

Project 2

Simulation of Ticket Entry and Resolution

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12/6/2011

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INTRODUCTION

Due to the limitations of our initial project – specifically, how it addressed infected computers, however was only checked every Monday thus all incidents were reported at the same time every week – Project 2 instead expands to cover the comprehensive nature of tickets received at the MSU Computer Services Help Desk. Computer Services twenty-four hours a day during the week, but is closed over the weekend from midnight to 10:00am on Saturday and Sunday. The Help Desk call center consists of four labs, a total of eight people present, four lines which receive calls, two people in chat at all times, and one person solely dedicated to monitoring emails. Tickets can be entered via person, email, phone, and on-line chat-system. The issue faced is providing the correct amount of coverage to resolve tickets in a timely manner. Labs are at Cheek, Strong, Glass, and Meyer Library.

We faced several limitations while working on this project, resulting in an average arrival time of 48 minutes. Our data was pulled from September 23 through October 1. Clearly, there were certain times that were busier than others. For example, from midnight to 8am, there were, at most, three tickets logged, generally, however, there were none most days of the week. Meanwhile, during the day, there were times when a ticket was logged every five minutes. Because of this, we limited the data by removing that time period from the data.

In addition, there was some human error indicated during the times taken for resolution. There were a large number of times which stated it took 0 minutes to resolve the issue. Because there is no way to tell how long those actually took, we also eliminated those times. Anything that took over 1,000 minutes was also eliminated because those tickets that were likely to have been forgotten, closed only when remembered. This greatly decreased our sample data, though the time period did not change.

PROBLEM:

Considering the number of 'queues' in place and the number of employees or 'servers' at each 'queue,' it is necessary to find out where the inefficiencies lay. While the locations are necessary – all but one necessary as a separate entity – we are looking to see how many servers at each location would make the overall system more efficient.

ALTERNATIVES:

During ExtendSim, we will be examined several different scenarios – eight in total. The initial model – Base Model – was based on the status quo, how the system works now. From there, we did three more scenarios based on this concept where we removed one person from each location until we had five queues with one server at each.

At that point, we removed the fifth queue – the one designed solely for email – and started the process over again. The assumption being, while tickets can still be submitted via email, instead of having a separate station for it, the email would be redistributed so that individuals working in the lab would be required to monitor email in addition to answering phones, interacting with people in live-chat, and addressing those who came in-person with issues. Again, we repeated the process of whittling down a server from each queue until we had four queues with one person at each location.

CONCLUSION:

As stated before, there is no choice but to continue to maintain four labs across campus for ease of access, and at least one person is necessary to work in each lab to answer questions. There will be times – such as in the week before finals – when the tickets increase dramatically, and at that point, another

worker would become necessary. Also, there are periods of time when incidents were far more common than others. Our data takes a look at it 'on average' rather than an exact snapshot.

Given all of this, it became obvious the most cost-efficient option would be to decrease the number of open queues to four – Cheek, Strong, Glass, and Meyer Library – and generally keep one worker at each location to handle incidents, questions, etc as they arise.

Appendix A

Key	Created	Resolved	IAT(in Minutes)	Time To Resolve (in minutes)
HELP-46000	9/23/2011 13:01	9/23/2011 13:03	1.00	2.00
HELP-46002	9/23/2011 13:27	9/23/2011 13:29	26.00	2.00
HELP-46006	9/23/2011 13:54	9/23/2011 13:55	27.00	1.00
HELP-46008	9/23/2011 14:27	9/23/2011 14:30	33.00	3.00
HELP-46010	9/23/2011 14:33	9/23/2011 14:35	6.00	2.00
HELP-46011	9/23/2011 14:53	9/23/2011 15:04	20.00	11.00
HELP-46013	9/23/2011 15:07	9/23/2011 15:08	14.00	1.00
HELP-46016	9/23/2011 15:22	9/23/2011 15:24	15.00	2.00
HELP-46018	9/23/2011 15:48	9/23/2011 15:49	26.00	1.00
HELP-46023	9/23/2011 17:17	9/23/2011 17:24	89.00	7.00
HELP-46026	9/23/2011 18:41	9/23/2011 19:01	84.00	20.00
HELP-46027	9/23/2011 19:05	9/23/2011 19:09	24.00	4.00
HELP-46031	9/24/2011 10:53	9/24/2011 11:13	948.00	20.00
HELP-46037	9/24/2011 13:48	9/24/2011 13:56	175.00	8.00
HELP-46040	9/24/2011 16:19	9/24/2011 16:49	151.00	30.00
HELP-46043	9/24/2011 16:47	9/24/2011 16:48	28.00	1.00
HELP-46044	9/24/2011 17:29	9/24/2011 17:41	42.00	12.00
HELP-46045	9/24/2011 17:32	9/24/2011 17:38	3.00	6.00
HELP-46047	9/24/2011 18:45	9/24/2011 22:05	73.00	200.00
HELP-46049	9/24/2011 22:19	9/24/2011 22:20	214.00	1.00
HELP-46052	9/25/2011 12:40	9/25/2011 12:44	861.00	4.00
HELP-46053	9/25/2011 12:46	9/25/2011 12:48	6.00	2.00
HELP-46057	9/25/2011 15:13	9/25/2011 15:19	147.00	6.00
HELP-46058	9/25/2011 15:19	9/25/2011 15:31	6.00	12.00
HELP-46059	9/25/2011 16:11	9/25/2011 16:18	52.00	7.00
HELP-46061	9/25/2011 16:15	9/25/2011 16:16	4.00	1.00
HELP-46064	9/25/2011 16:39	9/25/2011 16:47	24.00	8.00
HELP-46065	9/25/2011 17:08	9/25/2011 17:10	29.00	2.00
HELP-46066	9/25/2011 17:10	9/25/2011 17:13	2.00	3.00
HELP-46068	9/25/2011 17:46	9/25/2011 17:47	36.00	1.00
HELP-46069	9/25/2011 18:11	9/25/2011 18:12	25.00	1.00
HELP-46071	9/25/2011 19:13	9/25/2011 19:15	62.00	2.00
HELP-46072	9/25/2011 19:30	9/25/2011 19:31	17.00	1.00
HELP-46073	9/25/2011 19:52	9/25/2011 20:06	22.00	14.00
HELP-46074	9/25/2011 20:25	9/25/2011 20:26	33.00	1.00
HELP-46076	9/25/2011 21:13	9/25/2011 21:14	48.00	1.00
HELP-46079	9/25/2011 21:30	9/25/2011 21:31	17.00	1.00
HELP-46080	9/25/2011 21:32	9/25/2011 21:33	2.00	1.00
HELP-46082	9/25/2011 21:51	9/25/2011 21:52	19.00	1.00
HELP-46083	9/25/2011 22:03	9/25/2011 22:06	12.00	3.00
HELP-46084	9/25/2011 22:29	9/25/2011 22:30	26.00	1.00
HELP-46092	9/26/2011 8:10	9/26/2011 8:12	581.00	2.00
HELP-46093	9/26/2011 8:36	9/26/2011 10:33	26.00	117.00
HELP-46094	9/26/2011 8:46	9/26/2011 8:49	10.00	3.00
HELP-46095	9/26/2011 8:53	9/26/2011 8:56	7.00	3.00
HELP-46096	9/26/2011 9:15	9/26/2011 9:22	22.00	7.00
HELP-46097	9/26/2011 9:29	9/26/2011 9:48	14.00	19.00
HELP-46098	9/26/2011 9:37	9/26/2011 9:41	8.00	4.00
HELP-46099	9/26/2011 9:43	9/26/2011 9:44	6.00	1.00
HELP-46100	9/26/2011 10:02	9/26/2011 10:05	19.00	3.00

HELP-46101	9/26/2011 10:09	9/26/2011 15:19	7.00	310.00
HELP-46104	9/26/2011 10:17	9/26/2011 10:18	8.00	1.00
HELP-46105	9/26/2011 10:32	9/26/2011 10:33	15.00	1.00
HELP-46106	9/26/2011 10:43	9/26/2011 12:03	11.00	80.00
HELP-46107	9/26/2011 11:03	9/26/2011 14:08	20.00	185.00
HELP-46108	9/26/2011 11:18	9/26/2011 12:02	15.00	44.00
HELP-46110	9/26/2011 11:25	9/26/2011 11:38	7.00	13.00
HELP-46112	9/26/2011 11:50	9/26/2011 11:51	25.00	1.00
HELP-46114	9/26/2011 12:07	9/26/2011 12:09	17.00	2.00
HELP-46115	9/26/2011 12:29	9/26/2011 12:31	22.00	2.00
HELP-46116	9/26/2011 12:49	9/26/2011 13:56	20.00	67.00
HELP-46117	9/26/2011 12:57	9/26/2011 16:30	8.00	213.00
HELP-46118	9/26/2011 12:59	9/26/2011 13:42	2.00	43.00
HELP-46119	9/26/2011 13:22	9/26/2011 13:23	23.00	1.00
HELP-46125	9/26/2011 14:13	9/26/2011 15:32	51.00	79.00
HELP-46126	9/26/2011 14:18	9/26/2011 15:30	5.00	72.00
HELP-46129	9/26/2011 14:22	9/26/2011 14:23	4.00	1.00
HELP-46130	9/26/2011 14:23	9/26/2011 14:24	1.00	1.00
HELP-46131	9/26/2011 14:32	9/26/2011 14:33	9.00	1.00
HELP-46132	9/26/2011 14:36	9/26/2011 14:38	4.00	2.00
HELP-46133	9/26/2011 14:38	9/26/2011 15:19	2.00	41.00
HELP-46135	9/26/2011 14:40	9/26/2011 14:42	2.00	2.00
HELP-46136	9/26/2011 14:45	9/26/2011 14:46	5.00	1.00
HELP-46137	9/26/2011 14:55	9/26/2011 14:57	10.00	2.00
HELP-46138	9/26/2011 14:56	9/26/2011 14:59	1.00	3.00
HELP-46139	9/26/2011 14:56	9/26/2011 14:57	0.00	1.00
HELP-46140	9/26/2011 15:02	9/26/2011 15:04	6.00	2.00
HELP-46142	9/26/2011 15:13	9/26/2011 15:30	11.00	17.00
HELP-46143	9/26/2011 15:17	9/26/2011 15:19	4.00	2.00
HELP-46145	9/26/2011 15:25	9/26/2011 15:26	8.00	1.00
HELP-46147	9/26/2011 15:59	9/26/2011 16:17	34.00	18.00
HELP-46152	9/26/2011 16:57	9/26/2011 17:02	58.00	5.00
HELP-46154	9/26/2011 17:11	9/26/2011 17:12	14.00	1.00
HELP-46156	9/26/2011 17:35	9/26/2011 17:36	24.00	1.00
HELP-46161	9/26/2011 18:15	9/27/2011 9:28	40.00	913.00
HELP-46162	9/26/2011 18:28	9/26/2011 18:29	13.00	1.00
HELP-46165	9/26/2011 18:53	9/26/2011 18:54	25.00	1.00
HELP-46168	9/26/2011 19:14	9/26/2011 19:15	21.00	1.00
HELP-46169	9/26/2011 19:18	9/26/2011 19:28	4.00	10.00
HELP-46170	9/26/2011 19:31	9/26/2011 19:36	13.00	5.00
HELP-46172	9/26/2011 19:45	9/26/2011 20:20	14.00	35.00
HELP-46173	9/26/2011 20:38	9/26/2011 20:39	53.00	1.00
HELP-46174	9/26/2011 20:45	9/26/2011 20:49	7.00	4.00
HELP-46175	9/26/2011 21:02	9/26/2011 21:06	17.00	4.00
HELP-46178	9/26/2011 21:06	9/26/2011 21:25	4.00	19.00
HELP-46181	9/26/2011 21:42	9/26/2011 21:43	36.00	1.00
HELP-46185	9/26/2011 22:36	9/26/2011 22:37	54.00	1.00
HELP-46187	9/26/2011 23:11	9/26/2011 23:19	35.00	8.00
HELP-46188	9/26/2011 23:21	9/26/2011 23:24	10.00	3.00
HELP-46189	9/26/2011 23:29	9/26/2011 23:30	8.00	1.00
HELP-46191	9/27/2011 8:19	9/27/2011 8:21	530.00	2.00
HELP-46192	9/27/2011 8:25	9/27/2011 15:55	6.00	450.00
HELP-46194	9/27/2011 8:34	9/27/2011 8:37	9.00	3.00

HELP-46195	9/27/2011 8:43	9/27/2011 8:44	9.00	1.00
HELP-46196	9/27/2011 9:09	9/27/2011 9:14	26.00	5.00
HELP-46197	9/27/2011 9:26	9/27/2011 12:13	17.00	167.00
HELP-46198	9/27/2011 9:36	9/27/2011 9:37	10.00	1.00
HELP-46199	9/27/2011 10:13	9/27/2011 10:14	37.00	1.00
HELP-46202	9/27/2011 10:53	9/27/2011 10:54	40.00	1.00
HELP-46203	9/27/2011 10:58	9/27/2011 13:26	5.00	148.00
HELP-46208	9/27/2011 11:59	9/27/2011 14:15	61.00	136.00
HELP-46209	9/27/2011 12:10	9/27/2011 12:21	11.00	11.00
HELP-46210	9/27/2011 12:16	9/27/2011 12:24	6.00	8.00
HELP-46212	9/27/2011 12:23	9/27/2011 12:24	7.00	1.00
HELP-46213	9/27/2011 12:24	9/27/2011 12:38	1.00	14.00
HELP-46214	9/27/2011 12:31	9/27/2011 12:47	7.00	16.00
HELP-46215	9/27/2011 12:33	9/27/2011 12:34	2.00	1.00
HELP-46216	9/27/2011 12:47	9/27/2011 12:48	14.00	1.00
HELP-46219	9/27/2011 13:10	9/27/2011 13:28	23.00	18.00
HELP-46222	9/27/2011 13:57	9/27/2011 14:00	47.00	3.00
HELP-46223	9/27/2011 13:58	9/27/2011 13:59	1.00	1.00
HELP-46226	9/27/2011 14:24	9/27/2011 14:42	26.00	18.00
HELP-46227	9/27/2011 14:32	9/27/2011 16:45	8.00	133.00
HELP-46228	9/27/2011 14:32	9/27/2011 14:33	0.00	1.00
HELP-46232	9/27/2011 15:30	9/27/2011 16:47	58.00	77.00
HELP-46234	9/27/2011 15:40	9/27/2011 15:48	10.00	8.00
HELP-46235	9/27/2011 15:43	9/27/2011 15:44	3.00	1.00
HELP-46236	9/27/2011 15:49	9/27/2011 15:50	6.00	1.00
HELP-46239	9/27/2011 15:56	9/27/2011 16:03	7.00	7.00
HELP-46240	9/27/2011 16:01	9/27/2011 16:02	5.00	1.00
HELP-46241	9/27/2011 16:02	9/27/2011 16:08	1.00	6.00
HELP-46243	9/27/2011 16:15	9/27/2011 16:16	13.00	1.00
HELP-46244	9/27/2011 16:18	9/27/2011 16:25	3.00	7.00
HELP-46245	9/27/2011 16:19	9/27/2011 16:20	1.00	1.00
HELP-46247	9/27/2011 16:21	9/27/2011 16:22	2.00	1.00
HELP-46248	9/27/2011 16:34	9/27/2011 16:45	13.00	11.00
HELP-46250	9/27/2011 16:48	9/27/2011 16:49	14.00	1.00
HELP-46251	9/27/2011 16:50	9/27/2011 16:51	2.00	1.00
HELP-46253	9/27/2011 16:58	9/27/2011 17:01	8.00	3.00
HELP-46255	9/27/2011 17:15	9/27/2011 17:16	17.00	1.00
HELP-46256	9/27/2011 17:23	9/27/2011 17:24	8.00	1.00
HELP-46257	9/27/2011 17:28	9/27/2011 17:29	5.00	1.00
HELP-46259	9/27/2011 18:50	9/27/2011 18:51	82.00	1.00
HELP-46261	9/27/2011 20:19	9/27/2011 20:20	89.00	1.00
HELP-46262	9/27/2011 21:01	9/27/2011 21:03	42.00	2.00
HELP-46265	9/27/2011 22:03	9/27/2011 22:08	62.00	5.00
HELP-46267	9/27/2011 22:50	9/27/2011 22:53	47.00	3.00
HELP-46274	9/28/2011 9:10	9/28/2011 9:12	620.00	2.00
HELP-46279	9/28/2011 10:38	9/28/2011 16:58	88.00	380.00
HELP-46280	9/28/2011 11:15	9/28/2011 14:48	37.00	213.00
HELP-46282	9/28/2011 11:32	9/28/2011 11:38	17.00	6.00
HELP-46284	9/28/2011 11:46	9/28/2011 11:47	14.00	1.00
HELP-46287	9/28/2011 12:39	9/28/2011 14:44	53.00	125.00
HELP-46288	9/28/2011 12:41	9/28/2011 12:43	2.00	2.00
HELP-46289	9/28/2011 12:47	9/28/2011 12:55	6.00	8.00
HELP-46296	9/28/2011 13:14	9/28/2011 13:15	27.00	1.00

HELP-46301	9/28/2011 13:27	9/28/2011 15:06	13.00	99.00
HELP-46305	9/28/2011 14:14	9/28/2011 14:16	47.00	2.00
HELP-46309	9/28/2011 14:45	9/28/2011 14:46	31.00	1.00
HELP-46310	9/28/2011 14:52	9/28/2011 14:53	7.00	1.00
HELP-46313	9/28/2011 15:08	9/28/2011 15:09	16.00	1.00
HELP-46318	9/28/2011 16:03	9/28/2011 16:04	55.00	1.00
HELP-46319	9/28/2011 16:06	9/28/2011 16:15	3.00	9.00
HELP-46322	9/28/2011 17:05	9/28/2011 17:18	59.00	13.00
HELP-46324	9/28/2011 17:20	9/28/2011 17:21	15.00	1.00
HELP-46326	9/28/2011 17:29	9/28/2011 17:33	9.00	4.00
HELP-46327	9/28/2011 17:36	9/28/2011 17:40	7.00	4.00
HELP-46328	9/28/2011 17:38	9/28/2011 17:42	2.00	4.00
HELP-46329	9/28/2011 17:50	9/28/2011 17:52	12.00	2.00
HELP-46331	9/28/2011 18:02	9/29/2011 10:05	12.00	963.00
HELP-46333	9/28/2011 18:26	9/29/2011 10:07	24.00	941.00
HELP-46336	9/28/2011 18:35	9/28/2011 18:53	9.00	18.00
HELP-46339	9/28/2011 19:12	9/28/2011 19:28	37.00	16.00
HELP-46342	9/28/2011 20:44	9/28/2011 20:47	92.00	3.00
HELP-46343	9/28/2011 21:35	9/28/2011 21:36	51.00	1.00
HELP-46344	9/28/2011 23:14	9/28/2011 23:15	99.00	1.00
HELP-46349	9/29/2011 8:24	9/29/2011 8:34	550.00	10.00
HELP-46352	9/29/2011 8:37	9/29/2011 8:38	13.00	1.00
HELP-46353	9/29/2011 8:41	9/29/2011 8:52	4.00	11.00
HELP-46359	9/29/2011 9:20	9/29/2011 9:21	39.00	1.00
HELP-46361	9/29/2011 9:33	9/29/2011 14:55	13.00	322.00
HELP-46366	9/29/2011 10:10	9/29/2011 10:37	37.00	27.00
HELP-46368	9/29/2011 10:16	9/29/2011 10:17	6.00	1.00
HELP-46369	9/29/2011 10:32	9/29/2011 10:38	16.00	6.00
HELP-46370	9/29/2011 10:36	9/29/2011 10:38	4.00	2.00
HELP-46373	9/29/2011 11:08	9/29/2011 11:22	32.00	14.00
HELP-46374	9/29/2011 11:15	9/29/2011 11:18	7.00	3.00
HELP-46375	9/29/2011 11:31	9/29/2011 12:36	16.00	65.00
HELP-46378	9/29/2011 11:52	9/29/2011 11:53	21.00	1.00
HELP-46379	9/29/2011 12:00	9/29/2011 12:01	8.00	1.00
HELP-46380	9/29/2011 12:31	9/29/2011 15:13	31.00	162.00
HELP-46385	9/29/2011 13:15	9/29/2011 13:31	44.00	16.00
HELP-46387	9/29/2011 13:20	9/29/2011 13:21	5.00	1.00
HELP-46388	9/29/2011 13:31	9/29/2011 14:38	11.00	67.00
HELP-46391	9/29/2011 13:55	9/29/2011 14:02	24.00	7.00
HELP-46393	9/29/2011 14:13	9/29/2011 14:40	18.00	27.00
HELP-46394	9/29/2011 14:15	9/29/2011 14:17	2.00	2.00
HELP-46397	9/29/2011 15:00	9/29/2011 15:02	45.00	2.00
HELP-46398	9/29/2011 15:05	9/29/2011 15:07	5.00	2.00
HELP-46399	9/29/2011 15:08	9/29/2011 15:09	3.00	1.00
HELP-46401	9/29/2011 15:19	9/29/2011 15:20	11.00	1.00
HELP-46403	9/29/2011 15:25	9/29/2011 17:36	6.00	131.00
HELP-46405	9/29/2011 16:23	9/29/2011 16:24	58.00	1.00
HELP-46406	9/29/2011 16:34	9/29/2011 16:35	11.00	1.00
HELP-46409	9/29/2011 16:51	9/29/2011 16:52	17.00	1.00
HELP-46411	9/29/2011 17:10	9/29/2011 17:11	19.00	1.00
HELP-46413	9/29/2011 17:50	9/29/2011 17:51	40.00	1.00
HELP-46416	9/29/2011 19:48	9/30/2011 9:03	118.00	795.00
HELP-46417	9/29/2011 21:10	9/29/2011 21:11	82.00	1.00

HELP-46419	9/29/2011 21:30	9/29/2011 21:31	20.00	1.00
HELP-46421	9/29/2011 23:16	9/30/2011 9:03	106.00	587.00
HELP-46431	9/30/2011 9:06	9/30/2011 9:15	590.00	9.00
HELP-46432	9/30/2011 9:15	9/30/2011 9:17	9.00	2.00
HELP-46436	9/30/2011 10:03	9/30/2011 10:48	48.00	45.00
HELP-46438	9/30/2011 10:14	9/30/2011 10:17	11.00	3.00
HELP-46441	9/30/2011 10:33	9/30/2011 15:42	19.00	309.00
HELP-46442	9/30/2011 10:36	9/30/2011 10:37	3.00	1.00
HELP-46443	9/30/2011 10:36	9/30/2011 12:26	0.00	110.00
HELP-46444	9/30/2011 11:06	9/30/2011 13:51	30.00	165.00
HELP-46445	9/30/2011 11:19	9/30/2011 15:21	13.00	242.00
HELP-46446	9/30/2011 11:24	9/30/2011 11:25	5.00	1.00
HELP-46447	9/30/2011 12:11	9/30/2011 12:13	47.00	2.00
HELP-46450	9/30/2011 12:21	9/30/2011 12:22	10.00	1.00
HELP-46451	9/30/2011 12:37	9/30/2011 12:51	16.00	14.00
HELP-46452	9/30/2011 12:39	9/30/2011 12:45	2.00	6.00
HELP-46453	9/30/2011 12:53	9/30/2011 16:27	14.00	214.00
HELP-46454	9/30/2011 12:53	9/30/2011 16:27	0.00	214.00
HELP-46455	9/30/2011 12:54	9/30/2011 13:33	1.00	39.00
HELP-46457	9/30/2011 13:18	9/30/2011 13:24	24.00	6.00
HELP-46459	9/30/2011 13:30	9/30/2011 13:40	12.00	10.00
HELP-46461	9/30/2011 13:35	9/30/2011 13:37	5.00	2.00
HELP-46462	9/30/2011 13:41	9/30/2011 13:42	6.00	1.00
HELP-46463	9/30/2011 13:47	9/30/2011 14:18	6.00	31.00
HELP-46464	9/30/2011 14:05	9/30/2011 14:06	18.00	1.00
HELP-46466	9/30/2011 14:16	9/30/2011 14:45	11.00	29.00
HELP-46469	9/30/2011 14:42	9/30/2011 14:43	26.00	1.00
HELP-46470	9/30/2011 15:09	9/30/2011 15:11	27.00	2.00
HELP-46473	9/30/2011 15:23	9/30/2011 15:25	14.00	2.00
HELP-46474	9/30/2011 15:36	9/30/2011 15:46	13.00	10.00
HELP-46475	9/30/2011 15:40	9/30/2011 15:41	4.00	1.00
HELP-46477	9/30/2011 16:39	9/30/2011 16:41	59.00	2.00
HELP-46479	9/30/2011 18:26	9/30/2011 18:39	107.00	13.00
HELP-46481	9/30/2011 20:09	9/30/2011 20:11	103.00	2.00
HELP-46485	10/1/2011 11:37	10/1/2011 11:53	928.00	16.00
HELP-46488	10/1/2011 14:13	10/1/2011 14:15	156.00	2.00
HELP-46490	10/1/2011 15:29	10/1/2011 15:32	76.00	3.00
HELP-46491	10/1/2011 15:47	10/1/2011 15:50	18.00	3.00
HELP-46492	10/1/2011 16:24	10/1/2011 16:26	37.00	2.00
HELP-46493	10/1/2011 16:29	10/1/2011 16:31	5.00	2.00
HELP-46495	10/1/2011 16:39	10/1/2011 16:41	10.00	2.00
HELP-46499	10/1/2011 23:24	10/1/2011 23:26	405.00	2.00

Appendix B

With E-Mail

2C2G2M1S1E	Servers	Price	Time (minutes)	Labor Costs	Seed				Cost		
					11	15	7				
		\$		\$							
Email	1	0.25	17,570	4,392.50							
		\$		\$							
Labs	7	0.13	17,570	15,988.70	\$ -	77.16	\$ -		Waiting Cost	\$ 1,240.09	
		\$		\$						Labor Cost	\$ 20,381.20
				20,381.20	1,349.37	644.00	459.14			Total Cost	\$ 21,621.29
					\$	\$	\$				
					79.43	679.49	308.08				
					\$	\$	\$		Waiting		
					11.43	44.09	\$ -		Cost		
					\$	\$	\$				
					33.43	34.65	\$ -		AVG		
					\$	\$	\$			Average Activity	
					1,473.66	1,479.39	767.22	1,240.09	Utilization		9%

2C2G1M1S1E	Servers	Price	Time (minutes)	Labor Costs	Seed				Cost		
					11	15	7				
		\$		\$							
Email	1	0.25	17,570	4,392.50	\$ -	77.16	\$ -		Waiting Cost	\$ 1,661.36	
		\$		\$						Labor Cost	\$ 18,097.10
Labs	6	0.13	17,570	13,704.60	1,349.37	666.13	459.14			Total Cost	\$ 19,758.46
		\$		\$							
				18,097.10	79.43	679.49	308.08				
					\$	\$	\$		Waiting		
					11.43	44.09	\$ -		Cost		
					\$	\$	\$				
					546.23	463.73	299.79		AVG		

					\$	\$	\$	\$	Average Activity Utilization	
					1,986.46	1,930.60	1,067.01	1,661.36	10%	
					Seed					
2C1G1M1S1E	Servers	Price	Time (minutes)	Labor Costs	11	15	7	Cost		
Email	1	\$ 0.25	17,570	\$ 4,392.50	\$ 405.03	\$ 339.07	\$ 272.06	Waiting Cost	\$ 2,020.33	
Labs	5	\$ 0.13	17,570	\$ 11,420.50	\$ 1,349.37	\$ 666.13	\$ 459.14	Labor Cost	\$ 15,813.00	
				\$ 15,813.00	\$ 79.43	\$ 679.49	\$ 308.08	Total Cost	\$ 17,833.33	
					\$ 11.43	\$ 44.09	\$ -	Waiting Cost		
					\$ 546.28	\$ 601.59	\$ 299.79	AVG		
					\$ 2,391.54	\$ 2,330.37	\$ 1,339.07	\$ 2,020.33	Average Activity Utilization	12%
					Seed					
1C1G1M1S1E	Servers	Price	Time (minutes)	Labor Costs	11	15	7	Cost		
Email	1	\$ 0.25	17,570	\$ 4,392.50	\$ 405.03	\$ 339.07	\$ 272.76	Waiting Cost	\$ 2,521.25	
Labs	4	\$ 0.13	17,570	\$ 9,136.40	\$ 1,374.37	\$ 666.13	\$ 459.14	Labor Cost	\$ 13,528.90	
				\$ 13,528.90	\$ 79.43	\$ 679.49	\$ 308.08	Total Cost	\$ 16,050.15	
					\$ 305.15	\$ 823.08	\$ 403.83	Waiting Cost		
					\$ 546.80	\$ 601.59	\$ 299.79	AVG		
					\$ 2,710.78	\$ 3,109.36	\$ 1,743.60	\$ 2,521.25	Average Activity Utilization	13%

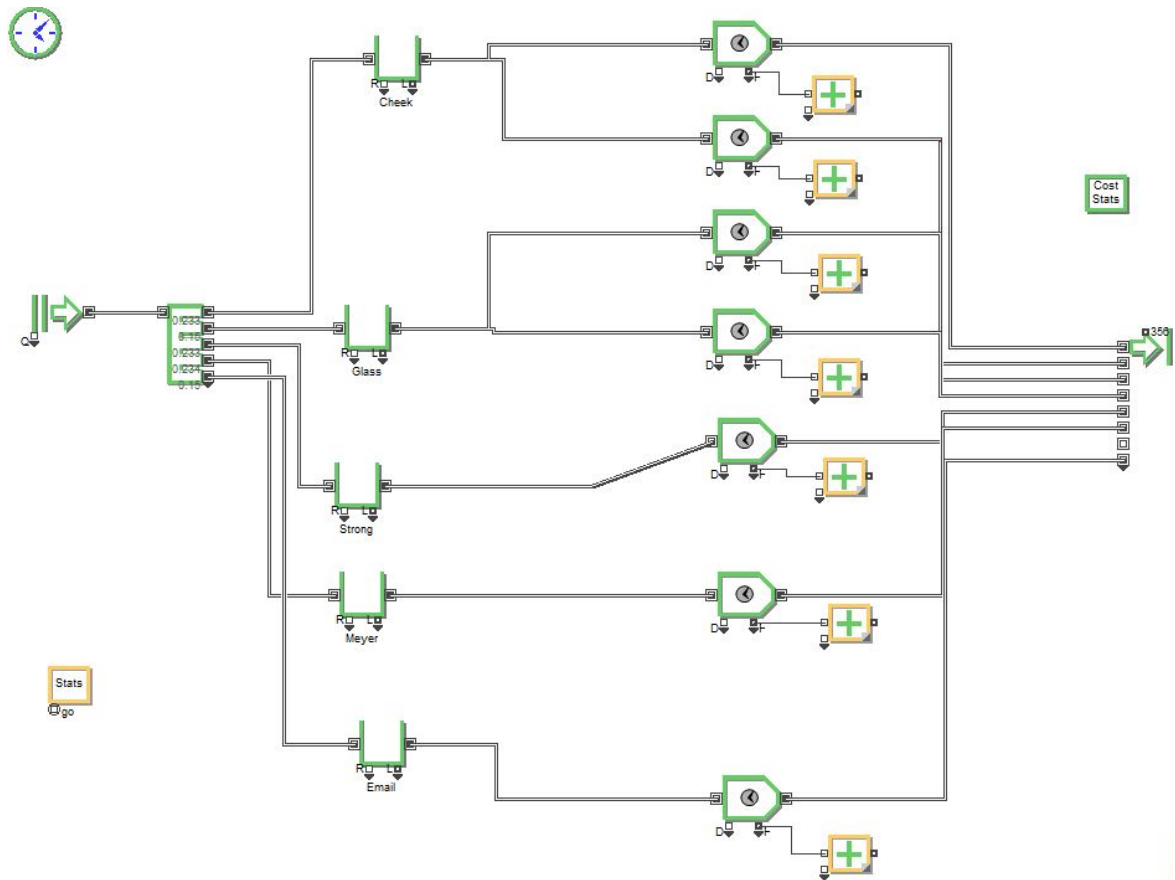
Without E-mail

2C2G2M1S	Servers	Price	Time (minutes)	Labor Costs	Seed				Cost	
		\$		\$						
Labs	7	0.13	17,570.00	15,988.70	11	15	7			
					\$	\$	\$			\$
					421.24	7.80	37.87		Waiting Cost	746.71
					\$	\$	\$			\$
					460.15	520.79	557.41		Labor Cost	15,988.70
					\$	\$	\$			\$
					11.43	44.09	\$ -	Waiting Cost	Total Cost	16,735.41
					\$	\$	\$			
					122.60	10.22	46.54	AVG		
					\$	\$	\$	\$		
					1,015.42	582.90	641.82	746.71	Average Activity Utilization	10%
<hr/>										
2C2G1M1S	Servers	Price	Time (minutes)	Labor Costs	Seed				Cost	
		\$		\$						
Labs	6	0.13	17,570.00	13,704.60	11	15	7			
					\$	\$	\$			\$
					421.24	7.80	37.87		Waiting Cost	1,504.19
					\$	\$	\$			\$
					160.15	520.79	557.41		Labor Cost	13,704.60
					\$	\$	\$			\$
					11.43	44.09	\$ -	Waiting Cost	Total Cost	15,208.79
					\$	\$	\$			
					1,010.90	860.42	880.47	AVG		
					\$	\$	\$	\$		
					1,603.72	1,433.10	1,475.75	1,504.19	Average Activity Utilization	12%

2C1G1M1S	Servers	Price	Time (minutes)	Labor Costs	Seed				Cost	
		\$		\$	11	15	7			
Labs	5	0.13	17,570.00	11,420.50						
					\$	\$	\$			\$
					1,275.55	1,409.93	119.56		Waiting Cost	2,260.91
					\$	\$	\$			\$
					160.15	452.83	557.41		Labor Cost	11,420.50
					\$	\$	\$			\$
					11.43	44.09	\$ -	Waiting Cost	Total Cost	13,681.41
					\$	\$	\$			
					1,010.90	860.42	880.47	AVG		
					\$	\$	\$	\$		
					2,458.03	2,767.27	1,557.44	2,260.91		
									Average Activity Utilization	10%
1C1G1M1S	Servers	Price	Time (minutes)	Labor Costs	Seed				Cost	
		\$		\$	11	15	7			
Labs	4	0.13	17,570.00	9,136.40						
					\$	\$	\$			\$
					1,275.55	1,284.93	1,139.56		Waiting Cost	3,295.66
					\$	\$	\$			\$
					160.15	452.83	557.41		Labor Cost	9,136.40
					\$	\$	\$			\$
					427.38	1,433.55	403.83	Waiting Cost	Total Cost	12,432.06
					\$	\$	\$			
					1,010.90	860.42	880.47	AVG		
					\$	\$	\$	\$		
					2,873.98	4,031.73	2,981.27	3,295.66		
									Average Activity Utilization	16%

Appendix C

Base Model



Appendix D

Cost Effective Model

