Associating bond graph junctions with series/parallel structures

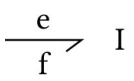
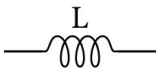
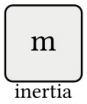
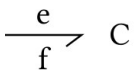
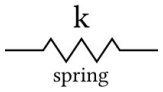
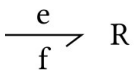
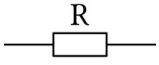
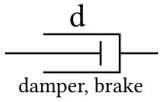
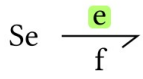
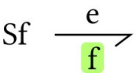
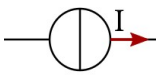
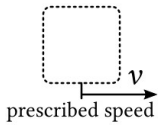
Exercise solution: sorted tables

Summarized solution:

- **0 junctions** (shared effort) corresponds to:
  - parallel connections of electrical elements
  - series connected of mechanical devices
- **1 junctions** (shared flow) correspond to:
  - series connection of electrical elements (loop of share current)
  - parallel connection of mechanical devices (several forces/devices acting on the same velocity point)

Important observation: the association is flipped between mechanics and electricity!

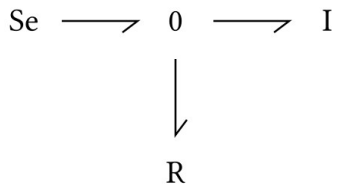
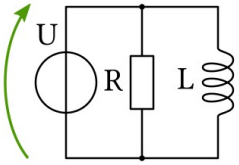
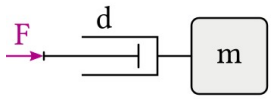
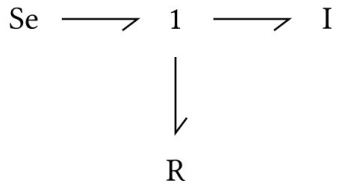
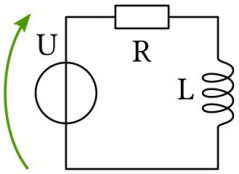
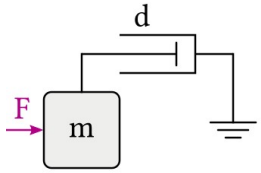
Reminder: BG elements in electrical and mechanical domains

	Bond graph	Electricity	Mechanics (translation)
1			
2			
3			
4			
5			

Warning: a capacitor C is equivalent to a spring k=1/C !

(no such problem for I and R: L=m and R=d)

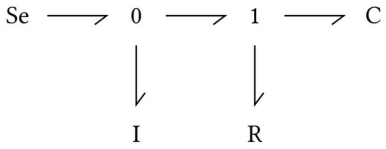
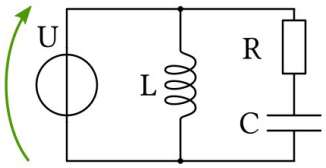
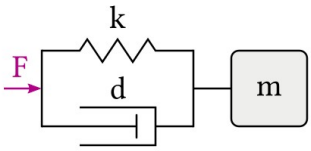
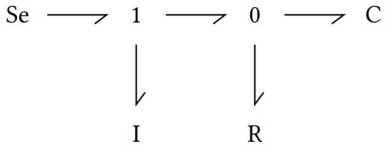
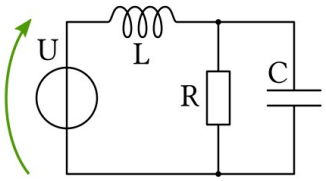
Association 1: a single 0/1 junction with series/parallel structure

Bond graph	Electricity	Mechanics (translation)
1 Common effort 	Common voltage: // 	Common force: series 
2 Common flow 	Common current: series 	Common speed: ~// 

Notice that dampers or spring connected to an absolute speed (i.e. not to a relative speed, using a 0 junction as explained in the M2 example) *needs to be grounded* on the other side.

Association 2: combined 0/1 junc. with series/parallel structures

Associate each bond graph with its corresponding electrical circuit or mechanical system.

Bond graph	Electricity	Mechanics (translation)
1 	L in // with (R-C in series) 	F applied to both m and k//d 
2 	L in series with R//C 	F shared between m and d-k