Dijkstra Algorithm
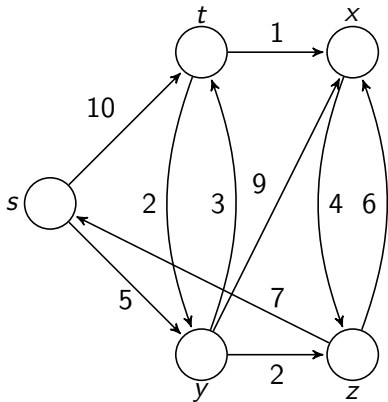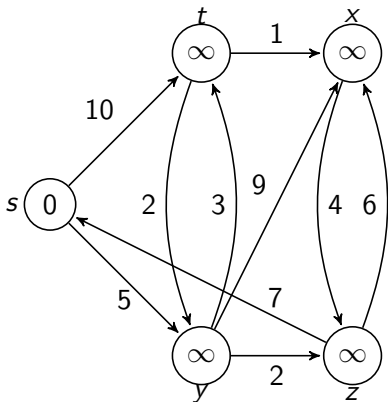
Cheng Li, Virgil Pavlu
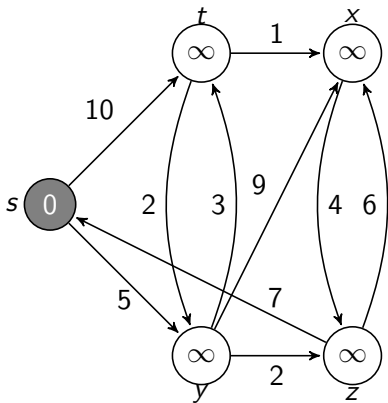
graph G
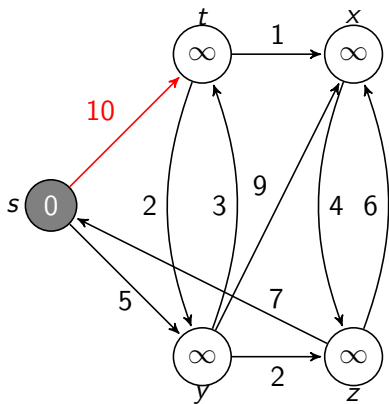source = s

INITIALIZE -SINGLE
-SOURCE(G,s)
$S = \Phi$
$Q = G.V$

$s=\text{EXTRACT-MIN}(Q)$
$S = \{s\}$
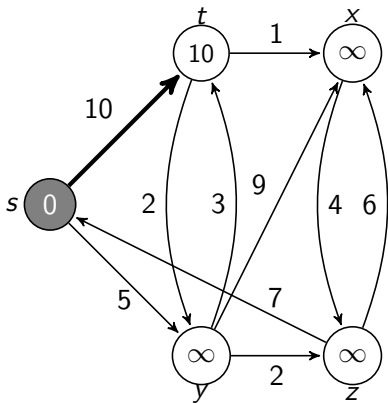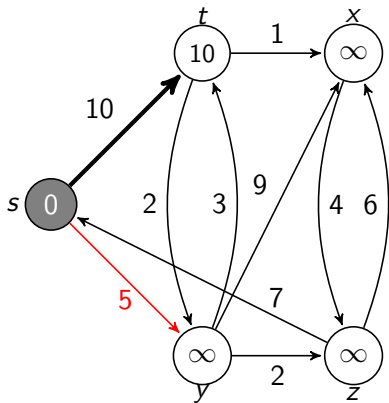$Q = \{t, x, y, z\}$

RELAX(s, t, w)
$S = \{s\}$
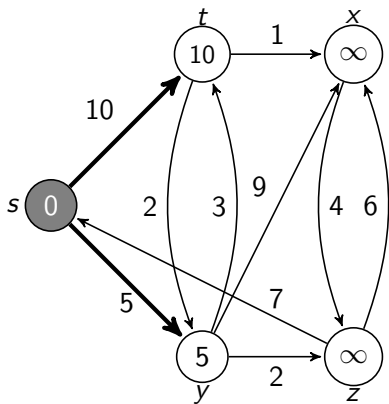$Q = \{t, x, y, z\}$

$\text{RELAX}(s, t, w)$
$S = \{s\}$
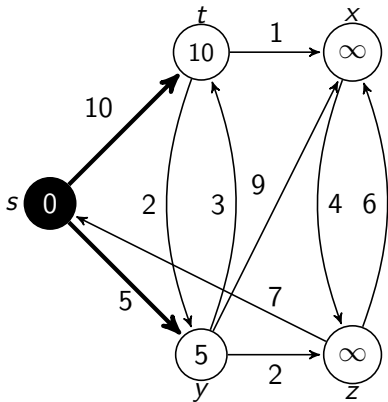$Q = \{t, x, y, z\}$
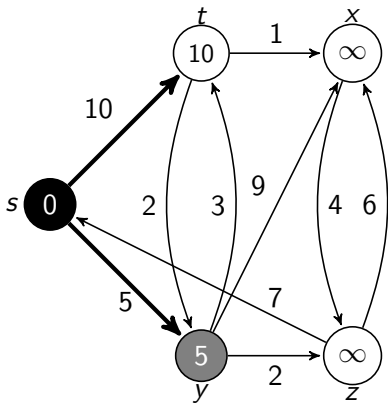
RELAX(s, y, w)
$S = \{s\}$
$Q = \{t, x, y, z\}$

$\text{RELAX}(s, y, w)$
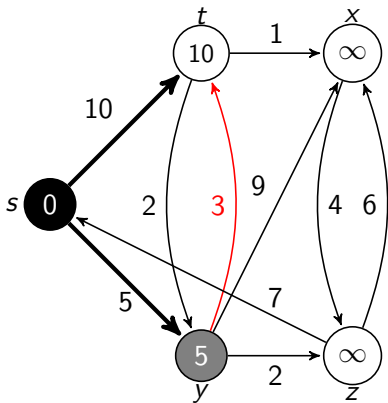$S = \{s\}$
$Q = \{t, x, y, z\}$

$S = \{s\}$
$Q = \{t, x, y, z\}$

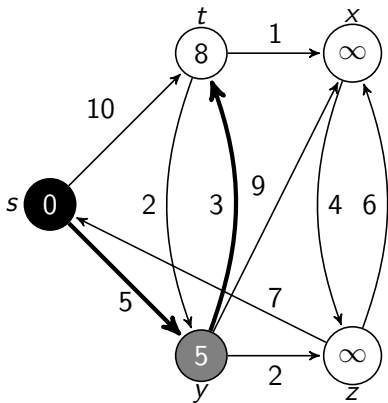y=EXTRACT-MIN(Q)
$S = \{s, y\}$
$Q = \{t, x, z\}$

$\textsc{Relax}(y, t, w)$
$S = \{s, y\}$
$Q = \{t, x, z\}$

RELAX(y, t, w)
$S = \{s, y\}$
$Q = \{t, x, z\}$

$\text{Relax}(y, x, w)$
$S = \{s, y\}$
$Q = \{t, x, z\}$

$\textsc{Relax}(y, x, w)$
$S = \{s, y\}$
$Q = \{t, x, z\}$

$\textrm{Relax}(y, z, w)$
$S = \{s, y\}$
$Q = \{t, x, z\}$

$\text{Relax}(y, z, w)$
$S = \{s, y\}$
$Q = \{t, x, z\}$

$S = \{s, y\}$
$Q = \{t, x, z\}$

$z=\text{EXTRACT-MIN}(Q)$
$S = \{s, y, z\}$
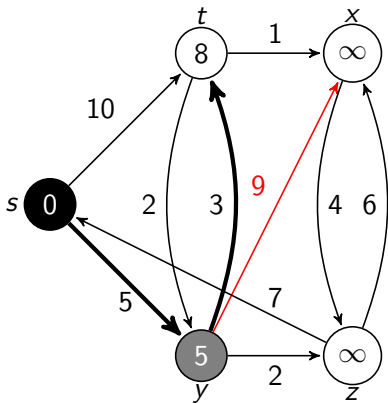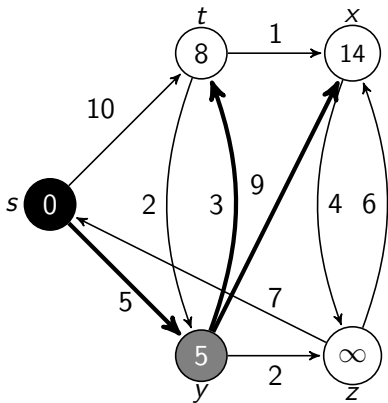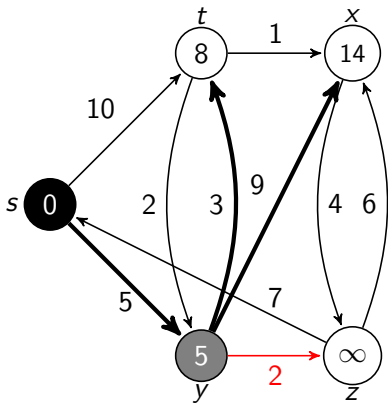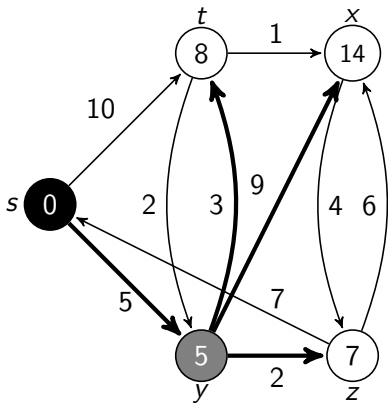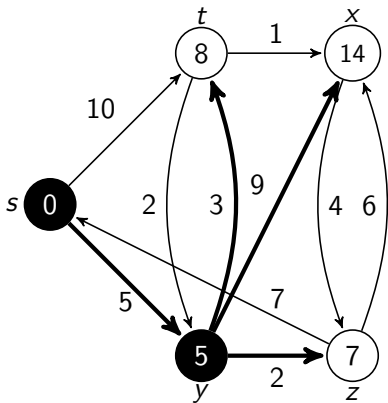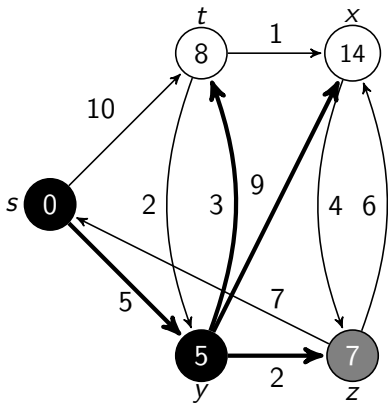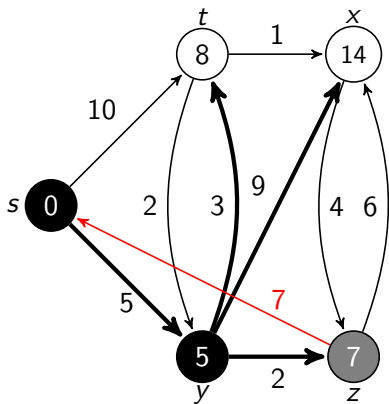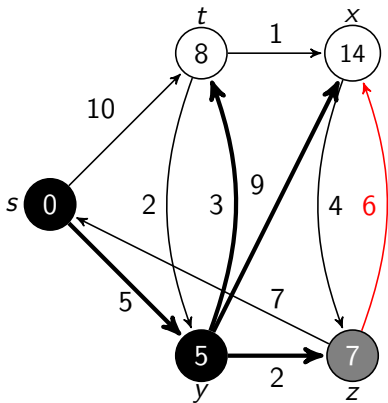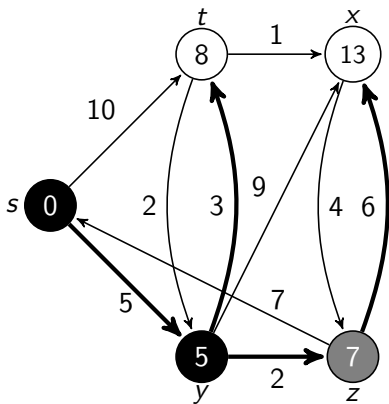$Q = \{t, x\}$

$\text{Relax}(z, s, w)$
$S = \{s, y, z\}$
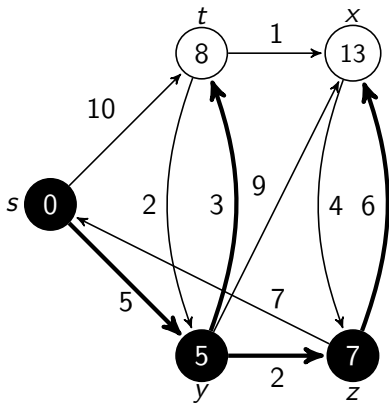$Q = \{t, x\}$

$\text{Relax}(z, x, w)$
$S = \{s, y, z\}$
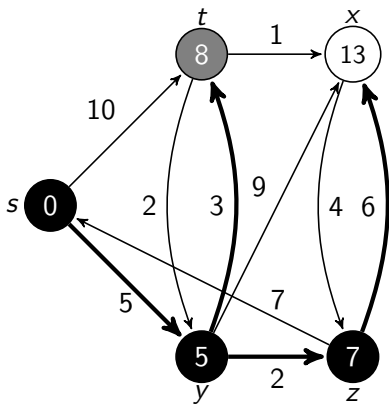$Q = \{t, x\}$

$\text{Relax}(z, x, w)$
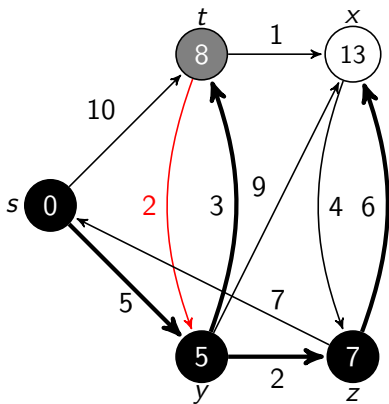$S = \{s, y, z\}$
$Q = \{t, x\}$

$S = \{s, y, z\}$
$Q = \{t, x\}$
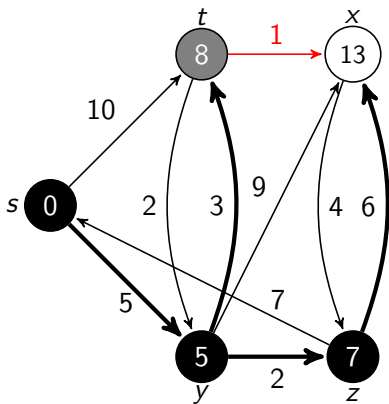
$t = \text{EXTRACT-MIN}(Q)$
$S = \{s, y, z, t\}$
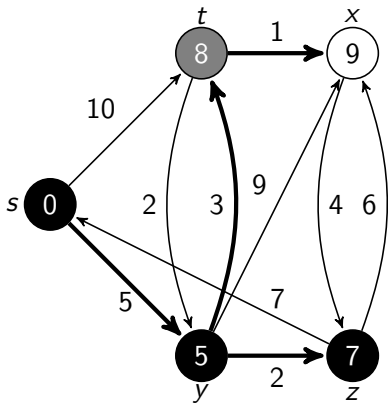$Q = \{x\}$

$\text{Relax}(t, y, w)$
$S = \{s, y, z, t\}$
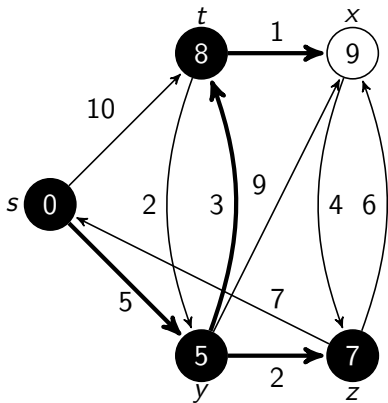$Q = \{x\}$

$\text{RELAX}(t, x, w)$
$S = \{s, y, z, t\}$
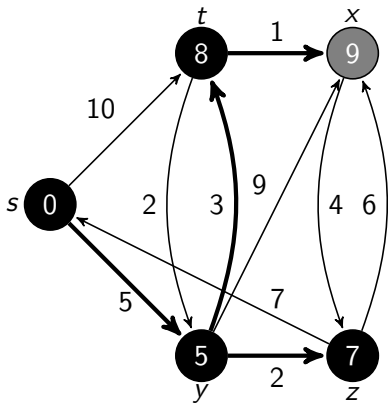$Q = \{x\}$

$\text{RELAX}(t, x, w)$
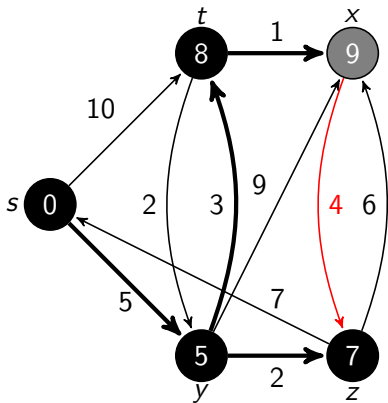$S = \{s, y, z, t\}$
$Q = \{x\}$

$S = \{s, y, z, t\}$
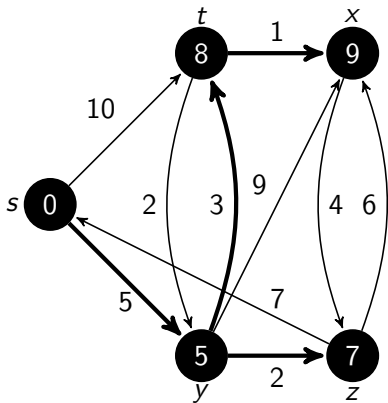$Q = \{x\}$

$x = \text{EXTRACT-MIN}(Q)$
$S = G.V$
$Q = \Phi$

$\textrm{R\small ELAX}(x, z, w)$
$S = G.V$
$Q = \Phi$

$S = G.V$
$Q = \Phi$
Done!