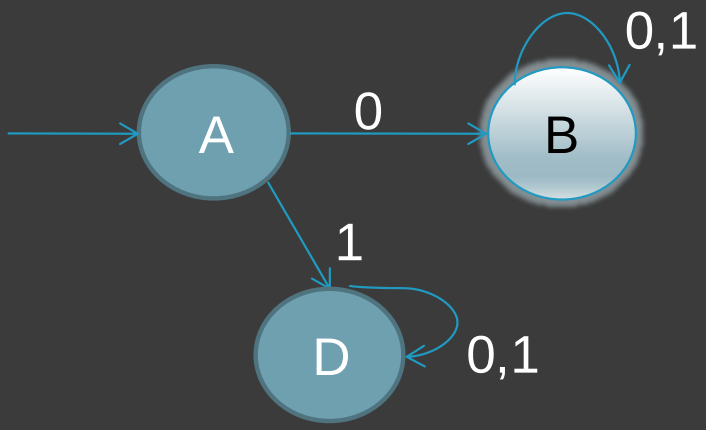
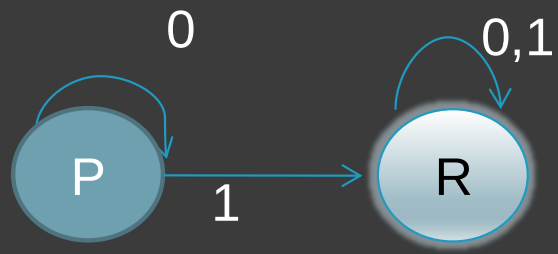
Union operation is closed for RL

- If L1 and L2 are regular sets then L1UL2 is also regular.
- **Proof by construction**
- Given L1 and L2 are RL so there exist a DFA M1 and M2 respectively such that L(M1)=L1 and L(M2)=L2
- Suppose DFA M1=(Q1,∑,δ1,q_{01},F1) and
- M2=(Q2,∑,δ2,q_{02},F2)
- Now we construct FSA M=(Q,∑,δ,q_0,F) such that L(M)=L(M1) U L(M2)= L1 U L2
- Q=Q1 X Q2
- δ: δ([q,p],a)=[δ1(q,a), δ2(p,a)] where qεQ1 and pεQ2
- q_0= [q_{01},q_{02}]
- F contains pair [q,p] such that either qεF1 or pεF2

Union operation is closed for RL



L1={wε{0,1}*|w starts with '0'}



L2={wε{0,1}*|w contains with '1'}

δ: δ([q,p],a)=[δ1(q,a), δ2(p,a)]

δ1	0	1
A	B	D
B	B	B
D	D	D

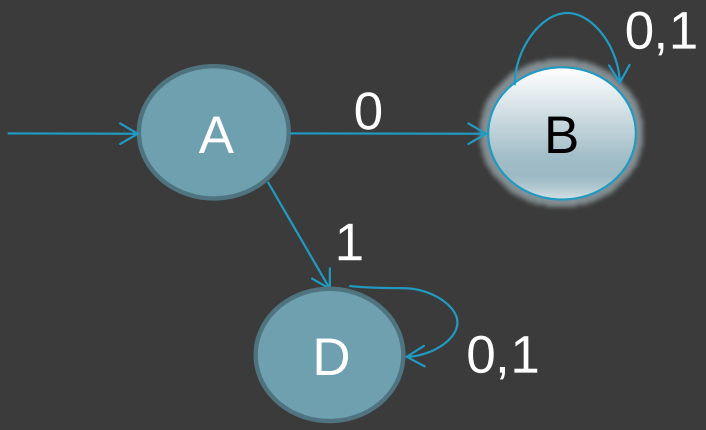
δ2	0	1
P	P	R
R	R	R

δ	0	1
AP	BP	DR
AR	BR	DR
BP	BP	BR
BR	BR	BR
DP	DP	DR
DR	DR	DR

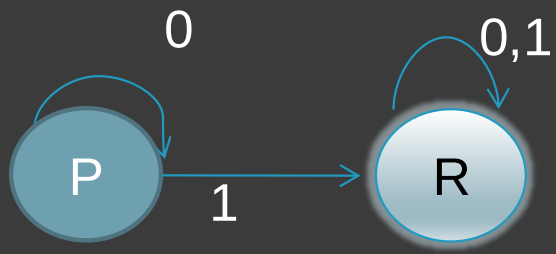
Intersection operation is closed for RL

- If L1 and L2 are regular sets then L1∩L2 is also regular.
- **Proof by construction**
- Given L1 and L2 are RL so there exist a DFA M1 and M2 respectively such that L(M1)=L1 and L(M2)=L2
- Suppose DFA M1=(Q1,∑,δ1,q_{01},F1) and
- M2=(Q2,∑,δ2,q_{02},F2)
- Now we construct FSA M=(Q,∑,δ,q_0,F) such that L(M)=L(M1) ∩ L(M2)= L1 ∩ L2
- Q=Q1 X Q2
- δ: δ([q,p],a)=[δ1(q,a), δ2(p,a)] where qεQ1 and pεQ2
- q_0= [q_{01},q_{02}]
- F contains pair [q,p] such that both qεF1 and pεF2

Intersection operation is closed for RL



L1={wε{0,1}*|w starts with '0'}



L2={wε{0,1}*|w contains with '1'}

δ2	0	1
P	P	R
R	R	R

δ: δ([q,p],a)=[δ1(q,a), δ2(p,a)]

δ1	0	1
A	B	D
B	B	B
D	D	D

δ	0	1
AP	BP	DR
AR	BR	DR
BP	BP	BR
BR	BR	BR
DP	DP	DR
DR	DR	DR