Project Report

Distributed Control Systems

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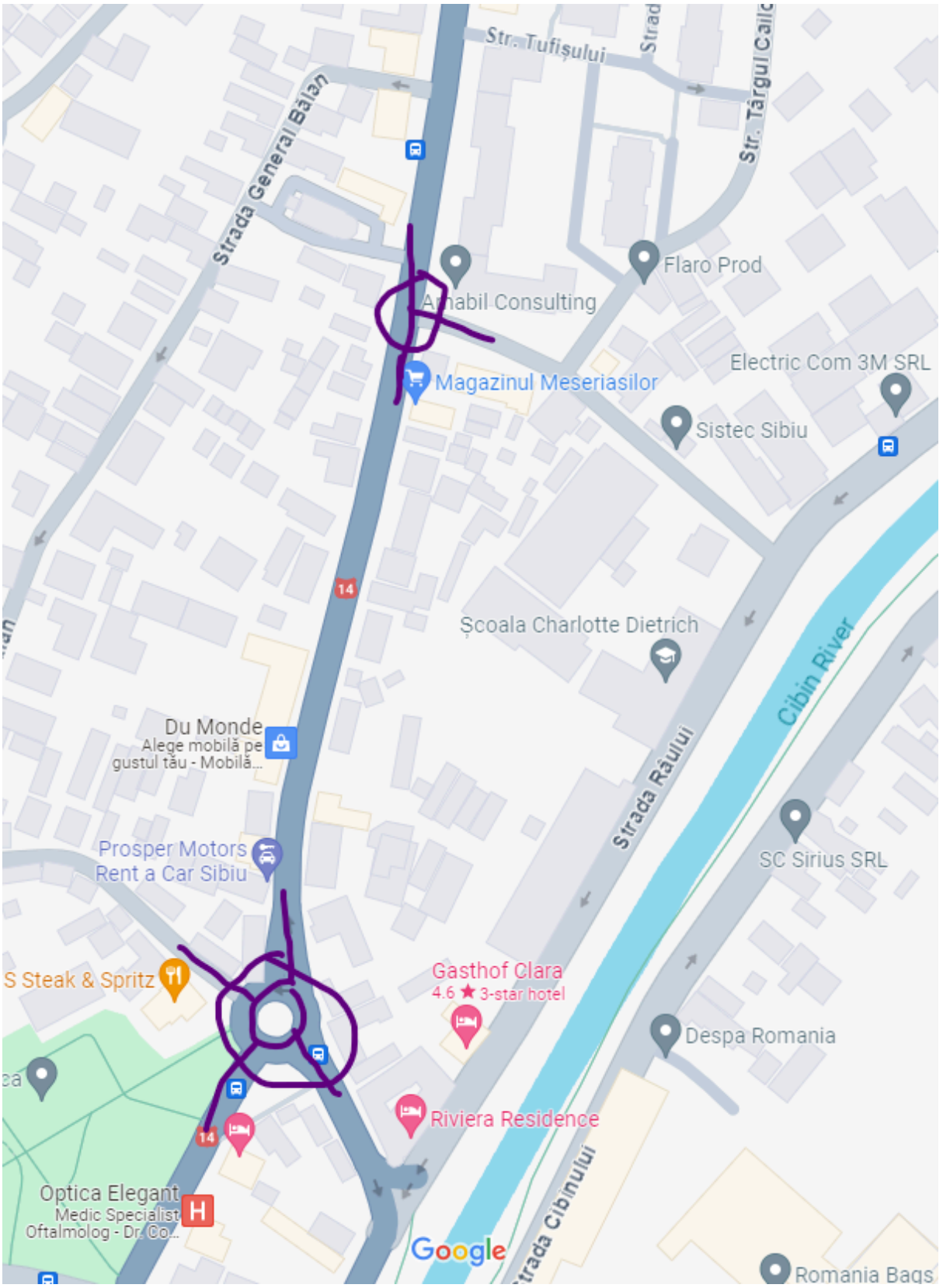
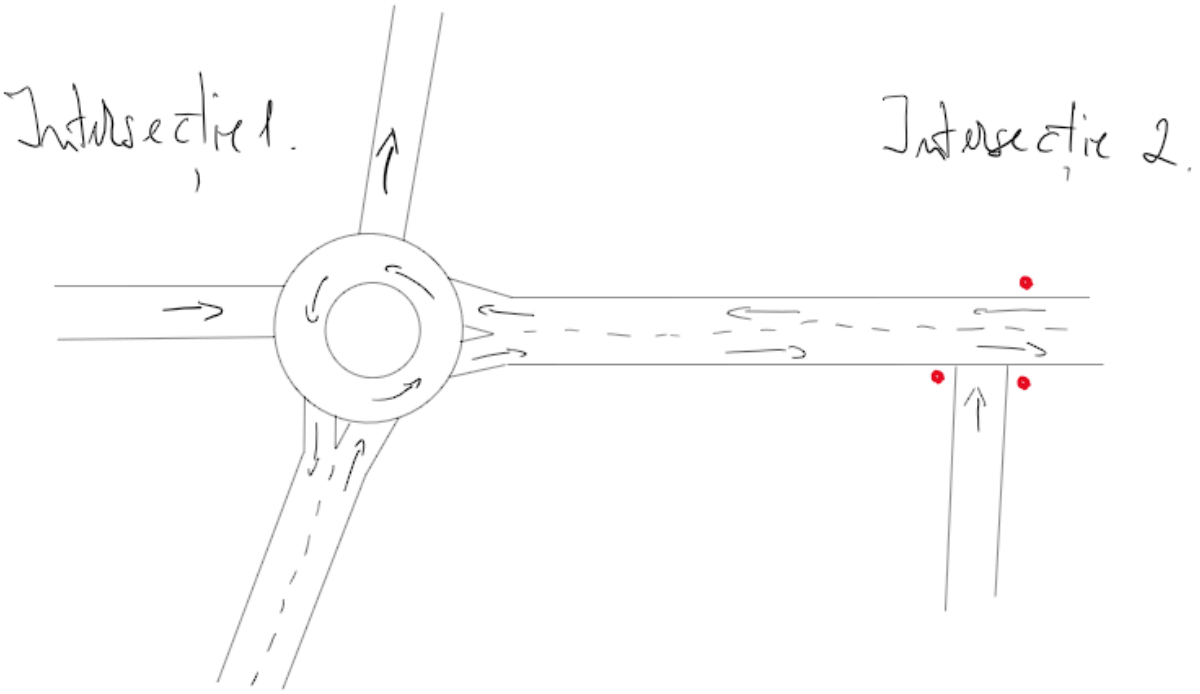
1. Specifications

a. Assigned Map



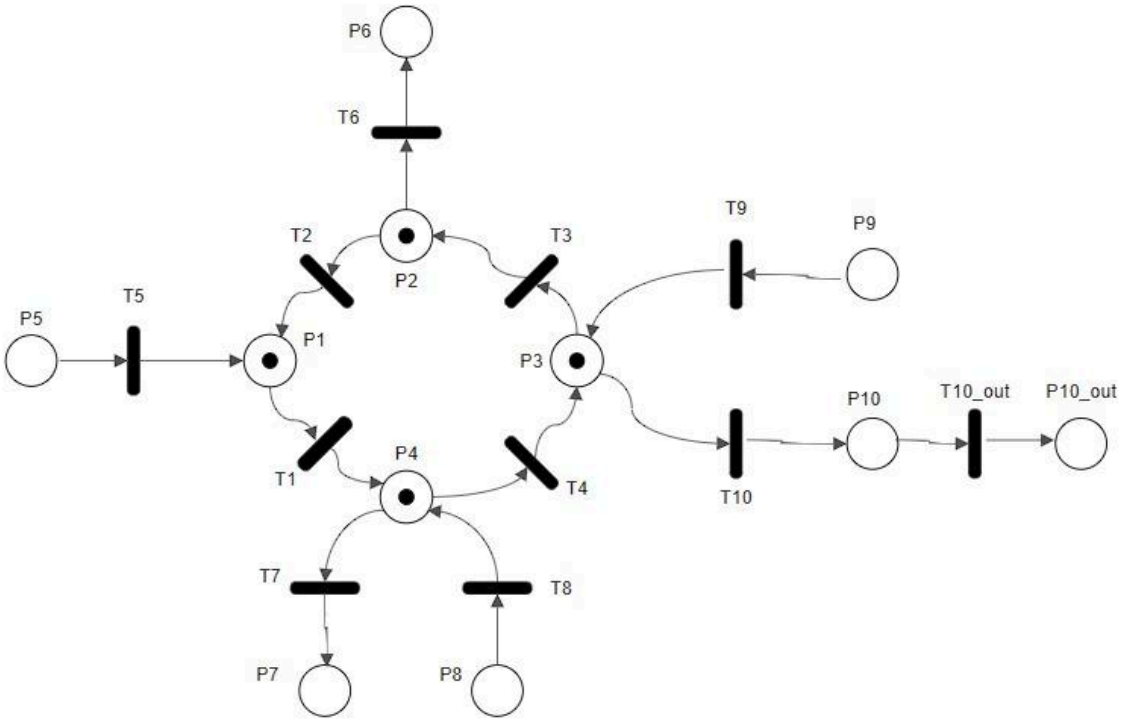
b. Simplified map



2. Design

a. OETPN Model

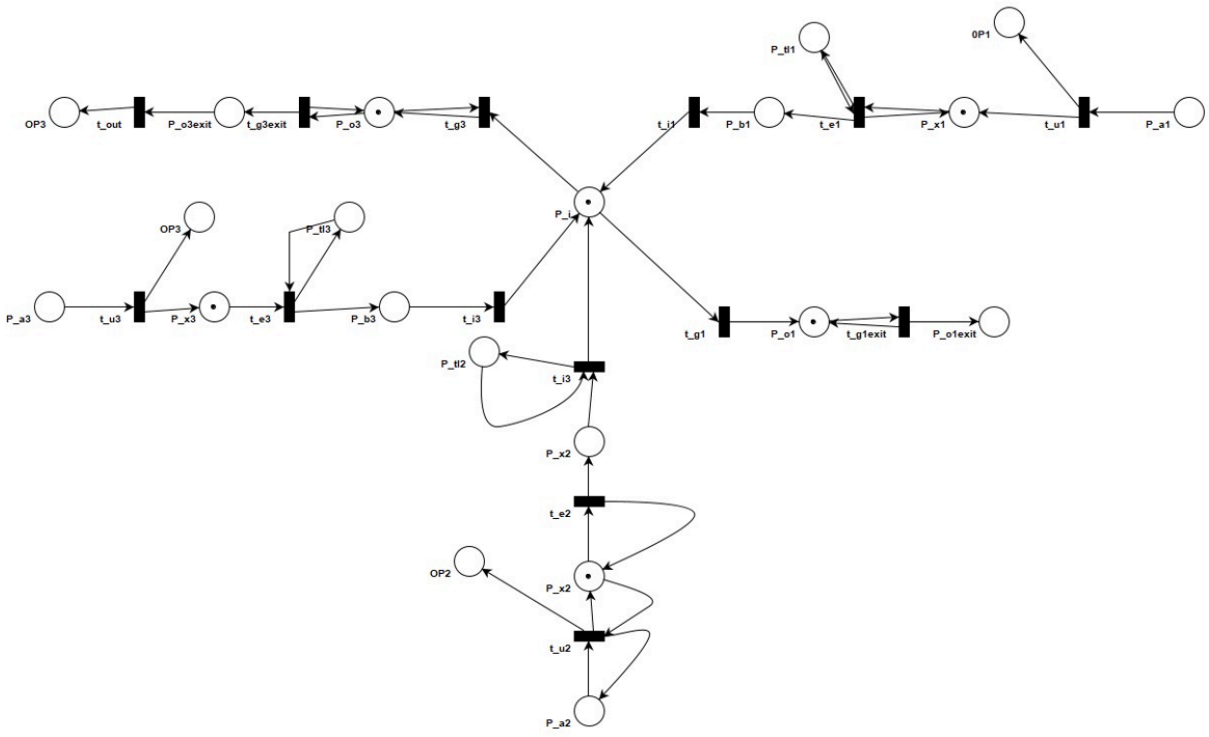
i. Intersection 1 (roundabout)



Place Types	
P1, P2, P3, P4	DataCarQueue
P5, P6, P7, P8, P9, P10	DataCar
P10_out	DataTransfer

Guards and Maps	
T5 (same for T8, T9)	(P5 != null && P1.CanAddCars)
	P1.AddElement(P5)
T1 (same for T2, T3, T4)	(p1.HaveCarForMe && P4.CanAddCars)
	P1.PopElementWIthTargetToQueue(P4)
T6 (same for T7, T10)	(P2.HaveCarForMe && P6.CanAddCars)
	P2.PopElementWithTarget(P6)
T10_out	P10 != null
	P10_out.SendOverNetwork(P10)

ii. Intersection 2

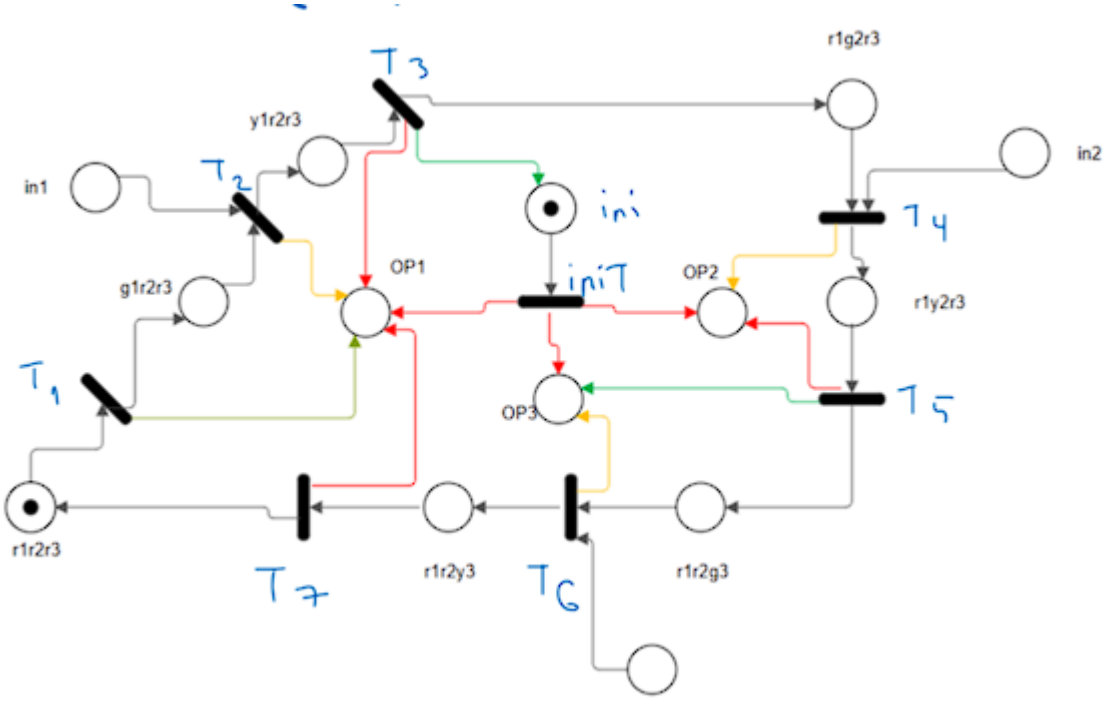


Place Types	
P_x1, P_x2, P_x3, P_o1, P_o3, P_i	DataCarQueue
P_a1, P_b1, P_a2, P_b2, P_a3, P_b3, P_o1_exit, P_o3_exit	DataCar

P_tl1, P_tl2, P_tl3	DataString
OP1, OP2, OP3, PO3	DataTransfer

Guards and Maps	
T_u1 (same for T_u2, T_u3)	(P_a1 != null && P_x1.CanAddCars)
	P_x1.AddElement(P_a1)
T_u1 (same for T_u2, T_u3)	(P_o1 != null && P_x1.CanNotAddCars)
	OP1.Send("Full"); P_a1 = P_a1
T_e1 (same for T_e2, T_e3)	(P_x1.HaveCar && P_tl1 == "green")
	P_x1.PopElementWithoutTarget(P_b1); P_tl1 = P_rl1
T_i1 (same for T_i2, T_i3)	(P_i.CanAddCars && P_b1 != Null)
	P_i.AddElement(P_b1)
T_g1 (same for T_g2, T_g3)	(P_i.HaveCarForMe && P_o1.CanAddCars)
	P_i.PopElementWithTargetToQueue(P_o1)
T_g1_exit (same for T_g2_exit, T_g3_exit)	(P_o1.HaveCar)
	P_o1.PopElementWithoutTarget(P_o1_exit)
T_out	(P_o3_exit != Null)
	P_o3_exit.SendOverNetwork(P_o3)

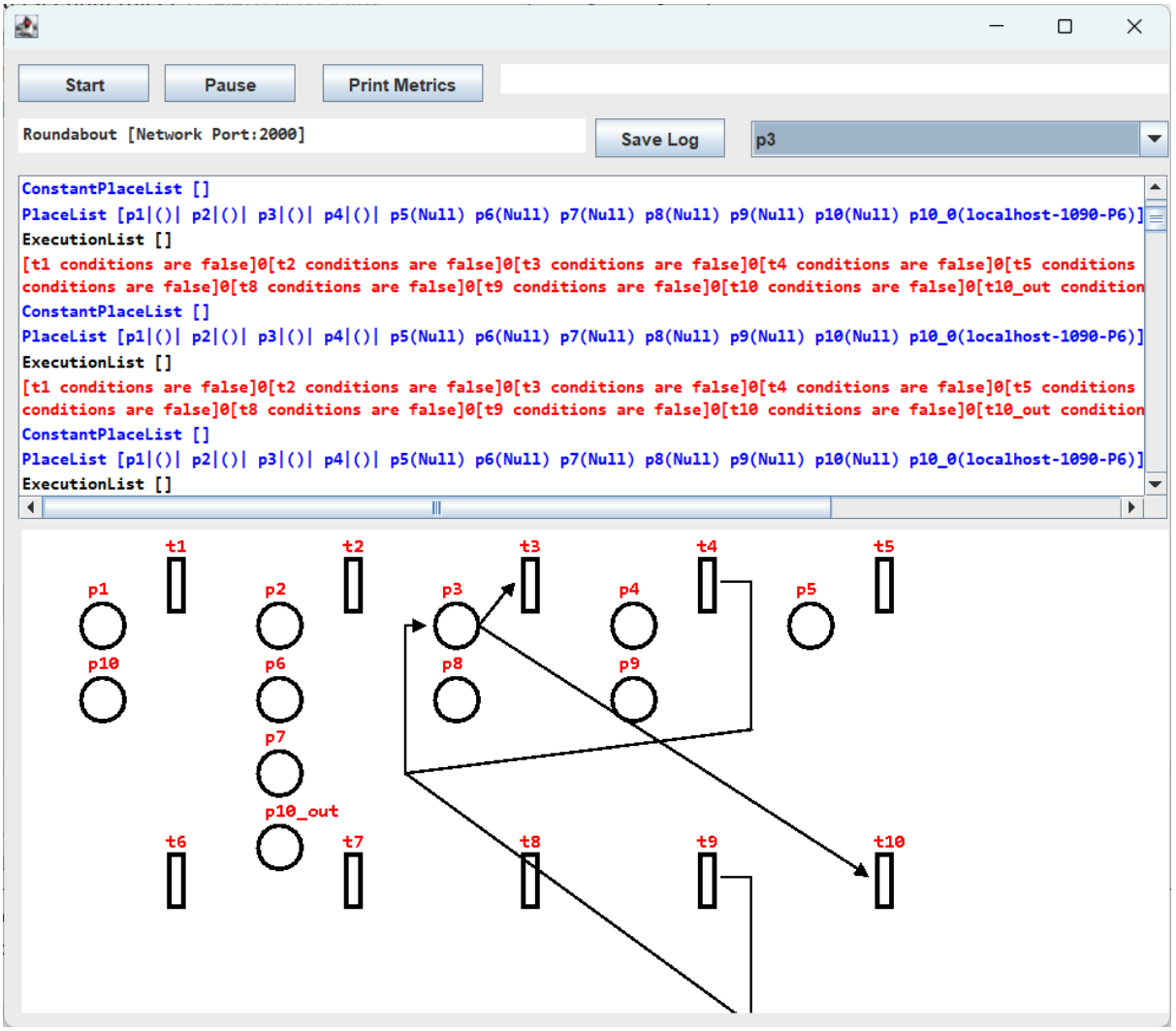
Controller:

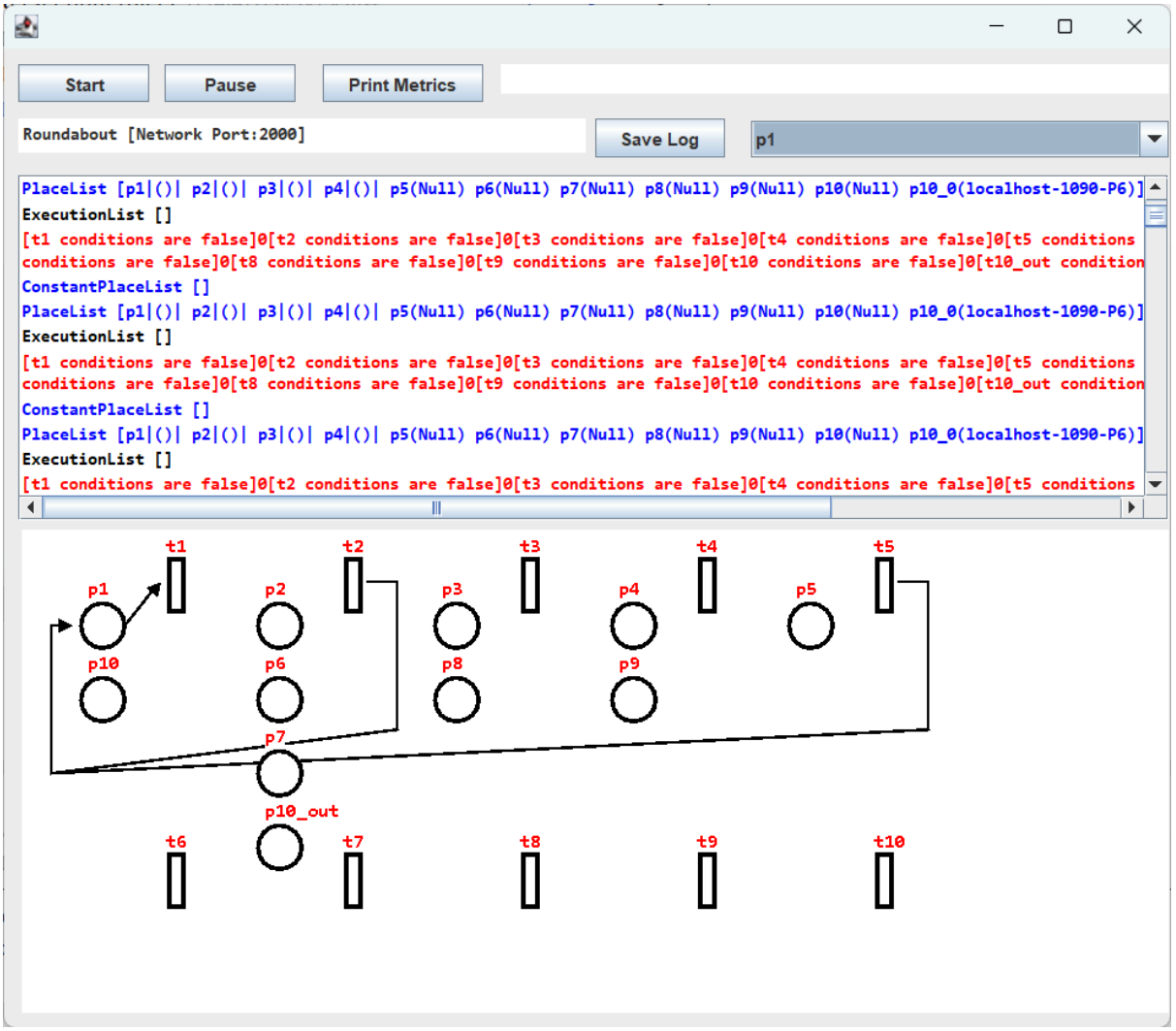


3. Implementation

[View code on GitHub]

4. Testing

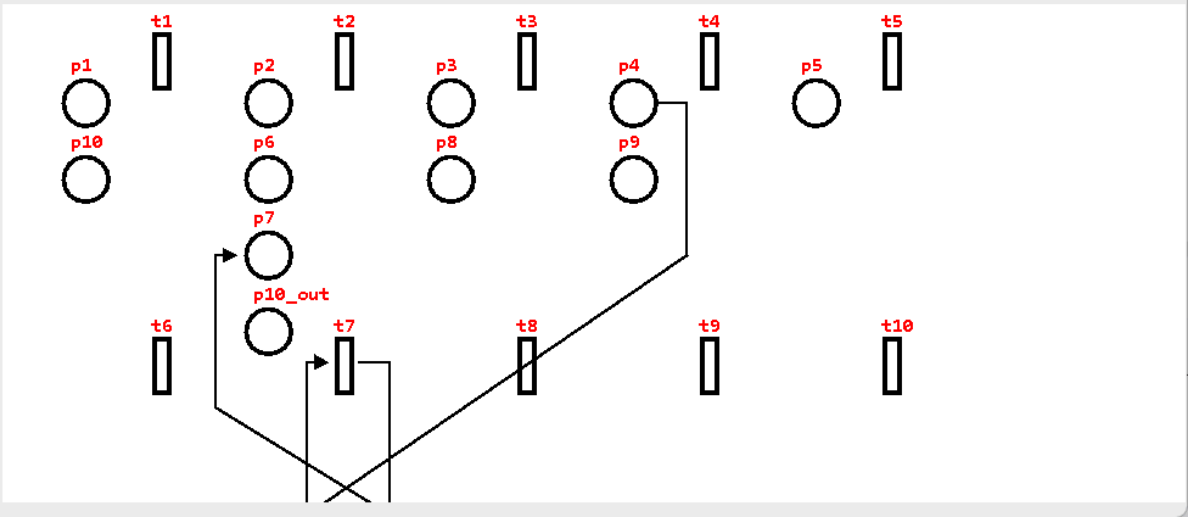

Start
Pause
Print Metrics
Roundabout [Network Port:2000]
Save Log
p3
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out condition
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out condition
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
t1
t2
t3
t4
t5
p1
p2
p3
p4
p5
p10
p6
p8
p9
p7
p10_out
t6
t7
t8
t9
t10


Start
Pause
Print Metrics
Roundabout [Network Port:2000]
Save Log
p1
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out condition
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out condition
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
t1
t2
t3
t4
t5
p1
p2
p3
p4
p5
p10
p6
p8
p9
p7
p10_out
t6
t7
t8
t9
t10

Start Pause Print Metrics

Roundabout [Network Port:2000] Save Log t7

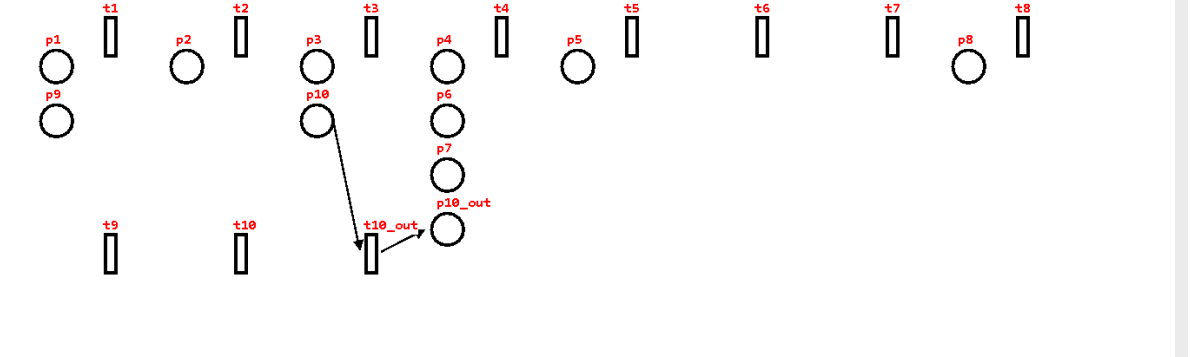
```
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out condition
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out condition
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
```

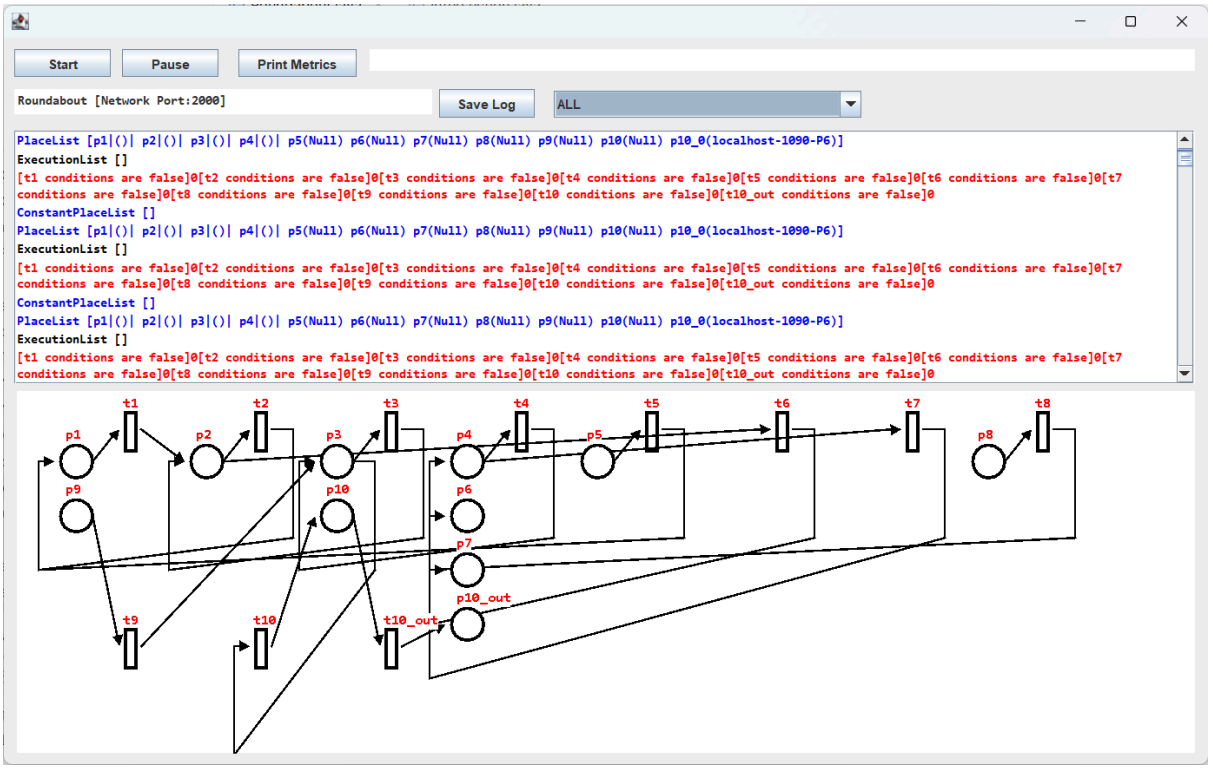


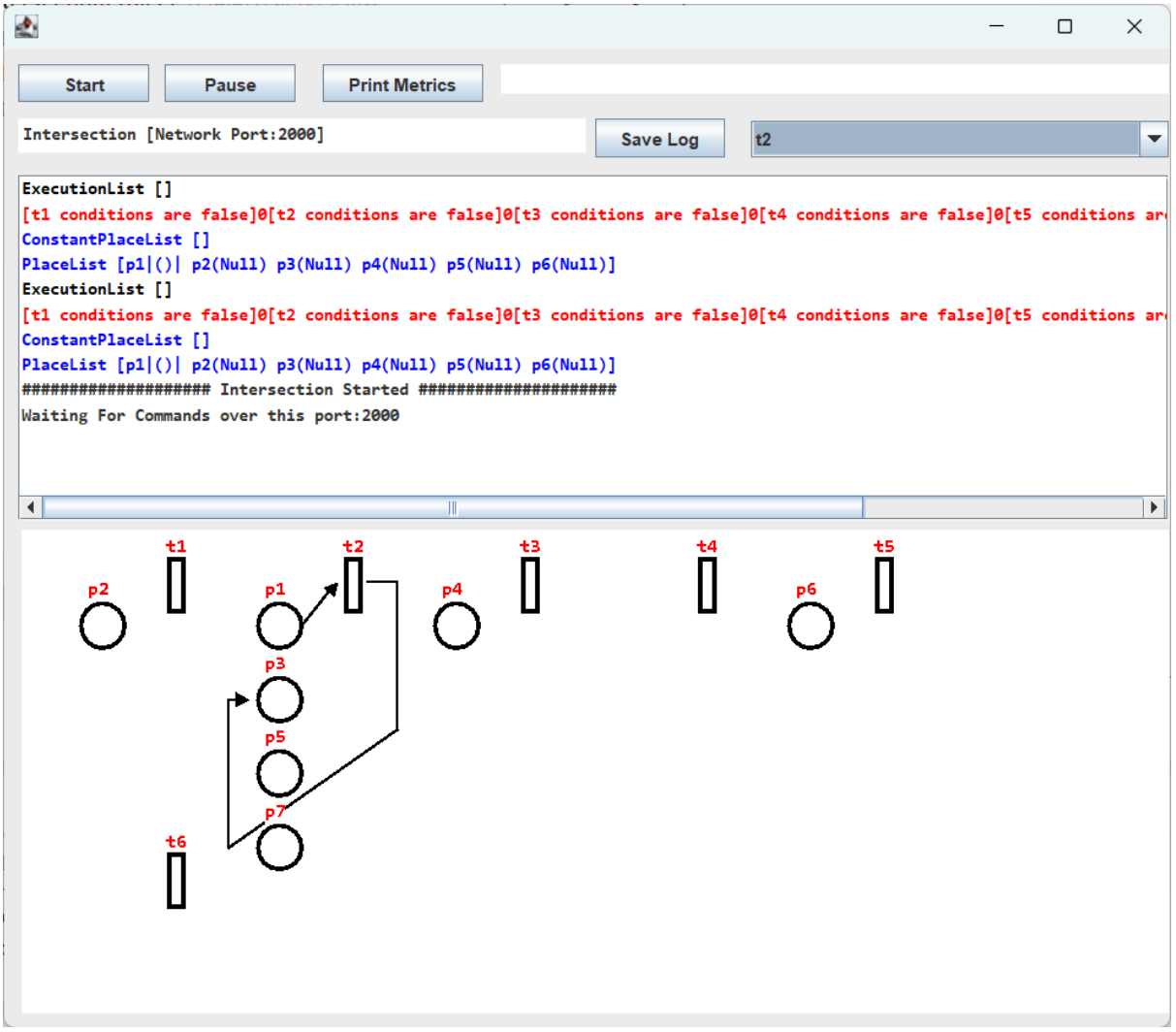
Start Pause Print Metrics

Roundabout [Network Port:2000] Save Log t10_out

```
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions are false]0[t6 conditions are false]0[t7
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out conditions are false]0
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions are false]0[t6 conditions are false]0[t7
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out conditions are false]0
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions are false]0[t6 conditions are false]0[t7
conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out conditions are false]0
```



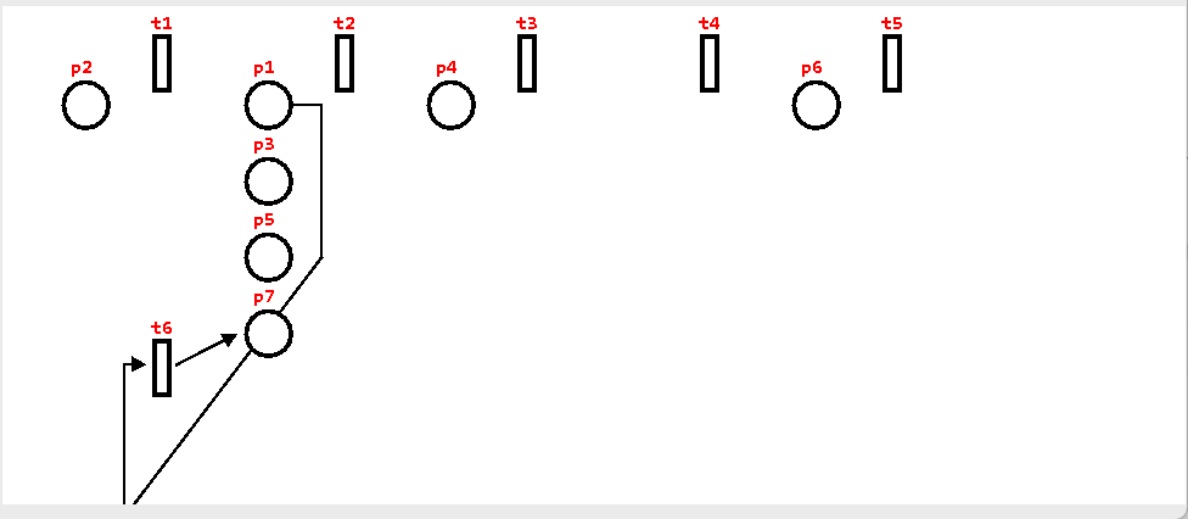

Start
Pause
Print Metrics
Roundabout [Network Port:2000]
Save Log
ALL
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions are false]0[t6 conditions are false]0[t7 conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out conditions are false]0
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions are false]0[t6 conditions are false]0[t7 conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out conditions are false]0
ConstantPlaceList []
PlaceList [p1|()| p2|()| p3|()| p4|()| p5(Null) p6(Null) p7(Null) p8(Null) p9(Null) p10(Null) p10_0(localhost-1090-P6)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions are false]0[t6 conditions are false]0[t7 conditions are false]0[t8 conditions are false]0[t9 conditions are false]0[t10 conditions are false]0[t10_out conditions are false]0
t1
t2
t3
t4
t5
t6
t7
t8
p1
p2
p3
p4
p5
p8
p9
p10
p6
p7
p10_out
t9
t10
t10_out

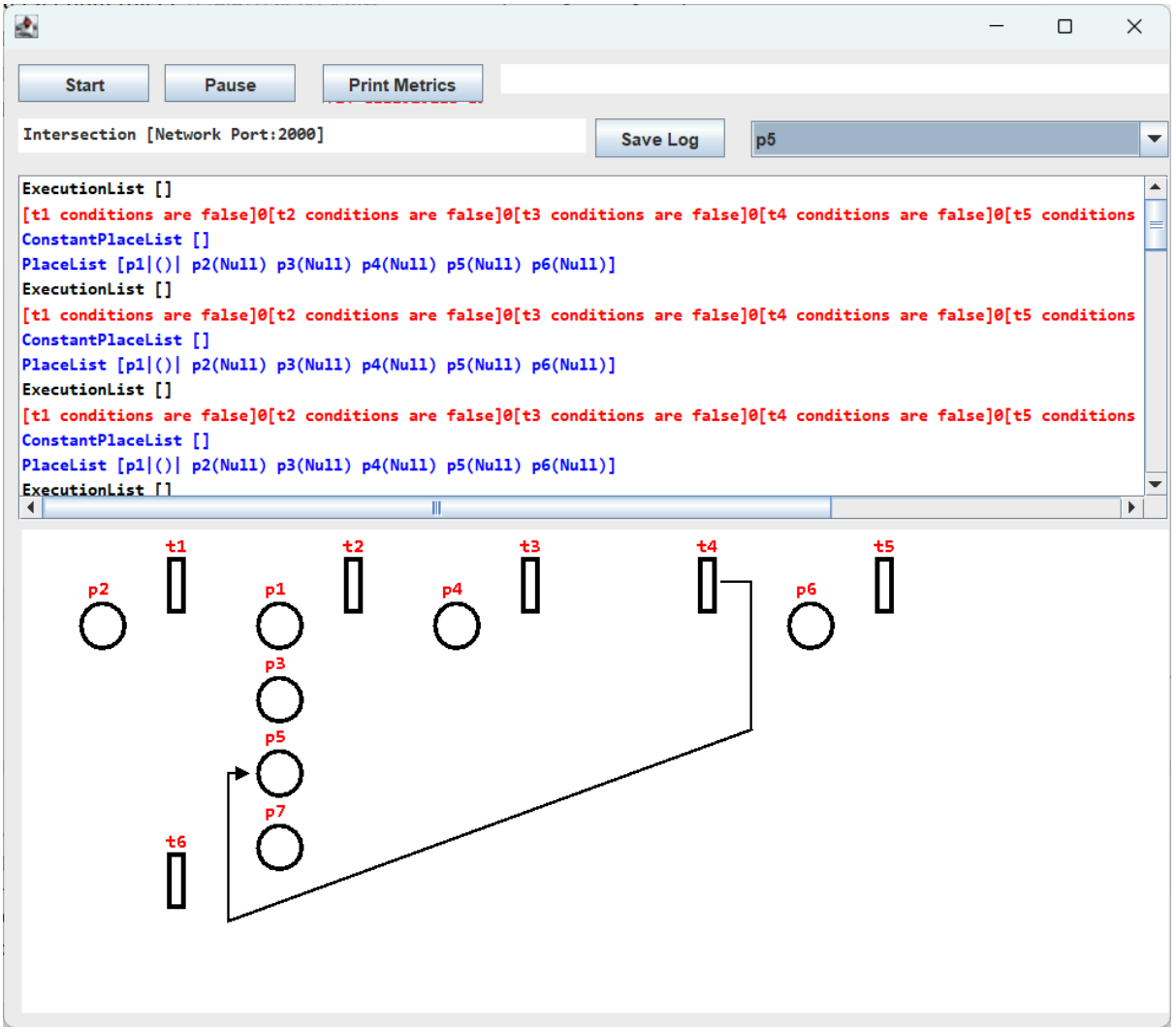

Start
Pause
Print Metrics
Intersection [Network Port:2000]
Save Log
t2
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions ar
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions ar
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
##################### Intersection Started ####################
Waiting For Commands over this port:2000
t1
t2
t3
t4
t5
p2
p1
p4
p6
p3
p5
p7
t6

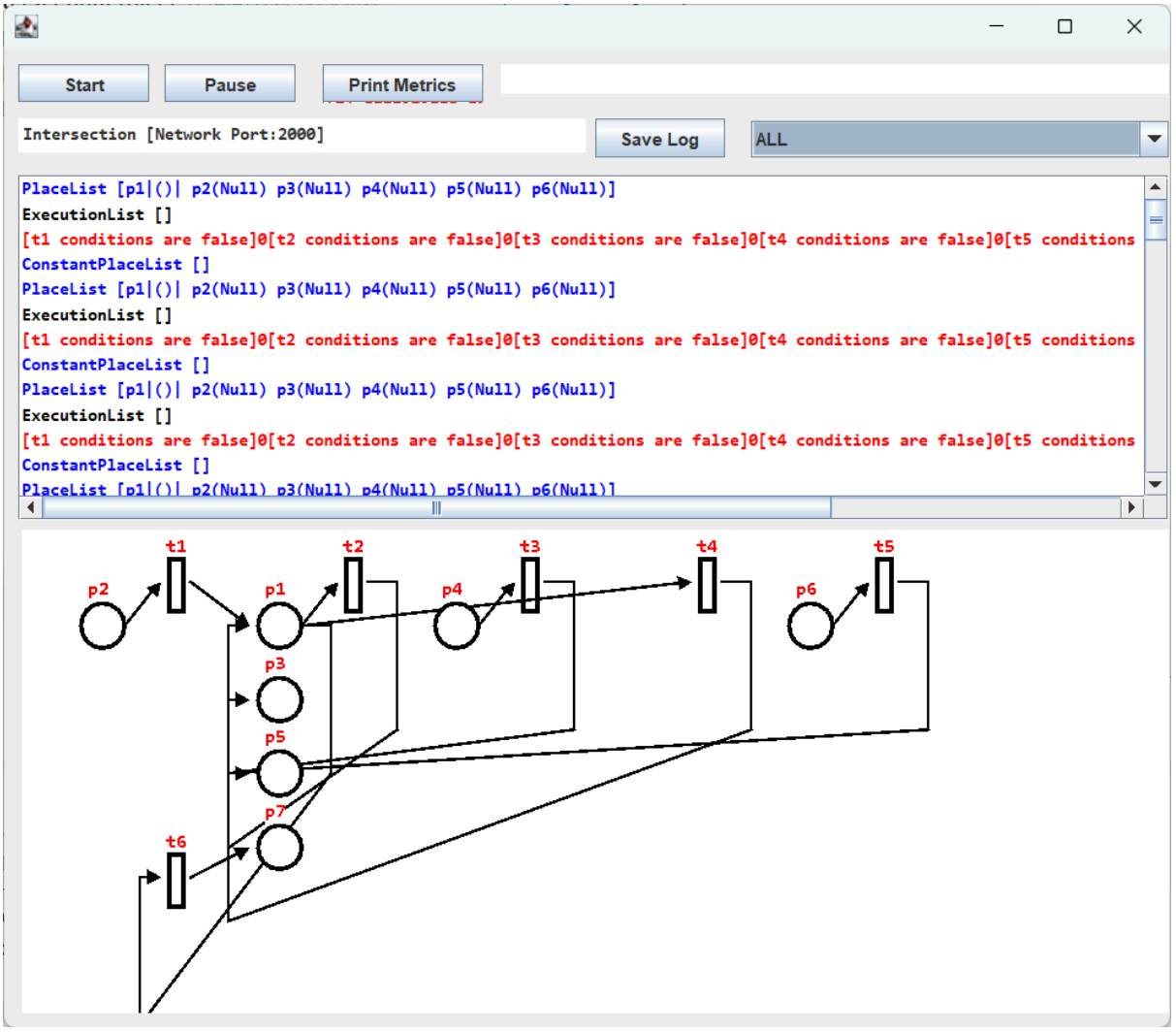
Start Pause Print Metrics

Intersection [Network Port:2000] Save Log t6

```
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
```




Start
Pause
Print Metrics
Intersection [Network Port:2000]
Save Log
p5
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
t1
t2
t3
t4
t5
p2
p1
p4
p6
p3
p5
p7
t6


Start
Pause
Print Metrics
Intersection [Network Port:2000]
Save Log
ALL
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
t1
t2
t3
t4
t5
p2
p1
p4
p6
p3
p5
p7
t6