Report CPN Assignment BIS 2IIC0/2IHI10 (2017/2018 Q1)
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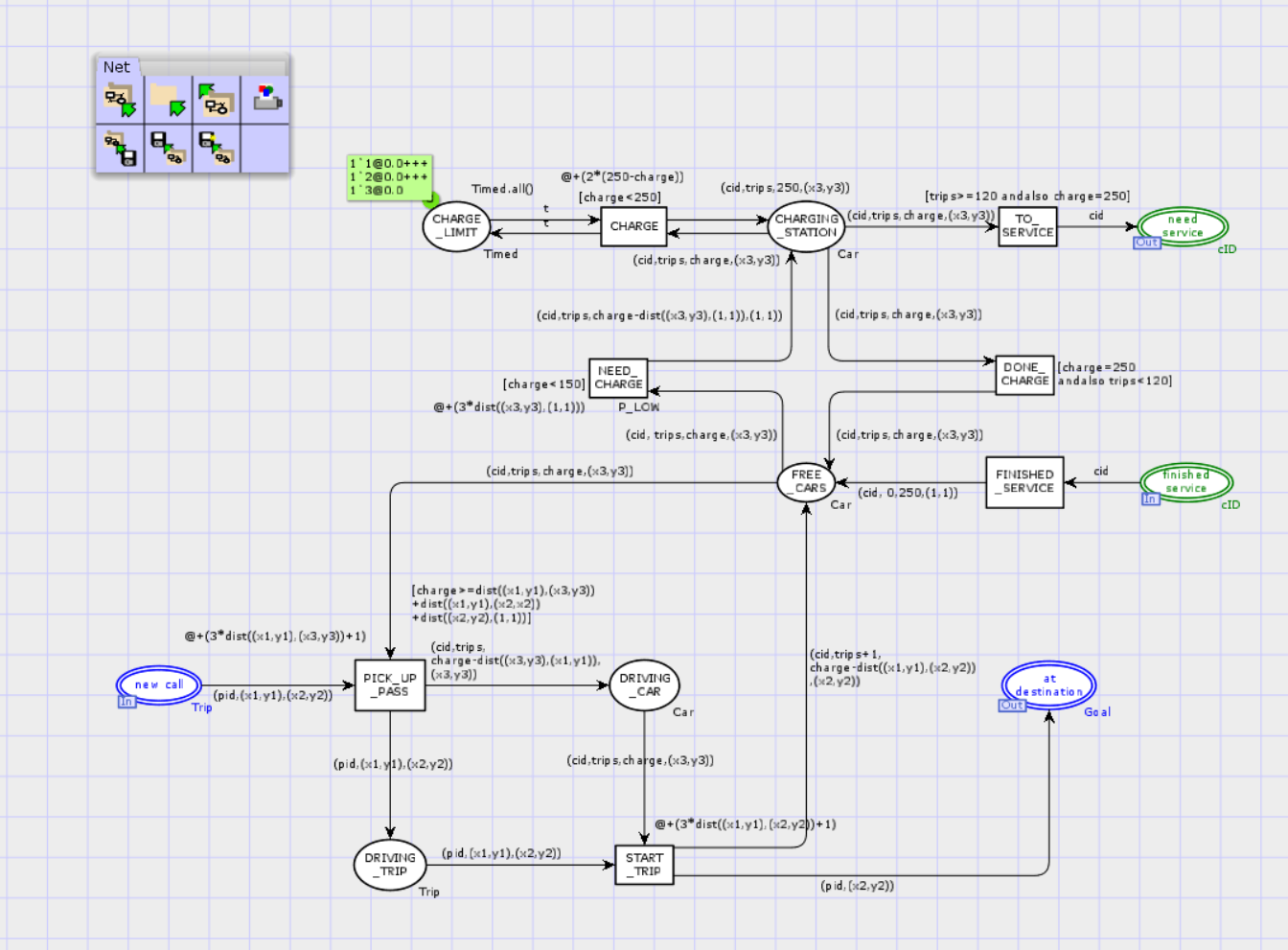
1 Model



2 Model Description

- After a car completed service in the garage, its car id is available in place (finished service). From there it takes transition FINISHED_SERVICE to place FREE_CARS. FINISHED_SERVICE adds the cid to its corresponding car with full charge and 0 trips and position (1,1).
- From FREE_CARS the car can either go to the charging station and recharge or it can be used to pick up a new TRIP.
- If the Car has less than 150 charge it can go to the CHARGING_STATION. If it does, its' charge is updated properly. The charging station can charge up to 3 Cars at once. Once a Car has been fully charged, the Car can go back to the FREE_CARS place, or, if it has taken more than 120 trips since the last service, it will go to the need service place.
- When a Trip is to be picked up by a Car, their corresponding times are updated and the Cars charge is decreased appropriately. The Trip then goes to the DRIVING_TRIP place and the Car goes to the DRIVING_CAR place.
- Once the Car has picked up the Trip, the Car drops off the Trip at the destination. In this step the time and variables of both are updated respectively.

3 Declarations, Guards, Arc Inscriptions, Functions

3.1 Declarations

t	A variable of type Timed
X3,y3	Variables of type INT
Timed	A timed integer used to limit charging to 3 cars at a time
Car	a collection of information representing a car. A Car contains a cid, an integer representing the amount of trips since the last service, an integer representing the remaining charge, and a location representing the cars current location

3.2 Guards and Arc Inscriptions

Guard/Arc Inscription	Where is it in the model?	Explanation
[charge>=dist((x1,y1),(x3,y3)) +dist((x1,y1),(x2,x2)) +dist((x2,y2),(1,1))]	This is the guard of PICK_UP_PASS	This limits cars that can pick up Trips to cars that can complete the trip without running out of charge
(cid,trips+1, charge-dist((x1,y1),(x2,y2)) ,(x2,y2))	This is the Arc inscription from START_TRIP to FREE_CARS	This updates the cars variables. Charge if decreased by the amount it used to drive from where the Trip was picked up to where it was dropped off. Trips is increased by one. The position of the car is updated to where it dropped of the Trip
@+(2*(250-charge))	This is attached to the CHARGE transition	This updates the car and Timed with the amount of time they used to charge a car.

4 Simulation Results

4.1 Summary of Simulation Results

From the simulation report it can be seen that my model always completes 1000 trips successfully with on average only 238 trips taking too long.

4.2 Raw Simulation Reports

Statistics							
Name	**Avrg**	**90% Half Length**	**95% Half Length**	**99% Half Length**	**StD**	**Min**	**Max**
Cars_in_service							
count_iid	17.000000	0.000000	0.000000	0.000000	0.000000	17	17
max_iid	5.000000	0.000000	0.000000	0.000000	0.000000	5	5
min_iid	0.000000	0.000000	0.000000	0.000000	0.000000	0	0
avrg_iid	0.144502	0.001405	0.001691	0.002279	0.004529	0.132467	0.150904
Passengers_on_trip							
count_iid	2002.000000	0.000000	0.000000	0.000000	0.000000	2002	2002
max_iid	22.066667	1.579444	1.901096	2.562064	5.091801	13	40
min_iid	0.000000	0.000000	0.000000	0.000000	0.000000	0	0
avrg_iid	5.669666	0.228958	0.275585	0.371400	0.738113	4.576792	7.844128
Travel_time_dist_1_to_3							
count_iid	770.833333	4.612498	5.551829	7.482074	14.869741	731	806
avrg_iid	37.494738	1.391553	1.674942	2.257281	4.486081	29.946424	51.763571
max_iid	295.687748	23.448389	28.223635	38.036351	75.592771	131.713352	468.408323
min_iid	6.135110	0.305853	0.368140	0.496134	0.986008	5.063182	8.734504
sum_iid	28866.112775	972.059215	1170.018302	1576.807061	3133.718419	23657.675061	37839.170503
Travel_time_dist_4_to_6							
count_iid	229.166667	4.612498	5.551829	7.482074	14.869741	194	269
avrg_iid	45.469625	1.691601	2.036094	2.743998	5.453373	39.771130	62.631400
max_iid	258.415756	26.288471	31.642097	42.643334	84.748607	121.788852	477.950228
min_iid	16.111546	0.495175	0.596018	0.803239	1.596344	14.032902	20.018258
sum_iid	10462.478426	556.315944	669.609244	902.417152	1793.447860	7739.081605	16847.846674
Travel_time_too_long							
count_iid	237.833333	11.712548	14.097799	18.999283	37.758839	178	354
avrg_iid	72.524460	3.506693	4.220828	5.688314	11.304854	50.852445	110.133768
max_iid	301.372321	22.863152	27.519215	37.087020	73.706087	131.713352	477.950228
min_iid	25.215855	0.063286	0.076174	0.102658	0.204020	25.000000	25.705315
sum_iid	17555.569506	1665.741962	2004.968989	2702.051116	5370.008519	9051.735148	34582.003102