(IndoBlockly) Visual Programming Editor for Indonesia

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ABSTRACT

Informatics Engineering never be apart from programming terms. Industry in the informatic's field both in the national and international scope always need people who are expert in programming but it's hard to be an expert programmer. Learning programming is difficult, it needs precision, logic, and must memorize the syntax and the rules of programming language and its relevant. According in a research, took 10 years for novice programmers to become the expert ones. The education system in developed countries are already anticipating this problem, the programming language already introduced to children from kindergarten and elementary school, such as puzzle, logic games, and many others. Eg : *Scratch, Greenfoot, App Inventor, waterbearlang, and google Blockly.*

From the reason above, we developing a visual programming language called IndoBlockly that derived from google Blockly. The users doesn't feel *coding* but looks like arrange puzzle by using IndoBlockly. Our slogan is, "*Anyone can become programmers by IndoBlockly*". It equipped with C and Pascal generators, blocks which are constructed by the user can be converted into C or Pascal source code directly.

Keywords: *IndoBlockly, visual block programming , IndoBlockly to C, IndoBlockly to Pascal*

I. Introduction

The research proved that many students feel difficult when learning a programming language learning both the concept and it's application into the source code [1, 2]. Learning a programming language is difficult. To be good programmers, students need skill and hard effort to memorize and understand the rules of syntax to learn the programming itself [3] - [4]. The reason why programming seems difficult, because of the students should know and understand how to solve a problem and learn creating and specifying an efficient algorithm. In fact, many students have failed and encountered the problem at the beginning of the programming lessons / courses for the first time. There have been many researchers who studied this problem [5] - [6] - [4].

One of the factor mentioned are unprepared students to think and solve problems. In the process of learning in the previously level students are not familiar with the problem/ case, so they do not have good problem solving skills [7] - [8] - [9]. Some students which is quite capable to settle problems and constructing algorithms, typically also constrained the problem completion time [7].

Another cause of the failure in learning programming is almost students said that they dislike it because the concept is difficult to be understand [3] - [7], such as variables, data types, memory address. Why? Because of it is an abstract concept that can not be represented in the real world. [7]. Another cause is the learning process that tends to the traditional method. The lecturer only teach specific programming language syntax and immature in terms of understanding the concept [10].

Rapid progress of technology and software development makes a lot of software created in order to conquer the issues above. [11] Many of them is text based software, but there is also a visual-based software [12], and there is a game . [13] However, almost no software made in Indonesia among them. This paper will discuss a kind of software to aid students understanding programming derived from Google Blockly. We called it IndoBlockly. IndoBlockly has similar

visual language to the previous language as scratch, Greenfoot, AppInventor, [14] and Google Blockly. [15] The users doesn't feel *coding* but looks like arrange puzzle by using IndoBlockly. Our slogan is, "*Anyone can become programmers by IndoBlockly*". It equipped with C and Pascal generators, blocks which are constructed by the user can be converted into C or Pascal source code directly.

II. The Concept of IndoBlockly

Our original concept was build a software which is can help children or anyone who wants to learn programming, makes it easier, convenient, and fun. The software criteria are as follows:

1. In Indonesian Language.
2. Interesting, not boring, the users doesn't feel coding but feels like playing a game.
3. Minimizing the use of syntaxis which can difficult to be understood by new users.
4. Portable IDE (cloud / web-based).
5. IDE that has a display such as Desktop Environment IDE.
6. The result can be converted into C or Pascal source code and be executed with C or Pascal compailer directly.
7. Portable storage file format.
8. There are some logic games to hone skills of the children's brain.
9. Can enhance the users' comprehension towards the concepts of programming and algorithms.
10. Can connect to microcontroller.

Early 2012, Google launched Google Blockly with opensource license. And we agreed to take source from Google Blockly then modified it according to our concept.The name of IndoBlockly also taken from Google Blockly, Indo mean Indonesia and the Blokly are blocks puzzle from Google Blockly. The IndoBlockly concept shown in the Figure 2.1.

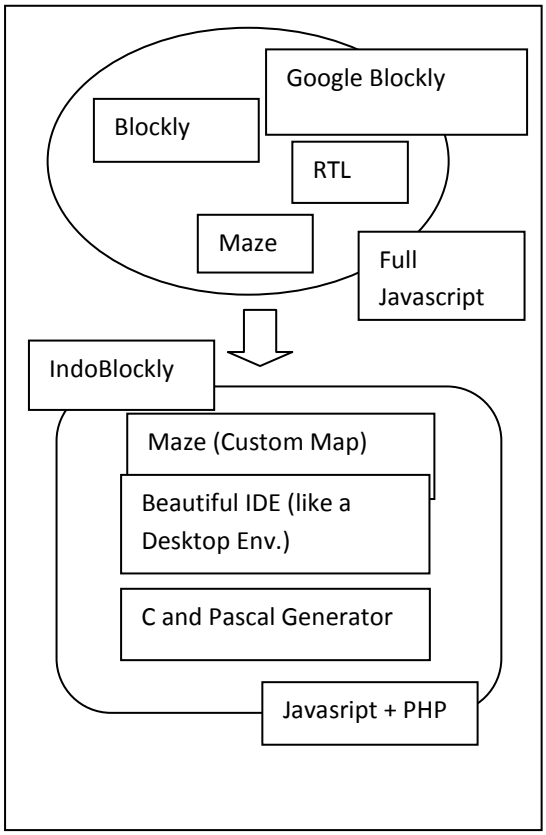

Figure 2.1. IndoBlockly Concept

III. Results and Discussion

We will explain the different between Google Blockly with the ones we have been modified, which called IndoBlockly. Here is the explanation :

1. In Indonesian

In accordance to our initial concept, we want a tool/ software for learning programming with Indonesian language. This will help Indonesian children who are not familiar with English yet, but we also provide English language for users who already familiar with the English.

2. Make Your Own Map for Maze Game

Maze is already on Google Blockly, then we just added another feature such as create their own maps, with beautiful layout and calculations of maze completion time (efficiency of the algorithm). Figure 3.1 display maze IDE, then Figure 3.2 is a view which showed how to create a map of the maze according the user's wishes.

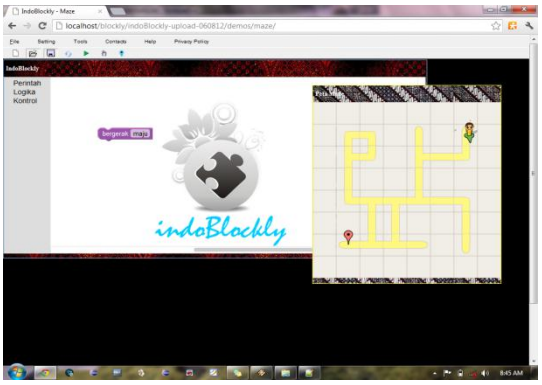

Figure 3.1. Maze IDE Layout.

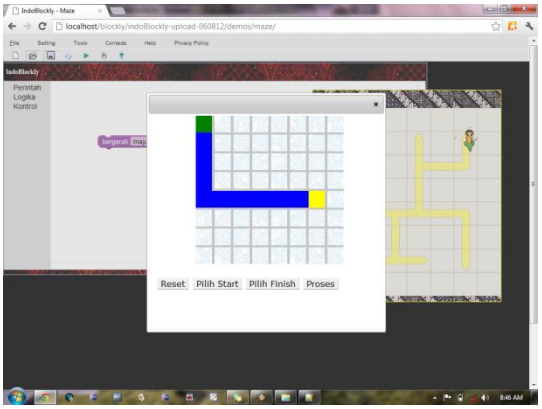

Figure 3.2. Custom Map of Maze.

By using the custom of map maze, user can make their own maps and then settled it with the most effective algorithms. For the future development, we will be provided IndoBlockly admin menu for custom map maze, so the teachers can set the same map then instructs the students to access IndoBlockly site and finish maze by the specified time. It also can be used as a competition to train students's logic. Figure 3.3 shown the results of custom map of maze.

3. Beautiful IDE with a similar display of Desktop Environment IDE by jQuery.

We want IndoBlockly looks like an Desktop Environment IDE. We can try the program by access it in http://apps.developers.or.id and then select Full Screen mode. It will not looks like web-based applications, but like a desktop based application. IndoBlockly using jQuery for the IDE. Figure 3.5 is shown the default view of IndoBlockly with one form. For now, IndoBlockly IDE only supports one form. It will support multiple forms in future development.

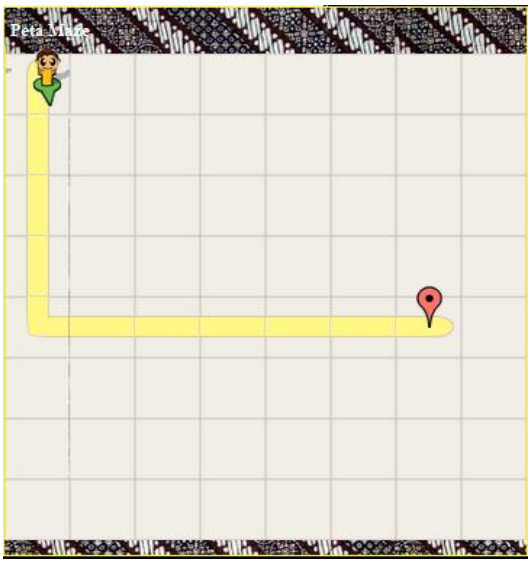

Figure 3.3. Results of the custom map of maze.

The example of the completion of above map of maze is shown in Figure 3.4.

Figure 3.4. Sample completion of Map Maze.

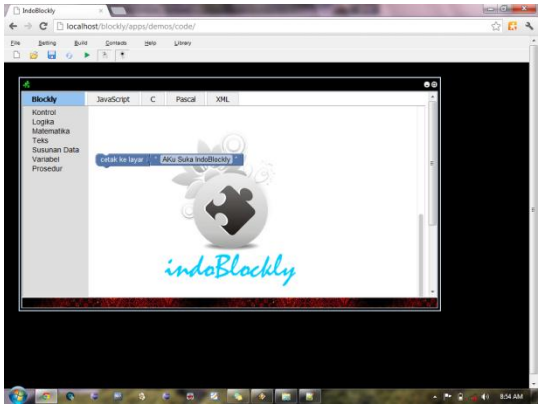

Figure. 3.5. IndoBlockly default view.

4. Converts Block Puzzle to C and Pascal Source Code.

Why should C and Pascal? That may be a question occurred to the reader' mind. The answer that it's the first language taught to the students who get know with programming for the first time. So, that has been our consideration to put our generator converter into both languages, it's C and Pascal. Figure 3.6. is shown an example of the block to calculate the area of a rectangle that requested input from the user.

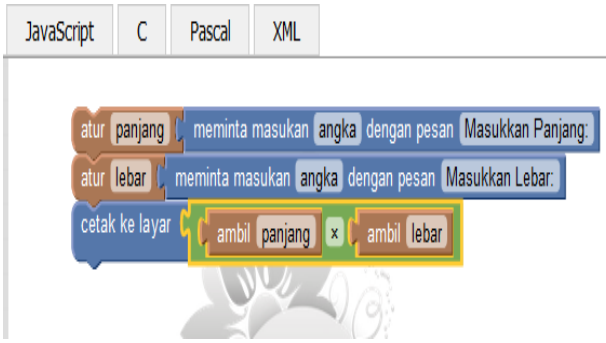

Figure 3.6. Block of the Application to Calculate Rectangle Area

Once the user compose the puzzle blocks according to the application to be made, the user can press the run button to execute. The result of the execution of the program can be seen in Figure 3.7. The result is from Javascript code compilation and this feature already exist on Google Blockly.

Moreover, the user can directly converts blocks into another programming language code such like Javascript, C, and Pascal by pressing the tab for the available programming languages. We can save the block using XML data formats, the XML files can be saved and re-opened or executed in other browsers. This storage format by use XML is already exist in the Google Blockly.

We can see the The results of the generated C source code is shown in Figure 3.8.The results of the execution from Calculate Area of Rectangle Program by using C Free 4.0 in Figure 3.9.

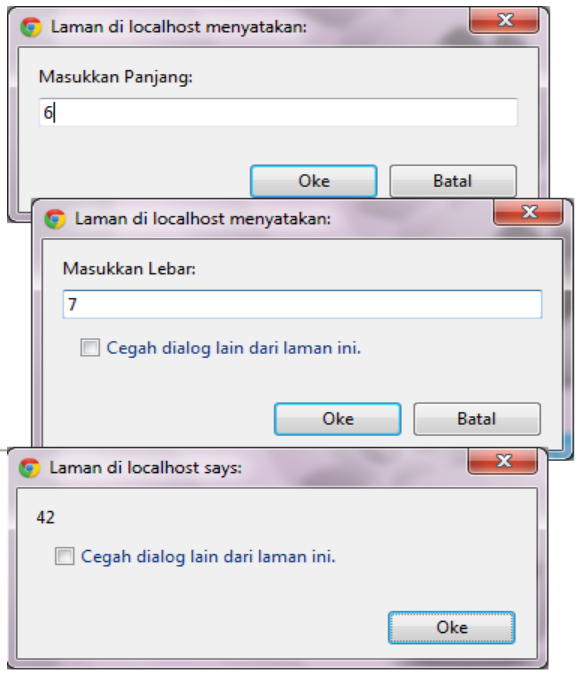

Figure 3.7. Results of the Block of Calculate Rectangle Area Program

Blockly | JavaScript | C | Pascal | XM

```
//-----------STANDARD LIBRARY------
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <math.h>
#include <ctype.h>
//---------------------------------
#define maxChar 100

int panjang;
int lebar;

int main() {


  //input variabel Angka
  printf("Masukkan Panjang:");scanf("%d",&panjang);
  //input variabel Angka
  printf("Masukkan Lebar:");scanf("%d",&lebar);
  printf("%u  ",panjang * lebar);

return 0;
}
```

Figure 3.8. Results of the C Generator from Calculate Rectangle Area Application.

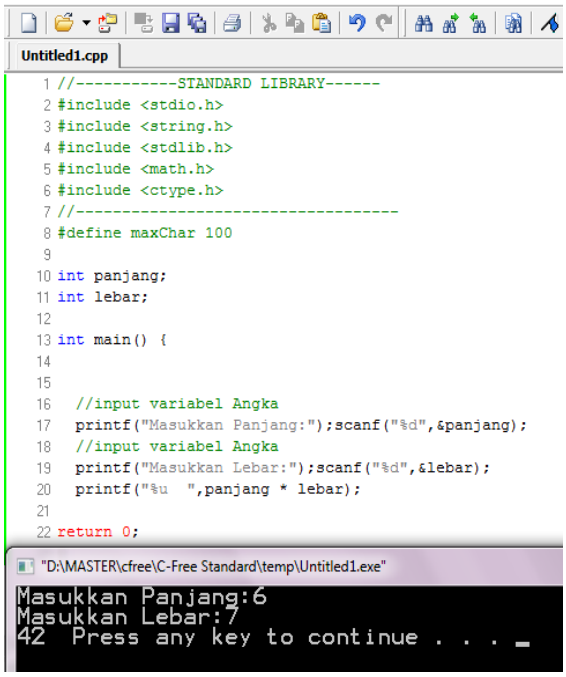

Figure 3.9. The execution result Calculate Rectangle Area Program using C Free 4.0.

5. Complete documentation

IndoBlockly and Google Blockly are software that still in development, so the documentation still limited. We, the developer of IndoBlockly is trying to create a fairly complete documentation, either API documentation (for development) as well as documentation of the use of IndoBlockly. For more info about IndoBlockly and its documentation can be accessed at http://blockly.developers.or.id.

6. Complete tutorial (documents and video tutorials).

IndoBlockly is has a tutorial that is still minimal because it is new software / under development. The tutorial is important because the target user of IndoBlockly is beginner in programming. Currently we are preparing a tutorial in the documents and video tutorials.

7. Maze Game to Real Robot

The next target is make a maze game to real robot. This target will be successful because It's a lot of javascript libraries to connect to the microcontroller. Currently we are trying to connect between indoBlockly with arduino. and I as a author is very concentrated with this target

IV. Conclusions

IndoBlockly is a tool/ software derivated from Google Blockly (Open source license)and IndoBlockly certainly also licensed as opensource. To access IndoBlockly IDE at http://apps.developers.or.id , then for full info of IndoBlockly can be accessed at http://blockly.developers.or.id . The Source Code of IndoBlockly can be accessed at http://code.google.com/indoBlockly . Because of the software is still under development, there's a lot of bugs. We as the developers, beside of continuing to develop IndoBlockly as well as our target, also invited to all Indonesian programmers to participate developing this software. We hope that IndoBlockly can helps and makes Indonesian children or whoever going to learn programming.

Next research is *"The Effect of Using indoBlockly (visual block programming language) to Students Comprehension in Structured Programming Subjects"* with a case study of Informatics Engineering Student in Semester I (2012/2013) at UIN Sunan Kalijaga Yogyakarta. This research will be demonstrated whether deserved IndoBlockly used as tool / software to learn programming or not.

V. References

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