Analisis y Diseño de Algoritmos

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Heap

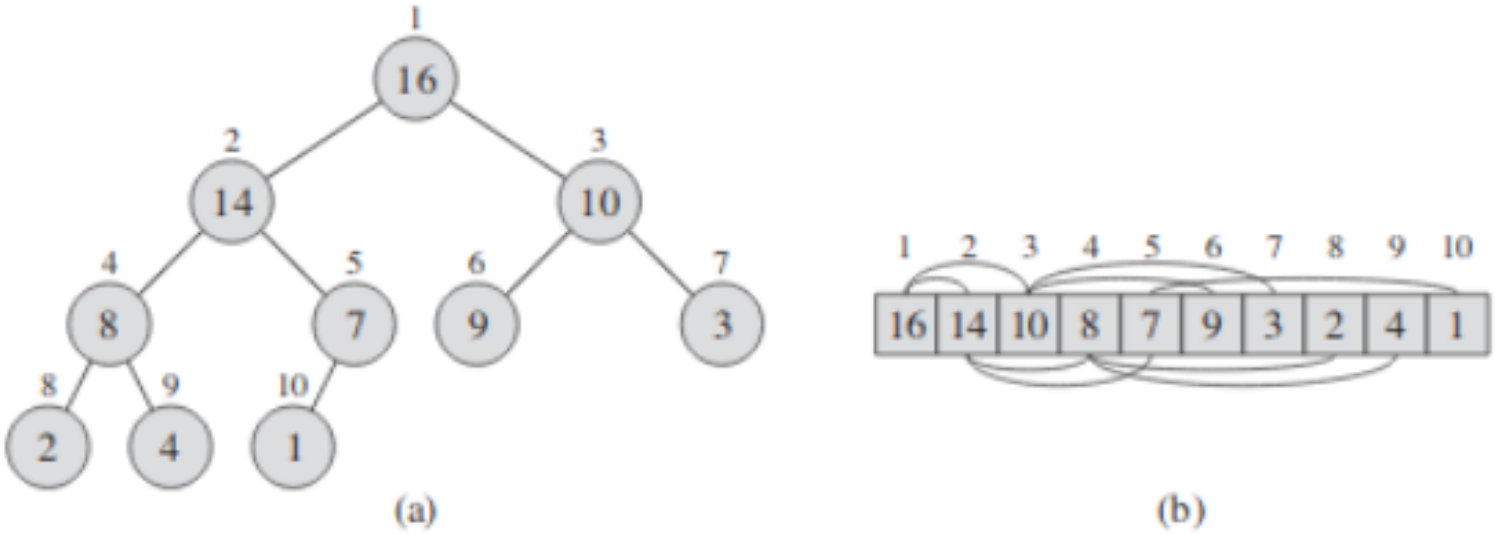


Figure 1: Tomada del libro Cormen, Introduction to Algorithms

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap


```
PARENT(i)
1  return ⌊i/2⌋

LEFT(i)
1  return 2i

RIGHT(i)
1  return 2i + 1
```

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap


```
MAX-HEAPIFY(A, i)
 1  l = LEFT(i)
 2  r = RIGHT(i)
 3  if l ≤ A.heap-size and A[l] > A[i]
 4       largest = l
 5  else largest = i
 6  if r ≤ A.heap-size and A[r] > A[largest]
 7       largest = r
 8  if largest ≠ i
 9       exchange A[i] with A[largest]
10       MAX-HEAPIFY(A, largest)
```

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap

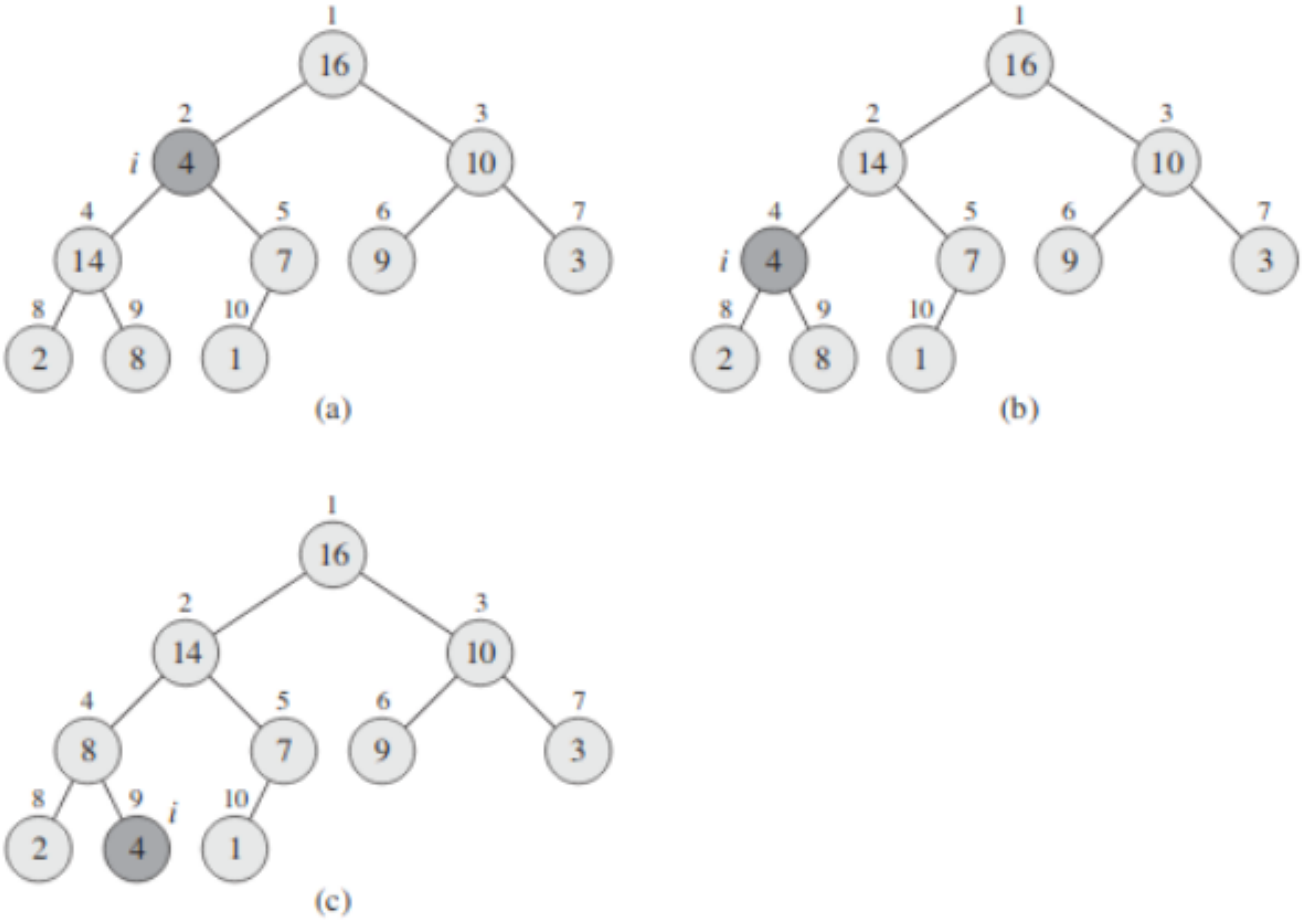


Figure 4: Tomada del libro Cormen, Introduction to Algorithms

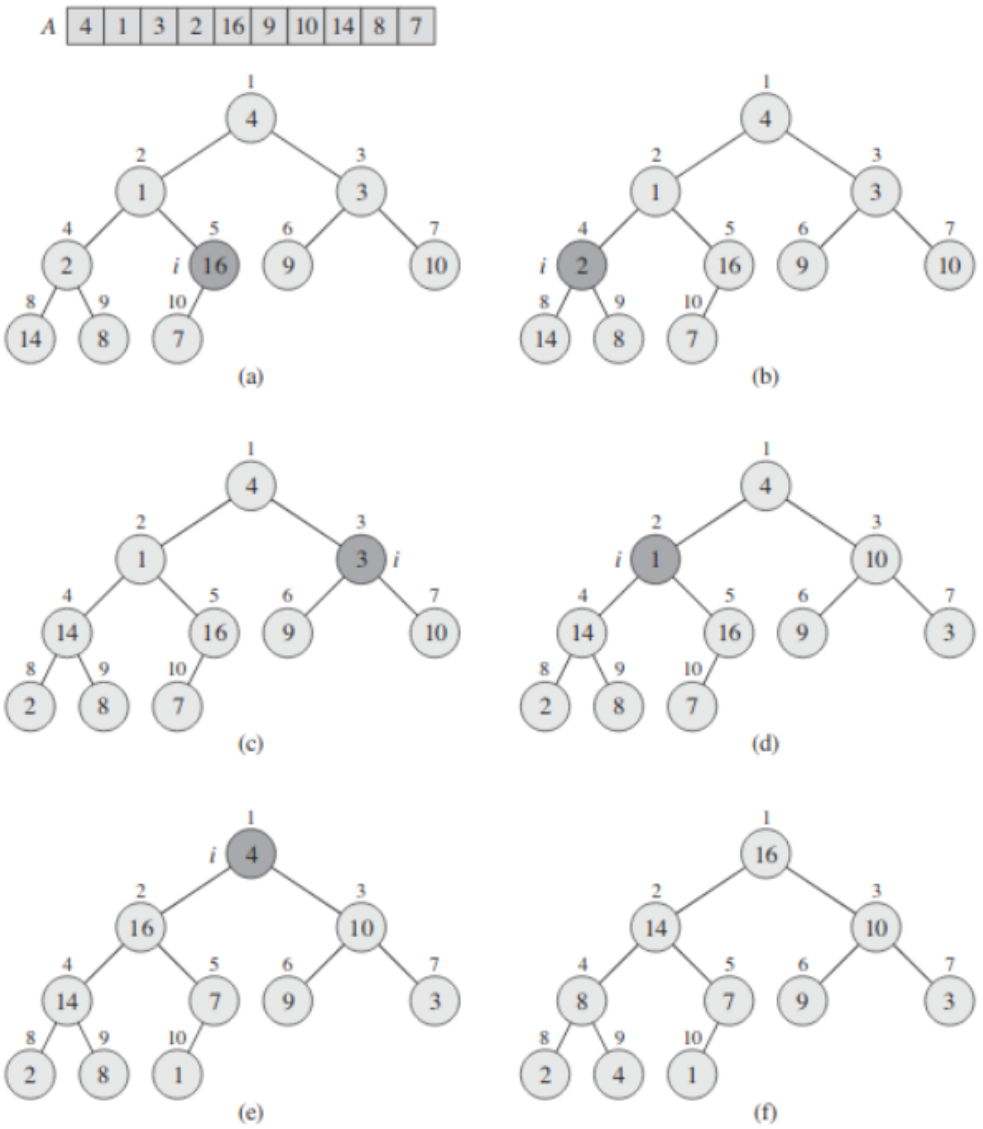
Heap


```
BUILD-MAX-HEAP(A)
1  A.heap-size = A.length
2  for i = ⌊A.length/2⌋ downto 1
3      MAX-HEAPIFY(A, i)
```

Figure 5: Tomada del libro Cormen, Introduction to Algorithms

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap



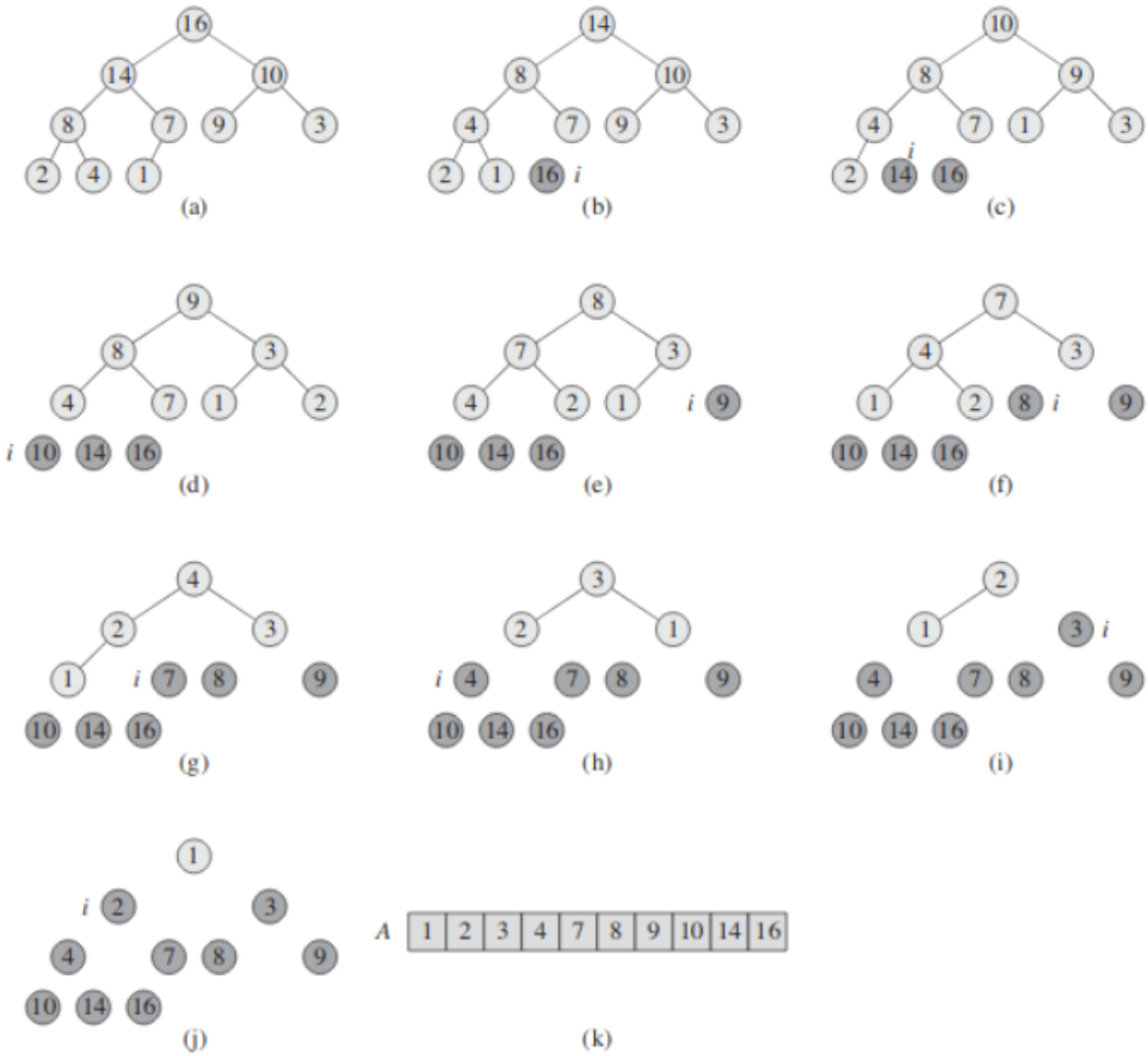
Heapsort


```
HEAPSORT(A)
1  BUILD-MAX-HEAP(A)
2  for i = A.length downto 2
3      exchange A[1] with A[i]
4      A.heap-size = A.heap-size − 1
5      MAX-HEAPIFY(A, 1)
```

Figure 7: Tomada del libro Cormen, Introduction to Algorithms

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heapsort



Heap


```
HEAP-MAXIMUM(A)
1  return A[1]
```

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap


```
HEAP-EXTRACT-MAX(A)
1  if A.heap-size < 1
2        error "heap underflow"
3  max = A[1]
4  A[1] = A[A.heap-size]
5  A.heap-size = A.heap-size − 1
6  MAX-HEAPIFY(A, 1)
7  return max
```

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap


```
HEAP-INCREASE-KEY(A, i, key)
1  if key < A[i]
2      error "new key is smaller than current key"
3  A[i] = key
4  while i > 1 and A[PARENT(i)] < A[i]
5      exchange A[i] with A[PARENT(i)]
6      i = PARENT(i)
```

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap


```
MAX-HEAP-INSERT(A, key)
1  A.heap-size = A.heap-size + 1
2  A[A.heap-size] = −∞
3  HEAP-INCREASE-KEY(A, A.heap-size, key)
```

Figure: Tomada del libro Cormen, Introduction to Algorithms

Heap

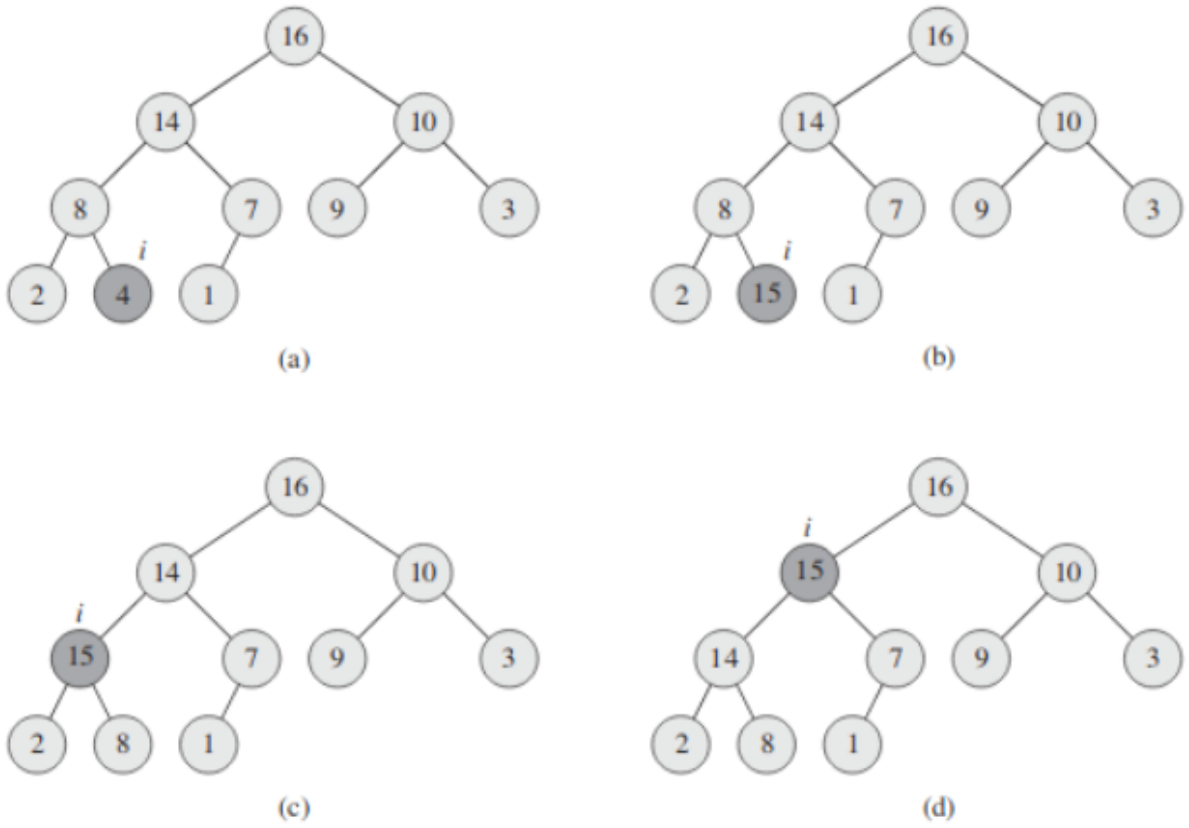


Figure 13: Simulación del HEAP-INCREASE-KEY. Tomada del libro Cormen, Introduction to Algorithms

Figure: Tomada del libro Cormen, Introduction to Algorithms

Gracias