

## Laboratory Notes for Homework 7

Table 1. Report for Improvements Through Profiling  
*Big* – sandmark.umz, *Medium* – partial advent.umz, *Small* – midmark.um

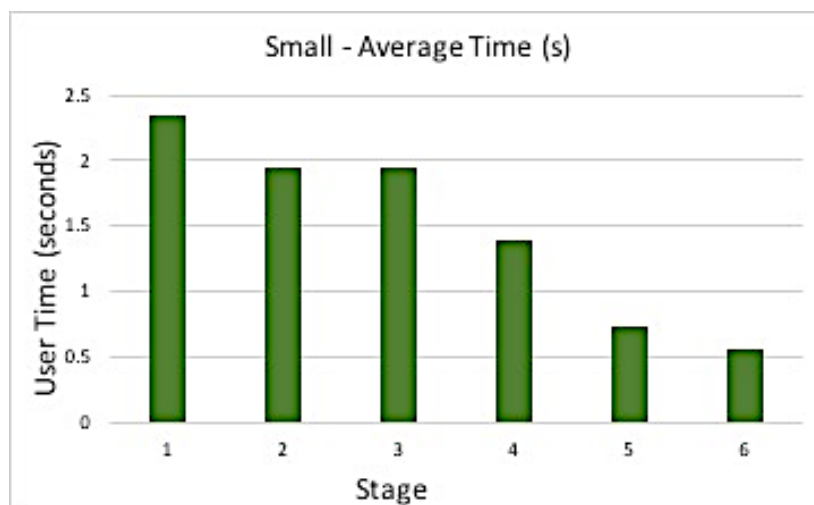
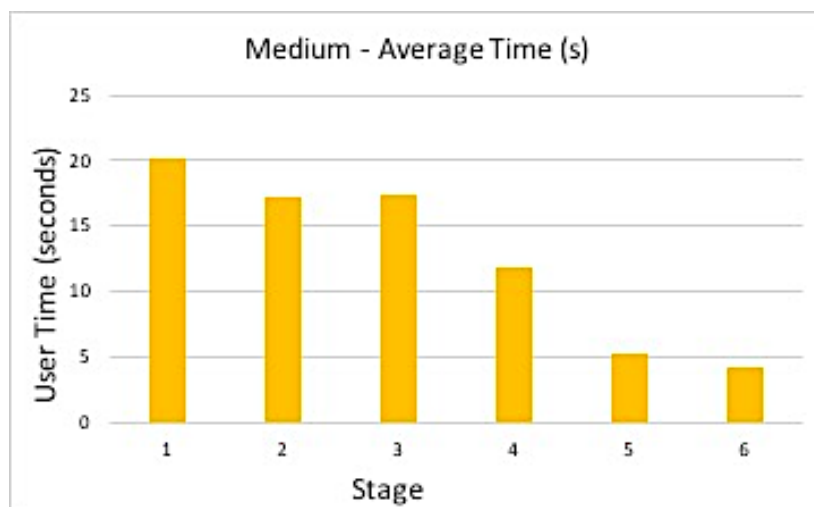
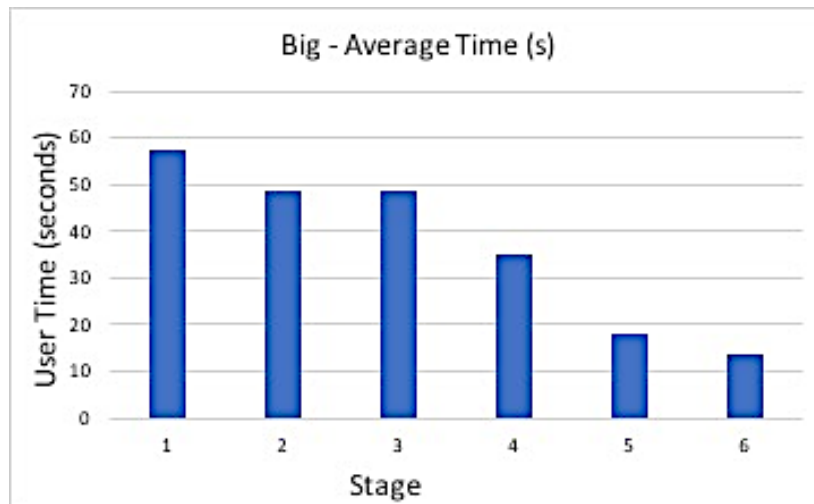
Benchmark	Run 1 Time (s)	Run 2 Time (s)	Run 3 Time (s)	Avg Time (s)	Instructions	Rel to Start	Rel to Prev	Improvement	Bottleneck	Stage
<b>Big</b>	60.46	56.06	56.04	<b>57.52</b>		1.000	1.000			
<b>Medium</b>	20.51	20.23	19.54	<b>20.09</b>		1.000	1.000	No improvement (starting point)	Bitpack_getu	1
<b>Small</b>	2.61	2.22	2.22	<b>2.35</b>	2.39E+10	1.000	1.000			
<b>Big</b>	48.61	48.83	48.46	<b>48.63</b>		0.846	0.846			
<b>Medium</b>	17.1	17.08	17.23	<b>17.14</b>		0.853	0.853	Compiled with optimization flag -O1 and linked against -lcii-O1	Bitpack_getu	2
<b>Small</b>	1.94	1.93	1.95	<b>1.94</b>	2.22E+10	0.826	0.826			
<b>Big</b>	48.32	48.79	48.46	<b>48.52</b>		0.844	0.998			
<b>Medium</b>	17.11	17.26	17.63	<b>17.33</b>		0.863	1.011	Compiled with optimization flag -O2 and linked against -lcii-O2	Bitpack_getu	3
<b>Small</b>	1.93	1.95	1.95	<b>1.94</b>	2.22E+10	0.827	1.002			
<b>Big</b>	35.16	35.06	35.02	<b>35.08</b>		0.610	0.723	Eliminated function call to bitpack_getu. Created smaller version of bitpack_getus using local variables for mask and shift values. This removes assertions found in bitpack, and allows the use of static mask and shift values.	Seq_get, UArray_at	4
<b>Medium</b>	11.79	11.76	11.82	<b>11.79</b>		0.587	0.680			
<b>Small</b>	1.39	1.38	1.39	<b>1.39</b>	1.04E+10	0.590	0.714			

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<i>Benchmark</i>	<i>Run 1 Time (s)</i>	<i>Run 2 Time (s)</i>	<i>Run 3 Time (s)</i>	<i>Avg Time (s)</i>	<i>Instructions</i>	<i>Rel to Start</i>	<i>Rel to Prev</i>	<i>Improvement</i>	<i>Bottleneck</i>	<i>Stage</i>
<b>Big</b>	18.29	18.39	18.15	<b>18.28</b>		0.318	0.521	Changed the program_counter to point to the next index directly. This was achieved by incrementing the program_counter by +1, rather than extracting the array from the sequence at each subsequent word.	segmented_load, segmented_store	5
<b>Medium</b>	5.24	5.26	5.26	<b>5.25</b>		0.261	0.446			
<b>Small</b>	0.72	0.76	0.73	<b>0.74</b>	6.94E+09	0.313	0.531			
<b>Big</b>	13.89	13.9	13.9	<b>13.90</b>		0.242	0.760	Removed temporary variables for Seq_get and Uarray_at pairs, removed function calls by integrating all instruction functions into one primary function	Seq_get, UArray_at	6
<b>Medium</b>	4.32	4.16	4.17	<b>4.22</b>		0.210	0.803			
<b>Small</b>	0.55	0.55	0.55	<b>0.55</b>	6.12E+09	0.234	0.747			

*See next page for visual representations.*

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