

Tutorial

Available from <http://goo.gl/Lpx9H>

(spreadsheet: <http://goo.gl/zq8y9>)

Introduction

In the context of our research we have developed an assisted environment to the development of spreadsheets.

This environment offers a set of buttons each of which executes a set of unit operations.

In this study we intend to analyze to which extent it is an advantage to use the environment we have developed.

If you have any question during this tutorial, please ask us so we can help you.

An Example

This tutorial intends to offer a first contact with our environment and uses a spreadsheet to store information about flights.

The spreadsheet shown in the next figure stores, on line 3, the number, the departure, the destination and the flights of each flight. In this example, we have only one flight registered, but it is possible to add more, as we will see.

Starting on line 6, it is possible to register new pilots information, namely ID, name, contact and category.

Moreover, after line 12 the spreadsheet contains information about the steward on board, namely the ID, name and contact. As in the previous cases, besides the two existing entries, it is possible to add more.

Finally, after line 18 we have information about the in-flight menu where information about the dish, garnish and desert is kept.

Cell G1 holds a formula containing the number of flights stored in the spreadsheet. Cell E9 holds a formula which counts the number of pilots per flight.

The screenshot shows a LibreOffice Calc spreadsheet titled "flights.ods". The spreadsheet is organized into several sections, each with a header row and data rows. The sections are: Flights (rows 1-4), Pilots (rows 5-7), Stewards (rows 11-13), and Menu (rows 17-19). There are also summary rows for "Add Pilots" (row 8), "Add Flight" (row 9), and "Add Stewards" (row 14). The spreadsheet uses color-coding for different sections: yellow for Flights, orange for Pilots, red for Stewards, and green for Menu. The status bar at the bottom shows "Sheet 2 / 2", "Default", "STD", and "Sum=0".

	A	B	C	D	E	F	G
1	Flights	Flight					Nr of flights
2		Number	Depart	Destination	Plane		1
3		FR1234	CGD	AMS	A321		
4							
5	Pilots	ID	Name	Contact	Category		
6		pi1	John	123456789	Newbie		
7		pi2	Mary	987654321	Pro		
8	Add Pilots						
9				Nr of pilots	2	Add Flight	
10							
11	Stewards	ID	Name	Contact			
12		st1	Anne	456321789			
13		st2	Charles	789654123			
14	Add Stewards						
15							
16							
17	Menu	Dish	Garnish	Desert			
18		Chicken	Rice	logurt			
19	Add Menu						
20							

Instance Operations

In the next pages we will explain in detail the operations our spreadsheet environment provides.

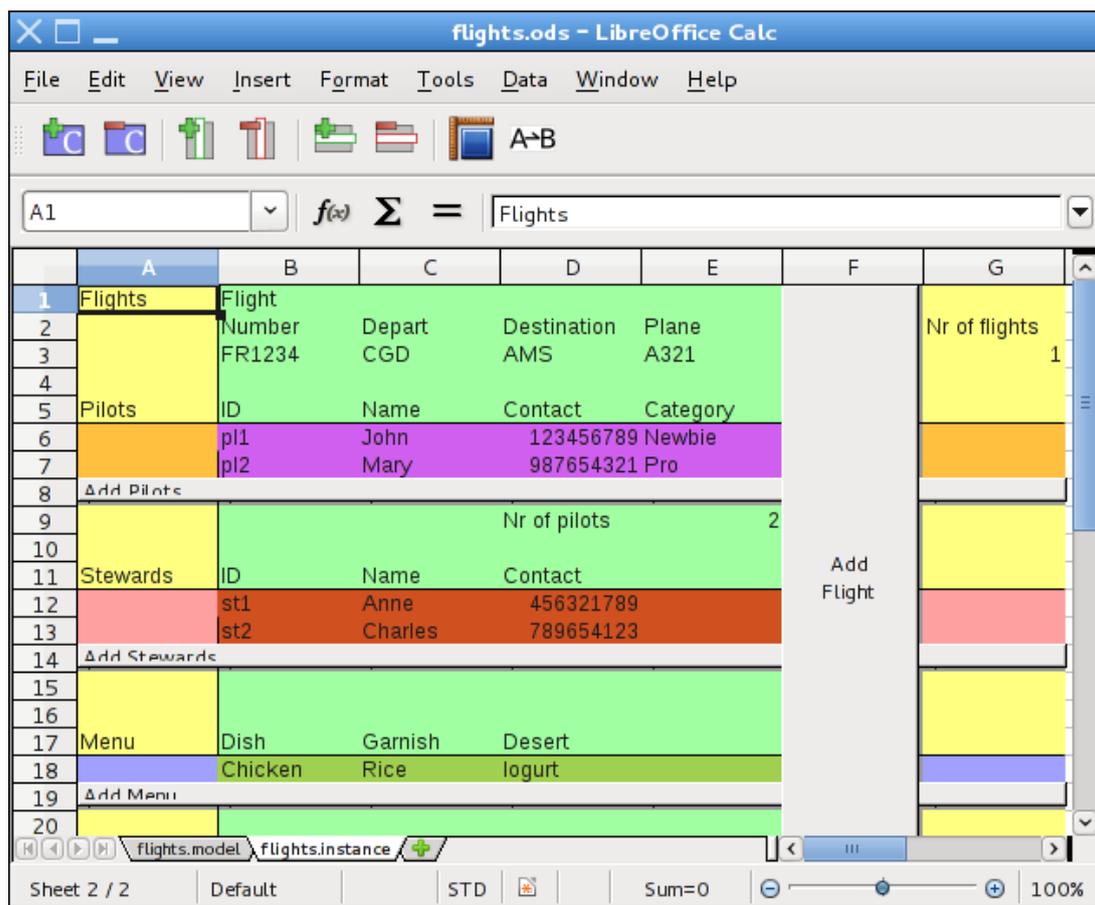
Features of our development environment

New elements (which expand horizontally)

A horizontal element of a spreadsheet consists of an aggregation of a set of columns. A concrete example is the element “Flight”, which is composed by the information about its **Number, Depart, Destination, and Plane**.

In our environment adding new elements (for instance, a new flight) to a spreadsheet is done using a specific button.

Note that you can not use the usual LibreOffice operations to add or remove columns or rows.



In the spreadsheet we are considering in this tutorial every time it is necessary to add a new flight one should click on the button “**Add Flight**” (column F).

We will now add the information of a new flight. Please follow our steps as we go.

1. Add a new flight with the following data:
 1. Number: TP244
 2. Depart: LIS
 3. destination: OPO
 4. Plane: A319

Note that all formulas have been automatically updated (for instance, the formula which calculates the total number of flight)! In fact, in our environment it is never necessary to check whether the formulas are correct or not, because this is always guaranteed!

Let us add a new flight. Now you must do so autonomously.

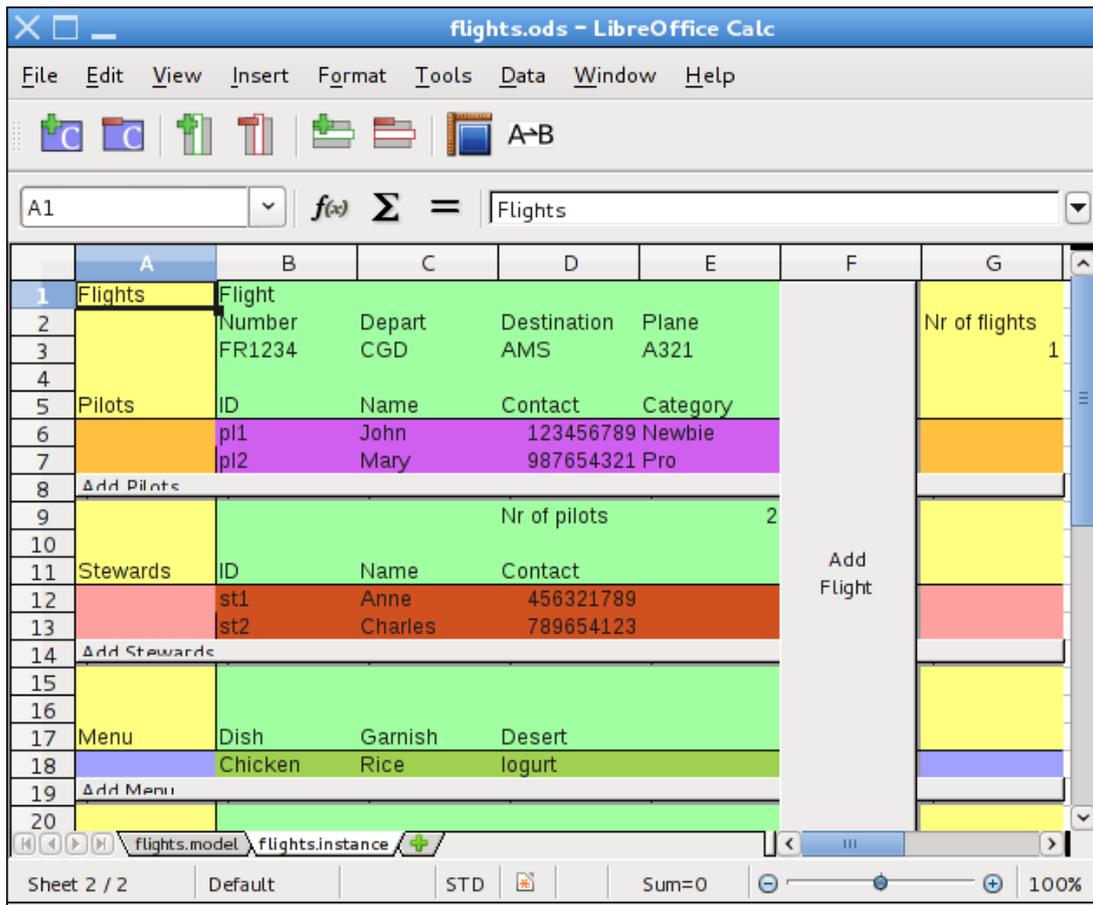
It is normal that when you are working in our environment, the operations that result from clicking buttons take a few seconds. Please be patient and do not press the button more than once at each step.

2. Add a new flight with the following data:
 1. Number: TP388
 2. Depart: MAD
 3. destination: LIS
 4. Plane: A321

Note again that the formulas were automatically updated to contain the new references.

New elements (that expands vertically)

A vertical element of a spreadsheet consists of the aggregation of a set of attributes that expand vertically. A specific example would be an element of "Pilot", which is the set of information concerning his/her **ID**, **Name**, **Contact**, and **Category**.



In our environment, the addition of new elements (for example, a new pilot) in spreadsheets is done by a specific button.

In the spreadsheet we consider in this tutorial, whenever we need to add a new pilot one should click the button "Add Pilots" (row 8). To add "Stewards" and "Menus" one would proceed similarly.

Let us now add a new pilot to the original flight (FR1234). You should follow in our footsteps.

3. Add a pilot with the following data:
 1. ID: pl3
 2. Name: Manuel
 3. Contact: 255 231 213
 4. Category: Intermediate

Let us add a new pilot. Now you must do so autonomously.

4. Add a new pilot with the following data to the flight FR1234:
 1. ID: pl4
 2. Name: John
 3. Contact: 213 454 544

4. Category: Intermediate

Remove a column

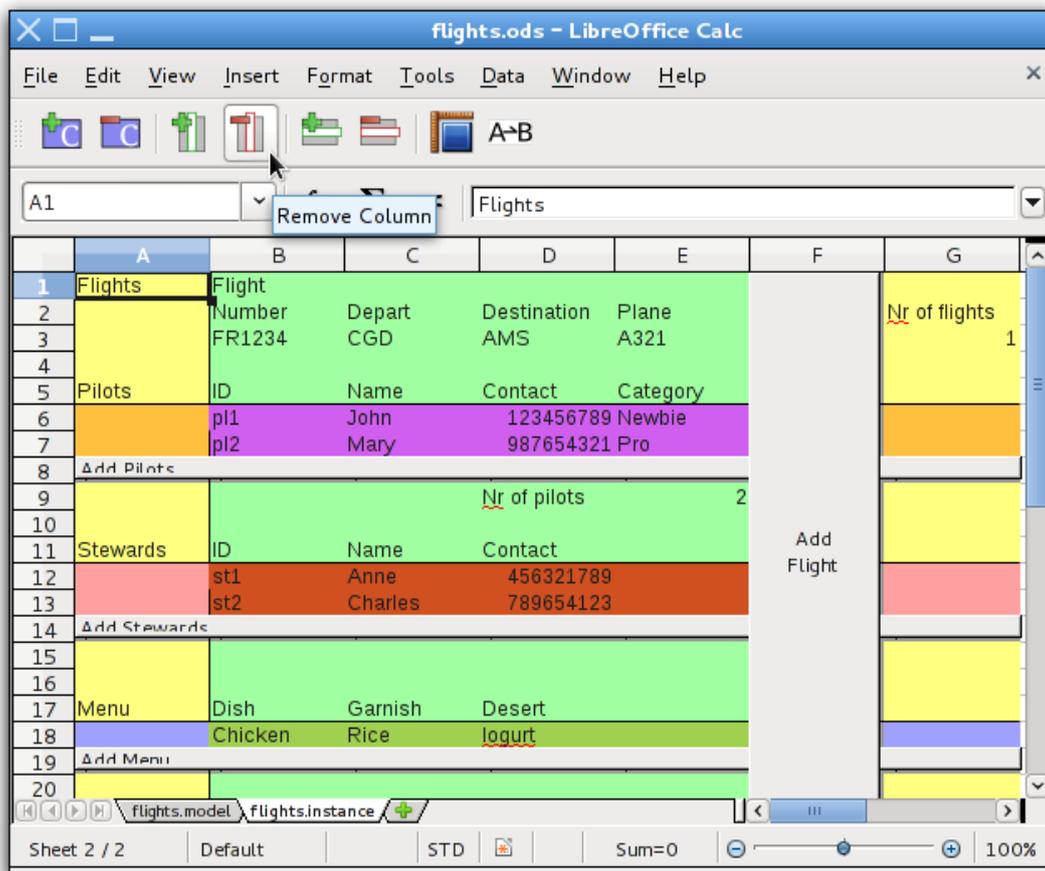
Deleting a column works similarly to what already happens with spreadsheets without our environment.

This feature is also obtained via a button, and all the formulas used in the spreadsheet are automatically updated without the need to verify so.

To delete a column in all repetitions of an element (for example, eliminating the category of a pilot on every flight), do the following:

1. choose the column to be deleted by clicking on one of its cells (as is usually done in Excel);
2. click the button “**Remove Column**” (equivalent to remove column in Excel).

The button “**Remove Column**” is indicated in the following figure.



We will now remove the column referring to the category of the pilot. You should follow in our footsteps.

5. Remove the column that contains information about the plane and the pilot category:
 1. Select any of the cells in column E or I or M;
 2. Click the button “**Remove Column**”.

It is possible that other information is removed. It is normal!

We will now remove the column for the destination of the flights. You must now do so autonomously.

6. Remove the column that contains information about the destination of the flight.

Model Operations

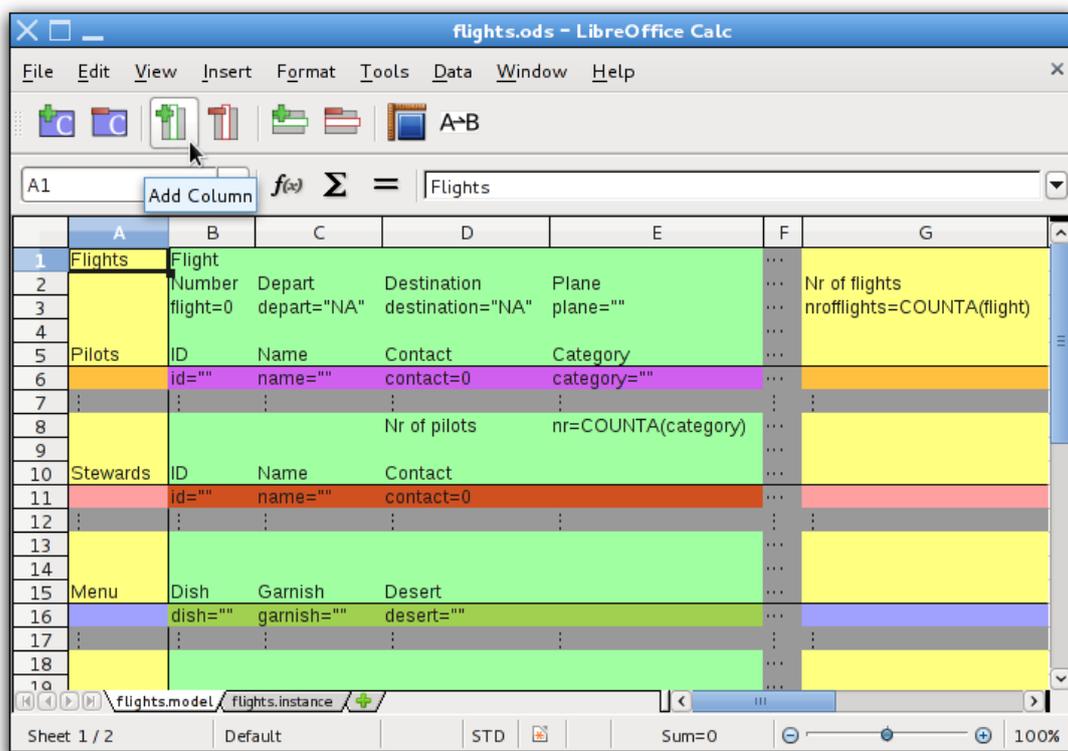
We have explored the operations in our environment related to instances. We will now discuss the operations available for models.

Features of our development environment (for models)

Add column

It is possible in our environment to do operations in the model similar to the ones performed in the instance. In particular, it is possible to add a column to an existing model. If the part of the model where the column is inserted is expandable horizontally, then a new column will appear in all repetitions of the corresponding instance.

An example of the usage of this operation would be to add a new column after column E to store information about the time a flight takes. To do so, follow the instruction given after the figure.



Let us add such a column. To do it please follow our steps.

7. Add a new column to store flight hours information:
 - a. Select one of the cells in column E;

- b. Click the button “**Add Column**”;
- c. Chose “After”;
- d. Edit cell F2 to “Hours”;
- e. Edit cell F3 to “hours=0”.

This added a new column containing the number of hours each flight takes.

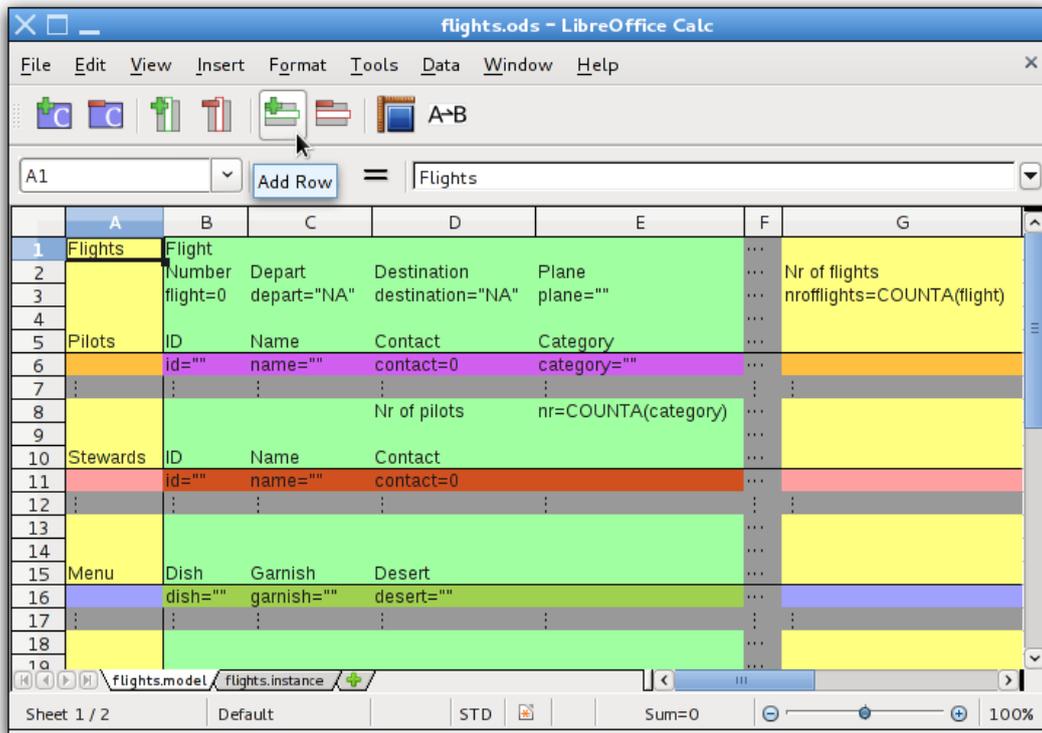
As you can see in the instance worksheet, a new column has been added to each flight. It is now ready to receive data.

8. Let us now add another column to store information about the number of passengers on board.

Add row

As expected, it is also possible to add a row to an existing model. If the part of the model where the row is inserted is expandable vertically, then a new row will appear in all repetitions of the correspondent instance.

An example of the usage of this operation would be to add a new row after row 3 to store information about the total amount of time all the flights took. To do so, please follow the instructions after the next figure.



Let us add such a row. To do it please follow our steps.

9. Add a new row to store total amount of time flights took:
 - a. Select one of the cells in row 3;
 - b. Click the button “**Add Row**”;

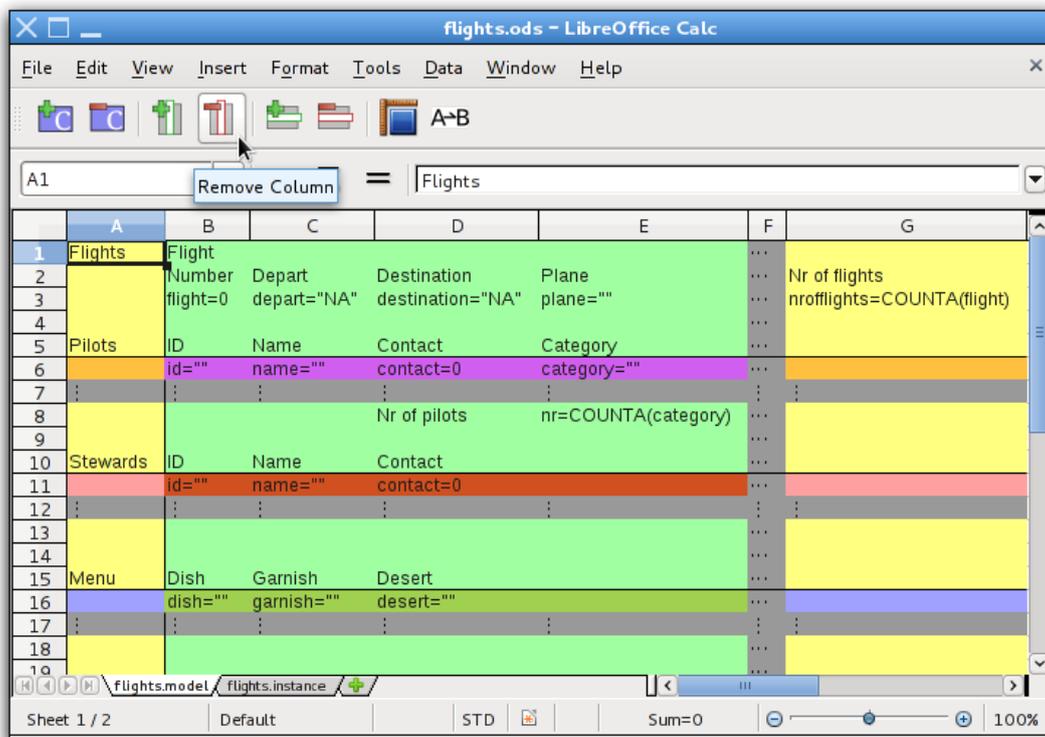
- c. Edit cell G4 to "Total Hours";
- d. Edit cell G5 to "total_hours=SUM(hours)".

This added a new row containing the total number of hours flight took.

As you can see in the instance worksheet, a new row has also been added. Note that the formula we wrote in the model has now an instance counterpart with the correct references and result.

Remove column/row

To remove a column or a row using our setting is analogous to add a column or a row. To do so, one selects one cell of the column/row to be removed and presses the corresponding button: "**Remove Column**" or "**Remove Row**" (signaled in the next figure). Such action will remove all the repetitions in the instance (as well as all the data in them).



Let us remove column C. Please follow our steps.

10. Remove Column C:

1. Choose one cell in column C;
2. Click the button "**Remove Columns**";

As you can see column C has disappeared. Please also notice that all the corresponding columns in the instance have also been removed.

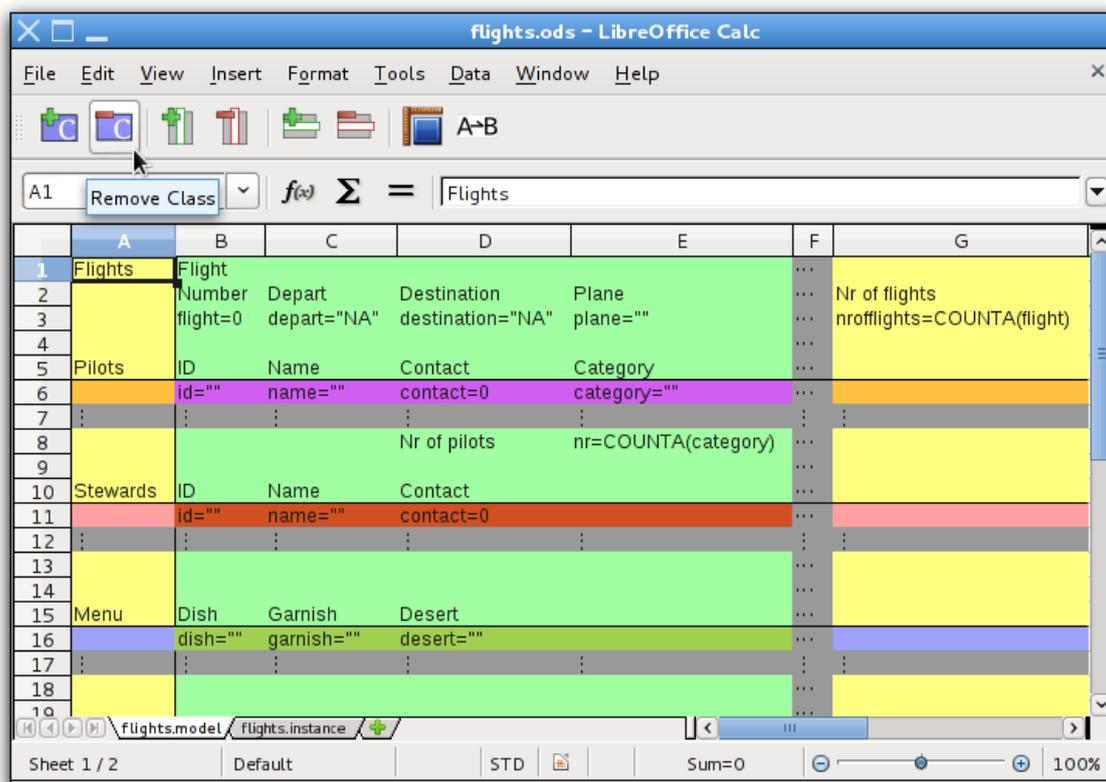
11. Remove a column of you choice from the model.

Remove a class

It is possible in our environment to remove all the information about a particular kind (class) of element (for instance, remove all the information about menus of flights).

This feature is also obtained via a button, and again all the formulas used in the spreadsheet are automatically updated without the need to verify them.

To remove any information on a particular element kind (for example, completely remove the information about menus of flights), just press the button “**Remove Class**”, and choose the kind of element you want to remove.



Let us remove the class related to menus. Please follow our steps.

12. Remove the class related to menus:
 5. Click the button “**Remove Class**”;
 6. Select the class “Menus”;
 7. Click the button “Remove”.

Let us remove the class related to stewards. Please do it autonomously.

13. Remove the class related to stewards.