Dossier de compétences : candidature

Stéphane BÜCHELER
Address : Rue de Filipesti 5, 4630 Soumagne
GSM : 0499472301
Mail : stephane.bucheler@protonmail.com
February 14, 2018

Table of contents

I. INTRODUCTION

My name is Stéphane BÜCHELER, I'm 23 years old and I am from Liège (Belgium). I recently graduated from a Bachelor degree in *Computer science: Industrial orientation* with distinction at Haute École de la Province de Liège – INPRES (Seraing, Belgium).

Although I do not have solid experience in the workplace yet, I am really interested in the project for which I am applying. In this report, I will try to convince you that, based on the projects carried out at school and the ones of personal interest, I deserve to work on your project.

II. BACHELOR 1

During my first year of bachelor, I studied a lot of subjects, including the fundamentals of Database-Management System (DBMS) by manipulating data from a database by SQL queries, the basics of assembly programming by developing small programs - the final project being the realization of a reverse Polish calculator, the rudimentary about interface and control between an electronic system and a computer – comprising courses in electronics and control software which the final project was the programming in C of the course of a little robot named "BoeBot" through obstacles, and the principles of the network.

But of course, the main course I followed, which lasted a full year, was the C programming. I learned to use all the notions related to this language including types, functions, library, arrays, pointers, structures and dynamic allocations. My final project for this course was based on a specification allowing players to rent games in a store. It was thus possible for

any manager to register players and games in a database, perform research on them, sort them according to different criteria, or keep a history of rented games. This final project allowed me to stand out from my classmates because I had to, despite it runs in a non-graphical terminal, develop my own graphic library. I received the best grade of my class.

In this library, it was possible to change the color of the text or its position on the screen which made my application user-friendly. I also had to pay attention to possible memory leaks and processing time in terms of the accessibility of certain types of information. For instance, the different searches on the database were based on a dichotomy search algorithm. As shown, I always fully commit myself to a project, from start to finish, and to improve it visually and in terms of coding.

During my spare time, I created several programs in C, such as one aimed at calculating a quadratic equation, another aimed at determining and checking all points on the circumference of a given 2D circle, another which recorded the information related to my student jobs (salary, hours, the name of the company, dates, hours, etc.), a graphical animated rocket heading to Space while being attacked by aliens, and finally a non-graphical game in a terminal named "LoveSimulator" which consisted of talking to a girl named Alice. Every time any user was asked a question, they would have multiple (3) choice answers, from which predetermined questions would follow, based on the individual answers. The structure of the game was quite close to a binary tree. Not only was the objective of the game to further the discussion with Alice, but also to assign a personal storyline to every user. As shown, I like to discover, to experiment, and to set up personal projects with already mastered skills or unknown technologies and artistic features.

III. BACHELOR 2

During my second year, I studied new subjects such as C++ programming and the beginnings of the concept of relational analysis and object-oriented programming. The final project for this lesson was based on an educational requirements specification based for schedule creation for a school. It was possible to register teachers, pupils, lessons and locals and to plan schedules, as well as carry out research, sorting or even print a particular schedule for a teacher. I learned to use the notions related to C++ especially classes and flux.

I also was taught about the fundamentals of Unix systems. For serveral courses, I had to use the "Solaris" operating system to make my C++ application with the command line tools as "make" or "gcc". Besides the C++ project, I also made programs with the specificities of Unix, using signals, processes, semaphore, Inter-process Communication (IPC) or even shared memory.

Once I had mastered the object-oriented concept, I was introduced to C# and JAVA. For each of this course, I implemented all the object-oriented logic in one application. Regarding C#, the final application was similar to the “Paint” application from Microsoft on Windows.
It would allow any user to draw shapes (segments, squares or circles), to change their color, their size or their position. This project was based on two very distinctive parts. First, the lower layer with a full object-oriented logic included objects, lists, interfaces, inheritances, and so on. It was the logical representation of the data. Secondly, the upper layer, thanks to all the features of .NET, allowed me to represent the data visually. This project was mathematics-oriented. For example, when a user wanted to select a shape in the toolbox, it was necessary to determine whether the mouse cursor was touching the shape, or close enough to be selected.

Regarding Java, my final project was based on a specification about the management of a hospital. It would allow any user to register doctors and patients, to schedule appointments, to carry out searches, to sort information, or to serialize data. The object-oriented logic was really advanced in Java.

I also learned the principles of threads by making in C a game similar to the famous “Snake”. Like “Snake”, the purpose of the game was to make the snake eat apples while avoiding obstacles in order not to lose “lives”. Every apple eaten made the snake become longer. The difficulty of the levels was increasing. While using threads, I had to pay attention to the protection of shared resources and the synchronization of the different elements. Thanks to this experience, I am now able to use threads in several languages, including C, C++, Java and C#.

Regarding the robotic technology seen during my studies, I was introduced to “QNX” operating system which helped me perform real time operations and communicate with external systems like “Petra”. “Petra” is a machine that moves mechanical parts on its carpet and tests their validity. In order to several pieces to be analyzed simultaneously, I had to make a program in C using threading.

In robotics, I also enjoyed developing a personal project for which I had the best grade in my class. This project was made with “Arduino”, a home automation system which calculates the temperature in a room and therefore detects strong sources of heat (like a fire). Moreover, according to the distance between objects, several LEDs lit up. Thanks to “Arduino”, I documented myself, learned its language, and set the electronic system up from scratch, with all the electronic elements (sensors, etc.).

Finally, for my English examination, I chose to speak about "Advanced Military Weapon” because of the then tensions between Russia and Ukraine. In 2014, Crimea was annexed by Russia, which led to waging fights between Ukraine and Russia. Fond of the topic, I thought it was a good idea to debate the issue of current weapons in the world. What is more, that topic allowed me to show my enthusiasm for advanced military weapons, such as drones or exoskeletons.

During my free time, I worked on and updated the “LoveSimulator” (see Bachelor 1) to include C++ and a base of object-oriented logic to increase game performance. Although I occasionally used Windows or a Unix / Linux distribution, I mostly worked on a MacBook Pro with the “Mac OS X” operating system. Given that “Mac OS X” comes from Unix, I have been using the command line tools for all of my C/C++ projects.

Once the “LoveSimulator” was almost completed, I embarked on an application for IPhone using the SWIFT language from Apple. For the birthday of one of my friends, I decided to make an original gift by animating a cartoon in C#. It was a scene with a boy wishing “Happy Birthday”, with music in the background, Emoji’s on the screen and several plans that overlapped.

IV. BACHELOR 3

In the last year of my bachelor degree, I was mostly taught about distributed systems and embedded systems (creating and exporting project on a microcontrollers).

That year was also marked by a consequent project in JAVA. I created several secure and networked servers / clients applications for the management of an airport, from online ticket purchase to the taking off of the plane. The first part of the project involved the creation of a server and a client network application in C/C++ to check the registration tickets. Subsequently, I had to set up other java network servers that could communicate with Java or C client applications to perform other tasks at the airport.

The project was greeted by enthusiasm from my teachers because instead of using the method seen in the theoretical course, I decided to conceive my own concept called “autonomous object”, which was aimed at achieving communication between a client and a server. Those objects were stand-alone elements that would be exchanged between the client and the server and were able to perform the requested task. The client was responsible for configuring the object and the server for receiving the object, not aware of its nature. The object was able to work alone thanks to its work method and the resources held by the server.

This example shows my commitment to set up the most generic system. I also included cryptography in some client and server applications in order to secure network connections, especially regarding the purchase and payment of tickets, with symmetric and asymmetric cryptography concepts, Digest, Hmac, Digital signature or Certificate. There was also a web part and the numerous servers worked with a “MySQL” database.

The last big project that I worked on while at school was an image processing application. Having used the “LabView” software to perform different treatments on an image (turning an image to grayscale, inverse its colors, change its size, thresholding and filtering to determine the outlines contained in an image). The validity of mechanical parts could be checked based on one or several criteria. Keeping that in mind, I had to design almost the same application, but from scratch. I implemented it in C# to have graphical visualization and ease of tools. I created my own low level object "Image". I could therefore understand how to represent an image with its pixels (RGBA) and perform different treatments (greyscale, thresholding, etc.) on this low-level class which increased the speed of treatment. I only used high-level objects, provided by .NET to display the image. I did my best so that the GUI of the application was user-friendly too.

In my free time, I discovered several technologies and tried to make several projects, such as a network chat using TCP in JAVA, scripts to encrypt or decrypt data on my computer, several little games in Unity or improving “LoveSimulator” (see Bachelor 1).

V. INTERNSHIP

Being a video game player and enjoying the artistic side of gaming, I had always told myself that if I had the opportunity to work on a videogame project, I would put all my chances on my side to get there. And that's what happened. In 2017, I was able to achieve one of my personal goals and one of my childhood dreams.

For 4 months, I was an intern at “303% Studio”, a company located in Liège (Belgium), with which I conducted my Bachelor thesis titled “Développement d'un jeu vidéo en réalité virtuelle et augmentée multiplateforme en réseau sous Unity”.

The work I provided was based on the game “Dungeons & Dragons”. I had to develop a videogame which allowed players to, on one side, create and customize their own character according to several criteria (sex, races, classes, morphologies, clothes, weapons, etc.), and on the other side, for a particular player named “GM” create a game map. As a result, all the characters would be loaded on the map created by “GM” for playing a game.

Although the major programming was in C#, it was the first time that I used Unity, a game Engine. I was mainly in charge of the creation and customization parts and I really invested myself in the project. I had to start from scratch, keeping in mind the logic, and creating the entire application, be it at the code level with the different classes, or at the graphic level in Unity looking for 3D model, UI element or creating music or stories. I also worked with augmented and virtual reality.

Given that the game was multiplatform, I had to make it available to both computers and smartphones. Therefore, I implemented a distributed system using “javascript” and “nodejs” to send and get through Http via queries data from a database.

The grade I had was 17/20.

Figure 1 : Screenshot from the project i developed in my internship

VI. CONCLUSION

I am really interested in the project for which I am applying. I am a motivated, determined and creative person who always tries to discover and invest himself in what he does. I am open-minded and interested in the world around me. I 'd like to contribute to this project, as valuable as innovative, focused on the future. If you give me a chance, I will prove you that I can carry out this project. Thank you for taking the time to read this document.

Stéphane Bücheler