Recipe Cove
Function Points and COCOMO II Booklet

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In this booklet we summarize all the results and findings we gathered with the use of specific spreadsheets to estimate the Function Points for our system as well as the effort, time and cost that is needed to complete the project with the COCOMO II method.

Function Points

For the estimation of Function Points, it is needed to analyze the interaction with both the user and other applications.
The system component interacting with the user is the web interface, by allowing the user to register a new account and to login, create a new calendar and add a new event directly in the system.
On the other hand, the interaction with other applications consists mainly in the exchange of data needed for the Google Calendar API as well as the Spoonacular API, used to search, organize and show the recipes and their information.
Additionally, there is the interaction with the RabbitMQ service used to send an email to the user that registers in the system.

CouchDB is the database used to store the users' information, in a table containing the data which is modified periodically by the application and which is maintained within the application's boundaries.
Other data which is instead referenced by the application and maintained within the boundaries of another, external application are the Google account information, the recipes and ingredients information.

All the estimations for the Function Points (FP) has been done through the use of a specialized Excel sheet. However, since we adopt the Cocomo II method to adjust the FPs, we ignore the adjustment done by the sheet, which considers the Value Added Factor (or Value Adjustment Factor, VAF) instead.

Thus, starting from the definition of the Internal Logical Files (ILF) and External Interface Files (EIF), we identified:

- An ILF for the users, with 1 RET and 10 DET (id, name, given name, family name, link, picture, gender, locale, favorites list, calendar information) $\Rightarrow$ 7FP
- An EIF for the google account information, with 1 RET and 8 DET $\Rightarrow$ 5FP
- An EIF for the recipes information, with 1 RET and 7 DET $\Rightarrow$ 5FP
- An EIF for the ingredient information, with 1 RET and 8 DET $\Rightarrow$ 5FP

The total amount of Function Points for all the ILF and EIF is 7+5+5+5=22 FP.

The data coming from outside the application boundaries mainly includes the registration process of a new user, the management of a calendar and the data pertinent to the recipes and ingredients. We therefore identified the following External Inputs (EI):

- An EI for inserting a new user, with 2 FTR and 10 DET ⇒ 4FP
- An EI for the login of a user, with 1 FTR and 1 DET ⇒ 3FP
- An EI for deleting a user, with 1 FTR and 10 DET ⇒ 3FP
- An EI for creating a new calendar for a user, with 1 FTR and 1 DET ⇒ 3FP
- An EI for deleting a calendar for a user, with 1 FTR and 1 DET ⇒ 3FP
- An EI for adding a recipe to the favorite list, with 1 FTR and 1 DET ⇒ 3FP
- An EI for deleting a recipe from the favorite list, with 1 FTR and 1 DET ⇒ 3FP

The total amount of function points for all EI is 4+3+3+3+3+3+3=22 FP.

For the data sent outside the application boundaries, which modifies or alters an ILF, is composed mainly of the email sent to a registered user and the creation and visualization of an event inside a calendar. Thus we described these External Outputs (EO):

- An EO for preparing and sending an email to the registered user, with 1 FTR and 2 DET ⇒ 4FP
- An EO for adding an event to calendar and visualize it, with 1 FTR and 1 DET ⇒ 4FP

As far as the data sent outside the application boundaries, which however is not modified nor provides derived data, it consists of the visualization of the user information, as well as recipes and ingredients information. We identified the following External Inquiries (EQ):

- An EQ for the visualization of the profile of a user, with 2 FTR and 7 DET ⇒ 4FP
- An EQ for the visualization of the favorite list of a user, with 1 FTR and 1 DET ⇒ 3FP
- An EQ for the visualization of a recipe's information, with 1 FTR and 7 DET ⇒ 3FP
- An EQ for the visualization of an ingredient's information, with 1 FTR and 8 DET ⇒ 3FP

The total amount of function points for all EO and EQ is 4+4+4+3+3+3=21 FP.

The final amount of FP for our system is 22+22+21=65 FP.

All these computations have been obtained with the Excel sheets present in the "Function Points and COCOMO II" folder.

COCOMO II

With the data previously obtained, we can carry out the COCOMO II estimation to see how much effort, time and cost is needed to complete the project.
By inserting all the necessary fields in the online calculator (at the link: http://softwarecost.org/tools/COCOMO/) we obtained the following results:

- it should require us approximately 3445 SLOC
- it should be scheduled for 5.3 months
- the effort required should be 6.1 person-month
- the overall cost (considering the cost per person-month as 2400) would be $14612

The corresponding values inserted to carry out the previous evaluation are the following:

```
startCOCOMO, 1
MonteCarlo, MonteCarlo_Off
AutoCalculate, On
size_type, Function Points
function_points, 65
language, Java
prec, Very_High
flex, Low
rely, Nominal
data, Low
cplx, Low
ruse, High
docu, Nominal
resl, Nominal
team, Extra_High
acap, Nominal
pcap, High
pcon, High
apex, High
pexp, Nominal
ltex, Nominal
pmat, Low
time, High
stor, Nominal
pvol, Low
tool, Nominal
site, Very_High
sced, Low
software_maintenance, Off
software_labor_cost_per_PM, 2400
software_EAF, 0.55
size_exponent, 1.0677
schedule_exponent, 0.312
software_effort, 6.1
software_schedule, 5.3
```