Chapter 21 Solusion

https://github.com/frc123/CLRS

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21.1

21.1-1

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

21.1-2

By contents in B.4, we know that the connected components of a graph are the equivalence classes of vertices under the "is reachable from" relation. The collection of the disjoint sets is exactly the quotient set of $G.V$ by the "is reachable from" relation. It is not hard to find out that Connected-Components construct such the quotient set since the procedure unions vertices based on all edges, and edges connect two reachable vertices with the smallest length of the path (recall that a equivalence relation must be transitive). Two vertices are in the same connected component if and only if they are reachable from each other.

21.1-3

Find-Set: $2 \cdot |E|$
Union: $|V| - k$

Updating...