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## Design Diagrams

The UML component diagram of the agent system with their goals and connectivity to other agents is presented in the Figure A.1 below.

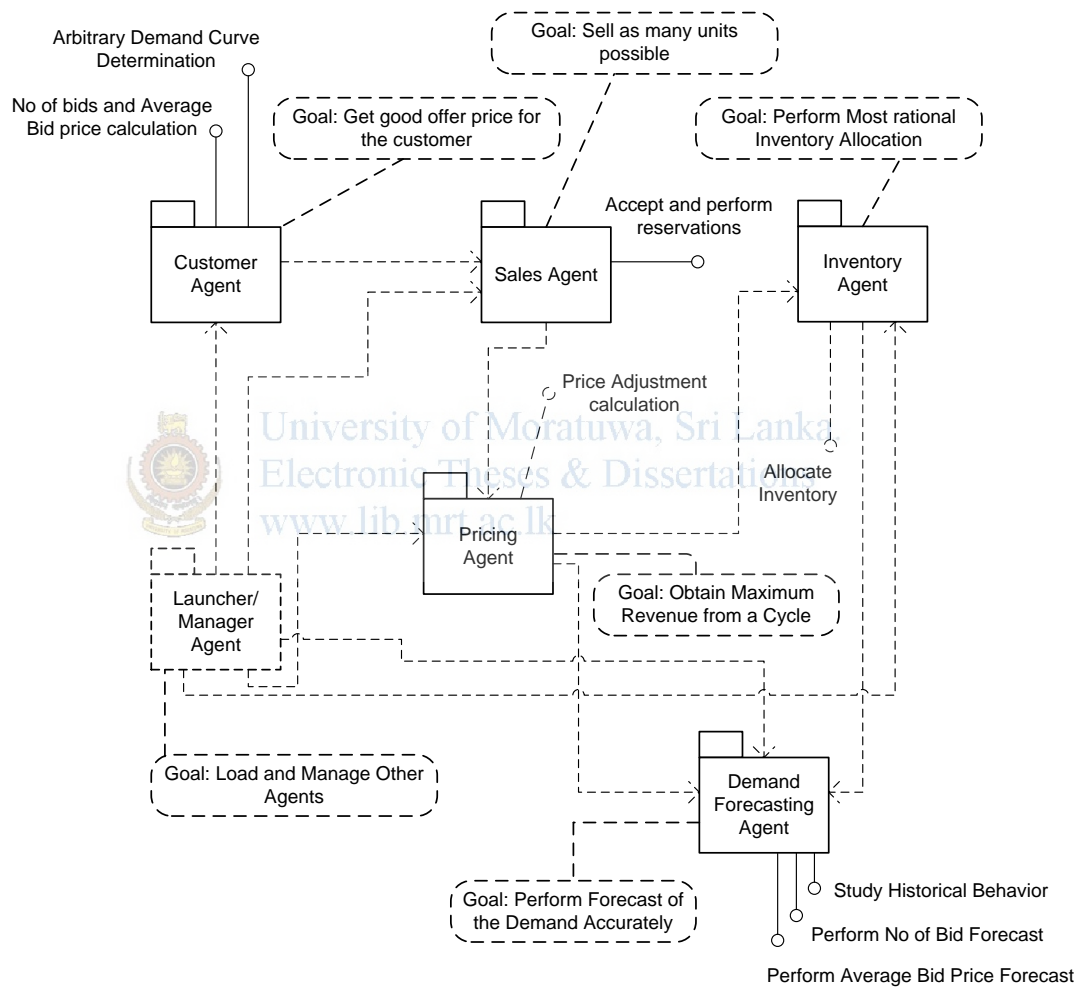


Figure A.1: UML Component diagram of agents inside a tour operator

The sequence diagram for message passing between agents is shown in Figure A.2 below.

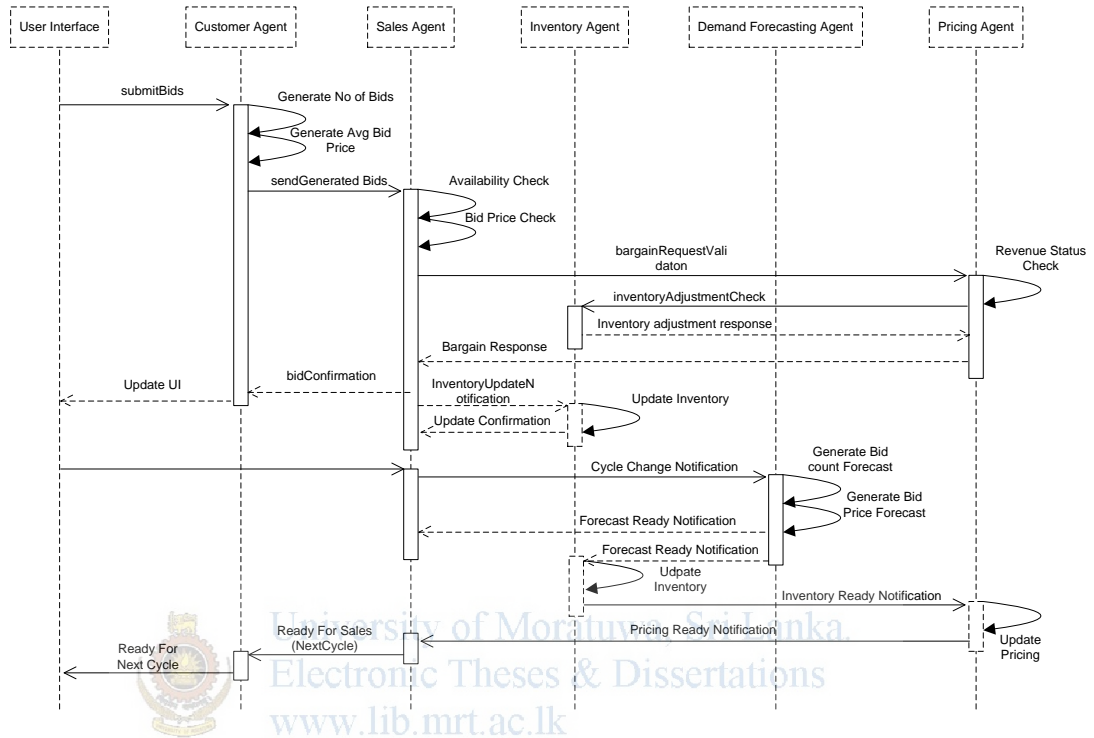


Figure A.2: UML Sequence chart for bid handling inside a tour operator

## Screens of the developed software

Figure B.1 shows the startup screen for message sending. Customer agents would submit a request for a particular day with a bid price.

Figure B.1: Customer Agent User Interface

The initial setup of the supplier side is shown in Figure B.2. Since the supplier doesn't have historical data, he tries to sell equal number of units throughout the period of selling.

Cycle No	Day No	All Sold	Units Opened	Org Price	Display Price	Units Sold	Bids	Avg Bid Price
1	1	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	2	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	3	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	4	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	5	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	6	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	7	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	8	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	9	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	10	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	11	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	12	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	13	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00
1	14	<input type="checkbox"/>	10	562.50	562.50	0	0	-1.00

Unit Cost: 450.00 Margin: 25.00% Units: 140.0 Rev Exp: 78,750.00 Sold: 0 Rev Earned: 0.00

Figure B.2: Sales Agent User Interface

Summary after running 1 cycle with no features enabled is shown in Figure B.3. Cycle ended up letting supplier to sell 139 units out of 140.

Cycle No	Day No	All Sold	Units Opened	Org Price	Display Price	Units Sold	Bids	Avg Bid Price
1	1	<input type="checkbox"/>	10	562.50	562.50	0	4	502.81
1	2	<input type="checkbox"/>	11	562.50	562.50	0	5	543.27
1	3	<input type="checkbox"/>	12	562.50	562.50	7	7	584.54
1	4	<input type="checkbox"/>	13	562.50	562.50	8	8	618.39
1	5	<input type="checkbox"/>	13	562.50	562.50	9	9	648.61
1	6	<input type="checkbox"/>	13	562.50	562.50	10	10	681.07
1	7	<input type="checkbox"/>	14	562.50	562.50	12	12	695.54
1	8	<input checked="" type="checkbox"/>	14	562.50	562.50	14	14	715.50
1	9	<input checked="" type="checkbox"/>	14	562.50	562.50	14	15	731.72
1	10	<input checked="" type="checkbox"/>	14	562.50	562.50	14	14	741.13
1	11	<input checked="" type="checkbox"/>	13	562.50	562.50	13	13	745.82
1	12	<input checked="" type="checkbox"/>	13	562.50	562.50	13	14	751.79
1	13	<input checked="" type="checkbox"/>	13	562.50	562.50	13	13	750.81
1	14	<input type="checkbox"/>	13	562.50	562.50	12	12	740.65

Unit Cost: 450.00 Margin: 25.00% Units: 140.0 Rev Exp: 78,750.00 Sold: 139.0 Rev Earned: 78,187.50

Figure B.3: Sales summary after a cycle completed

The next cycle summary with all the features enabled is shown in Figure B.4. This time also, seller has been able to sell all the units, but noticeably, with about 15% increase in revenues.

Cycle No	Day No	All Sold	Units Opened	Org Price	Display Price	Units Sold	Bids	Avg Bid Price
1	6	<input type="checkbox"/>	12	562.50	644.03	10	10	676.41
1	7	<input type="checkbox"/>	13	562.50	669.53	11	11	698.60
1	8	<input type="checkbox"/>	13	562.50	688.40	12	12	716.98
1	9	<input checked="" type="checkbox"/>	13	562.50	704.39	13	13	732.43
1	10	<input checked="" type="checkbox"/>	13	562.50	717.95	13	15	744.23
1	11	<input checked="" type="checkbox"/>	13	562.50	727.63	13	13	745.75
1	12	<input checked="" type="checkbox"/>	12	562.50	724.12	12	14	748.68
1	13	<input checked="" type="checkbox"/>	12	562.50	727.64	12	13	751.51
1	14	<input checked="" type="checkbox"/>	12	562.50	730.34	12	14	741.14
2	1	<input type="checkbox"/>	10	562.50	562.50	1	3	504.36
2	2	<input type="checkbox"/>	11	562.50	489.23	5	5	543.16
2	3	<input type="checkbox"/>	12	562.50	545.68	6	6	580.71
2	4	<input type="checkbox"/>	12	562.50	581.50	7	7	617.43
2	5	<input type="checkbox"/>	13	562.50	616.71	9	9	652.97
2	6	<input type="checkbox"/>	13	562.50	650.62	12	12	676.00
2	7	<input type="checkbox"/>	13	562.50	666.89	10	10	698.36
2	8	<input type="checkbox"/>	13	562.50	688.25	11	11	719.65
2	9	<input type="checkbox"/>	14	562.50	708.39	12	12	729.48
2	10	<input checked="" type="checkbox"/>	14	562.50	712.37	14	14	741.18
2	11	<input type="checkbox"/>	14	562.50	724.61	13	13	747.40
2	12	<input checked="" type="checkbox"/>	14	562.50	727.99	14	15	750.43
2	13	<input checked="" type="checkbox"/>	13	562.50	729.39	13	13	748.36
2	14	<input checked="" type="checkbox"/>	13	562.50	722.91	13	15	742.98

Unit Cost: 450.00 Margin: 25.00% Units: 140.0 Rev Exp: 78,750.00 Sold: 140.0 Rev Earned: 94,861.14

Figure B.4: Sales status after few cycles

## Appendix C

### Test Data

Table C.1 shows the entire test data used to perform evaluations with the results collected. Customer parameters are the controlled variables where the cases are the observations.

Customer Parameters		Cycle No	Case			
Bid Price	Number of Bids		Base Case	Bargaining	Adaptive Pricing	With Forecasting
Increasing	Above Average	1	51187.5	64561.19	73511.26	75464.14
Increasing	Above Average	2	50625	63446.65	74904.53	74664.93
Increasing	Above Average	3	50625	63947	79069.82	80030.49
Increasing	Above Average	4	50062.5	65110.23	78238.6	72358.51
Increasing	Marginal	1	41062.5	56,165.53	61,755.63	63,282.48
Increasing	Marginal	2	43312.5	53,358.19	60,486.46	60,140.42
Increasing	Marginal	3	42750	50,025.74	63,887.49	63,920.21
Increasing	Marginal	4	42750	52,857.44	60,671.84	69,335.73
Increasing	Below Average	1	32,625.00	43,843.17	46,981.98	48,399.03
Increasing	Below Average	2	34,875.00	46,151.57	46,562.15	46,883.06
Increasing	Below Average	3	36,562.50	41,194.57	45,290.39	51,102.37
Increasing	Below Average	4	33,750.00	42,323.26	46,741.96	49,816.00
Decreasing	Above Average	1	37,125.00	49,848.17	49,845.30	54,109.37
Decreasing	Above Average	2	37,125.00	49,362.58	49,922.12	49,483.20
Decreasing	Above Average	3	38,250.00	49,356.90	49,879.76	68,836.00
Decreasing	Above Average	4	37,125.00	49,895.31	53,659.17	67,976.45
Decreasing	Marginal	1	33,750.00	45,578.81	49,392.57	49,886.43
Decreasing	Marginal	2	36,000.00	45,544.66	53,830.99	51,974.29
Decreasing	Marginal	3	37,687.50	46,616.02	51,093.64	60,157.35
Decreasing	Marginal	4	34,875.00	44,529.48	56,555.57	60,857.70
Decreasing	Below Average	1	23,625.00	26,708.57	30,291.82	30,982.31
Decreasing	Below Average	2	21,937.50	28,847.38	32,753.61	31,688.51
Decreasing	Below Average	3	24,750.00	26,101.09	31,414.65	29,358.90
Decreasing	Below Average	4	21,375.00	27,214.14	31,211.52	32,379.02
Arbitrary	Arbitrary	1	77,625.00	78,623.37	94,765.16	94,410.83
Arbitrary	Arbitrary	2	77,625.00	78,653.28	94,137.92	94,851.60
Arbitrary	Arbitrary	3	77,625.00	78,590.48	94,760.96	92,796.28
Arbitrary	Arbitrary	4	78,750.00	78,597.56	94,085.90	93,818.67

Table C.1: Test Data