Presentation

Which data structure(s) did you use for part 1? Why did you select these data structures?

For the first part of the project, I used the Trie data structure, since this data structure is best suited for implementing the search for all possible variants of a given prefix, as well as for implementing a dictionary (associative array), the keys of which are strings
Trie provides the fastest string key search.
The search time does not depend on the number of elements in the dictionary, but depends only on the length of the string key.
No additional memory is used to store keys (keys are not stored in nodes)
Unlike hash tables, there are no collisions.
In addition to all of the above, this data structure was not mentioned in the lessons,
and for me it was a challenging case.

What is the runtime (in asymptotic notation) of searching for a food type? Do you think there is a more efficient runtime?

The runtime (in asymptotic notation) of searching for a food type in a Trie structure is O(n)
where 'n' is the length of the key. For searching all possible variants of a given prefix we hardly can find more efficient data structure then Trie

Which data structures did you use for part 2? Why did you select these data structures?

For this project I've selected a Hash Map. A Hash Map with a linked list separate chaining strategy.
In our case, when data from numerous restaurants are associated with one particular type of food, this data structure is best suited.

What is the runtime (in asymptotic notation) of retrieving the restaurant data.

In a worst case we will have some collisions and iterate through all Linked Lists and in such a case we will get runtime O(N)
In the best case, when not a single collision occurred, and therefore in one slot there are restaurants of only one type of food, we will get the runtime O (1).

Outside of this project, what are other innovative ways you can utilize data structures?

In the real world, we deal with data structures all the time and how we store and organize our data is of great importance in our life.
For example, an autocomplete systems, spell checkers, T9 systems and electronic dictionaries of any languages can effectively utilize the Trie data structure.
But of course, the most promising data structure is Graph. First of all - this is a logistic.
The task of finding ways and methods to optimally and quickly deliver cargos, goods, passengers, etc. to the destinations.
Another example can be logistics of the movement of documents and accounting paperwork.
Graphs everywhere around us. A road maps, flight routings, railway schemes.
When developing complex electrical circuits and their wiring diagrams and many other useful things.