Avrupa Bilim ve Teknoloji Dergisi
Sayı 14, S. 77-82, Aralık 2018
© Telif hakkı EJOSAT'a aittir
Araştırma Makalesi

www.ejosat.com ISSN:2148-2683

European Journal of Science and Technology
No. 14, pp. 77-82, December 2018
Copyright © EJOSAT
Research Article

Chameleon Turkish Programming Language

Okan Bingöl[1*], Ecir Uğur Küçüksille[2], İbrahim Kuru[3]

[1] Süleyman Demirel University, Faculty of Technology, Department of Electrical and Electronics, 32260, Isparta, Turkey
[2] Süleyman Demirel University, Faculty of Engineering, Department of Computer Engineering, 32260, Isparta, Turkey
[3] Provincial Directorate of National Education, Science Art Center, Antalya, Turkey

(First received 11 July 2018 and in final form 9 November 2018)

(DOI: 10.31590/ejosat.442334)

Abstract

Nowadays, humans use computer applications in all areas of life from the Ethernet to desktop applications and mobile devices. These applications work on different platforms, but when an application is developed, it is necessary that applications must be recoded. This situation is hard for elementary students developing applications for different platforms. Moreover, it is quite hard to learn existing programming languages for elementary students educating in Turkey due to the programming languages which are in English and insufficient level of English education at high school in Turkey. In this study, Turkish Chameleon programming language producing output all platforms has been developed. The programming language was applied on students and the results were shared.

Keywords: Cross Platform Programming, Turkish Programming.

[1] Corresponding Author: Süleyman Demirel University, Faculty of Technology, Department of Electrical and Electronics, 32260, Isparta, Turkey, okanbingol@sdu.edu.tr

1. Introduction

Softwares have become applicable in every field of life in parallel to rapid development of technology. Softwares which were developed only for desktop computers have taken its place on the internet and mobile platform recently. Platform can be defined as the media where applications are operated. Applications of each platform written in their own language are called native apps. It has become compulsory to develop software on more than one platform for the software developer who used to develop for a single platform. This was considered as a problem at first because it was not possible to convey a software developed with any programming language on internet or mobile environment quickly. This required more effort. Moreover, cases when the language of program does not support internet or mobile platform caused developers have more troubles. This problem was overcome in time and cross-platform software development tools helped solving problems of developers.

After the application is written once with cross platform software development tools, it is chosen for which platform it is wanted to be compiled and application is made for that platform. Although this is a kind of convenience, most of the developers still prefer to develop native applications.

In parallel to all these developments, coding education lowered from university level down to elementary grade. It is supported by the states that children should attain algorithm and programming skills at early ages.

Steps have been and still being taken in Turkey as well. Students generally do programming with drag-and-drop method and give education in this way. In the process of programming, students have problems in understanding and learning since English education is insufficient at high-school level and existing programming languages are in English. In this study, in order to overcome all these problems and teach coding at any level easily, a new programming language named “Chameleon” was developed which can work cross-platform with Turkish coding structure. This programming language was used during education of high-school students. A survey was done at the end of education, views of students were obtained and results were shared.

2. Resources Summary

The main aim of the study carried out by Küçük (2008) is to enable program developers who have different programming language experience generate codes without changing their programming habits. For this aim, Cezve was designed and created which is a new programming language infrastructure. In order to show language customization mechanism during study, a sample programming language named Java was created [1].

Ribeiro and Silva (2012) studied tools and frameworks which enhance development of cross platform mobile applications and put forward a general overview about this field [2].

In their studies Guangtai et al. (2014) compared platform based application development languages (Java for Android, Objective-C for IOS) and cross-platform application developments tools (JavaScripts) [3].

In his study, Karlı (2014) developed cross-platform mobile platform by using Hyper Text Markup Language – HTML and JavaScript [4].

Fu et al. (2017) mentioned about how difficult it is to teach C programming language which is mostly the first programming language to be taught at most of the universities. They suggested analysis of LAPLE (Learning Analytics in Programming Language Education) in order to make it easy to teach and learn C programming. They stated that with LAPLE, teacher can comprehend learning status of students in real-time and they can improve their teaching materials by using analysis result [5].

In their study, Portelance et al. (2016) shared the results of 6-week education given to 62 kindergarten students by using ScratchJr. As a result of this study; it was determined which ScratchJr programming blocks they used while doing their projects and it was analyzed in the sense of difference between classes and patterns [6].

In their study Xie and Zong (2017) analyzed current status of computer programming language education both in China and foreign countries, studied problems about programming language education at vocational high-schools and suggested a teaching method based on Python programming language [7].

In their study, Teng et al. (2017) present a teaching system assisted with augmented reality which provides visual presentation and interaction in order to teach programming to students to develop 3D application. An experiment was carried out with 34 university students in order to measure the success of this system. As a result, it was determined that augmented reality assisted system is better [8].

In their study, Lopez et al. (2016) evaluated class environment where a visual programming language was taught by using Scratch and analyzed results and attitudes of 107 students at 5-6 grades in five different schools in Spain [9].

In their studies, Kui et al. (2017) mentioned how python programming lesson based on visualization would correct and optimize teaching methods [10].

Kiriş et al. (2017) developed a mobile application in order to demonstrate control of photovoltaic panel and information obtained from this panel [11].

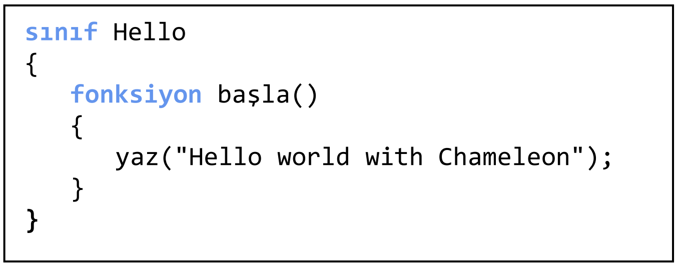
Garip et al. (2017) suggested a movement planning for more than one robot by using A* algorithm.

3. Application

In this section, information will be given about the programming language Chameleon.

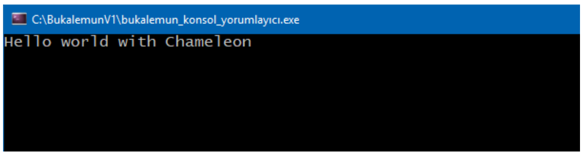
3.1 Chameleon Programming Language

Chameleon is a language which was developed to create an application with Turkish coding structure on windows and Mobile media. After being complied for once, application written with Chameleon can be operated on Windows (console and form), IOS and Android. A sample code written with Chameleon is given in Figure 1 and output on the console screen of sample code is given in Figure 2.



```
sınıf Hello
{
   fonksiyon başla()
   {
      yaz("Hello world with Chameleon");
   }
}
```

Figure 1. Sample Code Written with Chameleon



```
Hello world with Chameleon
```

Figure 2. Output on the Console Screen of Sample Code 1

3.2 Chameleon Language File Extensions

File extensions and their functions of Chameleon language are given in Table 1.

Table 1. Chameleon file extensions and explanations

File Type	Function
.buk	Source code file of Chameleon. Written codes can be saved as *buk* file and corrected again.
.ale	In cases when more than one .buk file is sent in compiler, source codes files are sent after written in .ale file line by line.
.mun	Compiled code file (Console applications, only windows)
.munf	Compiled code file (Form applications, Windows, IOS and android)

3.3 Compilation Chameleon Codes

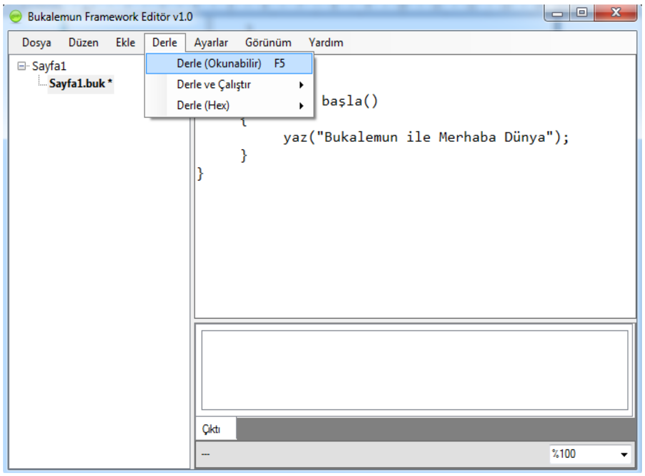
It was aimed to compile the written codes in the compiler and form an ordered instruction set in order not to need parsing in the process of interpretation. In order to compile codes written with Chameleon, a compiler program was written with Delphi and it was named as "bfd". Compilation is made according to parameters sent to this program. If no parameter is sent, compilation is made as console application. Compiler parameters and their meanings are given in Table 2.

Table 2. Compiler parameters and their meanings

Parameter	Meaning
-form	Shows that application includes form controls.
-beklet	Fixes compiler on screen after compilation process.
-hexyok	Makes results of compilation readable.
-tokengoster	Shows tokens on console screen after word analysis.
-konsolayaz	Shows code on console screen after compilation process.

3.4 Chameleon Framework Editor

Chameleon Framework Editor (BFE) program has function such as writing chameleon codes, debugging, sending source codes to compiler, operating compiled application and monitoring compiled results. Screen display of BFE program is given in Figure 3.



```
                başla()
        {
            yaz("Bukalemun ile Merhaba Dünya");
        }
}
```

Figure 3. Chameleon Framework Editor Screen Display

For Chameleon source codes compilation process, there are three options as seen in Figure 3. which are Compile (readable), Compile and Run, Compile (Hex).

Compile (readable), compiler creates an executable file as a result of compilation. There are 5 character hex equivalents of codes in this file. Applications run by reading these hex codes. In some cases, it is required to have more readable result by putting actual equivalent of hex code instead of hex codes themselves. In this "-hexyok" is inserted as parameter in the compiler.

Compile and run, enables codes created in compilation being sent and run in the interpreter.

Compile (Hex) enable hex codes compiled as a result of compilation being displayed to the user.

3.5 Chameleon Codes Life Cycle

Chameleon code should go through a few steps in order to be ready for interpretation. Programmer writes source code and sends to the compiler. Compiler disintegrates source codes to meaningful pieces with word analysis. These meaningful pieces are sent to syntactic analysis. In this phase, meaningful pieces which should be in a row are controlled and wanted lines are made by intermediate code generator. Compiler wrote these intermediate files on a file and completes the process. Then the file is opened by the generator and interpretation begins from begin command of the first function. These steps are given Figure 4.

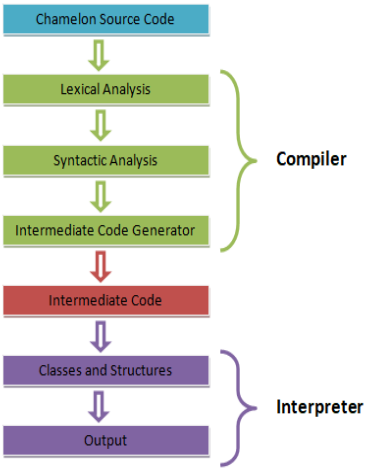


Figure 4. Chameleon Codes Life Cycle

3.6 Chameleon Language Interpreters

Interpreters were written with the programming language of platform for Chameleon language specific to each platform. In this way it was enabled to interpret smoothly every code taken from compiler in Windows, IOS and Android platforms.

3.7 Characteristics of Chameleon Language

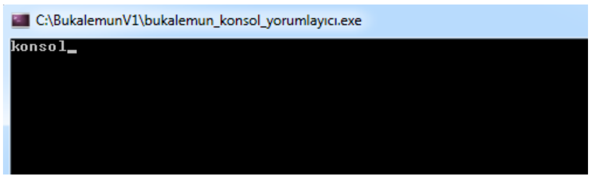
Just like in all the programming languages, there are structures such as data types, operators, control statements, loops, functions etc. in chameleon programming language. Since it would be too long to explain these parts in the study, detailed information is given in https://github.com/imkuru/bukalemundili/wiki github address.

3.8 Sample Application

In the sample given in Figure 5, platform variable was controlled, if it is console application the value of platform variable is written on the screen. If not, value of platform variable is written on message window. Output of console screen of the application is given in Figure 6, windows screen output is given in Figure 7, android and IOS screen output is given in Figure 8.

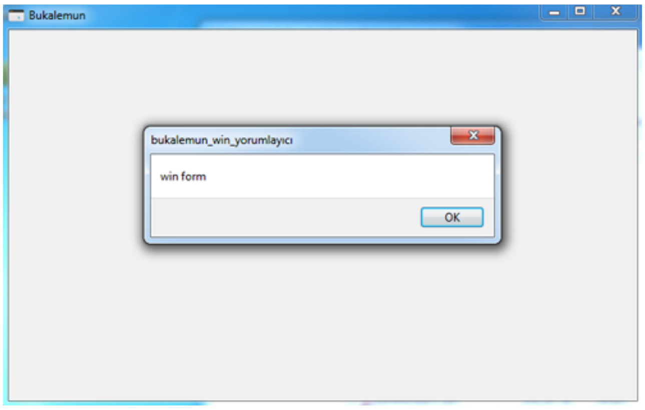
```
sınıf Platform
{
   fonksiyon başla()
   {
      eğer platform == "konsol" ise
         yaz(platform);
      değilse mesaj(platform);
   }
}
```

Figure 5. Sample Code



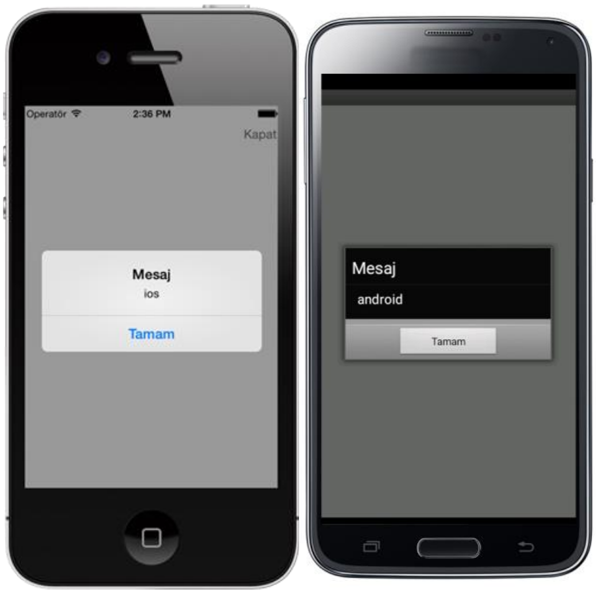
```
konsol_
```

Figure 6. Output on the Console Screen of Figure 5



win form

Figure 7. Output of Figure 5 on the Windows



Mesaj
ios

Mesaj
android

Figure 8. Output of Figure 3.5 on the IOS and Android

4. Survey

In order to analyze the effects of Turkish programming language on programming learning; the language was applied on 2 different groups being high-school grade second class (22 students) and high-school third class (34 students). Before the survey, both groups were given 3 weeks of chameleon language education. Question asked to students were given at the end of the study.

According to the survey applied on 22 high-school students at second class, percentage distribution of students' answers are given in Table 3. According to the survey applied on high-school students at third class, percentage distribution of students' answers are given in Table 4. According to this, 86% of students at second class and all the students at third class stated that Chameleon language is an easy programming language. All the 2nd class students and 91% of third class students think Chameleon language is helpful. 86% of second class students and 79% of third class students stated that their programming skills improved thanks to Chameleon programming language. 68% of second class students and 88% of third class students stated their competence in problem solving increase thanks to Chameleon programming language. 91% of second class students and 79% of third class students stated that their interest towards programming increased thanks to Chameleon programming language. Finally, all the second class students and

88% of third class students stated they will suggest chameleon programming language to others.

Table 3. Distribution percentage of High-school 2^{nd} grade (22 students) Group Survey answers

Line	Question	Definitely No	No	Neutral	Yes	Definitely Yes
1	Chameleon is helpful in learning programming language.	0	0	0	50	50
2	My programming skills were good before Chameleon.	5	5	54	36	0
3	My programming skills increased after Chameleon.	0	0	14	72	14
4	My competence in "Problem Solving" increased thanks to Chameleon.	0	0	32	54	14
5	Chameleon coding is easy to learn.	0	0	14	22	64
6	My interest towards programming increase thanks to Chameleon.	0	0	9	59	32
7	Chameleon interface is easy to learn.	0	5	9	54	32
8	Would you suggest Chameleon to others?	0	0	0	45	55

Table 4. Distribution percentage of High-school 3^{rd} grade (34 students) Group Survey answers

Line	Question	Definitely No	No	Neutral	Yes	Definitely Yes
1	Chameleon is helpful in learning programming language.	0	3	6	26	65
2	My programming skills were good before Chameleon.	3	18	59	17	3
3	My programming skills increased after Chameleon.	0	6	15	38	41
4	My competence in "Problem Solving" increased thanks to Chameleon.	0	6	6	56	32
5	Chameleon coding is easy to learn.	0	0	0	38	62
6	My interest towards programming increase thanks to Chameleon.	0	3	18	50	29
7	Chameleon interface is easy to learn.	0	0	6	47	47
8	Would you suggest Chameleon to others?	0	3	9	18	70

5. Results and Discussion

Learning programming is a difficult process. In this process, it is necessary to learn meaning of keywords and spelling rules of the mentioned language. This requires knowing specific parameters apart from programming logic. The language created in this study is completely composed of Turkish keywords and its coding is suitable for Turkish grammar.

With this study, a programming language named Chameleon was developed so that students at elementary, secondary, high-school grades would learn programming by using their own language. Students were motivated when they can operate the programs they wrote in console, windows and mobile media.

Survey results confirm the thesis that when students can receive education with programming language developed in their own language they would be more eager and learn programming faster.

References

Küçük, F. 2008. Özelleştirilebilir Imlaya Sahip Yeni Ve Esnek Nesne Tabanlı Bir Programlama Dili Geliştirme, Düzce Universitesi. Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 179s, Düzce

Ribeiro, A., Silva, A., R. 2012. Survey on Cross-Platforms and Languages for Mobile Apps., Eighth International Conference on the Quality of Information and Communications Technology, 3 - 6 September, 2012, Lisbon, Portugal.

Liang, G., Wang, J., Li, S., Chang, R. 2014. A Pattern-Based Bug Detector for Cross-Platform Mobile Applications, IEEE International Conference on Mobile Services, 27 June – 2 July, 2014, Anchorage, Alaska.

Karlı, G. 2014. Platform Bağımsız Mobil Geliştirim, Dokuz Eylül Universitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 70s, İzmir.

Fu, X., Shimada, A., Ogata, H., Taniguchi, Y., Suehiro, D. 2017. Real-time Learning Analytics for C Programming Language Courses, Proceedings of the Seventh International Learning Analytics & Knowledge Conference, 13-17 March, 2017, Vancouver, Canada.

Portelance, D.J., Strawhacker, A.L., Bers, M. U. 2016. Constructing the ScratchJr Programming Language in the Early Childhood Classroom, International Journal of Technology and Design Education 26(4), 489-504.

Xie, Y., Zhong, D. 2017. Reformation of Computer Programming Language Teaching in Higher Vocational Colleges Based on the Characteristics of Python Language Grammar, Advances in Higher Education, 1(1), 26-30.

Teng, J-H., Chen, J-Y., Chen, Z-H. 2018. Impact of Augmented Reality on Programming Language Learning, Journal of Educational Computing Research, 56(2), 254-271.

Lopez, J-M. S., Gonzalez, M. R., Cano, E. V. 2016. Visual Programming Languages Integrated Across the Curriculum in Elementary School: A two year case study using "Scratch" in five schools, Computers & Education, 97, 129-141.

Kui, X., Liu, W., Xia, J., Du, H. 2017. Research on the Improvement of Python Language Programming Course Teaching Methods Based on Visualization, 12th International

Conference on Computer Science and Education (ICCSE), 22-25 August, 2017, Houston, USA.

Kiriş, B., Bingöl, O., Uçar, M.H.B 2017. Photovoltaic Panel Simulation Using a Mobile Application, Acta Physica Polonica A, 132 (3), 922-925.

Garip, Z.B., Karayel. D., Özkan, S.S., Atalı, G. 2017. Path Planning for Multiple Mobile Robots Using A* Algorithm, Acta Physica Polonica A, 132(3), 685-688.