FINAL REPORT

IPRO 312
WIDGETS TO ENHANCE TRU2WAY CONSUMER EXPERIENCE

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Introduction of the Project

This report highlights the method used and accomplishment achieved in IPRO 312, Widget Applications to Enhance the Tru2Way Consumer Experience during the fall semester of 2009. The IPRO team is divided into two sub teams featuring each member's strengths to accomplish the task. The development team was to develop a user friendly application that can be used for testing. The testing team was to test and collect data for different metrics like Bandwidth, memory needed and response time.

Objective and Problem Statement

Since technology came into play, TV is one of the best inventions. It is used for entertainment and communication purpose. However, Comcast believes TV has not changed since it was created. They assume it always has been a one way communication. Comcast wants to make TV a two way communication. As a result, they are trying to develop a Tru2Way platform that allows people to run interactive application on their cable TV sets. Therefore, the purpose of this IPRO was to develop widget and test for different metrics. Widget is a small application that can be run on Tru2Way platform. It is similar to iPhone apps.

Organization and Approach

→ Team Structure and Methodology

The whole team was divided into two sub teams - a. Programming and b. Testing

i) Programming Sub Team – The team task was to create programs to create widget application that worked according to Tru2Way platform.

Methodology used for Programming

The coding and the development of the Widget Application were done in JAVA Eclipse. For the program to run in a Television environment widget needed an emulator which had to be compatible with the Tru2Way platform. The closest functional emulator that the project team found for the widget development was, Vision Work Bench. It simulated the environment where the widget would run in a Tru2Way Platform.

ii) Testing Sub Team – The team's task was to find the test metrics for the widgets created and test them so that they could run under the Tru2Way platform system.

Methodology used for Testing

The metrics that were identified for test purpose were Bandwidth, Response time, transaction, running time etc

The test was performed based on three levels of program memory

- 128 MB
- 256 MB
- 512 MB

Three cases of testing strategies were created based on the program memory . Such cases were created to check which memory was best suitable for the Widget application running in the Tru2Way Environment. And three different types of data were collected based on number of tweets generated and number of application opened in each type of tests: Memory Used, Bandwidth size and file size of the tweeter application program.

The tests were checked for breaking point, maximum usage of bandwidth, file size and memory.

ANALYSIS AND RESULTS

- Pilot Test Widgets were created namely Twitter, GoogleMaps Apps, etc.
- Created Scenario based Test plans
- Test & Run
  - → for any errors or more features to be added
- Test Results:
  - → effectiveness of the code
  - → existences of bugs
  - → trying to see when the program is interrupted and unacceptable input is entered
  - → case by case, try to catch all exceptions that program might throw
- Document every version of the program's bug, performance, code to see the difference from the first version up until the final version.

Result tabulated

The team was able to develop Twitter application that shows memory usage, bandwidth usage and file size as well. We set three machines to different memory sizes 128 MB, 256 MB and 512 MB and the application was tested. The result that was obtained from the test is shown below:

128 MB test result

256 MB test result

i) Test 1

Test #	Date	App	Test Variable (Instances)	Memory	File Size	Bandwidth
1	11/17/09	Twitter	1	9816.719 kb	30.932 kb	10558.000 kb
2		Twitter	2	13451.781 kb		15837.000 kb
3		Twitter	3	15288.549 kb		15837.000 kb
4		Twitter	4	16026.000 kb		15837.000 kb
5		Twitter	5	16213.000 kb		15837.000 kb
6		Twitter	6	16204.734 kb		15837.000 kb
7		Twitter	7	15891.000 kb		15837.000 kb
8		Twitter	8	16198.406 kb		15837.000 kb

9		Twitter	9	15078.078 kb		15837.000 kb
10		Twitter	10	15289.359 kb		15837.000 kb
11		Twitter	11	15241.453 kb		15837.000 kb
12		Twitter	12	15263.953 kb		15837.000 kb
13		Twitter	13	15969.047 kb		15837.000 kb
14		Twitter	14	7778.266 kb		15837.000 kb
15		Twitter	15	16164.672 kb		15837.000 kb
16		Twitter	16	15272.500 kb		15837.000 kb
17		Twitter	17	16211.359 kb		15837.000 kb
18		Twitter	18	15927.494 kb		15837.000 kb
19		Twitter	19	16147.563 kb		15837.000 kb
20		Twitter	20	16300.000 kb		15837.000 kb
21		Twitter	21	16211.969 kb		15837.000 kb
22		Twitter	22	16206.938 kb		15837.000 kb
23		Twitter	23	15255.484 kb		2879.000 kb
24		Twitter	24	16168.344 kb		15837.000 kb
25		Twitter	25	15931.313 kb		15837.000 kb
26		Twitter	26	16215.813 kb		15837.000 kb
27		Twitter	27	15266.000 kb		15837.000 kb
28		Twitter	28	16217.984 kb		15837.000 kb
29		Twitter	29	15302.406 kb		15837.000 kb
30		Twitter	30	15088.688 kb		15837.000 kb
31		Twitter	31	16156.484 kb		15837.000 kb
		Twitter	Couldn't obtain data for instances greater than 31			
		Twitter				
		Twitter				
		Twitter				
		Twitter				
		Twitter				

ii) Test 2

Test #	Date	App	Test Variable (Tweets)	Memory	File Size	2629.255
1	11/17/09	Twitter	10	5793.734 kb	15.492 kb	206.000 kb
2		Twitter	15	7953.938 kb	23.212	448.000 kb
3		Twitter	20	16464.016 kb	30.93164	1583.000 kb
4		Twitter	25	5393.813 kb	38.651	162.000 kb
5		Twitter	30	13949.422 kb	46.371	3957.000 kb
6		Twitter	35	6764.281 kb	54.09	3077.000 kb
7		Twitter	40	7433.781 kb	61.811	1808.000 kb
8		Twitter	45	19107.906 kb	69.53	2373.000 kb
9		Twitter	50	8864.813 kb	77.25	2551.000 kb

10		Twitter	60	24585.966 kb	92.68945	2565.000 kb
11		Twitter	70	11592.766 kb	108.129	3690.000 kb
12		Twitter	80	32173.812 kb	123.568	4081.000 kb
13		Twitter	90	35843.797 kb	139.007	3168.000 kb
14		Twitter	100	39465.580 kb	154.449	4274.000 kb
15		Twitter	200	29279.360 kb	309.039	4335.000 kb
16		Twitter	300	53320.000 kb	463.629	1648.000 kb
17		Twitter	400	57918.280 kb	618.218	6734.000 kb
18		Twitter	500	103755.670 kb	772.808	3079.000 kb
19		Twitter	600	83926.440 kb	927.398	2505.000 kb
20		Twitter	700	201378.470 kb	1081.988	7970.000 kb
21		Twitter	800	112361.000 kb	1236.578	8672.000 kb
22		Twitter	900	193140.000 kb	1391.168	7827.000 kb
23		Twitter	1000	184328.780 kb	1545.759	7501.000 kb
24		Twitter	1100	195950.720 kb	1700.54	6965.000 kb
25		Twitter	1200	213351.900 kb	1855.33	5769.000 kb
26		Twitter	1300	197298.300 kb	2010.1152	4464.000 kb
27		Twitter	1400	235617.370 kb	2164.9	6501.000 kb
28		Twitter	1500	207312.470 kb	2319.685	4779.000 kb
29		Twitter	1600	220513.080 kb	2474.47	6980.000 kb
30		Twitter	1700	256313.450 kb	2629.2559	3840.000 kb
		Twitter	The application stopped responding after 1700 tweets			
		Twitter				
		Twitter				
		Twitter				

iii) Test 3

			Test Variables				
Test #	**Date**	**App**	**Instances**	**Tweets**	**Memory**	**File Size**	**Bandwidth**
1	11/17/09	Twitter	1	15	10709.000 kb	23.212 kb	7923.000 kb
2		Twitter	2		9914.344 kb		23769.000 kb
3		Twitter	3		12052.188 kb		11884.000 kb
4		Twitter	4		12061.500 kb		23769.000 kb
5		Twitter	5		12671.320 kb		23769.000 kb
6		Twitter	1	20	12578.000 kb	30.93146	10558.000 kb
7		Twitter	2		13103.969 kb		15837.000 kb
8		Twitter	3		16160.344 kb		15837.000 kb
9		Twitter	4		16161.078 kb		15837.000 kb
10		Twitter	5		15888.813 kb		15837.000 kb
11		Twitter	1	25	13193.000 kb	38.651136	13193.000 kb
12		Twitter	2		19789.000 kb		19789.000 kb

13		Twitter	3		Resource Depletion Error		
14		Twitter	4				
15		Twitter	5				
16		Twitter	1	30	11871.000 kb	46.371094	11871.000 kb
17		Twitter	2		23742.000 kb		23742.000 kb
18		Twitter	3		Resource Depletion Error		
19		Twitter	4				
20		Twitter	5				
21		Twitter	1	35	13847.000 kb	54.09082	13847.000 kb
22		Twitter	2		18463.000 kb		18463.000 kb
23		Twitter	3		Resource Depletion Error		
24		Twitter	4				
25		Twitter	5				
26		Twitter	1	40	15823.000 kb	61.810547	15823.000 kb
27		Twitter	2		21098.000 kb		21098.000 kb
28		Twitter	3		Resource Depletion Error		
29		Twitter	4				
30		Twitter	5				

512 MB test result

i) Test1

Test #	Date	App	Test Variable (Instances)	Memory	File Size	Bandwidth
1	11/14/09	Twitter	1	16898.594KB	30.93164KB	6334Kbps
2		Twitter	2	13740.3125KB		4524Kbps
3		Twitter	3	15429.0KB		6334Kbps
4		Twitter	4	16545.25KB		6334Kbps
5		Twitter	5	16063.094KB		6334Kbps
6		Twitter	6	16552.656KB		4524Kbps
7		Twitter	7	15606.1875KB		7918Kbps
8		Twitter	8	16508.562KB		3959Kbps
9		Twitter	9	16540.937KB		7918Kbps
10		Twitter	10	15525.344KB		6334Kbps
11		Twitter	11	15447.5KB		3959Kbps
12		Twitter	12	15476.406KB		7918Kbps
13		Twitter	13	16551.312KB		6334Kbps
14		Twitter	14	15430.531KB		5279Kbps
15		Twitter	15	16549.312KB		6334Kbps
16		Twitter	16	15420.781KB		6334Kbps

17		Twitter	17	16516.344KB		2879Kbps
18		Twitter	18	16579.344KB		2639Kbps
19		Twitter	19	16571.594KB		2879Kbps
20		Twitter	20	16647.187KB		2436Kbps
21		Twitter	21	16563.0KB		2111Kbps
22		Twitter	22	16555.969KB		2639Kbps
23		Twitter	23	12692.469KB		3519Kbps
24		Twitter	24	15275.531KB		3959Kbps
25		Twitter	25	16557.187KB		3519Kbps
26		Twitter	26	9075.031KB		3519Kbps
27		Twitter	27	16553.75KB		3167Kbps
28		Twitter	28	15463.844KB		3959Kbps
29		Twitter	29	15281.25KB		1979Kbps
30		Twitter	30	16561.031KB		2639Kbps
31		Twitter	31	16560.0KB		2262Kbps
		Twitter	32	After 31, the program runs okay, however the screen gets messed up, I cannot read from the screen, I attached the screenshot in the email		
		Twitter	33			
		Twitter	34			
		Twitter	35			
		Twitter	36			
		Twitter	37			
		Twitter	38			
		Twitter	39			

ii) Test 2

Test #	Date	App	Test Variable (Tweets)	Memory	File Size	Bandwidth	Remarks	
1	11/14/09	Twitter	10	6176.4375KB	15.4921873KB	7932Kbps		
2		Twitter	15	8079.1562KB	23.211914KB	11884Kbps		
3		Twitter	20	9728.125KB	30.93164KB	7918Kbps		
4		Twitter	25	11636.8125KB	38.651367KB	9894Kbps		
5		Twitter	30	13724.4375KB	46.371094KB	5935Kbps		
6		Twitter	35	15486.656KB	54.090828KB	11077Kbps		
7		Twitter	40	17423.0KB	61.810547KB	9042Kbps		
8		Twitter	45	18946.75KB	69.53027KB	11855Kbps		
9		Twitter	50	21171.594KB	77.25KB	8789Kbps	Resource Depletion Error after running	
10		Twitter	100	39508.625KB	154.44922KB	11296Kbps		
11		Twitter	200	29241.187KB	309.03906KB	10912Kbps		
12		Twitter	300	57301.625KB	463.6289KB	15314Kbps		

13		Twitter	400	96676.59KB	618.21875KB	8116Kbps		
14		Twitter	500	89551.97KB	772.8086KB	9310Kbps		
15		Twitter	1000	330956.87KB	1545.7598KB	10278Kbps		takes more than 10 sec to retrieve data
16		Twitter	1500	330876.62KB	2319.6855KB	11311Kbps		
17		Twitter	2000	276142.62KB	3093.6113KB	10848Kbps		
18		Twitter	2500	502254.7KB	3867.537KB	10394Kbps		
19		Twitter	3000	494794.72KB	4641.463KB	9430Kbps		
20		Twitter	3100	432673.5KB	4796.248KB	11162Kbps		
21		Twitter	3200	487832.94KB	4951.033KB	11929Kbps		
22		Twitter	3300	509441.12KB	5105.8184KB	10498Kbps		
23		Twitter	3400	472403.75KB	5260.6035KB	10144Kbps		
24		Twitter	3500	481713.87KB	5415.3887KB	8215Kbps		
		No Response from the program beyond 3500 tweets						

iii) Test 3

			Test Variables				
Test #	**Date**	**App**	**Instances**	**Tweets**	**Memory**	**File Size**	**Bandwidth**
1	11/14/09	Twitter	1	10	6150.1875KB	15.4921875KB	7932Kbps
		Twitter	2	10	8384.969KB		7932Kbps
		Twitter	3	10	9814.125KB		7932Kbps
		Twitter	4	10	10074.6875KB		5288Kbps
		Twitter	5	10	10062.25KB		7932Kbps
2	11/14/09	Twitter	1	15	11059.5KB	23.211914KB	3961Kbps
		Twitter	2	15	11216.1875KB		7923Kbps
		Twitter	3	15	12039.78KB		7923Kbps
		Twitter	4	15	13297.6875KB		11884Kbps
		Twitter	5	15	12222.9375KB		7923Kbps
3	11/14/09	Twitter	1	20	9979.656KB	30.93164KB	10558Kbps
		Twitter	2	20	13748.219KB		4524Kbps
		Twitter	3	20	16509.344KB		7918Kbps
		Twitter	4	20	17198.906KB		4524Kbps
		Twitter	5	20	15253.0KB		10558Kbps
4	11/14/09	Twitter	1	25	11744.25KB	38.651367KB	13193Kbps
		Twitter	2	25	16235.094KB		9894Kbps
		Twitter	3	25	Resource Depletion Error		
		Twitter	4	25			
		Twitter	5	25			
5	11/14/09	Twitter	1	30	13654.594KB	46.371094KB	6783Kbps

		Twitter	2	30	18808.156KB		7914Kbps
		Twitter	3	30	Resource Depletion Error		
		Twitter	4	30			
		Twitter	5	30			
6	11/14/09	Twitter	1	35	15606.5KB	54.09082KB	5035Kbps
		Twitter	2	35	21339.219KB		9231Kbps
		Twitter	3	35	Resource Depletion Error		
		Twitter	4	35			
		Twitter	5	35			
7	11/14/09	Twitter	1	40	17424.0KB	61.810547KB	7032Kbps
		Twitter	2	40	23879.375KB		7911Kbps
		Twitter	3	40	Resource Depletion Error		
		Twitter	4	40			
		Twitter	5	40			

CONCLUSIONS

In this project our mission was to develop widgets applications for Tru2way platform, and to identify metrics that affect the performance of the widgets, such as memory usage, bandwidth usage and file size. The team has faced some obstacles such as, lack of documentation, availability of a decent emulator. However, as soon as we had a reliable emulator available, the programming team developed a twitter application. Also, the testing team was able to come up with a testing plan that contains different scenarios to test the performance of the widget.