

Exam2 - programming

Due Jun 15 by 6pm **Points** 50 **Submitting** a file upload

Available Jun 15 at 2:30pm - Jun 15 at 6pm about 4 hours

This assignment was locked Jun 15 at 6pm.

Count unique words

In this task we implement a *dictionary* data structure which is able to assign a number to a string. In some other languages like C++ or Java these are also called *maps* because these are mapping some keys to some values. We'll use this data structure for determining the multiplicity of the words in a file.

Implementation of a map

Define a macro token named `WORD_BUFFER_SIZE` with value 32.

Create a structure `Pair` with the following attributes:

- `str`: A character array of `WORD_BUFFER_SIZE` elements.
- `num`: An integer which is mapped to the string.

Create a structure `Map` with the following attributes:

- `items`: An array of `Pair` objects stored in heap memory.
- `size`: The length of the array.

Implement the following operations. These functions shouldn't print anything except for `print()`.

- `init()`: This function gets a `Map` as parameter and initializes it so the array length is 0 and `items` is a `NULL` pointer.
- `dest()`: Destructs the map, i.e. deallocates `items` array from the heap.
- `find()`: This function gets a `Map` and a string as parameter and finds this string in the map. The function returns a pointer to a `Pair` of which the `str` attribute is the string to find. If the string is not found in the data structure then `NULL` returns.
- `set()`: This function gets a `Map`, a string and an integer as parameter. Create a `Pair` with these and insert them to the map. After the insertion the array size increments by 1. We know that this is the least efficient way of implementing a map, but for sake of simplicity we choose this representation. Make sure to have the string only once in the map. If the string is in the map already then the assigned integer is overwritten.
- `get()`: This function gets a string as parameter and returns the integer assigned to that string. If the string is not in the map then insert it first with 0 and return this number.
- `print()`: Print the string-int pairs according to the output format below.

Read a file

Read the content of a text file word by word. You may assume that no word in the processed file is longer than `WORD_BUFFER_SIZE` including the `\0` terminator. Count the occurrences of each word using the `Map` data structure.

Input

```
apple orange apple peach pear
pear pear orange peach orange
```

Output

```
apple -> 2
orange -> 3
peach -> 2
pear -> 3
```

Modularity

Separate the program to translation units. Function definitions should go to separate translation units to which a header file belongs. Don't forget header guards.