The code has been changed to time the execution of the elevator host handling requests. To do this as accurately as possible, the majority of logs have been removed (when the below data was collected). We have added a utility Chrono class that allows for the starting and ending of a nano timer and the subsequent logging into a file of the elapsed time. We surround select handler methods namely: sendAckRequest, sendFloorUpdate, sendOpenDoors and the error notification - wait cycle.

The raw measurements for each elevator have been attached at the end of this document in Table 1 - all measurements are in nanoseconds (ns). Note that elevator 2 traveled the most floors (up to floor 22), hence we collected the most data for this elevator.

The data sample was assumed to be normally distributed with the specified mean and variance. As such, the confidence interval can be calculated using

$$CI = z \frac{s}{\sqrt{n}}$$

The results from the table include these measures, along with associated 95% confidence intervals for a single request. We did not need to time multiple requests to get sufficient clock granularity - furthermore, doing so without including the timeouts in the systems associated with events would be difficult.

Taking the average of all the elevator averages, we obtain an average handling time,

$$\overline{x}$$
 = (1070531.579 + 1006342.574 + 1136370.2 + 1383199.769)/4 = 1149111.031

With an associated average confidence interval,

```
CI = (88466.81148 + 83396.68269 + 97250.43229 + 553581.591) / 4
= 822695.5175
```

Thus, the average time for an elevator to handle an event is found to be around 1149111.031 \pm 822695.5175 ns or **1.1491** \pm **0.8226** ms.

We note that this is the time it takes on average, but not the CPU execution time for this event considering the time between context switches to also be included. Hence, this is simply two slices in time for the event to be processed which is a reasonable value to consider as the handling time (in contrast to the processing time).

Trial Number	Table 1: Table of	f elevator execution	on times to process	a single event.	
1					
2 988600 2480100 1024100 1245100 1245100 3 1599190 2183799 992500 1521700 4 1372700 922201 1108801 1012999 5 1212100 1355501 1245501 1182299 6 1037299 1192800 853499 924100 7 105600 1107500 1067399 8 990300 1123300 1470101 1262100 9 1192400 1270400 1107500 1067399 1192400 1270400 1107500 1067399 1192400 12724	Trial Number				+
3					+
4 1372700 92201 1108801 1012999 5 1212100 1355501 1245501 1186299 6 1037299 1192800 853499 924100 7 1068200 1154000 1101500 1067399 8 990300 123300 1470101 1262100 9 1192400 827300 1094100 828200 10 1014101 1658001 941299 1414700 11 1095100 1057990 188501 908600 12 1084101 865500 1432899 1331901 13 772899 72929 925801 612800 14 1251800 829199 1232800 16 904400 1611099 809700 17 7758200 1147800 1545600 18 980100 778100 1043500 19 1001900 768899 1292499 20 1051699 996901 21 1003300 122 92300 122 92300 122 923000 23 671801 124 991500 124 991500 122 122 92300 123 9010 122 13 92300 123 9010 123 9010 123 9010 123 9010 123 9010 123 9010 124 9010 124 9010 124 9010 125					
6 1212100 1355501 1245501 1186299 6 1037299 1192800 853499 924100 7 1069200 1154000 1101500 1067399 8 990300 1123300 1470101 1262100 9 1192400 827300 1084100 822200 10 1014101 1686001 941299 1414700 11 1095100 1057900 1089501 908600 12 1094101 806500 1432899 1331901 13 772699 728299 92801 612800 14 1251800 829199 922401 612800 15 823801 789999 1232800 612800 16 904400 1611099 809700 17 17 759200 1147900 1549500 18 18 980100 778100 1043500 19 20 1051599 996901 21 1003300 19			+	+	+
6 1037299 1192800 853499 924100 7 1069200 1154000 1101500 1067399 8 990300 1123300 1470101 1262100 9 1192400 827300 1094100 828200 10 1014101 16868001 941299 1414700 111 1096100 1057900 1098901 909901 12 1094101 866500 1432699 1331901 13 772699 729299 928801 612800 14 12 12 12 12 12 12 12 12 12 12 12 12 12		1372700	922201		1012999
7 1069200 1154000 1101500 1067399 8 990300 1123300 1094100 82200 9 1192400 827300 1094100 82200 10 1014101 1658001 941289 1414700 11 1095100 1057900 1089501 908600 12 1094101 865500 1432699 1331901 13 772699 729299 928601 612800 14 1251800 829199 992401 15 823801 789999 1232900 16 904400 1611099 809700 17 759200 1147900 1549500 18 980100 778100 1043900 19 1001900 788899 1222499 20 1051599 996601 21 1003300 1022499 22 920300 23 23 671801 24 24 961500 36 <td>5</td> <td></td> <td>1355501</td> <td></td> <td></td>	5		1355501		
8 990300 1123300 1470101 1262100 9 1192400 827300 1094100 828200 10 1014101 1688001 941299 1414700 11 1095100 1057900 1088501 908600 12 1094101 866500 1432699 1331901 13 772899 729299 926801 612800 14 1251800 829199 992401 612800 15 823801 789999 1232800 612800 16 90400 1611099 809700 61549500 17 759200 1147900 1549500 61549500 18 980100 778100 1043500 61549500 19 1001900 768899 1292499 615509 20 10515699 996901 615509 696901 615509 23 671801 61500 61500 61500 61500 61500 61500 61500 61500	6	1037299			
9	7	1069200			
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11 1095100 1057900 1089501 908600 12 1094101 866500 1432699 1331901 13 772699 729299 925801 612800 14 1251800 829199 992401 612800 15 823801 789999 1232900 616 16 904400 1611099 809700 616 17 755200 1147900 1549500 618 18 980100 778100 1043500 600 19 1001900 788899 1292499 600 20 1051599 996901 600 600 21 1003300 600<	9	1192400	827300	1094100	828200
12 1094101 866500 1432699 1331901 13 772699 729299 925801 612800 14 1251800 829199 992401 15 823801 789999 1232900 16 904400 1611099 809700 17 759200 1147900 1549500 18 980100 778100 1043500 19 1001900 768899 1292499 20 1051599 996901 21 1003300 22 22 920300 23 23 671801 3671801 24 961500 365801 25 650801 366800 26 769900 3757900 27 757900 368800 29 686300 30 30 736300 31 31 658000 32 33 809600 33 34 1282900 35 35 1793901 36 36 878600 38 37 115399 38 39 1226100 40 40 1270400 40 41	10	1014101	1658001	941299	1414700
13 772699 729299 925801 612800 14 1251800 829199 992401 15 823801 789999 1232900 16 904400 1611099 809700 17 759200 1147900 1549500 18 980100 778100 1043500 19 1001900 788899 1292499 20 1051599 996901 21 1003300 22 22 920300 22 23 671801 30 24 961500 30 25 650801 30 26 769900 30 27 757900 30 28 910800 30 29 686300 30 30 736300 31 31 658000 32 33 809600 33 34 1282900 34 35 1793901 36 36 878600 37 37 115399 33 38 691900 39 39 1236100 40 40 1270400 41 41 <t< td=""><td>11</td><td>1095100</td><td>1057900</td><td>1089501</td><td>908600</td></t<>	11	1095100	1057900	1089501	908600
14 1251800 829199 992401 15 823801 789999 1232900 16 904400 1611099 809700 17 759200 1147900 1548500 18 980100 778100 1043500 19 1001900 768899 1292499 20 1051599 996901 21 1003300 22 22 920300 23 23 671801 24 24 961500 25 25 650801 26 26 769900 27 27 757900 28 9 10800 29 686300 30 736300 31 31 658000 32 33 809600 34 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 <	12	1094101	866500	1432699	1331901
15 823801 789999 1232900 16 904400 1611099 809700 17 759200 1147900 1549500 18 980100 778100 1043500 19 1001900 768899 1292499 20 1051599 996901 21 1003300 22 23 671801 30 24 961500 30 25 650801 30 26 769900 30 27 757900 30 28 910800 30 29 686300 30 30 736300 31 31 658000 32 33 809600 34 34 1282900 35 35 1793901 36 36 878600 37 37 1153999 38 39 1236100 40 1270400	13	772699		925801	612800
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22 920300 23 671801 24 961500 25 650801 26 769900 27 757900 28 910800 29 686300 30 736300 31 658000 32 1074699 33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	20		1051599	996901	
23 671801 24 961500 25 650801 26 769900 27 757900 28 910800 29 686300 30 736300 31 658000 32 1074699 33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	21		1003300		
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28 910800 29 686300 30 736300 31 658000 32 1074699 33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	26		769900		
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31 658000 32 1074699 33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	29		686300		
32 1074699 33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	30		736300		
33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	31		658000		
33 809600 34 1282900 35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	32		1074699		
35 1793901 36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600			809600		
36 878600 37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	34		1282900		
37 1153999 38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	35		1793901		
38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	36		878600		
38 691900 39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600	37		1153999		
39 1236100 40 1270400 41 1295200 42 660699 43 890000 44 918699 45 1155101 46 722600			691900		
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48 1078100					

	49		820201		
	50		1244299		
	51		730701		
	52		815999		
	53		1061000		
	54		937700		
	55		815000		
	56		1117900		
	57		715100		
	58		812399		
	59		1003101		
	60		669900		
	61		967500		
	62		1227300		
	63		980400		
	64		745500		
	65		873600		
	66		631599		
	67		760100		
	68		919399		
Average (Mean, x̄)		1070531.579	1006342.574	1136730.2	1383199.769
Variance (s2)		38708131481	123110280761	49238060093	1037037564850
Standard Deviation (s)		196743.822	350870.7465	221896.5076	1018350.414
Z (95% CI)		1.96	1.96	1.96	1.96
95% Confidence Interval *		88466.81148	83396.68269	97250.43229	553581.591