BAIK– PROGRAMMING LANGUAGE BASED ON INDONESIAN LEXICAL PARSING FOR MULTITIER WEB DEVELOPMENT

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Abstract

Business software development with global team is increasing rapidly and the programming language as development tool takes the important role in the global web development. The real user friendly programming language should be written in local language for programmer who has native language is not in English. This paper presents our design of *BAIK* (Bahasa Anak Indonesia untuk Komputer)scripting language which syntax is modeled with Bahasa Indonesian for multitier web development. Researcher propose the implementation of Indonesian Parsing Engine and Binary Search Tree structure for memory allocation of variable and compose the language features that support basic Object Oriented Programming, Common Gateway Interface, HTML style manipulation and database connection. Our goal is to build real programming language from simple structure design for web development using Indonesian lexical words.

Keywords: *database access, indonesian lexical parser, multitierweb development, scripting language*

Abstrak

Pengembangan bisnis perangkat lunak dalam tim berskala global meningkat dengan cepat dan bahasa pemrograman berperan penting dalam pengembangan *web* secara global. Bahasa pemrograman yang benar-benar ramah terhadap pengguna harus ditulis dalam bahasa lokal *programmer* yang bahasa ibunya bukan Bahasa Inggris. *Paper* ini menyajikan desain dari bahasa penulisan *BAIK* (Bahasa Anak Indonesia untuk Komputer), yang sintaksisnya dimodelkan dengan Bahasa Indonesia untuk pengembangan web *multitier*. Peneliti mengusulkan implementasi dari *parsing engine* Bahasa Indonesia dan struktur *binary search tree* untuk alokasi memori terhadap variabel, serta membuat fitur bahasa yang mendukung dasar pemrograman berbasis objek, *common gateway interface,* manipulasi gaya HTML, dan koneksi basis data. Tujuan penelitian ini adalah untuk menciptakan bahasa pemrograman yang sesungguhnya dan menggunakan desain struktur sederhana untuk pengembangan *web* dengan menggunakan kata-kata dari Bahasa Indonesia.

Kata Kunci: *akses database, bahasa penulisan, pemisahan kata-kata bahasa Indonesia, pengembangan web multitier*

1. Introduction

The need of programmer job for building web based business software with global team in the cloud computing era is increasing rapidly. However, the number of global programmer is not growing as fast as market demand. The web global software development with involving developers from many countries faces the language barrier not only in spoken communication between members, but also in programming code level.

The programmers should focus not only on program algorithm, but also should write and understand the English based programming languages. In this paper, researcher explain the scripting language which is suitable for building multitier web application using lexical sentence in Indonesian Language. The main concept of this local scripting language is easy to use for everyone and more easily to be introduced to the programmer since junior or senior high school level.

We call our scripting language as *BAIK* (Bahasa Anak Indonesia untuk Komputer), which means language for computer by Indonesian kid with lexical syntax is written in Indonesian. This scripting language supports basic components of programming language such as basic arithmetic operation, logical condition, array, text file handling, and simple object oriented programming. For multitier web programming, this language is able to be used in server side programming and has not only web interaction via CGI (Common Gateway Interface) [1], but also database connection. This scripting language was developed using GNU C language [2][3] and CGI programming was tested using Apache [4] web server in Windows and Unix/Linux environment

The design of *BAIK* language can be divided into three parts: The first is Indonesian Parsing Engine (IPE), which read the source code from text file and determine the language word in Indonesian. Since Indonesian syntax uses alphabetic character, the standard C language functions are used to recognize Indonesian words. The second is Memory Allocation of Variables (MAV). To put the value of variable, memory allocation using Binary Search Tree model [5][6] is used as data structure. List structure of memory allocation is used to store the array of string and an object. The last is Language Function (LF), which provides the capability to process specific functions such as mathematical Sin and Cos functions. LF depends on the standard C library or other extern C library that can be adopted into *BAIK* language.

2. Methodology

The first target in design of *BAIK* language is to provide console based real scripting language for multitier web development in multi platforms. The implementation emphasizes on using Indonesian word as language word in processing the data of web application. The Graphic User Interface (GUI) for desktop application development is out of our implementation at this time. In order to help web development, in *BAIK* language there are some functions to simplify writing HTML tags.

The flow of code reading. To read each character inside source code in *BAIK* and translate the group of characters as a variable or a value, researcher keep the current position pt and the back position back_pt of code reading as shown in figure1.

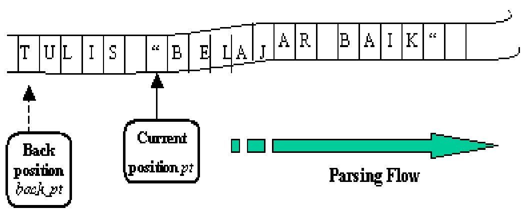


Figure 1. Code reading in *BAIK*.

BAIK interpreter starts by reading source code from text file. *BAIK* reads the entire source code into a variable *source with calloc memory allocation function. This memory allocation is assumed to be enough to store as big as file size of source code. In parsing [7-9] lexical word inside source code by IPE, the current parsing position and the last position are memorized in data type called S_ADDR and noticed by struct in standard C language as follow in figure 2.

```
   typedefstruct
   {
   intpt;                     /*  current
position of parsing*/
   intback_pt;         /* last position of
parsing */
    char *source;    /*source code */
   }
   S_ADDR;
```

Figure 2. *BAIK* interpreter starts by reading source code from text file.

The data type for *BAIK* variable recognized while parsing is stored into data type called LEX_T as follow in figure 3:

```
   typedefstruct
   {
   /* type of lexical parse */
   int type;
   union{
        intnum;
       double dblnum;
       char
ident[MAX_IDENT_LEN];
       char
string[MAX_STRING_LEN];
       char symbol;
       char
array_str[MAX_STRING_LEN];
       char
array_name[MAX_STRING_LEN];
       char
array_idx[MAX_STRING_LEN];
   char
object_str[MAX_STRING_LEN];
       char
object_name[MAX_STRING_LEN];
     }
   detail;}
   LEX_T;
```

Figure 3. Data type for *BAIK* variable.

If the parsing result is substitution, the value and additional information of *BAIK* variable is stored into data type called VAL_LABEL by MAV. If the parsing result is the name of variable itself (ident), MAV will read the value from memory.

In case the parsing result is a function, LE will call procedure that contains specific functions. *BAIK* language will release all memory allocation when program ended. *BAIK* language also has HAPUS keyword to remove the value of variable by setting NULL and releasing memory allocation.

Finite state machine of *BAIK* parsing**.** We can derive the finite state machine [9][10] of parsing process of IPE into 12 main states as shown in figure4. We define the state 0 in order to indicate the end of parsing process of a word or a symbol, and the state 1 for indicating the beginning. Parsing a digit at the first character, will create two states: the first is an integer state and the second is decimal state which has dot symbol inside digit parsing. Parsing a string will produce also two states for reading the first and the last of double quotes (0x22) symbols between alphabetic characters. The line with first character is the sharp (#) will be parsed into comment state.

If the first character is an alphabetic one, there are four states can be achieved: a group of character which has brackets [] symbol at the tail, will be read as an array state. Character group with hyphen and more than symbol (->) will be interpreted as an object state. If the object state has bracket () symbol, it will be recognized as an object function state. Alphabetic character group without any symbol will be accepted as the state of variable name. The other parsing result will create a state for mathematical expression symbol or the end of source code EOF symbol.

Design of variable handling. A variable in *BAIK* is a collection of different type of data type, called VAL_LABEL and noticed by struct in standard C language. When parsing a word of a variable, the real type is determined based on the parsing result of a word, which can be integer numeric, floating num*eric, string, array or object.*The real type is also memorized into VAL_LABEL. By this approach, the users do not need to define the type of variable. In other word, variable in *BAIK* language has automatic data type in design. *BAIK* design uses only one Binary Search Tree to allocate all variables except an object. Hence, all variables have global scope that can be referred from entire execution flow.

```
typedefstruct _val_label
{
struct  _val_label  *left;         /*  left
pointer of tree struct   */
struct  _val_label  *right;       /*  right
pointer of tree struct */
 char   ident[MAX_IDENT_LEN]; /* var or lbl
name   */
intdatatype;                   /*  type  of
variable*/
   .......
}
VAL_LABEL;
```

Figure 6. Implementation of VAL_LABEL in C language using pointer *left and *right.

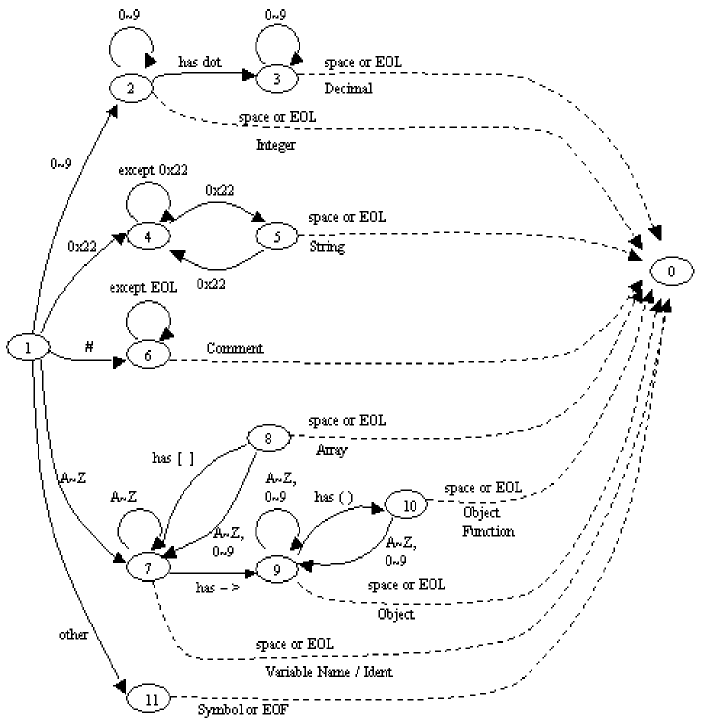


Figure.4. Finite statemachine in IPE.

The binary tree structure of variable allocation VAL_LABEL is shown in figure 5.Implementation of VAL_LABEL in C language using pointer *left and *right is shown as follow in figure 6.The type of variable is saved in datatype parameter. The main types of parameter are listed as follow in table I.

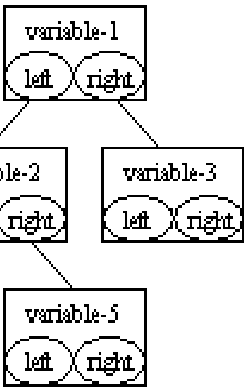


Figure 5. Binary search tree structure of variable.

Tree structure of MAV**.** The main design of variable handling in *BAIK* language is Binary Search Tree structure of MAV. This tree structure uses static variable *root to build binary tree which point to node that produced by operation of ValLabel function.

If value of flag is VAL_FLAG_START, VAlLabel creates new binary searching tree *node. All components of VAL_LABEL are initialized and sufficient memory is allocated. When flag is VAL_FLAG_SEARCH_W, a data as a new node is added into binary searching tree *node. When VAL_FLAG_SEARCH_R is given into flag, ValLabel searches a data from binary searching tree *node. By VAL_FLAG_END, all data in *node will be erased. ValLabel function is defined as follow in figure 7.

TABLE I
MAIN TYPES OF PARAMATER

Type	Kind of variable
0	Integer
1	Double/decimal
2	File
3	String
4	Sockect of TCP connection
5	Socket of UDP connection
6	Array of integer
7	Array of double/decimal
8	Array of string
9	Function
30	Object definition
31	Object instance
32	Function of object
33	Array of object

```
structval_label_dataValLabel
( char *ident, structval_label_datavaldat,
int flag )
{
  static VAL_LABEL *root = NULL;
structval_label_datatmpdat;
  if( flag == VAL_FLAG_START )
{
    root = MakeValLabelTree( ident, valdat
);
    if( root == NULL )
      return TRUE;
    else
      return FALSE;}
  if( flag == VAL_FLAG_SEARCH_W ||
      flag == VAL_FLAG_SEARCH_R )
{
    VAL_LABEL *node =
SearchValLabelTree(root,ident );
  if( node != NULL )
{
      if(flag == VAL_FLAG_SEARCH_W )
        node->data = valdat.val;
        ....
        tmpdat.val = node->data;
        ....
 return tmpdat;
    }
Else
{
      if(flag==VAL_FLAG_SEARCH_W )
{
        if(       MakeAddValLabelTree(root,
ident, valdat ) )
    ERROR("MakeAddValLabelTree");
}
return valdat;}
  }
  if( flag == VAL_FLAG_END )
{
DeleteValLabelTree( root );
    return FALSE;
}
  return TRUE;
}
```

Figure 7. Tree structure of MAV.

3. Results and Analysis

BAIK language is in single thread execution. To execute *BAIK* language as a console program, researcher simply to write *baik* with text file source code file as a parameter. The illustration to execute *test01.ina* source code in Unix/ Linux environment is as follow in figure 8.

```
% baiktest01.ina<return>
```

Figure 8. Illustration to execute *test01.ina* source code in Unix/ Linux environment.

Storing a value into a variable is gained by using equal (=) symbol for any data type as following in figure 9:

```
Number = 10
Tax = 6.5
Address= "Indramayu- West Java - Indonesia"
```

Figure 9.Storing a value into a variable.

TABLE II
ARITHMETIC OPERATION OF *BAIK* LANGUAGE

Operator	Operation	Type	Result
+	Addition	Integer, Decimal	Integer, Decimal
-	Substraction	Integer, Decimal	Integer, Decimal
*	Multiply	Integer, Decimal	Integer, Decimal
/	Division	Integer, Decimal	Integer, Decimal
%	Modulus	Integer	Integer
BUKAN	NOT	Boolean	Integer, Decimal
DAN	AND	Boolean	Integer, Decimal
ATAU	OR	Boolean	Integer, Decimal
==	Equal	Integer, Decimal, String	Boolean
<>	Not Equal	Integer, Decimal, String	Boolean
<	Less than	Integer, Decimal	Boolean
>	More than	Integer, Decimal	Boolean
<=	Less than or Equal	Integer, Decimal	Boolean
>=	More than or Equal	Integer, Decimal	Boolean

To print the value of a variable to standard output, researcher use keyword *TULIS* as follow in figure 10:

```
TULIS variable1, variable2, variable3, …
```

Figure 10. Keyword *TULIS*.

To delete a value of a variable, researcher use keyword *HAPUS* as follow in figure 11:

```
HAPUS variable
```

Figure 11. Keyword *HAPUS*.

In *BAIK* language, program code is written per line without line number. Writing among keywords or between keyword and variable is separated by space character. A line with first character is sharp '#' will be interpreted as comment line.*BAIK* language supports basic arithmetic operation as follow in table II.

BAIK language supports basic logical operations such as IF condition, WHILE condition, FOR condition, and SWITCH condition. Firts, IF condition. To make logical choosing if condition is valid, researcher use keywords *KALAU* and *MAKA*. When condition is not satisfied, researcher use keyword *LAINNYA* to refer ELSE condition. We close this IF condition by using keyword *AKHIRKALAU*(figure 12). Those all will realize IF, THAN, ELSE and ENDIF statement.

```
KALAU condition MAKA
    Command code A
LAINNYA
    Command code B
AKHIRKALAU
```

Figure 12. IF condition by using keyword *AKHIRKALAU*.

Second, WHILE condition. We use phrases *SELAGI*, *LAKUKAN* and*BALIKLAGI* to interpret loop operation: WHILE, DO, ENDWHILE (figure 13).

```
SELAGI condition LAKUKAN
   Command code
BAIKLAGI
```

Figure 13. While condition.

To jump outside from WHILE loop operation even the condition is still true, researcher use phrase *KELUARSELAGI* (figure 14).

```
KALAU condition MAKAKELUARSELAGI
```

Figure 14. WHILE loop operation by using keyword *KELUARSELAGI.*

Third, FOR condition. To make logical iteration with start and stop condition values, researcher use keywords *UNTUK*, *ULANG* and*LAGI*. Those will interpret loop operation: FOR, REPEAT, and ENDFOR (figure 15):

```
UNTUK
(firstcondition;lastcondition;increament)
ULANG
   Command code
LAGI
```

Figure 15. FOR condition.

To jump outside from FOR loop operation even the condition is still true, researcher use phrase *KELUARUNTUK*(figure 16):

```
KALAU condition MAKA KELUARUNTUK
```

Figure 16. Foor loop operation by using keyword *KELUARUNTUK.*

Fourth, SWITCH condition. We use phrases *PILIH*, *SAMA* and *AKHIRPILIH* to interpret election in choice. In this choice condition, logical flow will execute code when variable is the same with the given value as option. Those keywords will realize SWITCH, CASE, ENDCASE statement (figure 17).

Implementation of array in *BAIK* language is using basic one dimension array so researcher called *UNTAIAN*. Researcher need to determine the size of array in definition by using bracket symbol '[' and ']'. To get the value of array size, researcher use keyword *PANJANG*.

Here is the illustration of using array in *BAIK* language:

Untaianp[5]
p[0] = 1.5
p[1] = 3.0
p[2] = 4.5
L =**panjang**p

Function or subprocedure is defined using keyword *FUNGSI*. The return value of function is given by keyword *BALIK*. To call a function, researcher need to put symbol ampersand '&' before the function name (figure 18).The usage pattern of function Calling as follow in figure 19.

For flexible data handling by using reuse pattern of source code and perform modern programming style, *BAIK* language has basic capability of object oriented programming. The basic object definition, instance, cloning, and removing have been adopted.

An Object is composed by any parameters and one or many functions. An Object can be defined by keyword *DEFINISIBENDA* and at least has one function which name is the same with object name. To write function inside object definition, researcher use *FUNGSI* keyword.

```
PILIH variabel
{
SAMA value-A
     Command code A
     AKHIRPILIH
SAMA value-B
     Command code B
 AKHIRPILIH
     ....
SAMA value-N
    Command code N
AKHIRPILIH
}
```

Fig. 17. SWITCH condition.

In main program, researcher use keyword *BENDA* for defining an object parameter. To make instance of an object, keyword *BENDABARU* is used. To remove an object, researcher use keyword *HAPUS*.

To call a variable or a function of object from main program, researcher use referring format as follows:

mainparam->objparam
mainparam->funcname

*where,mainparam*is object variable name in mainprogram, *objparam*is variable name inside object definition*funcname*is function name inside object definition.

```
FUNGSI functionname (param1, param2, ...)
 {
command code
 ...
BALIK returnval
}
```

Figure 18. Function or subprocedure is defined using keyword *FUNGSI.*

```
Param = &functionname (param1,param2, ...)
```

Figure 19. Function calling.

Object definition as follow in figure 20. Object variable and instanceas follow in figure 21. Object variable cloningas follow in figure 22. Object variable removingas follow in figure 23.There is a concept of variable scope in object definition. By default, a variable in object will have global scope. However, researcher can determine variables with local scope that means valid only inside corresponded object by using keyword LOKAL.

Figure 24 and 25 is the example of using object oriented style of *BAIK* language for general business application in order to record working time of employee. In this example, researcher define *DataPersonel* object which has *nama* and*no_identitas* variables. In main program, researcher use *pegawai1* and *pegawai2* for object variables and make an instance from *DataPersonel* object. The filename of source code is assumed as *mypersonel.ina*.

```
DEFINISIBENDAobjectdefname[
objparam1,objparam2,
       ...
FUNGSIobjectdefname(param1, param2, ...)
        {
           ...
         }
FUNGSIotherfuncname(paramx,paramy, ...)
        {
           ...
          }]
```

Figure 20.Objectdefinition.

```
BENDA mainparam1
BENDA mainparam2
mainparam1 = BENDABARU objectdefname
```

Figure 21. Object variable and instance.

```
Mainparam2 = mainparam1
```

Figure 22. Object variable cloning.

```
HAPUS mainparam1
```

Figure 23. Object variable removing.

The result of code executing is as follow in figure 26.To support multitier web programming, *BAIK* has capabilities of Common Gateway Interface(CGI) for data transfer interface, default HTML layout for menu design interface and database access interface.

```
# ########################################

DefinisiBenda DataPersonel [
  # parameter dalam cakupan Global
  # untuk parameter hanya dalam objek,
gunakan LOKAL

  nama          = ""
  no_identitas = ""
  tanggal       = "dd/mm/yyyy"
  LOKAL jam_masuk  = "08:00"
  LOKAL jam_keluar = "16:00"
  LOKAL jam_lembur = 0
  fungsi DataPersonel(nm, no)
{
    nama        = nm
    no_identitas = no
    tulis " ", nama," telah diregistrasi\n"
  }
fungsi setJamMasuk(jam1)
 {
    jam_masuk = jam1
  }
 fungsi lihatJamMasuk()
{
    balik jam_masuk
  }

 fungsi setJamKeluar(jam2)
{
    jam_keluar = jam2
  }

 fungsi lihatJamKeluar()
{
    balik jam_keluar
 }
]
```

Figure 24. Definisi Bendaobject oriented style of *BAIK* language for general business application.

CGI for data transfer interface. *BAIK* language was designed to provide an input and output interface for Internet based software development. *BAIK* language uses CGI which is a standard interface for writing programs for data interacting between web server side program and a client running a web browser.

```
# ########################################
# Program Utama - Main Program
# ########################################

Tulis "Tes Object Oriented Program dengan
BAIK\n"
Benda pegawai1
Benda pegawai2
nama1 = "nama1"
nama2 = "nama2"
Tulis "Pemasukan data absenpersonel\n"
pegawai1 = BendaBaruDataPersonel
pegawai1->awalan(nama1,"NIP000001")
pegawai1->tanggal = "01/02/2009"
pegawai1->setJamMasuk("10:00")
Tulis "Hasilpemasukan data ", nama1, "
setelahregistrasi\n"
Tulis "nama: ", pegawai1->nama, " ",
pegawai1->no_identitas, "\n"
Tulis "tanggal: ", pegawai1->tanggal, "\n"
Tulis "-----------------------------\n"
pegawai2 = BendaBaruDataPersonel
pegawai2->awalan(nama2,"NIP000002")
pegawai2->tanggal = "01/02/2009"
pegawai2->setJamKeluar("18:00")
Tulis "Hasilpemasukan data ", nama2, "
setelahregistrasi\n"
Tulis "nama: ", pegawai2->nama, " ",
pegawai2->no_identitas, "\n"
Tulis "tanggal: ", pegawai2->tanggal, "\n"
Tulis "-----------------------------\n"
Tulis "Pemasukan data absenselesai\n"

TAMAT
# ########################################
```

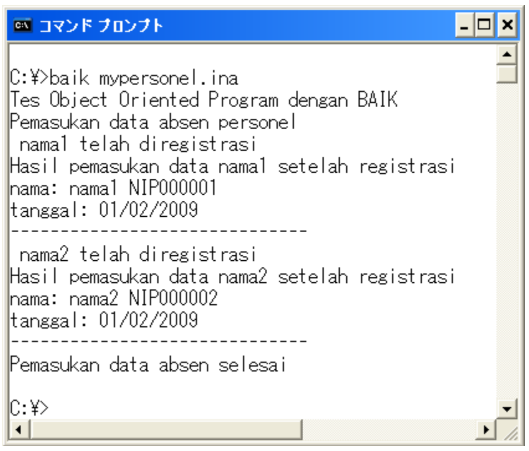
Figure 25. Main program object oriented style of *BAIK* language for general business application.

The interface of *BAIK* for passing the data through CGI are input interface and output interface. Input Interface use POST method of CGI to receive data inputted from HTML page by stating POST_CGI keyword at the first line of program. *BAIK* language is still be able to use GET method of CGI by reading environment parameter of Operating System.

Output Interface consists of simply to write to standard output (The TULIS keyword is used to print HTML tags message directly into standard output), keywords for simplifying writing HTML tags (We create a collection keywords KERTASWEB_ xxx to simplify writing HTML tags with basic menu layout), keywords for simplifying drawing directly onto HTML page (Collection keywords KANVASWEB_xxx are created to simplify using JavaScript Vector

Graphics Library jsGraphics [9] to draw simple shapes on HTML page).

Default HTML layout for menu design of web page interface. Serving business application via web interface requires at least one menu layout of HTML pages. *BAIK* language was designed to provide default HTML layout for menu design in web page. This HTML layout will be created by keyword SEDIA_KERTASWEB and has four main components: Menu area, Copyright area, Title area, and Main area as shown in figure 27.

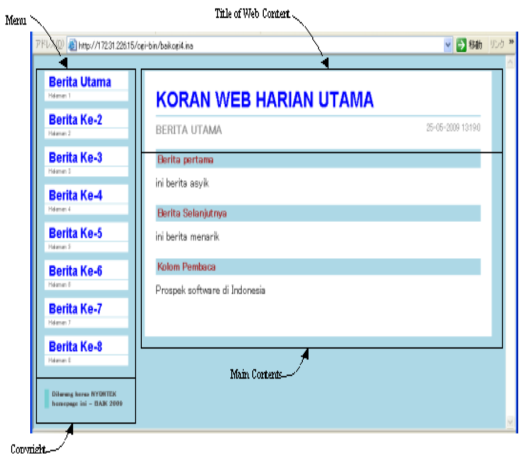


```
C:¥>baik mypersonel.ina
Tes Object Oriented Program dengan BAIK
Pemasukan data absen personel
 nama1 telah diregistrasi
Hasil pemasukan data nama1 setelah registrasi
nama: nama1 NIP000001
tanggal: 01/02/2009
------------------------------
 nama2 telah diregistrasi
Hasil pemasukan data nama2 setelah registrasi
nama: nama2 NIP000002
tanggal: 01/02/2009
------------------------------
Pemasukan data absen selesai

C:¥>
```

Figure 26. Result of code executing.

Figure 28 is the example code to produce and use the standard HTML layout in a web page. The first step is to determine the real file location of HTML style will be placed and the main color of HTML style by using keyword SEDIA_KERTASWEB. The second step is to define the beginning and the end of HTML page by using KERTASWEB_AWAL and KERTASWEB_AKHIR. In third step, researcher determine the alias address of URL path for HTML style by using KERTASWEB_MODEL.



Berita Utama
Halaman 1
Berita Ke-2
Halaman 2
Berita Ke-3
Halaman 3
Berita Ke-4
Halaman 4
Berita Ke-5
Halaman 5
Berita Ke-6
Halaman 6
Berita Ke-7
Halaman 7
Berita Ke-8
Halaman 8
Dilarang keras NYONTEK homepage ini - BAIK 2009

KORAN WEB HARIAN UTAMA
BERITA UTAMA 25-05-2009 13190
Berita pertama
ini berita asyik
Berita Selanjutnya
ini berita menarik
Kolom Pembaca
Prospek software di Indonesia

Figure27. Default HTML style in *BAIK*.

```
C:/baik
warna_halaman = "birumuda"
lokasi_filestyle = "C:/Program Files/Apache
Group/Apache/style"
SEDIA_KERTASWEBlokasi_filestyle,
warna_halaman
KERTASWEB_AWAL  "KORAN WEB HARIAN
UTAMA"
lokasi_style = "/style"
KERTASWEB_MODEL lokasi_style
Kertasweb_Menu_Awal
Untuk(A=1; A<9; A=A+1) ulang
kalau A==1 maka
Nama = "BeritaUtama"
Lainnya
Nama = Gabung "BeritaKe-", A
akhirkalau
Deskripsi = gabung "Halaman ", A
Halaman = gabung "hal", A , ".html"
Kertasweb_MenuNama, Deskripsi, Halaman
Lagi
Kertasweb_Hakcipta  "Copyright  kertasweb  -
BAIK 2009"
Kertasweb_Menu_Akhir
Judul = "KORAN WEB HARIAN UTAMA"
Nama = "BERITA UTAMA"
Deskripsi = WAKTU
ISIWEB_AWAL
ISIWEB_TITELJudul, Nama, Deskripsi
tulis "<h2>Beritapertama</h2>"
tulis "iniberitaasyik<BR>"
tulis "<h2>BeritaSelanjutnya</h2>"
tulis "iniberitamenarik<BR>"
tulis "<h2>KolomPembaca</h2>"
tulis "Prospek software di Indonesia <BR>"
ISIWEB_AKHIR
KERTASWEB_AKHIR
TAMAT
```

Figure28. Example code to produce and use the standard HTML layout in a web page.

A menu in left side area of web page, can be created using keywords Kertasweb_Menu_Awal for beginning and Kertasweb_Menu_Akhir for ending. The text for Copyright area is provided by Kertasweb_Hakcipta. The main content is tagged by keywords: Isiweb_Awal and Isiweb_Akhir. We use Isisweb_Titel to create Title of Web Content.

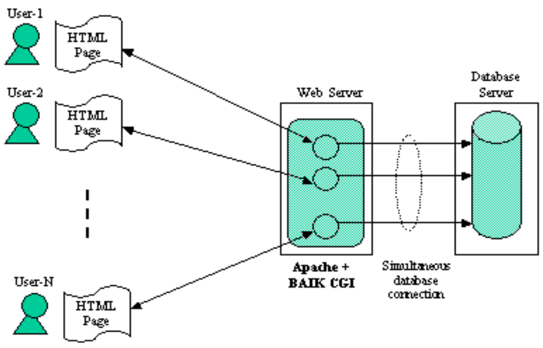


Figure 29. *BAIK* in multitier web system.

```
# ContohAkseske Database
TULIS "BelajarMysqldengan BAIK \n"
### parameter untuk database

alamatdb   = "192.168.xxx.yyy"
pemakai    = "namamu"
katasandi =  "xzxzxzxzxz"
namadb     = "tbl_gaji"
nomerport =  3306
tulis "-------------------------\n"
### kalimatsqluntukoperasi database
sql = "select * from tbl_strukgaji"
### koneksike database
kon = mysql_koneksialamatdb, pemakai,
  katasandi, namadb,
nomerport
hasil = mysql_hasilkon, sql
num = mysql_totalhasil
tulis "jumlah data=", num ,"\n"
### mengambilnamakolomdarisuatuTabel
kolom = mysql_namakolomhasil
besarkolom = panjangkolom
untuk (i=0; i<besarkolom; i=i+1) ulang
tulis "kolom ", i ," = ", kolom[i] ,"\n"
lagi
###       mengambilisi       data       per
barisdarisuatuTabel
untuk (i=0; i<num; i=i+1) ulang
tulis "------------------------\n"
baris = mysql_isidatahasil
tulis "Ambil data baris ", i, " OK\n"
kolomnum = panjangbaris
tulis "jumlahkolom=", kolomnum ,"\n"
untuk (j=0; j<kolomnum; j=j+1) ulang tulis
"baris ", i, " kolom ", j, " = ", baris[j]
,"\n"
lagi
lagi
### menutupkoneksi database
Tutupkon

tamat
```

Figure30. Example of using Mysql database access in order to get the data.

Database Access Interface. *BAIK* language is suitable to be used in multitier web system where the database server is required to store or to provide the data via web interface.At this time, *BAIK* supports the basic design of database connection, passing the data into sql statement, performing operation of sql statement and getting the sql result from Mysql database server.

The most common operations such as query and data manipulation have been tested. Since memory allocation for each database connection is created independently, *BAIK* supports simultaneous database connection for each web connection by users as shown in figure 29. Figure 30 is the example of using Mysql database access in order to get the data from the table called tbl_strukgaji by executing simple sql statement: “select * from tbl_strukgaji” and show the result into standard output.

4. Conclusion

In this paper researcher introduce the basic design of *BAIK*, a scripting language which syntax is in Indonesian for multitier web development. The basic parsing method, parameter handling and language construction for web programming are explained. The main performance of this design depends on variable handling using Binary Search Tree which has average complexity O(log n) [6].

BAIK scripting language is still far from modern programming language. However, a strong fundamental for developing software using programming language with Indonesian syntax has been established. Currently, implementation of *BAIK* language is adequate enough for mathematical computation and data presenting or manipulation in web business application.

For future work, researcher will first focus on adding language base, especially for multi thread execution, polymorphism and inheritance for object oriented programming. The second step is providing modular design of calling extern library function, so it is easy to add new function capability into *BAIK* language without changing the core design. Improving LF by adopting extern open source libraries is a must. Currently, *BAIK* language supports basic TCP/IP network programming, database connection using Mysql[11] library and creating picture file in PNG and JPG format using GD graphic library[12]. In near future, researcher plan to add functions of simple network management protocol, secure socket layer and other databases supports.

Lastly, adopting Apache module library in order to support client side HTML script programming and to make design of database connection pool is the next step of *BAIK* implementation in multitier web system. Improving the performance of simultaneous database access for web system will be the main issue. The source code, executable program and document in Indonesian of *BAIK* language introduced in this paper are available on thefollowingwebsite: http://sourceforge.net/projects/baik/

Acknowledgement

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