Project Report

Distributed Control Systems

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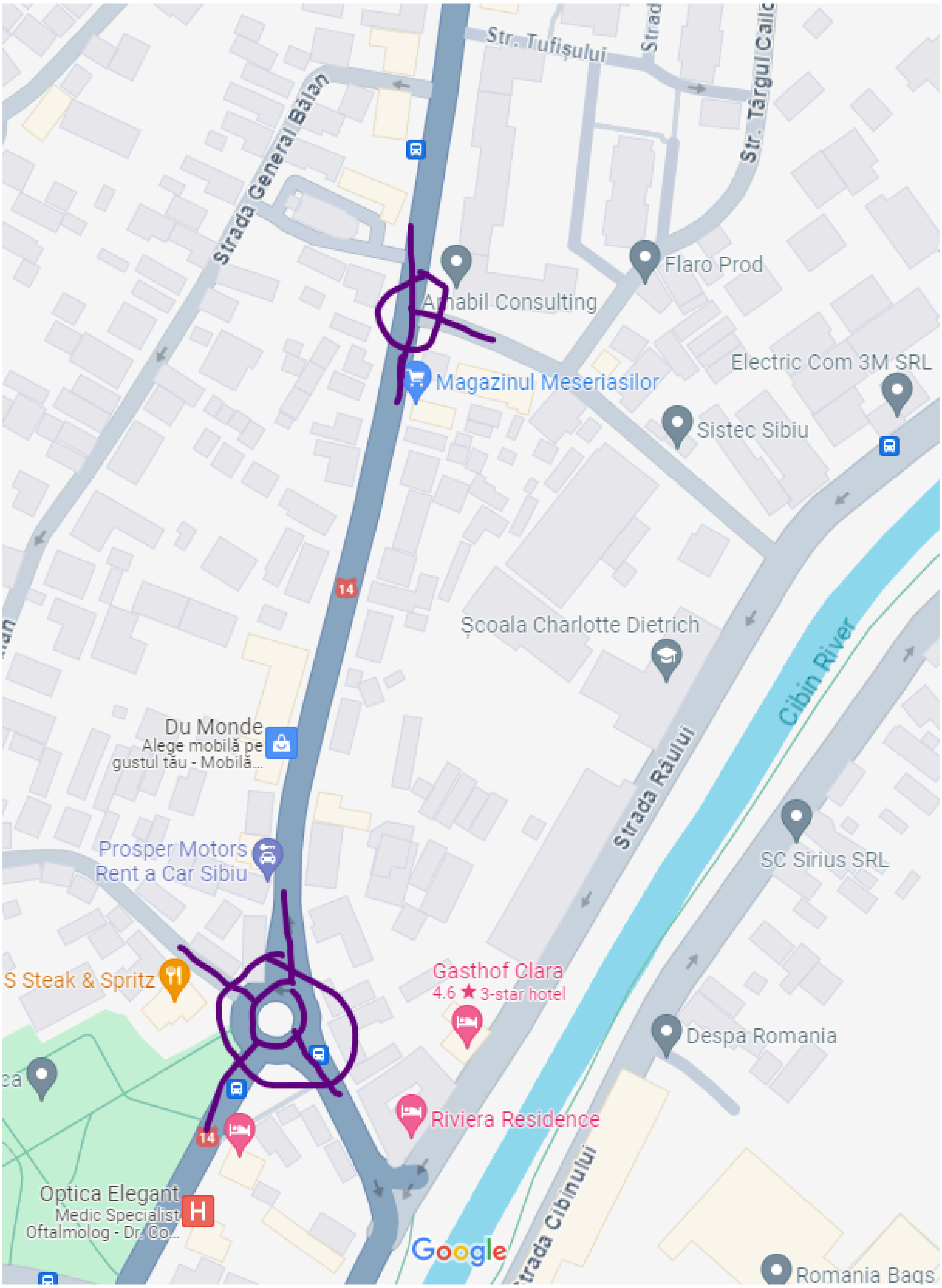
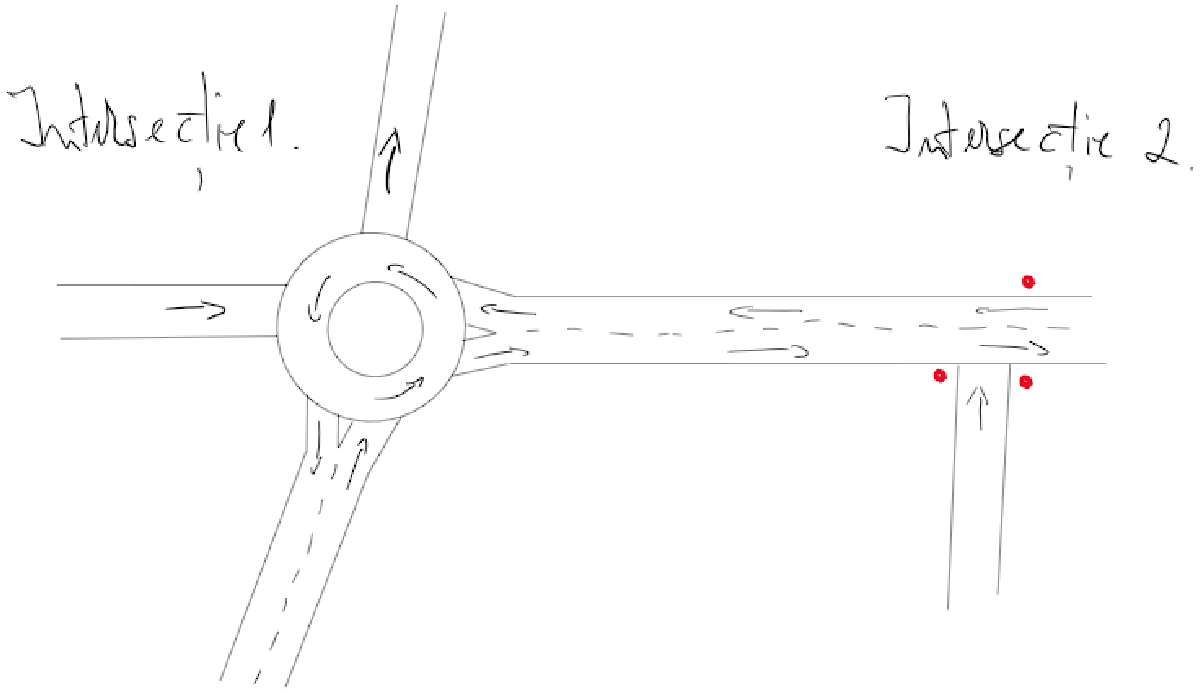
1. Specifications

a. Assigned Map



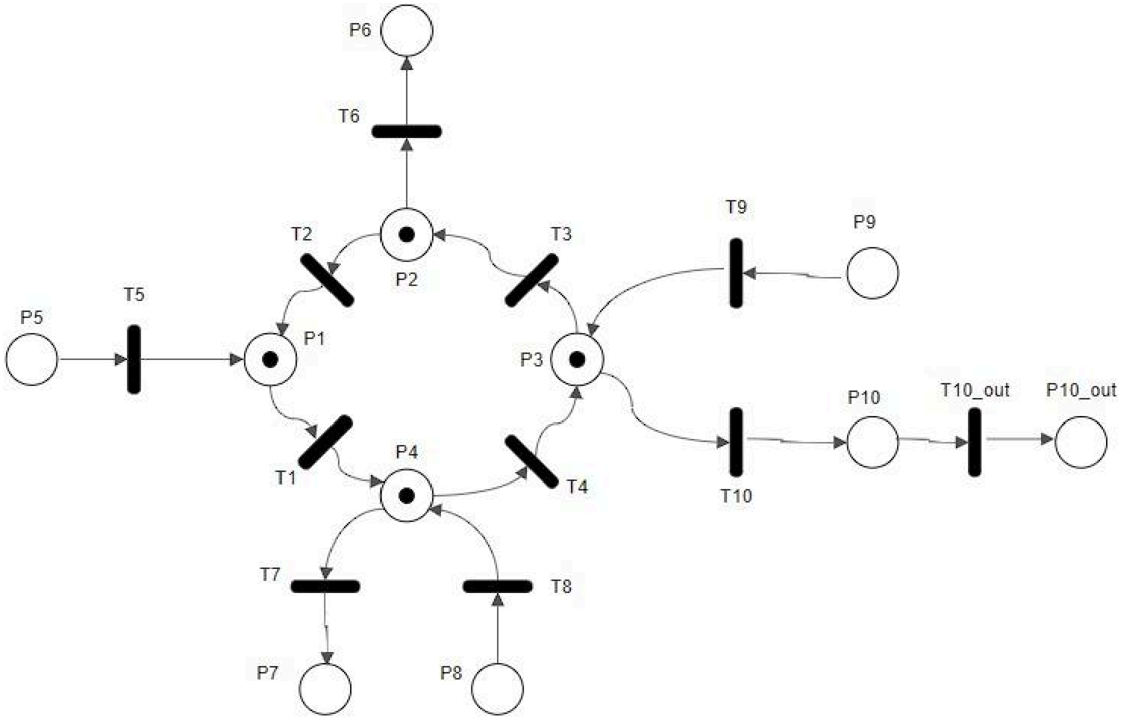
b. Simplified map



2. Design

a. OETPN Model

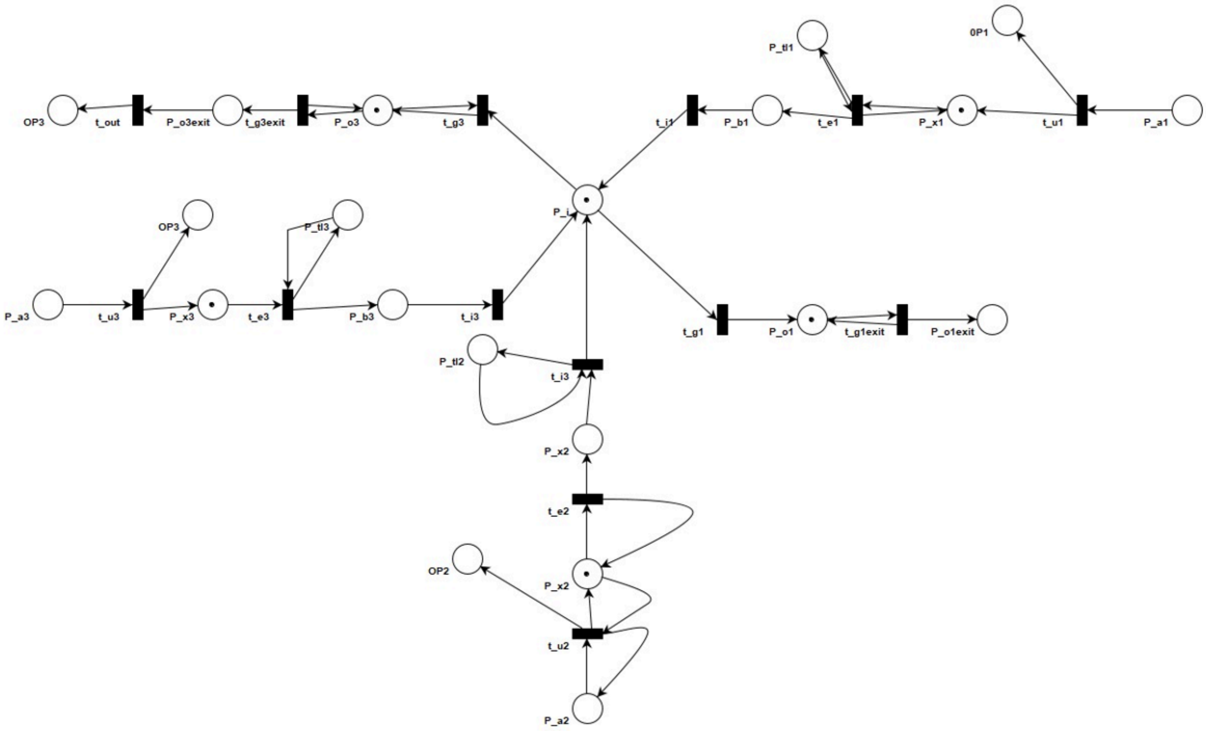
i. Intersection 1 (roundabout)



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

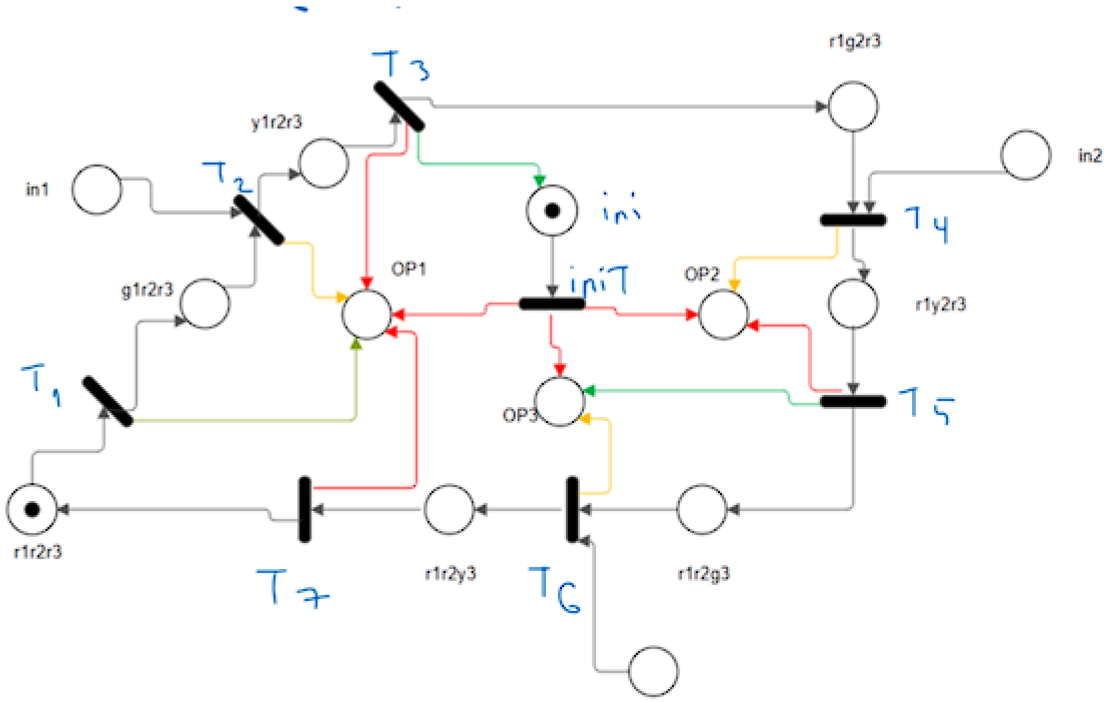
P_tl1, P_tl2, P_tl3	DataString
OP1, OP2, OP3, PO3	DataTransfer

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)

iii. Controller



Guards and Maps	
init	ini != null
	OP1 -> OP3.sendOverNetwork(ini) ini.MakeNull
T1	r1r2r3 != null

	OP1.SendOverNetwork(“green”)
	g1r2r3 = r1r2r3

T2	g1r2r3 != NULL && in1 == NULL

	OP1.SendOverNetwork(“yellow”)
	y1r2r3 = g1r2r3
	DynamicDelay(“five”)

T2	g1r2r3 != null && in1 != NULL

	OP1.SendOverNetwork(“yellow”)
	y1r2r3 = g1r2r3
	DynamicDelay(“ten”)

T3	(y1r2r3 != null)

	r1g2r3 = y1r2r3
	OP1.SendOverNetwork(“red”)
	OP2.SendOverNetwork(“green”)

T4	(r1g2r3 != NULL && in2 == NULL)

	OP2.SendOverNetwork(“yellow”)
	R1y2r3 = r1g2r3
	DynamicDelay(“five”)

T4	(r1g2r3 != NULL && in2 != NULL)

	OP2.SendOverNetwork(“yellow”)
	R1y2r3 = r1g2r3
	DynamicDelay(“ten”)

T6	(r1r2g3 != NULL && in3 == NULL)

	OP3.SendOverNetwork(“yellow”)
	R1r2y3 = r1r2g3
	DynamicDelay(“five”)

T6	(r1r2g3 != NULL && in3 != NULL)

	OP3.SendOverNetwork(“yellow”)
	R1r2y3 = r1r2g3
	DynamicDelay(“ten”)

T5	(r1y2r3 != NULL)

	R1r2g3 = r1y2r3
	OP2.SendOverNetwork(“red”)
	OP3.SendOverNetwork(“green”)

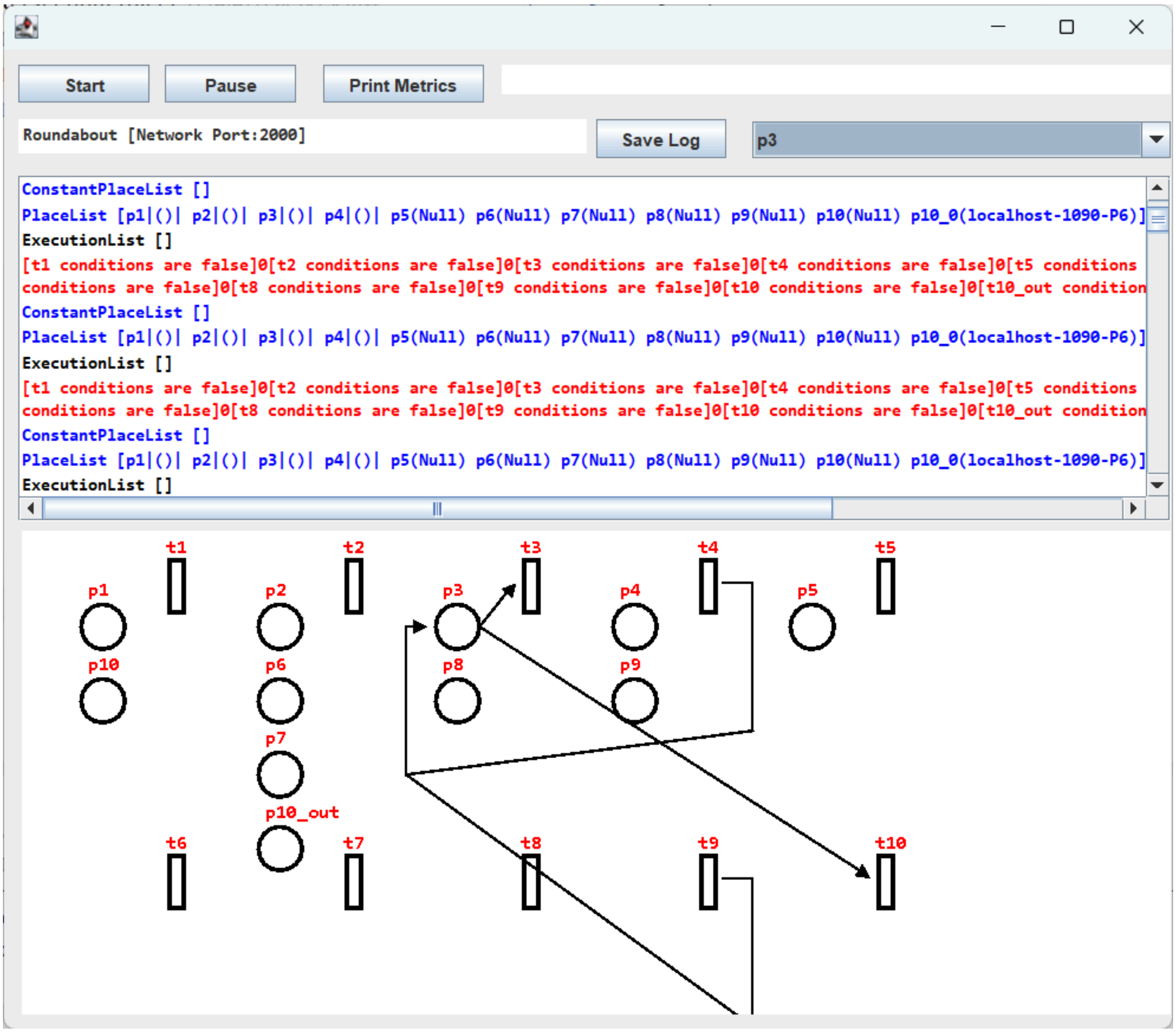
T7	(r1r2y3 != NULL)

	OP3.SendOverNetwork(“red”)
	R1r2r3 = r1r2y3

3. Implementation

View code on GitHub

4. Testing



Roundabout [Network Port:2000]

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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)]
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ExecutionList []
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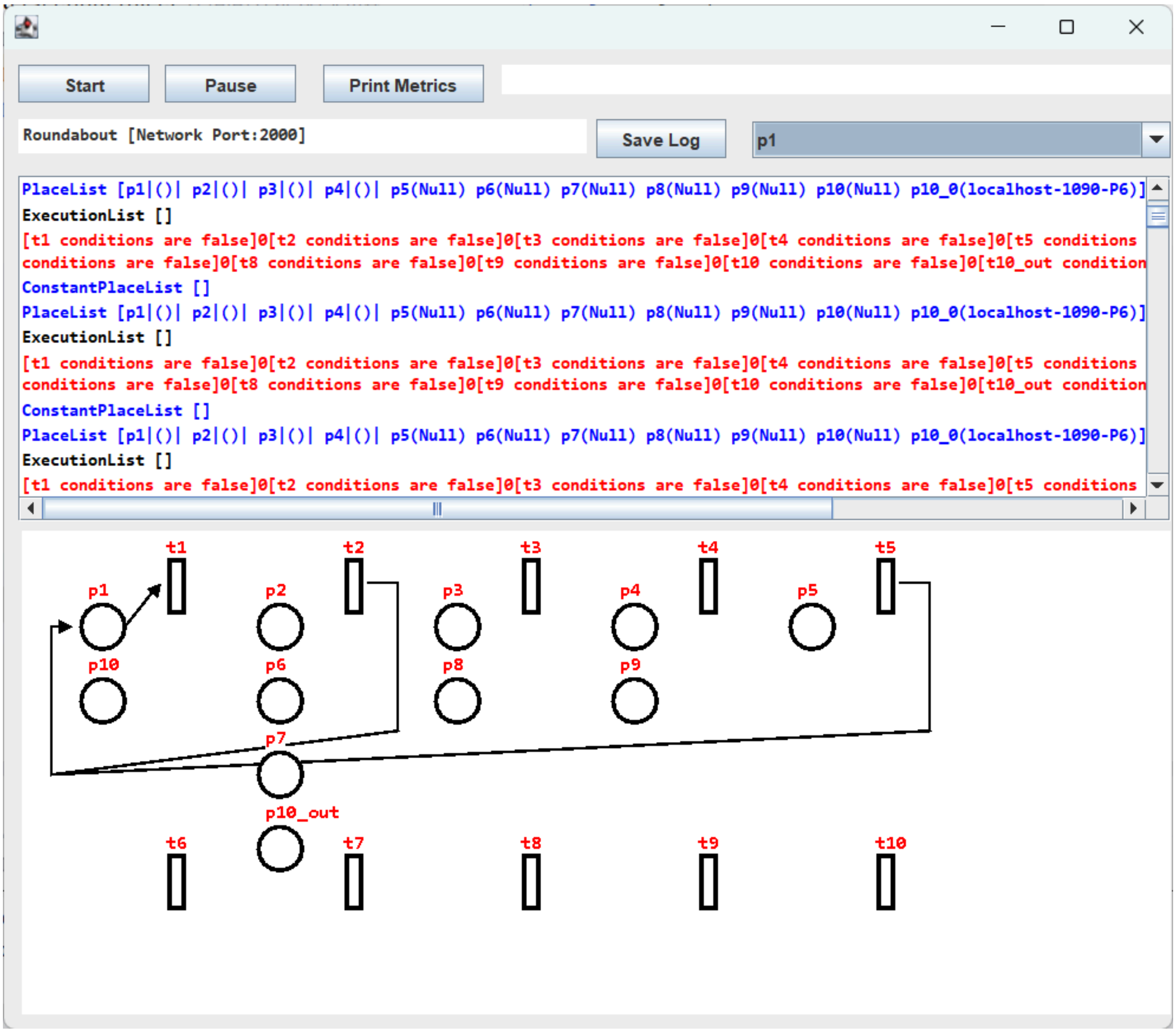

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ExecutionList []
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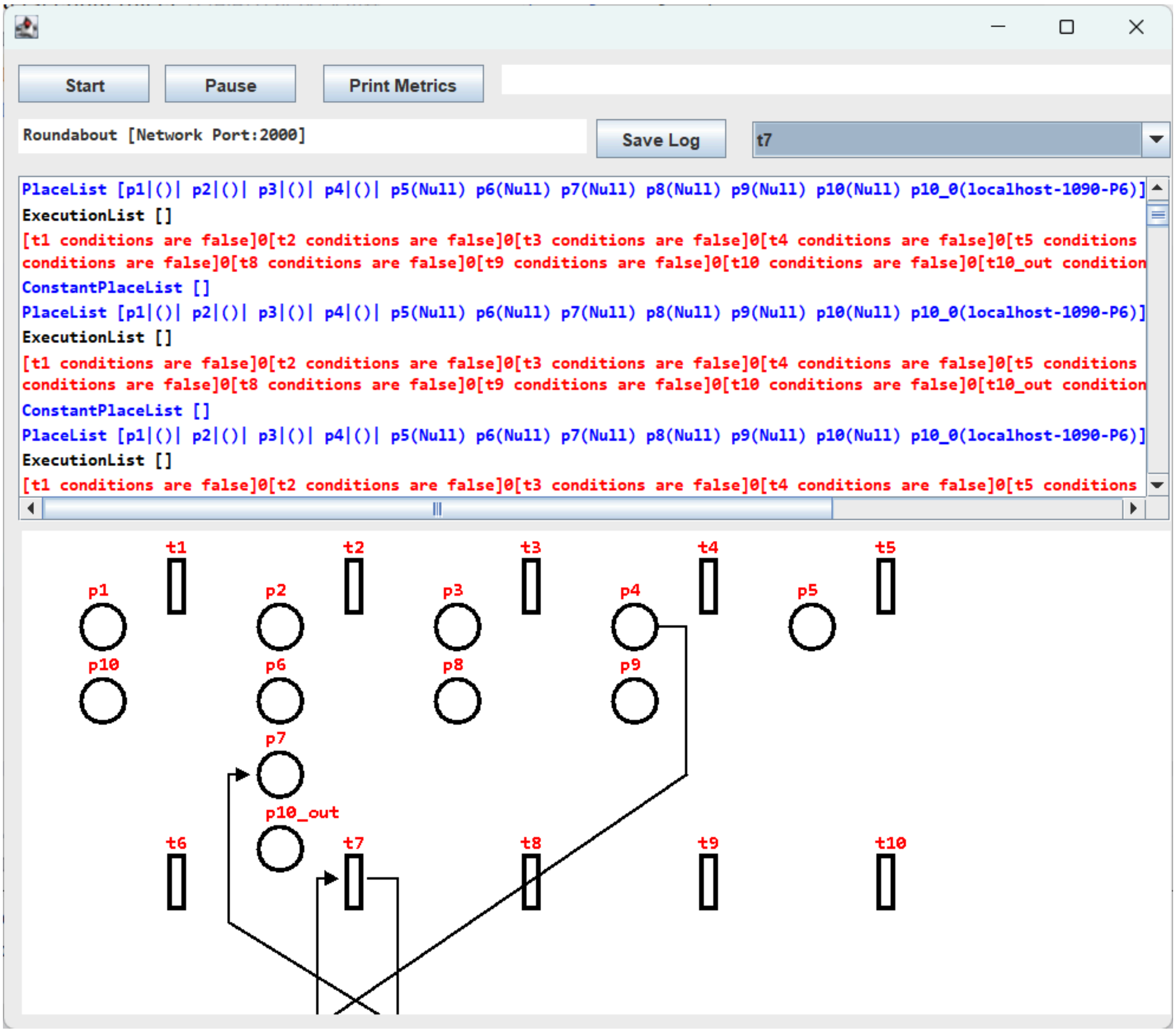

Roundabout [Network Port:2000]

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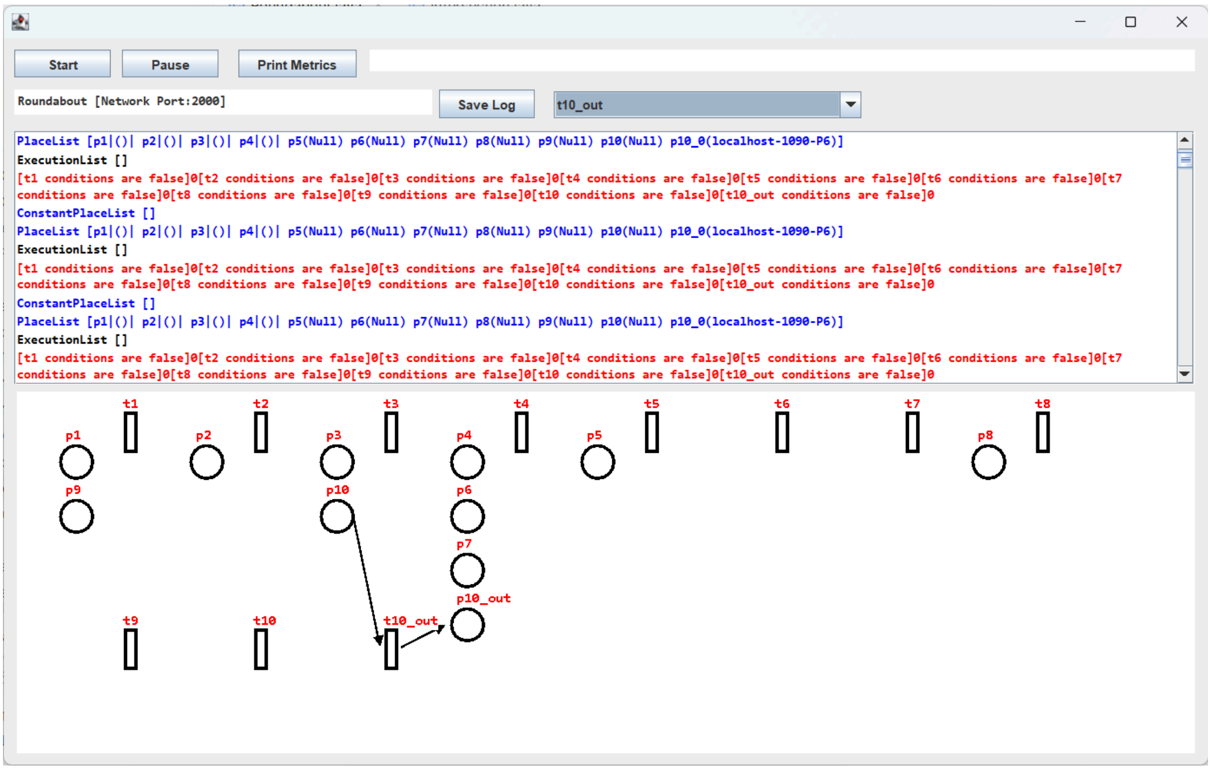

Roundabout [Network Port:2000]

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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)]
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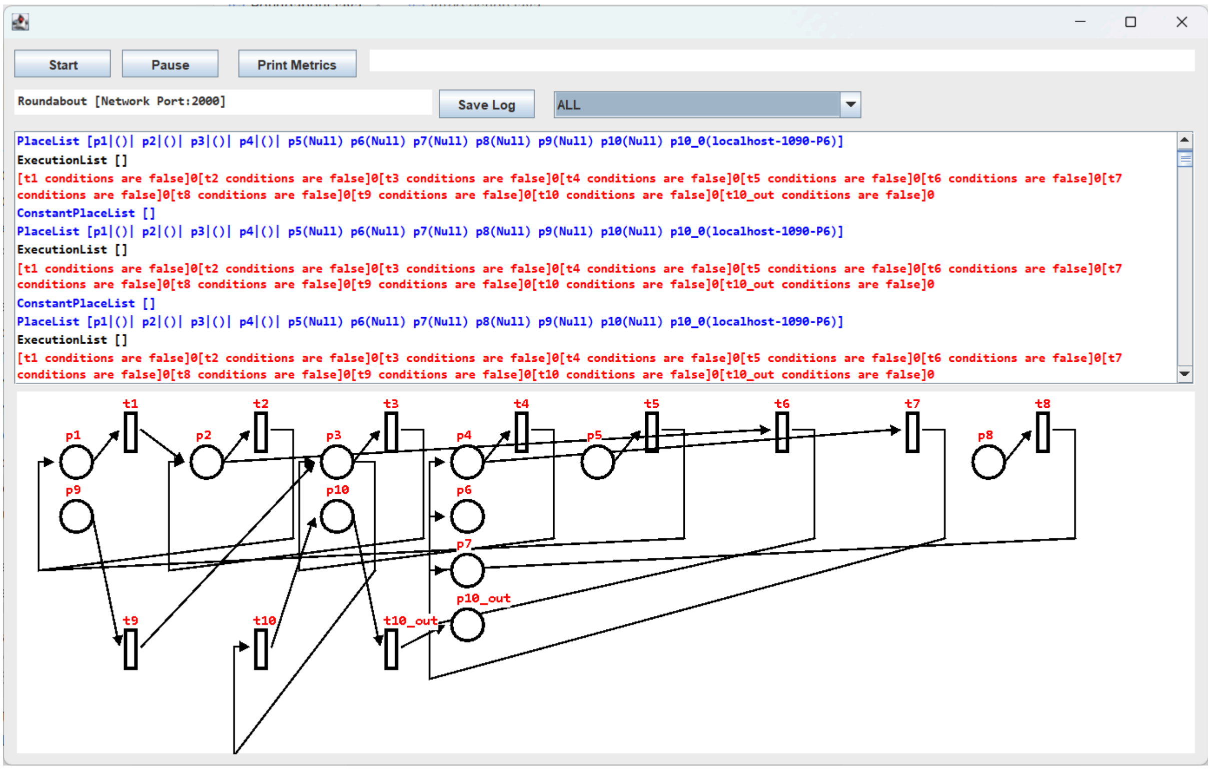

Roundabout [Network Port:2000]

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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)]
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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 []
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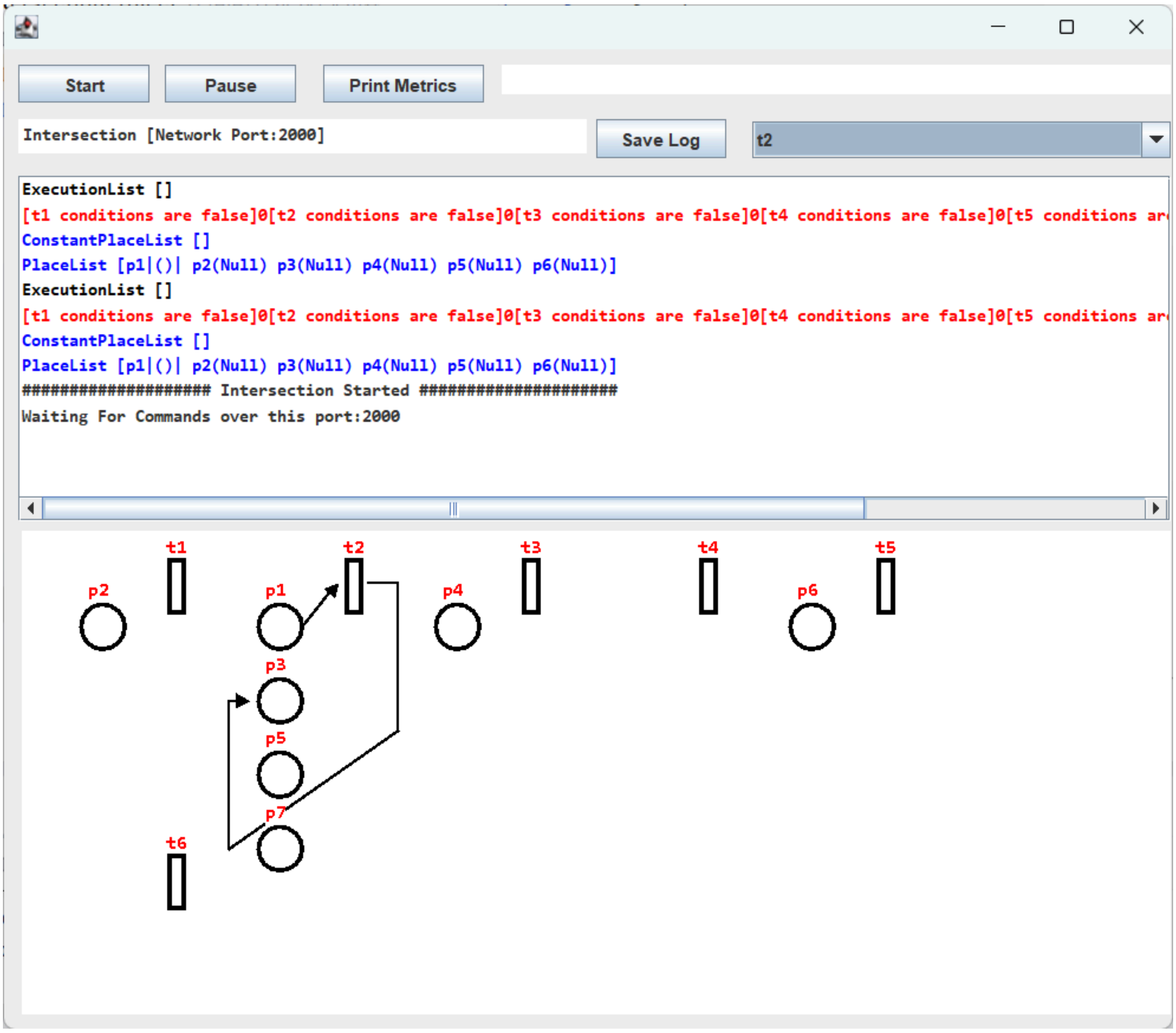

Intersection [Network Port:2000]

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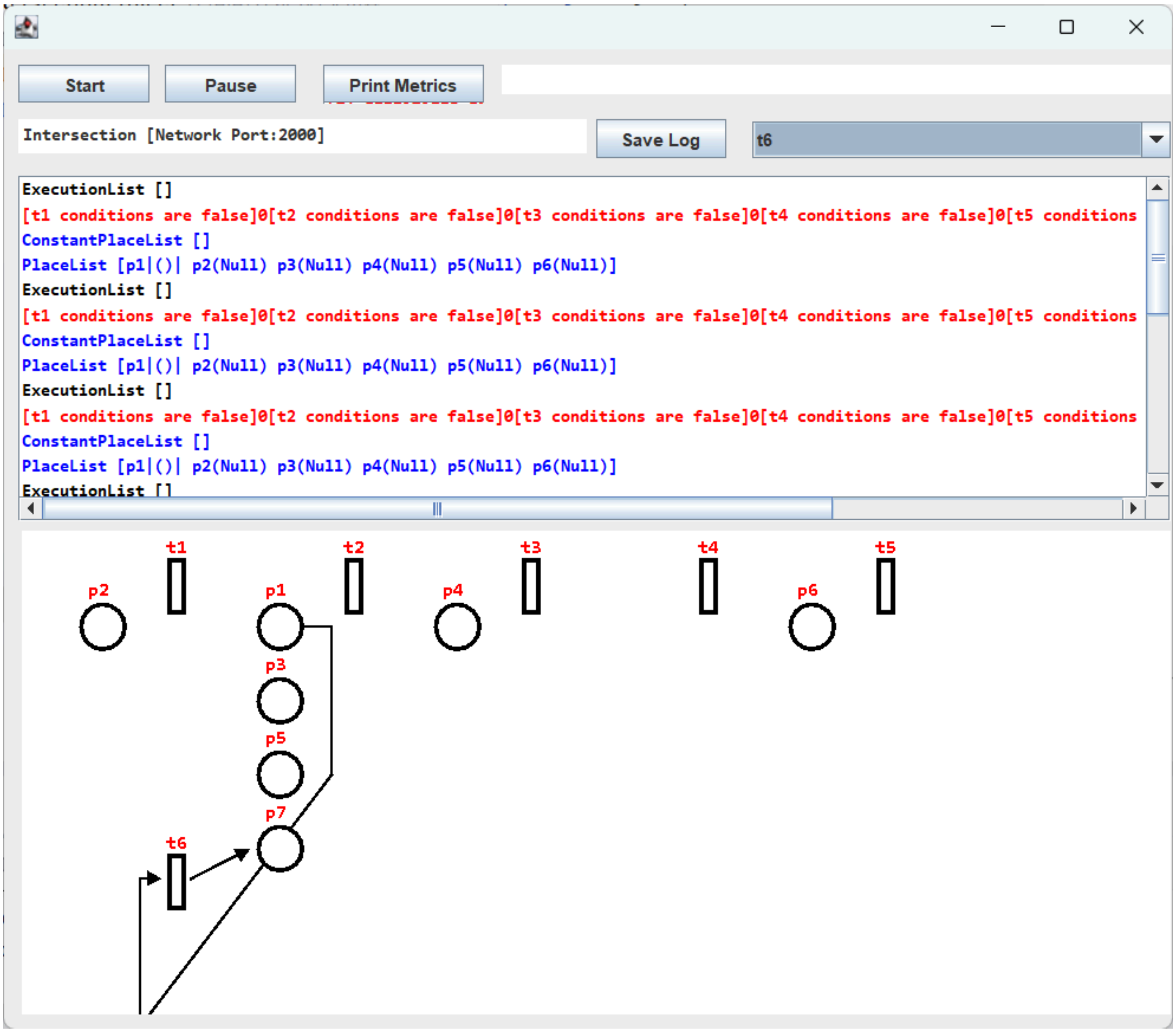
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4 conditions are false]0[t5 conditions ar
ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
[t1 conditions are false]0[t2 conditions are false]0[t3 conditions are false]0[t4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



Intersection [Network Port:2000]

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[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 []
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PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
```

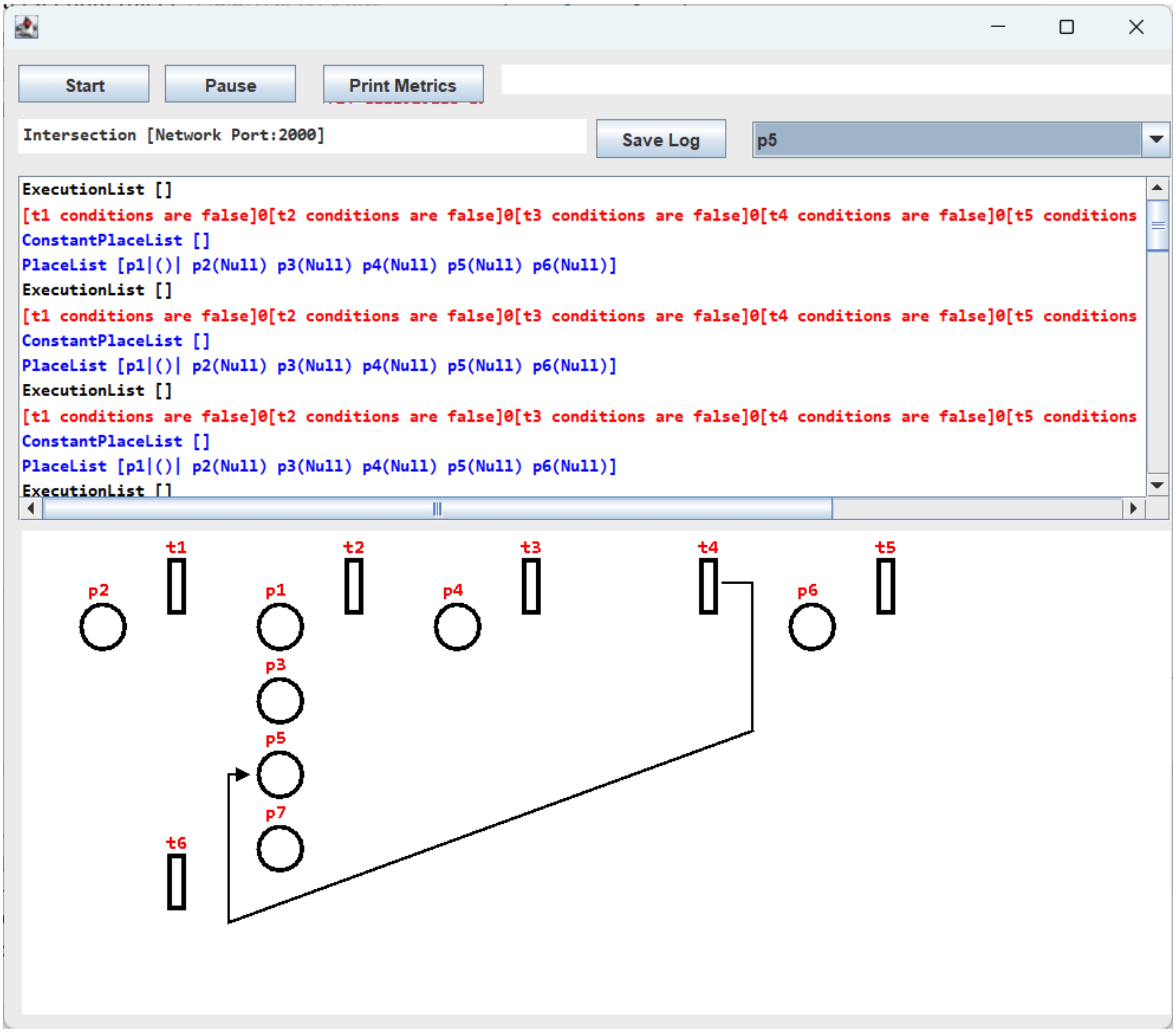

```
Intersection [Network Port:2000]
```

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ExecutionList []
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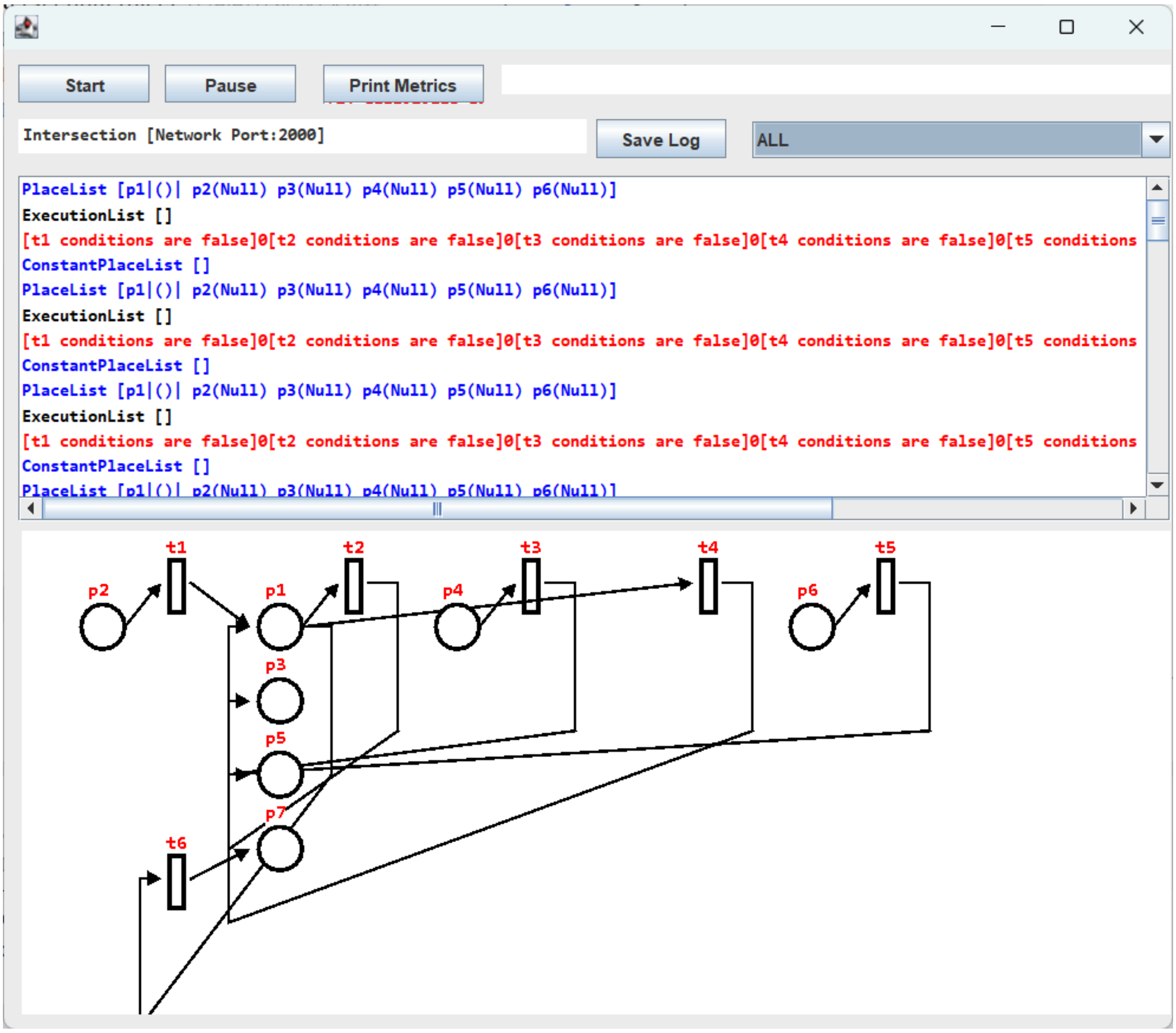

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Intersection [Network Port:2000]
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PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
ExecutionList []
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ConstantPlaceList []
PlaceList [p1|()| p2(Null) p3(Null) p4(Null) p5(Null) p6(Null)]
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