SOFTWARE INSTRUMENTS FOR THE RAPID INFORMATION APPLICATION DEVELOPMENT

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Abstract: In this paper, we introduce a method , which affords us an efficient, short time-consuming and low cost informational application's conception. We, also, illustrate with examples what we have discussed in the paper, by developing a web browser, which uses a small number of instructions and requires little time.

1. Rapid application development

The necessity for informational applications, obtained with low financial efforts and in a short conceiving time, led to the appearance of some design methods and techniques and programming languages, which are adjusted to this purpose. One of the methods that afford the rapid application development and that require a short conceiving time is the so-called RAD method, an acronym from Rapid Application Development. This method was set up, in 1981 [Martine, James; 1981]. Subsequently, starting in 1994, the method has been improved and completed [Vickoff, Jean-Pierre; 2000] and [Stapleton. Jennifer; 1997]. The main objective of the RAD method is to obtain, without too big an effort, an accurate application, starting from a prototype and going through an iterative process. The method is concerned with both conceiving, and testing the application. The RAD method is not related to any programming instrument, but it recommends using the graphic programming instruments, which could afford a rapid obtaining of the prototypes.
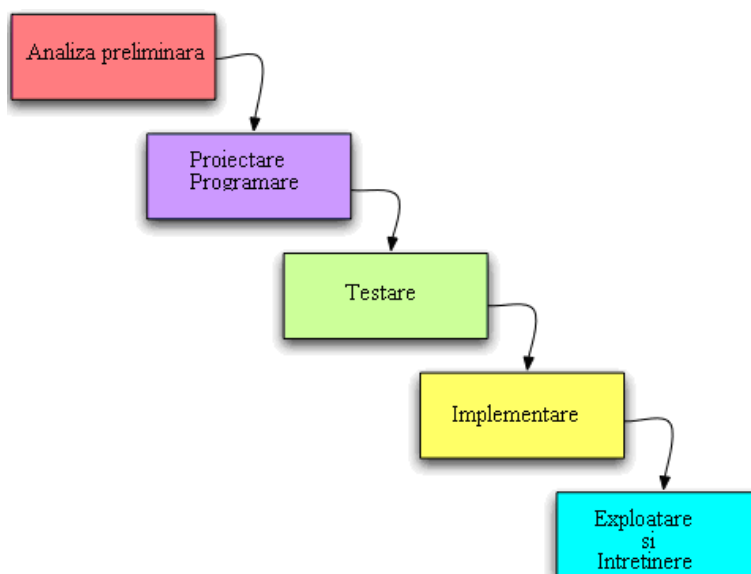

Fig. 1: Modelul Waterfall

The RAD technology was a response to the slow application conceiving processes in 1970s, such as Waterfall pattern (Figure 1). This pattern is a method os sequential development of the applications, which aproached the conceiving of the applications as a waterfall, going through the folowing stages : preliminary analysis, design, testing, implementation, integration and maintenance.

According to this pattern, the applications developer goes from a stage of the application conceiving process to another, in a sequential manner. For example, one cannot go on to the design stage, unless the preliminary stage, in which - starting from the final results of the application - the necessary entrance data is established, is finalized. Also, one cannot go on to the testing stage, unless the algorithm coding is finalized, thatis programming stage. Afterwards, one can go on to the implementation stage and, only after this, in the end, to the exploitation and maintenance of the application.

2. RAD method description

According to James Martin's statement, the RAD method implies:

• a development cicle, safe and short, based on few simple stages :framing, design and building, complying with a time dimension (90 days optimum, 120 days maximum).

• Communication architecture, which engage the structure's working groups and variable component parts, according to each stage's requirements, as well as complying with an accurate working style, divided into three stages: pre-session, session and post-session [Mucchielli, Roger;1987].

• Working methods, techniques and instruments which afford defining and applying some ideas regarding four potentially conflicting objectives : budget, expectation, technical functional quality and visibility [Vickoff, Jean-Pierre;1998].

• A programms' conception architecture, which is based on object techniques and, in particular, on the ones that allow a seeing and doing conception [McCarty, Jim; 1997].

• A conception architecture which requires minimum rules, project resuming, zero out of order marks, all of this in order to guarantee, not only the technical quality of the application, but also the functional one, which recommends using the prototypes.

The RAD methods divide a project's life cicle into 5 stages (Figure 2):

A. INITIALIZATION (preparing the organization and the communication)
In this stage, the project's overall perimeter, the working structure, by themes, the competent stuff's selection and a project's dynamics initiation are defined. This stage takes approximately 6% of the working project.

B. FRAMING - (establishing the objectives, analyzing and specifying the necessities)
Specifying the necessities is the user's task. The user expresses his requirements, during the group discussions. Generally, there are 2 to 5 days stipulated for each theme. This stage represents approximately 9% of the project's conception effort.
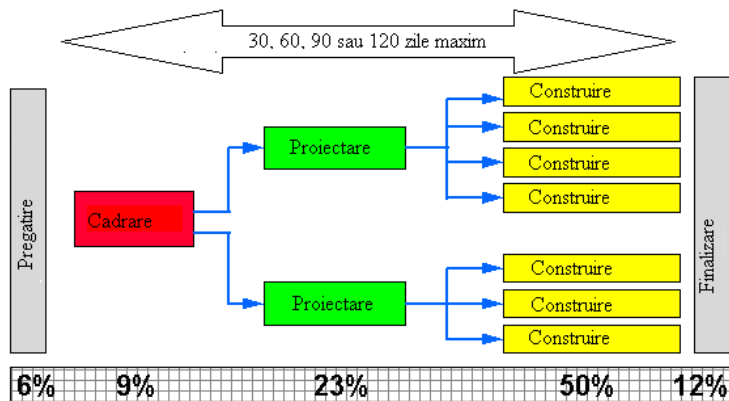
Fig. 2: Steps and effort for each stage

C. DESIGN- (conception and modeling)

In this stage, both designers and users are involved. They take part, together, both in models' breaking up and validation: data flow, documents flow, transformations etc. Designers and users also validate together the prototype's first level, showing the application's ergonomics and overall kinematics. In this stage, there are 4 to 8 days stipulated for each theme. This stage represents about 23% of the project's conception period. Starting with this stage, a working parallelism is possible.

D. BUILDING (constraction, prototyping)

During this stage, the application rapid development team (SWAT) has to conceive the application module by module. The user will take active part in expressing detailed specifications and in prototypes' validation. In this stage, there are stipulated more iterative working sessions. This stage consumes approximately 50% of the project's conception period. Starting with this stage, apart from the activities' parallelism, there can be done a serialization of these activities.

E. FINALISATION – (recipes and dissemination)

In the previous stages, a number of partial working recipes have been obtained, while in this stage, an overall project's delivery will be officialized and the system will be transferred to exploitation and maintenance.

The applications' conception process, using the RAD method, is an iterative one. The evolution of a process, using the RAD method, is shown in Figure 3.
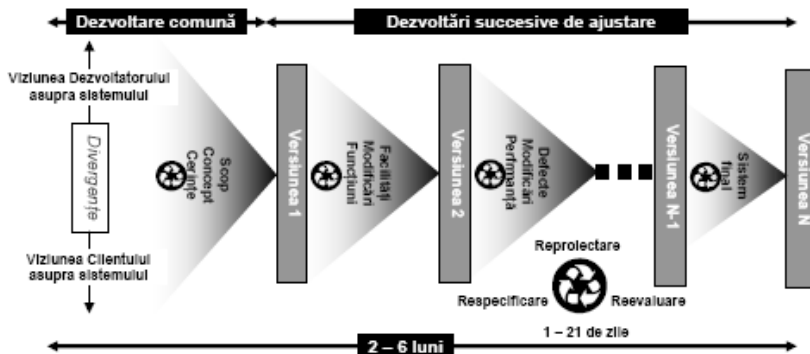

Figura 3. Redare a iterațiilor succesive specifice metodei RAD.
(adaptare după Walter Maner 1997).

3. The team of a RAD project

RAD suggests a project's organization, based on an accurate work distribution among different members of the working team. The teams involved in the RAD method are mixed teams. In their structures enter the polyvalent persons with good data-processing knowledge: developers, analysts and architects. In addition to these „true experts of designing", in the team's structures, also, enter the end-users of systems. Each member's responsibility depends on the member's role inside the team. The RAD method distinguishes 5 types of roles : the project leader binomial, the user, the RAD expert, the prototype shaper and the owner.

▶ The project leader binomial consists of an user project leader (UPL) and an informational project leader (IPL). Both of them need to have authority and legitimity in the enterprise. This binomial is involved right from the beginning stage, through the entire the project, until its finalisation. Their responsibility is expressed according to each stage of the project, either in conjunction, or in one's domination. Thus, the necessities' stipulation stage is the users project leader's responsibility, while the building stage is the informational project leader's responsibility.

▶ The user is a person who has deep knowledge about the administration system and can express himself concerning the system's evolution. Thus, in this case, it's not about the final user, but about a decision-maker user. The user will operate as a team : the JRP (*Joint Requirements Planning*) team for necessities stipulation, the JAD (*Joint Application Development*) team for conception, the building team and the application team.

▶ The RAD expert must not be mistaken for a project leader. He is the one who assists the project leader binomial. Usually. He has a triple role: he prepares the working sessions, he is an entertainer of the working sessions and he has a contribution in the methodological sustainment of RAD, especially in leading the project. He always intervenes in preparing the working sessions after the users, and he is not concerned with the substance, but with the form (documents, presentations etc). During working sessions, he promotes, pre-eminently, team works. He is multiproject, because, he is usually engaged in more then one project.

▶ The prototype shaper's role is to avoid the traditional breaking between the conceiver and the developer. He intervenes in the conception stage and the building stage.

▶ The owner is the one who finances the project. He is , usually, called the application director.

4. When can we apply the RAD method?

The utilization of the RAD method starts with an opportunity diagnosis : can this method be used ? In order to build a profile for the project, an analysis of its specific features is performed. This profile helps making a decision, either the method is considered being profitable, or another method is preferred.

The criteria that afford approaching the project in relation with the method's application field are as it follows : the project's environment stability ; the existence of a project leader on the users' behalf; the users' decision power ; the number of users and the administration system knowledge.

A few words about each of these 5 criteria:

• The project's environment is stable, only if the project's connected fields have stable communication areas. If this doesn't happen, than the calendar of the necessities

stipulation and conception stages depends on the connected fields' calendar. Under these conditions, approaching the border areas' conception through the RAD method is very useful. The RAD method will be used in the project's building stage. If the project's environment is stable, then tha RAD method is used from the beginning.

- The method's strong points consist of the success of the following actions: stimulating the users and distributing the responsibilities. The organizational regulations stipulate that there must be project leader on behalf of the users, as well as an informational one. The leaders' involvement is necessary, especially during the first two development stages of the project. If the users' project leader is only partly available, than the project can be led through the RAD method starting only with the design stage.

- The users' decision power is expressed, significantly, in the necessities expressing stage and the conception one. This ability brings an advantage from the works performed in the preparation stages. If the power delegation is limited, than the RAD method will be used only for the building stage.

- Working in sessions allows the administration of different points of view. The JRP and JAD techniques are very useful, particularly, when there's a large number of users.

- Knowing the administration system is indispensable for the users, in the preparation works from the necessities expressing stage. The decision makers can happen to have only limited knowledge of operational working. It is, also, possible for the administrative rules to be locked in an automatized system, so that the administrators don't know them. In such a situation, the purpose is to identify an additional role for the one who brings more knowledge. The necessities expressing stage will prepare a first session which will afford knowledge transfer and explanation.

5. RAD instruments

As I was saying above, the necessity for informational applications, obtained with low costs, led to the appearance of adequate programming instruments. More accurate speaking, there can't be an application rapid development, unless there is an adequate instrument for this. One of these instruments is Visual Studio C# 2008 Express Edition. I've chosen this working instrument, because it is free and easy to obtain.

We will illustrate the rapid development of an informatical application, using the RAD instrument Visual Studio C# 2008 and, for this purpose, we are going to build a Web browser.

After initiating Visual Studio C# 2008 and creating a new *Windows Forms Application* project, the form that appears is adjusted, giving it a larger size.

Afterwards, the working instruments box , the toolbox, is activated and the common control, *WebBrowser*, is chosen. Clicking on the projection area, the Web browser will gain control over the entire surface. You click on the browser's *lock/unlock button* and you choose the *Undock in parent container* option.

You adjust the web browser on the projection area, so that a part of the surface should remain outside the browser's control, in the lower or the upper part of the area. After this, you choose, from the toolbox, the controls *Textbox* and *Button*, which will be inserted in the free section.

Further on, you name the toolbox *textURL*, and the button, *goURL* and you also change the button's value in *goURL*.

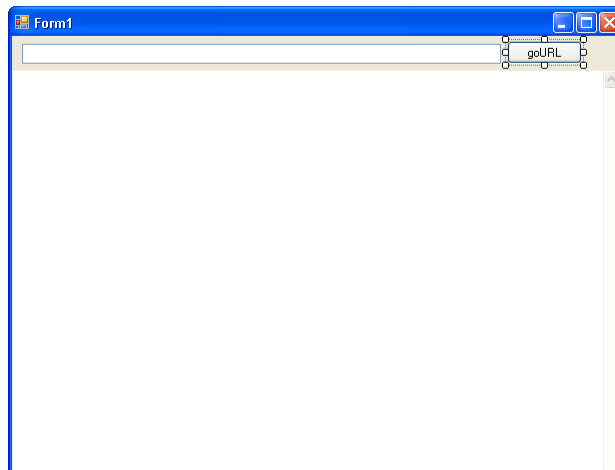The result of these processes is similar to the one in Figure 4.

Fig.4. The Web browser resulted after three processes

The web browser will be initiated, a web page will be introduced and the results will be, thus, seen.

What is to be noticed here, is the rapidity in building this application.

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