

CSCI 2 – Assignment 7

Linked List of Frequency of All Letters

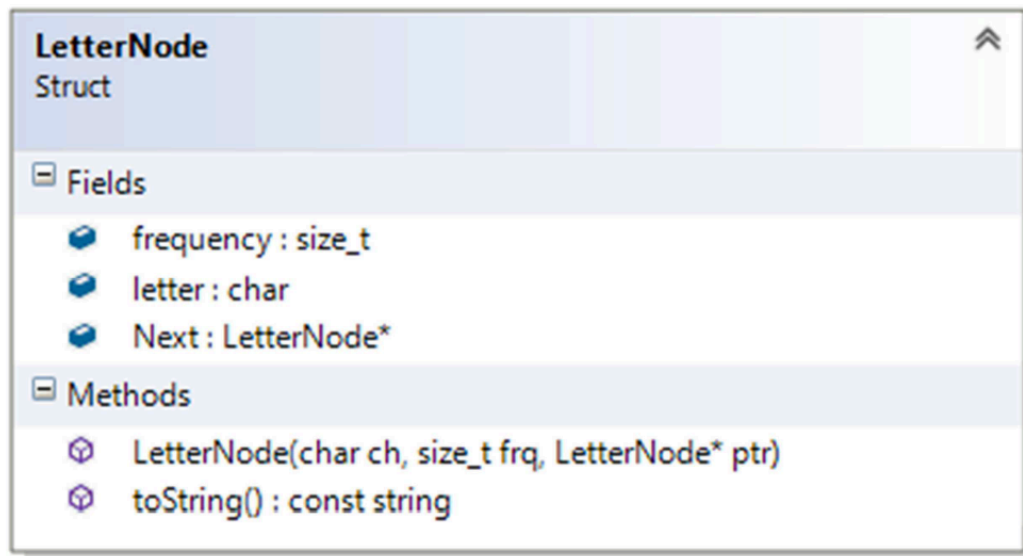
Assignment Description

One simple form of encryption is to replace every alphabet in an English text by any other alphabet. For example, one encryption scheme can be to replace characters in a text file as follows (case ignored):

a = c, b = d, c = e, d = f.....x = z, y = a, z = b. To break this encryption one can analyze a typical text of English writing and see, as to which letters occur at what frequency, and then analyze the encrypted text for the frequency of letters. By comparing the frequency of letters in encrypted and non-encrypted texts, one can break the encryption code designed above. In this assignment your program would do the followings:

1. Read a given text file character by character.
2. If the character is a letter and that letter is being read for the first time, then it is added in-order (meaning in alphabetical order) to a Letter Frequency linked list as a letter node. Design of letter node is given shortly. Be sure to add letter as an uppercase letter only to ignore case sensitivity.
3. However, if letter has already been read in previous lines then program just updates (increases) its frequency in its node by one.
4. Finally program prints the Letter frequency linked list to console and an output file.

The UML diagram below shows the design of LetterNode.

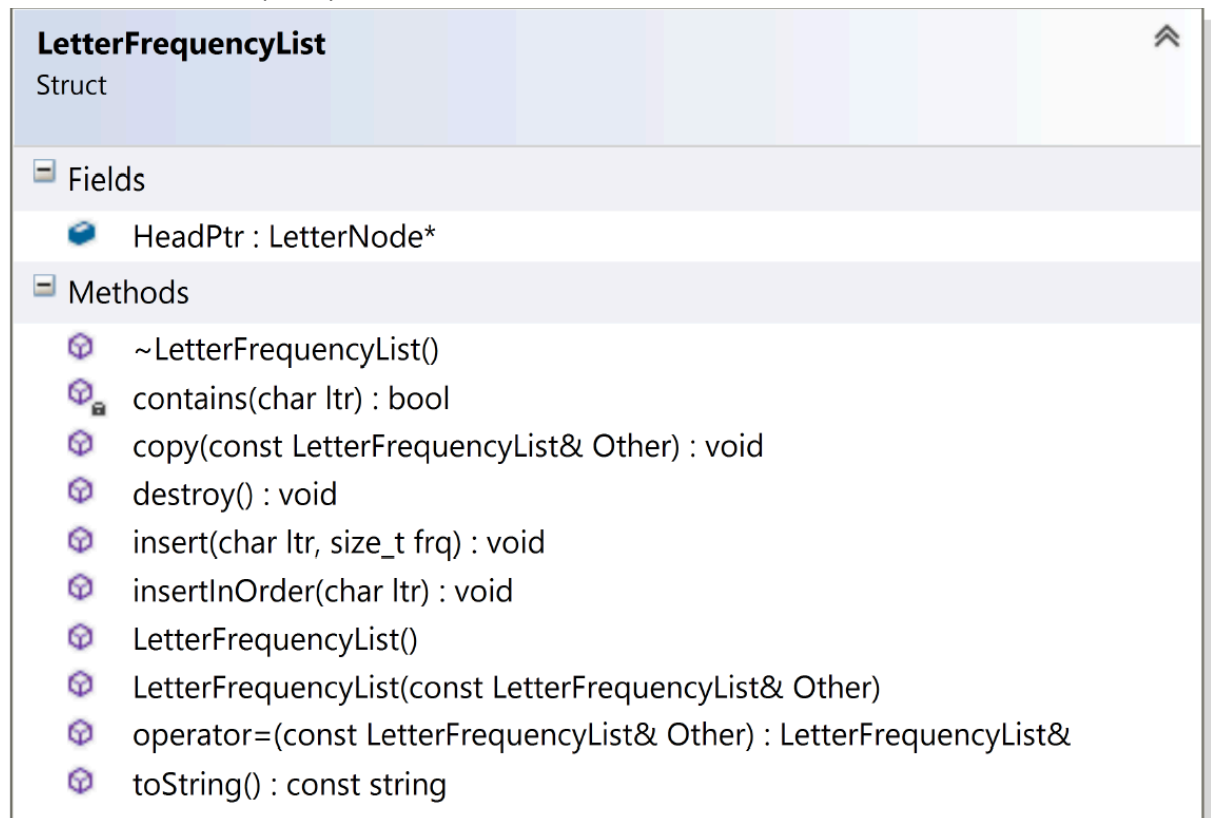


In LetterNode letter is the field that can contain letters A to Z, and frequency field would contain as to how many times the letter was present in the input text file. Next is the usual pointer field to next node in the linked list.

Followings are not allowed in this program:

1. Use of arrays in any shape or form is not allowed.
2. It is not allowed that program first adds 26 nodes to linked list (A to Z) with each node having a zero frequency and then program only updates the frequency as it reads the file. Instead a function has to be designed so that a letter node is added when that letter is read for the first time in the file. [At that time frequency field is set to 1]. If that letter is read again, then in its node the frequency field is incremented by 1.

The UML diagram below shows the suggested design of LetterFrequencyList class (or struct) that is a linked list of frequency of letters in a text file.



All functions except contains are required. The contains function is an optional private function that returns true if letter ltr is present in the LetterFrequencyList. Otherwise it returns false. Contains function can be called from inside the function **insertInOrder** function as a helper function. The function insertInOrder works as follows:

1. If letter is **NOT** present in the linked list then it adds it as a **LetterNode** in such order that linked list stays sorted in ascending order (from front to back) at all times. Naturally when a letter node is being added for the first time, its frequency of occurrence is one.
2. If letter node is already present in the list then function only increment its frequency field by one.

All other functions, constructors, and destructor have usual meaning that you have been exposed to in examples we did on linked lists.

The file text file below was tested by the program that I wrote. The output is shown after the text file. This file is being provided.

A previously undisclosed Pentagon report concluded that the three terrorism suspects held at a brig in South Carolina were subjected to months of isolation, and it warned that their "unique" solitary confinement could be viewed as violating U.S. detention standards.

According to a summary of the 2004 report obtained by The Washington Post, interrogators attempted to deprive one detainee, Ali Saleh Kahlah al-Marri, a Qatari citizen and former student in Peoria, Ill., of sleep and religious comfort by taking away his Koran, warm food, mattresses and pillow as part of an interrogation plan approved by the high-level Joint Forces Command.

Interrogators also prevented the International Committee of the Red Cross from visiting at least one detainee, according to the report, which noted evidence of other unspecified, unauthorized interrogation techniques.

The report by the Navy's inspector general was presented to Defense Secretary Donald H. Rumsfeld in May 2004 and was declassified in 2005. It was the first to raise the question of mistreatment of alleged enemy combatants inside the United States.

Its details about conditions at the Navy brig in 2004 could prove critical to the fate of two of the "enemy combatant" detainees who spent years in the prison: Marri, the only one of the three who remains there and is facing the prospect of a special military trial, and Jose Padilla, a Brooklyn-born U.S. citizen now facing criminal charges in Miami.

Attorneys for Padilla have argued in recent court filings that any abusive interrogation methods used on their client may mean that his statements to government agents were coerced and, therefore, inadmissible in his trial. He is accused of engaging in a conspiracy to kill U.S. citizens and provide material support to terrorists abroad.

The attorneys told a federal judge in Florida yesterday that they have a right to learn about those interrogation methods, and they recently sought to subpoena Brig. Gen. Daryl D. Thiessen, the deputy inspector general who made the findings after inspecting the brig, and other senior military officers who worked at the prison. The attorneys said Padilla spent 1,307 days in a 9-by-7-foot cell in an isolated unit, was often chained to the ground for hours by his wrists and torso, and was kept awake at night by guards using bright lights and loud noises.

Prosecutors asked the judge to quash the subpoenas, arguing that Padilla's

attorneys are making "meritless" and "sensationalist" claims to turn the court's attention away from his alleged misconduct. In previous filings, the government decried the "absurdity of Padilla's assertion" that he was abused, noting that the government was "conscientious enough to tend to his toothache."

Marri remains at the brig awaiting an appeals court ruling on whether he will be tried in a U.S. court or by a military commission, as the government requested last month. He sued the government last year over the conditions of his confinement, alleging that for 16 months in 2003 and 2004, he had been barred from contact with anyone but guards delivering food, causing his mental state to deteriorate.

Thiessen wrote in his summary that the Joint Forces Command had approved that "one detainee in Charleston has Koran, mattress, and pillow removed and is fed cold MRES as part of interrogation plan." He also noted concerns about isolation: "Limited number and unique status of detainees in Charleston precludes interaction with other detainees. Argument could be made that this constitutes isolation."

Extended solitary confinement can be considered a form of inhumane treatment. In 2003, Rumsfeld specified the use of isolation as an interrogation tactic, but he cautioned that its use required detailed plans and approvals from superiors for the length of time. His memo warned that use of isolation for more than 30 days was atypical, and that nations that consider detainees subject to prisoner-of-war protections may view this technique as "inconsistent with the requirements of Geneva [Article] III."

"What you're describing confirms what we said in our complaint," said Jonathan Hafetz of the Brennan Center for Justice and an attorney for Marri, when asked to review the summary findings. "There were periods of time when al-Marri felt he was losing his mind. He went months without hearing a human voice. . . . And these weren't rogue officers, but it was part of a deliberate violation of the laws of the U.S. by the top levels of the administration."

Padilla's attorneys -- Orlando do Campo, Andrew Patel and Michael Caruso -- did not return calls seeking comment or declined to comment. Federal prosecutors also declined to comment. A hearing is expected soon on whether Padilla's attorneys can question military officials about his treatment and the conditions at the brig.

A Pentagon spokesman, Navy Cmdr. J.D. Gordon, said multiple reviews of detention operations have not found policies that condoned abuse and have led to more consistent policies to prevent abuse.

"The reviews have resulted in numerous recommendations which have been implemented and have improved our detention operations," he said. "The Department of Defense policy is clear: We treat detainees humanely."

Thiessen's report is part of a larger review by Vice Adm. Albert T. Church III, then the Navy's inspector general. Rumsfeld ordered the wide-ranging military investigation to determine whether any interrogation policy for terrorism suspects had caused detainee abuse in U.S. military detention facilities.

The output from printing the linked list of frequency of all letters from this file is below.

Letter A occurred: 383 times.
Letter B occurred: 53 times.
Letter C occurred: 134 times.
Letter D occurred: 200 times.
Letter E occurred: 537 times.
Letter F occurred: 89 times.
Letter G occurred: 85 times.
Letter H occurred: 188 times.
Letter I occurred: 363 times.
Letter J occurred: 10 times.
Letter K occurred: 14 times.
Letter L occurred: 151 times.
Letter M occurred: 121 times.
Letter N occurred: 363 times.
Letter O occurred: 345 times.
Letter P occurred: 89 times.
Letter Q occurred: 11 times.
Letter R occurred: 296 times.
Letter S occurred: 294 times.
Letter T occurred: 454 times.
Letter U occurred: 114 times.
Letter V occurred: 47 times.
Letter W occurred: 60 times.
Letter X occurred: 2 times.
Letter Y occurred: 64 times.
Letter Z occurred: 5 times.