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SEAT ALLOCATION TO PASSENGERS ON AN AIRCRAFT

Abstract of the Invention

A customer seating system for allocating seats to a group of customers, adapted to - Calculate a satisfaction value for each available seat, for each customer Characterized in, that said system is further adapted to - Compute a global satisfaction value for each seat, said global satisfaction value is the sum of the previously calculated satisfaction values for the customers of the group, - Provide seating arrangements according to one of the predetermined geometrical shapes corresponding to the group, - Determine the group of seats matching said predetermined shape that gives the maximum average global satisfaction value, - Assign the corresponding seats to the group of customers.

WE CLAIM :

1. A customer seating system for allocating seats to a group of customers, comprising:

a memory for storing data, said data comprising a plurality of sets of predetermined geometric shapes corresponding to arrangements of seats, a particular one of the sets of geometric shapes corresponding to a number of customers in a particular group, the geometric shapes within a set being ranked in a rank order, and

a processor for processing data, where operation of the processor in accordance with a computer program stored in a non-transitory computer-readable medium causes the system to

calculate a satisfaction value for each available seat for each customer of a group of customers,

compute a global satisfaction value for each seat, said global satisfaction value being a sum of the calculated satisfaction values for each of the customers of the group,

select a geometric shape of a particular one of the predetermined sets of shapes that corresponds to the number of customers in the group of customers,

identify groups of available seats that match the arrangement of seats corresponding to the selected geometric shape,

for each identified group of available seats, compute an average global satisfaction value based on the global satisfaction values of all the seats of the identified group of available seats,

select a particular one of the identified groups of available seats that corresponds to a maximum average global satisfaction value,

assign the corresponding seats of the selected one of the identified groups of available seats to the group of customers.

2. The customer seating system according to claim 1, where said satisfaction value is calculated using at least one criterion selected from a set of criteria comprising at least customer preferences, target area, suitability, multi legs, courtesy.

3. The customer seating system according to claim 1 or 2, where the geometric shapes within the particular one of the sets of geometric shapes are considered sequentially beginning with the geometric shape having a highest rank order.

4. The customer seating system according to any of claims 1 to 3, where if none of the arrangements of seats corresponding to the geometric shapes within the set are suitable, the operation of the processor in accordance with the computer program further causes the system to split the group of customers into at least two smaller groups of customers.

5. The customer seating system according to any of the preceding claims, where the selected one of the arrangements of seats corresponding to one of the geometric shapes within the set is placed within a larger arrangement of available seats.

6. The customer seating system according to claim 5, where the arrangement of available seats is located in a cabin of an aircraft.

7. The customer seating system according to claim 2 further comprising a user interface configured to allow a user to assign weights to the individual criterion of the set of criteria.

8. The customer seating system according to claim 4, where said system repeatedly splits the group of customers into smaller groups until the entire group of customers is assigned a seat.

9. The customer seating system of any of the preceding claims, where the average global satisfaction value is a sum of the global satisfaction values of all the seats of the identified group of available seats.

10. The customer seating system of any of the preceding claims, where operation of the processor in accordance with the computer program stored in the non-transitory computer-readable medium further causes the system to assign each customer of the group of customers to one particular seat of the selected one of the identified groups of available seats, said one particular seat having a maximum satisfaction value for the customer.

11. A method to allocate seats to a group of customers, comprising:

calculating with a data processor a satisfaction value for each available seat for each customer of a group of customers;

calculating with the data processor a global satisfaction value for each seat, said global satisfaction value being a sum of the calculated satisfaction values for each of the customers of the group;

for a particular one of a plurality of sets of geometric shapes represented by data stored in a memory that is accessible to the data processor, the particular one of the plurality of sets being one that corresponds to a number of customers in the group of customers, selecting based at least on a maximum average global satisfaction value an arrangement of seats that corresponds to one of the geometric shapes within the particular set of geometric shapes; and

assigning with the data processor the corresponding seats of the selected arrangement of seats to the group of customers.

12. The method of claim 11, where calculating the satisfaction value uses at least one criterion selected from a set of criteria comprising at least customer preferences, target area, suitability, multi legs, courtesy.

13. The method of claim 11 or 12, where the geometric shapes within the particular one of the sets of geometric shapes are considered sequentially beginning with a geometric shape having a highest rank order within the particular one of the sets of geometric shapes.

14. The method of claim 11, 12 or 13, where if none of the arrangements of seats corresponding to the geometric shapes within the set are suitable, further comprising splitting the group of customers into at least two smaller groups of customers.

15. The method of any of claims 11 to 14, where the selected one of the arrangements of seats corresponding to one of the geometric shapes within the set is placed within a larger arrangement of available seats.

16. The method of claim 15, where the arrangement of available seats is located in a

cabin of an aircraft.

17. The method of claim 12, further comprising assigning weights to the individual criterion of the set of criteria.

18. The method of claim 14, further comprising repeatedly splitting the group of customers into smaller groups until the entire group of customers is assigned a seat.

19. The method of any of claims 11 to 18, where the average global satisfaction value is a sum of the global satisfaction values of all the seats of the identified group of available seats.
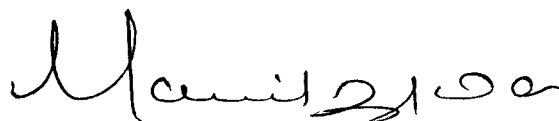
20. The method of any of claims 11 to 19, further comprising assigning each customer of the group of customers to one particular seat of. the selected one of the identified groups of available seats, said one particular seat having a maximum satisfaction value for the customer.

21. A terminal comprising
a user interface for inputting and outputting data,
a memory and database for storing data,
a processor for processing data,
further comprising the customer seating system of any of claims 1 to 10.

22. A terminal according to claim 21, where said terminal communicates with a remote server.

23. A computer program configured to perform the steps of any of claims 11 to 20.
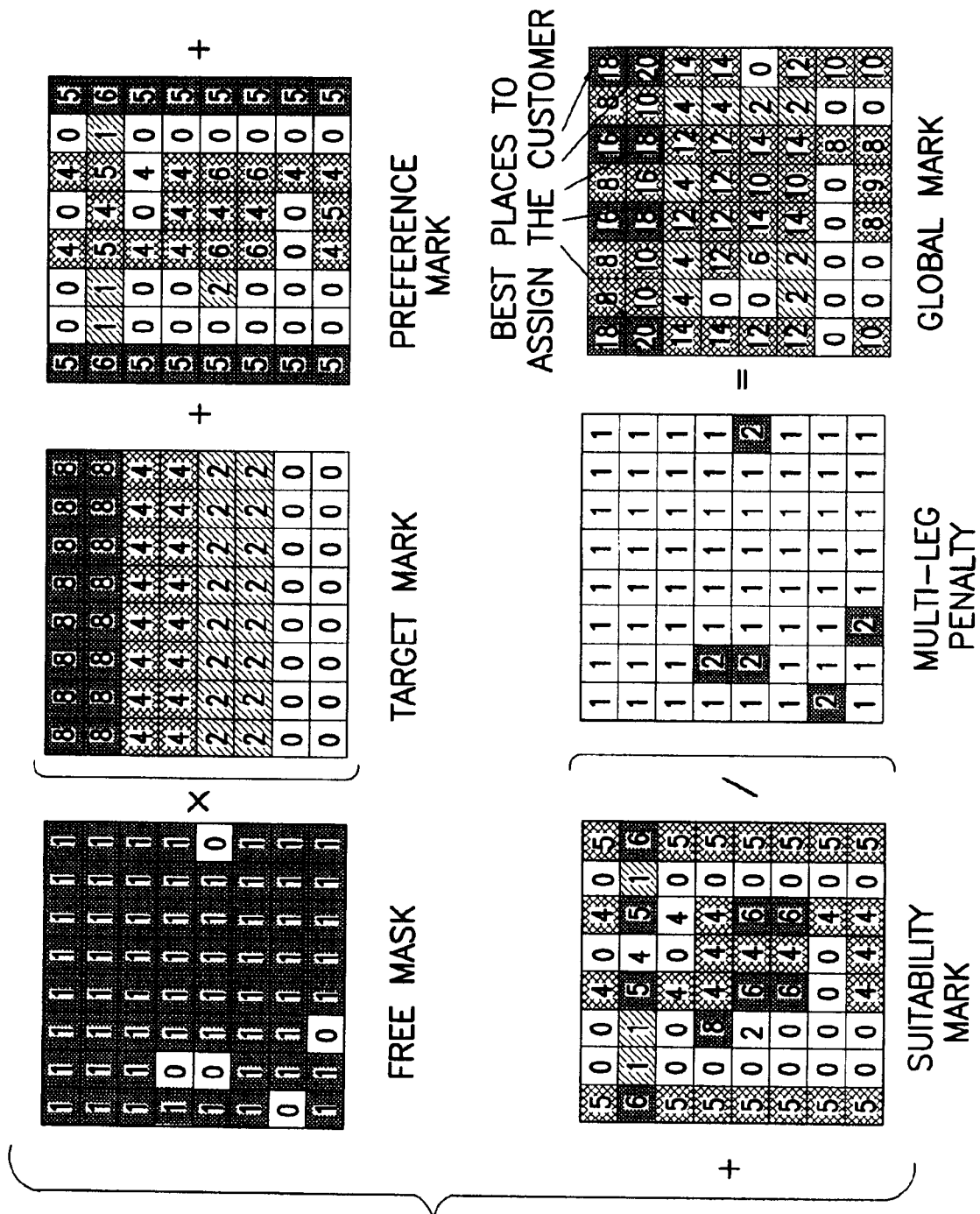
Dated this the 9th day of April, 2012

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FIG.1

PREFERENCE MARK

TARGET MARK

FREE MASK

BEST PLACES TO ASSIGN THE CUSTOMER

GLOBAL MARK

MULTI-LEG PENALTY

SUITABILITY MARK

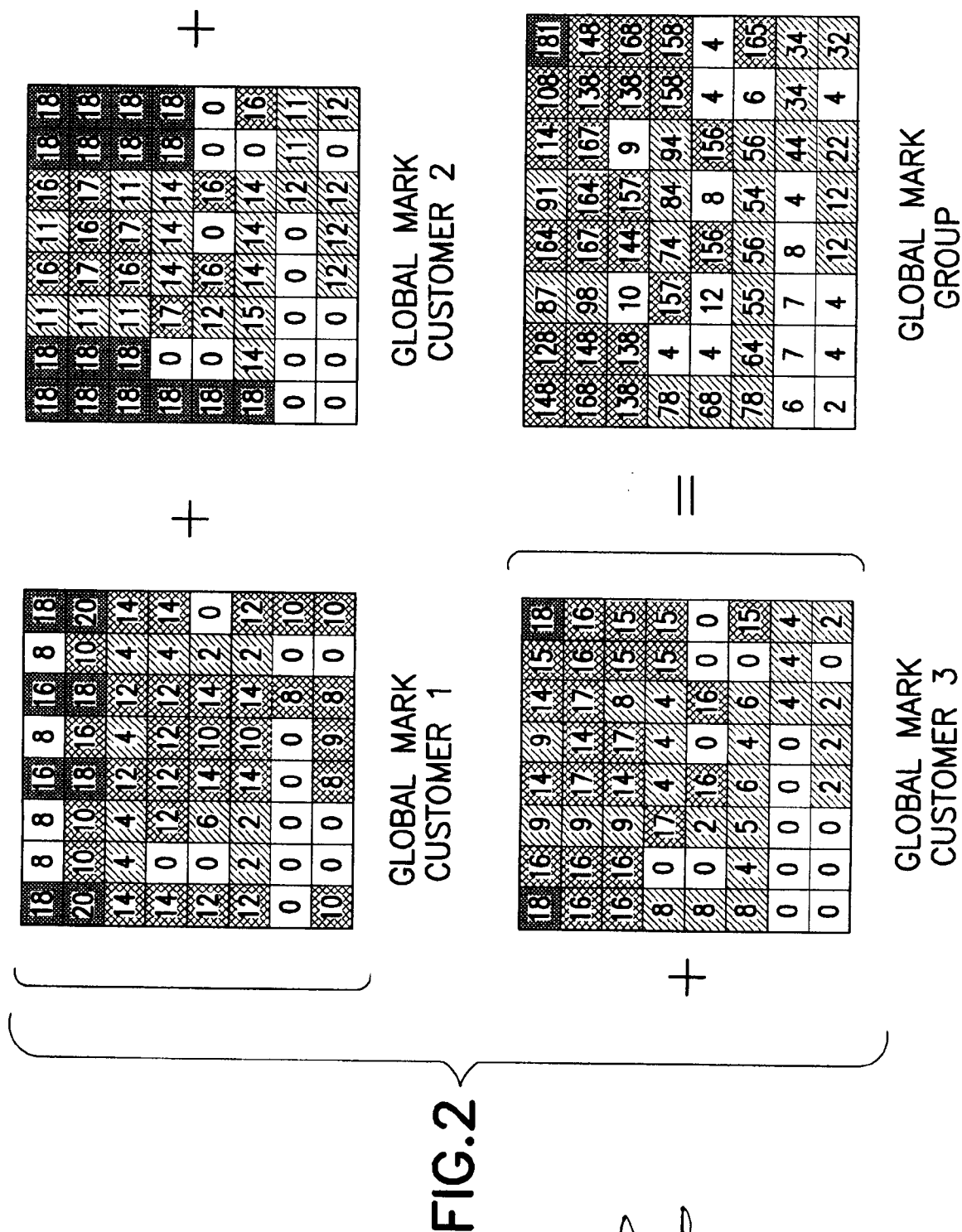MANISHA SINGH NAIR
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FIG.1A

FIG.1B

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GLOBAL MARK
CUSTOMER 2
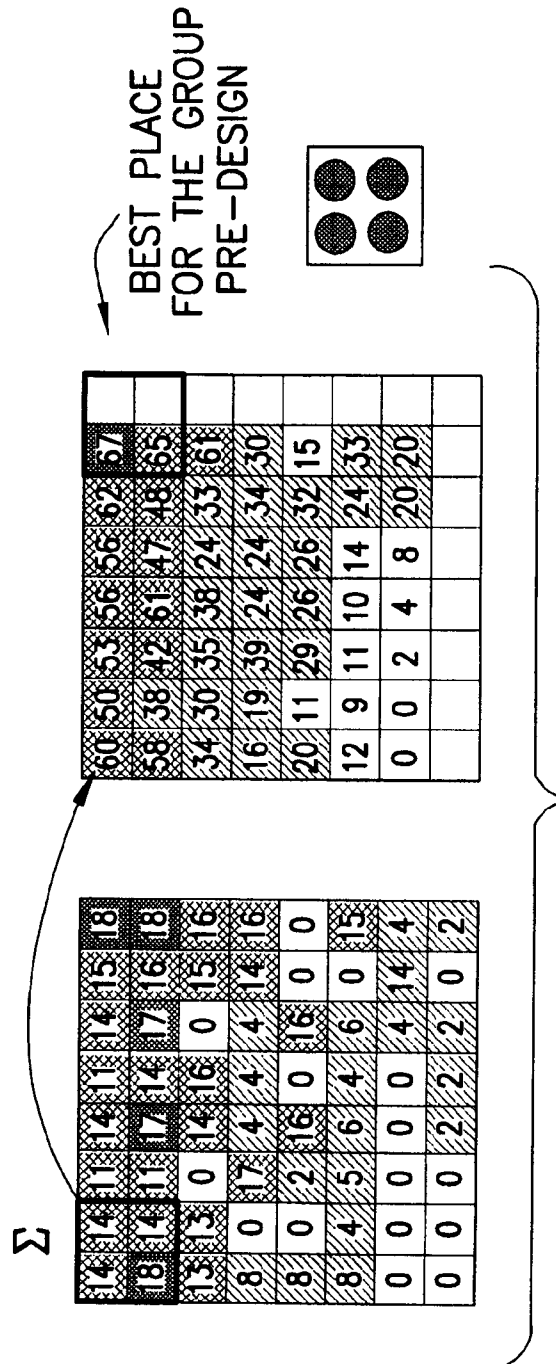
GLOBAL MARK
GROUP

GLOBAL MARK
CUSTOMER 1

GLOBAL MARK
CUSTOMER 3

FIG.2

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FIG.3

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Customer preferences	Target areas	Suitability	Multiple legs	Group linking	Courtesy
9	5	8	1	9	2

Fig. 4
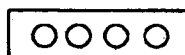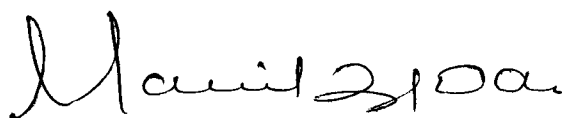
Fig. 5A

Fig. 5B

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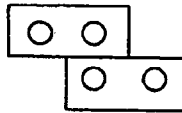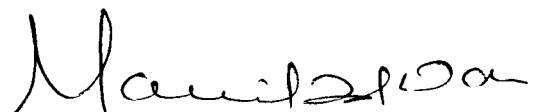LEX ORBIS IP PRACTICE

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Fig. 6

Fig. 7

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The present invention relates to a customer seating system for allocating seats to a group of customers using a computer system. More specifically, the invention relates to a customer seating system for allocating seats to a group of passengers into a cabin of an airplane or similar using a computer system, while maximizing the requirement to the airplane and the preferences of the customers.

In the field of aerial transportation, the appointment of seats to passengers onboard an aircraft took once place by a manual assignment by an employee. The criteria essentially used by the employee to carry out this appointment of seats are the distribution of weight within the aircraft and taking into account on a case by case basis, the preferences and value of the passengers. An automated system was needed to optimize the efficiency of the seating allocation.

Today, automated reservation systems for seat allocation are well-known from for example publication number WO2004010349. This document teaches how a computerized system can allocate seats to passengers, while taking their preferences and the requirements of the airplane as weight distribution into account. That way, each passenger reserving a seat onboard an aircraft will automatically be assigned a seat according to the preferences he inputted and the aircrafts capacity and other requirements, such as security requirements.

A system like the above-described system, works well for individual passengers. However, when several passengers are travelling together as a group, specific seating is needed. It is for example preferred to place the group together when possible. Also different passengers being part of that group might have different preferences.

So far, aerial transportation companies still rely on seat allocation by manual assignment by an employee when it comes to seat allocation for a whole group of passengers with individual needs as well as preferences as a group.

There is therefore a need to provide an automated computerized system that is configured to allocate seats for groups of costumers, while taking their preferences as individuals and as a group into account, and further while respecting the requirements such as weight distribution of the specific aircraft.

It is the purpose of the present invention to provide such a system.

In a more specific manner, the present invention relates to a customer seating system for allocating seats to a group of customers, adapted to

- order the customers by value, and process them sequentially
- calculate a satisfaction value for each available seat, for each customer,
- compute a global satisfaction value for each seat, said global satisfaction value is the sum of the previously calculated satisfaction values for the customers of the group,
- provide seating arrangements according to one of the predetermined geometrical shapes corresponding to the group,

- determine the group of seats matching said predetermined shape that gives the maximum average global satisfaction value, and
- assign the corresponding seats to each customer of the group.

It further relates to a customer seating system as defined above, where said satisfaction value is calculated using several criteria. These criteria may be one or more but not limited to the following:

- Customer preferences, giving the customer the option to choose between window seat or aisle seat for example.
- Target areas, defining an area where the customer should be seated. This allows grouping customers of same characteristics (value, booking class ...) in same areas.
- Suitability, telling if a seat is suitable for a customer depending on his characteristics. There are two types of suitability criteria: the passenger to seat suitability, and the passenger to passenger suitability. A criterion can be defined optional or mandatory. The interface of the system allows the definition of about thirty different types of passengers (wheelchair, unaccompanied minor, child ...) and forty types of seats (exit row, close to lavatory, bulkhead ...).
- Multiple legs, based on that a same seat should be assigned in case of a trip involving multiple sections with no change of aircraft between the sections.
- Group linking, placing passengers travelling in a group as close to each other as possible.

One of the main features of the present invention is how to seat a group of customers. According to the invention, passengers in a group will not be considered as individuals, but as a whole unit. This is possible by introducing geometrical seating patterns or "shapes", which may be predefined in the seating allocation system.

Hence, the geometrical shapes corresponding to the number of customer seats required for a group are selected from a set of predetermined geometrical shapes.

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There is for each number of customers in a group, a certain number of possible geometric shapes.

The predetermined geometrical shapes may have a ranking order, defining which shape is preferred. This preference can be configurable and even be aircraft or cabin dependent.

Thereby the highest ranked geometrical shape amongst the available geometrical shapes corresponding to the number of customer seats required for a group is selected first.

If the highest ranked geometrical shape amongst the available geometrical shapes corresponding to the number of customer seats required for a group is not suitable, then the next shape in the ranking order is selected and so forth. By a suitable shape, we mean the highest ranked geometrical shape that can physically fit with regards to free seats, and which fulfills the above listed criteria.

With none of the highest ranked geometrical shapes being suitable due to for example lack of available adjacent seats, a lower ranked shape may actually be a sum of two smaller shapes separated from each other. This way, every customer from a group will still be seated next to another customer from the same group, even though the group is split into two or more smaller groups.

Also, the maximum number of customers in a group is preferably limited to a predetermined number, for example 9. A group having more than 9 customers may be split up in two or more smaller groups.

Advantageously, the system comprises computer program stored in a non-transitory computer-readable memory medium that is executed by at least one data processor that comprises part of all the system.

The present invention further comprises a method for allocating seats to a group of customer comprising the steps of:

- Courtesy, keeping a seat free next to high valued customers when possible.

- order the customers by value, and process them sequentially,
- Calculating a satisfaction value for each available seat, for each customer,
- Computing a global satisfaction value for each seat, said global satisfaction value is the sum of the previously calculated satisfaction values for the customers of the group,
- Providing seating arrangements according to one of the predetermined geometrical shapes corresponding to the group,
- Determining the group of seats matching said predetermined shape that gives the maximum average global satisfaction value,
- Assigning the corresponding seats to the group of customers.

The method is preferably performed as a result of execution of computer program by at least one data processor, the computer program being stored in a non-transitory computer-readable memory medium.

Also the invention describes a terminal comprising:

- a user interface for inputting and outputting data,
- a database and memory for storing data,
- a processor for processing data,
- further comprising the customer seating system described above.

The terminal may furthermore communicate with a local or remote server.

The present invention will now be described in details with reference to the drawings for the purpose of illustrating the preferred embodiment.

Fig 1 is a schematic view showing how customer satisfaction value is determined for each seat.

FIG 1a and 1b is a schematic view showing the criterion of multi-leg.

Fig 2 is a schematic view showing how a group of customers is seated according to the invention.

Fig 3 is a schematic view showing how a best seating "shape" is placed.

Fig. 4 is a chart showing an example of particular weight a user could give to criteria.

Figs. 5A and 5B are examples of shapes tried by the system for a group of 4 passengers.

Fig. 6 is an example of a next shape in the ranking order to be tired.

Fig. 7 is an example of another shape showing a split up of a group into smaller groups.

The following description is applicable to a reservation of seats for aircraft travel, onboard an airplane. However, this application is not limiting and the invention could be used for any other technical sector in which a reservation of places is necessary.

Figure 1 shows the criteria taken into account by the seat allocation system when seating a single passenger onboard an airplane. Each matrix in figure 1 represents the cabin in the airplane and each box represents a seat.

The matrix "free mask" shows available seats. This group of available seats is defined by subtracting the seats considered as unavailable, including those for which the reservation is confirmed, from the total number of seats. Seats can also be considered as unavailable for other reasons, in particular if they cannot be used in the course of a flight. The seats marked with a "0" in the figure are not available. In practice, if a passenger has confirmed his reservation, the seat allocated to him is thus considered as unavailable. This is particularly the case when he has already checked in and has a boarding pass with a published seat number.

The next matrices or "marks" define different preferences and criteria accommodating the passenger's wishes as well as the rules of the airplane.

For each rule to be respected, a value is determined as a function of the correspondence to the placement criteria for a given passenger in each seat. Each seat will then have a passenger satisfaction value for each rule. These values are added together for each seat and a global mark representing available seats with all rules taken into account is provided. The highest value is translated to the best seat to assign to that given passenger.

The user interface allows these criteria to define different levels of importance and the calculation will thus be more difficult as a result. The user gives thus a particular weight to each criterion, it can be for example as seen in Fig. 4.

The multiple-leg penalty applies when a passenger travel on several sections (for example: Nice -> Paris - Paris -> Berlin) and the aircraft is the same for those sections. The goal is to avoid that a customer has to move from a seat to another between the sections of his trip. See Fig. 1.

A seat available in section can be already occupied in the other sections. To ensure that such a seat won't get a good mark, we penalize it in dividing its score by two. For example, a multiple-legs penalty looking like shown in Fig. 1 and Fig. 1a.

for the section Nice -> Paris, would mean that the free mask for the section Paris -> Berlin would be as shown in Fig. 1b.

This seat allocation system only works on one single passenger at a time. This is different for a group of passengers, where passengers willing to travel in group should be seated next to the other group members as much as can be.

To allocate seats for a group of passengers according to the invention, the global mark for each passenger from the group is calculated according to figure 1. Thereafter, all the global marks (one for each passenger in the group) are added together to define a global group mark as shown in figure 2.

With the global group mark computed, the group can be seated according to their criteria, availability and the rules of the airplane.

To assign seats to a group, different predesigned seating shapes have been defined and stored in the system.

For example for a group of 4 passengers, the following good shapes are tried by the system shown in Figs. 5A or 5B.

The line shape may be preferred to the square shape. This remains configurable and may even be aircraft or cabin dependent.

Obviously, there is a certain number of predefined shapes for each number of passengers forming a group. The shapes have a ranking order, where the highest ranked shape always will be chosen if suitable in terms of seat availability.

If none of the highest ranked shapes are suitable, alternative shapes are tried. In our previous example with a group of 4 members, if the line and square shapes are not suitable due to lack of available seats in that configuration, the next shape in the ranking order to be tried may be as seen in Fig. 6.

As a last resort, if none of the shapes are suitable due to for example lack of available adjacent seats, the group can be split up into smaller groups such as seen in Fig. 7 until a suitable shape is found.

Let's assume the square shape in the above example is suitable.

In figure 3 the global mark group in shown on the right. To compute the best position for the square shape, an average mark is calculated by summing the marks contained inside the shape in every position in the cabin matrix. The resulting matrix is shown in figure 3, left matrix.

By positioning the shape in the left corner to perform the first calculation, it is clear to see that the sum is 14+14+14+18=60.

The second calculation comes from moving the shape one position to the right having a total mark of 14+11+14+11=50, as indicated in the left matrix at the second position (from the top left corner). And so forth, until computing sums for the whole global group mark matrix.

The highest value is in this example 67, which will therefore be the position of the square shape.

After the best shape has been found and placed, the final step of the system is to assign individually each passenger of the group inside the best shape, on the seat having the maximum satisfaction value.

To proceed according to the invention, computer means may be used. These means comprise data storage means for storing databases such as a database of predefined geometrical shapes, and particularly a computer database as well as processing means in the form of a processor. A communication network may or may not be available. All the data accessed may be stored on the terminal itself or on a remote server.