

(a)

| Edge processed | Collection of disjoint sets | | | | | | | | | |
|----------------|-----------------------------|-------|-----|-----|---------|-----|-----|-------|-----|-----|
| initial sets | {a} | {b} | {c} | {d} | {e} | {f} | {g} | {h} | {i} | {j} |
| (b,d) | {a} | {b,d} | {c} | | {e} | {f} | {g} | {h} | {i} | {j} |
| (e,g) | {a} | {b,d} | {c} | | {e,g} | {f} | | {h} | {i} | {j} |
| (a,c) | {a,c} | {b,d} | | | {e,g} | {f} | | {h} | {i} | {j} |
| (h,i) | {a,c} | {b,d} | | | {e,g} | {f} | | {h,i} | | {j} |
| (a,b) | {a,b,c,d} | | | | {e,g} | {f} | | {h,i} | | {j} |
| (e,f) | {a,b,c,d} | | | | {e,f,g} | | | {h,i} | | {j} |
| (b,c) | {a,b,c,d} | | | | {e,f,g} | | | {h,i} | | {j} |

(b)

Figure 21.1 (a) A graph with four connected components: $\{a, b, c, d\}$, $\{e, f, g\}$, $\{h, i\}$, and $\{j\}$.
 (b) The collection of disjoint sets after processing each edge.

CONNECTED-COMPONENTS(G)

```

1  for each vertex  $v \in G.V$ 
2      MAKE-SET( $v$ )
3  for each edge  $(u, v) \in G.E$ 
4      if FIND-SET( $u$ )  $\neq$  FIND-SET( $v$ )
5          UNION( $u, v$ )

```

SAME-COMPONENT(u, v)

```

1  if FIND-SET( $u$ ) == FIND-SET( $v$ )
2      return TRUE
3  else return FALSE

```

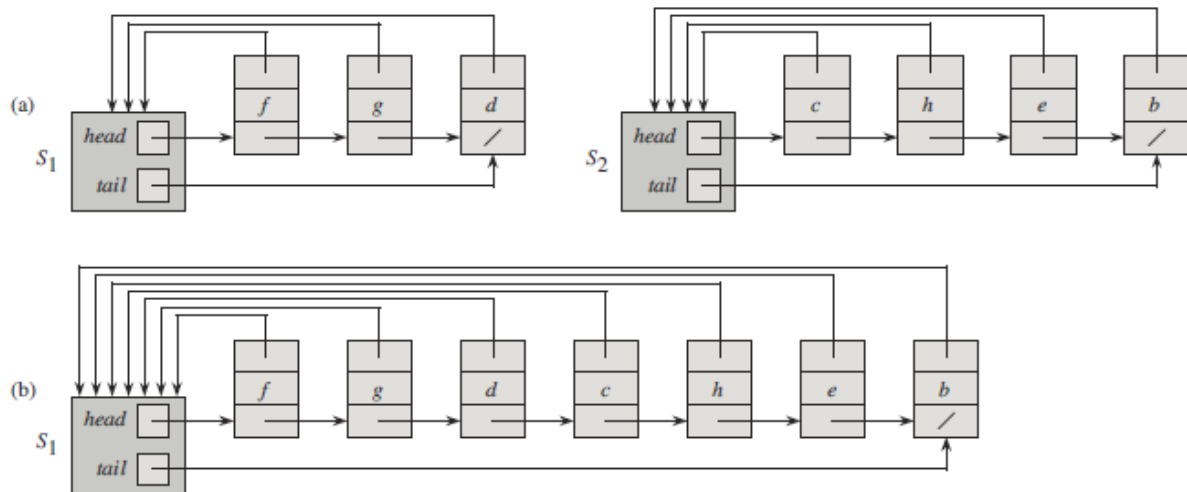


Figure 21.2 (a) Linked-list representations of two sets. Set S_1 contains members d , f , and g , with representative f , and set S_2 contains members b , c , e , and h , with representative c . Each object in the list contains a set member, a pointer to the next object in the list, and a pointer back to the set object. Each set object has pointers `head` and `tail` to the first and last objects, respectively. (b) The result of $\text{UNION}(g, e)$, which appends the linked list containing e to the linked list containing g . The representative of the resulting set is f . The set object for e 's list, S_2 , is destroyed.