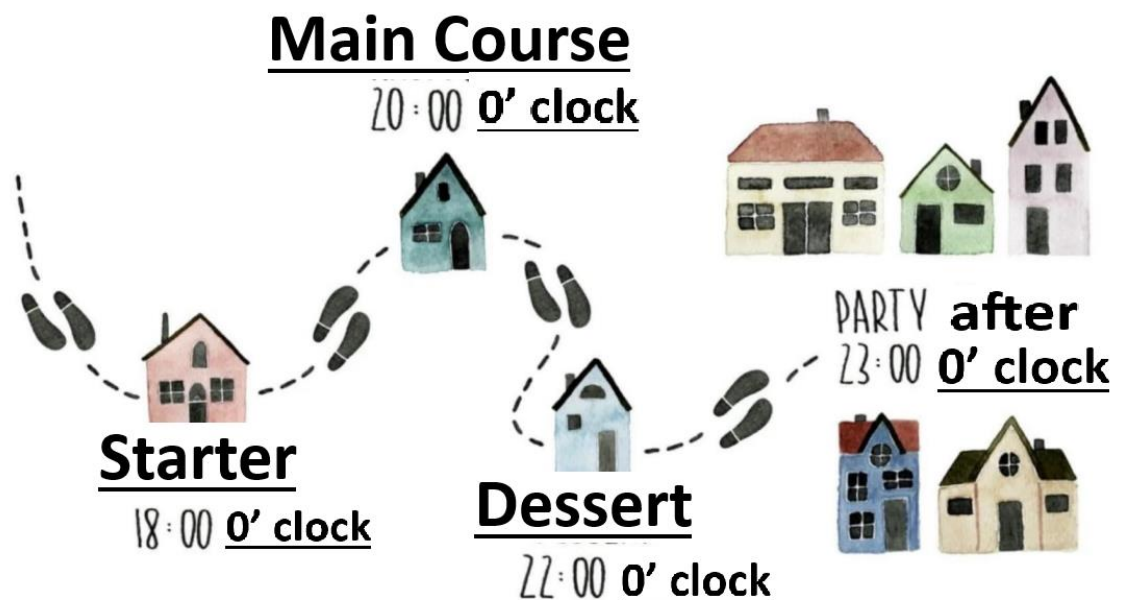# Goal of the project:

- A three-course menu through your city

- From the data of all registered Participants will be put together as suitable cooking teams as possible.

Main Course
20:00 O' clock

Starter
18:00 O' clock

Dessert
22:00 O' clock

PARTY **after**
23:00 O' clock

- _____

The Spinfood Principal:

- The cooking teams should fit together in the best way possible.

- Meat lovers should not be paired with veggies or vegans

- Gender Diversity

- Age difference should be minimal

- New composition for each course (starter, main course, dessert)

- Not too long distances between the courses. (paths)

Goal of the internship:

- The list of participants consists of individuals and Pair.

- Tasks:
    - assign individuals in pairs as the best way possible.

○ Match the pairs as closely as possible to groups of three Put pairs together in each course

○ Take account of the ones left behind (successor) and unsubscribers.

○ An intuitive graphical interface for comparing different configurations.

1 General description

Depending on the ticket, two cooking partners will create the starter, the main course or the dessert. They receive their guests in one of their kitchens and move from corridor to corridor to new cooking teams, who also welcome them to their apartments.

The two cooking partners always stay together, but meet new teams with every course. So for each course there is a new group of cooking teams that dine together. Finally, the entire spin food community meets again at the after dinner party.

Two cooking partners can either register together or suitable participants will be drawn. The lot also decides on the course in the menu.

Each cooking team is sent their personal dinner route and all relevant information a few days before the start of the event. Whether vegan, vegetarian or with meat, there is something for everyone.

2 Objective

As part of the software project, an application software is to be developed that receives the data of all registered participants and uses it to put together the most suitable cooking teams and groups. The data of all participants are available in a .csv file. All individual registrations should first be made into pairs and then into groups with the other couples. In order to achieve the highest possible degree of satisfaction and fun among the participants, a number of important criteria must be observed (see section 5), which form the core of this task. The aim of the task is therefore to develop a strategy for putting together the pairs and groups that optimally fulfills the criteria listed below. The software should have a graphical interface with which the importance of the criteria can be set, combinations can be calculated and calculated combinations can be compared.

3 definitions

Age difference The age difference between the persons in a couple is the absolute value of the difference in the numerical values assigned to their age groups (eg 26-year-old person and 32-year-old person: $4 ÷ 2 = 2$). The (average) age difference of a group, list of couples or a list of groups is the sum of all age differences of the couples in relation to the number of couples involved. The age difference should be as small as possible.

Gender diversity The gender diversity of a list of couples or groups is as follows: The ratio of women to men in a list entry (group or couple) is the ratio of the number of women to the total number of people, ideally 0.5. The absolute deviation from this ideal ratio is recorded for each entry in the list. The gender diversity of the list results from the sum of these deviations in relation to the number of list entries. This sum should be as small as possible.

Group (Group) A group consists of three different pairs. A group, ie three couples, meets for each course. After each course there is a new compilation of all groups. This means that a couple meets two new couples in every aisle. No couple sees another couple twice. A couple gets to know two couples with the starter, two new couples with the main course and two new couples with dessert. A couple has met six couples over all courses. That is what makes the event so appealing.

A group is *valid* if it consists only of valid couples and the following applies: All food preference requirements have been met and there is no second group containing two of the same couples. (This is to check that two couples don't meet in two different aisles.)

Group key figures In order to define the quality of a group list, the following key figures are recorded for the group list: number of groups in the list, number of couples moving up, gender diversity, age difference, preference deviation and distance.

Group List A group list consists of valid groups.

Successor The cooking event is limited to a maximum number of participants. If more people register, some will not be included in the compilation. These become substitutes in the event that participants cancel before the event. It can also happen that not all participants can be included in the pair or group composition. These too will become followers.

Couple (Pair) A couple is two participants. You can register alone or in pairs. Participants who register alone will be paired as best as possible with the criteria below. A couple hosts one course of the menu and visits other couples for the other two courses.

A couple is *valid* if the following applies: All conditions regarding food preferences have been met and there is at least one kitchen. Two participants can only register as a couple if this couple is valid.

Couple metrics In order to define the quality of a couples list, the following metrics for the couples list are recorded: number of couples in the list, number of follow-up participants, gender diversity, age difference, and preference deviation.

Pair List A pair list consists of valid pairs.

Participants All registered persons are participants. Your data, which you must provide when registering, will be recorded in the data format specified below.

Preference deviation A couple's preference deviation is calculated as the absolute value of the difference in the numerical values assigned to the preferences of the two participants (eg vegan and veggie: 2 ÿ 1 = 1). The (average) preference deviation of a group, pair list or a group list is the sum of all preference deviations of the included couples in relation to the number of participating couples. The preference deviation should be as small as possible.

Path length The path length of a couple is the sum of the distances (as the crow flies) between the following cuisines: from appetizer to main course, from main course to dessert and from dessert to the after-dinner party. The path length of a group list is the sum of the path lengths of all pairs of the groups contained in the group list.

4 data format

The personal data of the participants in the .csv file has the following form:

- ID: Unique hash value

- Name: Full name of the participant

- FoodPreference: Food preference

    – none (value: 0)

    – meat (value: 0)

    – veggie (value: 1)

    – vegan (value: 2)

- Age: age

- Sex: Gender

    - female

    – male

    - other

- Kitchen: Will a kitchen be provided as the venue?

    – no: No kitchen available. So no willingness to host.

    – yes: kitchen available.

    – maybe: kitchen available, but should only be used if there is absolutely no other way (emergency kitchen)

- Kitchen_Story: Floor where the person lives. If no kitchen is specified for cooking (ie Kitchen = no), the value is also set to the floor on which the person resides.

- Kitchen_Longitude: Location coordinates of the place of residence. Only relevant if a kitchen is available.

- Kitchen_Latitude: Location coordinates of the place of residence. Only relevant if a kitchen is available.

In the case of couple registrations, the data of the second person (ID_2, Name_2, Age_2, Sex_2) is also recorded. For single registrations these fields are empty. ==While the food preference applies to both people when registering as a couple, the kitchen is only assigned to the first person!==

Two additional pieces of information are derived from the data:

- AgeRange: Age range of a person. The following age groups are defined:

  – 0-17 (value: 0)

  – 18-23 (value: 1)

  – 24-27 (value: 2)

  – 28-30 (value: 3)

  – 31-35 (value: 4)

  – 36-41 (value: 5)

  – 42-46 (value: 6)

  – 47-56 (value: 7)

  – 57 and older (value: 8)

- KitchenCount: Number of other registrations with the same location coordinates and the same floor. These may come from roommates in a flat-sharing community (WG).

5 criteria for putting together couples and groups

1. When assembling a couple, they are assigned a primary food preference. This results as follows: If the food preferences of the two participants are the same, this is also the main food preference. In the case of a meat lover (affectionately called Fleischi in the following) and Egali, Fleischi is the main preference. If a Fleischi/Egali is in a pair with a Veggie/Veganer, the Fleischi/Egali is inferior. A vegan and a veggie have vegans as their main meal. For a group's choice of dish is the main food preference

the group crucial. This also results from the main food preferences of the couples in the group in accordance with the above conditions. If all couples are egalis, then the preference of the group is Fleischi.

Of course, when putting together a pair, it makes no sense to assign a meatball to a vegan or veggie. Such combinations are therefore forbidden. So that not too many Fleischis/Egalis have to adapt, mixed groups can only have one Fleischi/Egali pair. The veggie/vegan couples must therefore form the majority.

2. Make sure that a couple dines with different couples in all three courses. That is, during the course of the evening one couple should dine with six other couples, with two other couples in each course. In addition, each couple has to cook exactly once in the evening.

3. Each cooking couple must have at least one kitchen. Since kitchens are always scarce, it should be avoided to form pairs in which both people could provide a kitchen. That would be a waste of kitchens, because only one kitchen is used per couple. Couples without kitchens are invalid as they cannot cook or receive guests.

4. Sometimes very large shared flats register at Spinfood. Overcrowding of the kitchen cannot be avoided if there are more than 3 registrations from a flat share, each providing a kitchen. For example, if there are 4 registrations from a flat share in which the kitchen is specified as usable, either the starter, main course or dessert will be doubled. Then it gets too cramped in the kitchens. A kitchen may ultimately never be used by more than 3 couples.

5. It is preferable to create pairs and groups with identical food preferences. If this does not work, the preferences should at least be as similar as possible. The difference in preferences between couples and groups should therefore be as small as possible. The Egalis group of people is particularly helpful here. They can be used as gap fillers and should preferably be combined with a Fleischi when forming pairs. Also when forming groups, Egali couples should preferably be in a group with Fleischi couples. Otherwise, there will be an increased number of cancellations shortly after the announcement of the composition of the couples and groups.

6. The age difference in pair formation should be minimized. For example, we want to prevent young women from being paired with significantly older men.

7. The sexes should be mixed if possible. This means that pairs with different sexes are preferably formed. Gender diversity should also be high in the groups.

8. The walking distance of a couple should be as small as possible, so that the walking times between the aisles are not so long. If possible, the walking direction from aisle to aisle should be in the direction of the after-dinner party. This means that if the after-dinner party is to take place in the city center, then the appetizers should be further away from the city center, the main courses a little closer and the desserts should tend to be closer to the city center. In this way, the participants get closer and closer to the after-dinner party from course to course.

9. Of course, it may not be possible under the given conditions to allocate a cooking partner to every participant. However, the number of people who do not get a partner should be minimised. The more assignments that come about, the better. It is to be expected that some participants will not be given a cooking partner. These people will be assigned to followers and as soon as other participants unsubscribe from the event.

Criteria 1 to 4 must always be met. Criteria 5 to 9 should be fulfilled as optimally as possible.

6 Product Environment

The application is aimed at the organizers of a spin food event. People who want to take part in an event register via the Spinfood website at. After the registration deadline, the organizers analyze the data of all registered persons and, while complying with the above criteria as best as possible, first put together couples and then groups for all courses of the menu. This analysis and compilation is to be carried out using the new application software to be created. The modification of this compilation due to cancellations and replacements should also be made possible.

7 Functional Requirements

Unless explicitly stated otherwise, the user of the application is assumed to be the actor for all specified requirements.

7.1 Formation of couples and groups

7.1.1 Setting the importance of the criteria Brief

description: The user can set how important criteria 5-9 should be when putting together pairs and groups.

Prerequisite: None.

Process: The user establishes an overall order for criteria 5-9, which shows their relative importance.

Post-condition: The importance of the criteria has been established and is taken into account when pairing and grouping are made.

7.1.2 Putting together couples Brief

description: The user can have couples put together from the list of all participants who have registered alone. The criteria given above are adhered to as closely as possible.

Prerequisite: There is a list of participants and the coordinates of the after-dinner party in .csv format.

Procedure: The user provides the list of participants and the file with the coordinates of the after-dinner party and starts the algorithm for pairing.

Postcondition: A list of valid pairs has been created. This also includes the couples who have already registered together. There may still be participants who are not organized in pairs. These are recorded in a list of replacements.

7.1.3 Putting together groups Brief

description: The user can have groups put together for the three courses from the list of all couples. The criteria specified above are adhered to as closely as possible.

Prerequisite: There is a list of couples, coordinates of the after-dinner party and a maximum number for the event.

Procedure: The user starts the algorithm for putting together the groups and gives it the list of couples, the coordinates of the after-dinner party and the maximum number.

Postcondition: A list of valid groups per gear has been created. There may be pairs left that are not organized into groups. These are recorded in a list of replacements.

7.1.4 Cancellation by Participants

Brief description: One or more assigned participants have canceled. Therefore, the couple and group lists have to be adjusted.

Prerequisite: There is a list of cancellations, a list for couples and a group, and a maximum number.

Procedure: It will be checked whether a participant who has canceled has registered alone. Then she will be replaced by a participant from the list of replacements, if possible. If two participants who have registered as a couple cancel together, this couple will be replaced by a moving couple or two individual participants, if possible. If a single declining participant has registered in a couple, the second person of this couple will be included in the list of successors for participants and another person will be found who can move up with them and form a valid couple. For this purpose, it should be possible to select an existing algorithm for putting together pairs. If a couple is successfully formed, it will be included in the list of successors for couples. If there is at least one couple in the replacement list for couples, an attempt is made to complete groups that have become incomplete. If there are at least three couples in the replacement list for couples and the maximum number has not yet been reached, an existing algorithm for forming new groups should be able to be applied to this list.

Postcondition: All lists have been updated consistently.

7.2 Visualization of the resulting pairs and groups and their manual change

7.2.1 Visualization of all pairs

Brief description: A list of pairs is presented visually.

Prerequisite: A list of participants and a matching list of couples are available. Also for this list there are the couple metrics.

Procedure: The pair list is presented visually as a table. It is enriched with information on the key figures. The participants who did not make it into a pair are also shown. All this information should help the organizers of the cooking event to analyze the assignment in pairs.

Postcondition: A table with the pair information is presented visually.

7.2.2 Visualization of all groups for all three gears

Brief description: A group list is presented visually.

Prerequisite: A couples list and a matching group list for all three courses are available. There are also group codes for this list.

Process: The group list is presented visually as a table. It is enriched with information on the key figures. The couples who did not make it into a group are also shown. All this information should help the organizers of the cooking event to analyze the assignment in groups.

Postcondition: A table with the group information is presented visually.

7.2.3 Comparison of two pairs lists

Short description: Two pairs lists are compared visually.

Prerequisite: Two lists of pairs and their key figures are available.

Procedure: Both lists of pairs are presented visually as tables in such a way that the differences are clearly highlighted using the key figures.

Postcondition: A table with the information on both pairs lists is presented visually.

7.2.4 Comparison of two group lists

Brief description: Two group lists are compared visually.

Prerequisite: Two group lists and their key figures exist.

Procedure: Both group lists are presented visually as tables in such a way that the differences are clearly highlighted based on the key figures.

Postcondition: A table containing the information about both group lists is presented visually.

7.2.5 Manual adjustment of the couples list

Short description: A couples list is adjusted manually by the user.

Prerequisite: A table with pair information is presented visually. There is a replacement list.

Process: This table can be adapted by the users. Couples may be broken up or put together again. The list of replacements is also used and adjusted for this purpose. Users should continue to be supported with undo/redo functionality. This means that the changes made to the table can be undone step by step and the undone steps can also be executed again.

Postcondition: The list of pairs on which the visually displayed table is based has been changed and the table has been adjusted accordingly. In addition, the list of replacements has been consistently adjusted.

7.2.6 Manual adjustment of the group list

Brief description: A group list is adjusted manually by the user.

Prerequisite: A table with group information is presented visually. There is a replacement list for couples.

Process: This table can be adapted by the users. Groups may be dissolved or newly formed. Users should continue to be supported with undo/redo functionality. This means that the changes made to the table can be undone step by step and the steps that have been undone can also be executed again.

Postcondition: The group list on which the visually displayed table is based has been changed and the table has been adjusted accordingly. In addition, the replacement list for couples has been consistently adjusted.

8 Non-Functional Requirements

8.1 Java version

The application software is to be written in Java. At least Java version 11 should be used. When implementing, the code conventions for Java get noticed.

8.2 Multilingual User Interface

The user interface of the application should be written in *German* . In addition, an uncomplicated expansion with additional languages, such as English, should be made possible by the design of the application.

8.3 User Interface

The graphical interface should be in Swing or JavaFX to be created. For a particularly good design, JavaFX extensions such as MaterialFX, be used. During implementation, design guidelines for graphical user interfaces should be followed. There are many guidelines for surfaces. For this task you should, on the one hand, follow the guidelines for integrated development environments, such as the In telliJ Platform UI Guidelines, and on the other hand Guidelines for application software such as Guidelines for Material Design observe.