

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-1-

**WELCOME**

-----

Welcome to the MQL4 course.

In this series, I will try to strip the mystique and confusion from MQL4 by giving you comprehensive tutorials with a straight forward example.

In this series of lessons, I will show you how to use the MQL4 for building your own Expert Advisors, Custom Indicators and Scripts.

If you are programming in C (or its superset C++) then you know a lot of MQL4 before even I start my lessons, if you didn't write in any programming language before, no problem, I'll guide you to understand the concept of programming in general as well.

So, let's start from the beginning.

## MQL4? What, Why and Where?

MQL4 stands for **MetaQuotes Language 4**.

MetaQuotes is the company who built the MetaTrader Trading Platform.

And to make it stronger than the other trading platforms the company extended it by a built-in programming language that enables the user (you) to write his own trading strategies.

The language enables you to create one of the following:

- 1- Expert Advisors.
  - 2- Custom Indicators.
  - 3- Scripts.
- Expert Advisor is a program which can automate trading deals for you. For example it can automate your market orders, stops orders automatically, cancels/replaces orders and takes your profit.
  - Custom Indicator is a program which enables you to use the functions of the technical indicators and it cannot automate your deals.

- Script is a program designed for single function execution. Unlike the Advisor, scripts are being held only once (on demand), and not by ticks. And of course has no access to indicator functions.

These were “What” MQL4 is? “Why” to use MQL4?  
Now, “Where” do I write MQL4?

To write your MQL4 code and as anything else in world, you can choose one of two ways, the hard way and the easy way.

### 1- The hard way

The hard way is using your favorite text editor and the command prompt to compile your program.

Notepad is not bad choice, but do not forget two things:

- 1- To save the file you have created in plain text format.
- 2- To save the file as .mp4 (that’s to be easy to reopen it with Metaeditor), but you can save it as any extension you prefer.

After saving your program there is an extra step to make your code comes out to the light.  
*It’s the Compiling step.*

Compiling means to convert the human readable script that you have just wrote to the machine language that your computer understands.

MetaTrader has been shipped with its own compiler (the program which will convert your script to the machine language) called **MetaLang.exe**.

Metalang.exe is a console program which takes 2 parameters and output an .ex4 file (the file which Metatrader understands).

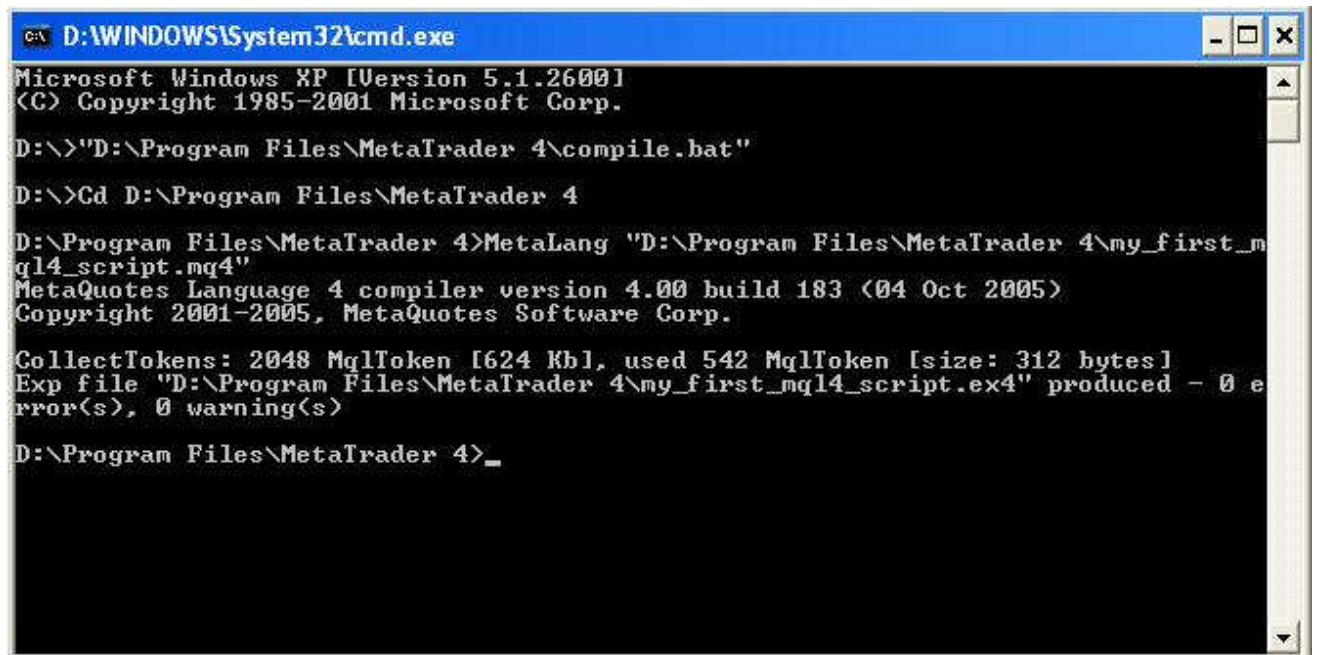
The first parameter is “options” parameter and the only option available is **-q** quit  
The second parameter is the full path to your .mq4 file.

The syntax will be in this format.

**metalang [options...] filename**

### Example

- 1- Find your metalang.exe path, it will be the same path of MetaTrader (here my path is D:\Program Files\MetaTrader 4)
- 2- Create a batch file and name it compile.bat (or any name you prefer).
- 3- Write these lines into the bat file then save it.  
*cd D:\Program Files\MetaTrader 4*  
*metalang -q "D:\Program Files\MetaTrader 4\my\_first\_mql4\_script.mq4"*  
(Don’t forget to change the path to you MetaTrader installed path)
- 4- Run the batch file and if you are lucky person like me you will get a screen like this.



```
C:\ D:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

D:\>"D:\Program Files\MetaTrader 4\compile.bat"
D:\>Cd D:\Program Files\MetaTrader 4
D:\Program Files\MetaTrader 4>MetaLang "D:\Program Files\MetaTrader 4\my_first_m
ql4_script.mq4"
MetaQuotes Language 4 compiler version 4.00 build 183 (04 Oct 2005)
Copyright 2001-2005, MetaQuotes Software Corp.

CollectTokens: 2048 MqlToken [624 Kb], used 542 MqlToken [size: 312 bytes]
Exp file "D:\Program Files\MetaTrader 4\my_first_mql4_script.ex4" produced - 0 e
rror(s), 0 warning(s)

D:\Program Files\MetaTrader 4>_
```

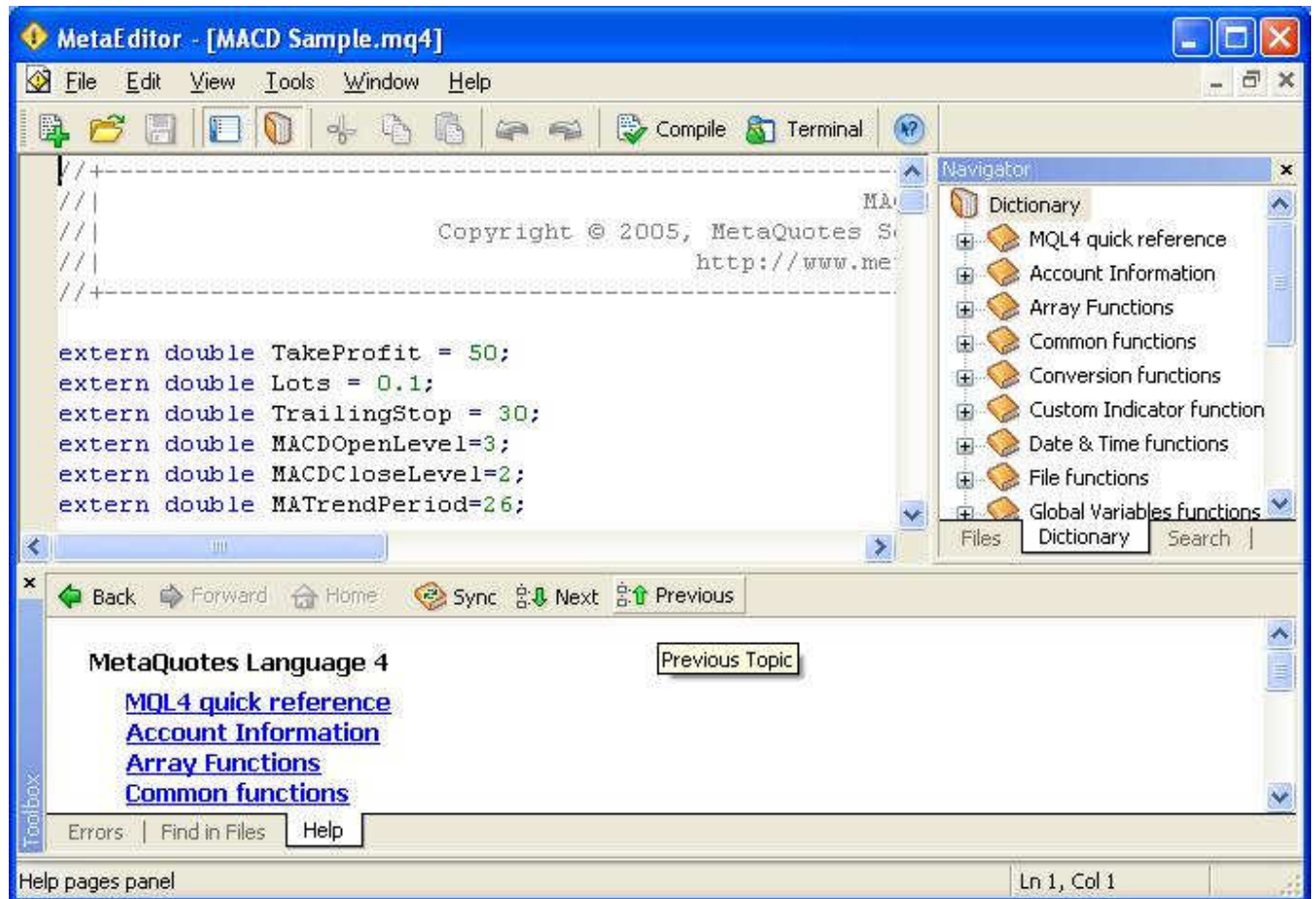
**Figure 1** *Metalang compiler*

As you see you will get the output file “my\_first\_mql4\_script.ex4”

## **2-The easy way**

Metatrader has been shipped with a good IDE (integrated development editor) called MetaEditor which has these features:

- 1- A text editor has the feature of highlighting different constructions of MQL4 language while you are writing/reading code.
- 2- Easy to compile your program, just click F5 and the MetaEditor will make all the hard work for you and produces the “ex4” file.  
Besides it’s easy to see what the wrong in your program is (in the Error Tab – see figure 2).
- 3- Built-in a dictionary book which you can access by highlight the keyword you want to know further about it then press F1.



**Figure 2** *MetaEditor 4*

In the coming lessons we will know more about MetaEditor.

Today I just came to say hello, tomorrow we will start the real works.  
Tomorrow we will study the Syntax of MQL4?

I welcome very much the questions and the suggestions.

See you  
**Coders' Guru**  
19-10-2005

# MQL4 COURSE

By Coders' guru  
www.forex-tsd.com

-2-

## SYNTAX

-----

I hope you enjoyed the “Welcome” lesson which tried to answer the very basic questions; **what** MQL4 is, **why** MQL4 and **where** (to write) MQL4?

Always the biggest and the most important question(s) are **how**, and the entire coming lessons are the answer.

Now, I want you to empty your mind from any confusion and read carefully the next few concepts.

We are talking today about the SYNTAX rules of MQL4.

And as I told you before, *If you are programming in C (or its superset C++) then you know a lot of MQL4 before even I start my lessons.*

That's because the syntax of MQL4 is very like of the syntax of C.

The dictionary means of the word SYNTAX of a programming language is:

*“The set of allowed reserved words and their parameters and the correct word order in the expression is called the syntax of language”. “Wikipedia”*

So, when we are studying the syntax of the language we are studying its grammar and writing rules which consist of:

- Format
- Comments
- Identifiers
- Reserved words

Let's slice the cake.

## 1- Format:

When you write your code, you can freely use any set of spaces, tabs and empty lines you want to separate your code and your line of code to make them readable and eyes pleasing.

For example all of these lines are valid in MQL4:

```
double MacdCurrent, MacdPrevious, SignalCurrent;
```

```
double  
MacdCurrent,  
MacdPrevious,  
SignalCurrent;
```

```
double           MacdCurrent,           MacdPrevious,           SignalCurrent;
```

But, as you see, the first line is more readable and easy to understand.

And as everything in the world there are exceptions to the rule:

1- You can't use new line in the "Controlling compilation"

You will know more about "Controlling compilation" in next lesson but just remember this is an exception.

For example the next line of code is invalid and the MQL4 compiler will complain:

```
#property  
copyright "Copyright © 2004, MetaQuotes Software Corp."
```

This is the valid "Controlling compilation":

```
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
```

2- You can't use new line or space in the middle of Constant values, Identifiers or Keywords.

For example this line is valid:

```
extern int MA_Period=13;
```

*“extern” and “int” here are Keywords , “MA\_Period” is an Identifier and “13” is a Constant value..*

*You will know more in the next lessons.*

For example the next lines are invalids:

```
extern int MA_Period=1
3;
```

```
extern int MA_Period=1    3;
```

*Notice the tab between 1 and 3.*

```
ex
tern int MA_Period=13;
```

## **2- Comments:**

To make the programming world easier, any programming language has its style of writing comments.

You use Comments to write lines in your code which the compiler will ignore then but it clears your code and makes it understandable.

Assume that you write a program in the summer and in the winter you want to read it.

Without comments -even you are the code's creator- you can't understand all these puzzled lines.

MQL4 (& C/C++) uses two kinds of comments styles:

### 1- Single line comments

The Single line comment starts with “//” and ends with the new line.

For example:

```
//This is a comment
extern int MA_Period=13;
```

```
extern int MA_Period=13; //This is another comment
```

## 2- Multi-line comments

The multi-line comment start with “/\*” and ends with “\*/”.

And you can comment more than line or more by putting “/\*” at the start of the first line, and “\*/” at the end of the last line.

For example:

```
/* this  
is  
multi  
line  
comment*/
```

You can also nest single line comment inside multi lines comment like that:

```
/* this  
is  
multi //another comment nested here.  
line  
comment*/
```

This is a valid comment too:

```
extern int /*HELLO! I'm a comment*/ MA_Period=13;
```

But this is invalid comment:

```
extern int //test MA_Period=13;
```

## 3- Identifiers:

An identifier is the name you choose to your variables, constants and functions.

For example MA\_Period here is an identifier:

```
extern int MA_Period=13;
```



There are few rules and restrictions for choosing those names:

- 1- The length of the Identifier must not exceed **31** characters.
- 2- The Identifier must begin with a letter (capital or small) or the underlining symbol .  
So, it can't be started with a number or another symbol except the underlining symbol.
- 3- You can't use any reserved words as an Identifier.  
You will see the list of the reserved words too soon.
- 4- The identifiers' names are case sensitive.  
So, **MA\_PERIOD** not the same as **ma\_period** or **MA\_Period**

Let's take some examples:

<b>Name1</b>	Valid
<b>_Name1</b>	Valid
<b>1Name</b>	Invalid (don't start with number)
<b>~Name1</b>	Invalid (you can only use underline symbol)
<b>N~ame1</b>	Invalid (you can only use underline symbol)
<b>i_love_my_country_and_my_country_loves_all_the_world</b>	Invalid (you can't exceed the 31 characters length)
<b>Color</b>	Valid
<b>color</b>	Invalid (you can't use reversed word, and <b>color</b> is one of them)

#### 4- Reserved words:

There are "words" which the language uses them for specific actions.

So, they are reserved to the language usage and you can't use them as an identifier name or for any other purpose.

This is the list of the reserved words (*from the MQL4 guide*):

Data types	Memory classes	Operators	Other
bool	extern	break	false
color	static	case	true
datetime		continue	
double		default	

int		else	
string		for	
void		if	
		return	
		switch	
		while	

For example the next lines of code are invalid:

```
extern int datetime =13;  
int extern =20;  
double continue = 0;
```

I hope you enjoyed the lesson.  
The next lesson will be about the “**Data Types**”.  
So, Be Ready, the real hard work is coming!

I welcome very much the questions and the suggestions.

See you  
**Coders' Guru**  
20-10-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-3-

## DATA TYPES

-----

Welcome to my third lesson in my MQL4 course.

I hope you enjoyed the “SYNTAX” lesson, which tried to give you the answers for:

- What format you can use to write MQL4 code?
- How to make the world better by commenting your code?
- What the Identifiers are, and what are the rules of choosing them?
- What are the MQL4 Reserved words?

If you didn't read the “SYNTAX” lesson please download it from here:

<http://forex-tsd.com/attachment.php?attachmentid=399>

And you can download the “Welcome” lesson from here:

<http://forex-tsd.com/attachment.php?attachmentid=372>

*Don't forget to login first.*

Now, let's **enjoy** the DATA TYPES.

### What's the Data type mean?

Any programming language has a set of names of the memory representation of the data. For example if the memory holds numbers between -2147483648 to 2147483647, the most of the programming languages will name this data as “**Integer**” data type.

### Variables?

Variables are the names that refer to sections of memory into which data can be stored.

To help you think of this as a picture, imagine that memory is a series of different size boxes. The box size is memory storage area required in bytes.

- In order to use a box to store data, the box must be given a name; this process is known as **declaration**.
- In the declaration process you use a word tell the computer what's the kind and size of the box you want to use, this word known as **keyword**.

- It helps if you give a box a meaningful name that relates to the type of information which make it easier to find the data, this name is the **variable constant**.
- Data is placed into a box by **assigning** the data to the box.
- When we set the value of the box you have created in the same line you declared the variable; this process is known as **initialization**.

When we create a variable we are telling the computer that we want him to assign a specified memory length (in bytes) to our variable, since storing a simple number, a letter or a large number is not going to occupy the same space in memory, so the computer will ask us what's the kind of data and how much the length of the data? That is the Data type for.

For example if we said this line of code to the computer:

```
int MyVariable=0;
```

That's mean we are asking the computer to set a block of 4 bytes length to our variable named "MyVariable".

In the previous example we have used:

**int** ← Keyword

**int** ← Integer data type.

**int** ← Declaration

**MyVariable** ← Variable's constant.

**=0** ← Initialization

We will know more about variables in a coming lesson.

In MQL4, these are the kinds of Data types:

- [Integer](#) (int)
- [Boolean](#) (bool)
- [Character](#) (char)
- [String](#) (string)
- [Floating-point number](#) (double)
- [Color](#) (color)
- [Datetime](#) (datetime)

## 1- Integer

An integer, is a number that can start with a + or a - sign and is made of digits. And its range value is between -2147483648 to 2147483647.

MQL4 presents the integer in [decimal or hexadecimal format](#).

For example the next numbers are Integers:

```
12, 3, 2134, 0, -230  
0x0A, 0x12, 0X12, 0x2f, 0xA3, 0Xa3, 0X7C7
```

We use the keyword **int** to create an integer variable.

For example:

```
int intInteger = 0;  
int intAnotherIntger = -100;  
int intHexIntger=0x12;
```

*Decimal and Hexadecimal:*

*Decimal notation is the writing of numbers in the base of 10, and uses digits (0, 1, 2, 3, 4, 5, 6, 7, 8 and 9) to represent numbers. These digits are frequently used with a decimal point which indicates the start of a fractional part, and with one of the sign symbols + (plus) or - (minus) to indicate sign.*

*Hexadecimal is a numeral system with a base of 16 usually written using the symbols 0–9 and A–F or a–f.*

*For example, the decimal numeral 79 can be written as 4F in hexadecimal.*

## 2- Boolean

Boolean variable is a data type which can hold only two values, true and false (or their numeric representation, 0 and 1). And it occupies 1 bit of the memory. In MQL4, false, FALSE, False, true, TRUE and True are equals.

*Boolean named like this in the honor of the great mathematician Boole George.*

We use the keyword **bool** to create a boolean variable.

For example:

```
bool I = true;  
bool bFlag = 1;  
bool bBool=FALSE;
```

### 3- Character

*MQL4 names this Data type “Literal”.*

A character is one of 256 defined alphabetic, numeric, and special key elements defined in the [ASCII](#) (American Standard Code for Information Interchange) set. Characters have integer values corresponding to location in the ASCII set. You write the character constant by using single quotes (') surrounding the character.

For example:

```
'a' , '$' , 'Z'
```

We use the keyword **int** to create a character variable.

For example:

```
int chrA = 'A';  
int chrB = '$';
```

Some characters called Special Characters can't present directly inside the single quotes because they have a reserved meanings in MQL4 language. Here we use something called **Escape Sequence** to present those special characters, And that by prefixing the character with the backslash character (\).

For example:

```
int chrA = '\\'; //slash character  
int chrB = '\n'; //new line
```

This is the list of Escape Sequence characters used in MQL4.

carriage return	\r
new line	\n
horizontal tab	\t
reverse slash	\\
single quote	'
double quote	"
hexadecimal ASCII-code	\xhh

## ASCII table

Char	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char	Dec	Oct	Hex
(nul)	0	0000	0x00	(sp)	32	0040	0x20	@	64	0100	0x40	`	96	0140	0x60
(soh)	1	0001	0x01	!	33	0041	0x21	A	65	0101	0x41	a	97	0141	0x61
(stx)	2	0002	0x02	"	34	0042	0x22	B	66	0102	0x42	b	98	0142	0x62
(etx)	3	0003	0x03	#	35	0043	0x23	C	67	0103	0x43	c	99	0143	0x63
(eot)	4	0004	0x04	\$	36	0044	0x24	D	68	0104	0x44	d	100	0144	0x64
(enq)	5	0005	0x05	%	37	0045	0x25	E	69	0105	0x45	e	101	0145	0x65
(ack)	6	0006	0x06	&	38	0046	0x26	F	70	0106	0x46	f	102	0146	0x66
(bel)	7	0007	0x07	'	39	0047	0x27	G	71	0107	0x47	g	103	0147	0x67
(bs)	8	0010	0x08	(	40	0050	0x28	H	72	0110	0x48	h	104	0150	0x68
(ht)	9	0011	0x09	)	41	0051	0x29	I	73	0111	0x49	i	105	0151	0x69
(nl)	10	0012	0x0a	*	42	0052	0x2a	J	74	0112	0x4a	j	106	0152	0x6a
(vt)	11	0013	0x0b	+	43	0053	0x2b	K	75	0113	0x4b	k	107	0153	0x6b
(np)	12	0014	0x0c	,	44	0054	0x2c	L	76	0114	0x4c	l	108	0154	0x6c
(cr)	13	0015	0x0d	-	45	0055	0x2d	M	77	0115	0x4d	m	109	0155	0x6d
(so)	14	0016	0x0e	.	46	0056	0x2e	N	78	0116	0x4e	n	110	0156	0x6e
(si)	15	0017	0x0f	/	47	0057	0x2f	O	79	0117	0x4f	o	111	0157	0x6f
(dle)	16	0020	0x10	0	48	0060	0x30	P	80	0120	0x50	p	112	0160	0x70
(dc1)	17	0021	0x11	1	49	0061	0x31	Q	81	0121	0x51	q	113	0161	0x71
(dc2)	18	0022	0x12	2	50	0062	0x32	R	82	0122	0x52	r	114	0162	0x72
(dc3)	19	0023	0x13	3	51	0063	0x33	S	83	0123	0x53	s	115	0163	0x73
(dc4)	20	0024	0x14	4	52	0064	0x34	T	84	0124	0x54	t	116	0164	0x74
(nak)	21	0025	0x15	5	53	0065	0x35	U	85	0125	0x55	u	117	0165	0x75
(syn)	22	0026	0x16	6	54	0066	0x36	V	86	0126	0x56	v	118	0166	0x76
(etb)	23	0027	0x17	7	55	0067	0x37	W	87	0127	0x57	w	119	0167	0x77
(can)	24	0030	0x18	8	56	0070	0x38	X	88	0130	0x58	x	120	0170	0x78
(em)	25	0031	0x19	9	57	0071	0x39	Y	89	0131	0x59	y	121	0171	0x79
(sub)	26	0032	0x1a	:	58	0072	0x3a	Z	90	0132	0x5a	z	122	0172	0x7a
(esc)	27	0033	0x1b	;	59	0073	0x3b	[	91	0133	0x5b	{	123	0173	0x7b
(fs)	28	0034	0x1c	<	60	0074	0x3c	\	92	0134	0x5c		124	0174	0x7c
(gs)	29	0035	0x1d	=	61	0075	0x3d	]	93	0135	0x5d	}	125	0175	0x7d
(rs)	30	0036	0x1e	>	62	0076	0x3e	^	94	0136	0x5e	~	126	0176	0x7e
(us)	31	0037	0x1f	?	63	0077	0x3f	_	95	0137	0x5f	(del)	127	0177	0x7f

### 4- String

The string data type is an array of characters enclosed in double quote (").

The array of characters is an array which holds one character after another, starting at index 0. After the last character of data, a NULL character is placed in the next array location. It does not matter if there are unused array locations after that.

A NULL character is a special character (represented by the ASCII code 0) used to mark the end of this type of string.

See figure 1 for a simple representation of the string constant "hello" in the characters array.

h	e	l	l	o	NULL				
0	1	2	3	4	5	6	7	8	9

**Figure 1 – Characters array**

MQL4 limits the size of the string variable to 255 characters and any character above 255 characters will generate this error: *(too long string (255 characters maximum))*.

You can use any special character -mentioned above- in your string constant by prefixing it with the backslash (\).

We use the keyword **string** to create a string variable.

For example:

```
string str1 = "Hello world1, with you coders guru";
string str2 = "Copyright © 2005, \"Forex-tds forum\"."; //Notice the use of (") character.
string str3 = "1234567890";
```

## 5- Floating-point number (double)

Floating point number is the Real Number (that is, a number that can contain a fractional part beside the integer part separated with (.) dot).Ex: 3.0,-115.5, 15 and 0.0001.

And its range value is between 2.2e-308 to 1.8e308.

We use the keyword **double** to create a floating-point variable.

For example:

```
double dblNumber1 = 10000000000000000;
double dblNumber3 = 1/4;
double dblNumber3 = 5.75;
```



## 6- Color

Color data type is a special MQL4 data type, which holds a color appears on the MetaTrader chart when you create your own Expert Advisor or Custom Indicator and the user can change it from the property tab of your Expert Advisor or Custom Indicator.

You can set the Color variable constant in three ways:

1- **By the color name:** For the well know colors (called Web Colors Set) you can assign the name of the color to the color variable, see the list of the Web Colors Set.

2- **By Character representation** (MQL4 named it this name): In this method you use the keyword (C) followed by two signal quotations ('). Between the two signal quotations you set the value of the red, green and blue (know as RGB value of the color). These values have to be between: 0 to 255. And you can write these values in decimal or hexadecimal format.

3- **By the integer value:** Every color in the Web Colors Set has its integer value which you can write it in decimal or hexadecimal format. And you can assign the Integer value of the color to the color variable. The hexadecimal color format looks like this: 0xBBGGRR where BB is the blue value, GG is green value and RR is the red value.

For example:

```
// symbol constants
C'128,128,128' // gray
C'0x00,0x00,0xFF' // blue
// named color
Red
Yellow
Black
// integer-valued representation
0xFFFFFFFF // white
16777215 // white
0x008000 // green
32768 // green
```

We use the keyword **color** to create a color variable.

For example:

```
color clr1= Red;
color clr1= C'128,128,128' ;
```

```
color clr1=32768;
```

## Web Colors Set

Black	DarkGreen	DarkSlateGray	Olive	Green	Teal	Navy	Purple
Maroon	Indigo	MidnightBlue	DarkBlue	DarkOliveGreen	SaddleBrown	ForestGreen	OliveDrab
SeaGreen	DarkGoldenrod	DarkSlateBlue	Sienna	MediumBlue	Brown	DarkTurquoise	DimGray
LightSeaGreen	DarkViolet	FireBrick	MediumVioletRed	MediumSeaGreen	Chocolate	Crimson	SteelBlue
Goldenrod	MediumSpringGreen	LawnGreen	CadetBlue	DarkOrchid	YellowGreen	LimeGreen	OrangeRed
DarkOrange	Orange	Gold	Yellow	Chartreuse	Lime	SpringGreen	Aqua
DeepSkyBlue	Blue	Magenta	Red	Gray	SlateGray	Peru	BlueViolet
LightSlateGray	DeepPink	MediumTurquoise	DodgerBlue	Turquoise	RoyalBlue	SlateBlue	DarkKhaki
IndianRed	MediumOrchid	GreenYellow	MediumAquamarine	DarkSeaGreen	Tomato	RosyBrown	Orchid
MediumPurple	PaleVioletRed	Coral	CornflowerBlue	DarkGray	SandyBrown	MediumSlateBlue	Tan
DarkSalmon	BurlyWood	HotPink	Salmon	Violet	LightCoral	SkyBlue	LightSalmon
Plum	Khaki	LightGreen	Aquamarine	Silver	LightSkyBlue	LightSteelBlue	LightBlue
PaleGreen	Thistle	PowderBlue	PaleGoldenrod	PaleTurquoise	LightGrey	Wheat	NavajoWhite
Moccasin	LightPink	Gainsboro	PeachPuff	Pink	Bisque	LightGoldenRod	BlanchedAlmond
LemonChiffon	Beige	AntiqueWhite	PapayaWhip	Cornsilk	LightYellow	LightCyan	Linen
Lavender	MistyRose	OldLace	WhiteSmoke	Seashell	Ivory	Honeydew	AliceBlue
LavenderBlush	MintCream	Snow	White				

## 7- Datetime

Datetime data type is a special MQL4 data type, which holds a date and time data. You set the Datetime variable by using the keyword (D) followed by two signal quotations (!). Between the two signal quotations you write a character line consisting of 6 parts for value of year, month, date, hour, minutes, and seconds. Datetime constant can vary from Jan 1, 1970 to Dec 31, 2037.

For example:

```
D'2004.01.01 00:00' // New Year
D'1980.07.19 12:30:27'
D'19.07.1980 12:30:27'
D'19.07.1980 12' //equal to D'1980.07.19 12:00:00'
D'01.01.2004' //equal to D'01.01.2004 00:00:00'
```

We use the keyword **datetime** to create a datetime variable.

For example:

```
datetime dtMyBirthDay= D'1972.10.19 12:00:00';  
datetime dt1= D'2005.10.22 04:30:00';
```

I hope you enjoyed the lesson.

The next lesson will be about the “Operations & Expressions”.

I welcome very much the questions and the suggestions.

See you  
**Coders' Guru**  
22-10-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-4-

## Operations & Expressions

-----

Welcome to the fourth lesson in my course about MQL4.  
The previous lesson "Data Types" presented a lot of new concepts; I hope you understand it, and above all you **enjoyed** it.

You can download the previous lesson from here:  
<http://forex-tsd.com/attachment.php?attachmentid=399>  
<http://forex-tsd.com/attachment.php?attachmentid=372>  
<http://forex-tsd.com/attachment.php?attachmentid=469>  
*Don't forget to login first.*

Now, let's enjoy the Operations & Expressions.

### What's the meaning of Operations & Expressions?

You know the operations very well. If I told you that (+, -, \*, /) are the basic arithmetical operators, you will remember very fast what's the operator means.

I hear you saying "OK, I know the operations; could you tell me what's the meaning of the expression?"

**Identifiers** (do you remember them? If not, Review the SYNTAX lesson) together with the **Operations** produce the **Expressions**.

Puzzled? Let's illustrate it in an example:

```
x = (y*z)/w;
```

**x, y, z** and **w**, here are **identifiers**.

**=, \*** and **/** are the **operators**.

The whole line is an **expression**.

*When the expressions combined together it makes a **statement**.*

*And when the statements combined together it makes a **function** and when the functions combined together it makes a **program**.*

In the remaining of this lesson we are going to talk about the kinds operators used in MQL4.

So, let's start with the basic arithmetical operators:

## 1- Arithmetical operators:

In MQL4 there are 9 Arithmetical operations  
This is the list of them with the usage of each:

Operator	Name	Example	Description
+	Addition operator	$A = B + C;$	Add <b>B</b> to <b>C</b> and assign the result to <b>A</b> .
-	Subtraction operator	$A = B - C;$	Subtract <b>C</b> from <b>B</b> and assign the result to <b>A</b> .
+ -	Sign changer operators	$A = -A;$	Change the sign of <b>A</b> from positive to negative.
*	Multiplication operator	$A = B * C;$	Multiply <b>B</b> and <b>C</b> and assign the result to <b>A</b> .
/	Division operator	$A = B / C;$	Divide <b>B</b> on <b>C</b> and assign the result to <b>A</b> .
%	Modulus operator	$A = A \% C;$	<b>A</b> is the remainder of division of <b>B</b> on <b>C</b> . (ex: $10\%2$ will produce 0, $10\%3$ will produce 1).
++	Increment operator	$A++;$	Increase <b>A</b> by 1 (ex: if $A = 1$ make it 2).
--	Decrement operator	$A--;$	Decrease 1 from <b>A</b> (ex: if $A = 2$ make it 1).

**Note:** The remainder operator works by dividing the first number by the second number for the first integer results and then returns the remaining number.

For example:

**$10\%5=0$**

This is because if you divide 10 by 5 you will get 2 and there no remaining value, so the remainder is 0.

**$10\%8=2$**

This is because if you divide 10 by 8 you will get 1 ( $1*8=8$ ), so the remainder is ( $10-8 = 2$ ).

**$100\%15=10$**

This is because if you divide 100 by 15 you will get 6 ( $6*15=90$ ), so the remainder is ( $100-90=10$ ).

**What about 6%8?**

It will be 6 because if you divide 6 by 8 you will get 0 ( $8*0=0$ ), so the remainder is ( $6-0=6$ ).

**Note:** You can't combine the increment and decrement operator with other expressions. For example you can't say:

```
A=(B++)*5;
```

But you can write it like that:

```
A++;  
B=A*5;
```

**Note:** How the above example works? Let's assume:

```
int A=1; //set A to 1  
int B;  
A++; //increase A by 1, now A=2  
B=A*5; //which means B=2*5
```

## 2- Assignment operators:

The purpose of any expression is producing a result and the assignment operators setting the left operand with this result.

For example:

```
A = B * C;
```

Here we multiply **B** and **C** and assign the result to **A**.  
(=) *here is the assignment operator.*

In MQL4 there are 11 assignments operations  
This is the list of them with the usage of each:

Operator	Name	Example	Description
=	Assignment operator	<b>A = B;</b>	Assign <b>B</b> to <b>A</b> .
+=	Additive Assignment operator	<b>A += B;</b>	It's equal to: <b>A = A + B;</b> Add <b>B</b> to <b>A</b> and assign the result to <b>A</b> .

<code>-=</code>	Subtractive Assignment operators	<code>A -= B;</code>	It's equal to: <code>A = A - B;</code> Subtract B from A and assign the result to A.
<code>*=</code>	Multiplicative Assignment operator	<code>A *= B;</code>	It's equal to: <code>A = A * B;</code> Multiply A and B and assign the result to A.
<code>/=</code>	Divisional Assignment operator	<code>A /= B;</code>	It's equal to: <code>A = A / B;</code> Divide A on B and assign the result to A.
<code>%=</code>	Modulating Assignment operator	<code>A %= B;</code>	It's equal to: <code>A = A % B;</code> Get the remainder of division of A on B and assign the result to A.
<code>&gt;&gt;=</code>	Left Shift Assignment operator	<code>A &gt;&gt;= B;</code>	It shifts the bits of A left by the number of bits specified in B.
<code>&lt;&lt;=</code>	Right Shift Assignment operator	<code>A &lt;&lt;= B;</code>	It shifts the bits of A right by the number of bits specified in B.
<code>&amp;=</code>	AND Assignment operator	<code>A &amp;= B;</code>	Looks at the binary representation of the values of A and B and does a bitwise AND operation on them.
<code> =</code>	OR Assignment operator	<code>A  = B;</code>	Looks at the binary representation of the values of A and B and does a bitwise OR operation on them.
<code>^=</code>	XOR Assignment operator	<code>A ^= B;</code>	Looks at the binary representation of the values of two A and B and does a bitwise exclusive OR (XOR) operation on them.

### 3- Relational operators:

The relational operators compare two values (operands) and result false or true only.

It's is like the question "Is **John** taller than **Alfred**? Yes / no?"

The result will be false only if the expression produce zero and true if it produces any number differing from zero;

For example:

```
4 == 4; //true
4 < 4; //false
4 <= 4 //true;
```

In MQL4 there are 6 Relational operations

This is the list of them with the usage of each:

Operator	Name	Example	Description
==	Equal operator	<b>A == B;</b>	True if <b>A</b> equals <b>B</b> else False.
!=	Not Equal operator	<b>A != B;</b>	True if <b>A</b> does not equal <b>B</b> else False.
<	Less Than operators	<b>A &lt; B;</b>	True if <b>A</b> is less than <b>B</b> else False.
>	Greater Than operator	<b>A &gt; B;</b>	True if <b>A</b> is greater than <b>B</b> else False.
<=	Less Than or Equal operator	<b>A &lt;= B;</b>	True if <b>A</b> is less than or equals <b>B</b> else False.
>=	Greater Than or Equal operator	<b>A &gt;= B;</b>	True if <b>A</b> is greater than or equals <b>B</b> else False.

#### 4- Logical operators:

Logical operators are generally derived from Boolean algebra, which is a mathematical way of manipulating the truth values of concepts in an abstract way without bothering about what the concepts actually *mean*. The truth value of a concept in Boolean value can have just one of two possible values: true or false.

*MQL4 names the Logical operators as Boolean operators*

MQL4 uses the most important 3 logical operators.  
This is the list of them with the usage of each:

Operator	Name	Example	Description
&&	AND operator	<b>A &amp;&amp; B;</b>	If either of the values are zero the value of the expression is zero, otherwise the value of the expression is 1. If the left hand value is zero, then the right hand value is not considered.
	OR operator	<b>A    B;</b>	If both of the values are zero then the value of the expression is 0 otherwise the value of the expression is 1. If the left hand value is non-zero, then the right hand value is not considered.
!	NOT operator	<b>!A;</b>	Not operator is applied to a non-



			zero value then the value is zero, if it is applied to a zero value, the value is 1.
--	--	--	--

## 5- Bitwise operators:

The bitwise operators are similar to the logical operators, except that they work on a smaller scale -- binary representations of data.

The following operators are available in MQL4:

Operator	Name	Example	Description
&	AND operator	<b>A &amp; B;</b>	Compares two bits and generates a result of 1 if both bits are 1; otherwise, it returns 0.
	OR operator	<b>A   B;</b>	Compares two bits and generates a result of 1 if the bits are complementary; otherwise, it returns 0.
^	EXCLUSIVE-OR operator	<b>A ^ B;</b>	Compares two bits and generates a result of 1 if either or both bits are 1; otherwise, it returns 0.
~	COMPLEMENT operator	<b>~A;</b>	Used to invert all of the bits of the operand.
>>	The SHIFT RIGHT operator	<b>A &gt;&gt; B;</b>	Moves the bits to the right, discards the far right bit, and assigns the leftmost bit a value of 0. Each move to the right effectively divides <code>op1</code> in half.
<<	The SHIFT LEFT operator	<b>A &lt;&lt; B;</b>	Moves the bits to the left, discards the far left bit, and assigns the rightmost bit a value of 0. Each move to the left effectively multiplies <code>op1</code> by 2.

**Note** Both operands associated with the bitwise operator must be integers.

## 6- Other operators:

There are some operators which used in MQL4 and don't belong to one of the previous categories:

- 1- The array indexing operator (`[]`).
- 2- The function call operator (`()`);
- 3- The function arguments separator operator -comma (`,`)

We will know more about the Arrays and Functions in the next lessons, so just remember these 3 operators as "Other operators".

## Operators Precedence:

If you don't explicitly indicate the order in which you want the operations in a compound expression to be performed, the order is determined by the precedence assigned to the operators in use within the expression. Operators with a higher precedence get evaluated first. For example, the division operator has a higher precedence than does the addition operator. Thus, the two following statements are equivalent:

```
x + y / 100
x + (y / 100) //unambiguous, recommended
```

When writing compound expressions, you should be explicit and indicate with parentheses `()` which operators should be evaluated first. This practice will make your code easier to read and to maintain.

The following table shows the precedence assigned to the operators in the MQL4. The operators in this table are listed in precedence order: The higher in the table an operator appears, the higher its precedence. Operators with higher precedence are evaluated before operators with a relatively lower precedence. Operators on the same **group** have equal precedence. When operators of equal precedence appear in the same expression, a rule must govern which is evaluated first. All binary operators except for the assignment operators are evaluated from left to right. Assignment operators are evaluated right to left.

<code>()</code>	Function call	<i>From left to right</i>
<code>[]</code>	Array element selection	

<code>!</code>	Negation	<i>From left to right</i>
----------------	----------	---------------------------

~ Bitwise negation  
- Sign changing operation

\* Multiplication *From left to right*  
/ Division  
% Module division

+ Addition *From left to right*  
- Subtraction

<< Left shift *From left to right*  
>> Right shift

< Less than *From left to right*  
<= Less than or equals  
> Greater than  
>= Greater than or equals

== Equals *From left to right*  
!= Not equal

& Bitwise AND operation *From left to right*

^ Bitwise exclusive OR *From left to right*

&& Logical AND *From left to right*

|| Logical OR *From left to right*

= Assignment *From right to left*  
+= Assignment addition  
-= Assignment subtraction  
\*= Assignment multiplication  
/= Assignment division  
%= Assignment module

>>= Assignment right shift  
<<= Assignment left shift  
&= Assignment bitwise AND  
|= Assignment bitwise OR  
^= Assignment exclusive OR

, Comma *From left to right*

I hope you enjoyed the lesson.  
I welcome very much the questions and the suggestions.

See you  
**Coders' Guru**  
23-10-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-5-

## Loops & Decisions Part 1

-----

Welcome to the fifth lesson in my course about MQL4.

You can download the previous lesson from here:

<http://forex-tsd.com/attachment.php?attachmentid=399>

<http://forex-tsd.com/attachment.php?attachmentid=372>

<http://forex-tsd.com/attachment.php?attachmentid=469>

<http://forex-tsd.com/attachment.php?attachmentid=481>

*Don't forget to login first.*

The normal flow control of the program you write in MQL4 (And in others languages as well) executes from top to bottom, A statement by a statement.

*A statement is a line of code telling the computer to do something.*

*For example:*

***Print("Hello World");***

***return 0;***

*A semicolon at end of the statement is a crucial part of the syntax but usually easy to forget, and that's make it the source of 90% of errors.*

But the top bottom execution is not the only case and it has two exceptions,  
They are the loops and the decisions.

The programs you write like -the human- decides what to do in response of circumstances changing. In these cases the flow of control jumps from one part of the program to another. Statements cause such jumps is called Control Statements.  
Such controls consist of Loops and Decisions.

# LOOPS

---

Loops causing a section of your program to be repeated a certain number of times. And this repetition continues while some condition is true and ends when it becomes false. When the loop ends it passes the control to the next statement following the loop section.

In MQL4 there are two kinds of loops:

## The for Loop

---

The **for** loop is considered the easiest loop because all of its control elements are gathered in one place.

The **for** loop executes a section of code a fixed number of times.

For example:

```
int j;  
for(j=0; j<15; j++)  
    Print(j);
```

### How does this work?

The **for** statement consists of the **for** keyword, followed by parentheses that contain three expressions separated by semicolons:

**for(j=0; j<15; j++)**

These three expressions are the **initialization** expression, the **test** expression and the **increment** expression:

**j=0** ← initialization expression

**j<15** ← test expression

**J++** ← increment expression

The **body** of the loop is the code to be executed the fixed number of times of the loop:

**Print(j);**

*This executes the body of the loop in our example for 15 times.*

**Note:** the **for** statement is not followed by a semicolon. That's because the **for** statement

and the loop body are together considered to be a program statement.

### **The initialization expression:**

The initialization expression is executed only once, when the loop first starts. And its purpose to give the loop variable an initial value (0 in our example).

You can declare the loop variable outside (before) the loop like our example:

```
int j;
```

Or you can make the declaration inside the loop parentheses like this:

```
for(int j=0; j<15; j++)
```

The previous two lines of code are equal, except the **Scope** of each variable (you will know more about the variable declaration and scopes in the Variables lesson).

The outside declaration method makes every line in the code block to know about the variable, while the inside declaration makes only the **for** loop to know about the variable.

You can use more than one initialization expression in **for** loop by separating them with comma (,) like this:

```
int i;  
int j;  
for(i=0, j=0; i<15; i++)  
    Print(i);
```

### **The Test expression:**

The test expression always a relational expression that uses relational operators (please refer to relational operators in the previous lesson).

It is evaluated by the loop every time the loop is executed to determine if the loop will continue or will stop. It will continue if the result of the expression is true and will stop if it is false.

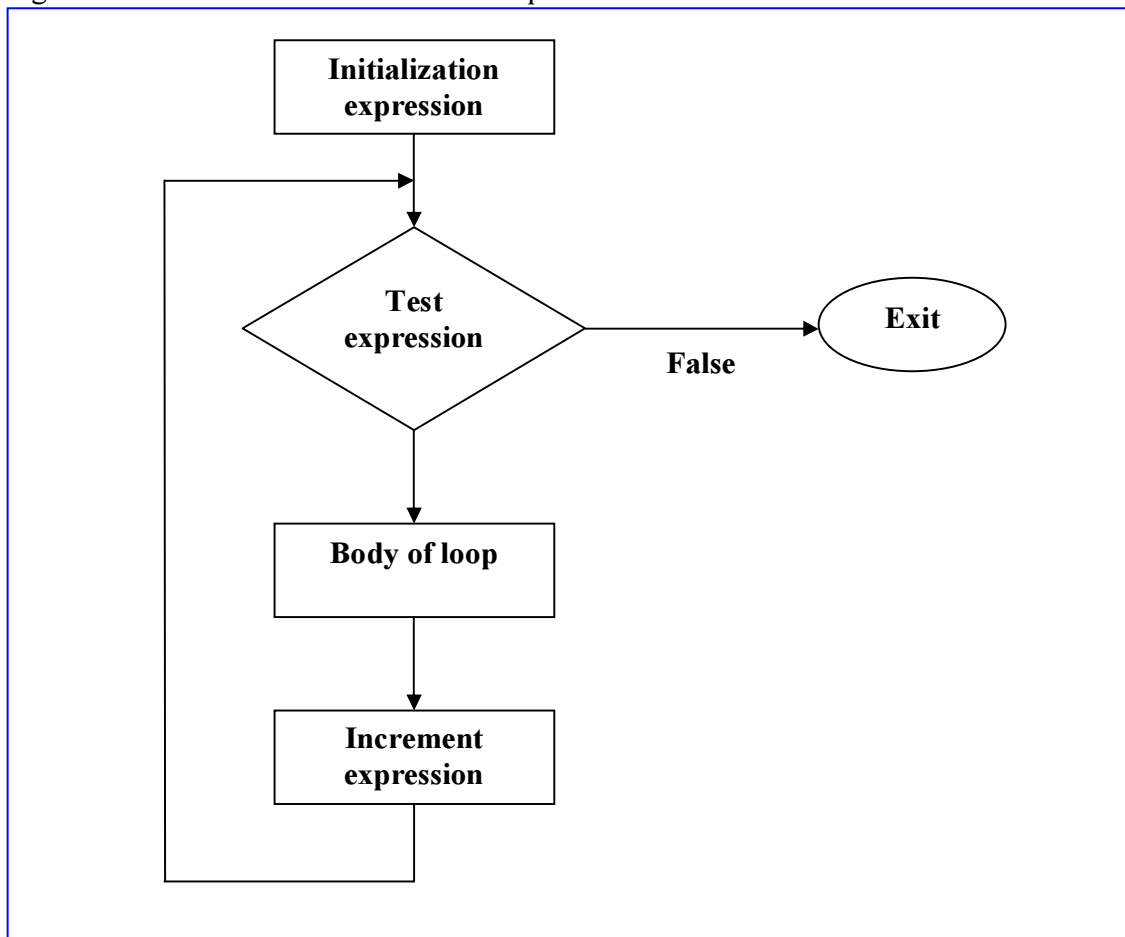
In our example the **body** of the loop will continue printing **i (Print(i))** while the case **j<15** is true. For example the **j = 0,1,2,3,4,5,6,7,8,9,10,11,12,13** and **14**.

And when **j** reaches **15** the loop will stop and the control passes to the statement following the loop.

### **The Increment expression:**

The increment expression changes the value of the loop variable (j in our example) by increase it value by 1.  
It executed as the last step in the loop steps, after initializing the loop variable, testing the test expression and executing the body of the loop.

Figure 1 shows a flow chart of the **for** loop.



**Figure 1 - Flow chart of the for loop**

Like the initialization expression, in the increment expression you can use more than one increment expression in the **for** loop by separating them with comma (,) like this:

```
int i;  
int j;  
for(i=0 ,j=0;i<15,i<;i++,j++)  
    Print(i);
```

But you can only use one test expression.



Another notice about the increment expression, it's not only can increase the variable of the loop, but it can perform an operation like for example decrements the loop variable like this:

```
int i;
for(i=15;i>0,i<;i--)
    Print(i);
```

The above example will initialize the **i** to **15** and start the loop, every time it decreases **i** by **1** and check the test expression (**i>0**).

The program will produce these results: 15,14,13,12,11,10,9,8,7,6,5,4,3,2,1.

### **Multi statement in the loop body:**

In our previous examples, we used only one statement in the body of the loop, this is not always the case.

You can use multi statements in the loop body delimited by braces like this:

```
for(int i=1;i<=15;i++)
{
    Print(i);
    PlaySound("alert.wav");
}
```

In the above code the body of the loop contains two statements, the program will execute the first statement then the second one every time the loop is executed.

Don't forget to put a semicolon at the end of every statement.

### **The Break Statement:**

When the keyword presents in the **for** loop (and in **while** loop and **switch** statement as well) the execution of the loop will terminate and the control passes to the statement followed the loop section.

For example:

```
for(int i=0;i<15;i++)
{
    if(i==10)
        break;
    Print(i);
}
```

The above example will execute the loop until **i** reaches **10**, in that case the break keyword

will terminate the loop. The code will produce these values: 0,1,2,3,4,5,6,7,8,9.

### The Continue Statement:

The break statement takes you out the loop, while the continue statement will get you back to the top of the loop (parentheses).

For example:

```
for(int i=0;i<15; i++)
{
    if(i==10) continue;
    Print(i)
}
```

The above example will execute the loop until **i** reaches **10**, in that case the continue keyword will get the loop back to the top of the loop without printing **i** the tenth time. The code will produce these values: 0,1,2,3,4,5,6,7,8,9,11,12,13,14.

### Latest note:

You can leave out some or all of the expressions in **for** loop if you want, for example:

**for(;;)**

This loop is like **while** loop with a test expression always set to true.

We will introduce the **while** loop to you right now.

## The while Loop

---

The **for** loop usually used in the case you know how many times the loop will be executed. What happen if you don't know how many times you want to execute the loop?

This the **while** loop is for.

The **while** loop like the **for** loop has a Test expression. But it hasn't Initialization or Increment expressions.

This is an example:

```
int i=0;
while(i<15)
{
    Print(i);
    i++;
}
```

```
}
```

In the example you will notice the followings:

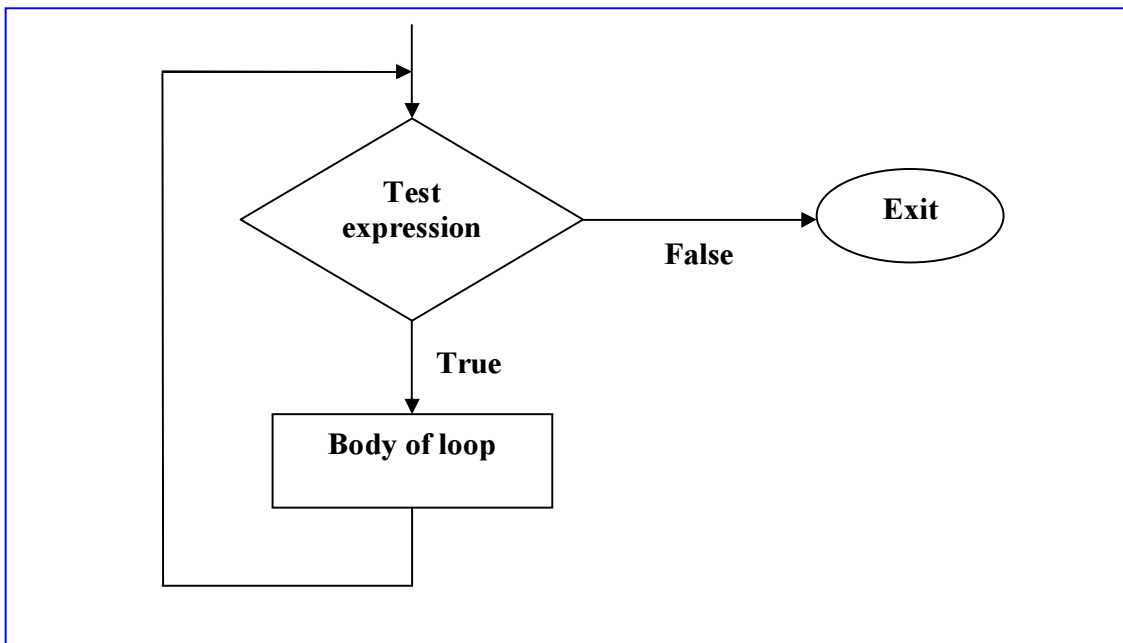
- The loop variable had declared and initialized before the loop, you can not declare or initialize it inside the parentheses of the **while** loop like the **for** loop.
- The **i++** statement here is not the increment expression as you may think, but the body of the loop must contain some statement that changes the loop variable, otherwise the loop would never end.

### How the above example does work?

The **while** statement contains only the Test expression, and it will examine it every loop, if it's true the loop will continue, if it's false the loop will end and the control passes to the statement followed the loop section.

In the example the loop will execute till **i** reaches **16** in this case **i<15=false** and the loop ends.

Figure 2 shows a flow chart of the **while** loop.



**Figure 2 - Flow chart of the while loop**

I told you before that the **while** loop is like the **for** loop, these are the **similar aspects**:

1. You can use **break** statement and **continue** in both of them.
2. You can single or multi statements in the body of the loop in both of them, in the case of using multi statements you have to delimit them by braces.
3. The similar copy of **for(;;)** is **while(true)**

I hope you enjoyed the lesson.

I welcome very much the questions and the suggestions.

See you

**Coders' Guru**

24-10-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-6-

## Loops & Decisions Part 2

---

Welcome to the sixth lesson in my course about MQL4.  
I hope you enjoyed the previous lessons.

In the previous lesson, we have talked about the Loops.  
And we have seen that the Loops are one of two ways we use to change the normal flow of the program execution -from top to bottom. The second way is the Decisions.

Decisions in a program cause a one-time jump to a different part of the program, depending on the value of an expression.  
These are the kinds of decisions statements available in MQL4:

### The if Statement

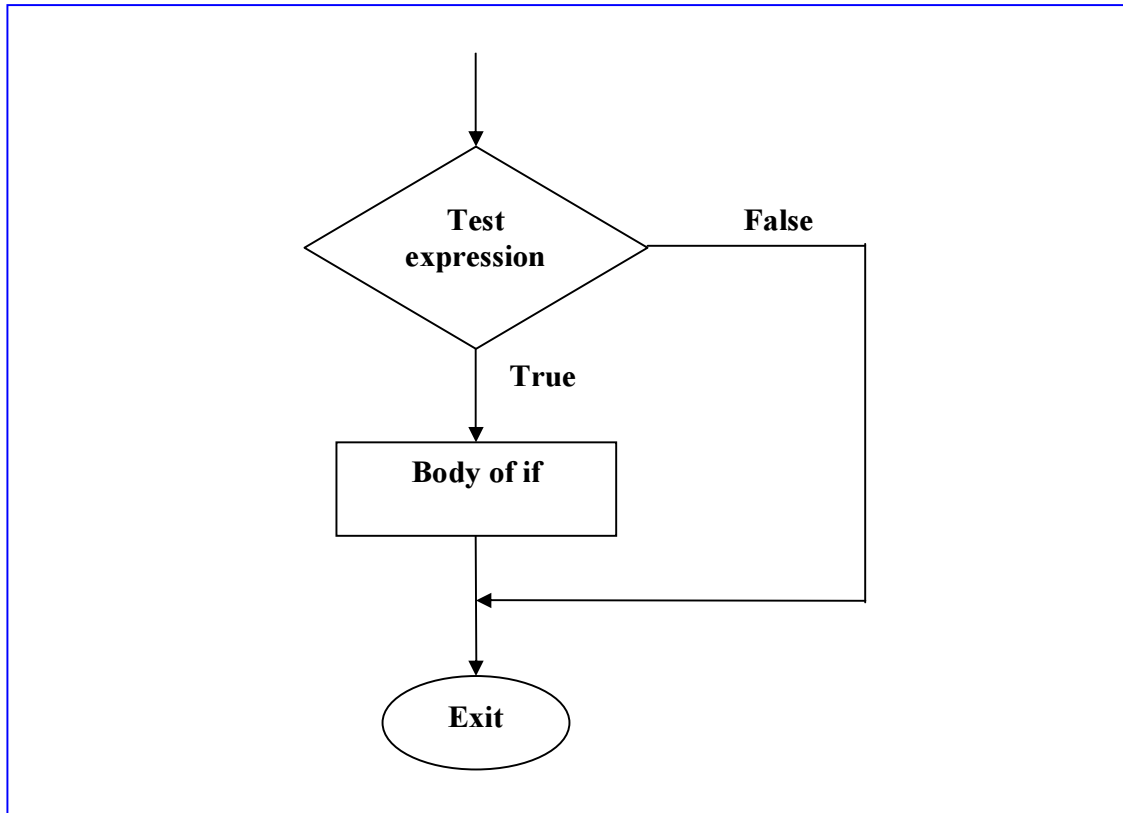
---

The **if** statement is the simplest decision statement, here's an example:

```
if( x < 100 )  
Print("hi");
```

Here the **if** keyword has followed by parentheses, inside the parentheses the **Test expression** ( **x < 100**), when the result of test expression is **true** the body of the **if** will execute (**Print("hi");**), and if it is false, the control passes to the statement follows the **if** block.

Figure 1 shows the flow chart of the **if** statement:



**Figure 1 - Flow chart of the if statement**

### **Multi Statements in the if Body:**

Like the loops, the body of **if** can consist of more than statement delimited by braces.

For example:

```
if(current_price==stop_lose)
{
    Print("you have to close the order");
    PlaySound("warning.wav");
}
```

*Notice the symbol == in the Test expression; it's one of the Relational Operators you have studied in the lesson 4, operations & expressions.*

*This is a source of a lot of errors, when you forget and use the assignment operator =.*

### **Nesting:**

The loops and decision structures can be basted inside one another; you can nest **ifs**

inside loops, loops inside **ifs**, **ifs** inside **ifs**, and so on.

Here's an example:

```
for(int i=2 ; i<10 ; i++)
    if(i%2==0)
    {
        Print("It's not a prime number");
        PlaySound("warning.wav");
    }
```

In the previous example the **if** structure nested inside the for loop.

*Notice: you will notice that there are no braces around the loop body, this is because the **if** statement and the statements inside its body, are considered to be a single statement.*

## The **if...else** Statement

---

The **if** statement lets you do something if a condition is true, suppose we want to do another thing if it's false. That's the **if...else** statement comes in.

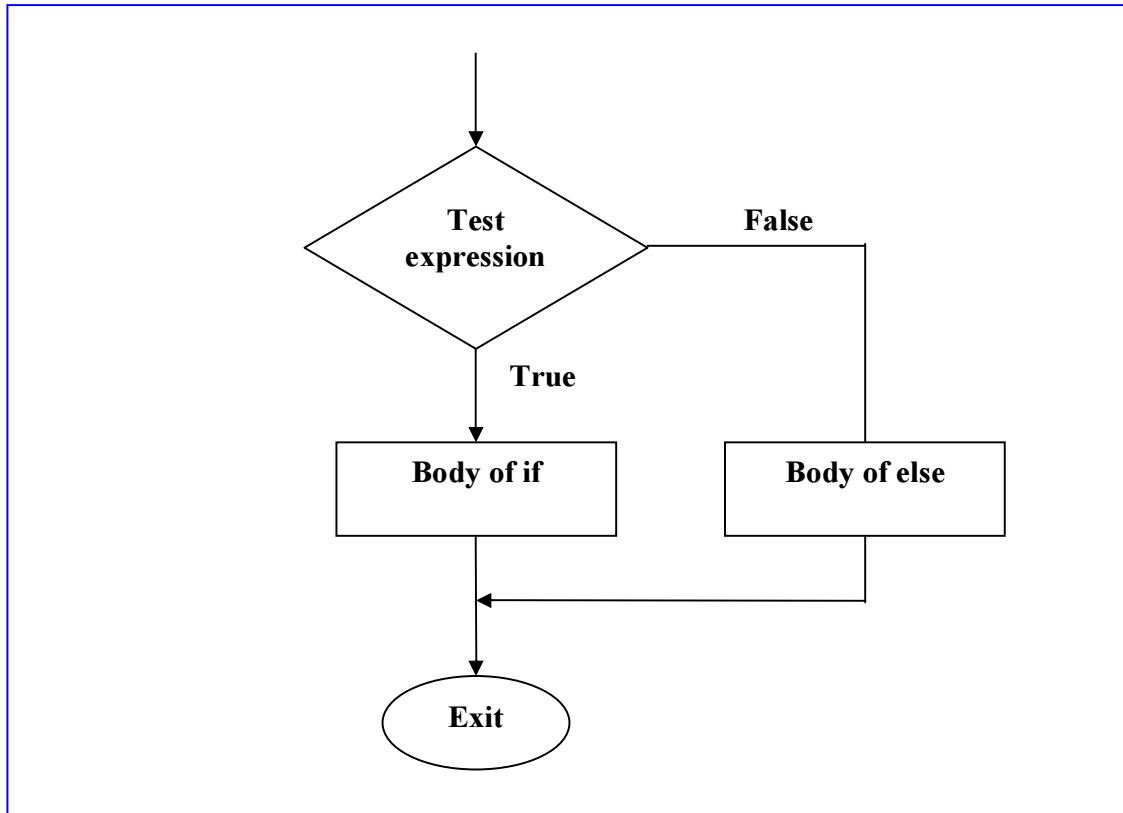
It consists of **if** statement followed by statement or a block of statements, then the **else** keyword followed by another statement or a block of statements.

Like this example:

```
if(current_price>stop_lose)
    Print("It's too late to stop, please stop!");
else
    Print("you playing well today!");
```

If the test expression in the **if** statement is true, the program prints one message, if it isn't true, it prints the other.

Figure 2 shows the flow chart of the **if...else** statement:



**Figure 2 - Flow chart of the if..else statement**

### **Nested if...else Statements**

You can nest if... else statement in ifs statements, you can nest if... else statement in if... else statement, and so on.

Like this:

```

if(current_price>stop_lose)
    Print("It's too late to stop, please stop!");
if(current_price==stop_lose)
    Print("It's time to stop!");
else
    Print("you playing well today!");
  
```

There's a potential problem in nested if... else statements, you can inadvertently match an else with the wrong if.

To solve this case you can do one of two things:



1- you can delimited the **if...else** pairs with braces like this:

```
if(current_price>stop_lose)
{
    Print("It's too late to stop, please stop!");
if(current_price==stop_lose)
    Print("It's time to stop!");
else
    Print("you playing well today!");
}
```

2- If you can't do the first solution (in the case of a lot of if... else statements or you are lazy to do it) take it as rule.

**Match else with the nearest if.** (Here it's the line **if(current\_price==stop\_lose)**).

## The switch Statement

---

If you have a large decision tree, and all the decisions depend on the value of the same variable, you can use a switch statement here.

Here's an example:

```
switch(x)
{
    case 'A':
        Print("CASE A");
        break;
    case 'B':
    case 'C':
        Print("CASE B or C");
        break;
    default:
        Print("NOT A, B or C");
        break;
}
```

In the above example the switch keyword is followed by parentheses, inside the parentheses you'll find the **switch constant**, this constant can be an integer, a character constant or a constant expression. The constant expression mustn't include variable for example:

**case X+Y:** is invalid switch constant.

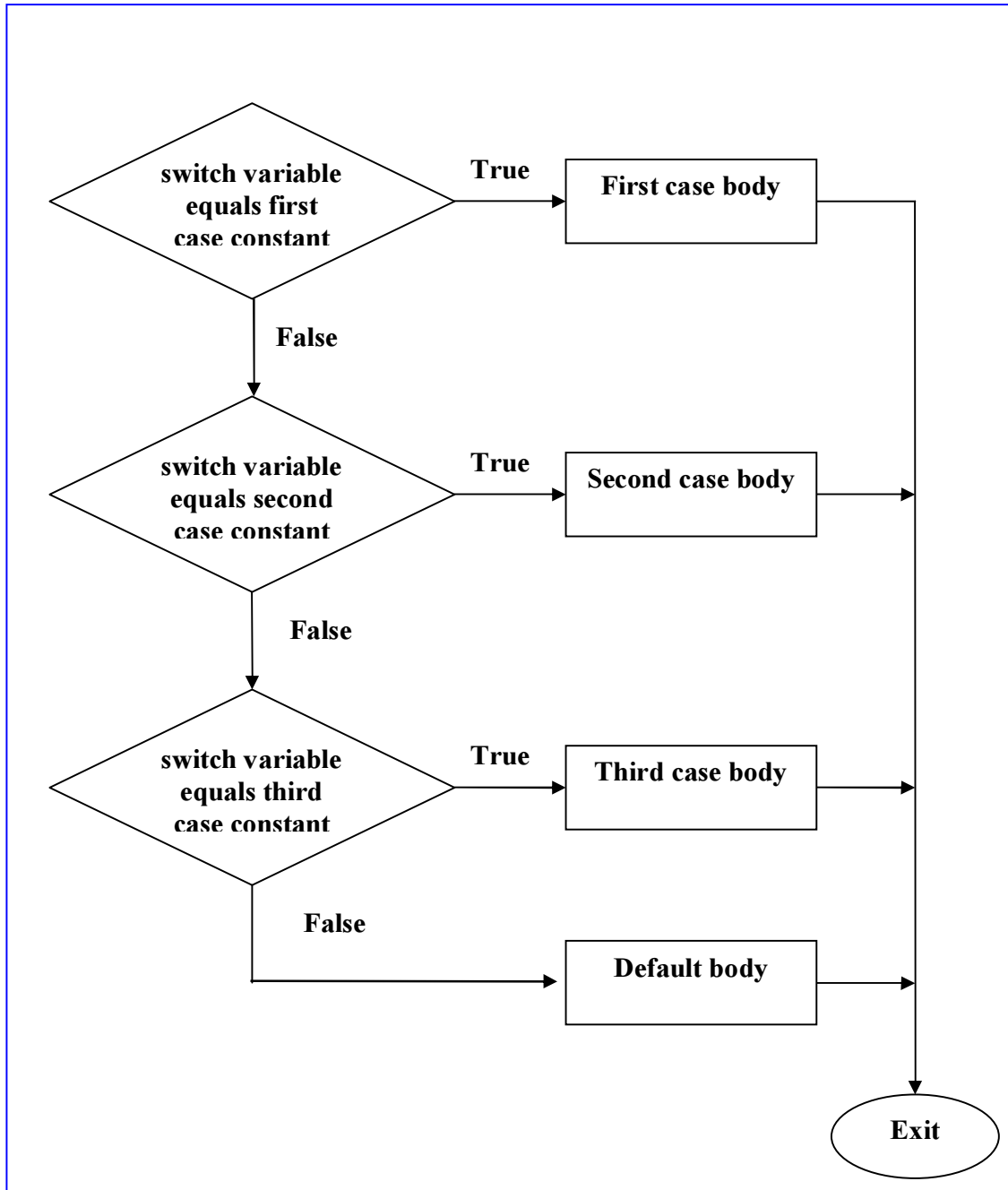
**How the above example works?**

The switch statement matches the constant **x** with one of the **cases constants**.  
In the case **x=='A'** the program will print "**CASE A**" and the **break** statement will take you the control out of the switch block.

In the cases **x=='B'** or **x=='C'**, the program will print "**CASE B or C**". That's because there's no **break** statement after **case 'B'**:

In the case that **x !=** any of the cases constants the switch statement will execute the **default** case and print "**NOT A, B or C**".

**Figure 3 shows the flow chart of the switch statement**



**Figure 3 - Flow chart of the switch statement**

I hope you enjoyed the lesson.

I welcome very much the questions and the suggestions.

See you

**Coders' Guru**

25-10-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-7-

## Functions

---

Welcome to the world of MQL4 Functions.  
The functions in any language take two phases:  
Learning them which sometimes a boring thing.  
Using them which always a **lifeboat**.

I want to tell you my traditional sentence:

I hope you enjoyed the previous lessons, which you can download them from here:

- 1- Lesson 1 - Welcome to the MQL4 course.  
<http://www.forex-tsd.com/attachment.php?attachmentid=372>
- 2- Lesson 2 – SYNTAX.  
<http://www.forex-tsd.com/attachment.php?attachmentid=399>
- 3- Lesson 3 - MQL4 Data types.  
<http://www.forex-tsd.com/attachment.php?attachmentid=469>
- 4- Lesson 4 - MQL4 Operations & Expressions.  
<http://www.forex-tsd.com/attachment.php?attachmentid=481>
- 5- Lesson 5- Loops & Decisions (Part1).  
<http://www.forex-tsd.com/attachment.php?attachmentid=504>
- 6- Lesson 6 - Loops & Decisions (Part2).  
<http://www.forex-tsd.com/attachment.php?attachmentid=547>

Let's start the seventh lesson.

### What's the meaning of functions?

The function is very like the sausage **machine**, you input the **meat** and the **spices** and it outs the **sausage**.

The meat and the spices are the **function parameters**; the sausage is the **function return** value. The machine itself is the **function body**.

There's only one difference between the functions and your sausage machine, some of the functions will return nothing (nothing in MQL4 called **void**).

Let's take some examples:

```
double                // type of the sausage – return value
my_func (double a, double b, double c) // function name and parameters list (meat &
spices)
{
    return (a*b + c);           // sausage outs - returned value
}
```

As you see above, the function starts with the **type** of the returned value “**double**” followed by the **function name** which followed by parentheses. Inside the parentheses you put the meat and spices, sorry, you put the **parameters** of the function.

Here we have put three parameters **double a, double b, double c**.

Then the function body starts and ends with braces. In our example the function body will produce the operation (**a\*b + c**).

The **return** keyword is responsible about returning the final result.

### **Return keyword:**

The return keyword terminate the function (like the **break** keyword does in the loop), and it gives the control to the **function caller** (we will know it soon).

The return keyword can include an expression inside its parentheses like the above example **return (a\*b + c)**; and this means to terminate the function and return the result of the expression.

And it can be without expression and its only job in this case is to terminate the function.

Notice: Not all the functions use the return keyword, especially if there's no return value. Like the next example:

```
void                // void mean there's no sausage – returned value.
my_func (string s) // function name and parameters list (meat & spices)
{
    Print(s);
}
```

The function above will not return value, but it will print the parameter **s** you provided.

When the function has no return value you use “**void**” as the function returns type.

These kinds of functions in some programming language called “**Methods**”, but MQL4 calling them functions.

### **Function call:**

We know very well now what the function is (I hope)? How to use the functions in your MQL4?

There's an extra steps after writing your function to use the function in you program.

This step is **calling it** (using it).

Assume you have a function which collects the summation of two integers.

This is the function:

```
int collect (int first_number, int second_number)
{
    return(first_number+ second_number);
}
```

You know how the previous function works, but you want to use it.

You use it like this:

```
int a = 10;
int b = 15;
int sum = collect(a,b);
Print (sum);
```

The example above will print **25** (is it a magic). But how did it know?

The magic line is **int sum = collect(a,b)**; here you declared a variable (**sum**) to hold the function return value and gave the function its two parameters (**a,b**).

You basically **called the function**.

MQL4 when see your **function name**, it will take you parameters and go to the function and it will return –soon- with the result and place them in same line.

It's very like copying all the lines of the function instead of the place you called the function in, easy right?

### **Nesting functions inside function:**

You can nest function (or more) inside the body of another function. That's because the caller line is treated like any normal statement (it's actually a statement).

For example:

We will use the collect function described above inside another new function which its job is printing the result of the collection:

```
void print_collection (int first_number, int second_number)
{
    int sum = collect(first_number, second_number);
    Print(sum);
}
```

```
}
```

Here we called the **collect** function inside the **print\_collection** function body and printed the result. **void** means there's no return value (do you still remember?).

### **MQL4 Special functions `init()`, `deinit()` and `start()`:**

In MQL4, every program begins with the function "**init()**" (initialize) and it occurs when you attach your program (Expert advisor or Custom indicator) to the MetaTrader charts or in the case you change the financial symbol or the chart periodicity. And its job is initializing the main variables of your program (you will know about the variables initialization in the next lesson).

When your program finishes its job or you close the chart window or change the financial symbol or the chart periodicity or shutdown MetaTrader terminal, the function "**deinit()**" (de-initialize) will occur.

The third function (which is the most important one) "**start()**" will occur every time new quotations are received, you spend 90% of your programming life inside this function.

We will know a lot about these functions in our **real world lessons** when we write our own Expert advisor and Custom Indicator.

I hope you enjoyed the lesson.

**I welcome very much the questions and the suggestions.**

See you  
**Coders' Guru**  
25-10-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-8-

## Variables

---

Welcome to my MQL4 variables.

I hope you enjoyed the previous lessons and I hope you are ready for the variables challenge:

I recommend you to read the "DATA TYPES" lesson before reading this lesson.

You can download it here:

<http://forex-tsd.com/attachment.php?attachmentid=469>

Now, let's **enjoy** the Variables.

### What are the variables mean?

As I told you the secret before, the variables are the names that refer to sections of memory into which data can be stored.

To help you think of this as a picture, imagine that memory is a series of different size boxes. The box size is memory storage area required in bytes.

- In order to use a box to store data, the box must be given a name; this process is known as **declaration**.
- In the declaration process you use a word tell the computer what's the kind and size of the box you want to use, this word known as **keyword**.
- It helps if you give a box a meaningful name that relates to the type of information which make it easier to find the data, this name is the **variable constant**.
- Data is placed into a box by **assigning** the data to the box.
- When we set the value of the box you have created in the same line you declared the variable; this process is known as **initialization**.

When we create a variable we are telling the computer that we want him to assign a specified memory length (in bytes) to our variable, since storing a simple number, a letter or a large number is not going to occupy the same space in memory, so the computer will



ask us what's the kind of data and how much the length of the data? That is the Data type for.

For example if we said this line of code to the computer:

```
int MyVariable=0;
```

That's mean we are asking the computer to set a block of 4 bytes length to our variable named "MyVariable".

In the previous example we have used:

**int** ← Keyword

**int** ← Integer data type.

**int** ← Declaration

**MyVariable** ← Variable's constant.

**=0** ← Initialization

We will know more about variables in a coming lesson.

In MQL4, these are the kinds of Data types:

- Integer (int)
- Boolean (bool)
- Character (char)
- String (string)
- Floating-point number (double)
- Color (color)
- Datetime (datetime)

I've copied the previous few lines from the DATA TYPES lesson for you. To know what's the variable, now how do to declare the variables:

### **Declaration:**

Declaring a variable means to introduce it to the world and specify its type. By using the **keywords** you have learned in the DATA TYPES lesson (int, double, char, bool, string, color and datetime) with the name you chose to the variable.

For example:

```
int MyVariable;
```

Here you declared a variable named **MyVariable** which is an integer type. And before the declaration you can't use the **MyVariable** in your code. If you used it without declaration the MQL4 compiler will complain and will tell you something like this: **'MyVariable' - variable not defined. 1 error(s), 0 warning(s).**

### **Initialization:**

Initializing the variable means to assign a value to it, for example **MyVariable=0;** You can initialize the variable at the same line of the declaration like the example: **int MyVariable=0;**

And you can declare the variable in one place and initialize it in another place like this:

```
int MyVariable;  
...  
...  
MyVariable=5;
```

But keep in your mind this fact: **the declaration must be before the initialization.**

### **Scopes of variables:**

There are two scopes of the variables, Local and Global.

Scope means, which part of code will know about the variable and can use it.

**Local variable** means they are not seen to outside world where they had declared. For example the variables declared inside function are local to the function block of code, and the variables declared inside the loop or decisions block of code are local to those blocks and can be seen or used outside them.

For example:

```
double my_func (double a, double b, double c)  
{  
    int d ;  
    return (a*b + c);  
}
```

In the above example the variables **a,b,c** and **d** are local variables, which can be used only inside the function block of code ( any thing beside the braces) and can't be used by outside code. So we can't write a line after the function above saying for example: **d=10;** because **d** is not seen to the next line of the function because it's outside it.

The second kind of the scopes is the **Global variables**, and they are the variables which had declared outside any block of code and can be seen from any part of your code.

For example:

```
int Global_Variable;
double my_func (double a, double b, double c)
{
    return (a*b + c + Global_Variable);
}
```

Here the variable **Global\_Variable** declared outside the function (function level declaration) so, it can be seen by all the functions in you program.

The Global variables will automatically set to **zero** if you didn't initialize them.

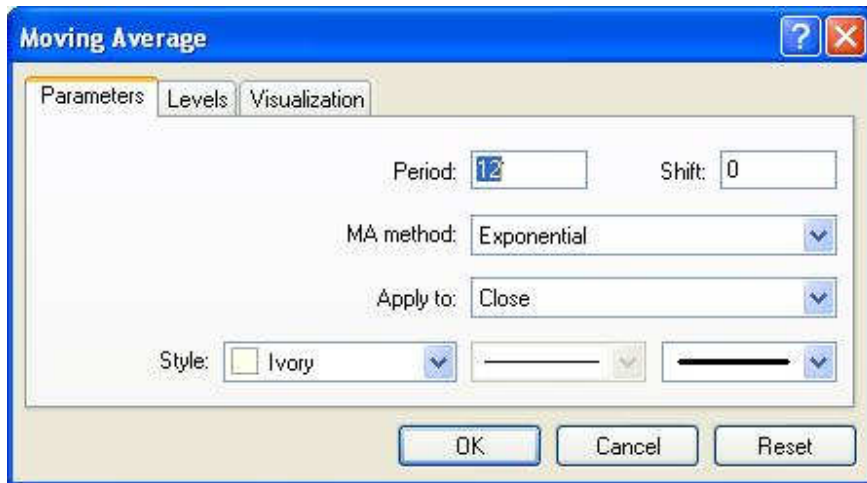
### **Extern variables:**

The keyword “**extern**” used to declare a special kind of variables; those kinds of variables are used to define input date of the program, which you can set them form the property of your Expert advisor or Custom indicator.

For example:

```
extern color Indicator_color = C'0x00,0x00,0xFF'; // blue
int init()
{
    ...
}
```

Here the variable **Indicator\_color** had defined as an **extern** variable which you will see it the first time you attach your indicator (or EA) to the MetaTrader chart and which you can change it from the properties sheet windows. Look at Figure 1.



**Figure 1: Property sheet of MA indicator**

Here the variables **Period**, **Shift**, **MA\_method**, **Apply\_to** and **Style** are variables defined using the “**extern**” keyword so they appear in the property sheet. Any variable you want the user of your program be able to change and set, make it extern variable.

I hope you enjoyed the lesson.

**I welcome very much the questions and the suggestions.**

See you  
**Coders' Guru**  
29-10-2005

# MQL4 COURSE

By Coders' guru

-9-

## Preprocessors

---

Welcome to my last **theoretical** lesson in this series.  
In the next series of lessons we will start to build our first Customer Indicator,  
So I recommend you to read all the nine lessons carefully before the real work starts.

Now, let's enjoy the Preprocessors:

### What are the Preprocessors mean?

Preprocessors are the instructions you give to the compiler to carry them out before starting (processing) your code.

For example if you used the preprocessor directive **#include <win32.h>** that's mean you telling the compiler to include the content of the file "**win32.h**" in the place you wrote the include keyword before processing your code.

In MQL4 there are four of preprocessors directives:

#### 1- define directive:

**define** directive used to generate a constant.

The constant is very like the variable with only one different, you set its value only once and you can not change its value in your code like the variable.

For example:

```
#define my_constant 100
```

As you can notice in the above example there's no assignment symbol (=) but only space between the constant name (**my\_constant**) and its value (**100**).

And you can notice too that the line didn't end with semi-colon but it ended with a carriage-return character (new line).

The name of constant obeys the same rules you had learnt about choosing the identifier names (lesson 2 SYNTAX), for example you can't start the constant name with a number or exceeds 31 characters.

The value of the content can be any type you want.

The compiler will replace each occurrence of constant name in your source code with the corresponding value.

So you can use the above constant in your code like that:

```
sum = constant1 * 10;
```

## 2- property directive:

There are predefined constants called "**Controlling Compilation**" included in the MQL4 language, which you can set them in your program.

They are the properties of your program which you can set them using the compiler directive "**property**" and the compiler will write them in the settings of your executable program (ex4 file).

For example:

```
#property link "http://www.forex-tsd.com"  
#property copyright "Anyone wants to use"
```

This is the list of the MQL4 predefined constants:

Constant	Type	Description
link	string	a link to the company website
copyright	string	the company name

stacksize	int	stack size
indicator_chart_window	void	show the indicator in the chart window
indicator_separate_window	void	show the indicator in a separate window
indicator_buffers	int	the number of buffers for calculation, up to 8
indicator_minimum	int	the bottom border for the chart
indicator_maximum	int	the top border for the chart
indicator_colorN	color	the color for displaying line N, where N lies between 1 and 8
indicator_levelN	double	predefined level N for separate window custom indicator, where N lies between 1 and 8
show_confirm	void	before script run message box with confirmation appears
show_inputs	void	before script run its property sheet appears; disables show_confirm property

### 3- include directive:

When you asking the compiler to include a file name with the “**include**” directive, it’s very like when you copy the entire file content and paste it in the place of the line you write include.

For example:

```
#include <win32.h>
```

In the above example you telling the compiler to open the file “**win32.h**” and reads all of its content and copy them in the same place of the include statement.

**Note:** in the above example you enclosed the file name with Angle brackets (<>) and that’s mean you telling the compiler to use the default directory (usually, terminal\_directory\experts\include) to search for the file **win32.h** and don’t search the current directory.

If the file you want to include located at the same path of your code, you have to use quotes instead of angle brackets like this:

```
#include "mylib.h"
```

In the both cases if the file can't be found you will get an error message.

You can use include at anywhere you want but it usually used at the beginning of the source code.

**Tip:** *It's a good programming practice to write the frequently used code in a separate file and use include directive to put it in your code when you need (just an advice).*

#### 4- import directive:

It's like include directive in the aspect of using outside file in your program.

But there are differences between them.

You use **import** only with MQL4 executables files (.ex4) or library files (.dll) to import their functions to your program.

For example:

```
#import "user32.dll"
    int MessageBoxA(int hWnd,string lpText,string lpCaption,
                    int uType);
    int MessageBoxExA(int hWnd,string lpText,string lpCaption,
                     int uType,int wLanguageId);
#import "melib.ex4"
#import "gdi32.dll"
    int  GetDC(int hWnd);
    int  ReleaseDC(int hWnd,int hDC);
#import
```

When you import functions from "ex4" file you haven't to declare their functions to be ready for use.

While importing the functions from a ".dll" file requires you to declare the functions you want to use like this:

```
int MessageBoxA(int hWnd,string lpText,string lpCaption,
                int uType);
```

And only the functions you has declared you can use in your code.



You must end the import directives with a blank import line **#import** (without parameters).

I hope you enjoyed the lesson. And I hope you are ready now for your first Custom Indicator.

**I welcome very much the questions and the suggestions.**

See you  
**Coders' Guru**  
30-10-2005

# MQL4 COURSE

By Coders' guru

-10-

## Your First Indicator Part 1

---

Welcome to the practical world of MQL4 courses; welcome to your first indicator in MQL4.

I recommend you to read the previous nine lessons very carefully, before continuing with these series of courses, that's because we will use them so much in our explanations and studies of the Expert Advisors and Custom Indicators which we will create in this series of lessons.

Today we are going to create a simple indicator which will not mean too much for our trade world but it means too much to our MQL4 programming understanding.

It simply will collect the subtraction of **High** [] of the price – **Low** [] of the price; don't be in a hurry, you will know everything very soon.

*Let's swim!*

### MetaEditor:

This is the program which has been shipped with MT4 (MetaTrader 4) enables you to write your programs, read MQL4 help, compile your program and More.

I've made a shortcut for MetaEditor on my desktop for easily access to the program. If you want to run MetaEditor you have three choices.

- 1- Run MT4, then click **F4**, choose MetaEditor from Tools menu or click its icon on the Standard toolbar (Figure 1).
- 2- From Start menu → Programs, find MetaTrader 4 group then click MetaEditor.
- 3- Find the MT4 installation path (usually C:\Program Files\MetaTrader 4), find the MetaEditor.exe and click it (I recommend to make a shortcut on you desktop).



Figure 1 – MetaTrader Standard Toolbar

Any method you have chosen leads you to MetaEditor as you can see in figure 2.

As you can see in figure 2, there are three windows in MetaEditor:

- 1- The Editor window which you can write your program in.
- 2- The Toolbox window which contains three tabs:
  - a. Errors tab, you see here the errors (if there any) in your code.
  - b. Find in files tab, you see here the files which contain the keyword you are searching for using the toolbar command “Find in files” or by clicking CTRL +SHIFT+ F hotkeys.
  - c. Help tab, you can highlight the keyword you want to know more about it and click F1, and you will see the help topics in this tab.
- 3- The Navigator window which contains three tabs:
  - a. Files tab, for easy access to the files saved in the MT4 folder.
  - b. Dictionary tab enables you to access the MQL4 help system.
  - c. Search tab enables you to search the MQL4 dictionary.

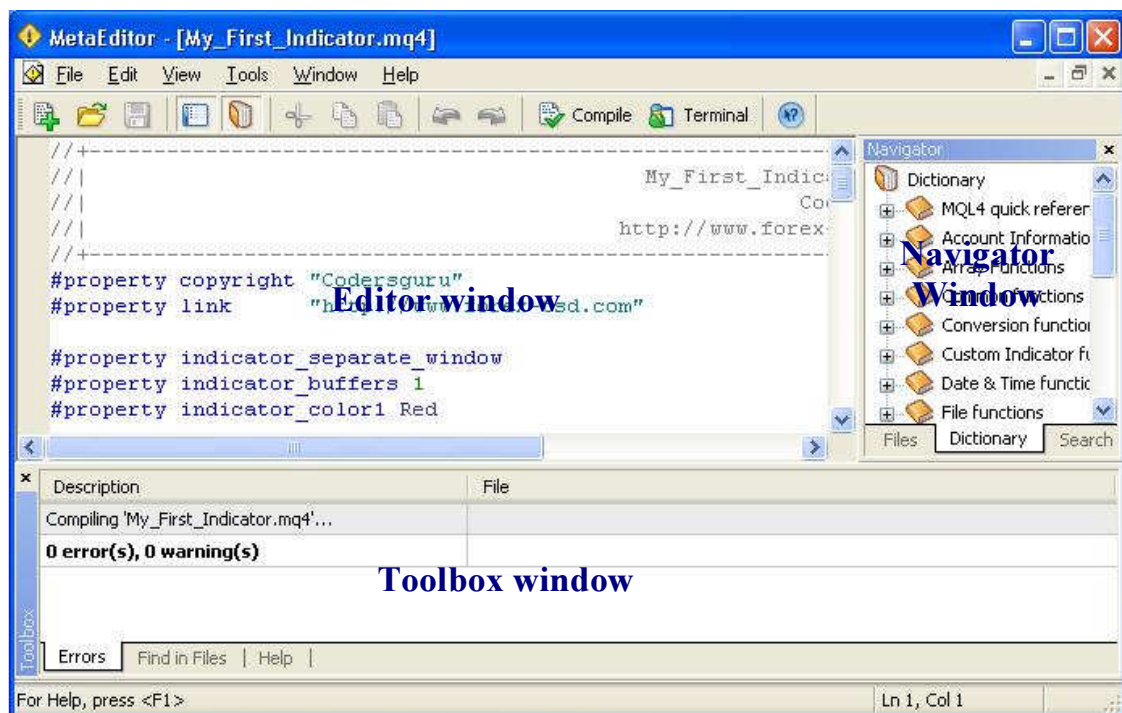


Figure 2 – MetaEditor Windows

I recommend you to navigate around the MetaEditor Menus, Toolbar and windows to be familiar with it.

Now let's enjoy creating our first custom indicator.

*Custom Indicator is a program which enables you to use the functions of the technical indicators and it cannot automate your deals.*

### **First three steps:**

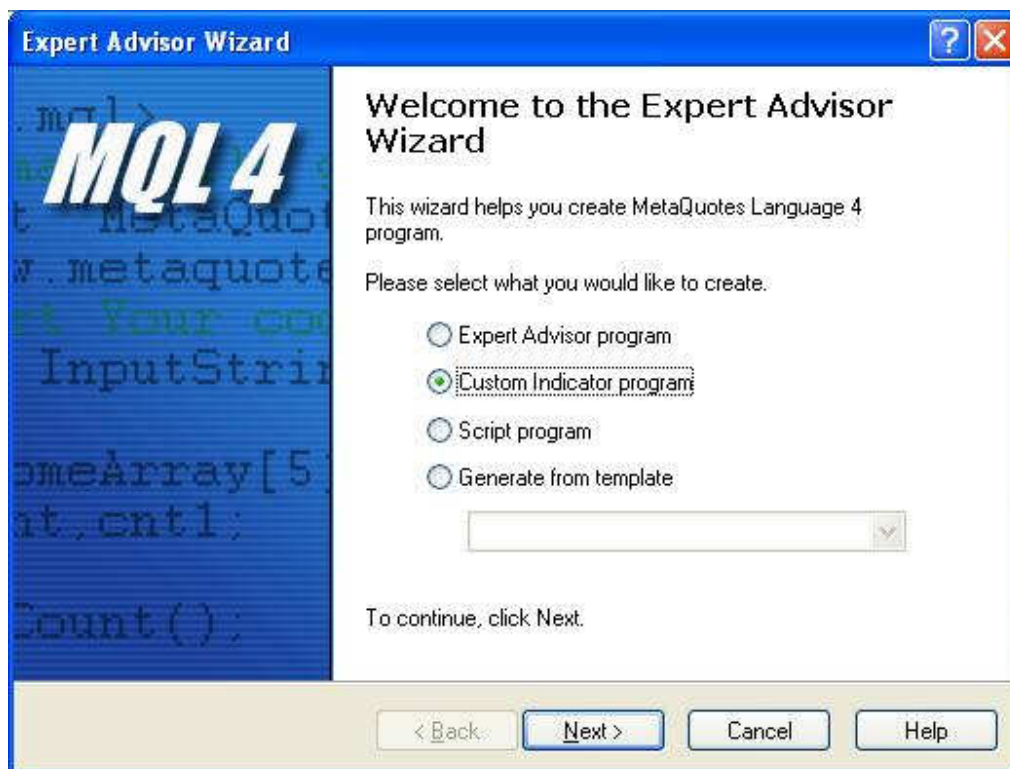
Now you have run your MetaEditor and navigated around its Menus, Toolbar and windows, let's USE it.

To create a custom indicator you have to start with three steps (you will learn later how to skip these boring steps (my personal opinion)).

**Step 1:** Click **File** menu → **New** (you use CTRL+N hotkey or click the New Icon in the Standard toolbar).

You will get a wizard (Figure 3) guiding you to the next step.

Choose Custom Indicator Program option, and then click next.



*Figure 3 - New project wizard*

**Step 2:** When you clicked **Next**, you will get the second step wizard (Figure 4) which will enable you to edit the properties of your program. In this step you can enter these properties:

1- **Name** of your program, this is the name which the world will call you program with and it will be saved as **the\_name\_you\_have\_chosen.mq4**

2- **Author** name, the creator of the program name.

3- **Link** to your web site.

4- **External** variables list: I want to pause here to remember you about external variable.

External variables are the variables which will be available to the user of you indicator to set from the properties tab of your indicator in MetaTrader. For example: **MA\_Period** in the very popular **EMA** indicator. And these variables will be declared with the “**extern**” keyword in your code (Please review **Variables** lesson).

So, this section of the wizard enables you to add these kinds of variables.

In our first indicator example we will not need any external variables just write the values you see in figure 4 and let's go to step 3 by clicking **Next** button.

Name	Type	Initial value
------	------	---------------

*Figure 4 – Program properties wizard.*

**Step 3:** The third wizard you will get when you clicked **Next** button is the Drawing properties wizard (Figure 5).

Its job is enabling you to set the drawing properties of the lines of your indicator, for example: how many lines, colors and where to draw your indicator (in the main chart or in separate windows).

This wizard contains the following options:

- 1- **Indicator in separate window** option: by clicking this option, your indicator will be drawn in separate windows and not on the main chart window. If you didn't check the option, your indicator will be drawn in the main chart window.
- 2- **Minimum** option: it will be available (enabled) only if you have checked the Indicator in separate window option, and its job is setting the bottom border for the chart.
- 3- **Maximum** option: it will be available (enabled) only if you have checked the Indicator in separate window option, and its job is setting the top border for the chart
- 4- **Indexes** List: here you add your indicator line and set its default colors.

I want you to wait to the next lesson(s) to know more about these options and don't be in a hurry.

For our first indicator example, choose Indicator in separate window option and click **Add** button, when you click add button the wizard will add a line to the indexes list like you see in figure 5.

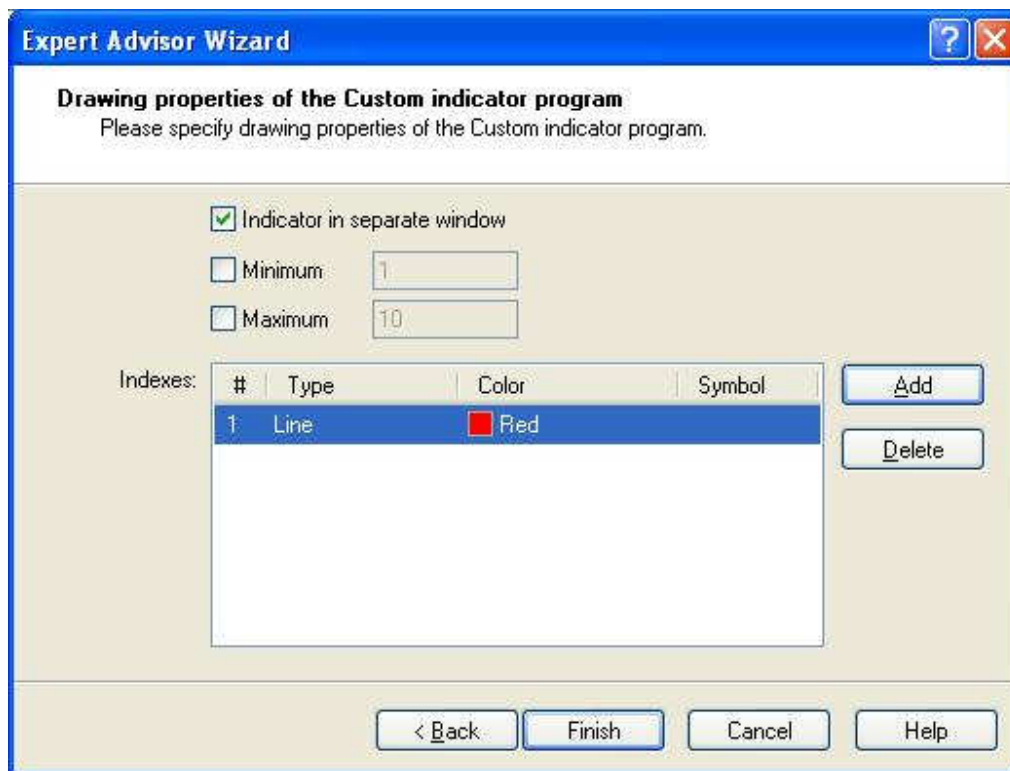


Figure 5 - Drawing properties wizard.

When you click **Finish** button the Magic will start. You will see the wizard disappeared and the focus returned to the MetaEditor environment and... guess what?

You have ready to use first indicator draft code.

This is the code you will get:

```
//+-----+
//|                                     My_First_Indicator.mq4 |
//|                                     Codersguru |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Codersguru"
#property link      "http://www.forex-tsd.com"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Red
//---- buffers
double ExtMapBuffer1[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- indicators
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,ExtMapBuffer1);
//----
    return(0);
}
//+-----+
//| Custor indicator deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}
//+-----+
//| Custom indicator iteration function |
//+-----+
int start()
{
    int    counted_bars=IndicatorCounted();
//----

//----
    return(0);
}
//+-----+
```

As you see in the above code, the wizard has written a lot of code for you, now I have to thank the wizard and to thank you too.

In the next lesson we will discover every line of code you have seen above and add our code to make our first indicator. To this lesson I hope you be ready!

Please don't forget to download the source code of the first indicator and warm yourself for the next lesson.

**I welcome very much the questions and the suggestions.**

See you  
**Coders' Guru**  
01-11-2005



# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-11-

## Your First Indicator Part 2

---

Welcome to the second part of “**Your First Indicator**” lesson. In the previous lesson we didn't write any line of code, that's because the New Project Wizard wrote all the code for us. Thanks!

Today we are going to add few lines to the code the wizard had generated to make our program more useful. Afterwards, we are going to explain the whole of the code line by line.

Let's coding

### Code we have added:

We have added the code which in a **bold dark blue** to our previous code:

```
//+-----+
//|                                     My_First_Indicator.mq4 |
//|                                     Codersguru          |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Codersguru"
#property link      "http://www.forex-tsd.com"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Red

//---- buffers
double ExtMapBuffer1[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- indicators
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,ExtMapBuffer1);
    string short_name = "Your first indicator is running!";
    IndicatorShortName(short_name);
}
```

```

//-----
    return(1);
}
//+-----+
//| Custom indicator deinitialization function |
//+-----+
int deinit()
{
//-----

//-----
    return(0);
}
//+-----+
//| Custom indicator iteration function |
//+-----+
int start()
{
    int    counted_bars=IndicatorCounted();

//----- check for possible errors
    if (counted_bars<0) return(-1);
//----- last counted bar will be recounted
    if (counted_bars>0) counted_bars--;

    int    pos=Bars-counted_bars;

    double dHigh , dLow , dResult;
    Comment("Hi! I'm here on the main chart windows!");

//----- main calculation loop
    while(pos>=0)
    {
        dHigh = High[pos];
        dLow  = Low[pos];
        dResult = dHigh - dLow;
        ExtMapBuffer1[pos]= dResult ;
        pos--;
    }
//-----
    return(0);
}
//+-----+

```

---

## How will we work?

We will write the line(s) of the code we are going to explain then we will explain them afterwards, if there are no topics, we will explain the line(s) of code directly. But at the most of the time we will pause to discuss some general topics.

**I want to here your suggestion about this method please!**

Now let's crack this code line by line.

```
//+-----+
//|                                     My_First_Indicator.mq4 |
//|                                     Codersguru           |
//|                                     http://www.forex-tsd.com |
//+-----+
```

## Comments:

The first five lines of code (which are in gray color) are comments.

You use Comments to write lines in your code which the compiler will ignore them.

You are commenting your code for a lot of reasons:

- To make it clearer
- To document some parts like the copyright and creation date etc.
- To make it understandable.
- To tell us how the code you have written is work.
- ...

You can write comments in two ways:

**Single line comments:** The Single line comment starts with “//” and ends with the new line.

**Multi-line comments:** The multi-line comment start with “/\*” and ends with “\*/” and you can comment more than one line.

In our program the MQL4 wizard gathered from the data we entered the **name** of the program, **author** and the **link** and wrote them as comments at the top of our program.

---

```
#property copyright "Codersguru"
#property link      "http://www.forex-tsd.com"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Red
```

## Property directive:

As you notice all of these lines start with the word (**#property**). That’s because they are kind of the **Preprocessors directives** called **property directives**.

The **Preprocessors** are the instructions you give to the compiler to carry them out before starting (processing) your code.

The **property directives** are predefined constants called “**Controlling Compilation**” built in the MQL4 language; their job is setting the properties of your program. For example: is your Indicator will appear in the main chart window or in a separate window? Who is the writer of the program?

*Note: The preprocessors lines end with a carriage-return character (new line) not a semi-colon symbol.*

We will try to discuss here the property directives available in MQL4.

**link:**

This property setting the web link to your web site which you asked to enter it in step 2 in the Expert Advisor Wizard (review the previous lesson).

The data type of this property is string.

**copyright:**

It's the name of the author of the program, same as the link property you asked to enter it in step 2 in the Expert Advisor Wizard.

The data type of this property is string.

**stacksize:**

It's an integer value sets the memory size for every thread, the default value is 16384.

The data type of this property is integer.

**indicator\_chart\_window:**

When you set this property, your indicator will be drawn in the main chart window (Figure 1). You have to choose one of two options for your Indicators, drawing them in the main chart windows by using this property, or drawing them in separate windows by choosing **the indicator\_separate\_window**. You can't use the both of them at the same time.

The data type of this property is void, which means it takes no value.

**indicator\_separate\_window:**

When you set this property, your indicator will be drawn in a separate window (Figure 1). You can set the scale of the separate indicator window using two properties **indicator\_minimum** for the minimum value and **indicator\_maximum** for the maximum value of the scale.

And you can set the level of your indicators on these scales using the property **indicator\_levelN** where's the **N** is the indicator number.

Both of the properties **indicator\_chart\_window** and **indicator\_separate\_window** are void data type, which mean they don't take value and you just write them.

In our program we will draw our indicator in a separate window:

```
#property indicator_separate_window
```



Figure 1

### **indicator\_minimum:**

With the aid of this property we are setting the minimum value of the separate windows scale, which is the bottom border of the windows. For example:

```
#property indicator_minimum      0  
#property indicator_maximum     100
```

Here we have set the bottom border of the window to 0 and the top border to 100 (see **indicator\_maximum**), hence we have a scale ranged from 0 to 100 in our separate window which we are drawing our indicator.

The data type of this property is integer.

### **indicator\_maximum:**

With the aid of this property we are setting the maximum value of the separate windows scale, which is the top border of the windows.

This value must be greater than the **indicator\_minimum** value.

The data type of this property is integer.

### **indicator\_levelN:**

With the aid of this property we are setting the level of the indicator in the scale we have created with the properties **indicator\_minimum** and **indicator\_maximum**, this value must be greater than the **indicator\_minimum** value and smaller than the **indicator\_maximum** value.

**N** is the indicator number which we are setting its level, it must range from 1 to 8 (because we are allowed only to use up to 8 indicator buffers in our program, so we can set the **indicator\_level** for each of them using its number). For example:

```
#property indicator_minimum      0
#property indicator_minimum      100
#property indicator_level1       10    //set the first indicator buffer level
#property indicator_level2       65.5  //set the second indicator buffer level
```

The data type of this property is double.

### **indicator\_buffers:**

With the aid of this property we are setting the number of memories spaces (Arrays) allocated to draw our line(s). When we set the number (ranged from **1** up to **8**) we are telling MQL4: “Please allocate a memory space for me to draw my indicator line”.

In our program we used only one buffer.

```
#property indicator_buffers 1
```

That’s because we will draw only one line.

### **indicator\_colorN:**

We can use up to 8 lines in our indicator, you can set the color of each of them using this property **indicator\_colorN** , where the **N** is the line number which defined by **indicator\_buffers**.

The user of your Indicator can change this color from the properties dialog of your Indicator (Figure 2).

In our program the indicator line color will be red.

```
#property indicator_color1 Red
```

The data type of this property is color.

---

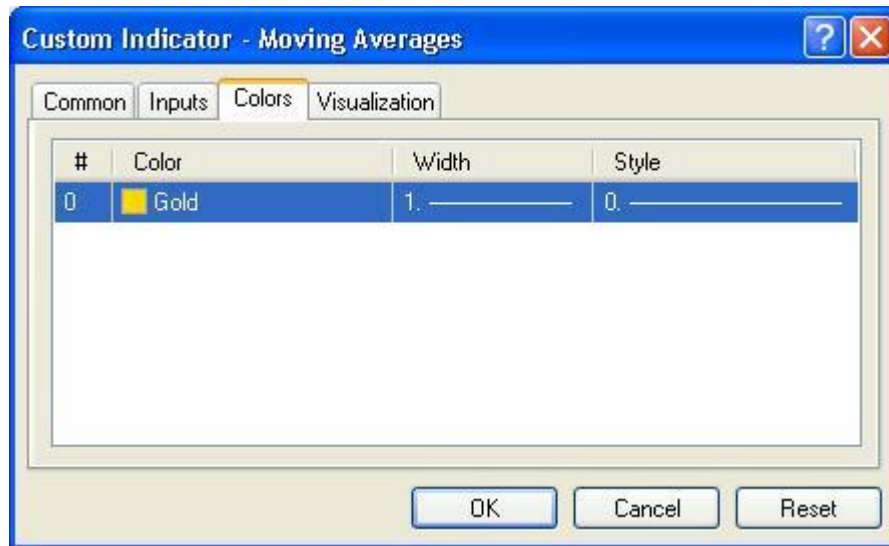


Figure 2

---

```
double ExtMapBuffer1[];
```

## Arrays:

In our life we usually group similar objects into units, in the programming we also need to group together the data items of the same type. We use Arrays to do this task.

Arrays are very like the list tables, you group the items in the table and access them the number of the row. Rows in the Arrays called Indexes.

To declare an array you use a code like that:

```
int my_array[50];
```

Here, you have declared an array of integer type, which can hold up to 50 items.

You can access each item in the array using the index of the item, like that:

```
My_array[10] = 500;
```

Here, you have set the item number 10 in the array to 500.

You can initialize the array at the same line of the declaration like that:

```
int my_array[5] = {1,24,15,66,500};
```

In our program we used this line of code:

```
double ExtMapBuffer1[];
```

Here we have declared an array of double type. We will use array to calculate our values which we will draw them on the chart.

---

```
int init()  
{  
}
```

## Special functions:

Functions are blocks of code which like a machine takes inputs and returns outputs (Please review lesson 7 – Functions).

In MQL4 there are three special functions

### **init():**

Every program will run this function before any of the other functions, you have to put here your initialization values of your variables.

### **start():**

Here's the most of the work, every time a new quotation has received your program will call this function.

### **deinit():**

This is the last function the program will call before it shuts down, you can put here any removals you want.

---

```
SetIndexStyle(0, DRAW_LINE);  
SetIndexBuffer(0, ExtMapBuffer1);  
string short_name = "Your first indicator is running!";  
IndicatorShortName(short_name);
```

## Custom indicator functions:

I can't give you a description for all of the indicator functions in this lesson. But we will use them all in our next lessons with more details. So, we will study here the functions used in our program.

### **SetIndexStyle:**



```
void SetIndexStyle( int index, int type, int style=EMPTY, int width=EMPTY, color  
clr=CLR_NONE)
```

This function will set the style of the drawn line.

The **index** parameter of this function ranges from 1 to 7 (that's because the array indexing start with 0 and we have limited 8 line). And it indicate which line we want to set its style.

The **type** parameter is the shape type of the line and can be one of the following shape type's constants:

**DRAW\_LINE** (draw a line)

**DRAW\_SECTION** (draw section)

**DRAW\_HISTOGRAM** (draw histogram)

**DRAW\_ARROW** (draw arrow)

**DRAW\_NONE** (no draw)

The **style** parameter is the pen style of drawing the line and can be one of the following styles' constants:

**STYLE\_SOLID** (use solid pen)

**STYLE\_DASH** (use dash pen)

**STYLE\_DOT** (use dot pen)

**STYLE\_DASHDOT** (use dash and dot pen)

**STYLE\_DASHDOTDOT** (use dash and double dots)

Or it can be **EMPTY** (default) which means it will be no changes in the line style.

The **width** parameter is the width of line and ranges from 1 to 5. Or it can be **EMPTY** (default) which means the width will not change.

The **clr** parameter is the color of the line. It can be any valid color type variable. The default value is **CLR\_NONE** which means empty state of colors.

In our line of code:

```
SetIndexStyle(0, DRAW_LINE);
```

We have set the index to 0 which means we will work with the first (and the only) line.

And we have set the shape type of our line to `DRAW_LINE` because we want to draw a line in the chart.

And we have left the other parameters to their default values.

### **SetIndexBuffer:**

```
bool SetIndexBuffer( int index, double array[])
```

This function will set the array which we will assign to it our indicator value to the indicator buffer which will be drawn.

The function takes the index of the buffer where's 0 is the first buffer and 2 is the second, etc. Then it takes the name of the array.

It returns **true** if the function succeeds and **false** otherwise.

In our program the array which will hold our calculated values is `ExtMapBuffer1`.

And we have only one indicator buffer (`#property indicator_buffers 1`). So it will be the buffer assigned.

### **IndicatorShortName:**

```
void IndicatorShortName( string name)
```

This function will set the text which will be showed on the upper left corner of the chart window (Figure 3) to the text we have inputted.

In our program we declared a string variable and assigned the value "You first indicator is running" to it, then we passed it to the **IndicatorShortName** function.

```
string short_name = "Your first indicator is running!";  
IndicatorShortName(short_name);
```



Figure 3

---

```
return(0);
```

This is the return value of the **init()** function which terminate the function and pass the program to the execution of the next function **start()**.

---

```
int deinit()  
{  
//----  
  
//----  
    return(0);  
}
```

Nothing new to say about **deinit()** function.

We will continue with remaining of the code in the next lesson.  
I hope you enjoyed the lesson and I welcome your questions.

See you  
**Coders' Guru**  
06-11-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-12-

## Your First Indicator Part 3

---

Welcome to the third part of “**Your First Indicator**” lesson.

In the previous lesson we studied the code of our first indicator line by line and we reached the function **dinit()**.

I hope you've come from the previous lessons with a clear idea about what we have done.

Today we are going to study **start()** function and its content. And *–finally–* we will compile and run our first Indicator.

Are you ready? Let's hack the code line by line:

### Our Code:

```
//+-----+
//|                                     My_First_Indicator.mq4 |
//|                                     Codersguru          |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Codersguru"
#property link      "http://www.forex-tsd.com"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Red

//---- buffers
double ExtMapBuffer1[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- indicators
    SetIndexStyle(0, DRAW_LINE);
    SetIndexBuffer(0, ExtMapBuffer1);
    string short_name = "Your first indicator is running!";
    IndicatorShortName(short_name);
//----
}
```

```

        return(1);
    }
//+-----+
//| Custom indicator deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}
//+-----+
//| Custom indicator iteration function |
//+-----+
int start()
{
    int    counted_bars=IndicatorCounted();

//---- check for possible errors
    if (counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if (counted_bars>0) counted_bars--;

    int    pos=Bars-counted_bars;

    double dHigh , dLow , dResult;
    Comment("Hi! I'm here on the main chart windows!");

//---- main calculation loop
    while(pos>=0)
    {
        dHigh = High[pos];
        dLow  = Low[pos];
        dResult = dHigh - dLow;
        ExtMapBuffer1[pos]= dResult ;
        pos--;
    }
//----
    return(0);
}
//+-----+

```

---

```

int start()
{...
    return(0);
}

```

As I told you before, we will spend 90% of programming life inside the braces of **start()** function. That's because it's the most important MQL4 Special functions.

On the contrary of the **init()** and **deinit** function, **start()** will not be called (by the terminal client) only one time, But every time a new quotation arrives to MetaTrader terminal client, every time the **start()** function has been called.

**start()** function returns an integer value like all of the MQL4 special function, where **0** means no error and any number else means an error has been occurred.

---

```
int    counted_bars=IndicatorCounted();
```

Here, we have defined the variable **counted\_bars** as an integer type, and we have assigned to it the returned value of the function **IndicatorCounted()**.

### **int IndicatorCounted()**

This function will return an integer type value holds the count of the **bars** which our indicator has been calculated them.

In the first launch of your indicator this count will be **0** because the indicator didn't calculate any bars yet. And after that it will be the count of total bars on the chart **-1**. (Please see the function **Bars** below).

---

```
if (counted_bars<0) return(-1);
```

We have got the number of **counted\_bars** in the previous line of code by using **IndicatorCounted()** function.

This number must be 0 or greater if there's no errors have been occurred. If it's less than 0 that's means we have an error and we have to terminate the **start()** function using the return statement.

---

```
if (counted_bars>0) counted_bars--;
```

We are checking here if the **counted\_bars** are greater than 0. If that's true we decrease this number by subtracting 1 from it. That's because we want to recount the last bar again.

We use the decrement operator (please review [Lesson 4 - Operations & Expressions](#)) for decreasing the value of **counted\_bars** by **1**.

*Note: We can write the expression `counted_bars--` like this:*

```
counted_bars = counted_bars-1;
```

---

```
int    pos=Bars-counted_bars;
```

Here, we are declaring the variable **pos** to hold the number of times our calculation loop

will work (see while loop later in this lesson). That's by subtracting the **counted\_bars** from the count of total bars on the chart, we get the total bars count using **Bars()** function.

It's a good time to discuss **Bars()** function and its brother.

### **Pre-defined MQL4 variables:**

Ask, Bid, Bars, Close, Open, High, Low, Time and Volume are functions although MQL4 called them Pre-defined variables. And I'll prove to you why they are functions.

Variable means a space in memory and data type you specify.

Function means do something and return some value, For example **Bars** collects and returns the number of the bars in chart. So, is it a variable?

Another example will prove for you that they are not variables:

If you type and compile this line of code:

```
Bars=1;
```

You will get this error: **'Bars' - unexpected token**

That's because they are not variables hence you can't assign a value to them.

Another proof, the next line of code is a valid line and will not generate an error in compiling:

```
Alert(Bars(1));
```

You can't pass parameter to a variable, parameters passed only to the functions.

I'm so sorry for the lengthiness, let's discuss every function.

#### **int Bars**

This function returns an integer type value holds count of the total bars on the current chart.

#### **double Ask**

This function (used in your Expert Advisors) returns a double type value holds the buyer's price of the currency pair.

#### **double Bid**

This function (used in your Expert Advisor) returns a double type value holds the seller's price of the currency pair.

*Note: For example, USD/JPY = 133.27/133.32 the left part is called the **bid** price (that is a price at which the trader sells), the second (the right part) is called the **ask** price (the price at which the trader buys the currency).*

### **double Open[]**

This function returns a double type value holds the opening price of the referenced bar. Where opening price is the price at the beginning of a trade period (year, month, day, week, hour etc)

For example: Open[0] will return the opening price of the current bar.

### **double Close[]**

This function returns a double type value holds the closing price of the referenced bar. Where closing price is the price at the end of a trade period

For example: Close[0] will return the closing price of the current bar.

### **double High[]**

This function returns a double type value holds the highest price of the referenced bar. Where it's the highest price from prices observed during a trade period.

For example: High [0] will return the highest price of the current bar.

### **double Low[]**

This function returns a double type value holds the lowest price of the referenced bar. Where it's the lowest price from prices observed during a trade period.

For example: Low [0] will return the lowest price of the current bar.

### **double Volume[]**

This function returns a double type value holds the average of the total amount of currency traded within a period of time, usually one day.

For example: Volume [0] will return this average for the current bar.

### **int Digits**

This function returns an integer value holds number of digits after the decimal point (usually 4).

### **double Point**

This function returns a double value holds point value of the current bar (usually 0.0001).



## **datetime** Time[]

This function returns a datetime type value holds the open time of the referenced bar.  
For example: Time [0] will return the open time of the current bar.

---

```
double dHigh , dLow , dResult;
```

We declared three double type variables which we will use them later. Notice the way we used to declare the three of them at the same line by separating them by coma.

---

```
Comment("Hi! I'm here on the main chart windows!");
```

This line of code uses the **Comment** function to print the text “Hi! I'm here on the main chart windows!” on the left top corner of the main chart (figure1).

There are two similar functions:

## **void Comment( ... )**

This function takes the values passed to it (they can be any type) and print them on the left top corner of the chart (figure 1).

## **void Print ( ... )**

This function takes the values passed to it (they can be any type) and print them to the expert log (figure 2).

## **void Alert( ... )**

This function takes the values passed to it (they can be any type) and display them in a dialog box (figure 3)



Figure 1 – Comment

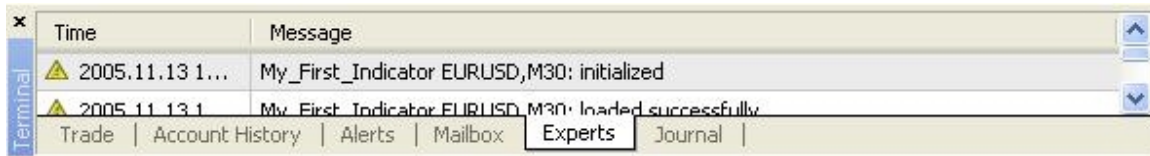


Figure 2- Expert log



Figure 3 - Alerts

---

```

while(pos>=0)
{
    dHigh = High[pos];
    dLow = Low[pos];
    dResult = dHigh - dLow;
    ExtMapBuffer1[pos]= dResult ;
    pos--;
}

```

Now, it's the time to enter the loop for calculating our indicator points to draw them. Any value we assign to the array `ExtMapBuffer1[]` will be drawn on the chart (because we have assign this array to the drawn buffer using **SetIndexBuffer** function).

Before we enter the loop we have got the number of times the loop will work by subtracting the **counted\_bars** from the total count of the bars on chart. The number of times the loop will work called **Loop variable** which it's **pos** variable in our example.

We use the loop variable as a current bar of the calculation for example **High[pos]** will return the highest price of the pos bar.

In the loop body we assign to the variable **dHigh** the value of the highest price of the current loop variable.

And assign to the variable **dLow** the value of the lowest price of the current loop variable.

The result of subtracting **dLow** from **dHigh** will be assigned to the variable **dResult**.

Then we using the **dResult** to draw or indicator line, by assigning it to the drawn buffer array **ExtMapBuffer1[]**.

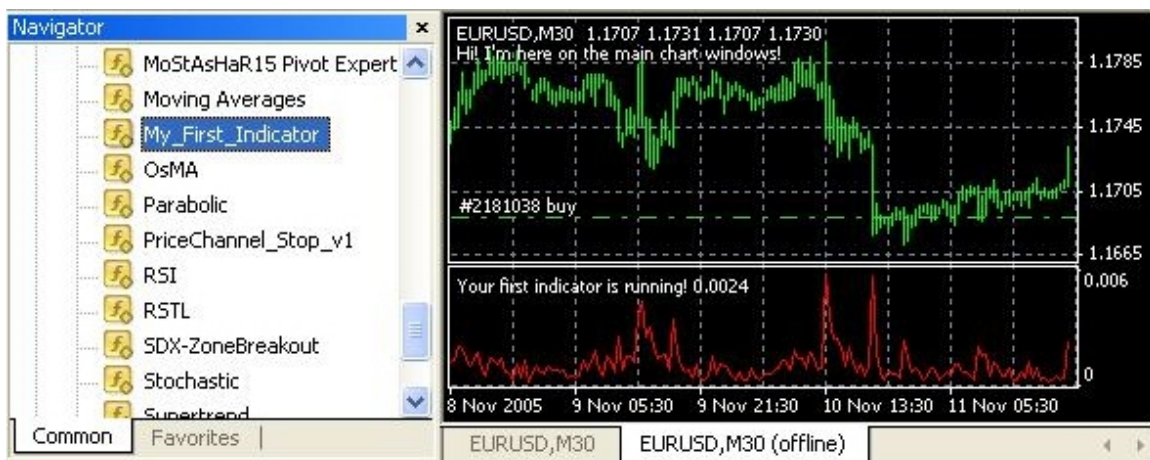
The last line of the loop is a decrement expression which will decrease the loop variable **pos** by 1 every time the loop runs. And when this variable reaches **-1** the loop will be terminated.

---

Finally, we can compile our indicator. Press **F5** or choose **Compile** from file menu. That will generate the executable file “My\_First\_indicator.ex4” which you can load in your terminal client.

To load your indicator click **F4** to bring the terminal client. Then From the **Navigator** window find the **My\_First\_indicator** and attach it to the chart (figure4).

*Note: The indicator will not do much, but it believed that the subtraction of the highest and lowest of the price gives us the market's volatility.*



**Figure 4 - My\_First\_Indicator**

I hope you enjoyed your first indicator. And be prepared to your first Expert Advisor in the next lesson(s).

I welcome very much your questions and suggestions.

**Coders' Guru**  
13-11-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-13-

## Your First Expert Advisor Part 1

-----

**I**n the previous lesson we created our first indicator. Although this indicator wasn't useful for us as trader, but it was very useful for us as programmers.

The indicators –in general- are very important for the technical analysis of the market in trying to predict the future prices.

But with the indicators we observe the chart then use our hands to sell, buy and modify our orders manually. You have to set in front of your terminal, and keep your eyes widely open.

If you get tired, want to drink a cup of tea or even take a short vacation. You have to consider one of these solutions:

You may rent someone to observe the terminal for you and calling your mobile phone every five minutes to tell you what's going on. If this employee is an expert, he will cost you the pips you earn. And if he is novice one, he will cost you your capital.

The second solution is using a program to automate your trades. That's what the Expert Advisor is for.

The Expert advisor is a program wrote in MQL4 (we are studying MQL4 huh?) uses your favorite indicators and trade methods to automate your orders.

It can buy, sell and modify the orders for you. It enables you to drink a cup of tea and save the salary you gave out to your employee or the bunch of flowers you bring to your assistant wife.

Today we are going to create our first expert advisor so let's go.

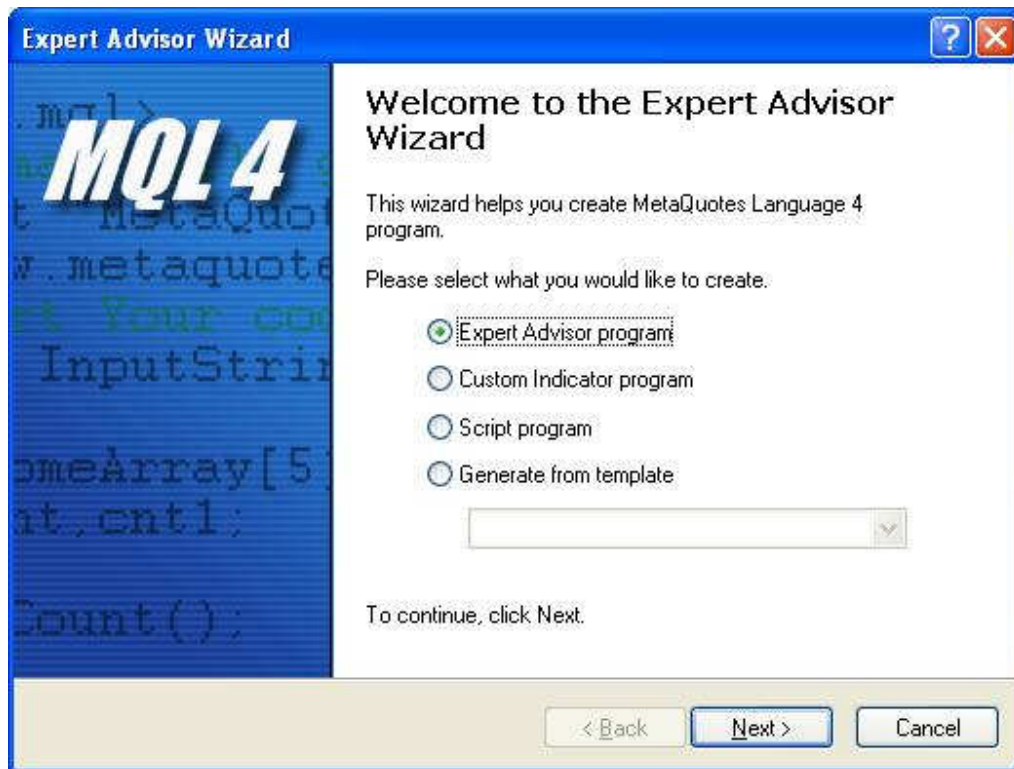
### **First two steps:**

#### **Step1:**

If you didn't open your MetaEditor yet, I think it's the time to run it.

From the MetaEditor File menu click **New** (you can use **CTRL+N** hotkey or click the **New** icon in the standard toolbar). That will pop up the new program wizard which you have seen when you created your first indicator (Figure 1).

This time we will choose the first option “**Expert Advisor program**” then click **Next** button.



**Figure 1 – the first step wizard**

## **Step2:**

When you clicked **Next**, you have got the general properties wizard (Figure 2). This wizard enables you to set the properties of your expert advisor and to set the external variables you will use in your expert advisor.

In this step you can set these properties:

- 1- **Name** of your expert advisor, in our sample we will use **My\_First\_EA**.
- 2- **Author** name of the program, type your name (I typed mine in the sample).
- 3- **Link** to your web site.
- 4- **External variables list:**

This is the list of the external variables you allow the user of your expert advisor to change them from the **Expert properties** window.

To add a new variable you click the **Add** button, clicking it will add a new record to the external variables list. Every record has three fields:

**Name:** double click this field to set the name (identifier) of the variable.

**Type:** double click this field to set the data type of the variable.

**Initial value:** double click this field to give your variable initialization value.

This field is *optional* which means you can leave it without setting

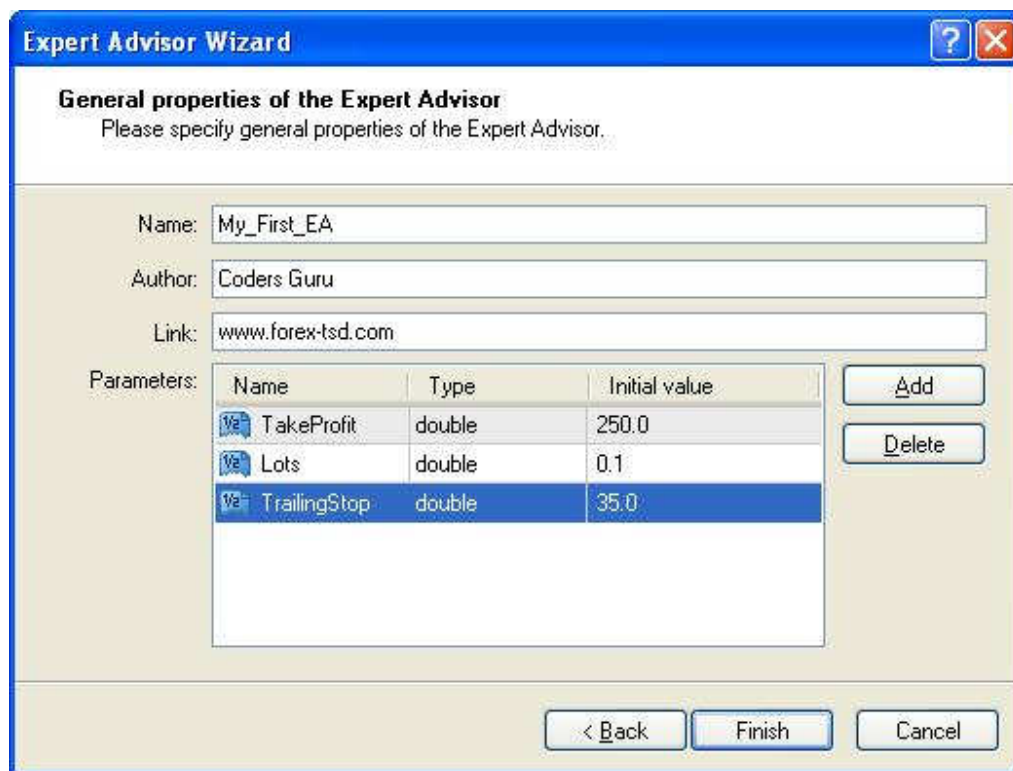
In our sample we have added three variables:

*Variable → Type → initial value*

-----  
TakeProfit → double → 350

Lots → double → 0.1

TrailingStop → double → 35



**Figure 2 – the second step wizard**

Now click the **Finish** button to close the wizard, and MetaEditor will bring to you the code created by the wizard and saves the file **My\_First\_EA.mq4** in the **MetaTrader 4 \experts** path.

*Note: you have to put the expert advisors in **MetaTrader 4\experts** path and the indicators in **MetaTrader 4\experts\indicators** path, otherwise they will not work.*

**This is the code we have got from the wizard:**

```
//+-----+
//|                                     My_First_EA.mq4 |
//|                                     Coders Guru |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Coders Guru"
#property link      "http://www.forex-tsd.com"

//---- input parameters
extern double      TakeProfit=250.0;
extern double      Lots=0.1;
extern double      TrailingStop=35.0;
//+-----+
//| expert initialization function |
//+-----+
int init()
{
//----

//----
    return(0);
}
//+-----+
//| expert deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}
//+-----+
//| expert start function |
//+-----+
int start()
{
//----

//----
    return(0);
}
//+-----+
```

As you see above, the code generated by the wizard is a template for you to add your code without bothering you by typing the main functions from scratch.

**Now let's add our own code:**

```
//+-----+
//|                                     My_First_EA.mq4 |
```

```

//|
//|
//|                                     Coders Guru |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Coders Guru"
#property link      "http://www.forex-tsd.com"

//---- input parameters
extern double      TakeProfit=250.0;
extern double      Lots=0.1;
extern double      TrailingStop=35.0;
//+-----+
//| expert initialization function |
//+-----+
int init()
{
//----

//----
    return(0);
}
//+-----+
//| expert deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}

int Crossed (double line1 , double line2)
{
    static int last_direction = 0;
    static int current_dirction = 0;

    if(line1>line2)current_dirction = 1; //up
    if(line1<line2)current_dirction = 2; //down

    if(current_dirction != last_direction) //changed
    {
        last_direction = current_dirction;
        return (last_direction);
    }
    else
    {
        return (0);
    }
}
//+-----+
//| expert start function |
//+-----+
int start()
{
//----

```



```

int cnt, ticket, total;
double shortEma, longEma;

if(Bars<100)
{
    Print("bars less than 100");
    return(0);
}
if(TakeProfit<10)
{
    Print("TakeProfit less than 10");
    return(0); // check TakeProfit
}

shortEma = iMA(NULL,0,8,0,MODE_EMA,PRICE_CLOSE,0);
longEma = iMA(NULL,0,13,0,MODE_EMA,PRICE_CLOSE,0);

int isCrossed = Crossed (shortEma,longEma);

total = OrdersTotal();
if(total < 1)
{
    if(isCrossed == 1)
    {
ticket=OrderSend(Symbol(),OP_BUY,Lots,Ask,3,0,Ask+TakeProfit*Point,
"My EA",12345,0,Green);
        if(ticket>0)
        {
            if(OrderSelect(ticket,SELECT_BY_TICKET,MODE_TRADES))
Print("BUY order opened : ",OrderOpenPrice());
        }
        else Print("Error opening BUY order : ",GetLastError());
        return(0);
    }
    if(isCrossed == 2)
    {
        ticket=OrderSend(Symbol(),OP_SELL,Lots,Bid,3,0,
Bid-TakeProfit*Point,"My EA",12345,0,Red);
        if(ticket>0)
        {
            if(OrderSelect(ticket,SELECT_BY_TICKET,MODE_TRADES))
Print("SELL order opened : ",OrderOpenPrice());
        }
        else Print("Error opening SELL order : ",GetLastError());
        return(0);
    }
    return(0);
}
for(cnt=0;cnt<total;cnt++)
{
    OrderSelect(cnt, SELECT_BY_POS, MODE_TRADES);
}

```

```

    if(OrderType()<=OP_SELL && OrderSymbol()==Symbol())
    {
        if(OrderType()==OP_BUY) // long position is opened
        {
            // should it be closed?
            if(isCrossed == 2)
            {
                OrderClose(OrderTicket(),OrderLots(),Bid,3,Violet);
// close position
                return(0); // exit
            }
            // check for trailing stop
            if(TrailingStop>0)
            {
                if(Bid-OrderOpenPrice()>Point*TrailingStop)
                {
                    if(OrderStopLoss()<Bid-Point*TrailingStop)
                    {
                        OrderModify(OrderTicket(),OrderOpenPrice(),Bid-
Point*TrailingStop,OrderTakeProfit(),0,Green);
                        return(0);
                    }
                }
            }
        }
        else // go to short position
        {
            // should it be closed?
            if(isCrossed == 1)
            {
                OrderClose(OrderTicket(),OrderLots(),Ask,3,Violet);
// close position
                return(0); // exit
            }
            // check for trailing stop
            if(TrailingStop>0)
            {
                if((OrderOpenPrice()-Ask)>(Point*TrailingStop))
                {
                    if((OrderStopLoss()>(Ask+Point*TrailingStop)) ||
(OrderStopLoss()==0))
                    {
                        OrderModify(OrderTicket(),OrderOpenPrice(),Ask+Point*TrailingStop,
OrderTakeProfit(),0,Red);
                        return(0);
                    }
                }
            }
        }
    }
    return(0);
}
//+-----+

```

*Note: don't copy and paste the code above because it **warped** and will not work for you, use the code provided with lesson in [www.forex-tsd.com](http://www.forex-tsd.com) .*

## **Scared?**

Don't be scared of the 160 lines you have seen above, we will know everything about this code line by line, I promise it's an easy task.

## **Test the Expert Advisor:**

Before studying our expert advisor code we have to check is it profitable one or not.

*Note: Our expert advisor will work with **EURUSD** pairs in **4 Hours** timeframe. So compile the expert advisor by pressing **F5** and load it in MetaTrader.*

You can test your expert advisor using two methods:

### **1- Live trading**

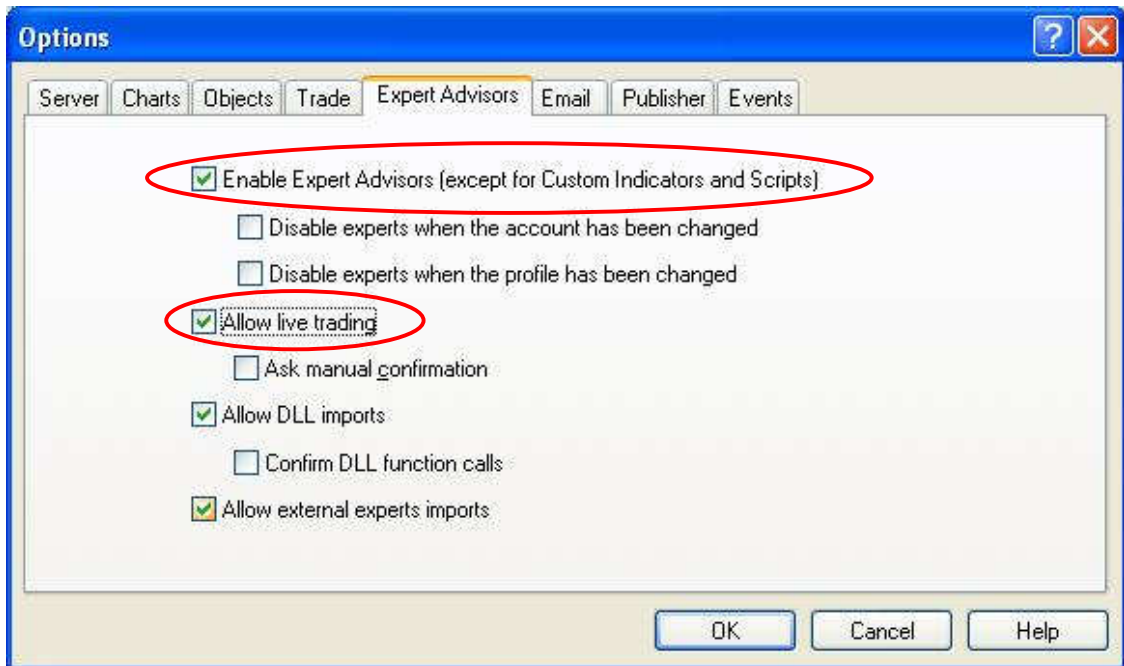
In live trading testing the results are more accurate but you have to spend days (and maybe months) to know is the expert advisor profitable or not.

You have to enable the expert advisor to automate your trades.

To enable it click **Tools** → **Option** menu (or use **CTRL+O** hotkey), that's will bring the **Options** windows (figure 3), click **Expert Advisors** tab and enable these options:

Enable Expert Advisors  
Allow live trading

And click Ok button



**Figure 3 – Enabling expert advisor auto trade**

You will see the **Smile** symbol beside the expert advisor name which means your expert advisor is working and ready to trade for you (Figure 4).



**Figure 4 – Expert advisor is enabled**

## 2- Strategy Tester:

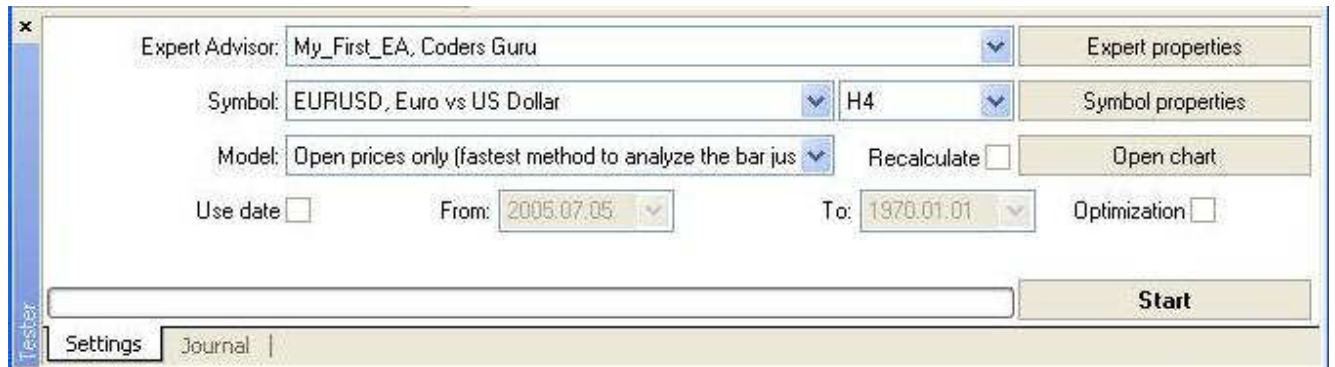
The second method of testing your expert advisor which is less accurate but will not take time is the Strategy tester. We will know everything about Strategy tester later, let's now bring its window by pressing **F6** (Figure 5).

When you get the window enter these options:

**Symbol:** EURUSD.

**Period:** H4 (4 Hours).

**Model:** Open price only.



**Figure 5 – Strategy tester window**

Now click **Start** button to start testing the expert advisor.

You will see a progress bar and the two tabs (Settings and Journal) became five tabs. We interested in **Report** tab (Figure 6); click it to see your profit.

Bars in test	696	Ticks modelled	1292	Modelling quality	n/a
Initial deposit	10000.00				
Total net profit	352.80	Gross profit	1025.50	Gross loss	-672.70
Profit factor	1.52	Expected payoff	13.07		
Absolute drawdown	26.00	Maximal drawdown (%)	349.20 (3.3...)		
Total trades	27	Short positions (won %)	8 (87.50%)	Long positions (won %)	19 (42.11%)
		Profit trades (% of total)	15 (55.56%)	Loss trades (% of total)	12 (44.44%)
	Largest	profit trade	249.30	loss trade	-92.70

We have a lot to say and to do in the next lesson; I hope you are ready for the challenge. I welcome very much the questions and the suggestions.

See you  
**Coders' Guru**  
 24-11-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

-14-

## Your First Expert Advisor Part 2

-----

Welcome to the second part of creating Your First Expert Advisor lesson. In the previous part we have taken the code generated by the *new program wizard* and added our own code which we are going to crack it today line by line.

Did you wear your *coding gloves*? Let's crack.

*Note: I have to repeat that our expert advisor is for educational purpose only and will not (or aimed to) make profits.*

### The code we have:

```
//+-----+
//|                                     My_First_EA.mq4 |
//|                                     Coders Guru |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Coders Guru"
#property link      "http://www.forex-tsd.com"

//---- input parameters
extern double      TakeProfit=250.0;
extern double      Lots=0.1;
extern double      TrailingStop=35.0;
//+-----+
//| expert initialization function |
//+-----+
int init()
{
//----

//----
    return(0);
}
//+-----+
//| expert deinitialization function |
//+-----+
int deinit()
{
//----
```

```

//----
return(0);
}

int Crossed (double line1 , double line2)
{
    static int last_direction = 0;
    static int current_direction = 0;

    if(line1>line2)current_direction = 1; //up
    if(line1<line2)current_direction = 2; //down

    if(current_direction != last_direction) //changed
    {
        last_direction = current_direction;
        return (last_direction);
    }
    else
    {
        return (0);
    }
}

//+-----+
//| expert start function |
//+-----+
int start()
{
//----

int cnt, ticket, total;
double shortEma, longEma;

if(Bars<100)
{
    Print("bars less than 100");
    return(0);
}
if(TakeProfit<10)
{
    Print("TakeProfit less than 10");
    return(0); // check TakeProfit
}

shortEma = iMA(NULL,0,8,0,MODE_EMA,PRICE_CLOSE,0);
longEma = iMA(NULL,0,13,0,MODE_EMA,PRICE_CLOSE,0);

int isCrossed = Crossed (shortEma,longEma);

total = OrdersTotal();
if(total < 1)
{
    if(isCrossed == 1)

```

```

    {

ticket=OrderSend(Symbol(),OP_BUY,Lots,Ask,3,0,Ask+TakeProfit*Point,
"My EA",12345,0,Green);
    if(ticket>0)
    {
        if(OrderSelect(ticket,SELECT_BY_TICKET,MODE_TRADES))
Print("BUY order opened : ",OrderOpenPrice());
    }
    else Print("Error opening BUY order : ",GetLastError());
    return(0);
}
if(isCrossed == 2)
{

        ticket=OrderSend(Symbol(),OP_SELL,Lots,Bid,3,0,
Bid-TakeProfit*Point,"My EA",12345,0,Red);
        if(ticket>0)
        {
            if(OrderSelect(ticket,SELECT_BY_TICKET,MODE_TRADES))
Print("SELL order opened : ",OrderOpenPrice());
        }
        else Print("Error opening SELL order : ",GetLastError());
        return(0);
    }
    return(0);
}
for(cnt=0;cnt<total;cnt++)
{
    OrderSelect(cnt, SELECT_BY_POS, MODE_TRADES);
    if(OrderType()<=OP_SELL && OrderSymbol()==Symbol())
    {
        if(OrderType()==OP_BUY) // long position is opened
        {
            // should it be closed?
            if(isCrossed == 2)
            {
                OrderClose(OrderTicket(),OrderLots(),Bid,3,Violet);
// close position
                return(0); // exit
            }
            // check for trailing stop
            if(TrailingStop>0)
            {
                if(Bid-OrderOpenPrice()>Point*TrailingStop)
                {
                    if(OrderStopLoss()<Bid-Point*TrailingStop)
                    {
                        OrderModify(OrderTicket(),OrderOpenPrice(),Bid-
Point*TrailingStop,OrderTakeProfit(),0,Green);
                        return(0);
                    }
                }
            }
        }
    }
    else // go to short position
    {

```



```

        // should it be closed?
        if(isCrossed == 1)
        {
            OrderClose(OrderTicket(),OrderLots(),Ask,3,Violet);
// close position
            return(0); // exit
        }
        // check for trailing stop
        if(TrailingStop>0)
        {
            if((OrderOpenPrice()-Ask)>(Point*TrailingStop))
            {
                if((OrderStopLoss()>(Ask+Point*TrailingStop)) ||
(OrderStopLoss()==0))
                {
                    OrderModify(OrderTicket(),OrderOpenPrice(),Ask+Point*TrailingStop,
OrderTakeProfit(),0,Red);
                    return(0);
                }
            }
        }
    }
}
return(0);
}
//+-----+

```

---

## The idea behind our expert advisor.

Before digging into cracking our code we have to explain the idea behind our expert advisor. Any expert advisor has to decide when to **enter** the market and when to **exit**. And the idea behind any expert advisor is what the entering and exiting **conditions** are? Our expert advisor is a simple one and the idea behind it is a simple too, let's see it.

We use two EMA indicators, the first one is the EMA of 8 days (short EMA) and the second one is the EMA of 13 days (long EMA).

*Note: using those EMAs or any thought in this lesson is not a recommendation of mine, they are for educational purpose only.*

### Entering (Open):

Our expert advisor will enter the market when the **short EMA** line crosses the **long EMA** line, the direction of each lines will determine the order type:  
 If the **short EMA** is **above** the **long EMA** will **buy** (long).  
 If the **short EMA** is **below** the **long EMA** we will **sell** (short).

We will open only **one** order at the same time.

### **Exiting (Close):**

Our expert advisor will close the **buy** order when the **short EMA** crosses the **long EMA** and the **short EMA** is **below** the **long EMA**.

And will close the **sell** order when the **short EMA** crosses the **long EMA** and the **short EMA** is **above** the **long EMA**.

Our order (buy or sell) will automatically be closed too when the **Take profit** or the **Stop loss** points are reached.

### **Modifying:**

Beside entering (opening) and exiting (closing) the market (positions) our expert advisor has the ability to modify existing positions based on the idea of **Trailing stop** point.

We will know how we implemented the idea of Trailing stop later in this lesson.

Now let's resume our code cracking.

---

```
//---- input parameters
extern double   TakeProfit=250.0;
extern double   Lots=0.1;
extern double   TrailingStop=35.0;
```

In the above lines we have asked the wizard to declare three **external** variables (which the user can set them from the properties window of our expert advisor).

The three variables are double data type. We have initialized them to default values (the user can change these values from the properties window, but it recommended to leave the defaults).

I have to pause again to tell you a little story about those variables.

### **Stop loss:**

It's a limit point you set to your order when reached the order will be closed, this is useful to minimize your lose when the market going against you.

Stop losses points are always set below the current asking price on a buy or above the current bid price on a sell.

### **Trailing Stop**

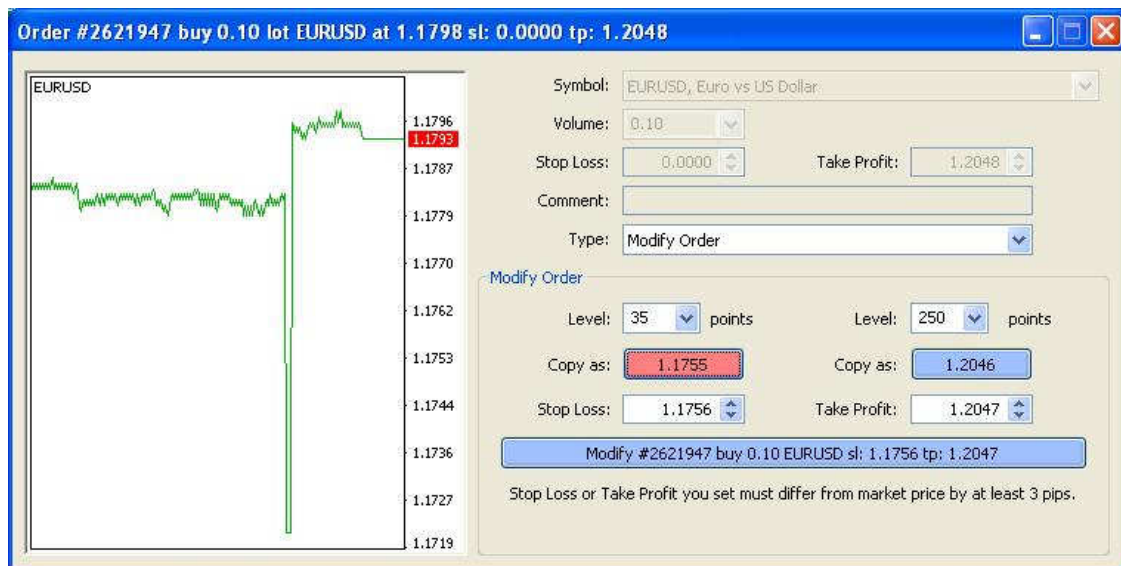
It's a kind of stop loss order that is set at a percentage level below (for a long position) or above (for a short position) the market price. The price is adjusted as the price fluctuates. We will talk about this very important concept later in this lesson.

## Take profit:

It's similar to stop loss in that it's a limit point you set to your order when reached the order will be closed

There are, however, two differences:

- There is no “trailing” point.
- The exit point must be set above the current market price, instead of below.



**Figure 1 – Setting Stop loss and Take profit points**

```
int Crossed (double line1 , double line2)
{
    static int last_direction = 0;
    static int current_direction = 0;

    if(line1>line2)current_direction = 1; //up
    if(line1<line2)current_direction = 2; //down

    if(current_direction != last_direction) //changed
    {
        last_direction = current_direction;
        return (last_direction);
    }
    else
    {
        return (0);
    }
}
```

As I told you before, the idea behind our expert advisor is monitor the crossing of the short EMA and the long EMA lines. And getting the direction of the crossing (which line is above and which line is below) which will determine the type of the order (buy, sell, buy-close and sell-close).

For this goal we have created the *Crossed* function.

The *Crossed* function takes two double values as parameters and returns an integer. The first parameter is the value of the first line we want to monitor (the short EMA in our case) and the second parameter is the value of the second we want to (the long EMA).

The function will monitor the two lines every time we **call** it by saving the direction of the two lines in static variables to remember their state between the repeated calls.

- It will return **0** if there's no change happened in the last directions saved.
- It will return **1** if the direction has changed (the lines crossed each others) and the first line is above the second line.
- It will return **2** if the direction has changed (the lines crossed each others) and the first line is below the second line.

*Note:* You can use this function in your coming expert advisor to monitor any two lines and get the crossing direction.

**Let's see how did we write it?**

```
int Crossed (double line1 , double line2)
```

The above line is the function declaration, it means we want to create *Crossed* function which takes two double data type **parameters** and **returns** an integer.

When you **call** this function you have to pass to it two double parameters and it will return an integer to you.

You have to declare the function before using (calling) it. The place of the function doesn't matter, I placed it above **start()** function, but you can place it anywhere else.

```
static int last_direction = 0;  
static int current_direction = 0;
```

Here we declared two static integers to hold the current and the last direction of the two lines. We are going to use these variables (they are static variables which means they save their value between the repeated calls) to check if there's a change in the direction of the lines or not.

we have initialized them to **0** because we don't want them to work in the first call to the function (if they worked in the first call the expert advisor will open an order as soon as we load it in the terminal).

```
if(current_direction != last_direction) //changed
```

In this line we compare the two static variables to check for changes between the last call of our function and the current call.

If *last\_direction* not equal *current\_direction* that's mean there's a change happened in the direction.

```
last_direction = current_direction;  
return (last_direction);
```

In this case (*last\_direction* not equal *current\_direction*) we have to reset our *last\_direction* by assigning to it the value of the *current\_direction*.

And we will return the value of the *last\_direction*. This value will be **1** if the first line is above the second line and **2** if the first line is below the second line.

```
else  
{  
    return (0);  
}
```

Else (*last\_direction* is equal *current\_direction*) there's no change in the lines direction and we have to return **0**.

Our program will call this function in its **start()** function body and use the returned value to determine the appropriate action.

In the coming part of this lesson we will know how did we call the function, and we will know a lot about the very important trading functions.

To that day I hope you the best luck.

I welcome very much the questions and the suggestions.

See you  
**Coders' Guru**  
01-12-2005

# MQL4 COURSE

By Coders' guru

## (Appendix 1)

### Bars

---

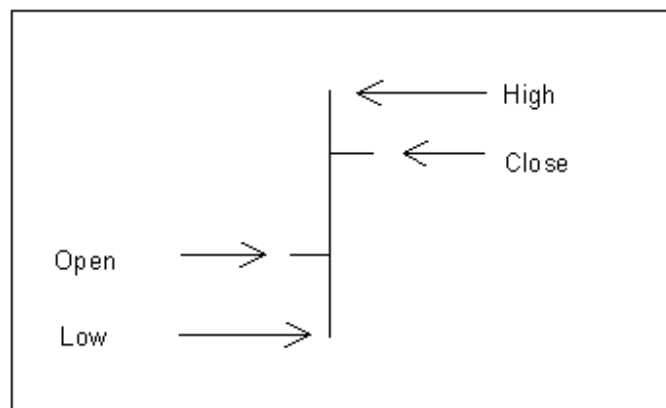
I have got a lot of questions about the mystery of the bars count. I'm going to describe everything about Bars in this appendix.

#### What's a BAR?

The bar is the dawning unit on the chart which you can specify by choosing the period of the timeframe.

For example: The 30 minutes timeframe will draw a bar every 30 minutes.

MetaTrader (and other platforms) uses the values of to high, low, open and close prices to draw the bar start and end boundaries. (Figure 1)



*Figure 1 - Bar chart dawning*

#### How the bars indexed in MQL4?

MQL4 indexes the bars from **0** (for the current bar) then 1, 2, 3 etc to the count of the bars.

So, if you want to work with the current bar you use the index **0**.

And the index of the previous bar (of the current bar) is **1**.

And the index 100 is the bar 100 in the history (100 bars ago).

And the index of last bar is the count of all bars on chart.

## **MQL4 BARS count functions:**

In MQL4 there is a variety of functions working with the count of bars:

### **int Bars**

This function returns the number of the bars of the current chart.

*Note that, changing the timeframe will change this count.*

### **int iBars( string symbol, int timeframe)**

This function returns the number of bars on the specified currency pairs symbol and timeframe.

Assume you are working on 30M timeframe and you want to get the count of **Bars** on 1H time frame, you use this line:

```
iBars(NULL, PERIOD_H1));
```

*Note: If you used it like this:*

```
iBars(NULL,0));
```

*It returns the same number as **Bars** function.*

### **int IndicatorCounted()**

When you are writing your indicator, you know now how to get the number of bars. You use this number in your calculation and line dawning.

But it's useful to know if you have counted the bar before or it's the first time you count it. That's because, if you have counted it before you don't want to count it again and want to work only with the new bars.

In this case you use the function **IndicatorCounted()**, which returns the number of bars have been counted by your indicator.

At the first run of your indicator this count will be zero, that's because your indicator didn't count any bars yet.

Afterwards, it will equal to the count of Bars – 1. That's because the last bar not counted yet (Figure 2).

🔔	16:55:08	Last Bar Open = 1.18230000
🔔	16:55:08	First Bar Open = 1.22200000
🔔	16:55:08	Bars = 15831
🔔	16:55:08	counted_bars = 15830
🔔	16:55:02	Last Bar Open = 1.18230000
🔔	16:55:02	First Bar Open = 1.22200000
🔔	16:55:02	Bars = 15831
🔔	16:55:02	counted_bars = 0

**Figure 2 – Program output**

Let's write a small program to show you what's going on.

```
//+-----+
//|                                     Bars.mq4 |
//|                                     Codersguru |
//|                                     http://www.forex-tsd.com |
//+-----+
#property copyright "Codersguru"
#property link      "http://www.forex-tsd.com"
#property indicator_chart_window
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- indicators

//----
    return(1);
}
//+-----+
//| Custor indicator deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}
//+-----+
//| Custom indicator iteration function |
//+-----+
int start()
{
//----
    Alert( "counted_bars = " , IndicatorCounted()); //The count of bars
have been counted
    Alert( "Bars = " , Bars); //The count of the bars on the chart
    Alert( "iBars = " , iBars(NULL,0)); //the same as Bars function
    Alert( "First Bar Open = " , Open[Bars-1]); //Open price of the
first bar
```



```
    Alert( "Last Bar Open = " , Open[0]); //Open price of the last bar
(current bar)
//-----
    return(0);
}
//+-----+
```

*Note: This program produces the image you have seen in figure 2*

I hope the Bars count is clear now.

I welcome very much the questions and the suggestions.

See you

**Coders' Guru**

21-11-2005

# MQL4 COURSE

By Coders' guru  
[www.forex-tsd.com](http://www.forex-tsd.com)

## (Appendix 2) Trading Functions

-----

In this appendix you will find the description of the **25** MQL4 trading functions. I decided to write this appendix before writing the third part of “**Your First Expert Advisor**” lesson because you have to know these important functions before cracking the remaining of the code.

---

### **OrderSend:**

#### Syntax:

```
int OrderSend( string symbol, int cmd, double volume, double price, int slippage, double stoploss, double takeprofit, string comment=NULL, int magic=0, datetime expiration=0, color arrow_color=CLR_NONE)
```

#### Description:

The *OrderSend* function used to open a sell/buy order or to set a pending order. It returns the ticket number of the order if succeeded and **-1** in failure. Use *GetLastError* function to get more details about the error.

**Note:** The ticket number is a unique number returned by *OrderSend* function which you can use later as a reference of the opened or pending order (for example you can use the ticket number with *OrderClose* function to close that specific order).

**Note:** *GetLastError* function returns a predefined number of the last error occurred after an operation (for example when you call *GetLastError* after *OrderSend* operation you will get the error number occurred while executing *OrderSend*).

Calling *GetLastError* will reset the last error number to 0.

You can find a full list of MQL4 errors numbers in *stderr.mqh* file. And you can get the error description for a specific error number by using *ErrorDescription* function which defined at *stdlib.mqh* file.

## **Parameters:**

This function takes **11** parameters:

string **symbol:**

The symbol name of the currency pair you trading (Ex: EURUSD and USDJPY).

**Note:** Use *Symbol()* function to get currently used symbol and *OrderSymbol* function to get the symbol of current selected order.

int **cmd:**

An integer number indicates the type of the operation you want to take; it can be one of these values:

Constant	Value	Description
OP_BUY	0	Buying position.
OP_SELL	1	Selling position.
OP_BUYLIMIT	2	Buy limit pending position.
OP_SELLLIMIT	3	Sell limit pending position.
OP_BUYSTOP	4	Buy stop pending position.
OP_SELLSTOP	5	Sell stop pending position.

**Note:** You can use the integer representation of the value or the constant name.

For example:

*OrderSend(Symbol(),0,...)* is equal to *OrderSend(Symbol(),OP\_BUY,...)* .

But it's recommended to use the constant name to make your code clearer.

double **volume:**

The number of lots you want to trade.

double **price:**

The price you want to open the order at.

Use the functions *Bid* and *Ask* to get the current bid or ask price.

int **slippage:**

The slippage value you assign to the order.

**Note:** *slippage* is the difference between estimated transaction costs and the amount actually paid.

*slippage* is usually attributed to a change in the spread. (*Investopedia.com*).

double **stoploss:**

The price you want to close the order at in the case of losing.

double **takeprofit:**

The price you want to close the order at in the case of making profit.

string **comment**:

The comment string you want to assign to your order (*Figure 1*).

The default value is *NULL* which means there's no comment assigned to the order.

**Note:** Default value of a parameter means you can leave (don't write) it out, and MQL4 will use a predefined value for this parameter.

For example we can write *OrderSend* function with or without *comment* parameter like this:

```
OrderSend(Symbol(),OP_BUY,Lots,Ask,3,Ask-25*Point,Ask+25*Point,"My order comment",12345,0,Green);
```

Or like this:

```
OrderSend(Symbol(),OP_BUY,Lots,Ask,3,Ask-25*Point,Ask+25*Point,12345,0,Green);
```

int **magic**:

The magic number you assign to the order.

**Note:** Magic number is a number you assign to your order(s) as a reference enables you to distinguish between the different orders. For example the orders you have opened by your expert advisor and the orders have opened manually by the user.



Type	L...	Sy...	Price	S / L	T / P	Time	Price	Swap	Profit	Comment
sell	0.10	eurusd	1.1722	0.0000	1.1672	2005....	1.1672	0.00	50.00	macd sample[tp]
sell	0.10	eurusd	1.1722	0.0000	1.1672	2005....	1.1672	0.00	50.00	macd sample[tp]
sell	0.10	eurusd	1.1721	0.0000	1.1671	2005....	1.1671	0.00	50.00	macd sample[tp]
buy	0.10	eurusd	1.1724	0.0000	1.1774	2005....	1.1774	0.00	50.00	macd sample
sell	0.10	eurusd	1.1721	0.0000	1.1671	2005....	1.1671	0.00	50.00	macd sample[tp]

*Figure 1 - Comment*

datetime **expiration**:

The time you want your pending order to expire at.

The default time is **0** which means there's no exportation.

**Note:** The time here is the server time not your local time, to get the current server time use *CurTime* function and to get the local time use *LocalTime* function.

color **arrow\_color**:

The color of opening arrow (*Figure 2*), the default value is *CLR\_NONE* which means there's no arrow will be drawn on the chart.

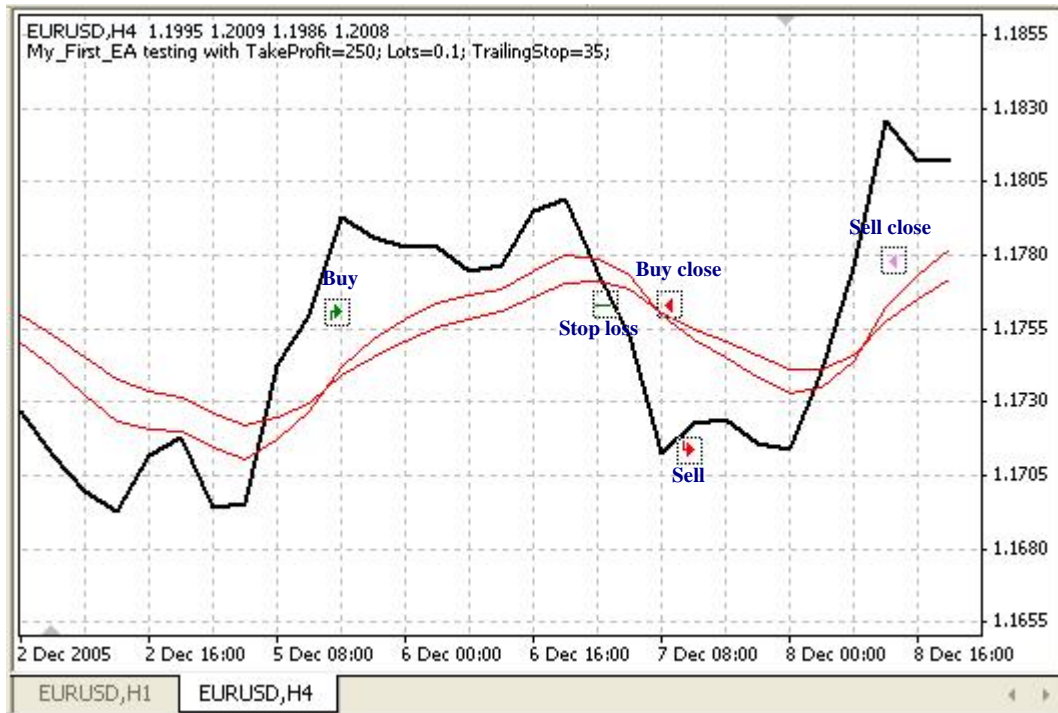


Figure 2 – Arrows color

**Example:**

```

int ticket;
if(iRSI(NULL,0,14,PRICE_CLOSE,0)<25)
{
    ticket=OrderSend(Symbol(),OP_BUY,1,Ask,3,Ask-25*Point,Ask+25*Point,"My
order #2",16384,0,Green);
    if(ticket<0)
    {
        Print("OrderSend failed with error #",GetLastError());
        return(0);
    }
}

```

**OrderModify:**

**Syntax:**

```

bool OrderModify( int ticket, double price, double stoploss, double takeprofit,
datetime expiration, color arrow_color=CLR_NONE)

```

### **Description:**

The *OrderModify* function used to modify the properties of a specific opened order or pending order with the new values you pass to the function.

It returns true if the order successfully modified and false in failure.

Use *GetLastError* function to get more details about the error.

### **Parameters:**

This function takes **6** parameters:

int **ticket**:

The ticket number of the order you want to modify.

Note: This number has been assigned to the order by the function *OrderSend*.  
You can use the function *OrderTicket* to get the ticket number of the current order.

double **price**:

The price you want to set for the order.

Note: Use the function *OrderOpenPrice* to get the open price for the current order.

double **stoploss**:

The price you want to close the order at in the case of losing.

double **takeprofit**:

The price you want to close the order at in the case of making profit.

Note: We usually use the *OrderModify* function to change the *stoploss* and/or *takeprofit* values and that called *Trailing*.

datetime **expiration**:

The time you want your pending order to expire at.

Use **0** if you don't want to set an expiration time.

color **arrow\_color**:

The color of the arrow, the default value is *CLR\_NONE* which means there's no arrow will be drawn on the chart.

### **Example:**

```
if(TrailingStop>0)
{
    SelectOrder(12345,SELECT_BY_TICKET);
    if(Bid-OrderOpenPrice(>Point*TrailingStop)
    {
        if(OrderStopLoss(<Bid-Point*TrailingStop)
        {
```

```
    OrderModify(OrderTicket(),Ask-10*Point,Ask-
35*Point,OrderTakeProfit(),0,Blue);
    return(0);
}
}
```

---

## OrderClose:

### Syntax:

```
bool OrderClose( int ticket, double lots, double price, int slippage,
color Color=CLR_NONE)
```

### Description:

The *OrderClose* function used to close a specific opened order (by its ticket). It returns true if the order successfully closed and false in failure. Use *GetLastError* function to get more details about the error.

### Parameters:

This function takes **5** parameters:

int **ticket**:

The ticket number of the order you want to close.

double **lots**:

The number of lots you use in the order.

**Note:** Use the *OrderLots* function to get the lots value of the current order.

double **price**:

The price you want to open the order at.

Use the functions **Bid** and **Ask** to get the current bid or ask price.

int **slippage**:

The *slippage* value of the order.

color **Color**:

The color of closing arrow, the default value is *CLR\_NONE* which means there's no arrow will be drawn on the chart.

### Example:

```
if(iRSI(NULL,0,14,PRICE_CLOSE,0)>75)
{
    OrderClose(order_id,1,Ask,3,Red);
    return(0);
}
```

---

### **OrderSelect:**

#### Syntax:

```
bool OrderSelect( int index, int select, int pool=MODE_TRADES)
```

#### Description:

The *OrderSelect* function used to select an opened order or a pending order by the ticket number or by index.

It returns true if the order successfully selected and false in failure.

Use *GetLastError* function to get more details about the error.

**Note:** You have to use *OrderSelect* function before the trading functions which takes no parameters:  
*OrderMagicNumber, OrderClosePrice, OrderCloseTime, OrderOpenPrice, OrderOpenTime, OrderComment, OrderCommission, OrderExpiration, OrderLots, OrderPrint, OrderProfit, OrderStopLoss, OrderSwap, OrderSymbol, OrderTakeProfit, OrderTicket and OrderType*

#### Parameters:

This function takes **3** parameters:

##### **int index:**

The index or the ticket number of the order you want to select. It depends on the second parameter (selecting type).

##### **int select:**

The type of selecting operation (by index or by ticket number).

It can be one of two values:

*SELECT\_BY\_POS*: use the position (index) of the order.

*SELECT\_BY\_TICKET* – use the ticket number of the order.

##### **int pool:**

If you used the *SELECT\_BY\_POS* selecting type, you have to determine which pool (data) you will select from:



*MODE\_TRADES*: select from the currently trading orders (opened and pending orders). This is the default value.

*MODE\_HISTORY*: select from the history (closed and canceled orders).

**Example:**

```
if(OrderSelect(12470, SELECT_BY_TICKET)==true)
{
    Print("order #12470 open price is ", OrderOpenPrice());
    Print("order #12470 close price is ", OrderClosePrice());
}
else
    Print("OrderSelect failed error code is", GetLastError());
```

---

**OrderDelete:**

**Syntax:**

```
bool OrderDelete( int ticket)
```

**Description:**

The *OrderDelete* function used to delete a pending order. It returns true if the order successfully deleted and false in failure. Use *GetLastError* function to get more details about the error.

**Parameters:**

This function takes only **1** parameter:

**int ticket:**

The ticket number of the order you want to delete.

**Example:**

```
if(Ask>var1)
{
    OrderDelete(order_ticket);
    return(0);
}
```

---

## OrderCloseBy:

### Syntax:

```
bool OrderCloseBy( int ticket, int opposite, color Color=CLR_NONE)
```

### Description:

The *OrderCloseBy* function used to close a specific opened order by opening an opposite direction order.

It returns true if the order successfully closed and false in failure.

Use *GetLastError* function to get more details about the error.

### Parameters:

This function takes **3** parameters:

**int ticket:**

The ticket number of the order you want to close.

**int opposite:**

The ticket number of the order you want to open in the opposite direction.

**color Color:**

The color of closing arrow, the default value is CLR\_NONE which means no arrow will be drawn on the chart.

### Example:

```
if(iRSI(NULL,0,14,PRICE_CLOSE,0)>75)
{
    OrderCloseBy(order_id,opposite_id);
    return(0);
}
```

---

## OrderType:

### Syntax:

```
int OrderType()
```

### Description:

The *OrderType* function returns the type of selected order that will be one of: *OP\_BUY*, *OP\_SELL*, *OP\_BUYLIMIT*, *OP\_BUYSTOP*, *OP\_SELLLIMIT* or *OP\_SELLSTOP* (see *OrderSend* function)

The order must be selected by *OrderSelect* before calling *OrderType*.

### **Parameters:**

This function doesn't take any parameters and returns an integer date type (the type of selected order).

### **Example:**

```
int order_type;
if(OrderSelect(12, SELECT_BY_POS)==true)
{
    order_type=OrderType();
    // ...
}
else
    Print("OrderSelect() returned error - ",GetLastError());
```

---

## **HistoryTotal:**

### **Syntax:**

```
int HistoryTotal( )
```

### **Description:**

The *HistoryTotal* function searches the account history loaded in the terminal and returns the number of closed orders.

**Note:** We usually use this function with the *OrderSelect* function to get information about a specific order in the history.

### **Parameters:**

This function doesn't take any parameters and returns an integer (the number of closed orders in the history).

Use *GetLastError* function to get more details about the error.

### **Example:**

```
// retrieving info from trade history
int i,hstTotal=HistoryTotal();
for(i=0;i<hstTotal;i++)
{
    //---- check selection result
```

```
if(OrderSelect(i,SELECT_BY_POS,MODE_HISTORY)==false)
{
    Print("Access to history failed with error (",GetLastError(),"");
    break;
}
// some work with order
}
```

---

## **OrderClosePrice:**

### **Syntax:**

```
double OrderClosePrice( )
```

### **Description:**

The *OrderClosePrice* function returns the close price of selected order. The order must be selected by *OrderSelect* before calling *OrderClosePrice*.

### **Parameters:**

This function doesn't take any parameters and returns a double data type (the close price of the selected order).

### **Example:**

```
if(OrderSelect(ticket,SELECT_BY_POS)==true)
    Print("Close price for the order ",ticket," = ",OrderClosePrice());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderCloseTime:**

### **Syntax:**

```
datetime OrderCloseTime( )
```

### **Description:**

The *OrderCloseTime* function returns the close time of the selected order. If the return value is **0** that means the order hasn't been closed yet otherwise it has been closed and retrieved from the history.

The order must be selected by *OrderSelect* before calling *OrderCloseTime*.

### **Parameters:**

This function doesn't take any parameters and returns a datetime data type (the close time of the selected order).

### **Example:**

```
if(OrderSelect(10,SELECT_BY_POS,MODE_HISTORY)==true)
{
    datetime ctm=OrderOpenTime();
    if(ctm>0) Print("Open time for the order 10 ", ctm);
    ctm=OrderCloseTime();
    if(ctm>0) Print("Close time for the order 10 ", ctm);
}
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

### **OrderComment:**

#### **Syntax:**

```
string OrderComment( )
```

#### **Description:**

The *OrderCloseTime* function returns the comment string for the selected order.

**Note:** This comment has been assigned when you opened the order with *OrderSend* or has been assigned by the server. Sometimes the server append its comment at the end of you comment string.

The order must be selected by *OrderSelect* before calling *OrderCloseTime*.

#### **Parameters:**

This function doesn't take any parameters and returns a string data type (the comment string of the selected order).

#### **Example:**

```
string comment;
if(OrderSelect(10,SELECT_BY_TICKET)==false)
{
    Print("OrderSelect failed error code is",GetLastError());
```

```
    return(0);  
    }  
    comment = OrderComment();  
    // ...
```

---

## **OrderCommission:**

### **Syntax:**

```
double OrderCommission( )
```

### **Description:**

The *OrderCommission* function returns the commission amount of the selected order. The order must be selected by *OrderSelect* before calling *OrderCommission*.

### **Parameters:**

This function doesn't take any parameters and returns a double data type (the commission amount of the selected order).

### **Example:**

```
if(OrderSelect(10,SELECT_BY_POS)==true)  
    Print("Commission for the order 10 ",OrderCommission());  
else  
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderExpiration:**

### **Syntax:**

```
datetime OrderExpiration( )
```

### **Description:**

The *OrderExpiration* function returns the expiration time of the selected pending order that you have set in *OrderSend*.

The order must be selected by *OrderSelect* before calling *OrderExpiration*.

### **Parameters:**

This function doesn't take any parameters and returns a datetime data type (the expiration time of the selected pending order).

### **Example:**

```
if(OrderSelect(10, SELECT_BY_TICKET)==true)
    Print("Order expiration for the order #10 is ",OrderExpiration());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderLots:**

### **Syntax:**

```
double OrderLots( )
```

### **Description:**

The *OrderLots* function returns the lots value of the selected order that you have set in *OrderSend* (volume parameter).

The order must be selected by *OrderSelect* before calling *OrderLots*.

### **Parameters:**

This function doesn't take any parameters and returns a datetime data type (the lots value of the selected order).

### **Example:**

```
if(OrderSelect(10,SELECT_BY_POS)==true)
    Print("lots for the order 10 ",OrderLots());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderMagicNumber:**

### **Syntax:**

```
int OrderMagicNumber( )
```

### **Description:**

The *OrderMagicNumber* function returns the magic number of the selected order that you have set in *OrderSend*.

The order must be selected by *OrderSelect* before calling *OrderMagicNumber*.

### **Parameters:**

This function doesn't take any parameters and returns an integer data type (the magic number of the selected order).

### **Example:**

```
if(OrderSelect(10,SELECT_BY_POS)==true)
    Print("Magic number for the order 10 ", OrderMagicNumber());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderOpenPrice:**

### **Syntax:**

```
double OrderOpenPrice( )
```

### **Description:**

The *OrderOpenPrice* function returns the open price of the selected order.

The order must be selected by *OrderSelect* before calling *OrderOpenPrice*.

### **Parameters:**

This function doesn't take any parameters and returns a double data type (the open price of the selected order).

### **Example:**

```
if(OrderSelect(10, SELECT_BY_POS)==true)
    Print("open price for the order 10 ",OrderOpenPrice());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---



## OrderOpenTime:

### Syntax:

```
datetime OrderOpenTime( )
```

### Description:

The *OrderOpenTime* function returns the open time of the selected order. The order must be selected by *OrderSelect* before calling *OrderOpenTime*.

### Parameters:

This function doesn't take any parameters and returns a datetime data type (the open time of the selected order).

### Example:

```
if(OrderSelect(10, SELECT_BY_POS)==true)
    Print("open time for the order 10 ",OrderOpenTime());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## OrderPrint:

### Syntax:

```
void OrderPrint( )
```

### Description:

The *OrderPrint* function prints the selected order data to the expert log file. The order must be selected by *OrderSelect* before calling *OrderPrint*.

### Parameters:

This function doesn't take any parameters and doesn't return any value (void).

**Note:** *void* means the function doesn't return any value, so, you can't assign it to a variable like this:

```
int i = OrderPrint(); //no meaning line, although the compiler will not complain.
```

### **Example:**

```
if(OrderSelect(10, SELECT_BY_TICKET)==true)
    OrderPrint();
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderProfit:**

### **Syntax:**

```
double OrderProfit( )
```

### **Description:**

The *OrderProfit* function returns the profit of the selected order. The order must be selected by *OrderSelect* before calling *OrderProfit*.

### **Parameters:**

This function doesn't take any parameters and returns a double data type (the profit of the selected order).

### **Example:**

```
if(OrderSelect(10, SELECT_BY_POS)==true)
    Print("Profit for the order 10 ",OrderProfit());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrderStopLoss:**

### **Syntax:**

```
double OrderStopLoss( )
```

### **Description:**

The *OrderStopLoss* function returns the *stoploss* price of the selected order that you have set in *OrderSend* or modified with *OrderModify*.

The order must be selected by *OrderSelect* before calling *OrderStopLoss*.

### **Parameters:**

This function doesn't take any parameters and returns a double data type (the *stoploss* price of the selected order).

### **Example:**

```
if(OrderSelect(ticket,SELECT_BY_POS)==true)
    Print("Stop loss value for the order 10 ", OrderStopLoss());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## **OrdersTotal:**

### **Syntax:**

```
int OrdersTotal( )
```

### **Description:**

The *OrdersTotal* function returns the number of opened and pending orders. If this number is **0** that means there are no orders (market or pending ones) has been opened.

### **Parameters:**

This function doesn't take any parameters and returns an integer data type (the number of opened and pending orders).

### **Example:**

```
int handle=FileOpen("OrdersReport.csv",FILE_WRITE|FILE_CSV,"\t");
if(handle<0) return(0);
// write header
FileWrite(handle,"#", "open price", "open time", "symbol", "lots");
int total=OrdersTotal();
// write open orders
for(int pos=0;pos<total;pos++)
{
    if(OrderSelect(pos,SELECT_BY_POS)==false) continue;

FileWrite(handle,OrderTicket(),OrderOpenPrice(),OrderOpenTime(),OrderSymbol(),OrderLots());
}
FileClose(handle);
```

## OrderSwap:

### Syntax:

```
double OrderSwap( )
```

### Description:

The *OrderSwap* function returns the swap value of the selected order. The order must be selected by *OrderSelect* before calling *OrderSwap*.

A *swap* involves the exchange of principal and interest in one currency for the same in another currency. Currency swaps were originally done to get around the problem of exchange controls. (*Investopedia.com*).

### Parameters:

This function doesn't take any parameters and returns a double data type (the swap value of the selected order).

### Example:

```
if(OrderSelect(order_id, SELECT_BY_TICKET)==true)
    Print("Swap for the order #", order_id, " ",OrderSwap());
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

## OrderSymbol:

### Syntax:

```
string OrderSymbol( )
```

### Description:

The *OrderSymbol* function returns the string representation of currency pair of the selected order (Ex: EURUSD and USDJPY).

The order must be selected by *OrderSelect* before calling *OrderSymbol*.

### Parameters:

This function doesn't take any parameters and returns a string data type (the string representation of currency pair of the selected order).



**Parameters:**

This function doesn't take any parameters and returns an integer data type (the ticket number of the selected order).

**Example:**

```
if(OrderSelect(12, SELECT_BY_POS)==true)
    order=OrderTicket();
else
    Print("OrderSelect failed error code is",GetLastError());
```

---

I hope the trading functions are clearer now.

I welcome very much your questions and suggestions.

**Coders' Guru**  
20-12-2005