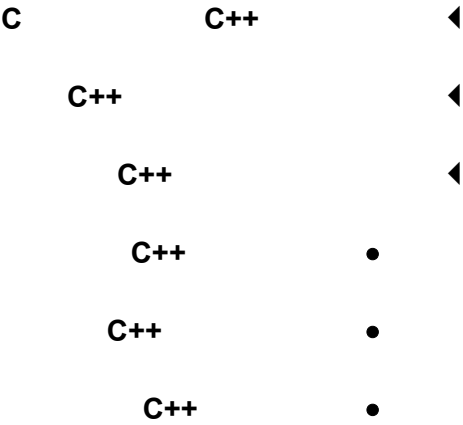


C++

:



. C++

C++

C++

C++

. AT&T Bell C++ Bjarne Stroustrup

C++

C

C

C++

.

."

C"

1979

Stroustrup

C++

C++

1983/1984

. 1987 1.2

.3.0 2.1 2.0 1.2

("Annotated C++ Reference Manual " ARM)

Stroustrup 1990

C++

:

C

C++

C

◀

◀

◀

C++

C++

(....)

.(1)

C++

```
// my first program in C++  
#include <iostream>  
using namespace std;  
int main ()  
{  
    cout << "Hello World!";  
    return 0;  
}
```

Hello World!

:

Visual Studio.Net

Microsoft visual C++

C++

GNU C++

C++

" Hello World!"

.C++

```
// my first program in C++
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
    cout << "Hello World!";
```

```
    return 0;
```

```
}
```

```
.
```

```
//
```

```
.
```

```
.
```

```
// my first program in C++
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
    cout << "Hello World!";
```

```
    return 0;
```

```
}
```

```
#
```

```
.
```

```
.
```

```
#include <iostream>
```

```
iostream
```

```
.C++
```

```
// my first program in C++
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
    cout << "Hello World!";
```

```
    return 0;
```

```
}
```

C++

.std

C++

```
// my first program in C++
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
    cout << "Hello World!";
```

```
    return 0;
```

```
}
```

.()

C++

()

main

{}

```
// my first program in C++
```

```
#include <iostream>  
using namespace std;
```

```
int main ()
```

```
{
```

```
    cout << "Hello World!";
```

```
    return 0;
```

```
}
```

. C++

.

C++

cout

)

(Hello World!

.

std

iostream

cout

.

.C++

```
// my first program in C++
```

```
#include <iostream>  
using namespace std;
```

```
int main ()
```

```
{
```

```
    cout << "Hello World!";
```

```
    return 0;
```

```
}
```

return

0

.

.

.C++

```

    .
    )
    ( //
    )
    ( #
    )
    (cout
    )
    .{ }

```

C++

:

```

int main ()
{
    cout << " Hello World ";
    return 0;
}

```

:

```

int main () { cout << "Hello World"; return 0; }

```

:

```

// my second program in C++
#include <iostream>
using namespace std;
int main ()
{
    cout << "Hello World! ";
    cout << "I'm a C++ program";
    return 0;
}

```

Hello World! I'm a C++ program

:

```
int main () { cout << " Hello World! "; cout << " I'm a C++ program "; return 0; }
```

:

```
int main ()  
{  
    cout <<  
        "Hello World!";  
    cout  
        << "I'm a C++ program";  
    return 0;  
}
```

#

:

```
// line comment  
/* block comment */
```

line comment

//

line comment

/*

*/

:

<pre> /* my second program in C++ with more comments */ #include <iostream> using namespace std; int main () { cout << "Hello World! "; // prints Hello World! cout << "I'm a C++ program"; // prints I'm a C++ program return 0; } </pre>	<pre> Hello World! I'm a C++ program </pre>
---	---

C++

:

reserved words

C++

and	and_eq	asm	auto	bitand
bitor	bool	break	case	catch
char	class	const	const_cast	continue
default	delete	do	double	dynamic_cast
else	enum	explicit	export	extern
false	float	for	friend	goto
if	inline	int	long	mutable
namespace	new	not	not_eq	operator
or	or_eq	private	protected	public
register	reinterpret_cast	return	short	signed
sizeof	static	static_cast	struct	switch
template	this	throw	true	try
typedef	typeid	typename	union	unsigned
using	virtual	void	volatile	wchar_t
while	xor	xor_eq		

C++

(1)

char bool float int :

C++

Type	Description	Size	Domain
char	Signed character/byte. Characters are enclosed in single quotes.	1	-128..127
double	Double precision number	8	ca. 10^{-308} .. 10^{308}
int	Signed integer	4	-2^{31} .. $2^{31} - 1$
float	Floating point number	4	Ca. 10^{-38} .. 10^{38}
long (int)	Signed long integer	4	-2^{31} .. $2^{31} - 1$
long long (int)	Signed very long integer	8	-2^{63} .. $2^{63} - 1$
short (int)	Short integer	2	-2^{15} .. $2^{15} - 1$
unsigned char	Unsigned character/byte	1	0..255
unsigned (int)	Unsigned integer	4	$0..2^{32} - 1$
unsigned long (int)	Unsigned long integer	4	$0..2^{32} - 1$
unsigned long long (int)	Unsigned very long integer	8	$0..2^{64} - 1$
unsigned short (int)	Unsigned short integer	2	$0..2^{16} - 1$

:

```
int i, j, count;  
float sum, product;  
char ch;  
bool passed_exam;  
double wave_length;  
unsigned char color;  
long seconds;
```

:

```
int i, j, count = 0;  
float sum = 0.0, product;  
char ch = '7';  
bool passed_exam = false;  
double wave_length=0.00000879;  
unsigned char color=120;  
long seconds=54087996;
```

C++

.

:

```
const type constant_identifier = value ;
```

```
const int days_in_year = 365;  
const float VatRate = 17.5;  
const int days_in_year = 365,  
        days_in_leap_year = 366;
```

.

C++

(output stream)

cin (input stream)

C++

cout

.

:cin



```
cin >> number;  
cin >> n1 >> n2;
```

n2 n1

enter

.enter

```
int count, n;  
float value;  
cin >> count >> value >> n;
```

:

23 -65.1 3

:

23
-65.1 3

(output stream)

cin (input stream)

C++

cout

.

:cout



```
cout << count;  
cout << "Hello there" << endl;
```

الإخراج الجملة الموضوعية بين علامتي اقتباس

endl .endl

.

:

:3.24 6.51

```
float length, breadth;  
cout << "Enter the length and breadth: ";  
cin >> length >> breadth;  
cout << endl << "The length is " << length;  
cout << endl << "The breadth is " << breadth << endl;
```

:

The length is 6.51
The breadth is 3.24

:

.(' 7 ')

C++

C++

1

(1) .1

: =

```
result = expression ;
```

```
average = (a + b)/2;
```

: =

+

-

*

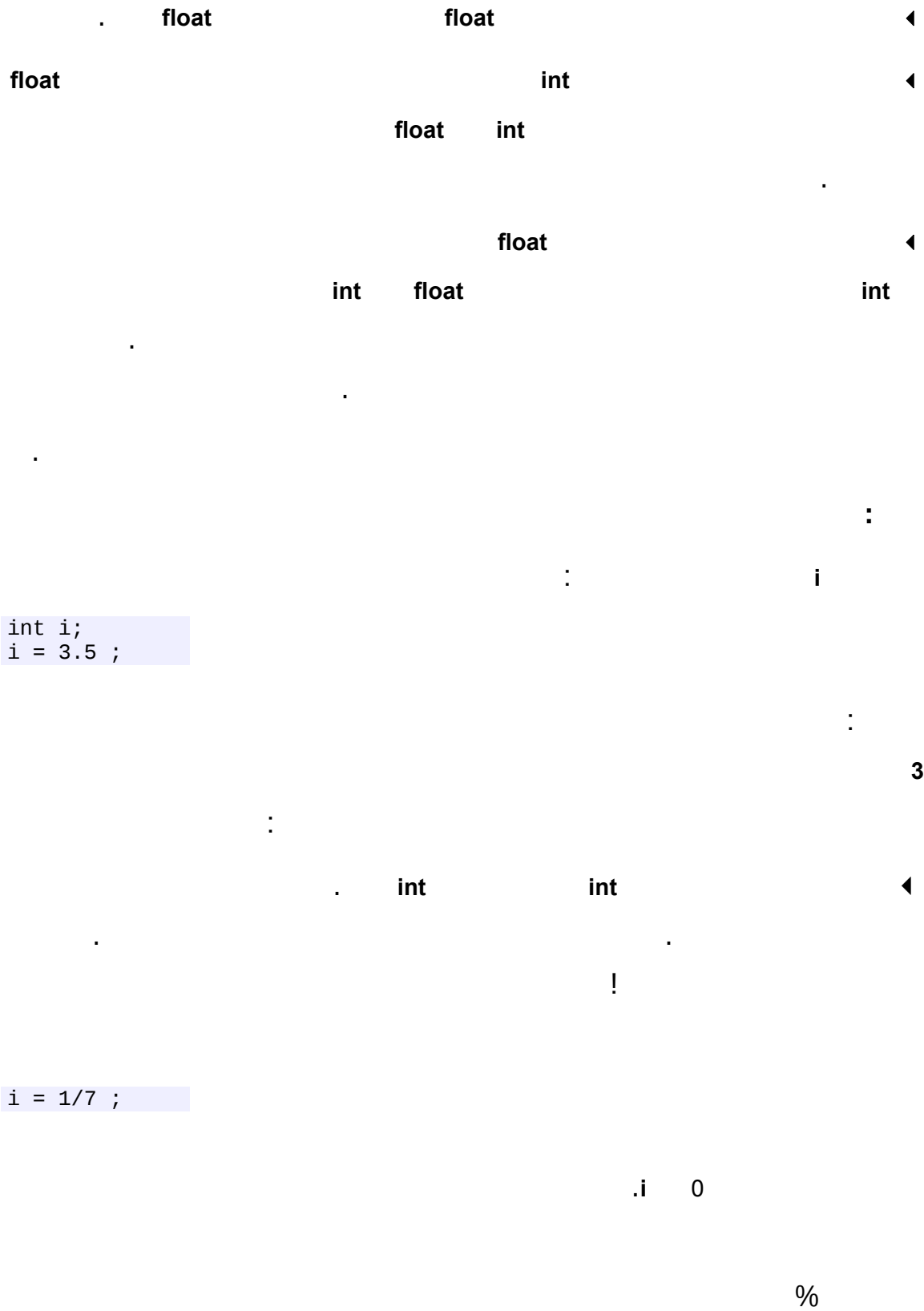
/

(modulus) %

```
i = 3;
sum = 0.0;
perimeter = 2.0 * (length + breadth);
ratio = (a + b)/(c + d);
```

:

. int int ◀



```
int i;
i=34 % 10;
cout<<i;    //i=4
```

:

```
int i;
i=10 % -7;
cout<<i;    //i=3 or -4
```

:

```
i % j = i - (i / j) * j
```

C++

:

()

% / *

- +

=

C++

int

()

int

.float

. .0

float

```
int i;  
float x=1.0/i;
```

float

: **cast**

```
f = float(i)/float(n);
```

float

.

char(y)

x

int(x)

.ASCII

y

```

// Convert Fahrenheit to Centigrade
// Enters a Fahrenheit value from the user,
// converts it to centigrade and outputs
// the result.

#include <iostream.h>

void main()
{
    const float mult = 5.0/9.0; // 5/9 returns zero
                                // integer division
    const int sub = 32;
    float fahr, cent;
    cout << "Enter Fahrenheit temperature: ";
    cin >> fahr;
    cent = (fahr - sub) * mult;
    cout << "Centigrade equivalent of " << fahr
         << " is " << cent << endl;
}

```

iostream.h

iostream

decrement

increment

C++

```

n = n + 1;
n = n - 1;

```

:

--

++ :

C++

n = n + 1;

n++;

`n = n - 1;      n - -;`

postincrement

postdecrement

preincrement

predecrement

`n = n + 1 ;      n++;`

`n = n - 1 ;      n - -;`

1

.n

`i = n++;`

1

n

i

postdecrement

postincrement

predecrement

preincrement

5 n

`i = n++;`

:

.6 n 5 i

`i = ++n;`

.6 n 5 i

C++

C++

```
sum = sum + x;
```

:

```
sum += x;
```

:% / * +

```
total += value; or total = total + value;  
prod *= 10;      or prod = prod * 10;  
x /= y + 1;      or x = x/(y + 1);  
n %= 2;          or n = n % 2;
```

C++

:

:

<

>

<=

>=

==

!=

.2

if statement

C++

```
if (condition)
    statement
```

()

condition

statement

```
if (x > 0.0)
    cout << "The value of x is positive;"
```

الاختيارية if_else statement

تأخذ التعليمة الشرطية الاختيارية في C++ الشكل :

```
if ( condition )
    statementT
else
    statementF
```

condition

statementF statementT

```

if (disc >= 0.0)
    cout << "Roots are real";
if (disc < 0.0 )
    cout << "Roots are complex";

```

```

:
.1 C++
y x
> )
( <
C++ .2
.Fail Pass
40 )
40
(Pass)
(
50
.

```

switch ◀

تأخذ التعليمات switch في C++ :

```

switch ( selector )
{
case label1: statement1;
    break;
case label2: statement2;
    break;
...
case labeln: statementn;
    break;
default: statementd; // optional
    break;
}

```

. char int selector

.selector

labeli

```
switch (i)
{
    case 1 : grade = 'A';
             break;
    case 2 : grade = 'B';
             break;
    case 3 : grade = 'c';
             break;
    default : cout << i
                << " not in range";
              break;
}
```

.3

while



: C++ while

```
while ( condition )
    statement
```

condition

statement

```
sum = 0.0;
cin >> x;
while (x > 0.0)
{
    sum += x;
    cin >> x;
}
```

for ◀

: C++ for

```
for ( initialise ; test ; update )  
statement
```

initialise

test

update

:

```
i = 1;  
while (i <= 10)  
{  
    cout << i << endl;  
    i++;  
}
```

:

```
for (i = 1; i <= 10; i++)  
{  
    cout << i << endl;  
}
```

:

:

n .1

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots + \frac{1}{n}$$

:

$$1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots \frac{1}{n}$$

$$(\pi/4) \qquad 0.7854$$

$$n$$

$$n) \; n$$

$$.2$$

$$.$$

$$($$

$$n$$

$$n$$

$$.3$$

$$4$$

$$n$$

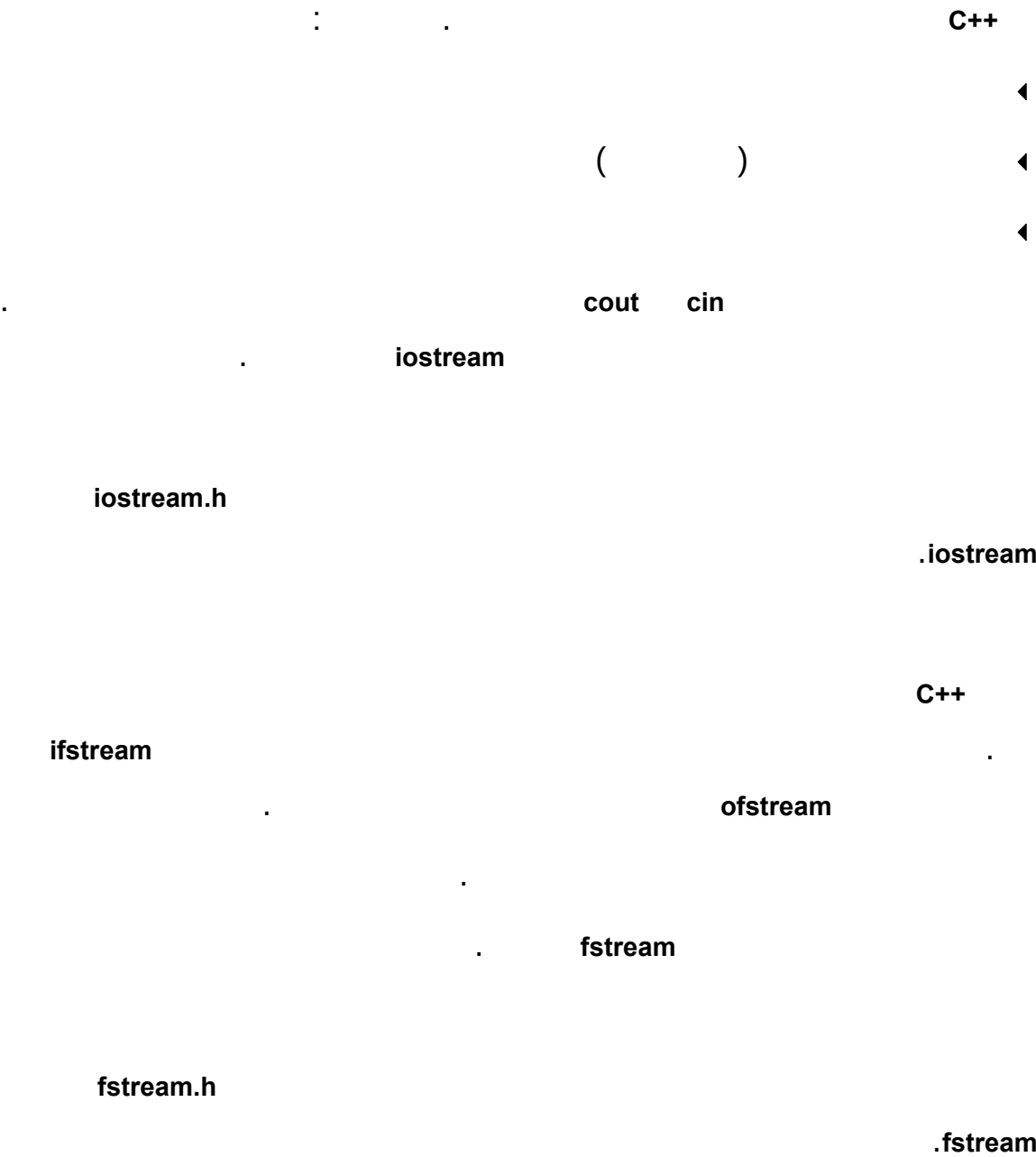
$$.10$$

$$:$$

	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

$$.$$

Streams



:

```
streamname.open(filename);
```

:

:Streamname

:Filename

:

```
ifstream ins; // input stream  
ofstream outs; // output stream
```

open

: indata.dat ins .

```
ins.open("indata.dat");
```

:

.

indata.dat

.open true streamname.fail ()

:

open

```
ifstream ins;  
ins.open("indata.dat");  
if (ins.fail())  
{  
    cout << "Error opening file indata.dat"  
        << endl;  
    return 1;  
}
```

1

.return

```
int main()
{
    ifstream ins;
    ofstream outs;
    ins.open("indata.dat");
    if (ins.fail())
    {
        cout << "Error opening indata.dat"
              << endl;
        return 1;
    }
    outs.open("results.dat");
    if (outs.fail())
    {
        cout << "Error opening results.dat"
              << endl;
        return 1;
    }
    .
    .
}
```

>>

outs ins

.<<

:x

ins

```
ins >> x;
```

: outs

```
outs << "Result is " << count << endl;
```

end-of-file

true

.eof

.false

:

```
#include <iostream.h>
#include <fstream.h>
int main()
{
    int n;
    float x, sum, average;
    ifstream ins;           // input stream
    ofstream outs;          // output stream
    ins.open("indata.dat");

    // open files, exit program if fail
    if (ins.fail())
    {
        cout << "Can't open indata.dat" << endl;
        return 1; //exit with code 1 for failure
    }
    outs.open("results.dat");
    if (outs.fail())
    {
        cout << "Can't open results.dat" << endl;
        return 1; //exit with code 1 for failure
    }

    // Initialise and let user know something is happening
    sum = 0.0;
    n = 0;
    cout << "Reading input file " << endl;
    // read from file, accumulate sum and output average
    // to output file.
    ins >> x; // if file was empty then eof would now be true
    while (!ins.eof())
    {
        sum += x;
        n++;
        ins >> x;
    }
    average = sum / n;
    cout << "Writing results to file " << endl;
    outs << "The average of " << n << " numbers is "
        << average << endl;
    ins.close(); // Close all files - GOOD PRACTICE
    outs.close();
    return 0;    // indicate success
}
```

.outs ins

.