MODELING AND DISCRETE SIMULATION

IE3081

PROJECT REPORT

UFUK GÜRBÜZ – 150113058

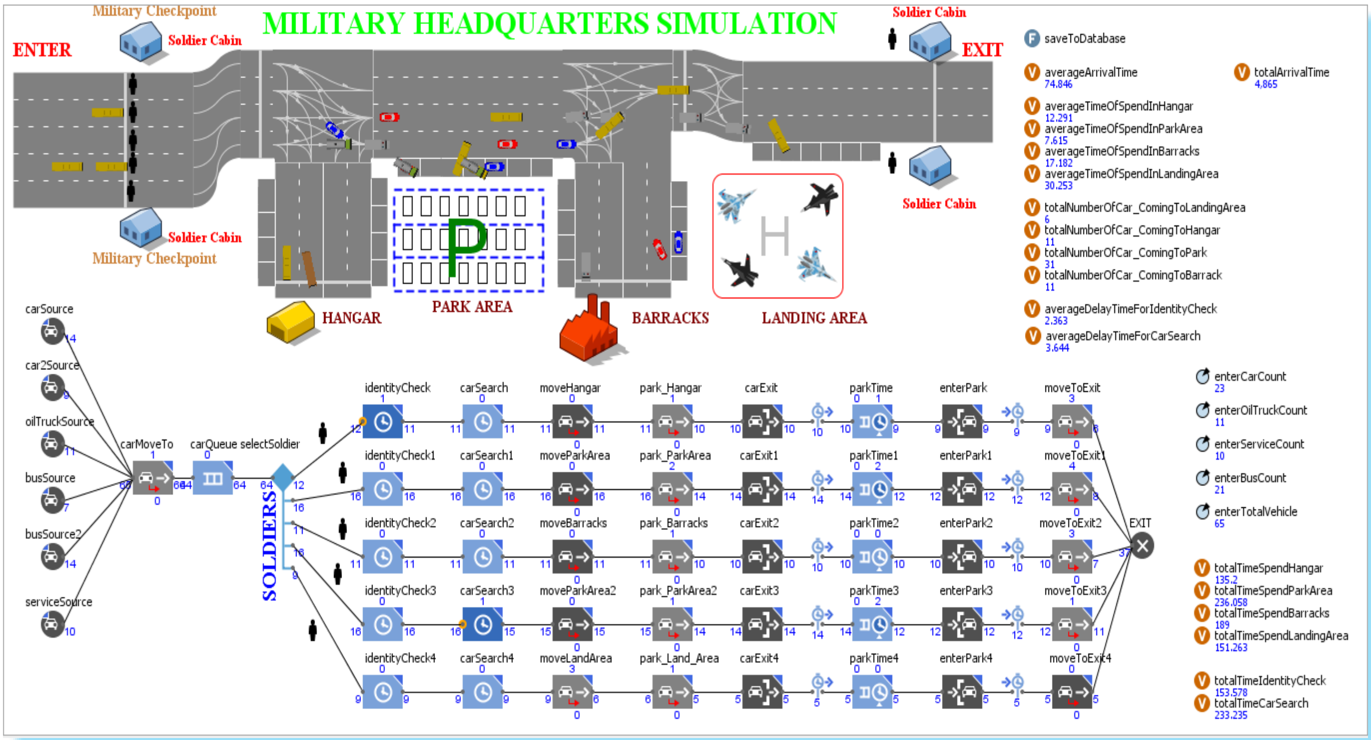
MILITARY HEADQUARTERS SIMULATION

1) FIRST DESIGN SIMULATION

System Components

- Car Source → Generates coming orders of cars
- Car Move To → Moves cars to specific place (enter point)
- Car Queue → Takes cars into queue
- Select Output 5 → Selects one of 5 soldiers
- Delay (5 times) → The cars wait for identity check
- Delay_2 (5 times) → The cars wait for car search
- Car Move To_2 → Moves cars to specific place (hangar, barracks, parking area or landing area)
- Car Exit → Exits car from its location (hangar, barracks, parking area or landing area)
- Time Measure Start → Starts measuring time for parking service
- ParkTime → The car wait for parking service.
- Time Measure End → Ends measuring time for parking service
- Car Enter → Enters car to road again
- Car Move To_3 → Moves cars to specific place (exit point)
- Car Dispose → Leaves car from system and deletes car object

" We did our model like below picture. "

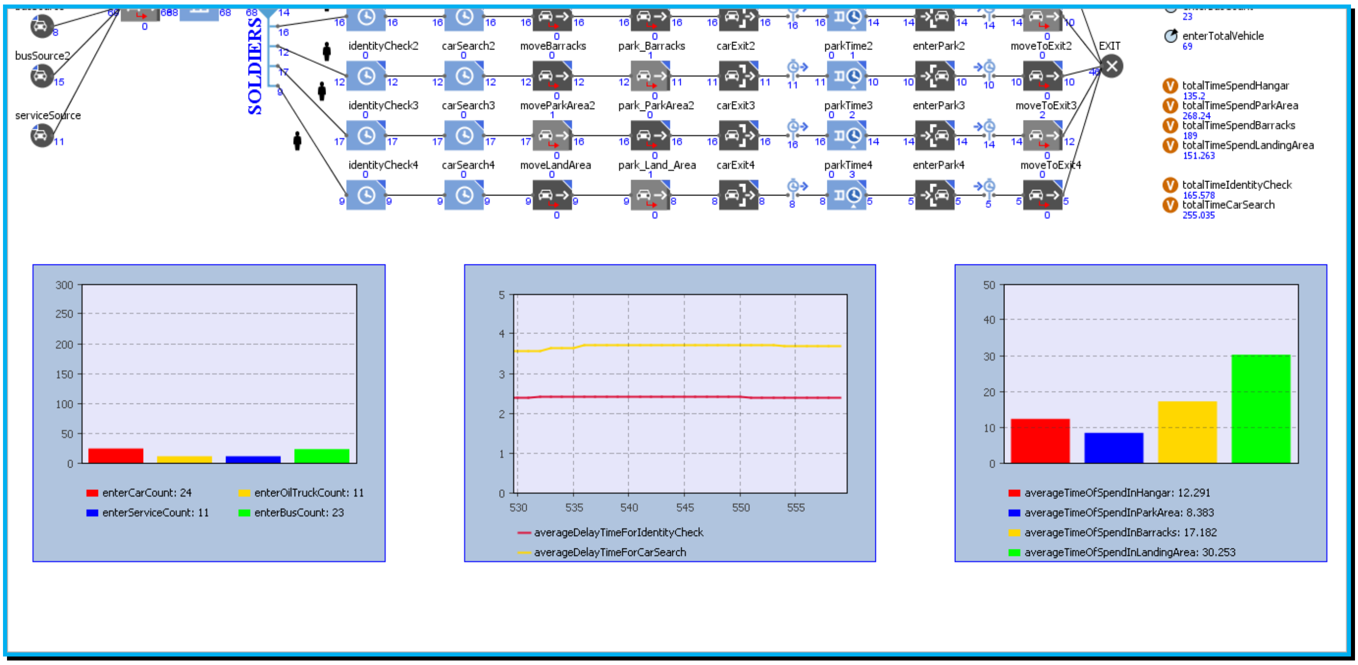


We make a military headquarters simulation. This simulation contains many compenents (cars, soldiers, military buildings and areas).

Firstly, we design a military headquarters. The coming cars will enter queue. There are 5 soldiers in entry for security. They checks identities of coming people. Then, the soldiers searches their cars. These operations are for security. After all, the cars can go "**hangar**, **barracks**, **parking area** or **landing area**". When the people finished to work, they can leave from headquarters.

We designed all map according to us. Also, we defined many measurement variables like "averageTimeArrival, averageTimeOfSpendingHangar, averageTimeOfSpendingParkArea, averageTimeOfSpendingLandingArea, averageTimeOfSpendingBarracks, totalNumberOfCar_ComingToHangar, totalNumberOfCar_ComingToLandingArea, totalNumberOfCar_ComingToBarracks, totalNumberOfCar_ComingToParkArea, averageDelayTimeForIdentityCheck, averageDelayTimeForCarSearch, enterCarCount, exitCarCount v.s".

Addition to these, we writed a function for writing the output results into **database** file and created **many graphics** for change of some variables. So, we can see the results of all simulation and we can compare them.



Input Variables

- Time interval
- Numbers of coming cars
- The arrival rate of cars
- Interarrival time of cars
- Maximum size for queue system (200)
- Select soldier probabilities
- Delay time for identity check
- Delay time for car search
- Service time for parking

Output Variables

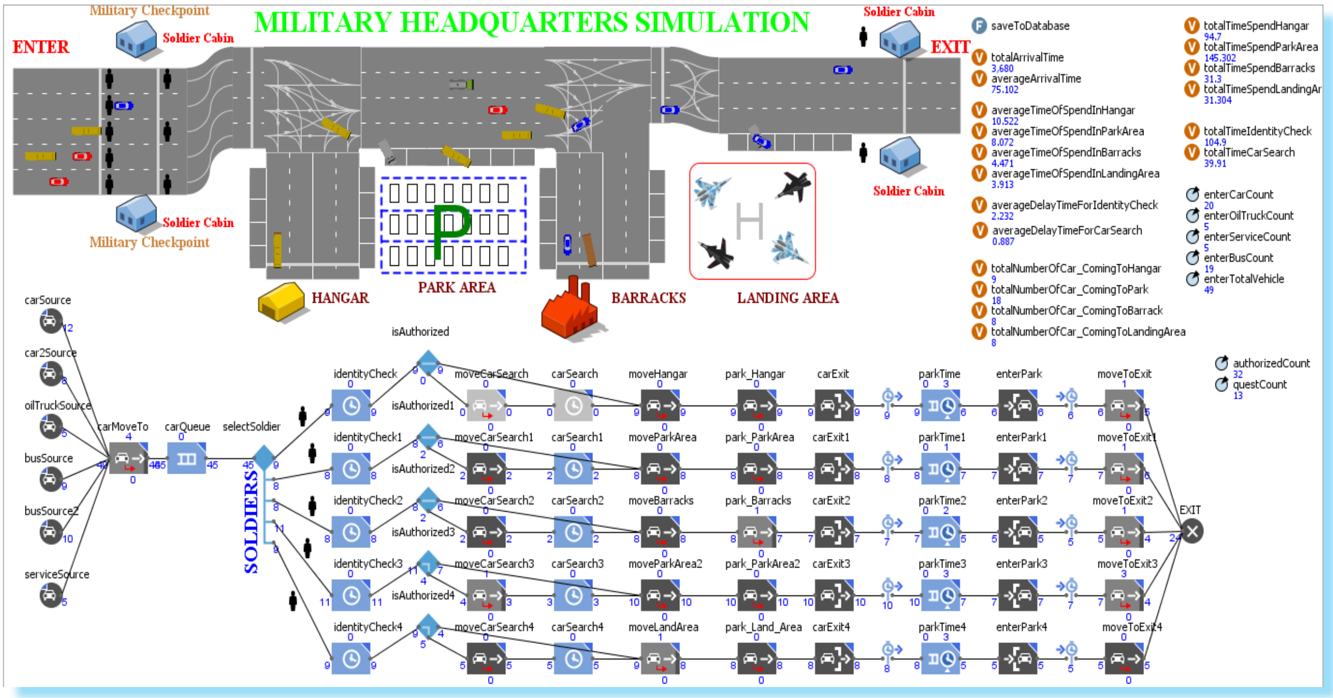
- Average Time Arrival
- Total Arrival Time
- Average Time Of Spending In Hangar
- Average Time Of Spending In ParkArea
- Average TimeOf Spending In LandingArea
- Average TimeOf Spending In Barracks
- Total Numbers Of Coming_Car To Hangar
- Total Numbers Of Coming_Car To LandingArea
- Total Numbers Of Coming_Car To Barracks
- Total Numbers Of Coming_Car To ParkArea
- Average Delay Time For Checking Identity
- Average Delay Time For Searching Car
- Counts of Car which Entered into System
- Counts of Oil Truck which Entered into System
- Counts of Service which Entered into System
- Counts of Bus which Entered into System
- Counts of Total Vehicle which Entered into System

2) CHANGED DESIGN SIMULATION

System Components

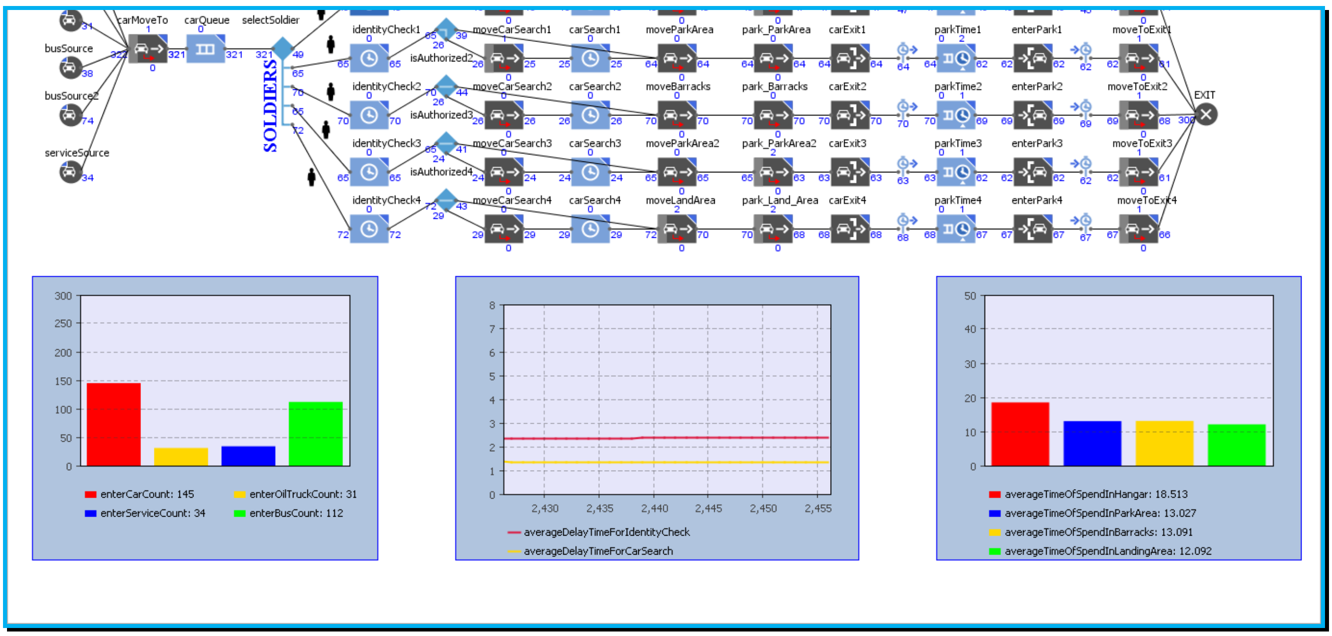
- Car Source → Generates coming orders of cars
- Car Move To → Moves cars to specific place (enter point)
- Car Queue → Takes cars into queue
- Select Output 5 → Selects one of 5 soldiers
- Delay (5 times) → The cars wait for identity check
- Select Output → Checks whether the car are authorized
- Car Move To_2 → Moves cars to identity checking points
- Delay_2 (5 times) → The cars wait for car search
- Car Move To_3 → Moves cars to specific place (hangar, barracks, parking area or landing area)
- Car Exit → Exits car from its location (hangar, barracks, parking area or landing area)
- Time Measure Start → Starts measuring time for parking service
- ParkTime → The car wait for parking service.
- Time Measure End → Ends measuring time for parking service
- Car Enter → Enters car to road again
- Car Move To_4 → Moves cars to specific place (exit point)
- Car Dispose → Leaves car from system and deletes car object

“ We changed our model like below picture. ”



Firstly, we **changed design** of military headquarters. The coming cars will enter queue. There are 5 soldiers in entry for security. They checks identities of coming people. Then, the system decides whether the cars are authorized. If they have authorization, they can go “**hangar**, **barracks**, **parking area** or **landing area**” directly. If they haven’t authorization, the soldiers searches their cars. These operations are for security. After all, the cars can go “**hangar**, **barracks**, **parking area** or **landing area**”. When the people finished to work, they can leave from headquarters.

Addition to these, we writed a function for writing the output results into **database** file and created **many graphics** for change of some variables. So, we can see the results of all simulation and we can compare them.



Input Variables

- Time interval
- Numbers of coming cars
- The arrival rate of cars
- Interarrival time of cars
- Maximum size for queue system (200)
- Select soldier probabilities
- Delay time for identity check
- Delay time for car search
- The authorization probability (Authorized or Guest)
- Service time for parking

Output Variables

- Average Time Arrival
- Total Arrival Time
- Average Time Of Spending In Hangar
- Average Time Of Spending In ParkArea
- Average TimeOf Spending In LandingArea
- Average TimeOf Spending In Barracks
- Total Numbers Of Coming_Car To Hangar
- Total Numbers Of Coming_Car To LandingArea
- Total Numbers Of Coming_Car To Barracks
- Total Numbers Of Coming_Car To ParkArea
- Average Delay Time For Checking Identity
- Average Delay Time For Searching Car
- Counts of Car which Entered into System
- Counts of Oil Truck which Entered into System
- Counts of Service which Entered into System
- Counts of Bus which Entered into System
- Counts of Total Vehicle which Entered into System
- Counts of Cars which are Authorized
- Counts of Cars which are Guest

STATISTICAL PARTS

A) FIRST SIMULATION

Q1) Estimate the mean values for the output (performance) parameters you defined above. You have to run (replicate) the simulation several times with different seed values. Estimates should be the mean of all runs (replications).

We ran it 463 times with different seeds. We calculated these average values by adding the values and dividing by the number of samples for each output parameter.

FORMULA : Mean (x) = Σxi / n where i 1 to n   n->463

	A	B	C	D	E	F	G	H	I	J
450	449	76,398	14,123	15,545	17,449	13,096	2,512	3,610		
451	450	76,374	14,123	15,545	17,449	13,096	2,512	3,610		
452	451	76,337	14,123	15,169	17,449	13,096	2,512	3,610		
453	452	76,363	14,123	15,169	17,449	13,096	2,512	3,610		
454	453	76,336	14,123	15,093	17,449	13,115	2,496	3,581		
455	454	76,333	14,123	15,093	17,449	13,115	2,496	3,575		
456	455	76,273	14,123	15,128	17,449	13,228	2,479	3,574		
457	456	76,247	14,123	15,128	17,449	13,228	2,491	3,573		
458	457	76,201	14,123	15,056	17,449	13,228	2,485	3,579		
459	458	76,260	14,123	15,056	17,449	13,228	2,491	3,575		
460	459	76,173	14,123	15,056	17,449	12,846	2,497	3,587		
461	460	76,173	14,123	15,056	16,895	12,846	2,497	3,588		
462	461	76,173	14,123	15,056	16,895	12,846	2,496	3,588		
463	462	76,171	14,123	15,056	16,895	12,846	2,496	3,594		
464	463	76,138	14,123	14,910	16,895	12,846	2,496	3,594		
465		35445,229	5870,995	7546,904	8090,503	6456,034	1160,798	1627,319	Sum	
466		76,556	7,546	16,300	17,474	13,944	2,507	3,515	Mean	
467		13114,735	2171,900	2792,170	2993,486	2388,732	429,495	602,108	epsilon (0,37*S)	
468		13191,291	2179,446	2808,470	3010,960	2402,676	432,002	605,623	MEAN + confidenceInterval (mean+tα/2,R-1S/sqrt(R))	
469		-13037,735	-2164,354	-2775,870	-2976,012	-2374,788	-426,988	-598,593	MEAN - confidenceInterval (mean+tα/2,R-1S/sqrt(R))	
470		1311,474	217,190	279,217	299,349	238,873	42,950	60,211	epsilon (%10 change)	
471		14426,209	2389,090	3071,387	3292,835	2627,605	472,445	662,319	newEpsilon	
472		23,191	23,199	23,194	23,191	23,191	23,191	23,191	N= $((z_{0,025}*S_0)/\varepsilon_{demanded})^2$	
473		24	24	24	24	24	24	24	N (Total number of replications)	
474		73690,631	12205,798	15690,014	16820,156	13422,094	2413,299	3383,196	2,079S	
475		73767,186	12213,344	15706,314	16837,630	13436,038	2415,806	3386,711	Prediction Interval (Positive '+')	
476		-73614,075	-12198,252	-15673,714	-16802,682	-13408,150	-2410,792	-3379,681	Prediction Interval (Positive '-')	

First Simulation Results | Changed Simulation Results | Diffrence Between Similations

35445,229	5870,995	7546,904	8090,503	6456,034	1160,798	1627,319	Sum
76,556	7,546	16,300	17,474	13,944	2,507	3,515	Mean
13114,735	2171,900	2792,170	2993,486	2388,732	429,495	602,108	epsilon (0,37*S)
13191,291	2179,446	2808,470	3010,960	2402,676	432,002	605,623	MEAN + confidenceInterval (mean+tα/2,R-1S/sqrt(R))
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1311,474	217,190	279,217	299,349	238,873	42,950	60,211	epsilon (%10 change)
14426,209	2389,090	3071,387	3292,835	2627,605	472,445	662,319	newEpsilon
23,191	23,199	23,194	23,191	23,191	23,191	23,191	N= $((z_{0,025}*S_0)/\varepsilon_{demanded})^2$
24	24	24	24	24	24	24	N (Total number of replications)
73690,631	12205,798	15690,014	16820,156	13422,094	2413,299	3383,196	2,079S
73767,186	12213,344	15706,314	16837,630	13436,038	2415,806	3386,711	Prediction Interval (Positive '+')
-73614,075	-12198,252	-15673,714	-16802,682	-13408,150	-2410,792	-3379,681	Prediction Interval (Positive '-')

Q2) Compute the 95% confidence intervals for the output parameters

We make the calculations as:

Confidence interval: Mean (+ -) tα / 2, R-1S / sqrt (R) where R is # samples, S is the standard deviation and α is the confidence level.

We used the t distribution for our model with % 95 precision and 463 samples:

Confidence Interval is [mean + t0,025.29S / sqrt (463), mean -0.025,29S / sqrt (463)]

From the distribution table t[0,025,29] is 2,045.

So simply t[0,025.29] / sqrt (463) = 2.045 / sqrt (463) = 2.045 / 21.52 = **0.09**

Confidence Interval is [mean + 0.09 * S, mean-0.09 * S].

average_arrival_time	averageTimeInHangar	averageTimeInParkArea	averageTimeInBarracks	averageTimeInLandingArea	AverageTimeIdCheck	AverageTimeCarSearch	
3266,626	535,936	695,521	745,619	594,987	106,979	149,973	MEAN + confidenceInterval (mean+tα/2,R-1S/sqrt(R))
-13037,735	-2164,354	-2775,870	-2976,012	-2374,788	-426,988	-598,593	MEAN - confidenceInterval (mean+tα/2,R-1S/sqrt(R))

Q3) Estimate the total number of replications needed to estimate mean output parameters with 10% enhancement (narrowing the CI for 10%).

We thought to reduce the first 10% CI to 10% ε narrom need.

We used the formula: R= $((z_{0,025}*S_0)/\varepsilon_{demanded})^2$. The “Z value” is 1.96. By we found that we have found that to obtain at least 10% Epsilon The required 343 repetition passes were increased.

$R=1{,}96^2*S^2/(0{,}9)$ $\varepsilon_{old}= ((z_{0,025}*S_0)/\varepsilon_{demanded})^2$

35445,229	5870,995	7546,904	8090,503	6456,034	1160,798	1627,319	Sum
76,556	7,546	16,300	17,474	13,944	2,507	3,515	Mean
3190,071	528,390	679,221	728,145	581,043	104,472	146,459	epsilon (0,09*S)
3266,626	535,936	695,521	745,619	594,987	106,979	149,973	MEAN + confidenceInterval (mean+tα/2,R-1S/sqrt(R))
-13037,735	-2164,354	-2775,870	-2976,012	-2374,788	-426,988	-598,593	MEAN - confidenceInterval (mean+tα/2,R-1S/sqrt(R))
319,007	52,839	67,922	72,815	58,104	10,447	14,646	epsilon (%10 change)
3509,078	581,228	747,144	800,960	639,147	114,919	161,105	newEpsilon
391,960	391,960	391,960	391,960	391,960	391,960	391,960	N= $((z_{0,025}*S_0/\varepsilon_{demanded})^2$
24	24	24	24	24	24	24	N (Total number of replications)

NOTE: You can see the total number of replications on red line.

Q4) Compute the 95% prediction intervals for the output parameters.

The Formula:

PI=Mean(+-)$t_{\alpha/2,R-1}$*S*sqrt(1+1/R)

PI=[mean+$t_{0,025,29}$*S*sqrt(31/30), mean+$t_{0,025,29}$*S*sqrt(31/30)]

We used this formula and calculated PI. We applied PI for each output parameters.

	A	B	C	D	E	F	G	H	I	J
450	449	76,398	14,123	15,545	17,449	13,096	2,512	3,610		
451	450	76,374	14,123	15,545	17,449	13,096	2,512	3,610		
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467		13114,735	2171,900	2792,170	2993,486	2388,732	429,495	602,108	epsilon (0,37*S)	
468		13191,291	2179,446	2808,470	3010,960	2402,676	432,002	605,623	MEAN + confidenceInterval (mean+tα/2,R-1S/sqrt(R))	
469		-13037,735	-2164,354	-2775,870	-2976,012	-2374,788	-426,988	-598,593	MEAN - confidenceInterval (mean+tα/2,R-1S/sqrt(R))	
470		1311,474	217,190	279,217	299,349	238,873	42,950	60,211	epsilon (%10 change)	
471		14426,209	2389,090	3071,387	3292,835	2627,605	472,445	662,319	newEpsilon	
472		23,191	23,199	23,194	23,191	23,191	23,191	23,191	N= $((z_{0,025}*S_0/\varepsilon_{demanded})^2$	
473		24	24	24	24	24	24	24	N (Total number of replications)	
474		73690,631	12205,798	15690,014	16820,156	13422,094	2413,299	3383,196	2,079S	
475		73767,186	12213,344	15706,314	16837,630	13436,038	2415,806	3386,711	Prediction Interval (Positive '+')	
476		-73614,075	-12198,252	-15673,714	-16802,682	-13408,150	-2410,792	-3379,681	Prediction Interval (Positive '-')	

First Simulation Results | Changed Simulation Results | Diffrence Between Similations

73767,186	12213,344	15706,314	16837,630	13436,038	2415,806	3386,711	Prediction Interval (Positive '+')
-73614,075	-12198,252	-15673,714	-16802,682	-13408,150	-2410,792	-3379,681	Prediction Interval (Negative '-')

B) CHANGED SIMULATION

Q5) Are these two systems (first one and the changed one) statistically different? Please answer your question for the 95% confidence interval.

- First simulation output is shown below :

1	average_arrival_time	averageTimeInHangar	averageTimeInParkArea	averageTimeInBarracks	averageTimeInLandingArea	AverageTimeIdCheck	AverageTimeCarSearch	
2	78,095	0,700	0,000	5,450	0,000	2,088	2,602	
3	77,800	0,700	0,000	5,450	0,000	1,935	2,306	
4	76,964	2,267	7,501	5,450	14,273	2,381	3,016	
5	76,964	2,267	7,664	5,450	14,273	2,293	3,016	
460	76,173	14,123	15,056	17,449	12,846	2,497	3,587	
461	76,173	14,123	15,056	16,895	12,846	2,497	3,588	
462	76,173	14,123	15,056	16,895	12,846	2,496	3,588	
463	76,171	14,123	15,056	16,895	12,846	2,496	3,594	
464	76,138	14,123	14,910	16,895	12,846	2,496	3,594	
465	35445,229	5870,995	7546,904	8090,503	6456,034	1160,798	1627,319	Sum
466	76,556	7,546	16,300	17,474	13,944	2,507	3,515	Mean
467	3190,071	528,390	679,221	728,145	581,043	104,472	146,459	epsilon (0,09*S)
468	3266,626	535,936	695,521	745,619	594,987	106,979	149,973	MEAN + confidenceInterval (mean+tα/2,R-1S/sqrt(R))
469	-13037,735	-2164,354	-2775,870	-2976,012	-2374,788	-426,988	-598,593	MEAN - confidenceInterval (mean+tα/2,R-1S/sqrt(R))
470	319,007	52,839	67,922	72,815	58,104	10,447	14,646	epsilon (%10 change)
471	3509,078	581,228	747,144	800,960	639,147	114,919	161,105	newEpsilon
472	391,960	391,960	391,960	391,960	391,960	391,960	391,960	N= $((z_{0,025}*S_0/\varepsilon_{demanded})^2$
473	24	24	24	24	24	24	24	N (Total number of replications)
474	73690,631	12205,798	15690,014	16820,156	13422,094	2413,299	3383,196	2,079S
475	73767,186	12213,344	15706,314	16837,630	13436,038	2415,806	3386,711	Prediction Interval (Positive '+')
476	-73614,075	-12198,252	-15673,714	-16802,682	-13408,150	-2410,792	-3379,681	Prediction Interval (Negative '-')

- Changed simulation output is shown below :

1	seed	average_arrival_time	averageTimeInHangar	averageTimeInParkArea	averageTimeInBarracks	averageTimeInLandingArea	AverageTimeIdCheck	AverageTimeCarSearch	
2	1	71,667	0,000	0,000	0,000	10,260	1,660	2,000	
3	2	74,286	3,900	6,556	0,000	10,260	2,205	0,533	
4	3	72,174	3,900	6,556	1,367	10,260	2,223	0,759	
5	4	73,542	3,900	6,556	1,367	10,260	2,223	0,759	
6	5	72,321	8,725	7,689	2,633	10,260	1,996	0,788	
7	6	72,321	8,725	7,689	2,633	10,260	1,996	0,788	
8	7	71,552	8,725	7,689	2,633	10,260	1,996	0,788	
9	8	71,552	8,725	7,689	2,633	5,179	2,100	0,788	
10	9	71,552	8,725	7,689	2,633	5,179	2,221	0,783	
451	450	74,630	16,870	13,614	14,635	12,715	2,414	1,363	
452	451	74,568	16,870	13,614	14,635	12,973	2,414	1,363	
453	452	74,568	16,870	13,614	14,635	12,973	2,414	1,363	
454	453	74,517	16,664	13,730	14,467	13,126	2,417	1,363	
455	454	74,517	16,664	13,730	14,467	13,126	2,422	1,363	
456		33330,725	8254,956	5781,342	5693,641	5230,521	1064,194	589,074	Sum
457		73,416	18,183	12,734	12,541	11,521	2,344	1,298	Mean

After these, we did comparison with them by using the formulas we show below :

Formula 1 :

$$s.e.(\overline{Y}_1 - \overline{Y}_2) = \sqrt{\frac{S_1^2}{R_1} + \frac{S_2^2}{R_2}}$$

– With degrees of freedom:

– $$\upsilon = \frac{\left(S_1^2 / R_1 + S_2^2 / R_2\right)^2}{\left[\left(S_1^2 / R_1\right)^2 / (R_1 - 1)\right] + \left[\left(S_2^2 / R_2\right)^2 / (R_2 - 1)\right]},$$ round to an interger ***

Formula 2 :

We calculated standart error of the differences of the means and their degrees of freedom according to these formulas. Then, we used below formula.

This formula is for the calculation of “CI”.

$$\overline{Y}_{.1} - \overline{Y}_{.2} \pm t_{\alpha/2,\upsilon} s.e.(\overline{Y}_{.1} - \overline{Y}_{.2})$$

THE DIFFERENCE BETWEEN FIRST AND CHANGED SIMULATIONS

After all procudes, we created below table which shows the difference between first and changed simulations. You can comparison between simulations using this table.

1	average_arrival_time	averageTimeInHangar	averageTimeInParkArea	averageTimeInBarracks	averageTimeInLandingArea	AverageTimeIdCheck	AverageTimeCarSearch
2	35445,229	5870,995	7546,904	8090,503	6456,034	1160,798	1627,319 Sum (First)
3	76,556	7,546	16,3	17,474	13,944	2,507	3,515 Mean (First) - Y1
4	33330,725	8254,956	5781,342	5693,641	5230,521	1064,194	589,074 Sum (Changed)
5	73,416	18,183	12,734	12,541	11,521	2,344	1,298 Mean (Changed) -Y2
6	3,14	-10,637	3,566	4,933	2,423	0,163	2,217 Y1 - Y2
7	7173,776957	1493,557766	1401,704516	1458,660692	1225,088506	232,1899928	255,171524 S.E (Y1-Y2)
8	1,9975	1,9895	1,997	2,009	2,0055	2,008	1,99 T Value
9	14332,75947	2960,796176	2802,769918	2935,38233	2459,337998	466,4005055	510,0083327 Confidence
10	-14326,47947	-2982,070176	-2795,637918	-2925,51633	-2454,491998	-466,0745055	-505,5743327 Interval

Q6) Estimate the additional replications needed to reduce the half-width of the confidence interval by 10% for the differences of the estimated values of the performance parameters.

We show halfwidth with “H”. Thus $H_{new}=0,9*H_{old}$. We assume that the two models have the same number of times, ($R_1=R_2=R$). We have already said, we have agreed $R_1=R_2$ so; SE = sqrt(($S_1^2+S_2^2$)/R) . And halfwidth (with the value of z to 95%) = 1.96 SE. H_{new}=1,96 SE

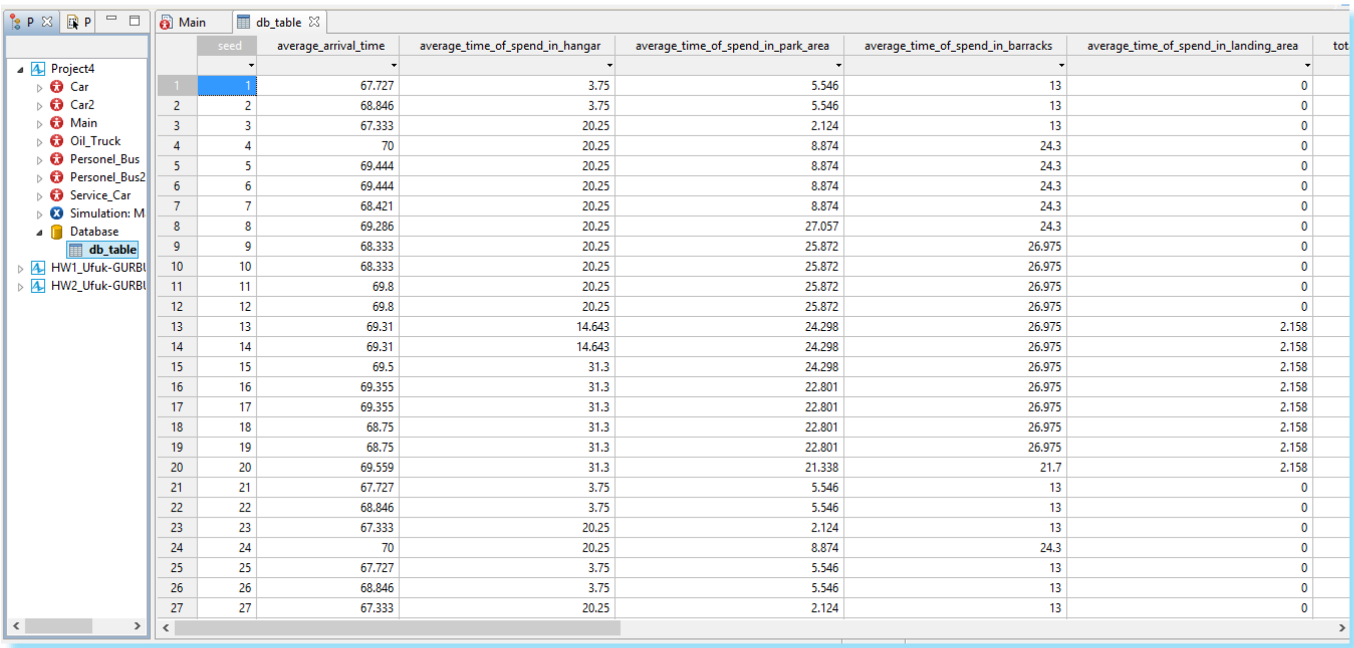
Hnew calculated to eliminate the previous equation new demand and demand for the sea.
$SE_{demanded}$ = sqrt(($S_1^2+S_2^2$)/R) From this equation; **R = (sqrt($S_1^2+S_2^2$)/$SE_{demanded}$)^2**

- We have the number of trials increases this.
• degrees of freedom grows.
• reduced T value of the distribution t.
• This wide medium decreases.
• At the same time we want to increase this range, these two models can not say that some of it was different, we see that I start to say that these models are different.

1	average_arrival_time	averageTimeInHangar	averageTimeInParkArea	averageTimeInBarracks	averageTimeInLandingArea	AverageTimeIdCheck	AverageTimeCarSearch
2	35445,229	5870,995	7546,904	8090,503	6456,034	1160,798	1627,319 Sum (First)
3	76,556	7,546	16,3	17,474	13,944	2,507	3,515 Mean (First) - Y1
4	33330,725	8254,956	5781,342	5693,641	5230,521	1064,194	589,074 Sum (Changed)
5	73,416	18,183	12,734	12,541	11,521	2,344	1,298 Mean (Changed) -Y2
6	3,14	-10,637	3,566	4,933	2,423	0,163	2,217 Y1 - Y2
7	7173,776957	1493,557766	1401,704516	1458,660692	1225,088506	232,1899928	255,171524 S.E (Y1-Y2)
8	1,9975	1,9895	1,997	2,009	2,0055	2,008	1,99 T Value
9	14332,75947	2960,796176	2802,769918	2935,38233	2459,337998	466,4005055	510,0083327 Confidence
10	-14326,47947	-2982,070176	-2795,637918	-2925,51633	-2454,491998	-466,0745055	-505,5743327 Interval

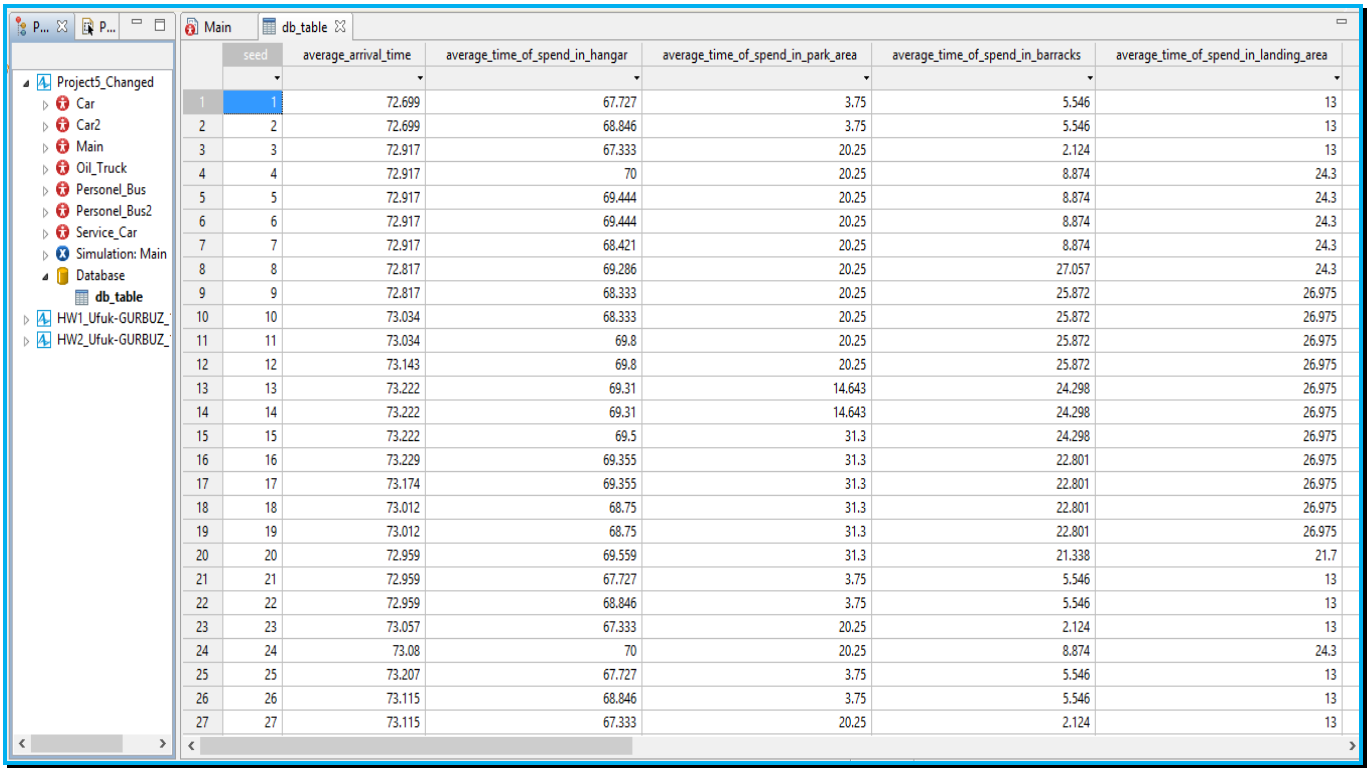
THE DATABASE WHICH KEEP VALUES of ALL VARIABLES

We kept values of all variables as table in a database for “first and changed simulations”. So, we always can see the values of all variables. And if we want to make comparison between first and changed simulations, we can make it easily.



	seed	average_arrival_time	average_time_of_spend_in_hangar	average_time_of_spend_in_park_area	average_time_of_spend_in_barracks	average_time_of_spend_in_landing_area
1	1	67.727	3.75	5.546	13	0
2	2	68.846	3.75	5.546	13	0
3	3	67.333	20.25	2.124	13	0
4	4	70	20.25	8.874	24.3	0
5	5	69.444	20.25	8.874	24.3	0
6	6	69.444	20.25	8.874	24.3	0
7	7	68.421	20.25	8.874	24.3	0
8	8	69.286	20.25	27.057	24.3	0
9	9	68.333	20.25	25.872	26.975	0
10	10	68.333	20.25	25.872	26.975	0
11	11	69.8	20.25	25.872	26.975	0
12	12	69.8	20.25	25.872	26.975	0
13	13	69.31	14.643	24.298	26.975	2.158
14	14	69.31	14.643	24.298	26.975	2.158
15	15	69.5	31.3	24.298	26.975	2.158
16	16	69.355	31.3	22.801	26.975	2.158
17	17	69.355	31.3	22.801	26.975	2.158
18	18	68.75	31.3	22.801	26.975	2.158
19	19	68.75	31.3	22.801	26.975	2.158
20	20	69.559	31.3	21.338	21.7	2.158
21	21	67.727	3.75	5.546	13	0
22	22	68.846	3.75	5.546	13	0
23	23	67.333	20.25	2.124	13	0
24	24	70	20.25	8.874	24.3	0
25	25	67.727	3.75	5.546	13	0
26	26	68.846	3.75	5.546	13	0
27	27	67.333	20.25	2.124	13	0

The Database of First Simulation



	seed	average_arrival_time	average_time_of_spend_in_hangar	average_time_of_spend_in_park_area	average_time_of_spend_in_barracks	average_time_of_spend_in_landing_area
1	1	72.699	67.727	3.75	5.546	13
2	2	72.699	68.846	3.75	5.546	13
3	3	72.917	67.333	20.25	2.124	13
4	4	72.917	70	20.25	8.874	24.3
5	5	72.917	69.444	20.25	8.874	24.3
6	6	72.917	69.444	20.25	8.874	24.3
7	7	72.917	68.421	20.25	8.874	24.3
8	8	72.817	69.286	20.25	27.057	24.3
9	9	72.817	68.333	20.25	25.872	26.975
10	10	73.034	68.333	20.25	25.872	26.975
11	11	73.034	69.8	20.25	25.872	26.975
12	12	73.143	69.8	20.25	25.872	26.975
13	13	73.222	69.31	14.643	24.298	26.975
14	14	73.222	69.31	14.643	24.298	26.975
15	15	73.222	69.5	31.3	24.298	26.975
16	16	73.229	69.355	31.3	22.801	26.975
17	17	73.174	69.355	31.3	22.801	26.975
18	18	73.012	68.75	31.3	22.801	26.975
19	19	73.012	68.75	31.3	22.801	26.975
20	20	72.959	69.559	31.3	21.338	21.7
21	21	72.959	67.727	3.75	5.546	13
22	22	72.959	68.846	3.75	5.546	13
23	23	73.057	67.333	20.25	2.124	13
24	24	73.08	70	20.25	8.874	24.3
25	25	73.207	67.727	3.75	5.546	13
26	26	73.115	68.846	3.75	5.546	13
27	27	73.115	67.333	20.25	2.124	13

The Database of Changed Simulation