FreeAlgView: *FreeAlgView project charter*

Aarón Bueno Villares <*abv150ci@gmail.com*>

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1 Introduction

This document is the *FreeAlgView project charter*. *FreeAlgView project* will be formalized here as a project responsible for building the *FreeAlgView* application, a libre algorithm animation with learning purposes[1]. The project is concerned no just with building this application but also with ensuring its success, meaning that the application just is used and has continuity prospects.

[1]The term "libre", from the Spanish and French languages, is a well-known alternative to "free", because of "free", in English, means both "at no cost" and "having liberty".

2 Surroundings

2.1 History of *FreeAlgView*

About ten months ago, *FreeAlgView* was being developed during around two months, but in a pretty much informal manner, whose outcome was a very simple prototype.

That first *FreeAlgView* development was carried out in order to participate in the VI edition of the *Concurso universitario del software libre* (Libre Software University Contest), a Spanish university programming competition organized by Spanish universities. That prototype is a simple interprete with a simple graphic interface. Its operation is very simple: the user has to write an algorithm in a interpreted language designed to *FreeAlgView* (intermediate between C and pseudocode), and to execute *FreeAlgView* with this algorithm (its filename) and its parameters. The execution is carry out, first, saving the complete evolution of the program state, and then, visualizing it as a animation: a box to each variable, lineally organized, and showing iteratively the values of this variables as the stacked set of states are readed. Due to lack of time, the project (and the contest) had to be discontinued.

Now it will be reseted more formally by means of project management issues.

2.2 Origin of the idea

The principal motivation for realizing this project is to generate an useful learning tool, due to I had always been interested in teaching, popular science, and everything else regarding knowledge and its popularization. Previosly, in the V edition of the contest above cited, I made other application related to popular science. Specifically, an application about cladis-

tic (a branch of biology). I win two awards in that contest: absolute in the local contest of my university (Universidad de Cádiz) and a special mention on its national chapter , and with a lot of new experience and knowledge gained. With this new knowledge, above all related to visualization and graphical interfaces (OpenGL and Qt), it occurded to me casually, remembering the traditional sorting algorithm animations as that of quicksort or bubblesort (that anybody can found in youtube, for example), to apply it to my own field: the computer engineering/science. And so was as *FreeAlgView* idea was born.

Now, in an Erasmus student capacity I will reset the project in a new formaler manner, and also I will enter it in the current VII edition of the *Concurso universitario del software libre* as extra motivation, as a way of spreading and personal satisfaction.

2.3 Project guidance

This project will be achieve following the PMBOK® GUIDE recomendations (fourth edition, 2008). PMBOK® GUIDE is a "recognized standard for the project management profession" wrote by a group of specialists in the project management area and coordinate by PMI, assembling the "subset of the project management body of knowledge generally recognized as good practice". "PMBOK" is the acronym of *Project Management Body Of Knowledge* and "PMI" of *Project Management Institute*. This last group is a not-for-profit professional organization relates to project management profession, which establishes standards, researches, educates, works as a certificate authority and, in general, does all types of services relates to the project management profession. Thus, the PMBOK® GUIDE is recognized as a higher quality standard in the project management issue.

Due to the reduced nature of this project, compared with the complex nature of the projects aims of PMBOK® GUIDE, this practices and areas of knowledge have to be restricted to the bare essentials.

2.4 Justification

Facilitating learning is the key issue to accelerate the professional formation. Specialization is increasingly important and consumes more and more time. But it is also important to ensure the quality of this education. Bibliography related to algorithm visualization software states the visualization together with textual explanations improves substantially the retention of the students studying a certaing algorithm. In the other hand, motivation is the principal requirement in the success of the learning process. An application making easier the knowledge can increase the motivation of students while constitutes an advantage to learning, and thus the quality of the whole learning process is increased.

Furthermore, among all the currently algorithm animation applications and other related system, there isn't any system that meets the thinking traits for *FreeAlgView*. The most modern systems have built-in algorithms and data structures and can't animate any other algorithm or data structure. Many system aren't libre, or are so old that they have been abandoned. Other systems capable of animating or showing somehow any algorithm, aren't simple enough to be a learning tool, due to they work by means of calls to system's graphic routines.

Thus, there isn't any application or system satisfying the described needs, which will be subject of the *FreeAlgView project*.

2.5 Concepts and definitions

Project and product According to PMBOK® GUIDE, a project is a "temporary endeavor undertaken to create a unique product, service or result". That means a project has a defined beginning and a defined end (the project life cycle), and its outcome is unique. In this case, *FreeAlgView project* has as outcome a unique product, *FreeAlgView*. The life cycle of the project finishes when it the goals have been accomplish (the outcome product has been generated keeping the project requirements and constraints), the project fails or it has been abandoned. The life cycle of the product finishes when the use of the product is stopped. That means the product life cycle is a extension of the project life cycle. Thus, the project aims (of its life cycle) are different from the product aims (that it has a longer-term life cycle).

Software Software has to be distinguish from program and application. A program is pure code: a set of instrucctions written in a certain language and saved in a file, or binary code in primary storage being ran by the operative system. Software is a program, or set of programs, together with its documentation, configuration files, data and so on, forming an integrated package offering a service. Lastly, and application is a software that performs a task for human users. *FreeAlgView* is an application. Software is a synonym for computer software and software system.

Program is a synonym for computer program. Application is a synonym for application software. Often all of them are used as synonyms but this concepts they will be used here with its correct meanings.

Project charter A *project charter*, just as explained by PMBOK® GUIDE, is a document establishing a contract with the external organization asking about making a project. In this project, a *project charter* is a document establishing a initial setting-up of a project, not a contract with external entities. This meaning is closer to the *Project Initiation Document*, as defined by PRINCE2 methodology. See the discussion in §3.

Learning-oriented application A learning-oriented application will be distinguished here from teaching-oriented application. A teaching-oriented application is defined here as an application for supporting human persons teaching something to other human person. This excludes self-learning. A learning-oriented application is in contrast defined here as an application for supporting human persons can learn, without aditional restrictions. This second definition is thus more general than the first one. This definitions are *de facto* definitions for this project. The use of "educational software" is avoided here since it can include other aspects not related specifically to "adquisition and delivery of knowledge".

Software community A software community is a group of persons together with its communication tools who are interested in a certain software, either as a user, developer or simply supporter. This communications tools are those that have been created expressly for this software by its originating developers, irrespective of anything else tool used additionally by the community. This definition is a *de facto* definition for this project. For taking a complete software community isn't enough design communication tools, as well it is neccesary to assemble a interested group of persons. A complete software community is an essential requirement for ensuring the software continuity.

3 Purpose of this charter

The purpose of this charter is to formalize *FreeAlgView project* as a real project and its goals. According to PMBOK® GUIDE, a project chart is, *inter alia*, a document that "authorizes a project or phase" and "establishes a partnership between the performing organization and the requesting organization". Due to *FreeAlgView project* is out of any business or organization, it is independent of any contract with "requesting organizations", and it isn't even neccesary to sign this document to formalice it, this document doesn't constitute a project chart according to PMBOK® GUIDE description.

It should be noted as well that this project is also not formaliced by this document in a institutional manner, for example, as Final Degree Project. My origin university (Universidad de Cádiz) and my destination university as Erasmus (Fachhochshule Würzburg) are just the institutions in sole charge of this formalization.

Nevertheless, this document is in fact a *project charter* formalizing *FreeAlgView project* inasmuch as an *internal*[2] document specifying its definition, higher-level goals, requirements and restrictions. Its overriding objetive is to establish unambiguosly the framework on which this work will be realized by me as the sole executor of this project. Anyway, this document will be freely available to any other user or developer interested in the purposes leading the project and its corresponding product.

4 Project description

4.1 Project definition

The name of this project is *FreeAlgView project*. *FreeAlgView project* is the project undertaken to create *FreeAlgView* and its software community. *FreeAlgView* is, respectively, a "libre and learning-oriented algorithm animation application". The central service of *FreeAlgView* is to show a graphical animation of the execution process of any algorithm, including whichever neccesary data structure for its execution.

This project concerns only with building a first version of *FreeAlgView*, and not a complete application. That means, for example, *FreeAlgView* will not contain effective self-learning features. The project concern thus with building a product with a first set of features for getting a usefull tool and ensuring its continuity (that implies to develop a community).

FreeAlgView is an acronym for "Free Algorithm

[2] That means this document is only for the project itself and it doesn't establish a contract with any external entity.

Viewer"[3].

4.2 Goals

The sintetized *FreeAlgView project* goal list. All words of this list have been thoroughly choosed for formalizing the project goals.

G0	To build an application improving algorithm learning by means of graphical animations of the process execution of any algorithm.
G1	To create its software community and ensure its future survival.

4.3 Project and product scope

The project aims to create *FreeAlgView* and its software community. Anything else work which is not directly-related to this aim is outside of the project. The product aims to support algorithm learning. Anything else feature which is not directly-related to algorithm learning is outside of the product.

That means, for example, features for professional purposes is outside of the product, and thus its corresponding work is outside of the project.

4.4 Requirements

Project requirements

RPJ0	The project has an iterative nature with at most four stages to distribute the whole work.
RPJ1	Each stage has its own project plan with a sort of objetives to accomplish.

Product requirements

RPD0	The product is object-oriented designed.
RPD1	The product source code is readable, well-documented, has a unified style, and is functional-decoupled and functional-cohesive.
RPD2	The product is designed for internationalization.
RPD3	The product processes algorithms written in a language intended for human reading.
RPD4	The product has an intuitive graphical user interface.

[3] "Free" and not "libre" was choosen for the name of the application for similarity with previous projects.

4.5 Constraints

Project constraints

CPJ0	Every document of this project is licensed under the Creative Commons Attribution-ShareAlike License terms.
CPJ1	The project is 148-days long (from 21st October 2012 until 20th March 2013).

Product constraints

CPD0	This product is licensed under the GNU General Public License terms.
CPD1	The documentation of this product is licensed under the GNU General Public License terms.
CPD2	The product is implemented through the programming language C++.
CPD3	The product is multiplataform.

4.6 Assumptions

A0	The English is the best language to further project and product.
A1	Setting libre project and product is the best form to further them.
A2	Following PMBOK® GUIDE recommendations is a good form to get success in the project.

5 Deliverables

Outcomes of this project are as follows:

FreeAlgView The *FreeAlgView* software, that includes user and developer manual, source code and source code documentation.

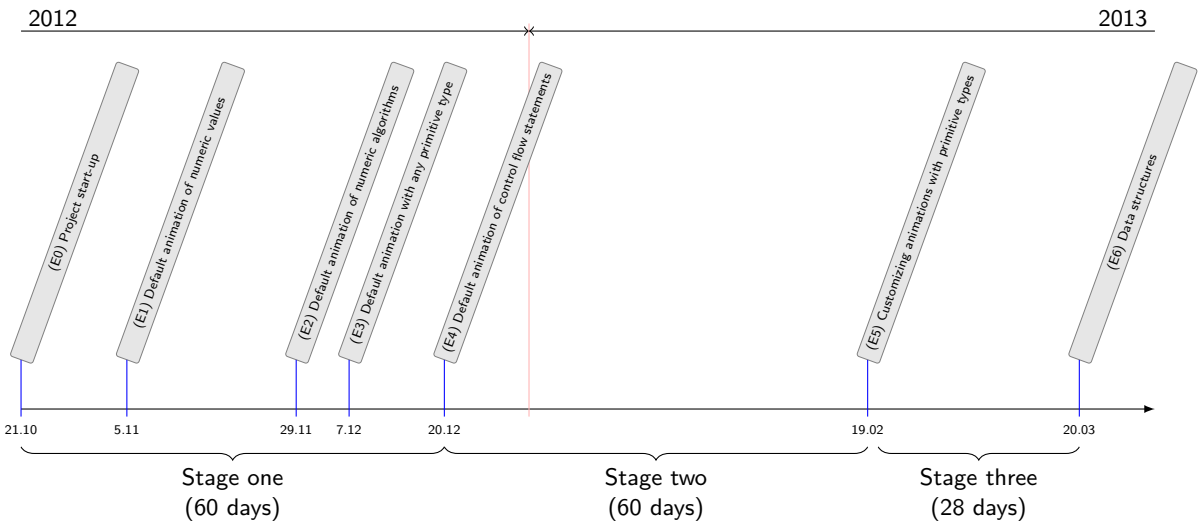
***FreeAlgView project* memory** A document describing the work realized. A detailed summary of the whole project. This document is a requirement for passing the "Final Degree Project" course[4].

6 Objetives and chronogram

A first group of concrete objetives and timelines will be described here as a means of further planification

[4] *Proyectos Informáticos* in the University of Cádiz (Spain), and *Projektarbeit* in the Hochshule für angewandte Wissenchaften Würzburg-Schweinfurt (Germany).

Figure 1: Preliminary chronology



E0 *FreeAlgView project charter* launched. Beginning of the project execution.

E1 Default animation of values of algorithms working only with numbers feature must be implemented.

E2 Default animation of values and operations of algorithms working only with numbers feature must be implemented.

E3 Default animation of values and operations of algorithms working with any primitive type feature must be implemented.

E4 Default animation of values, operations and control flow statements of algorithms working with any primitive type feature must be implemented.

E5 Allowing users to customize animations of primitive types, its operations and control flow statements feature must be implemented.

E6 Allowing users to create their own data structures and customizing its animation feature must be implemented.

orientation. Only functional features for the product will be described here. Objetives related to set up a software community are outside of this preliminary timeline.

The project has (provisionally) three stages (iterations), each stage with a planning, execution and monitoring-and-controlling phases. The planning of each stage (the objectives to accomplish) depends on results of the previous stage. This project follow thus the spiral software development process model.

Objectives of the first stage will be more concretly defined in this chronology, while the other stages will be only defined on its final result. Figure #1 depicts the preliminary chronogram and objetives.

In short, the first stage takes up implementing the default animation without data structures, the second stage implementing animation customization, and the last stage implementing data structures (built-in and user's data structures, with default and customizing animations). It will be assumed heaviest stage is that dedicated to customization (the second stage). Nevertheless, the first stage will be also a long-term stage due to the uncertainly of a first contact with the application.

7 Risks

Two higher-level risks have been identified:

- Trying to create an impossible application: perhaps, it is impossible or really heavy to customize any type of algorithm animation in a comfortable and usefull manner.
- Not getting an initial impact for spreading the application: perhaps, meeting with an initial interested group of persons that help to spread the application isn't achieve.

8 Reporting framework

The project development evolution will be well-documented and freely available on the Internet, by

means of a blog, web page to source code documentation and public repositories. The official language of the project, product and communication tools is English. The different communication channel will be described as follows:

***FreeAlgView* blog** Blog to inform about the project and product evolution, included technical issues, problems and so on. In this blog will be linked the other links decribed below. This blog was the used blog in the first development of *FreeAlgView* (see §2.1), and they still are all available (in spanish).

***FreeAlgView* documentation website** Website to upload the *FreeAlgView* source code documentation (Doxygen). This webpage will be of use as official website of the product.

***FreeAlgView* repository** Git repository of the *FreeAlgView* source code.

***FreeAlgView project* repository** Git repository of the *FreeAlgView project* documents source code (the documents of the project will be created in LaTeX).

The project documents (*project charter*, *project plan*, etcetera) will be upload in the *FreeAlgView* documentation website but they will be directly linked from the blog.

9 License