An overview about DroidBasic For Android™
from February 25, 2013

Contents

An overview about DroidBasic For Android™.................................................................1
Object-Oriented.................................................................................................................2
Event-Driven......................................................................................................................2
DroidBasic Framework......................................................................................................2
The Integrated Development Environment (IDE) - To simplify application development...3
IDE Contents.....................................................................................................................3
Project Window...............................................................................................................3
Code view.........................................................................................................................3
Review..............................................................................................................................3
Getting Started - Making your first application..............................................................3
Variables..........................................................................................................................4
Data Types.......................................................................................................................4
  Byte...............................................................................................................................4
  Short..............................................................................................................................4
  Integer..........................................................................................................................4
  Single..........................................................................................................................4
  Double / Float..............................................................................................................4
  Boolean.........................................................................................................................5
  String............................................................................................................................5
  Object / id......................................................................................................................5
Using Variables..............................................................................................................6
  Assigning Values..........................................................................................................6
  Examples.......................................................................................................................6
  Constants.......................................................................................................................6
Arrays...............................................................................................................................7
Branch statements.........................................................................................................7
  If...Else...Elseif Statement.........................................................................................7
  Select Statement........................................................................................................7
  Boolean Operators......................................................................................................8
Loop statements.............................................................................................................8
Operators.......................................................................................................................8
  Assignment and comparison operators.................................................................9
    Assignment...............................................................................................................9
    Comparison..............................................................................................................9
  Arithmetic operators................................................................................................10
    Why the funny symbols?.......................................................................................10
    Addition..................................................................................................................11
    Subtraction.............................................................................................................11
    Multiplication.........................................................................................................11
    Division...................................................................................................................11
    Exponentiation......................................................................................................11
String operators...........................................................................................................12
  String concatenation...............................................................................................12
Logical operators.........................................................................................................12
About The Author
Bernd Noetscher is a software developer and the main developer of the DroidBasic For Android™ programming language. In his spare time he goes dancing, reads many books, and plays piano. He is also interested in theatre and cinema.

DroidBasic For Android™ is a multi-purpose computer programming language that is suitable for most development needs. The language is designed with Rapid Application Development in mind, providing several tools to shorten development time. The following text introduces language fundamentals and covers a variety of the DroidBasic Framework.

DroidBasic is the next generation of BASIC programming languages. As a language, DroidBasic has the following traits:

Object-Oriented
Visual Basic 6 included limited support for object-oriented design. Encapsulation was supported with Public and Private data types in Classes, as well as special accessor/mutator pairs called Properties. Polymorphism received crude support through the Implements keyword, which would require that one class implement all of the methods in another, skeleton class. Inheritance was neglected completely.

As of DroidBasic, all of this has changed. It includes full-blown support for object-oriented concepts, including simple inheritance. Everything inherits from the Object base class.

Event-Driven
Events are recognized, because they use a certain naming convention (ObjectName_EventName).

DroidBasic Framework
As the name implies, DroidBasic For Android™ runs on top of Android framework, meaning the language has full access to all of the supporting classes in the Java Android framework.
The Integrated Development Environment (IDE) - To simplify application development.

An integrated development environment (IDE), also known as integrated design environment and integrated debugging environment, is a type of computer program that assists computer programmers to develop software.

IDE Contents

The IDE consists of several sections, or tools, that the developer uses while programming. As you view the IDE for a new project you generally have three sections in view:

- The Project Window
- The Code view in the middle

Project Window

This is a section that is used to view and modify the contents of the project. A DroidBasic project will generally have a code page, references to System components and possibly other modules with special code that is used by the application.

Code view

This center window of the IDE is also where developers write the code that makes everything in the application work. The code is written in modules, or files, that are either connected to an object or called specifically when needed.

Review

The DroidBasic IDE is a complex and exciting work space for developers, providing many enhancements and upgrades from the days of VB6. This section only serves as a mere introduction to this multi-functional interface.

Getting Started - Making your first application.

Okay, it’s now time for your first program!

Start up a DroidBasic IDE and create a new project.

Enter the following code in main.Activity:

```
Event Init()
    MsgBox("Hello World!")
End Event
```

This creates your classic “Hello World!” program.

Press F5 or go to the run menu and select Start to start the program. You should see an alert box that says “Hello World!” and then the main window (with nothing on it) should open.
**Variables**

Variables are the entities used to store various types of data. In programming, a variable is simply a place to store data. A variable has a name and a data type. In DroidBasic, a variable is declared using the Dim (short for Dimension) statement. Here is the syntax:

```
Dim varName As varType
```

*varName* is the name of your Variable. *varType* is the data type of the variable. Types include String, Integer, Double, Boolean, etc.

For example, to declare an Integer named MyInt use:

```
Dim MyInt As Integer
```

**Data Types**

Data Types define the type of data that a variable can store. Some variables store numbers, others store names. The basic types that can be used are:

**Byte**

8 bits, stores integer values from 0 to 255.

```
Dim bytMyVariable As Byte
```

**Short**

Meaning short integer. 16 bits (2 bytes), stores integer values from -32,768 to 32,767.

```
Dim shrtMyVariable As Short
```

**Integer**

32 bits (4 bytes), stores integer values from -2,147,483,648 to 2,147,483,647.

```
Dim intMyVariable As Integer
```

**Single**

Meaning single-precision floating point. 32 bits (4 bytes), stores floating-point values from -3.40282347e38 to 3.40282347e38. Cannot store an exact zero due to the required normalized form. Smallest positive value greater than zero is 1.401298e-45. Biggest negative value less than zero is -1.401298e-45.

```
Dim sglMyVariable As Single
```

**Double / Float**

Meaning double-precision floating point. 64 bits (8 bytes), stores floating-point values from -1.7976931348623157e308 to 1.7976931348623157e308. Cannot store an exact zero due to the required normalized form. Smallest positive value greater than zero is 4.94065645841247e-324. Biggest negative value less than zero is -4.94065645841247e-324.

```
Dim db1MyVariable As Double
```
**Boolean**
Requires 1 bit (1 byte used), stores boolean true/false values.

Dim boolMyVariable As Boolean

**String**
Stores any series of characters. e.g. word, phrase, sentence, paragraph, etc.

Dim strMyVariable As String

**Object / id**
Stores a reference to a DroidBasic/Java object.

Dim objMyObject As Object
Using Variables

Assigning Values

A value is the data contained in a variable. To assign a value to a variable that is already declared, use an equal sign.

Examples

For string variables, use double quotes around the value:

strMyVariable = "The String"

For all others, remove the quotes:

bytMyVariable = 1
sbyteMyVariable = -2
intMyVariable = 100
singleMyVariable = 1.234
doubleMyVariable = 1.567
boolMyVariable = True

To assign a variable the value of another variable, simply replace the value on the right side of the equal sign with the name of the variable that holds the desired data.

You can also assign a value to a variable in the declaration itself.

Dim myVariable As String = “StringValue”

Important: DroidBasic always assigns the value of the right variable to the left variable. The variable on the left takes the value of the right variable. The variable on the right does not change.

Constants

Constants are like variables that don’t change. They take the place of values that you would not like to type over and over. Constants are declared using the keyword “Const”. Their values are defined in their declaration - they also use data types. Here is the syntax:

Const cnstMyConstant As String = "The very long string"

Here is an example:

Const cnstPi As Float = 3.14159265
**Arrays**

A variable that stores several data of the same data type.

An array is simply a variable that can store more than one piece of data. The data is stored in a list. If you declare an integer, then that variable can only store one integer. An array of integers can store many integers. Each one is given its own number. For example, this line of code:

```dim myarray[5] as integer```

will give an array like this

<table>
<thead>
<tr>
<th>Index</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>0</td>
</tr>
<tr>
<td>01</td>
<td>0</td>
</tr>
<tr>
<td>02</td>
<td>0</td>
</tr>
<tr>
<td>03</td>
<td>0</td>
</tr>
<tr>
<td>04</td>
<td>0</td>
</tr>
</tbody>
</table>

**Branch statements**

The various conditional statements in the language for selective code execution.

**If...Else...ElseIf Statement**

If/Else Statements are used to conditionally execute code based on the condition provided. If the condition provided in the If statement evaluates to true, the code in the block is executed. Otherwise, execution would proceed to the optional Else If statements, or the Else statement. Else If and Else are not required parts of an If statement.

An example of the If/Else/Else If branch statement is:

```
' The following variable declarations are for the following example only.

dim x as integer
dim y as integer

if x = y then
    ' Whatever will happen if x = y
else if x < y then
    ' Whatever will happen if x < y
else
    ' Whatever will happen if x isn't = to y and x isn't < to y
end if
```

**Select Statement**

Either strings or numbers can be used for a Select statement.

Select Case statements are usually used to avoid long chains of If/Else If/.../Else If/Else statements.

An example of a Select branch statement using an integer is:

```dim nCPU as integer
select nCPU
    case 0
        ' No CPU!
    case 1```
Boolean Operators

Boolean operators in DroidBasic now accommodate for short circuit boolean evaluation, most other languages always apply short circuit boolean evaluation by default, consider the following boolean statement:

```
functionA() And functionB()
```

With this statement, when short-circuit boolean evaluation is used, the second function will only be called if the first function returns true, this is because if `functionA` returns false it becomes irrelevant to the outcome of the statement whether `functionB` returns true or not.

However, when no short-circuit boolean evaluation is used, both of the functions will be called irrespective of whether the first part of the statement returns true or false.

Something to note with short-circuit boolean evaluation is that the order of the parameters can become important when it is used.

Due to previous versions of VB6 not having short circuit boolean evaluation, DroidBasic comes with backward compatibility and adds two new boolean logic identifiers which support short-circuit boolean evaluation, so in addition to the standard boolean operators:

- `Not`
- `And`
- `Or`
- `Xor`

There are also two new operators which function using short-circuit boolean evaluation, and they are:

- `AndAlso`
- `OrElse`

Loop statements

The various loop statements in the language are for repetitive code execution.

For example:

- `Do...Until Loop`
- `While...Do Loop`
- `For Loop`

Operators

Programming languages have a set of operators that perform arithmetic operations, and others such as Boolean operations on truth values, and string operators manipulating strings of text. Computers are mathematical devices, but compilers and interpreters require a full syntactic theory of all
operations in order to parse formulae involving any combinations correctly. In particular they depend on operator precedence rules, on order of operations, that are tacitly assumed in mathematical writing.

Conventionally, the computing usage of operator also goes beyond the mathematical usage (for functions).

So operators are special symbols that are used to represent for example simple computations like addition and multiplication. Most of the operators in DroidBasic do exactly what you would expect them to do, because they are common mathematical symbols. For example, the operator for adding two integers is +.

**Assignment and comparison operators**

**Assignment**

The "=" operator is used for assignment. The operator also serves as a comparison operator (see Comparison).

- To set values:
  ```vbnet
  x = 7     ' x is now seven; in math terms we could say "let x = 7"
x = -1294
x = "example"
  ```

You can use variables in the equal operator, as well.

```vbc
Dim x As Integer
x = 4  ' Anywhere we use x, 4 will be used.
```

**Comparison**

The "=" operator is used for comparison. The operator also serves as a assignation operator (see Assignment).

- To compare values:
  ```vbc
  If 4 = 9 Then       ' This code will never happen:
      End  ' Exit the program.
  End If
  If 1234 = 1234 Then ' This code will always be run after the check:
      MsgBox("Wow! 1234 is the same as 1234.")
      ' Create a box in the center of the screen.
  End If
  ```

You can use variables in the equal operator, as well.

```vbc
If x = 4 Then
    MsgBox("x is four.")
End If
```

Let's try a slightly more advanced operation.

```vbc
MsgBox("Seven equals two is " & (7 = 2) & ".")
' The parentheses are used because otherwise, by order of operations
' (equals is processed last), it would be comparing "Seven equals two is 7" and "2."
' Note here that the & operator appends to the string. We will talk about this later.
'
' The result of this should be a message box popping up saying "Seven equals
two is
'   False." This is because (7 = 2) will return False anywhere you put it. In the
'   same sense, (7 = 7) will return True:
MsgBox("Seven equals seven is " & (7 = 7) & ")."

You will get an error if you try to assign a constant or a literal a value, such as 7 = 2. You can
compare 7 and 2, but the answer will always be False.

In the case of two equal operators appearing in a statement, such as
Dim x As Boolean
x = 2 = 7

The second equal operator will be processed first, comparing 2 and 7, giving a False. Then the first
equal operator will be processed, assigning False to x.

**Arithmetic operators**

Describes the operators that work on numerical values, such as the '+' in addition.

DroidBasic provides a basic set of operators to calculate simple arithmetic.

```
+   Addition
-   Subtraction
*   Multiplication
/   Division
\   Integer division
Mod Remainder Division
^   Exponentiation
&   String concatenation
```

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 + 2</td>
<td>produces 9</td>
</tr>
<tr>
<td>7 - 2</td>
<td>produces 5</td>
</tr>
<tr>
<td>7 * 2</td>
<td>produces 14</td>
</tr>
<tr>
<td>7 / 2</td>
<td>produces 3.5</td>
</tr>
<tr>
<td>7 \ 2</td>
<td>produces 3</td>
</tr>
<tr>
<td>7 Mod 2</td>
<td>produces 1</td>
</tr>
<tr>
<td>7 ^ 2</td>
<td>produces 49</td>
</tr>
</tbody>
</table>
| "7" & "7" | produces "77"

Let’s look at a short example of arithmetic operations before we jump into the operators themselves.

In this example we will also be using some basic variables. The Dim operator creates the variable.

```
Dim Commission As Single
Dim Sales As Single
Sales = 3142.51
Commission = 0.3 * Sales  ' Calculate 30% commission.
```

First, we set the total sales to 3142.51.

The * operator calculates multiplication, so the last line is equivalent to Commission = 0.3 * Sales.
This means that our second step is multiplying 0.3 and Sales. Sales is 3142.51, so our result should
be the product of 0.3 and 3142.51.

**Why the funny symbols?**

With the exception of addition and subtraction, the symbols used are different to the ones used in
real life. This is simply because the other symbols are not available on a standard keyboard.
Addition

This adds two numbers together, and is denoted by the "+" symbol. If strings are involved it may also do String concatenation. Examples:

```vbscript
Dim x As Integer
x = 7 + 2     ' Results in 9.
x = 25 + -4   ' Results in 21.
Dim StringA As String
StringA = "A string" + "Another string" ' Results in "A stringAnother string"
```

Subtraction

This subtracts two numbers, and is denoted by the "-" symbol. Examples:

```vbscript
Dim x As Integer
x = 7 - 2    ' Results in 5.
x = 25 - -4  ' Results in 29.
```

Multiplication

This multiplies two numbers, and is denoted by the "*" symbol. Examples:

```vbscript
Dim x As Integer
x = 7 * 2   ' Results in 14.
x = 25 * -4 ' Results in -100.
```

Division

There are more types of division than the one denoted by the "/" symbol. There is also integer division and remainder division.

- Division
  
  This is the most commonly used form of division and is denoted by the "/" operator. Examples:

```vbscript
Dim x As Single ' (note that we must use the Single class to have decimals) x = 7 / 2 ' Results in 3.5. x = 25 / 4 ' Results in 6.25.
```

- Integer division
  
  This divides two numbers, and gives the result without the remainder if the quotient is a decimal. Examples:

```vbscript
Dim x As Integer x = 7 \ 2 ' Results in 3. x = 25 \\ 4 ' Results in 6.
```

- Remainder Division
  
  This divides two numbers, and gives the result’s remainder if the quotient is a decimal. This is denoted by the operator “Mod.” Examples:

```vbscript
Dim x As Integer x = 7 Mod 2 ' Results in 1. x = 25 Mod 4 ' Results in 1.
```

Exponentiation

This is raising a number to a power. For example:

```vbscript
Dim x As Integer
x = 7 ^ 2     ' Results in 49.
```

This results in the number 49 being assigned to the variable x. It can also be used to calculate the
square root of a number. The square root of a number is the number raised to the power of 0.5.

```vbnet
Dim x As Single
x = 7 ^ 0.5 ' Results in a number around 2.645.
```

Note: It is necessary to ensure that the variables be correctly declared to get the desired results. The following example works, but will produce the wrong result. This is because the Integer class does not allow decimal places (just like mathematical integers.)

```vbnet
Dim x As Integer
x = 7 ^ 0.5 ' Results in 3.
```

Since x is declared as an Integer type, the value square root, a real number, is stored incorrectly.

Any nth root of number is the can be calculated by raising the number to the power of 1 / n:

```vbnet
Dim x As Single
Dim n As Single
n = 7
x = 2 ^ (1 / n)
```

### String operators

Describes the operators used for string and character manipulation, such as the '&' and '+' operators.

#### String concatenation

The "&" operator joins two strings together.

Example:

```vbnet
Dim String1 As String = "123"
Dim String2 As String = "456"
Dim String3 As String
String3 = String1 & String2 ' Results in "123456".
```

This will result in String3 being equal to “123456”

The "+" operator may be used in place of "&". However, it is not recommended.

### Logical operators

Describes the operators used in boolean logic, such as the ‘And’ and ‘Or’ operators.

#### Not

The Not operator returns True when the condition is False. Otherwise, it returns False. Example,

```vbnet
If Not (1 = 2) Then
    MsgBox("(1 = 2) is False. So Not False is True")
End If
```

<table>
<thead>
<tr>
<th>Truth Table Condition</th>
<th>Not Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
</tr>
</tbody>
</table>
**And**

The And operator returns True when the conditions of the left and right are True. Otherwise, it returns False. Both conditions are evaluated before the result is returned. Example,

```vba
If (1 = 1) And (2 = 2) Then
    MsgBox("(1 = 1) is True. (2 = 2) is True. So True And True is True")
End If
```

<table>
<thead>
<tr>
<th>Truth Table</th>
<th>Condition1</th>
<th>Condition2</th>
<th>Condition1 And Condition2</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>False</td>
<td>False</td>
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<tr>
<td>False</td>
<td>True</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

** AndAlso**

The AndAlso operator returns False when the condition on the left hand side is False. Else, it returns True when the conditions of the left and right are True. Otherwise, it returns False. The condition on the right hand side is never evaluated when that on the left hand side is False. This is called short-circuited logic.

<table>
<thead>
<tr>
<th>Truth Table</th>
<th>Condition1</th>
<th>Condition2</th>
<th>Condition1 AndAlso Condition2</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>-</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

**Or**

The Or operator returns True when the condition on either side is True. Otherwise, it returns False. Both conditions are evaluated before the result is returned.

<table>
<thead>
<tr>
<th>Truth Table</th>
<th>Condition1</th>
<th>Condition2</th>
<th>Condition1 Or Condition2</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

**OrElse**

The OrElse operator returns True when the condition on the left hand side is True. Else, if the condition on the right hand side is True, it returns True. Otherwise, it returns False. The condition on the right hand side is never evaluated when that on the left hand side is True. This is called short-circuited logic.

<table>
<thead>
<tr>
<th>Truth Table</th>
<th>Condition1</th>
<th>Condition2</th>
<th>Condition1 OrElse Condition2</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>-</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

**Xor**

The Xor operator returns True when the condition on the left hand side or right hand side is True, but not when both are True. Xor means “Exclusive OR”.

<table>
<thead>
<tr>
<th>Truth Table</th>
<th>Condition1</th>
<th>Condition2</th>
<th>Condition1 Xor Condition2</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

```
<table>
<thead>
<tr>
<th>Truth Table Condition1</th>
<th>Condition2</th>
<th>Condition1 Xor Condition2</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>
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