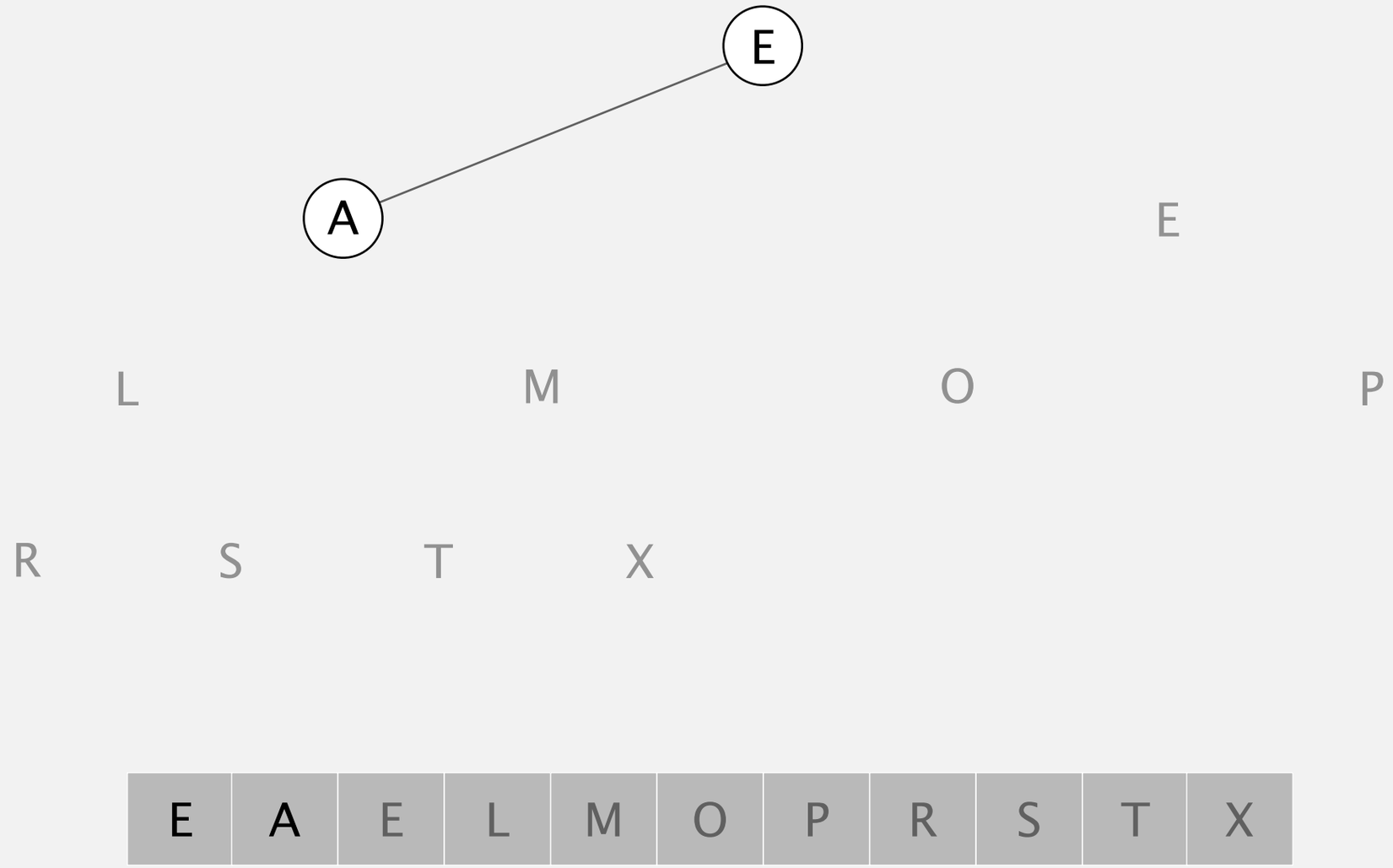
Sortdown. Repeatedly delete the largest remaining item.

sink 1



Heapsort

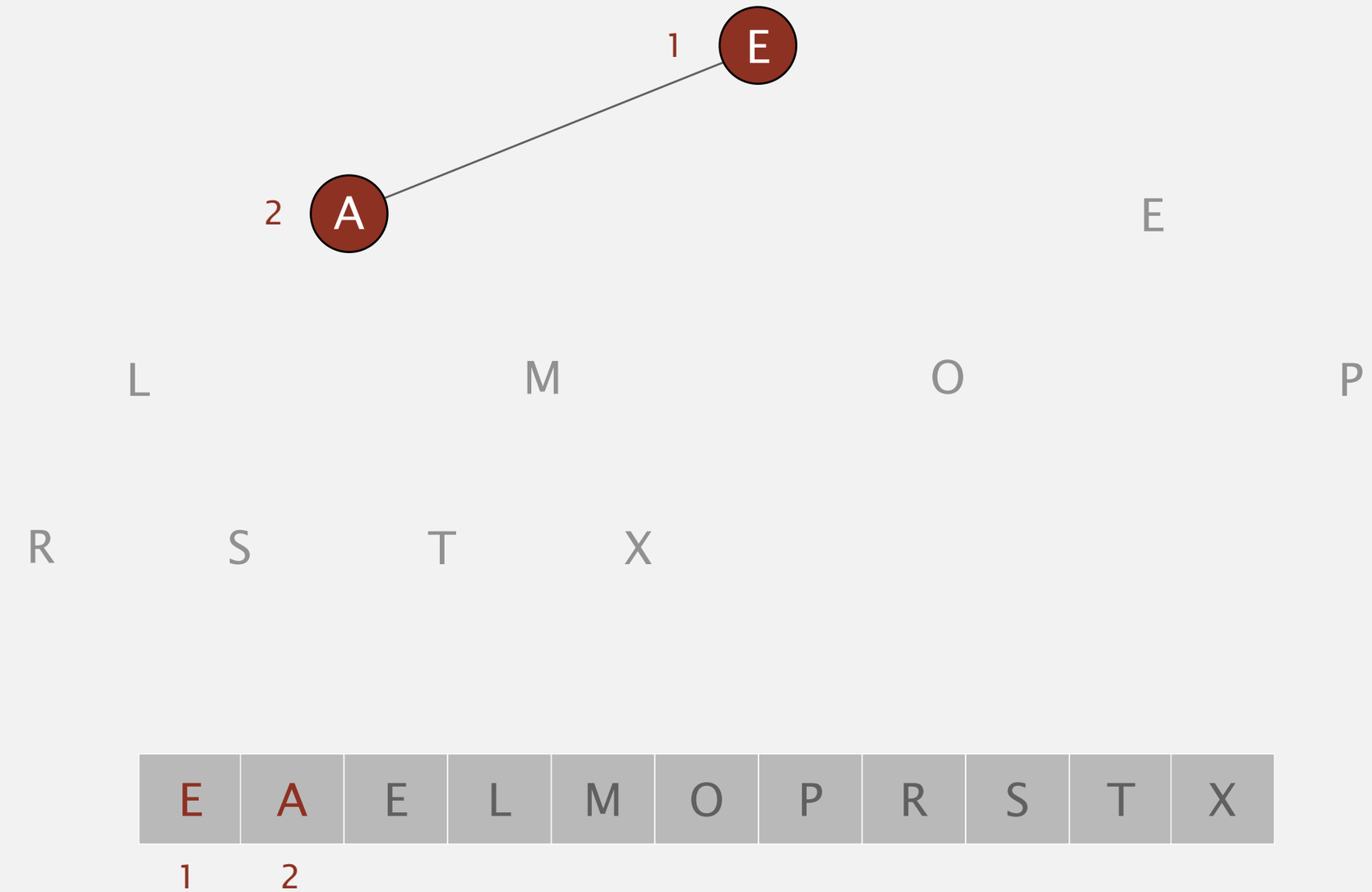
Sortdown. Repeatedly delete the largest remaining item.



E	A	E	L	M	O	P	R	S	T	X

Sortdown. Repeatedly delete the largest remaining item.

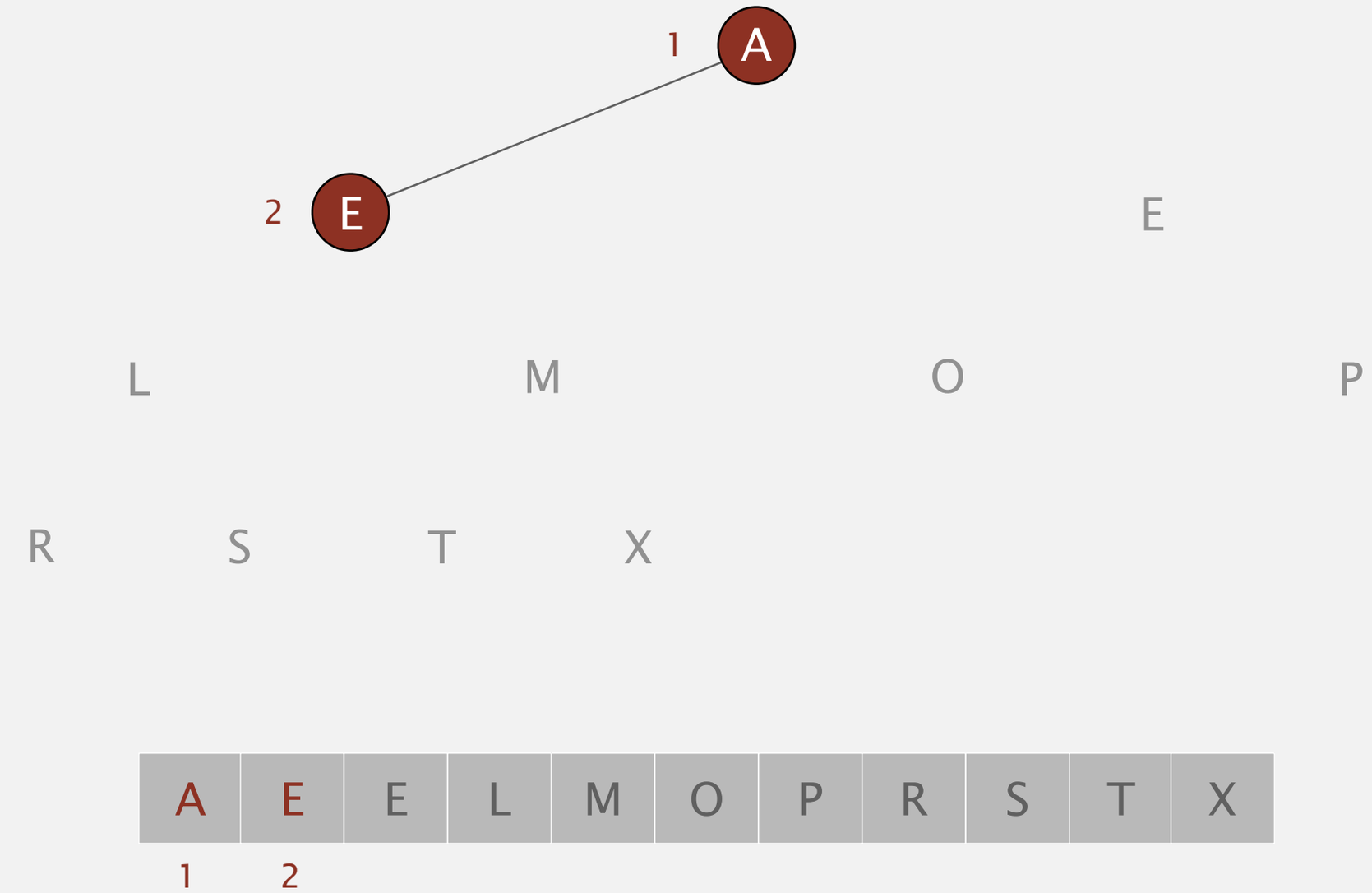
exchange 1 and 2



E	A	E	L	M	O	P	R	S	T	X
1	2									

Sortdown. Repeatedly delete the largest remaining item.

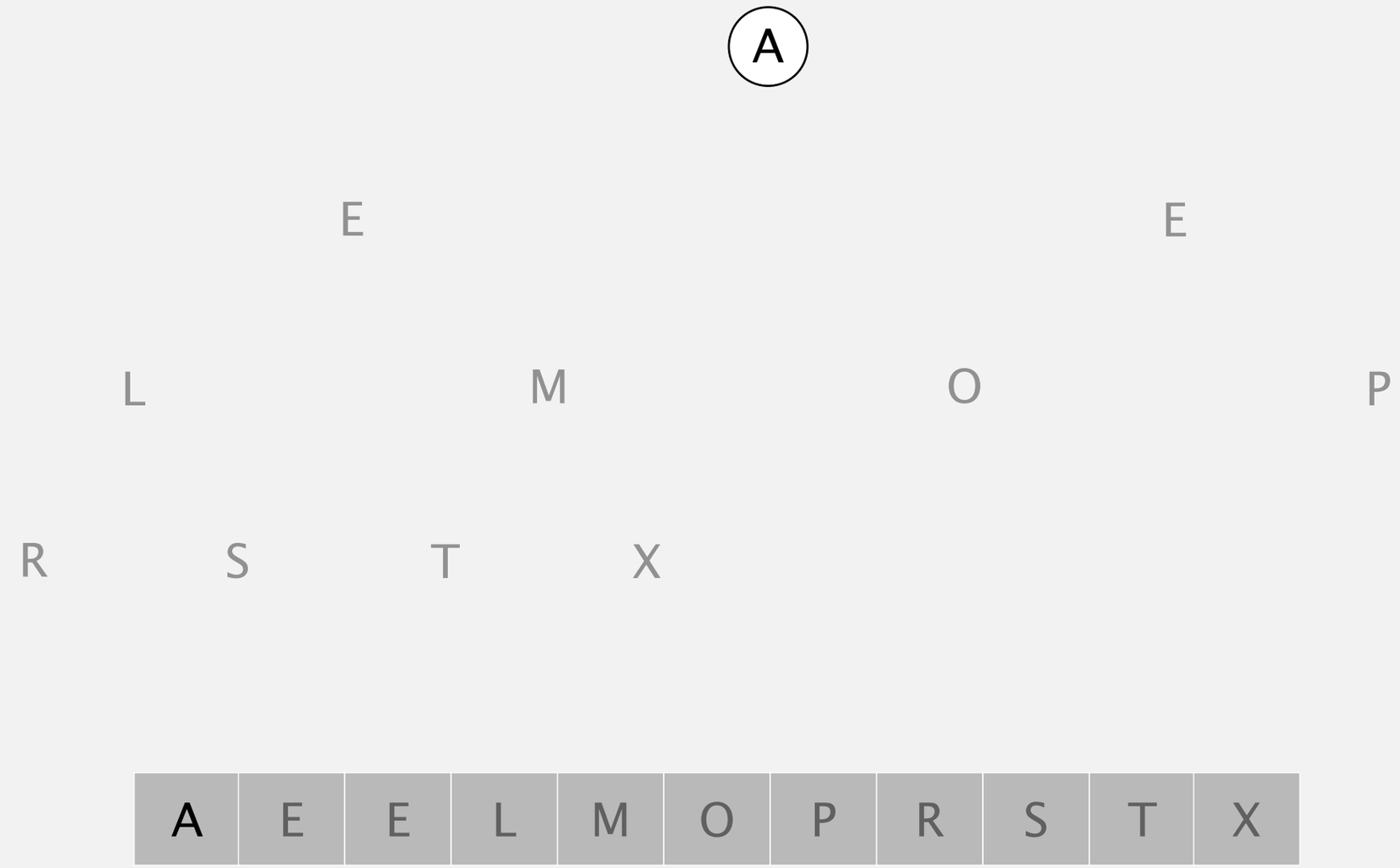
exchange 1 and 2



A	E	E	L	M	O	P	R	S	T	X
1	2									

Heapsort

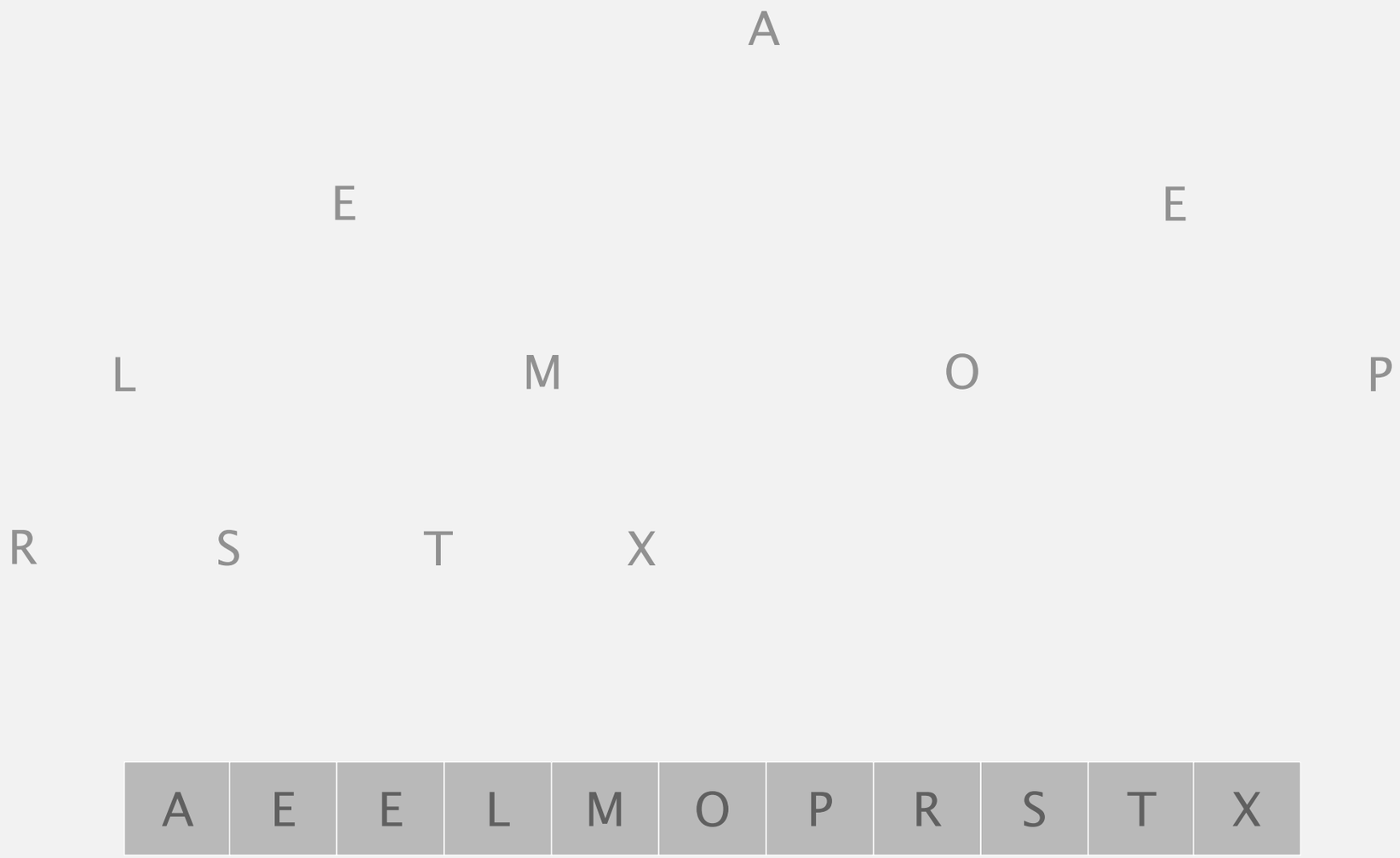
Sortdown. Repeatedly delete the largest remaining item.



Heapsort

Sortdown. Repeatedly delete the largest remaining item.

end of sortdown phase



Heapsort

Ending point. Array in sorted order.