CIS*3090 – Assignment 2 Report

Raw Test Results

Decryption timed by using: time mpiexec -n numProcesses ./a2decrypt

# of Unique Characters	inputString	Real Time (seconds)
3	banana	0.961
4	apple	1.046
5	laptop	1.318
6	slipper	2.886
7	journey	15.540
8	sandwich	111.545

# of Unique Characters	inputString	Real Time (seconds)
3	eat tea	1.141
4	at ten	1.544
5	the cat	2.172
6	dog tags	8.397
7	mix match	31.616
8	pink dots	164.262

# of Unique Characters	inputString	Real Time (seconds)
3	eat ate tea	1.267
4	sea saw see	1.432
5	dog got tag	3.010
6	cat nip pat	9.857
7	tip top cab	48.126
8	bit the mop	334.010

Graph of Results
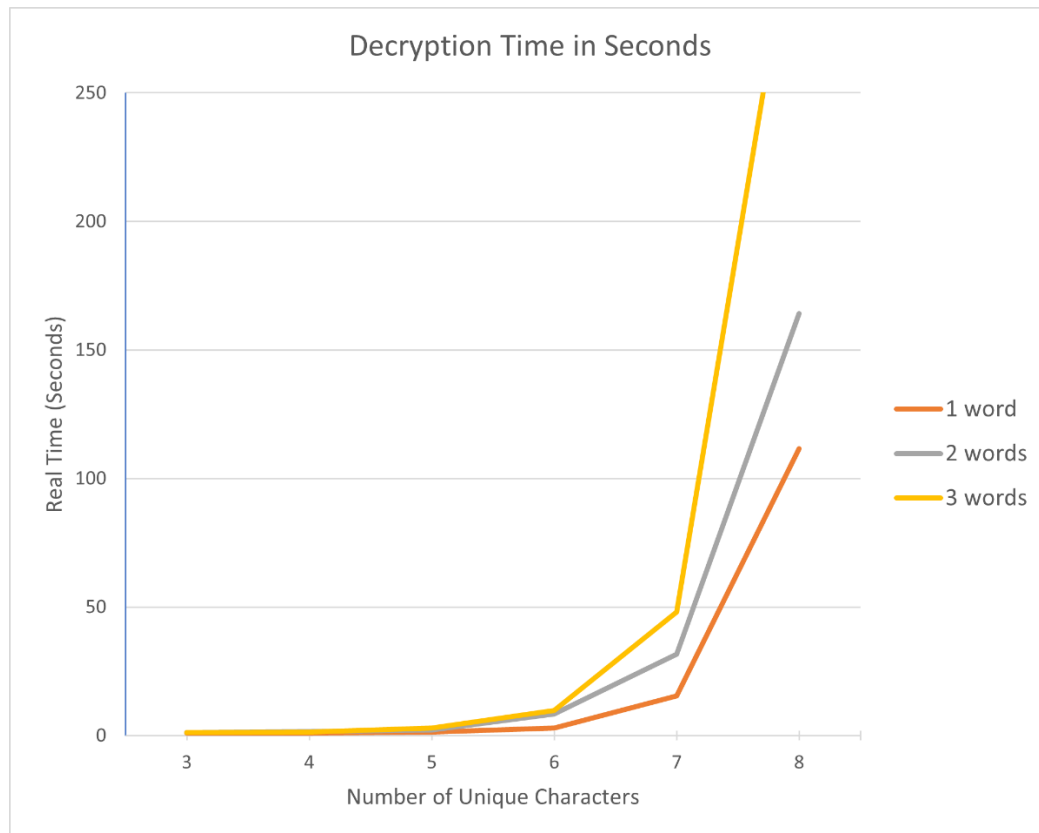
Analysis

I did 3 experiments with each number of unique characters to try and keep variables such as word length and number of words similar between runs in order to have a fair comparison. As I expected the algorithm is slower as more words are added since it takes longer to valid each word using the dictionary. However regardless of the number of words, the maximum alphabet size appears to be 7 unique characters. Any greater than this and the program takes over a minute to run and increases exponentially. Since each process needs to check all the permutations starting with a specific character the complexity is roughly $O((n-1)!)$.